

2.4 Hydrologic Engineering

Section 2.4 describes the hydrological characteristics of the VEGP site. The site location and description are provided in sufficient detail to support the safety analysis. This section addresses characteristics and natural phenomena that have the potential to affect the design basis for the proposed AP1000 units. The Section is divided into thirteen sections:

- Hydrologic Description (Section 2.4.1)
- Floods (Section 2.4.2)
- Probable Maximum Flood on Streams and Rivers (Section 2.4.3)
- Potential Dam Failures (Section 2.4.4)
- Probable Maximum Surge and Seiche Flooding (Section 2.4.5)
- Probable Maximum Tsunami Flooding (Section 2.4.6)
- Ice Effects (Section 2.4.7)
- Cooling Water Canals and Reservoirs (Section 2.4.8)
- Channel Diversions (Section 2.4.9)
- Flood Protection Requirements (Section 2.4.10)
- Low Water Considerations (Section 2.4.11)
- Ground Water (Section 2.4.12)
- Accidental Releases of Liquid Effluents in Ground and Surface Waters (Section 2.4.13)

2.4.1 Hydrologic Description

2.4.1.1 Site and Facilities

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 is approximately 30 river miles above the U.S. Highway 301 bridge and directly across the river from the Department of Energy's Savannah River Site (Barnwell County, South Carolina). The VEGP site is approximately 15 miles east-northeast of Waynesboro, Georgia and 26 miles southeast of Augusta, Georgia, the nearest population center (i.e., having more than 25,000 residents). It is also about 100 miles north-northwest of Savannah, Georgia and 150 river miles from the mouth of the Savannah River. The contributing drainage area of the Savannah River at the site is 8,304 square miles, as estimated from digital mapping.

The Savannah River Basin and its subbasins, as delineated by the National Weather Service (**NWS 2005**), and further subdivided into USGS Hydrologic Unit Code (HUC-12) subbasins

(**USGS 2006f**), are shown in Figure 2.4.1-1. The drainage areas of the NWS subbasins are given in Table 2.4.1-1

Two Westinghouse pressurized water reactors (PWRs), rated at 3,565 MWt each, are currently in operation at the VEGP site. Unit 1 began commercial operation in May 1987; Unit 2 began commercial operation in May 1989. All structures, including the containment structures, two natural draft cooling towers (one per unit), associated pumping and discharge structures, water treatment building, switchyard, and training center, are located at or above El. 220 ft mean sea level (msl).

SNC has selected the Westinghouse AP1000 certified plant design (**NRC 2006**) for the VEGP ESP application. The proposed AP1000 units, to be referred to as Units 3 and 4, will be located west of and adjacent to existing Units 1 and 2 as shown in SSAR Figure 1-4. The AP1000 is rated at 3,400 MWt, with a net electrical output of 1,117 megawatts electrical (MWe). The new units will use natural draft towers for circulating water system cooling, with make-up water coming from the Savannah River, and mechanical draft towers for service water system cooling, with make-up water coming from site wells. The Units 3 and 4 grade elevation will also be at or above 220 feet msl. An extensive site storm water drainage system was developed during construction of Units 1 and 2 and will be used for Units 3 and 4 with some modifications.

2.4.1.2 Hydrosphere

The Savannah River is the main hydrologic feature that may affect or be affected by power plants constructed at the VEGP site.

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 basin includes portions of 44 counties and borders two major metropolitan centers, Augusta and Savannah. The lower 50 mi is tidally influenced (**USACE 1996**).

The Savannah River basin, which is described as long and relatively narrow, crosses through three distinct physiographic provinces: 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, 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

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 the mouth is approximately 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 three adjoining US Army Corps of Engineers (USACE) multipurpose projects, forming a chain along the Georgia–South Carolina border 120 mi long. The three reservoirs, each with appreciable storage, are, from upstream to downstream:

- Hartwell Lake and Dam
- Richard B. Russell Lake and Dam
- J. Strom Thurmond Lake and Dam (also known as Clarks Hill Lake and Dam)

Of the 6,144 sq mi drainage basin above Thurmond Dam, 3,254 sq mi (53 percent) are between Thurmond and Russell Dams, 802 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 2.4.1-2 lists the River Miles of key landmarks along the Savannah River.

The climate in the upper Savannah River watershed is classified as temperate, with generally mild winters and long summers. The basin is protected from the extremes of winter continental weather experienced in the nearby Tennessee Valley by the Blue Ridge Mountains. 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 calendar month. The mean annual precipitation decreases from 83.5 in. in Highlands, North Carolina, to 49.2 in. at Savannah, Georgia (**USACE 1996**).

2.4.1.2.1 Hydrologic Characteristics

Average daily and annual peak flow series data have been tabulated by the USGS for nine stream gages that have been maintained along the Savannah River between River Miles 288.9 and 60.9. Table 2.4.1-3 identifies location, gage elevation, upstream drainage area, and start and stop date and number of records for the annual and daily time series for each gage. Annual peak discharge data for these gages are used in Section 2.4.2; daily discharge data for these gages are used in Section 2.4.11.3. Summary statistics characterizing the seasonal flow variability are discussed below.

As indicated in Table 2.4.1-2, the USGS gage at Jackson, South Carolina, is approximately 6 river miles upstream of the VEGP site. Based on the average daily flow series for this gage, presented in Table 2.4.1-6, the average daily discharge at the site is 8,913 cfs, calculated as the mean of the average daily flows for each day of the 31-year record. For this gage, the monthly average daily flow varies from a minimum of 7,216 cfs in September to a maximum of 11,347 cfs in March. A plot of the monthly variation in average daily flow on the Savannah River recorded at the Jackson, South Carolina stream gage (with plots for the Calhoun Falls, Augusta, and Clyo gages included for comparison) is provided in Figure 2.4.1-2, based on USGS records for the years of record of each gage, without accounting for the impact of changes in upstream regulation. Tables 2.4.1-4 through 2.4.1-7 show the average daily discharge for the years of record for each of the four gages presented in Figure 2.4.1-2.

2.4.1.2.2 Local Site Drainage

Local drainage is shown in Figure 2.4.1-3, which was developed from the Shell Bluff Landing, Girard NW, Alexander, and Girard USGS quadrangle sheets. The site is on a high, steep bluff on the west bank of the Savannah River, overlooking the extensive floodplain on the east bank. Georgia State Highway 23 runs roughly parallel to the river, about 4 mi 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 northern area of the site, including Mallard Pond, into the Savannah River just upstream of the site, near the point identified as Hancock Landing in Figure 2.4.1-3.

To the west, the site is drained by the Red Branch and Daniels Branch, which combine and drain along with Beaverdam Creek and High Head Branch into Telfair Pond, south of the site. A small, unnamed stream runs parallel to and about 2,000 ft to the west of River Road outfalls to Beaverdam Creek downstream of the pond.

The names, estimated channel lengths, and slopes of the natural channels draining the site area are provided in Table 2.4.1-8.

2.4.1.2.3 Dams and Reservoirs

There are a number of water control structures on the Savannah River and its major tributaries (**USGS 1990**, **USACE 1993**, and **USACE 1996**). Table 2.4.1-9 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 major projects run by the USACE upstream of the VEGP site have a significant influence on the discharge of the Savannah River due to their large storage volume. These are:

- Hartwell Lake and Dam,
- Richard Russell Lake and Dam, and
- J. Strom Thurmond Lake and Dam (also known as Clarks Hill Lake and Dam on the Georgia side)

The authorized water management goals of the three-dam multi-use project are specified for normal operation, flood operation, and drought condition operation as follows (**USACE 1996**):

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.

Under flood conditions, the water management objective of the multipurpose projects is to operate the reservoir system to minimize flooding downstream by timing turbine discharges, gate openings, and spillway discharges as required.

For drought conditions, the water management objectives of the projects 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, and
- To minimize adverse impacts to recreation during the recreation season (generally considered to be from May 1 through Labor Day)

The USACE also operates the New Savannah Bluff Lock and Dam upstream of the VEGP site, but this project has very little impact on flows at the site, due to its small run-of-river storage volume (**USACE 1996**).

Each project is described briefly in the following paragraphs (**USACE 1996**).

The Hartwell Lake and Dam is at River Mile 288.9, 7 mi east of Hartwell, Georgia. 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 approximately 962 mi long, excluding island areas. Operation of the project began in 1965.

The reservoir has a total storage capacity of 2,550,000 acre-feet below El. 660 ft msl. The dam consists of a concrete gravity section 1,900 ft in length and rising 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 at River Mile 259.1 in Elbert County, Georgia, and Abbeville County, South Carolina. 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 January 1985.

The top of the conservation pool is set at El. 475 ft msl. The reservoir has a total storage capacity of 1,026,200 acre-feet at this level, and 1,166,166 acre-feet of total storage at the top of the flood control pool (El. 480 ft msl).

The dam consists of a concrete gravity section 1,883.5 ft in length and two earth embankment sections, 2,180 ft in length in Georgia and 460 ft in length 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.

A flip bucket for dissipating the energy of spillway discharges is located at the bottom of the spillway. The spillway tainter gates are designed for a maximum discharge of 800,000 cfs at pool El. 490 ft msl.

The J. Strom Thurmond Lake and Dam is at River Mile 221.6 on the Savannah River, 22 mi upstream of Augusta, Georgia. 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 approximately 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. Operation of the project began in 1952.

The dam consists of a concrete gravity section 2,282 ft in length and two earth embankment sections with a total length of 5,680 ft, extending to high ground on the Georgia and South Carolina shores.

The spillway is a concrete gravity ogee section extending across the west floodplain and river channel. A bucket anchored to solid rock and constructed at four levels ranging from

El. 163.0 ft msl to El. 179.0 ft msl, is provided at the toe of the spillway. The spillway discharges are controlled by 23 tainter gates separated by concrete piers 8 ft thick.

The embankments and earth dam are of rolled fill construction. An impervious core, graded from coarse and medium sand to fine silt and clay, extends to rock and is contained by a more pervious shell, consisting of well-graded coarse and medium sand to silt. The embankments are covered with rip-rap from the top down to El. 295 ft msl on the upstream side, and from the toe up to an elevation above maximum tailwater on the downstream side. U.S. Highway 221 crosses the dam.

The New Savannah Bluff Lock and Dam is located at River Mile 187.7. The function of the lock was originally to provide adequate draft depths for navigation, but there is currently very little commercial navigation above Savannah Harbor. Today the structure's main function is to maintain an adequate river stage for upstream water supply intake structures.

The structure crosses 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 mitering lock gates. The lift is 15 ft, the depth over the lower miter sill being about 10 ft at low water and over the upper miter sill being 14 ft at normal pool level. Elevation of the normal pool is about 115.0 ft msl, and low water at the downstream entrance to the lock is at El. 101.8 ft msl, based on a flow of 6,300 cfs.

2.4.1.2.4 Proposed Water Management Changes

The USACE, working in response to US Environmental Protection Agency (EPA) recommendations, is currently reviewing operating rules for the dams under its jurisdiction in the Savannah River watershed. The study goal is to determine if changes are warranted to meet current and future water resource management goals, including flood control, water supply, fish and wildlife enhancement, drought control, water quality, recreation, and aquatic plant control. The study is scheduled for completion in 2009 (**USACE 2004**).

Pending the results of the watershed study, current USACE operations along the river are limited to the maintenance of existing structures and minor flood control improvements with no significant impact on the VEGP site.

It has been reported (**SR 2006**) that the Ports Authority of Georgia is considering deepening the harbor in Savannah to accommodate the new very large container ships that will be visiting ports on the East coast. The possibility that dredging would force the salinity gradient further upstream with possible adverse impact on the Savannah National Wildlife Refuge has been the subject of some study, but the possible change in policy would have no impact on safety issues at the VEGP site.

2.4.1.2.5 Surface Water Users

Historically, the Savannah River was an important transportation corridor, but today it serves primarily as a source of water for industry and municipalities, a receiving body for the subsequent discharge of effluent, and an avenue for power generation and recreational activities (**SR 2006**).

Agencies with important roles in the watershed include the USACE, which is responsible for maintaining reservoirs on the main stem of the Savannah River, and the EPA in cooperation with the Georgia Environmental Protection Division and the South Carolina, which are responsible for maintaining water quality in the basin.

Current in-stream use of Savannah River water includes minimum stream flow requirements for navigation and environmental maintenance, and diversions for industrial use, including once-through cooling. Consumptive use of Savannah River water is predominantly for industrial withdrawals for cooling water towers and processing and diversions to water treatment plants for municipal water use.

Table 2.4.1-10 presents a summary of data on surface-water users adjacent to or downstream from VEGP whose intakes could be adversely impacted by an accidental release of contaminants from the site; the summary includes information on the owner, facility type, estimated distance from the VEGP site, and average daily withdrawal rate.

Information about groundwater users is presented in Section 2.4.12, while Section 2.4.13 discusses the consequences of liquid effluent releases to surface waters.

Table 2.4.1-1 Savannah River Subbasins and Drainage Areas above VEGP Site

| 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 2.4.1-2 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 Seneca & 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 |
| Confluence 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.

Table 2.4.1-3 USGS Gage Data for the Savannah River

| USGS Gage ID | Location on Savannah River | River Mile * | Coordinates | Altitude, feet 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 Clio, 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 2.4.1-4 Daily Average Flow Data for the Savannah River at Calhoun Falls, South Carolina
(USGS Gage 2189000)**

| Day of month | Mean of daily mean values for this day for 49 years of record ¹ , in ft ³ /s | | | | | | | | | | | |
|--------------|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| 1 | 5,364 | 5,898 | 6,560 | 8,923 | 6,925 | 5,443 | 4,455 | 3,872 | 4,237 | 3,286 | 3,630 | 4,632 |
| 2 | 5,084 | 6,221 | 6,427 | 8,229 | 6,832 | 5,161 | 4,482 | 4,081 | 3,904 | 3,078 | 3,827 | 4,534 |
| 3 | 5,719 | 5,796 | 6,734 | 7,558 | 6,824 | 4,698 | 4,020 | 4,167 | 3,718 | 2,960 | 3,821 | 4,435 |
| 4 | 5,632 | 6,219 | 7,497 | 7,158 | 6,529 | 5,023 | 3,008 | 4,237 | 3,547 | 3,205 | 4,180 | 5,338 |
| 5 | 5,596 | 5,686 | 6,972 | 8,424 | 5,786 | 5,796 | 3,114 | 4,531 | 3,558 | 3,488 | 4,082 | 6,139 |
| 6 | 6,324 | 5,925 | 6,452 | 8,819 | 5,454 | 5,555 | 3,935 | 4,285 | 3,642 | 3,323 | 4,048 | 5,638 |
| 7 | 7,437 | 7,683 | 7,408 | 8,529 | 5,380 | 5,587 | 4,638 | 4,310 | 4,473 | 3,224 | 3,810 | 5,778 |
| 8 | 6,593 | 6,761 | 7,349 | 8,164 | 5,243 | 6,334 | 4,592 | 4,356 | 4,503 | 3,887 | 3,820 | 5,563 |
| 9 | 5,991 | 6,038 | 6,340 | 8,194 | 5,215 | 5,651 | 4,681 | 4,450 | 4,410 | 3,780 | 3,864 | 4,983 |
| 10 | 6,304 | 6,226 | 5,744 | 6,916 | 5,039 | 4,783 | 4,567 | 4,226 | 3,976 | 3,412 | 3,780 | 5,151 |
| 11 | 6,274 | 6,374 | 6,054 | 6,539 | 5,265 | 4,809 | 4,260 | 3,953 | 3,885 | 3,451 | 3,932 | 4,961 |
| 12 | 5,577 | 6,749 | 6,824 | 7,098 | 5,606 | 4,912 | 4,617 | 3,676 | 3,593 | 3,463 | 3,866 | 5,437 |
| 13 | 5,061 | 8,015 | 7,053 | 7,949 | 5,521 | 5,155 | 5,113 | 5,354 | 3,819 | 3,246 | 4,227 | 5,333 |
| 14 | 5,664 | 8,108 | 7,193 | 8,068 | 5,405 | 5,225 | 4,718 | 5,460 | 3,958 | 3,128 | 3,872 | 5,486 |
| 15 | 5,451 | 6,564 | 6,791 | 7,346 | 5,621 | 4,838 | 4,503 | 4,829 | 4,023 | 3,178 | 4,062 | 6,332 |
| 16 | 5,840 | 6,167 | 7,183 | 7,791 | 5,561 | 4,552 | 4,880 | 4,299 | 3,899 | 3,248 | 4,064 | 5,910 |
| 17 | 6,253 | 6,370 | 6,959 | 7,460 | 5,493 | 4,819 | 4,899 | 4,407 | 3,956 | 3,186 | 4,004 | 5,658 |
| 18 | 6,401 | 6,974 | 6,071 | 6,864 | 5,345 | 5,148 | 4,658 | 4,863 | 3,937 | 3,299 | 4,532 | 5,487 |
| 19 | 6,468 | 6,621 | 6,076 | 6,996 | 5,339 | 4,973 | 5,127 | 4,654 | 3,711 | 3,282 | 4,809 | 5,520 |
| 20 | 7,141 | 6,584 | 6,982 | 7,193 | 5,422 | 5,021 | 4,759 | 4,114 | 3,667 | 3,340 | 4,662 | 5,688 |
| 21 | 7,074 | 7,106 | 7,352 | 6,842 | 5,789 | 5,171 | 4,663 | 4,012 | 3,741 | 3,639 | 4,303 | 6,548 |
| 22 | 6,061 | 7,211 | 8,108 | 6,423 | 5,717 | 5,128 | 4,353 | 4,114 | 3,478 | 3,333 | 4,507 | 6,862 |
| 23 | 5,743 | 6,675 | 8,035 | 6,193 | 5,491 | 4,999 | 4,414 | 4,290 | 3,301 | 3,131 | 4,308 | 6,130 |
| 24 | 5,919 | 6,069 | 8,340 | 6,133 | 5,611 | 5,239 | 4,326 | 4,160 | 3,375 | 3,287 | 4,284 | 5,631 |
| 25 | 6,107 | 5,968 | 7,747 | 6,176 | 5,157 | 5,323 | 4,268 | 4,246 | 3,428 | 3,189 | 4,317 | 4,358 |
| 26 | 5,687 | 6,205 | 7,591 | 6,311 | 4,968 | 5,114 | 4,391 | 3,963 | 3,705 | 3,524 | 4,400 | 4,748 |
| 27 | 5,432 | 6,620 | 7,547 | 6,261 | 4,722 | 4,701 | 4,367 | 3,760 | 3,852 | 3,427 | 4,870 | 6,071 |
| 28 | 5,945 | 6,525 | 7,624 | 6,064 | 4,845 | 4,901 | 4,231 | 4,016 | 3,731 | 3,201 | 5,000 | 5,934 |
| 29 | 5,903 | 5,381 | 7,737 | 6,111 | 5,369 | 5,269 | 4,003 | 4,081 | 3,386 | 3,481 | 5,503 | 6,425 |
| 30 | 5,555 | | 8,100 | 6,932 | 5,325 | 4,942 | 4,129 | 4,709 | 3,125 | 3,492 | 5,053 | 6,429 |
| 31 | 6,005 | | 8,063 | | 5,419 | | 4,098 | 5,175 | | 3,446 | | 5,769 |
| Average: | 5,987 | 6,508 | 7,126 | 7,255 | 5,555 | 5,142 | 4,396 | 4,344 | 3,785 | 3,342 | 4,248 | 5,578 |

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

Source: Adapted from USGS 2006b

Table 2.4.1-5 Daily Average Flow Data for the Savannah River at Augusta, Georgia (USGS Gage 2197000)

| 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 | 10,790 | 11,320 | 17,390 | 16,289 | 10,680 | 8,129 | 7,708 | 8,359 | 8,281 | 7,717 | 5,987 | 8,172 |
| 2 | 11,380 | 11,860 | 15,900 | 16,230 | 10,950 | 8,078 | 8,381 | 8,139 | 8,205 | 10,460 | 6,316 | 7,694 |
| 3 | 11,360 | 11,960 | 14,110 | 17,210 | 10,570 | 8,107 | 7,871 | 8,541 | 7,546 | 10,080 | 6,574 | 7,651 |
| 4 | 12,460 | 12,860 | 13,420 | 15,820 | 10,130 | 7,917 | 7,126 | 8,446 | 7,586 | 8,478 | 6,847 | 8,232 |
| 5 | 13,170 | 13,380 | 14,440 | 14,099 | 9,711 | 7,943 | 7,085 | 7,901 | 7,451 | 7,249 | 6,990 | 8,680 |
| 6 | 12,130 | 13,339 | 14,920 | 15,170 | 9,621 | 8,233 | 7,356 | 8,065 | 7,634 | 7,143 | 6,782 | 8,617 |
| 7 | 11,860 | 13,850 | 15,029 | 15,920 | 9,875 | 8,760 | 7,357 | 8,125 | 7,709 | 6,793 | 6,303 | 8,444 |
| 8 | 12,600 | 15,250 | 15,910 | 15,740 | 10,160 | 8,985 | 7,993 | 7,921 | 7,986 | 6,526 | 6,310 | 8,281 |
| 9 | 12,650 | 15,590 | 16,410 | 15,490 | 10,140 | 8,532 | 8,653 | 8,440 | 7,689 | 6,696 | 6,763 | 8,289 |
| 10 | 12,080 | 15,459 | 16,070 | 15,120 | 10,110 | 8,316 | 8,541 | 8,329 | 8,819 | 7,243 | 6,846 | 8,670 |
| 11 | 11,550 | 15,330 | 14,549 | 14,560 | 9,318 | 8,103 | 7,732 | 7,352 | 9,687 | 7,243 | 6,650 | 8,512 |
| 12 | 11,790 | 15,190 | 13,940 | 13,650 | 8,830 | 8,026 | 7,387 | 7,287 | 7,867 | 7,047 | 6,635 | 8,372 |
| 13 | 12,240 | 14,620 | 14,520 | 12,780 | 8,648 | 8,111 | 7,342 | 7,680 | 6,671 | 7,058 | 6,901 | 8,580 |
| 14 | 11,610 | 14,330 | 14,940 | 12,730 | 8,600 | 8,570 | 7,788 | 8,807 | 6,223 | 6,582 | 7,357 | 8,793 |
| 15 | 11,200 | 14,090 | 14,690 | 13,110 | 8,388 | 8,829 | 7,669 | 9,442 | 6,372 | 6,121 | 7,344 | 9,559 |
| 16 | 10,860 | 13,469 | 15,490 | 13,619 | 8,393 | 9,036 | 7,872 | 9,381 | 6,331 | 5,916 | 7,227 | 10,260 |
| 17 | 11,570 | 13,880 | 15,880 | 13,450 | 8,369 | 8,825 | 7,699 | 9,570 | 6,543 | 6,188 | 7,475 | 9,995 |
| 18 | 12,350 | 15,020 | 14,779 | 12,270 | 7,988 | 8,540 | 7,635 | 9,034 | 7,583 | 6,975 | 7,398 | 9,486 |
| 19 | 13,900 | 15,020 | 13,869 | 11,650 | 7,629 | 8,056 | 7,612 | 8,447 | 7,598 | 6,931 | 7,311 | 9,025 |
| 20 | 15,450 | 14,170 | 14,490 | 11,670 | 8,318 | 7,589 | 7,735 | 8,776 | 6,913 | 6,854 | 7,297 | 8,854 |
| 21 | 14,820 | 14,130 | 15,780 | 11,620 | 9,137 | 7,369 | 7,393 | 8,078 | 6,540 | 7,215 | 6,879 | 9,797 |
| 22 | 12,730 | 15,110 | 16,450 | 11,370 | 9,283 | 7,657 | 7,171 | 7,790 | 6,591 | 7,233 | 6,834 | 9,845 |
| 23 | 11,580 | 14,790 | 16,189 | 10,830 | 9,216 | 7,228 | 6,961 | 7,473 | 6,438 | 7,373 | 6,792 | 9,854 |
| 24 | 11,800 | 14,010 | 16,550 | 10,380 | 8,788 | 7,318 | 6,879 | 7,321 | 6,270 | 7,584 | 7,131 | 9,289 |
| 25 | 11,990 | 13,780 | 15,960 | 10,060 | 8,499 | 8,373 | 7,196 | 7,213 | 6,418 | 7,035 | 7,296 | 9,232 |
| 26 | 12,190 | 13,880 | 15,079 | 10,500 | 7,805 | 8,399 | 7,623 | 7,367 | 6,989 | 6,491 | 7,352 | 9,595 |
| 27 | 11,760 | 14,160 | 15,370 | 10,500 | 7,795 | 7,699 | 7,499 | 7,301 | 8,905 | 6,709 | 7,551 | 10,100 |
| 28 | 11,260 | 16,089 | 15,380 | 10,190 | 7,904 | 7,406 | 7,428 | 7,615 | 8,902 | 6,778 | 7,584 | 10,090 |
| 29 | 11,310 | 11,980 | 15,300 | 9,767 | 7,866 | 7,209 | 7,655 | 8,207 | 7,516 | 6,342 | 7,950 | 10,160 |
| 30 | 11,450 | | 16,800 | 10,480 | 7,794 | 7,598 | 8,445 | 8,447 | 7,140 | 6,319 | 8,448 | 11,020 |
| 31 | 11,250 | | 16,920 | | 7,823 | | 8,962 | 8,352 | | 6,173 | | 11,100 |
| Average: | 12,101 | 14,066 | 15,372 | 13,076 | 8,979 | 8,098 | 7,669 | 8,168 | 7,413 | 7,115 | 7,038 | 9,169 |

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

Source: Adapted from USGS 2006c

Table 2.4.1-6 Daily Average Flow Data for the Savannah River at Jackson, South Carolina (USGS Gage 2197320)

| 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 | 8,843 | 10,990 | 10,650 | 11,520 | 9,351 | 8,778 | 8,337 | 7,511 | 7,725 | 7,052 | 7,188 | 8,115 |
| 2 | 9,091 | 11,140 | 11,050 | 10,540 | 8,757 | 8,383 | 7,974 | 7,581 | 7,334 | 7,079 | 7,167 | 8,850 |
| 3 | 9,807 | 11,920 | 11,320 | 10,560 | 8,860 | 7,941 | 7,691 | 7,778 | 7,141 | 7,541 | 7,088 | 8,730 |
| 4 | 9,931 | 11,990 | 11,470 | 10,660 | 8,858 | 8,393 | 7,922 | 7,877 | 7,433 | 7,708 | 7,193 | 8,524 |
| 5 | 9,759 | 11,430 | 12,559 | 10,900 | 9,146 | 8,316 | 7,743 | 7,420 | 7,791 | 7,885 | 7,261 | 8,674 |
| 6 | 9,677 | 11,560 | 12,140 | 11,150 | 8,650 | 8,323 | 8,097 | 7,441 | 7,891 | 7,779 | 7,233 | 8,840 |
| 7 | 9,407 | 11,650 | 12,040 | 10,630 | 8,578 | 8,328 | 8,102 | 7,409 | 7,778 | 7,589 | 7,218 | 8,908 |
| 8 | 9,032 | 11,730 | 12,160 | 10,290 | 7,630 | 8,169 | 7,924 | 7,463 | 7,395 | 7,581 | 7,141 | 9,053 |
| 9 | 9,086 | 11,620 | 12,240 | 10,180 | 7,377 | 8,247 | 7,316 | 7,566 | 7,322 | 7,791 | 7,225 | 9,121 |
| 10 | 9,402 | 11,830 | 12,020 | 10,470 | 8,088 | 7,944 | 7,700 | 7,752 | 7,428 | 7,937 | 7,354 | 8,978 |
| 11 | 9,922 | 11,430 | 11,100 | 10,920 | 7,937 | 8,374 | 7,524 | 7,465 | 7,247 | 7,994 | 7,435 | 9,219 |
| 12 | 10,540 | 11,980 | 11,480 | 10,510 | 8,381 | 8,175 | 7,107 | 7,766 | 7,042 | 7,991 | 7,510 | 9,271 |
| 13 | 10,800 | 12,060 | 11,790 | 10,360 | 8,695 | 8,682 | 7,079 | 7,695 | 7,059 | 7,850 | 7,542 | 9,356 |
| 14 | 10,870 | 11,850 | 11,920 | 9,937 | 8,551 | 8,554 | 7,042 | 7,798 | 7,047 | 7,693 | 7,745 | 9,084 |
| 15 | 10,640 | 11,930 | 11,740 | 9,614 | 8,096 | 8,441 | 7,183 | 7,859 | 7,299 | 7,367 | 8,222 | 9,007 |
| 16 | 10,430 | 11,840 | 11,510 | 10,490 | 8,221 | 8,061 | 7,270 | 7,835 | 7,208 | 7,330 | 8,354 | 9,235 |
| 17 | 10,510 | 10,920 | 11,570 | 10,510 | 8,368 | 7,730 | 7,478 | 7,945 | 7,015 | 7,739 | 7,940 | 9,326 |
| 18 | 10,770 | 10,540 | 11,340 | 10,150 | 8,784 | 7,774 | 7,583 | 8,110 | 6,855 | 7,308 | 7,681 | 9,248 |
| 19 | 11,290 | 11,110 | 10,750 | 9,529 | 9,375 | 7,715 | 7,551 | 8,038 | 6,841 | 7,717 | 7,734 | 9,064 |
| 20 | 11,480 | 10,840 | 10,560 | 9,320 | 8,814 | 7,670 | 7,688 | 7,437 | 6,826 | 7,695 | 7,644 | 9,841 |
| 21 | 11,260 | 10,200 | 10,800 | 9,484 | 8,461 | 8,276 | 7,558 | 7,482 | 6,702 | 7,905 | 7,584 | 9,628 |
| 22 | 11,430 | 10,260 | 10,990 | 9,388 | 8,173 | 8,800 | 7,393 | 7,431 | 7,010 | 7,758 | 7,739 | 9,536 |
| 23 | 11,580 | 10,760 | 10,220 | 9,379 | 8,739 | 8,878 | 7,469 | 7,361 | 7,161 | 7,848 | 8,381 | 9,469 |
| 24 | 11,300 | 11,080 | 9,758 | 9,780 | 9,255 | 8,404 | 7,360 | 7,312 | 7,366 | 8,257 | 8,387 | 9,350 |
| 25 | 11,240 | 11,250 | 10,010 | 9,456 | 9,503 | 8,230 | 7,209 | 7,335 | 7,141 | 8,340 | 8,529 | 9,362 |
| 26 | 10,980 | 11,090 | 11,160 | 9,380 | 9,236 | 8,154 | 7,234 | 7,284 | 7,216 | 8,108 | 8,117 | 9,653 |
| 27 | 10,900 | 11,380 | 11,150 | 9,780 | 9,021 | 8,113 | 7,057 | 7,332 | 7,115 | 7,974 | 7,992 | 9,524 |
| 28 | 11,230 | 10,990 | 10,860 | 9,542 | 8,956 | 8,240 | 6,866 | 7,430 | 6,977 | 8,022 | 7,863 | 9,155 |
| 29 | 10,720 | 10,540 | 11,550 | 9,237 | 9,177 | 8,481 | 6,835 | 8,035 | 7,106 | 7,759 | 8,077 | 8,781 |
| 30 | 10,850 | | 11,950 | 9,728 | 9,396 | 8,469 | 7,195 | 7,984 | 7,017 | 7,360 | 8,527 | 8,777 |
| 31 | 10,870 | | 11,900 | | 9,236 | | 7,465 | 7,957 | | 7,160 | | 8,816 |
| Average: | 10,440 | 11,307 | 11,347 | 10,113 | 8,699 | 8,268 | 7,482 | 7,635 | 7,216 | 7,713 | 7,702 | 9,113 |
| 1 -- Available period of record may be less than value shown for certain days of the year. | | | | | | | | | | | | |

Source: Adapted from USGS 2006d

Table 2.4.1-7 Daily Average Flow Data for the Savannah River at Clyo, Georgia (USGS Gage 2198500)

| Day of month | Mean of daily mean values for this day for 70 years of record ¹ , in ft ³ /s | | | | | | | | | | | |
|--|--|--------|--------|--------|--------|--------|-------|--------|-------|--------|-------|--------|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| 1 | 12,350 | 14,199 | 17,480 | 19,510 | 13,250 | 9,907 | 9,131 | 8,949 | 8,719 | 9,002 | 8,894 | 9,338 |
| 2 | 12,730 | 14,099 | 17,310 | 19,110 | 12,920 | 9,794 | 8,953 | 8,987 | 8,562 | 10,330 | 8,646 | 9,492 |
| 3 | 13,289 | 14,050 | 17,120 | 18,650 | 12,730 | 9,685 | 8,856 | 8,910 | 8,489 | 10,340 | 8,442 | 9,840 |
| 4 | 13,490 | 14,260 | 17,150 | 18,610 | 12,780 | 9,588 | 8,883 | 8,801 | 8,417 | 10,350 | 8,267 | 10,390 |
| 5 | 13,450 | 14,490 | 17,480 | 18,400 | 12,810 | 9,484 | 8,853 | 8,784 | 8,438 | 10,380 | 8,159 | 10,780 |
| 6 | 13,450 | 14,720 | 17,900 | 18,380 | 12,790 | 9,330 | 8,721 | 8,729 | 8,571 | 10,380 | 8,116 | 10,900 |
| 7 | 13,450 | 14,900 | 18,170 | 18,320 | 12,860 | 9,240 | 8,642 | 8,678 | 8,681 | 10,340 | 8,114 | 10,920 |
| 8 | 13,420 | 14,970 | 18,090 | 18,320 | 13,060 | 9,220 | 8,633 | 8,645 | 8,721 | 10,370 | 8,077 | 10,840 |
| 9 | 13,250 | 14,920 | 17,960 | 18,160 | 13,050 | 9,294 | 8,594 | 8,620 | 8,733 | 10,370 | 8,086 | 10,640 |
| 10 | 13,089 | 14,970 | 17,790 | 18,120 | 12,900 | 9,439 | 8,567 | 8,579 | 8,658 | 10,390 | 8,127 | 10,520 |
| 11 | 13,050 | 15,090 | 17,730 | 17,980 | 12,580 | 9,585 | 8,624 | 8,673 | 8,587 | 9,298 | 8,271 | 10,530 |
| 12 | 13,260 | 15,170 | 17,660 | 17,760 | 12,290 | 9,675 | 8,691 | 8,778 | 8,495 | 8,901 | 8,412 | 10,560 |
| 13 | 13,569 | 15,250 | 17,850 | 17,660 | 12,130 | 9,700 | 8,654 | 8,750 | 8,339 | 8,628 | 8,559 | 10,550 |
| 14 | 14,140 | 15,459 | 18,170 | 17,720 | 12,090 | 9,777 | 8,634 | 8,728 | 8,153 | 8,450 | 8,562 | 10,590 |
| 15 | 14,399 | 15,880 | 18,520 | 17,930 | 12,060 | 9,946 | 8,739 | 8,737 | 8,080 | 8,324 | 8,517 | 10,700 |
| 16 | 14,290 | 16,310 | 18,700 | 18,090 | 11,980 | 10,090 | 8,933 | 8,744 | 8,068 | 8,293 | 8,502 | 10,850 |
| 17 | 14,050 | 16,620 | 18,610 | 17,940 | 11,890 | 10,170 | 9,028 | 8,681 | 8,104 | 8,243 | 8,464 | 10,980 |
| 18 | 13,890 | 16,830 | 18,480 | 17,620 | 11,700 | 10,160 | 9,038 | 8,606 | 8,026 | 8,232 | 8,459 | 11,160 |
| 19 | 13,919 | 16,770 | 18,300 | 17,190 | 11,480 | 10,040 | 9,055 | 9,260 | 7,887 | 8,258 | 8,566 | 11,300 |
| 20 | 13,910 | 16,690 | 18,140 | 16,740 | 11,310 | 9,950 | 9,098 | 9,891 | 7,779 | 8,224 | 8,718 | 11,400 |
| 21 | 13,940 | 16,490 | 17,980 | 16,380 | 11,140 | 9,821 | 9,113 | 10,130 | 7,655 | 8,168 | 8,764 | 11,590 |
| 22 | 14,040 | 16,310 | 17,890 | 16,089 | 10,900 | 9,654 | 9,087 | 10,160 | 7,567 | 8,134 | 8,804 | 11,640 |
| 23 | 14,280 | 16,260 | 17,930 | 15,870 | 10,640 | 9,497 | 9,090 | 9,989 | 7,499 | 8,177 | 8,880 | 11,680 |
| 24 | 14,530 | 16,420 | 18,060 | 15,550 | 10,410 | 9,421 | 9,075 | 9,646 | 7,497 | 8,212 | 8,950 | 11,700 |
| 25 | 14,979 | 16,670 | 18,170 | 15,170 | 10,240 | 9,327 | 9,070 | 9,314 | 7,574 | 8,265 | 9,024 | 11,760 |
| 26 | 15,490 | 17,040 | 18,690 | 14,829 | 10,170 | 9,249 | 9,070 | 9,101 | 7,635 | 8,486 | 9,175 | 11,740 |
| 27 | 15,640 | 17,350 | 19,360 | 14,560 | 10,200 | 9,258 | 9,024 | 9,033 | 7,635 | 8,611 | 9,352 | 11,710 |
| 28 | 15,509 | 17,470 | 20,010 | 14,280 | 10,150 | 9,344 | 8,868 | 9,082 | 7,639 | 8,743 | 9,418 | 11,820 |
| 29 | 15,230 | 18,810 | 20,190 | 13,960 | 10,070 | 9,357 | 8,724 | 9,069 | 7,604 | 8,919 | 9,371 | 11,950 |
| 30 | 14,879 | | 20,050 | 13,640 | 10,010 | 9,252 | 8,612 | 9,002 | 7,537 | 9,001 | 9,329 | 12,070 |
| 31 | 14,490 | | 19,760 | | 9,990 | | 8,649 | 8,868 | | 9,039 | | 12,180 |
| Average: | 13,982 | 15,809 | 18,281 | 17,085 | 11,696 | 9,608 | 8,862 | 9,030 | 8,112 | 9,060 | 8,634 | 11,036 |
| 1 -- Available period of record may be less than value shown for certain days of the year. | | | | | | | | | | | | |

Source: Adapted from USGS 2006e

Table 2.4.1-8 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 |

* Identifier for streams shown in Figure 2.4-3

** from outfall to end of longest tributary

Table 2.4.1-9 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.) | Total Storage, in 1000's 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 | 1,026 | 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 | n/a |
| 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 2.4.1-10 Surface Water Users on the Savannah River Near or Downstream of Proposed Units

| Owner | Facility type & Description | Source Water | River mile | Distance from VEGP | Average Daily Withdrawal | Reference |
|---|--|----------------|------------|--------------------|--------------------------|------------------|
| Savannah River Site, U.S.D.O.E. | Tritium Extraction Facility | Savannah River | 151.0 | -0.1 | 2.9 MGD (1) | DOE/EIS 1997 |
| SCE & G | Vogtle Electric Generating Station | Savannah River | 150.9 | 0.0 | 171.3 MGD (1) | DOE/EIS 1997 |
| SCE & G | Coal-fired plant cooling water at SRS | Savannah River | 151.0 | -0.1 | 44.2 MGD (1) | DOE/EIS 1997 |
| City of Savannah | Cherokee Hill Water Treatment Plant in Port Wentworth for treatment of industrial & domestic water | Savannah River | 29.0 | 121.9 | 50.0 MGD | DOE/EIS 1997 |
| Beaufort/Jaspar Water & Sewer Authority | W.T.P. Intake for WTP facility serving 75% of Beaufort Co. & 1% of Jasper Co. | Savannah River | 39.2 | 111.7 | 16.0 MGD | DOE/EIS 1997 |
| City of Waynesboro, Burke Co. | Water Treatment Plant intake for municipal water supply (12 miles overland from site) | Brier Creek | 102.5 | 48.4 | 1.5 MGD (2) | Georgia DNR 2006 |
| International Paper Corporation in Chatham Co., GA | Water treatment plant intake for industrial water supply (approximate river mile) | Savannah River | 18.5 (3) | 132.4 | 50.0 MGD (2) | Georgia DNR 2006 |
| Kerr-McGee Chemical, LLC in Chatham Co., GA | Water treatment plant intake for industrial water supply (approximate river mile) | Savannah River | 18.5 (3) | 132.4 | 20.0 MGD (2) | Georgia DNR 2006 |
| Georgia Power Company Riverside, GA | Water treatment plant intake for industrial water supply | Savannah River | 18.5 (3) | 132.4 | 174.0 MGD (2) | Georgia DNR 2006 |
| Savannah Electric & Power Co-Pt Wentworth, GA | Water treatment plant intake for industrial water supply (approximate river mile) | Savannah River | 18.5 (3) | 132.4 | 267.0 MGD (2) | Georgia DNR 2006 |
| Weyerhaeuser Company, Chatham Co., GA | Water treatment plant intake for industrial water supply (approximate river mile) | Savannah River | 18.5 (3) | 132.4 | 27.5 MGD (2) | Georgia DNR 2006 |
| Weyerhaeuser Company, Chatham Co., GA | Water treatment plant intake for industrial water supply (approximate river mile) | Savannah River | 18.5 (3) | 132.4 | 30.0 MGD (2) | Georgia DNR 2006 |
| Fort James Operating Company, Effingham, GA | Water Treatment Plant intake for municipal water supply | Savannah River | 45 | 105.9 | 35.0 MGD (2) | Georgia DNR 2006 |
| Savannah Electric & Power Co, McIntosh, GA | Water treatment plant intake for industrial water supply | Savannah River | 45 | 105.9 | 130.0 MGD (2) | Georgia DNR 2006 |
| Savannah Industrial & Domestic Water, Effingham Co., GA | Combined municipal and industrial water supply (near confluence with Savannah R.) | Abercorn Creek | 29 | 121.9 | 55.0 MGD (2) | Georgia DNR 2006 |
| J M Huber Corp -Brier Creek, in Warren Co., GA | Water treatment plant intake for industrial water supply (near confluence with Savannah R.) | Brier Creek | 102.5 | 48.4 | 4.0 MGD (2) | Georgia DNR 2006 |

1) Average water use, 1998 interpolated to 2006 using 2010 projected value

2) Average water use, Georgia DNR 2006

3) Midpoint of the reach identified in Georgia DNR 2006

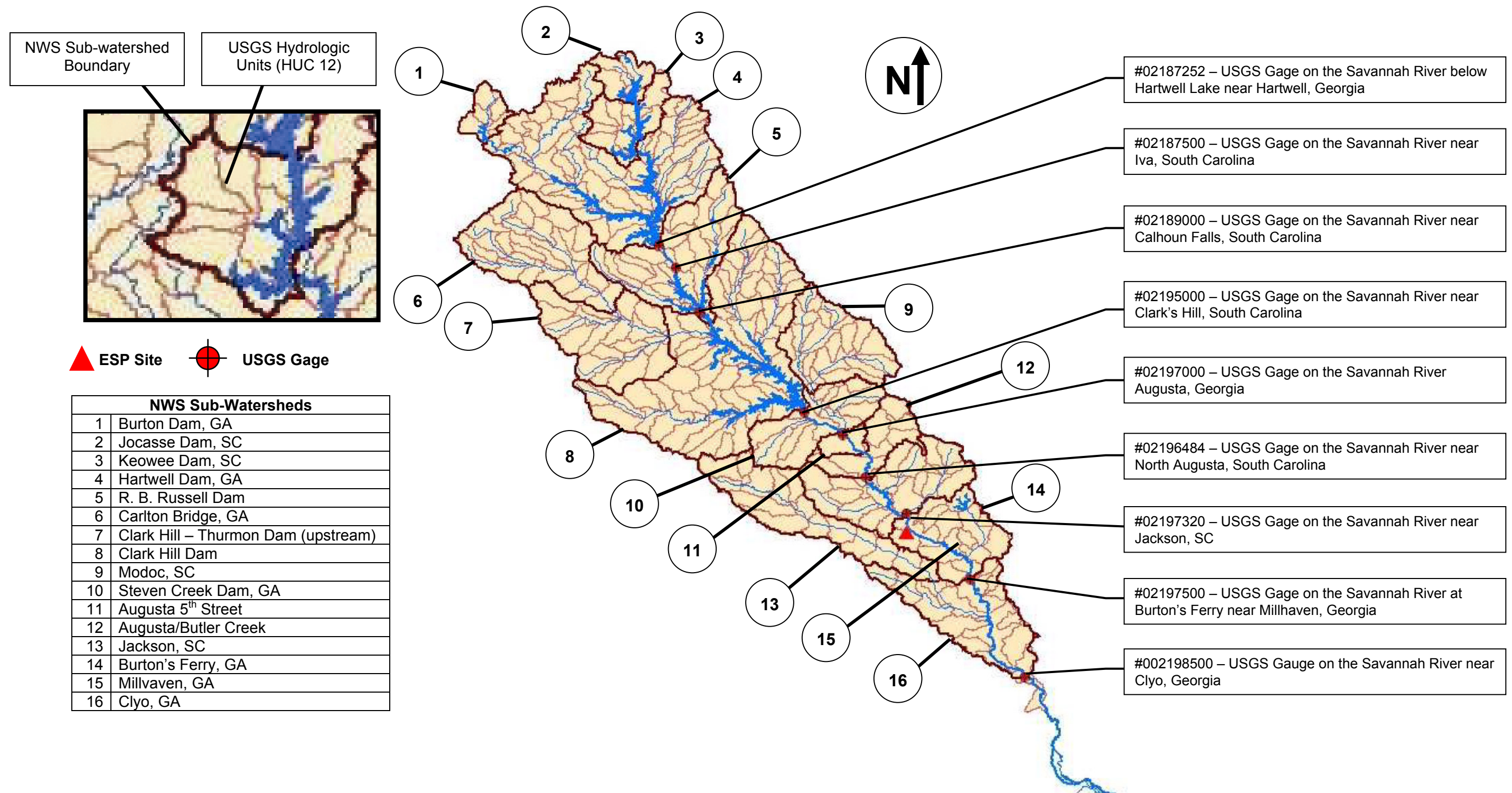


Figure 2.4.1-1 Savannah River Watershed and HUCs (No Scale)

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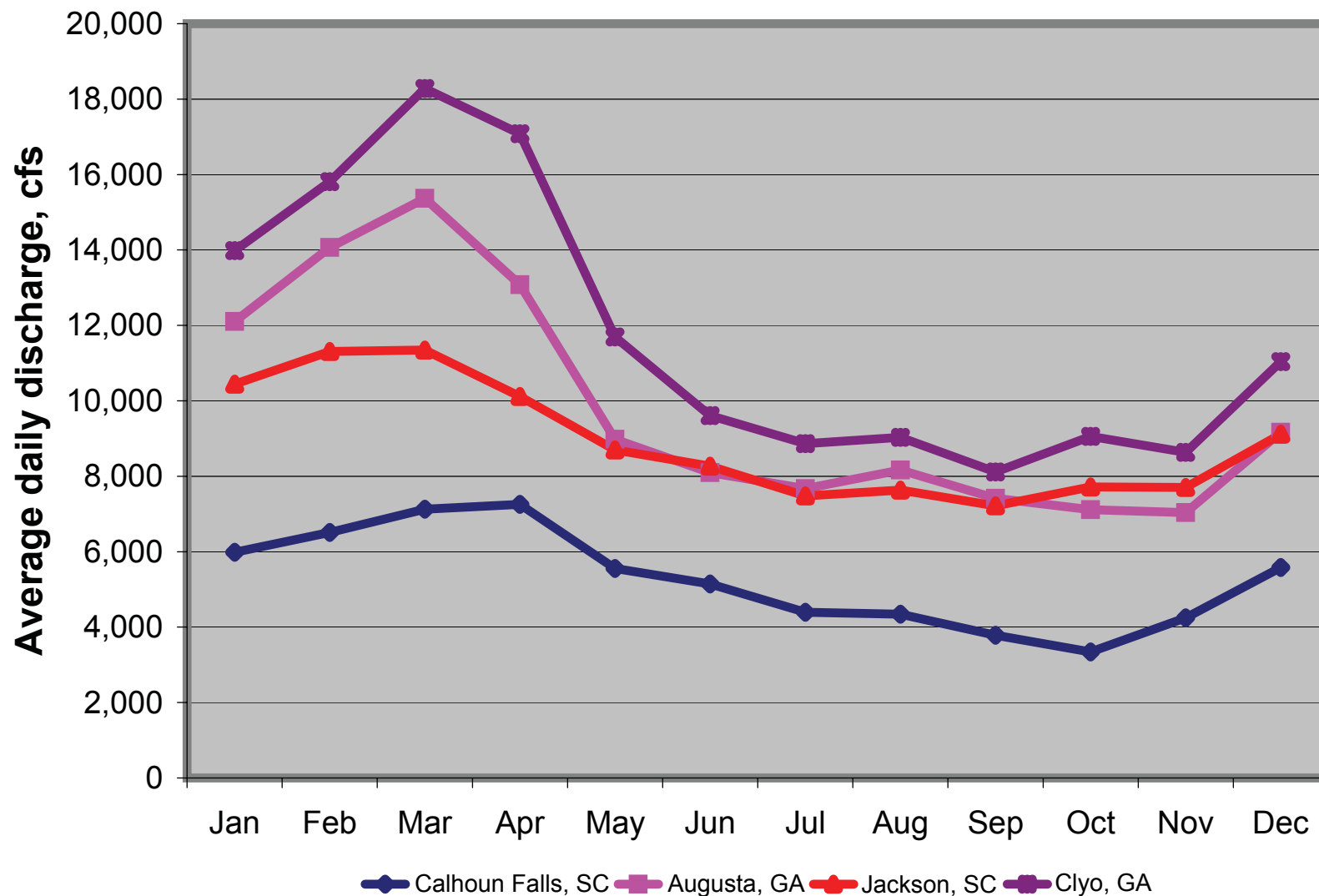


Figure 2.4.1-2 Average Daily Discharge for a Year – Selected Gages of the Savannah River

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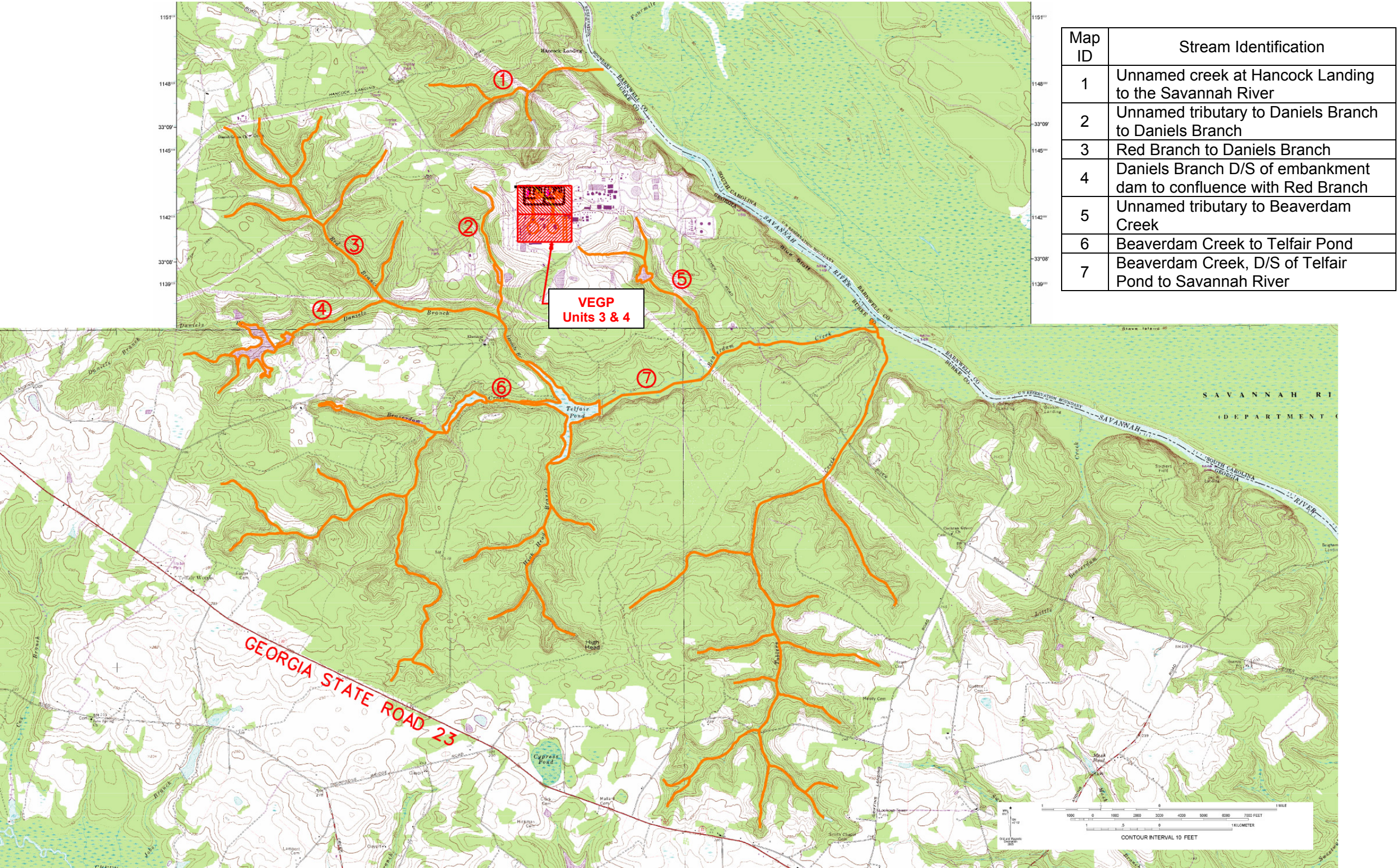


Figure 2.4.1-3 Site Drainage

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2.4.2 Floods

2.4.2.1 Flood History

Potential causes of flooding at the site are limited to local runoff events due to intense point-rainfall near the site and flooding from the Savannah River. There is no historical record of flooding due to storm surges or tsunamis at the site, which is consistent with its location approximately 150 River Miles inland from the ocean. Because there are no large bodies of water near the site, flooding due to seiche motion was not considered (see Sections 2.4.5 and 2.4.6).

Table 2.4.2-1 (**USGS 2006a**) provides the date, stage elevation, and annual peak discharge for the entire period of record of USGS stream 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, 1865, and 1876.

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 from 280,000 cfs for a reported stage of 38 ft (**USGS 2006a**) to 360,000 cfs for a reported maximum flood stage of 40 ft (**USGS 1990**). 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 elevation of 96.58 ft msl for the Augusta, Georgia, stream gage datum (see Table 2.4.2-1).

Since 1952, annual peaks on the Savannah River at Augusta, Georgia, have been impacted by regulation from upstream reservoirs: J. Strom Thurmond (also known as Clarks Hill) Lake and Dam in 1952, Hartwell Lake and Dam in 1961, and Richard B. Russell Lake and Dam in 1984 (**USACE 1996**). In Figure 2.4.2-1 (**USGS 1990**), which is based on the historical record from 1796 to 1985, this impact is shown by the pronounced reduction of peak flows after 1952. The addition of annual peak stream gage data from 1986 to 2002 would not significantly affect this graph, as indicated by the following averages:

| | |
|--|-------------|
| Average annual peak discharge 1796 - 1950: | 232,696 cfs |
| Average annual peak discharge 1876 - 1950: | 113,086 cfs |
| Average annual peak discharge 1951 - 2004: | 34,343 cfs |
| Average annual peak discharge 1951 - 1985: | 37,569 cfs |
| Average annual peak discharge 1986 - 2004: | 28,734 cfs |

The USGS stream gage at Jackson, South Carolina, which is approximately 5.9 River Miles upstream of the VEGP site (see Table 2.4.1-2), has a record length significantly shorter than that of the Augusta gage and contains no observations before upstream dams were closed.

Table 2.4.2-2 compares the annual peak discharges on the Savannah River at Augusta, Georgia, and Jackson, South Carolina, for the 29 coincident years of record. During this period, the peak annual discharge at the two sites was not associated with the same storm event in seven instances. These cases are indicated by the grayed-out rows of Table 2.4.2-2, for which the dates of the peaks differ by a significant number of days. There is a 1-to-2-day lag in the occurrence of annual maximum peaks at the two gages derived from the same flood event. A very strong linear correlation exists between flood stages at the two sites for the annual peak floods derived from the same event, as shown in Figure 2.4.2-2, making it feasible to extend the historical record at Jackson, South Carolina. The annual peak flood stage at the VEGP site could then be estimated from the stages at Jackson, with a level of confidence dependent on the ability to establish a reliable estimate of the stage at the VEGP site from the river stage at Jackson, South Carolina, based on hydraulic considerations.

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 2.4.2-3 (**USGS 1990**). Unregulated annual peak discharge values for the period after 1952 and regulated annual peak discharge values for the years before 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 1990**).

Figure 2.4.2-3 clearly shows the convergence of the regulated and unregulated annual flood frequency plots with increasing flood size. On the left side of the graph, for the 80 percent chance-of-exceedence event (a 1.25-year return period), the unregulated peak discharge exceeds the regulated peak by more than 100 percent; on the right side, for the 0.2 percent chance-of-exceedence event (500-year return period), the unregulated peak discharge exceeds the regulated peak by about 30 percent. Based on this trend, regulation would not be expected to significantly affect the probable maximum flood on the Savannah River downstream of Augusta, provided that the regulating structures do not fail. Flooding due to dam-breaks is discussed in Section 2.4.4.

2.4.2.2 Flood Design Considerations

The location of VEGP Units 3 and 4 would be adjacent to and generally to the west of existing VEGP Units 1 and 2, as illustrated in Figure 1-4. The site is located on a high bluff on the west bank of the Savannah River. The proposed site grade for the new units will be at or above El. 220 ft msl, similar to the existing VEGP units, well above the probable maximum flood stage of the Savannah River, as discussed in Section 2.4.3.

The annual maximum flood at the VEGP site can occur in any month of the year and is not associated specifically with icing, which does not normally occur to any significant degree, as

indicated in Section 2.4.7). For this reason, the effect of ice accumulation on runoff was not taken into account in selecting the design flood.

The design basis flood for the VEGP site was determined by selecting the maximum flood elevation on the Savannah River obtained by considering all flooding scenarios applicable to the location, including an approximate estimate of the probable maximum flood (PMF), flooding due to probable maximum precipitation (PMP) over local drainage courses, and potential dam failures coincident with wind set-up and wave run-up. Flood surge from ocean storms and tsunami-caused flooding were not considered because the VEGP site is approximately 151 river miles inland.

Each applicable flooding scenario was evaluated following guidelines provided in Regulatory Guide 1.59, *Design Basis Floods for Nuclear Power Plants*, 1977 (RG 1.59) and ANSI/ANS-2.8, *Determining Design Basis Flooding at Power Reactor Sites (ANSI/ANS-2.8-1992)*, as detailed in Sections 2.4.3 through 2.4.7.

The controlling event for the VEGP site was determined to be from the breach of the upstream dams, estimated as described in Section 2.4.4, using the Standard Project Flood discharge as a starting condition, including wind set-up and wave run-up. The design basis flooding level derived from this event, including wave setup, is El. 178.10 ft msl, which is 41.9 ft below the proposed site grade elevation of 220.0 ft msl.

Elevations for safety-related components and structures are not yet established for the proposed units. However, the grade elevation in the power block area of the VEGP site would be approximately the same as the existing units, elevation 220 ft msl, providing over 41 ft of freeboard above the design basis flooding level. Freeboard for all above-grade, safety-related structures, systems, and components of the new units will be equal to or greater than this value.

2.4.2.3 Effects of Local Intense Precipitation

The design basis for local intense precipitation at the site is the PMP, which is defined as the “greatest depth of precipitation for a given duration that is physically possible over a given size storm area at a particular geographical location at a certain time of year” (**HMR-52 1982**). Maps of the PMP are published for durations ranging from 6 to 72 hours and for watershed areas ranging from 10 to 20,000 sq mi (**HMR-51 1978**).

As can be seen in Figure 2.4.1-3, the VEGP site is situated on high ground in such a manner that the areas to be drained by each conveyance system serving the site will be on the order of 1 sq mi, with times of concentration considerably less than 6 hours. The 1-sq-mi PMP for the VEGP site is calculated for a range of durations between 5 and 60 minutes from the 10-sq-mi, 6-hour, all-season average PMP depth, using multipliers following accepted engineering practice (**HMR-52, 1982**). These values of depth are used to develop a relation between rainfall intensity and durations for the PMP, which will be used for storm drain designs at the VEGP

site. The point values used for developing the relation are listed in Table 2.4.2-3 and the estimated curve is plotted in Figure 2.4.2-4.

The existing storm water system provides positive drainage away from the site for the runoff generated by the PMP: surface runoff flows away from the high ground on which the Unit 1 and 2 structures are located and is collected in four principal drainage channels aligned in concert with access roads and railroad facilities to outfall to the north, south, east, and west.

The locations and designs of storm water management systems for the new units at the VEGP site have not been determined for this ESP application. This will be done as part of detailed engineering and will be described in the COL application. In general, the storm water management system developed for Units 3 and 4 will be integrated with the existing facilities as possible; runoff from Units 3 and 4 will be directed away from Unit 1 and 2 structures, to outfall to the west and south of the VEGP site.

The storm drain system will be designed in accordance with good engineering practice, following all applicable federal, state, and local storm water management regulations. In addition, site grading will be sufficiently sloped to convey runoff overland from the PMP event, away from all buildings and safety-related equipment, without flooding, even if all catch basins and roof drains are plugged.

Table 2.4.2-1 Annual Peak Discharge for USGS Gage 2197000 on the Savannah River at Augusta, Georgia

| Water Year | Date | Gage Height (feet) | Stream-flow (cfs) | Water Year | Date | Gage Height (feet) | Stream-flow (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 | 5-May-84 | 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) |
| 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 | 24-May-03 | 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

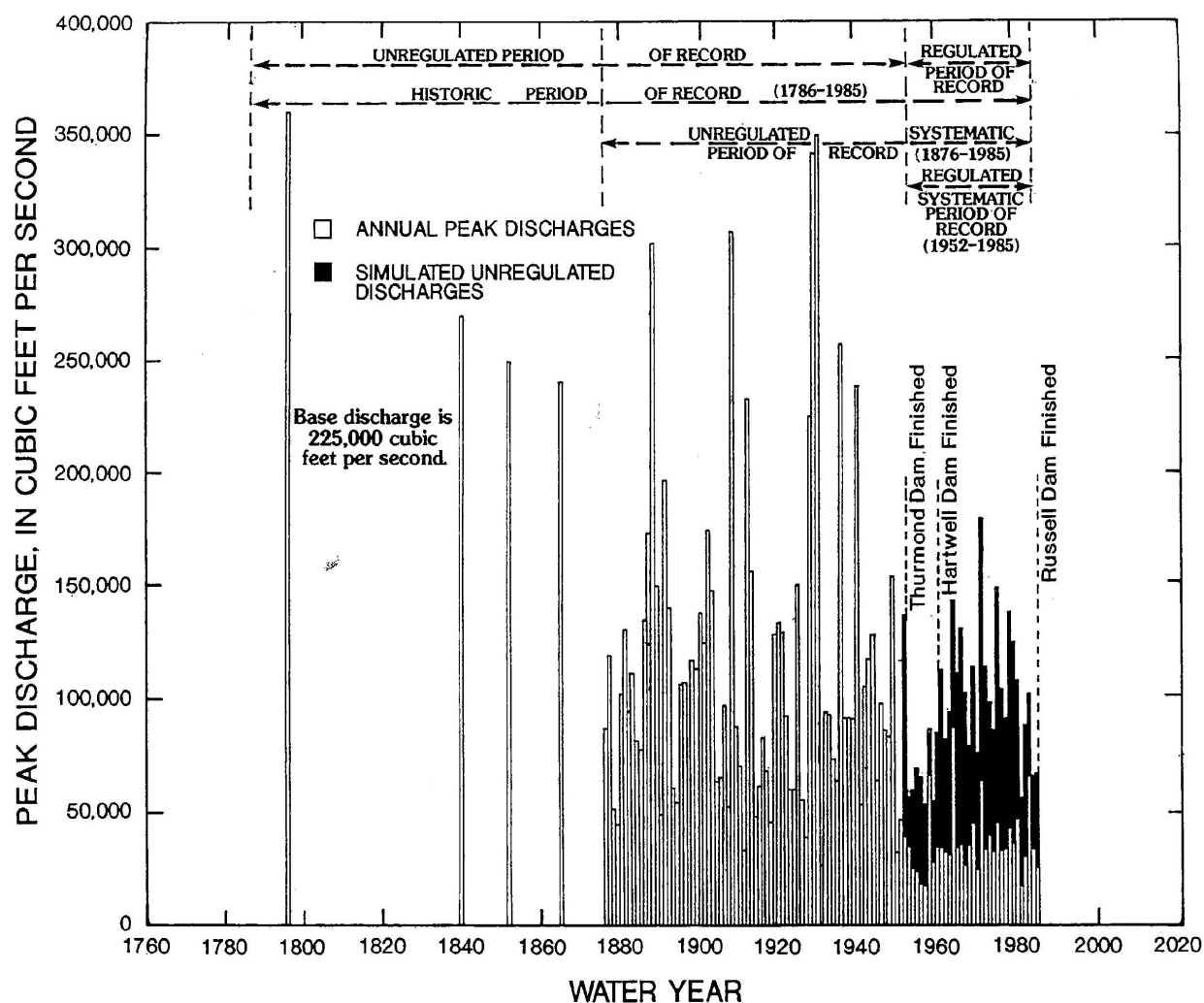
Table 2.4.2-2 Comparison of Annual Peak Discharges on the Savannah River at Augusta, Georgia and Jackson, South Carolina for 1972 to 2002

| Savannah River at Augusta, GA | | | | Savannah River at Jackson, SC | | |
|-------------------------------|----------------------------------|--------------------------|--------------------------|----------------------------------|--------------------------|--------------------------|
| Water Year (Oct - Sept) | Date of annual peak discharge | Gage Height (feet) | Stream- flow (cfs) | Date of annual peak discharge | Gage Height (feet) | Stream- flow (cfs) |
| 1972 | Jan. 20, 1972 | 20.36 | 33,700 | Jan. 21, 1972 | 19.02 | n/r |
| 1973 | Apr. 08, 1973 | 21.63 | 40,200 | Apr. 09, 1973 | 19.71 | n/r |
| 1974 | Feb. 23, 1974 | 20.13 | 32,900 | Feb. 24, 1974 | 18.64 | n/r |
| 1975 | Mar. 25, 1975 | 22.24 | 45,600 | Sep. 16, 1975 | 20.22 | n/r |
| 1976 | Jun. 05, 1976 | 20.27 | 33,300 | Jul. 06, 1976 | 18.84 | n/r |
| 1977 | Apr. 07, 1977 | 20.5 | 34,200 | Apr. 08, 1977 | 18.85 | n/r |
| 1978 | Jan. 26, 1978 | 21.98 | 43,100 | Jan. 28, 1978 | 19.65 | n/r |
| 1979 | Feb. 27, 1979 | 21.13 | 37,300 | Apr. 28, 1979 | 19.12 | n/r |
| 1980 | Mar. 31, 1980 | 22.33 | 47,200 | Apr. 01, 1980 | 20.72 | n/r |
| 1981 | Feb. 12, 1981 | 14.7 | 17,700 | Feb. 13, 1981 | 15.16 | 17300 |
| 1982 | Jan. 02, 1982 | 19.39 | 30,700 | Feb. 20, 1982 | 17.12 | 20500 |
| 1983 | Apr. 10, 1983 | 23.21 | 66,100 | Apr. 11, 1983 | 21.57 | n/r |
| 1984 | May 5, 1984 | 20.35 | 34,000 | Mar. 09, 1984 | 19.3 | n/r |
| 1985 | Feb. 07, 1985 | 17.89 | 25,700 | Feb. 08, 1985 | 17.21 | 20600 |
| 1986 | Oct. 03, 1985 | 15.74 | 21,000 | Nov. 24, 1985 | 14.29 | 15900 |
| 1987 | Mar. 06, 1987 | 18.98 | 29,200 | Mar. 07, 1987 | 18.35 | n/r |
| 1988 | Feb. 05, 1988 | 10.61 | 13,600 | Feb. 06, 1988 | 12.42 | 13200 |
| 1989 | Sep. 22, 1989 | 15.33 | 20,200 | Sep. 23, 1989 | 14.9 | 16800 |
| 1990 | Feb. 27, 1990 | 20.69 | 35,300 | Feb. 28, 1990 | 19.61 | n/r |
| 1991 | Oct. 13, 1990 | 22.8 | 59,200 | Oct. 14, 1990 | 20.05 | n/r |
| 1992 | Mar. 27, 1992 | 16.29 | 22,100 | Mar. 27, 1992 | 16.26 | 18800 |
| 1994 | Jul. 01, 1994 | 21.4 | 40,700 | Jul. 03, 1994 | 19.19 | n/r |
| 1995 | Feb. 19, 1995 | 20.28 | 33,600 | Feb. 20, 1995 | 18.91 | n/r |
| 1996 | Feb. 05, 1996 | 20.48 | 34,400 | Mar. 16, 1996 | 18.86 | n/r |
| 1997 | Mar. 10, 1997 | 18.11 | 26,300 | Mar. 11, 1997 | 18.41 | n/r |
| 1998 | Feb. 07, 1998 | 21.63 | 43,000 | Feb. 09, 1998 | 19.83 | n/r |
| 1999 | Feb. 02, 1999 | 14.72 | 19,000 | Oct. 28, 1998 | 15.23 | 17300 |
| 2000 | Jan. 25, 2000 | 13.25 | 16,800 | Jan. 26, 2000 | 14.86 | 16500 |
| 2002 | Mar. 04, 2002 | 7.14 | 8,510 | Mar. 05, 2002 | 8.77 | 8870 |

Source: Based on data from USGS 2006c and 2006d

Table 2.4.2-3 Probable Maximum Precipitation Values for Point Rainfall at VEGP Site

| Duration | Watershed Area, mi ² | Multiplier | Applied to | Source | PMP depth (inches) |
|------------|---------------------------------|------------|-------------------------------|----------------|--------------------|
| 6-hour | 10 | n/a | n/a | HMR-51, Fig 18 | 31.0 |
| 1-hour | 1 | 0.620 | 6-hr 10 mi ² value | HMR-52, Fig 23 | 19.2 |
| 30-minutes | 1 | 0.736 | 1-hr 1 mi ² value | HMR-52, Fig 38 | 14.1 |
| 15-minutes | 1 | 0.509 | 1-hr 1 mi ² value | HMR-52, Fig 37 | 9.8 |
| 5-minutes | 1 | 0.323 | 1-hr 1 mi ² value | HMR-52, Fig 36 | 6.2 |



Source: Figure 2 from USGS 1990

Figure 2.4.2-1 Unregulated and Regulated Peak Discharge Frequency Curves for the Savannah River at Augusta, Georgia (02197000)

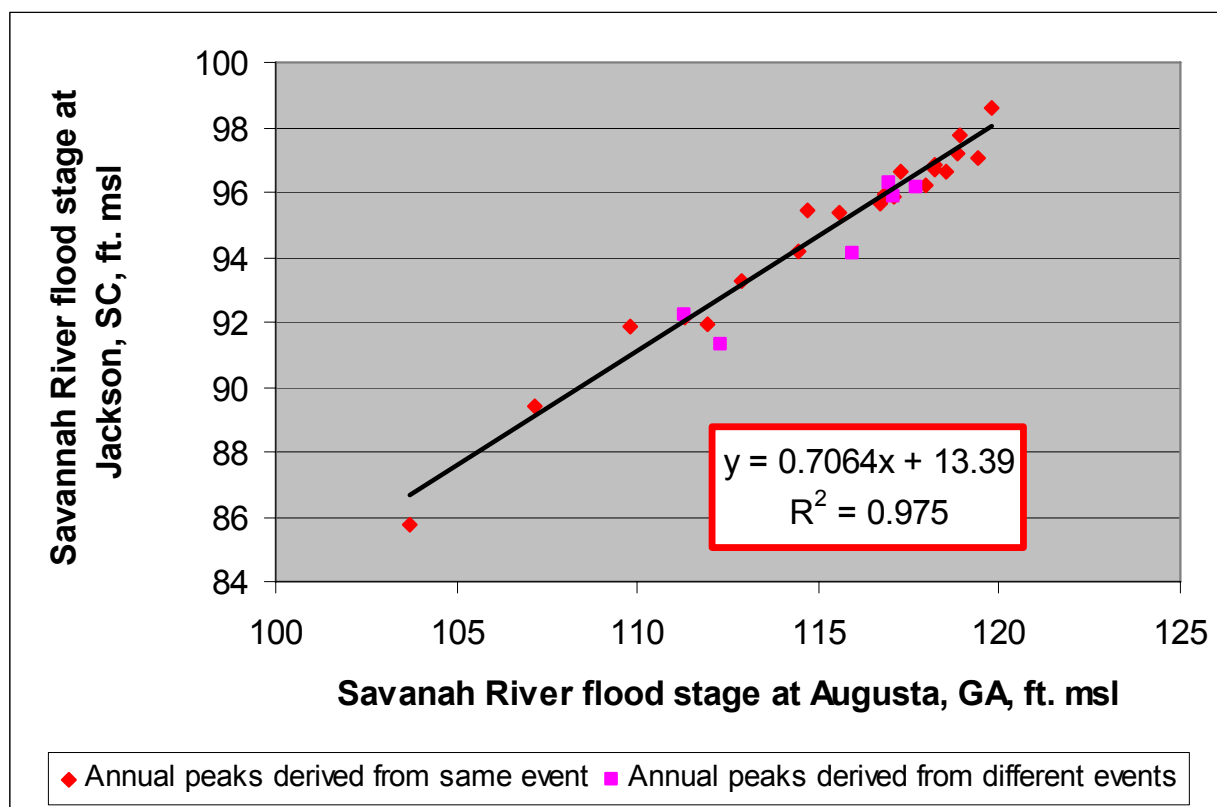
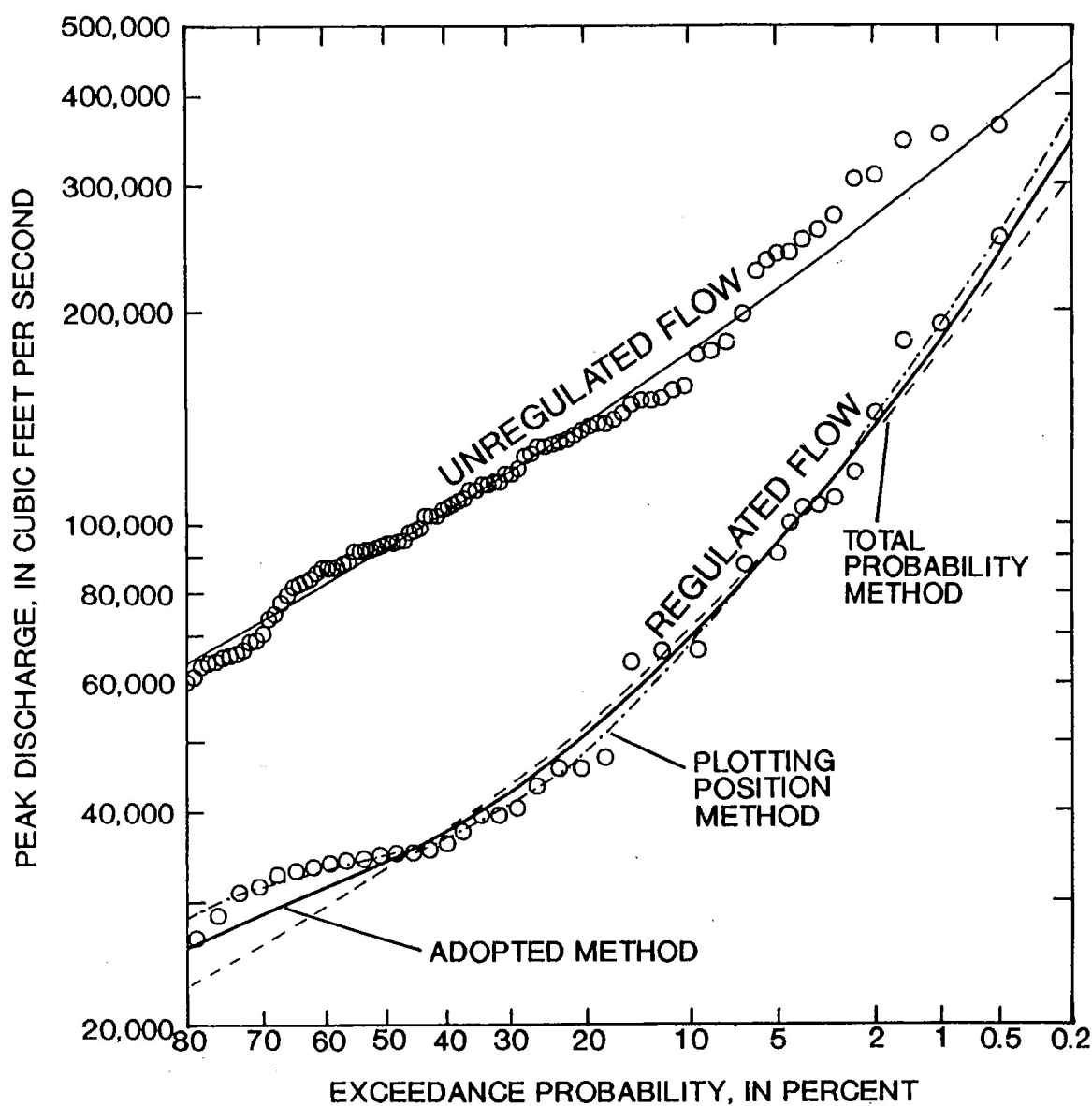


Figure 2.4.2-2 Correlation of Annual Peak Discharges on the Savannah River at Augusta, Georgia (02197000), and Jackson, South Carolina (2197320), for Years with Annual Peak Derived from Same Storm Event



Source: Figure 35 from USGS 1990

Figure 2.4.2-3 Unregulated and Regulated Annual Peak Discharge Frequency Curves for the Savannah River at Augusta, Georgia

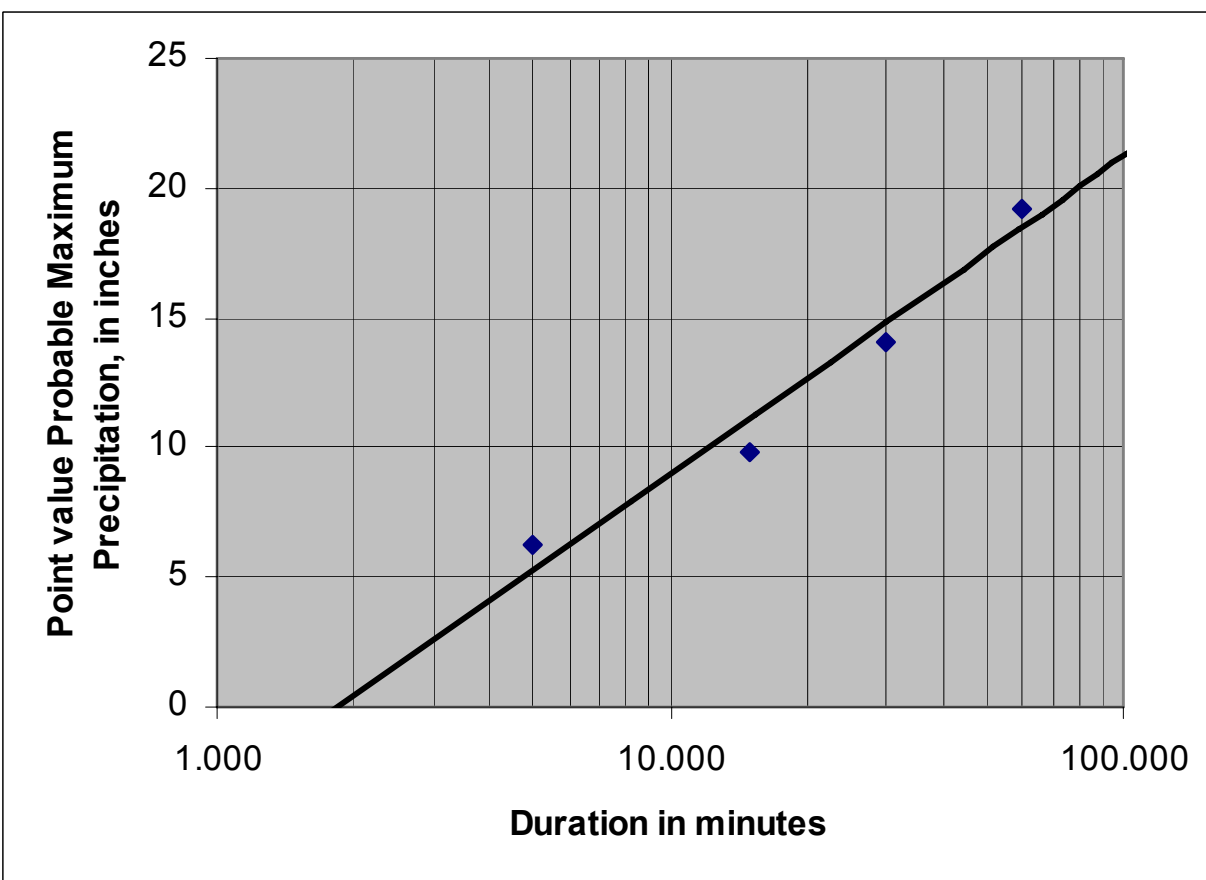


Figure 2.4.2-4 Probable Maximum Precipitation Values as a Function of Duration for Point Rainfall at VEGP Site

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(USGS 2006c) USGS Stream Gage 302197000 Savannah River at Augusta, Georgia. http://nwis.waterdata.usgs.gov/nwis/dvstat/?site_no=02197000 (annual peak data accessed 3-16-2006).

(USGS 2006d) USGS Stream Gage 302197320 Savannah River near Jackson, South Carolina http://nwis.waterdata.usgs.gov/nwis/dvstat/?site_no=02197320 (accessed 1-17-2006).

2.4.3 Probable Maximum Flood

In this section, the hydrometeorological design basis of any necessary flood protection measures is presented for those structures, systems, and components necessary to ensure the capability to shut down the proposed VEGP Units 3 and 4 and maintain them in a safe shutdown condition. One of the scenarios investigated to determine the design basis flood for ensuring the safety of nuclear power plants is the Probable Maximum Flood (PMF). PMF flows and stages at a site can be the result of local flooding, as discussed in Section 2.4.2, or riverine flooding, as described below.

The location of VEGP Units 3 and 4 would be adjacent to and generally to the west of the existing VEGP units, as illustrated in Figure 1-4. The site is located on a high bluff on the west bank of the Savannah River. The proposed site grade for the new units will be at or above Elevation 220 ft msl, similar to the existing VEGP units, which is well above the probable maximum flood stage of the Savannah River.

Based on calculations, site visits, an assessment of site conditions, and a review of previous studies, it was determined that the maximum water surface elevation resulting from the PMF on the Savannah River at the VEGP site and the additional combined action of wind setup and wave run-up would be substantially below El. 220 ft msl.

Considering this assessment, the VEGP site can be characterized as a “flood-dry site,” as described in Section 5.1.3 of the American National Standard Report, *Determining Design Basis Flooding at Power Reactor Sites*, because the safety-related structures of both the existing VEGP and proposed AP1000 units are or will be so high above the Savannah River that safety from flooding is “obvious or can be documented with minimum analysis” (**ANSI/ANS-2.8-1992**).

A review of studies and analysis performed for the existing units was carried out to confirm that the conclusions continue to be valid for Units 3 and 4. This characterization of the VEGP site is reported in Section 2.4.3.1.

A calculation of the PMF discharge using approximate methods was developed for the ESP application from Regulatory Guide 1.59, *Design Basis Floods for Nuclear Power Plants*, Revision 2, August 1977, reported in Section 2.4.3.2, and the calculation of the associated flood stage using a steady-state hydraulic model and wave run-up, reported in Section 2.4.3.3. These calculations indicate that the maximum flood stage associated with Savannah River flooding is approximately 70 ft below the base slab elevation of the proposed units, confirming the assessment of the VEGP site as “flood dry.”

2.4.3.1 Review of Studies for Units 1 and 2

As part of the hydrologic study carried out for Units 1 and 2, the PMF values for the Savannah River at the site were first estimated using a hydrologic model of the entire upstream watershed and then were checked with a dynamic hydraulic model of the reach of the Savannah River between the last storage reservoir and the VEGP site, as summarized below:

1. The HEC-1 Flood Hydrograph Computer Program, developed by the USACE, was used to develop the PMF hydrograph of the Savannah River near the VEGP site, using the unit hydrographs of the 10 subbasins developed by the National Weather Service (NWS) together with Probable Maximum Precipitation (PMP) estimates derived from methodology outlined in National Weather Service Hydrometeorological Reports (NWS HMR 51 and HMR 52). Valley storage was accounted for by separately modeling the Strom Thurmond Dam HEC-1 outflow hydrograph with the NWS DAMBRK program.
2. The HEC-1 model was independently verified by routing the USACE-derived PMF outflow hydrograph from the Strom Thurmond Dam down to the VEGP site and combining it with the PMF hydrographs from the intervening drainage areas developed from HEC-1.

The results of these previous modeling efforts are summarized in Table 2.4.3-1 and are described in more detail below.

Table 2.4.3-1 Results of Previous PMF Modeling Efforts

| Model | Description | PMF and Flood Elevation Results | PMF Stage Including Wave Action | Freeboard wrt El. 220 ft msl |
|------------------------------------|--------------------------------------|---------------------------------|---------------------------------|------------------------------|
| HEC-1 Model with HMR 51 and 52 PMP | Ignoring Valley Storage | 895,000 cfs, 136 ft msl | 163 ft msl | 57 ft |
| | Valley Storage Modeled in NWS DAMBRK | 540,000 cfs, 126 ft msl | 153 ft msl | 67 ft |
| USACE PMF with NWS DAMBRK Model | | 710,000 cfs, 138 ft msl | 165 ft msl | 55 ft |

2.4.3.1.1 Savannah River Watershed Hydrologic Model

In the HEC-1 hydrologic model, the watershed for the Savannah River at the VEGP site was subdivided into 10 subbasins with a total drainage area estimated at that time as 8,015 sq mi (the subwatershed areas used by the NWS for the current flood forecasting model of the Savannah River basin are different from the values used in previous modeling; the updated watershed areas are presented in Table 2.4.1-1 and are used for the PMF approximation described in Section 2.4.3.2). The PMF hydrograph for each subbasin was developed using the

unit hydrograph obtained from NWS for the respective subbasins and the corresponding PMP estimates pertaining to the subbasin in question.

Starting from the most upstream subbasin, the PMF hydrograph was then routed and combined in succession in the downstream direction to the VEGP site, including reservoir routing through the upstream Burton, Hartwell, Strom Thurmond, and Stevens Creek dams.

Below Augusta, Georgia, significant floodplain storage exists that could significantly reduce the flood peak. Two PMF values at the VEGP site are presented in the study for licensing Units 1 and 2: a value of 540,000 cfs, with valley storage effects considered, and a value of 895,000 cfs without storage. Without the wind wave activities included, the maximum Savannah River PMF water levels at the VEGP site were estimated to be at El. 126 ft msl and 136 ft msl, respectively, for these two cases.

2.4.3.1.2 Dynamic Hydraulic Model Check on Hydrologic Model Results

An independent check of the reliability of the HEC-1-based estimate of the PMF at the VEGP site was carried out by routing the USACE-derived PMF outflow hydrograph from the Strom Thurmond Dam down to the VEGP site using the NWS dynamic hydraulic model DAMBRK and combining it with the HEC-1-derived PMF hydrographs from the intervening drainage areas between the Strom Thurmond Dam and the site.

The PMF outflow hydrograph at the Strom Thurmond Dam was obtained from the 1962 USACE *Reservoir Regulation Manual* (revised in 1968) developed by the Savannah District before the HMR 51 and 52 PMP guidelines were published and before the closure of the upstream dams.

The PMF peak discharge at the VEGP site was found to be 710,000 cfs, with a corresponding maximum water level at EL 138 ft msl.

It appears that a PMF value of 710,000 cfs was adopted in the study for Units 1 and 2 because it gave a higher water level than the 540,000 cfs value derived from the HEC-1/NWS modeling effort, when valley storage effects were considered.

2.4.3.2 Estimation of PMF by Approximate Methods

An alternative method for estimating the PMF is described in the NRC Regulatory Guide 1.59 for flood dry sites. The method consists of obtaining a relationship for the PMF discharge as a function of drainage area, based on PMF iso-line maps developed for regions of the United States east of the 105th Meridian, and utilizing the drainage area at a given site, obtain the PMF from the relation determined for that region. No PMP is required for this method. Calculations for the estimated PMF at the VEGP site are presented below.

The PMF values determined from the 100-, 500-, 1,000-, 5,000-, 10,000-, and 20,000 sq mi contributing area maps at the location of the Savannah River watershed upstream of the VEGP site are tabulated in Table 2.4.3-2.

Table 2.4.3-2 PMF Values for an Area-PMF Relationship at the VEGP Site

| Watershed Area, sq. mi. | PMF in cfs from isolines | Supporting Figure (RG 1.59) |
|-------------------------|--------------------------|-----------------------------|
| 100 | 110,000 | B-2 |
| 500 | 250,000 | B-3 |
| 1,000 | 330,000 | B-4 |
| 5,000 | 750,000 | B-5 |
| 10,000 | 1,050,000 | B-6 |
| 20,000 | 1,300,000 | B-7 |

A logarithmic plot of the power curve fit to these values is presented in Figure 2.4.3-1. Based on the curve fit to the data and the currently estimated drainage area of 8,304 sq mi (as discussed in Section 2.4.1), the estimated PMF for the VEGP site is about 920,000 cfs. This point is located on the curve in Figure 2.4.3-1, along with a data point for VEGP (reported as Alvin W. Vogtle), presented on page 4 of 17 in Table B.1 of RG 1.59 as 1,001,000 cfs for a drainage area of 6,144 sq mi. Considering current and previously reported measurements, the drainage area reported for the VEGP site in Table B.1 appears to be incorrect and inconsistent with the RG 1.59 method, which was used to derive the value. However, it is presented as a published reference value.

2.4.3.3 Estimation of Flood Stage at VEGP Site for PMF

A stage-discharge relationship or “rating curve” is required to estimate the water surface elevation of the Savannah River near the VEGP site associated with the PMF discharge. This relationship was obtained from a steady-state hydraulic backwater analysis of the Savannah River run in HEC-RAS, a computer model developed by the USACE (**USACE 2005**).

The steady-state model was adapted from the dynamic model used for the analysis of the dam-break scenario described in Section 2.4.4, using the same channel roughness (Manning’s *n*) values as in that model. All bridges were removed from the dynamic model; they were not put back into the steady-state model, which is equivalent to assuming that any downstream bridges are either swept away or have a negligible impact on water surface elevations at the VEGP site during the PMF event.

Changes in the HEC-RAS model used to estimate stages at the VEGP site included:

- The reaches of the model upstream of the Augusta City Dam (River Mile 199.667) were removed.

- The model was converted from dynamic to steady-state mode with the downstream boundary condition at River Mile 99.406 determined by normal depth using an estimated energy slope of 0.0005 (the downstream water surface elevation will have a negligible impact on water surface elevations some 90 mi upstream near the VEGP site).
- The PMF and reference discharges were input for the entire model reach.
- The cross-section nearest the VEGP site (River Mile 150.906) was extended to the proposed top-of-slab elevation using 1:24,000-scale topography from 7.5-minute USGS quadrangles (**USGS MAPS 1989**)

The results for the cross-section nearest to the VEGP site (River Mile 150.906 in the model) are shown in Table 2.4.3-3.

Table 2.4.3-3 PMF Flood Stages for Cross-Section Nearest VEGP Site

| Profile | Q Total, cfs | W.S. Elev, ft | E.G. Elev, ft | E.G. Slope | Vel Chnl, fps | Flow Area, sf | Top Width, ft | Froude # Chl |
|-----------------|--------------|---------------|---------------|------------|---------------|---------------|---------------|--------------|
| Avg Daily Max | 13,669 | 88.22 | 88.25 | 0.000056 | 1.50 | 31,765 | 8,238 | 0.07 |
| Avg Annual Peak | 28,734 | 92.37 | 92.39 | 0.000056 | 1.64 | 66,743 | 8,551 | 0.07 |
| Historic Max | 360,000 | 118.55 | 118.63 | 0.000093 | 4.12 | 384,032 | 14,534 | 0.11 |
| PMF | 917,965 | 138.82 | 138.95 | 0.000102 | 5.66 | 680,627 | 14,681 | 0.13 |
| 2 x PMF | 1,835,930 | 160.50 | 160.71 | 0.000120 | 7.50 | 999,754 | 14,784 | 0.14 |

The longitudinal profile output for the Savannah River for this model is reproduced as Figure 2.4.3-2. The cross section developed for the VEGP site is shown in Figure 2.4.3-3.

The estimated maximum stages at the VEGP site for the PMF estimated per the approximate method outlined in RG 1.59 are shown in Table 2.4.3-4.

Table 2.4.3-4 Estimated Probable Maximum Flood Stage at VEGP Site

| | |
|---------------------------|---|
| PMF Stage: | 138.82 ft msl –HEC-RAS WSL at River Mile 150.906 |
| Wave run-up & wind set-up | 11.31 ft – result for 2h:1v slope w/ 50 mph wind from NE over an 11-mile fetch resulting from dam-break |
| Total PMF Stage: | 150.13 ft msl |
| Minimum Slab elevation | 220.00 ft msl |
| Estimated Freeboard | 69.87 feet |

Based on the fact that the estimated maximum stage reached by the Savannah River at the site for the approximate PMF flood is over 69 feet below the minimum top-of-slab elevation of any safety-related systems, structures, or components at the VEGP site, the characterization of a flood-dry site should be established.

2.4.3.4 Conclusions

The PMF discharge on the Savannah River at the VEGP site estimated using the approximate methodology recommended for flood-dry sites is approximately 920,000 cfs, which corresponds to an approximate flood stage of about El. 139 ft msl. Accounting for wave run-up and wind set-up, the probable maximum water surface elevation on the Savannah River at the VEGP site would be less than elevation 151 ft msl.

The peak flood discharge associated with the dam-break analysis presented in Section 2.4.4 is about 2,332,000 cfs – significantly higher than the estimated PMF, which is consistent with the very significant volume of storage in the reservoirs upstream of the site. The maximum water surface elevation of the Savannah River at the VEGP site associated with the dam-break scenario is El. 166.79 ft msl at a discharge of 2,233,000 cfs (occurring several hours after the wave front associated with peak discharge, at which time the water surface is lower). Including 11.31 feet of wave run-up and wind set-up, the estimated maximum water stage at the VEGP site is El. 178.1 ft msl, significantly higher than the stage resulting from the PMF event with no dam failure.

In either case, the probable maximum flood stage is so far below the proposed grade elevation for the new units that the site can be classified as flood dry without reservation, and it can be concluded that the site is not susceptible to flooding from the Savannah River.

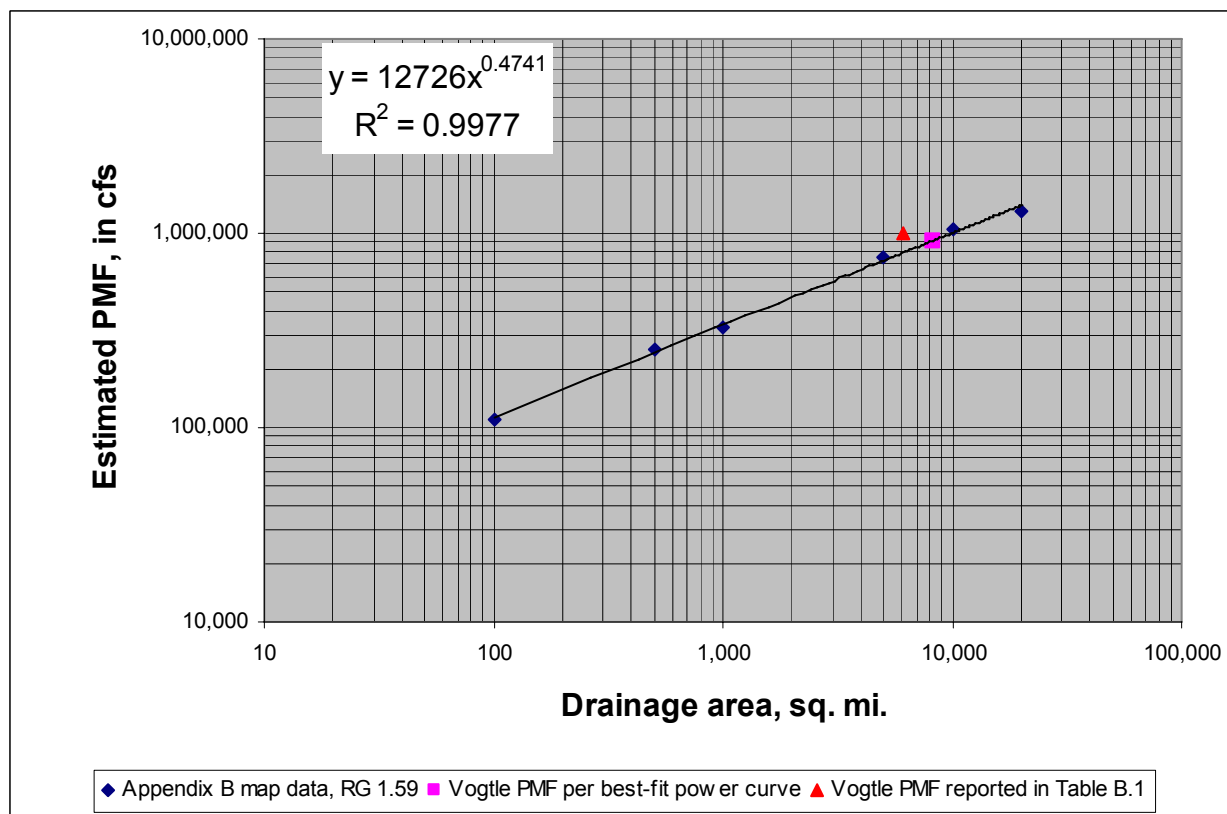


Figure 2.4.3-1 Area-PMF Plot for VEGP Site per Approximate Method from RG 1.59)

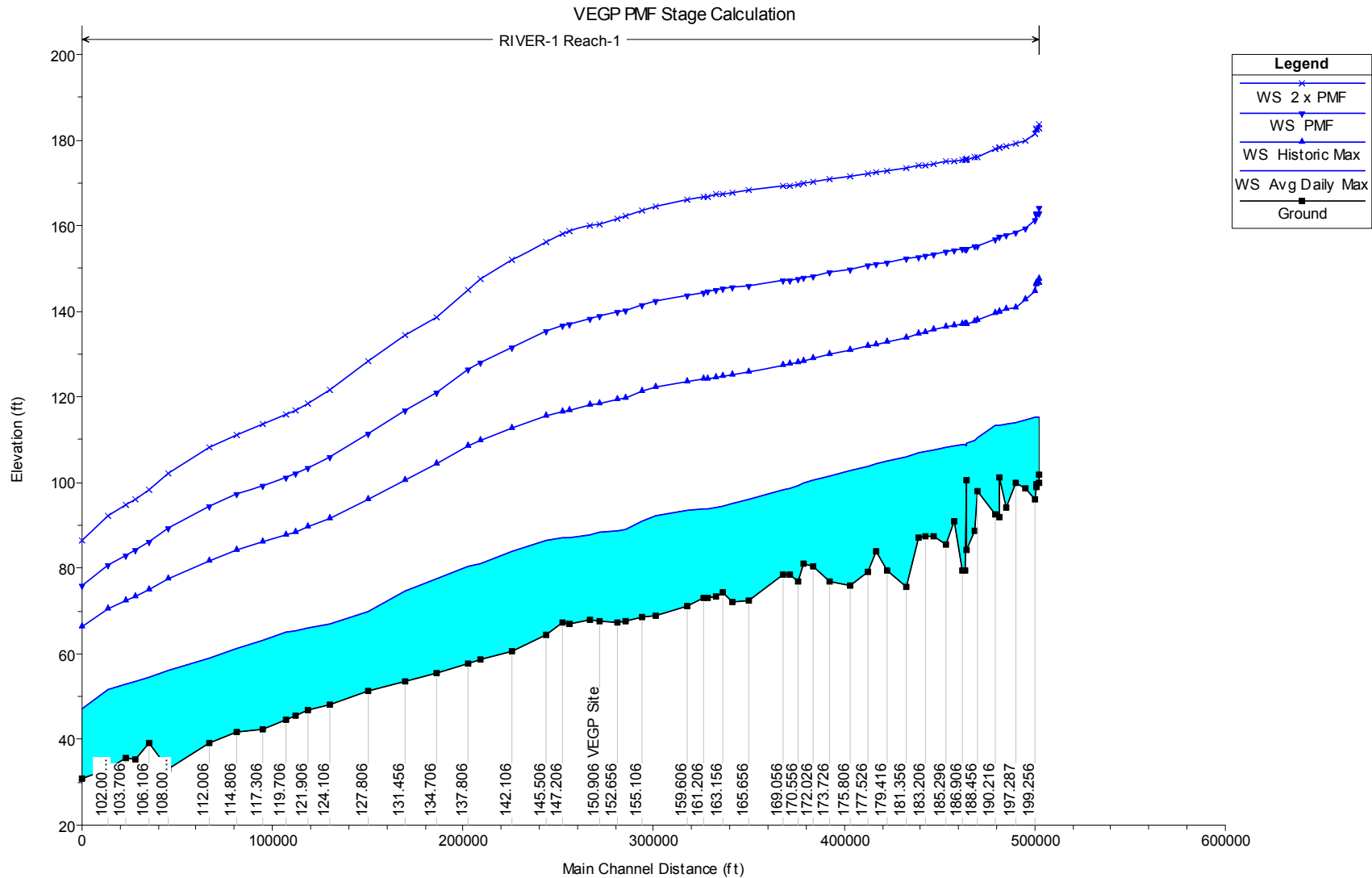


Figure 2.4.3-2 Longitudinal Profiles of the Savannah River from Steady-State HEC-RAS Model Run

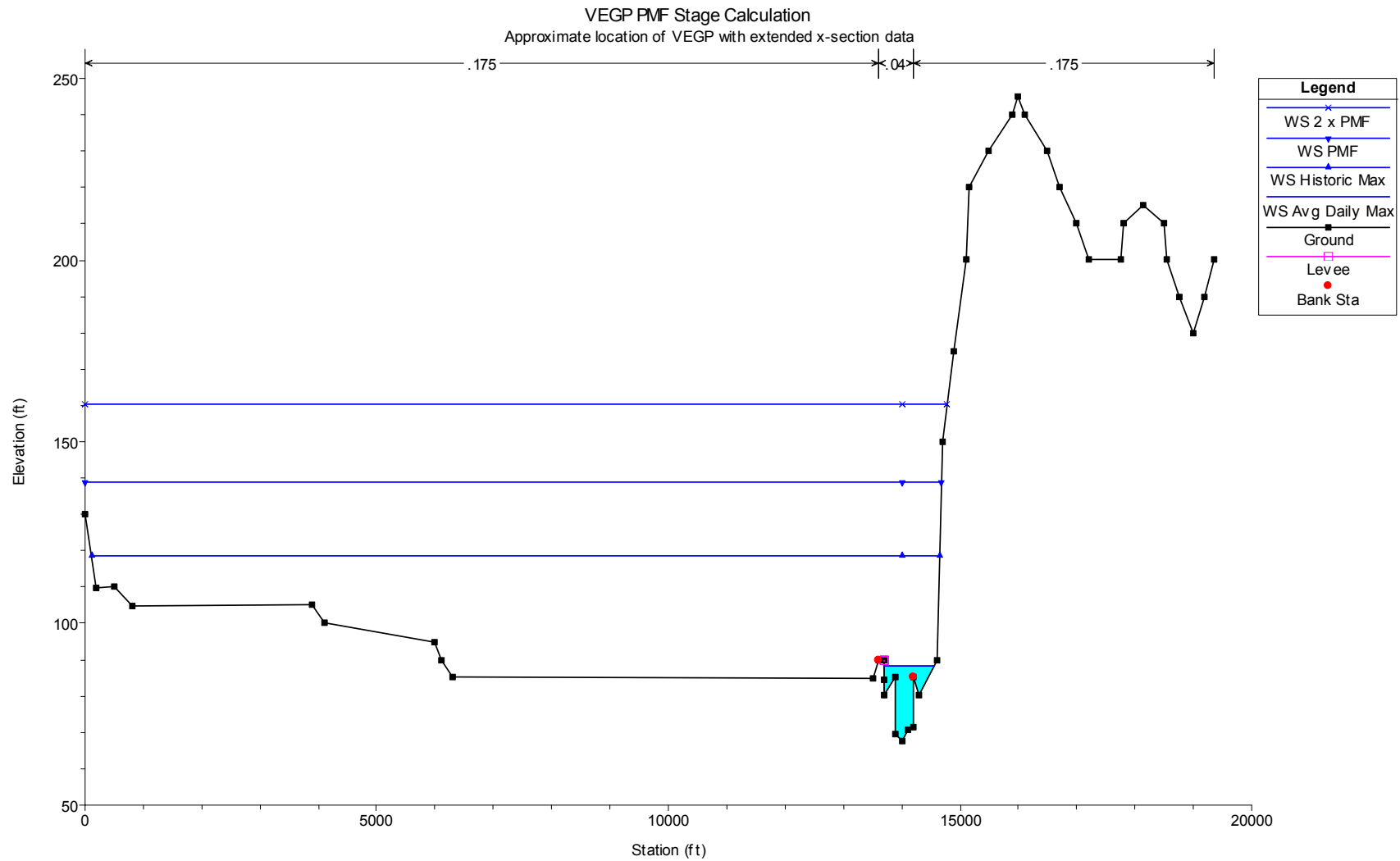


Figure 2.4.3-3 HEC-RAS Model Section at VEGP Site (Looking Downstream)

Section 2.4.3 References

(ANSI/ANS-2.8-1992) ANSI/ANS-2.8-1992, *Determining Design Basis Flooding at Power Reactor Sites*, American National Standards Institute/American Nuclear Society, 1992

(USACE 2005) HEC-RAS, River Analysis System, Version 3.1.3, Computer Program, Hydrologic Engineering Center, US Army Corps of Engineers, May 2005.

(USGS MAPS 1989) 7.5 Minute Series, Topographic Maps, US Geological Survey, Shell Bluff Landing, GA, 1989, Girard NW, GA-SC, 1989.

2.4.4 Potential Dam Failures

The VEGP site is located on the west bank of the Savannah River about 50 River Miles downstream of the City of Augusta, Georgia. There are 14 dams in the Savannah River Basin upstream of the VEGP site. These dams are owned and operated by either the U.S. Army Corps of Engineers (USACE) or one of several electric power generation companies located in Georgia and South Carolina. Table 2.4.1-9 lists the dams, their owners, and other pertinent data. The dams owned and operated by electric power generators fall under the jurisdiction of the Federal Energy Regulatory Commission (FERC); the other dams fall under the jurisdiction of the USACE.

Both FERC and USACE regulations require that dams for which failures pose a risk to human life be designed to survive very large earthquakes without risk of failure. Thus, it is unlikely that failure of any of the upstream dams would occur during a Safe Shutdown Earthquake (SSE). However, to demonstrate that the VEGP site will not be subject to flooding due to potential dam failures, a domino-type failure of the upstream dams is assumed, and this section analyzes the resulting flood wave and corresponding flood elevations at the VEGP site.

2.4.4.1 Dam Failure Permutations

Figure 2.4.4-1 shows the locations of the Savannah River Basin dams. Two of these dams, Stevens Creek Dam and New Savannah Bluff Lock and Dam, are relatively small weir structures used for flow diversion and small hydropower generation and do not have significant storage volumes. Both of these dams are located downstream of J. Strom Thurmond (also known as Clark's Hill) Dam and would be completely inundated by a breach of the upstream dams. Therefore, they are not included in the dam breach analysis presented in this subsection.

Table 2.4.1-9 lists each dam, its location, and size. Note that Little River Lake and Dam and Keowee Lake and Dam are hydraulically connected and share a common reservoir. All discharge from the common reservoir is through the Keowee Dam. Little River Dam has no outlet works.

Three large hydroelectric and storage dams on the Savannah River are operated by the USACE. They are J. Strom Thurmond Lake and Dam, Richard B. Russell Lake and Dam, and Hartwell Lake and Dam. Each dam comprises an earth embankment with a concrete gravity section in the center where the hydroelectric generation facilities and spillway gates are located. Upstream of Hartwell Dam, the remaining dams are located on tributaries to the Savannah River. Keowee/Little River Dam and Jocassee Dam are located on the Keowee River. Yonah Dam and Tugaloo Dam are located on the Tugaloo River. Tallulah Falls Dam, Mathis Dam, Nacoochee Dam, and Burton Dam are located on the Tallulah River, which is a tributary to the Tugaloo River.

For the dam breach analysis, conservatism of coincident flow rates in the Savannah River and water levels in the dams are assumed. The dam failure is assumed to be coincident with the standard project flood (SPF) water levels in the reservoirs behind the dams and the USACE-defined SPF discharge in the Savannah River.

Upstream of Thurmond Dam, there are essentially no free-flowing reaches of the Savannah River or the Keowee River. Each dam discharges into the reservoir pool of the next downstream dam. The failure mode that produces the largest flood wave and flood elevations at the VEGP site would produce the highest water level and largest volume of water at Thurmond Dam (the dam closest to the site) just before the assumed breach of Thurmond Dam. Based on the configuration of the dams upstream of Thurmond Dam, two breach scenarios are possible.

The first scenario consists of breaching all dams simultaneously. In this scenario, the water level at Thurmond Dam would be the SPF flood level in the lake, El. 342.1 ft msl (**USACE 1996**). Initially, the stored water behind the reservoir would be the storage volume associated with the SPF water level. The inflow into Thurmond Lake would be equal to the flow through the breach at Russell Dam, which would be based on the SPF water level at Russell Dam, and so on upstream for all dams.

The second scenario consists of initially breaching only the most upstream dam in one of the stream reaches upstream of Hartwell Dam and allowing it to fill the next downstream reservoir, overtopping the downstream dam and breaching it. This scenario would continue breaching dams downstream by overtopping until Thurmond Dam is breached. In this scenario, when the breach occurs at Thurmond Dam, the water level would be at the top of the dam, El. 351.0 ft msl (**USACE 1996**). Since the water level would be higher than the SPF level, the storage volume would also be larger. Additionally, the flow from Russell Dam into Thurmond Lake would have already started before Thurmond Dam was breached and would also be based on a higher water level in Russell Lake, resulting in a larger discharge into Thurmond Lake. Thus, with higher water levels and larger storage volumes and with the discharges from the upstream breaches already established before Thurmond Dam is breached, the second alternative would produce the higher flood wave downstream.

In the second scenario, there are two possible failure modes. The first mode (Mode 1) consists of Jocassee Dam breaching and progressing downstream through Keowee Dam to Lake Hartwell. The second mode (Mode 2) consists of Burton Dam breaching and progressing downstream through Nacoochee Dam, Mathis Dam, Tallulah Falls Dam, Tugaloo Dam, and Yonah Dam to Lake Hartwell. By comparing the normal pool storage volumes for the upstream dams listed in Table 2.4.1-9, the most severe failure mode is estimated. The combined normal pool storage volumes behind the dams in each mode are shown in Table 2.4.4-1.

Table 2.4.4-1 Normal Pool Storage Volumes

| Dam | Mode 1 Reservoir Storage Volume (1000 ac-ft) | Mode 2 Reservoir Storage Volume (1,000 ac-ft) |
|----------------|---|--|
| Jocassee | 1,100 | |
| Keowee | 940 | |
| Burton | | 108 |
| Nacoochee | | 8.2 |
| Mathis | | 31.4 |
| Tallulah Falls | | 2.46 |
| Tugalo | | 43.2 |
| Yonah | | 10.2 |
| Total | 2,040 | 203 |

Table 2.4.4-1 indicates that the normal pool storage volume in Mode 1 is 10 times the volume in Mode 2. Thus, an assumed dam failure scenario following Mode 1 with the Jocassee Dam failing is analyzed.

2.4.4.2 Unsteady Flow Analysis of Potential Dam Failures

The dam breach option of the USACE River Analysis System computer program (HEC-RAS) (**USACE 2005a**) was used to develop the dam breach flood wave. The unsteady flow option of HEC-RAS was then used to route the flood wave downstream to the VEGP site. Multiple dams were breached in the analysis to determine the maximum flood elevation at the site. Although HEC-RAS is capable of routing several dam breaches in succession, this analysis used an alternative modeling approach for simplicity and conservatism. In this analysis, only two dams (Russell Dam and Thurmond Dam) were breached in succession. The storage volume behind the upstream dam (Russell Dam) was assumed to be equivalent to the SPF storage volume of all the upstream reservoirs (Lake Jocassee, Lake Keowee, Hartwell Lake, and Lake Russell). This approach conservatively models the successive failure of the three upstream dams and the simultaneous arrival of their combined storage volumes at Russell Dam. Russell Dam is breached by overtopping, which then causes the overtopping breach of Thurmond Dam and a subsequent flood wave down the Savannah River.

The *Savannah River Basin Water Control Manual* (**USACE 1996**) contains the SPF water levels, SPF discharges, and storage volumes from the Thurmond, Russell, and Hartwell dams, as well as storage data for the Jocassee and Keowee dams. Jocassee and Keowee dam SPF peak discharges and water levels are not available. However, probable maximum flood (PMF) water levels and discharges, which are greater than SPF values, are available and were used instead of the SPF values in the analysis. The PMF water levels and peak discharges for these

two dams were obtained from LBC&W Associates of South Carolina (**LBC&W 1972**). Area-capacity curves for each of the five reservoirs are shown on Figures 2.4.4-2 through 2.4.4-6, respectively.

For the purposes of this analysis, the Russell and Thurmond dams were assumed to fail by overtopping. The HEC-RAS dam breach option requires that breach parameters be established for each dam. The parameters define the breach dimensions and the time required to develop the breach. Several methodologies are available to estimate the required breach parameters. A report produced by the U.S. Bureau of Reclamation summarizes many of the methodologies for determining earth embankment breach parameters (**USBR 1998**). This report is used to estimate the breach parameters for each dam. The estimated breach widths at the bottom of the breach are 750 and 755 ft for the Thurmond and Russell dams, respectively. The estimated breach side slope is 2H:1V for each breach, and the time to develop each breach is approximately 1 hour. For the dam breach analysis, it was conservatively assumed that each breach extends to the invert of the natural stream channel on the upstream side of the dam. For this to occur, it was assumed that some native material is eroded away along with the embankment material.

Once the dam breach occurred, the HEC-RAS computer program determined the flood wave discharge from the dam based on the breach dimensions, water level in the reservoir behind the dam, and the water level downstream of the dam. The program then used an unsteady flow option to model the progression of the flood wave downstream to the VEGP site. Additionally, HEC-RAS continued to model the flows through the dam breaches until the stored water in the reservoirs was evacuated. Since the combined volume of all five reservoirs is more than 10 million acre-feet, the flood wave from the dam breaches would last for several days at the VEGP site.

Cross-section data for the Savannah River used in the HEC-RAS computer model were obtained directly from the USACE, Savannah District (**USACE 2002**). The data were supplied in HEC-RAS format and assembled from various floodplain studies on the Savannah River. To ensure that the cross-section data were accurate, several representative cross-sections near the site, in the City of Augusta, and near Thurmond Dam, were compared with cross-sections developed independently from USGS topographic maps (**USGS 1984–2000**). In each instance, the cross-section data supplied provided a good match with those developed from USGS topographic maps.

The USACE elevation data for most of the cross-sections did not extend to the computed water surface elevation for the dam breach analysis. Therefore, HEC-RAS extended the left-most and right-most cross-section elevations vertically to meet the computed water surface. Usually, this approach is conservative in that it produces a cross-sectional area less than the actual cross-section. However, downstream of the breached dam, a constricted cross-section could produce

water levels high enough to restrict the flow from the breach due to tail water submergence. Thus, four cross-sections downstream of the dam were sufficiently extended horizontally, based on USGS topographic information, to cover the range of the computed water levels.

A sensitivity analysis was performed to assess the effect of extending the remaining cross-sections to higher elevations. The results of this analysis indicated that extending the cross-sections lowered the water level and peak discharge at the VEGP site by less than 0.5 ft. Thus, for the most part, these cross-sections were not modified. However, the cross-section data through the City of Augusta extend only to the top of the levee on the right (west) bank of the Savannah River. Flood elevations for the dam breach event would overtop the levee and extend out into the City of Augusta. Thus, cross-section data through the City of Augusta were extended horizontally using topographic maps (**USGS 1984–2000**) to include additional area to these cross-sections and account for overtopping of the levee.

At least two sets of River Mile stationing have appeared in different USACE publications for the Savannah River. There is an approximately 16-mi discrepancy between the two stationing sets. The River Mile stationing set used in this analysis matches the stationing set used in the VEGP UFSAR and most of the *Savannah River Basin Water Control Manual* (**USACE 1996**). The VEGP site is located at River Mile 150.9 in the HEC-RAS model. The other River Mile stationing reference would have the site at approximately River Mile 167.

Several bridges cross the Savannah River downstream of Thurmond Dam and through the City of Augusta. The last of these bridges is about 40 river miles upstream of the VEGP site. Modeling the dam breach flood wave through the City of Augusta with the bridges intact would produce results that impede the travel of the flood wave and reduce the computed flood levels at the VEGP site. However, during a dam breach event, all bridges would be significantly overtopped and it is likely that most, if not all, would be washed out. Thus, to provide more reasonable results, which allow the flood wave to progress unimpeded downstream (a conservative assumption for modeling the flood elevations at the VEGP site), the bridge structures were removed from the HEC-RAS model.

The Savannah River cross-section data supplied by the USACE stopped just downstream of Thurmond Dam. Cross-sections upstream and downstream of Thurmond and Russell dams were obtained from USGS topographic maps (**USGS 1984–2000**). The below-water portions of the cross-section data were obtained from fishing maps with depth contours (**FHS L649; FHS L650**).

Roughness coefficients (Manning's n) were estimated using procedures developed by the US Geological Survey (**USGS 1989**). Additionally, roughness coefficients were estimated for the flood studies performed for the existing VEGP Units 1 and 2 by calibrating water surface profile models with known flood elevations. The USGS estimation procedures produce roughness coefficients that are higher, and more conservative, than those presented in the UFSAR. Thus,

the USGS-estimated roughness coefficients were used in the HEC-RAS dam breach model. The use of higher roughness coefficients is consistent with observations of dam-break floods that show that roughness coefficients for exceptionally high flow depths associated with dam-break floods are higher than those associated with lower flood flows in a river.

The starting water levels at three locations were required in the HEC-RAS dam breach model—in each of the two reservoirs and at the downstream end of the model. The cross-section farthest downstream in the HEC-RAS model is located at the River Mile 99.41, 51.5 mi downstream of the VEGP site. The normal depth option in HEC-RAS was used to determine the starting water surface elevation at this location. Given the distance from the site, any changes in the downstream boundary condition water level will not affect the computed flood elevations at the VEGP site.

The starting water level in Thurmond Lake was set at the SPF water level (i.e., El. 344.7 ft msl). Additionally, at this point an initial inflow was added equal to the SPF discharge of 560,000 cfs from Thurmond Dam. Once Russell Dam breaches, the overtopping breach of Thurmond Dam is triggered when the water level reaches El. 351.1 ft msl, 0.1 ft above the top of the dam (**USACE 1996**), due to inflows from the breach of Russell dam.

The starting water level at Russell Dam was treated slightly differently. The model was set up as if the breaches of the Jocassee, Keowee, and Hartwell dams have already occurred and the combined SPF storage volume from these reservoirs is already at Russell Dam. Any upstream breaches would have already raised the water level to the top of Russell Dam. Therefore, the starting water level at Russell Dam was set at the top of the dam at El. 495.0 ft msl (**USACE 1996**). The overtopping breach of Russell Dam was triggered 2 hours after the start of the HEC-RAS simulation. This 2-hour time delay allowed the SPF flood flow in the Savannah River downstream of Thurmond Dam to stabilize in the HEC-RAS model prior to initiating the Russell Dam breach.

2.4.4.3 Water Level at the Plant Site

The results of the HEC-RAS dam breach and unsteady flow routing analysis indicate that the peak water level at the VEGP site due to dam failure is El. 166.79 ft msl, which is 53.21 ft below the proposed site grade at El. 220.0 ft msl. The computed discharge at the time of the peak water level is 2,232,605 cfs.

The computed peak discharge rate, however, occurs 5 hours before the peak water level. The peak discharge is 2,331,582 cfs, with a corresponding water level at El. 164.71 ft msl. The delay in the peak water level at the site is due to backwater effects caused by the peak flood wave moving downstream of the site. The results are quoted to more significant figures than is physically possible to measure so that, if necessary, a direct correlation between the numerical

results presented here and the computer output in supporting calculations can be obtained easily.

A plot of the Savannah River discharge and stage hydrograph at the VEGP site location is shown in Figure 2.4.4-7. Plots of the SPF water surface profile, maximum water surface profile, and water surface profile at the time of the maximum water level at the VEGP site are shown on Figures 2.4.4-8 through 2.4.4-10, respectively.

The flood elevations determined for this section have been determined to demonstrate that a postulated dam-break flood wave cannot adversely impact the VEGP site. The analysis to determine these elevations is based on very conservative assumptions, and the computed flood elevations should not be used for any other purposes or locations.

In accordance with ANSI/ANS-2.8 (1992), the maximum wave height and wave run-up at the shoreline generated by a 2-year wind speed must be estimated in conjunction with the dam breach flood level at the site. The fastest mile 2-year wind speed at the site is 50 mph (**ANSI/ANS-2.8 1992**). The *Coastal Engineering Manual (USACE 2005b)* is used to estimate the wave height and run-up elevations at the VEGP site. The procedures outlined in the *Coastal Engineering Manual* use the wind speed, wind speed duration, water depth, and over-water fetch length to determine wave heights and run-up. The maximum fetch length during the dam breach flood is from the northeast and is about 11.14 miles long. The maximum fetch length is shown on Figure 2.4.4-11.

Various wind speed durations were analyzed to determine the maximum wave height and run-up elevation at the site. The wave run-up was determined based on the steep embankment condition that will exist during a dam breach flood event at the VEGP site. The estimated slope of the embankment is 2H:1V for the wave run-up determination.

The estimated wave height and run-up values at the VEGP site during the dam breach flooding event are as follows:

- Maximum Wave Height, HMAX = 7.46 ft
- Spectral Peak Period, TP(MAX) = 4.09 s
- Maximum Wave Length, L0 = 85.73 ft
- Maximum Wave Run-up, R = 11.31 ft

The calculated wave run-up also includes wave setup effects. To obtain the maximum flood elevation due to wind-induced waves at the VEGP site, the maximum wave run-up elevation was added to the still water elevation due to dam breach flooding. Adding these two numbers gives a maximum flood level of El. 178.10 ft msl, which is 41.9 ft below the proposed site grade of El. 220.0 ft msl. Therefore, the VEGP site is precluded from flooding due to potential dam failures and coincident wind-generated waves.

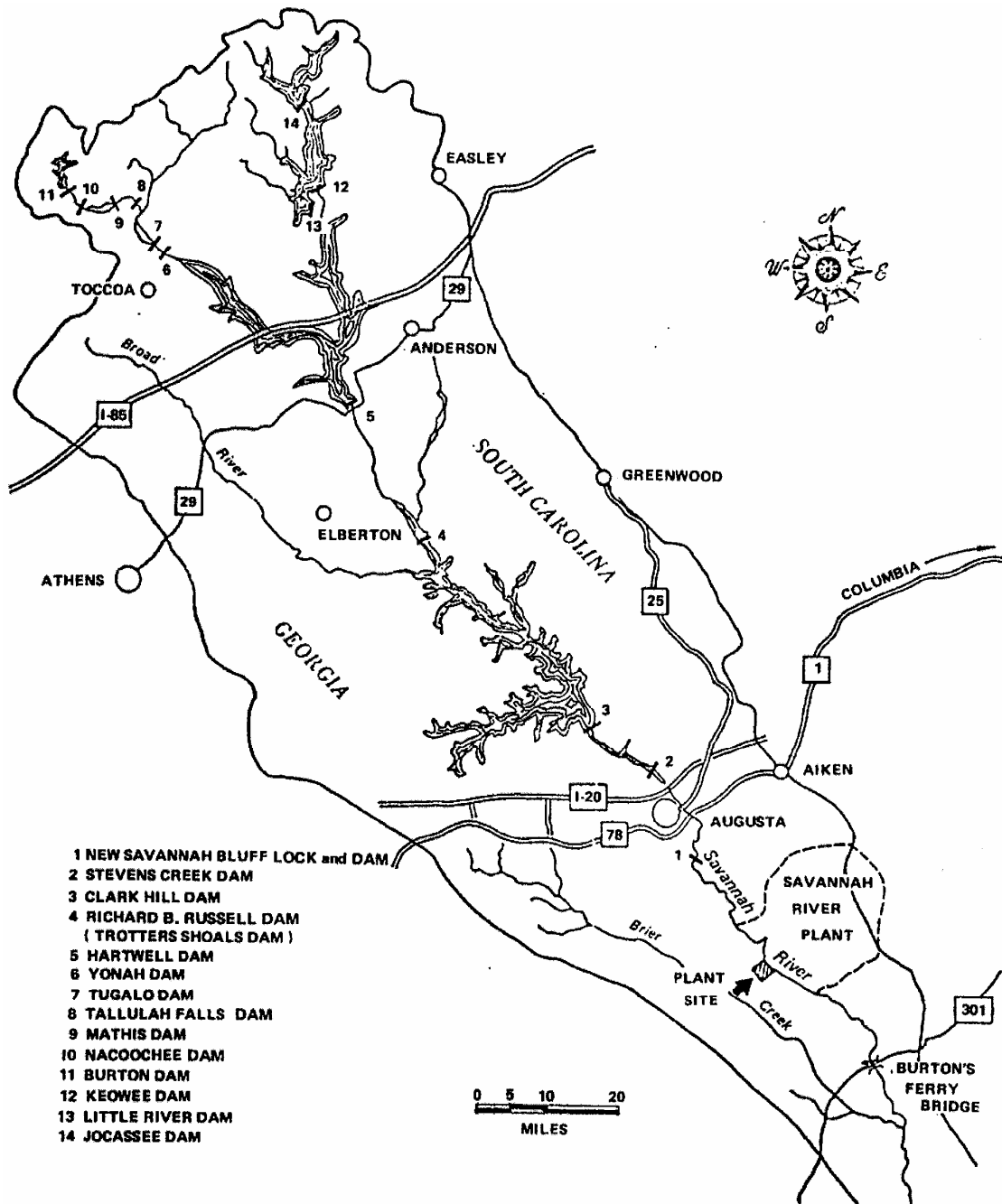
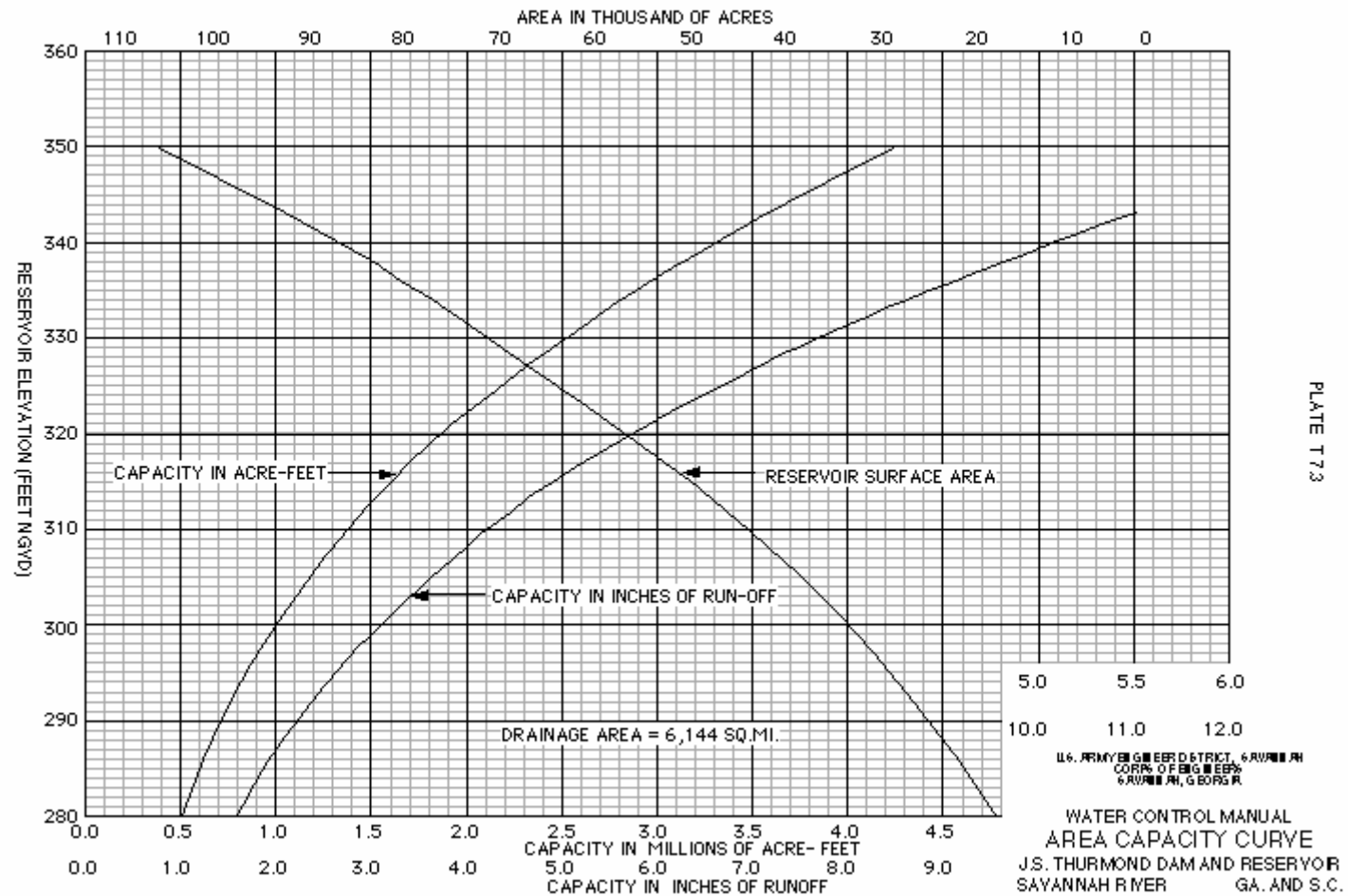
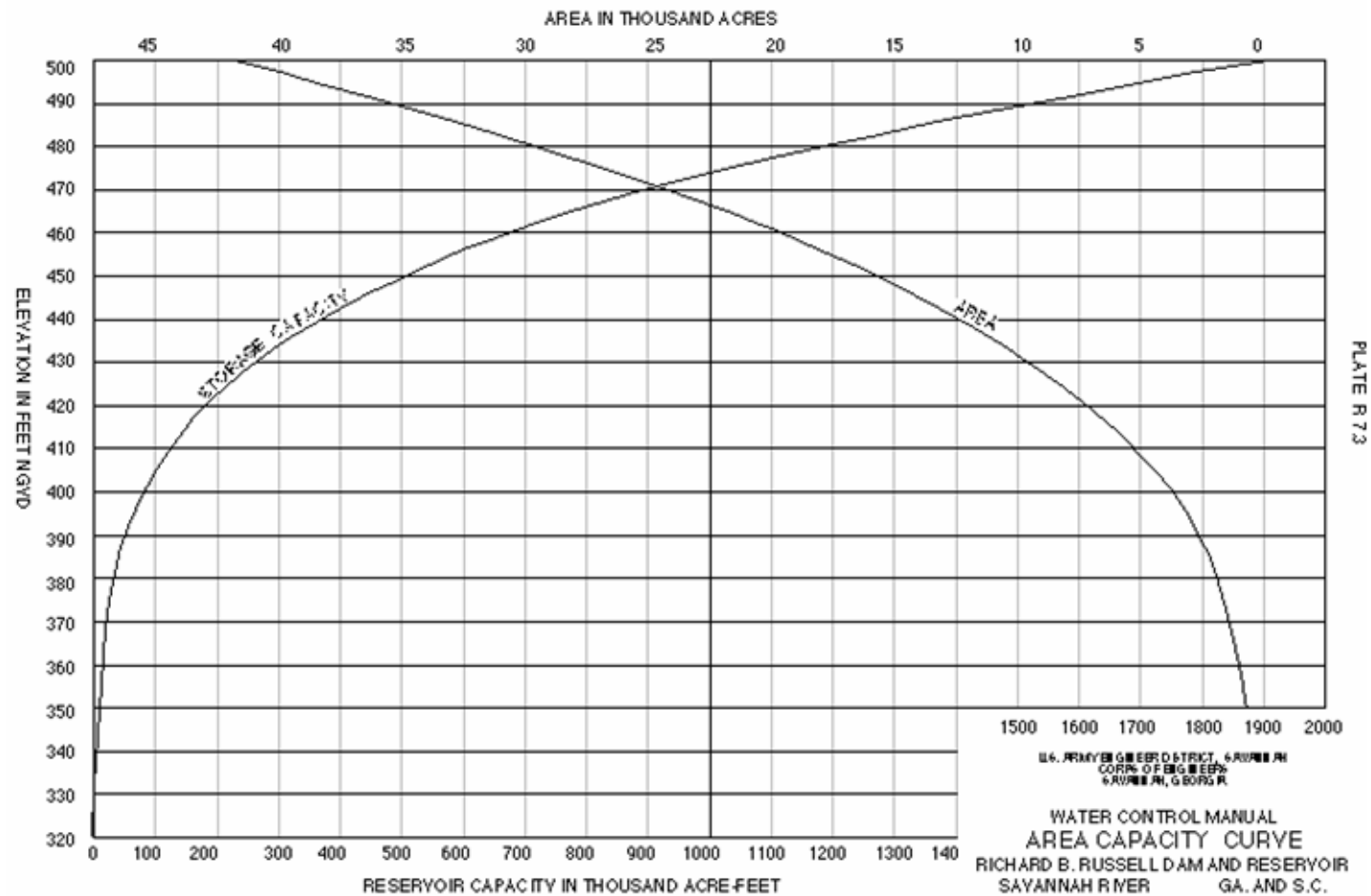


Figure 2.4.4-1 Savannah River Basin Dam Locations



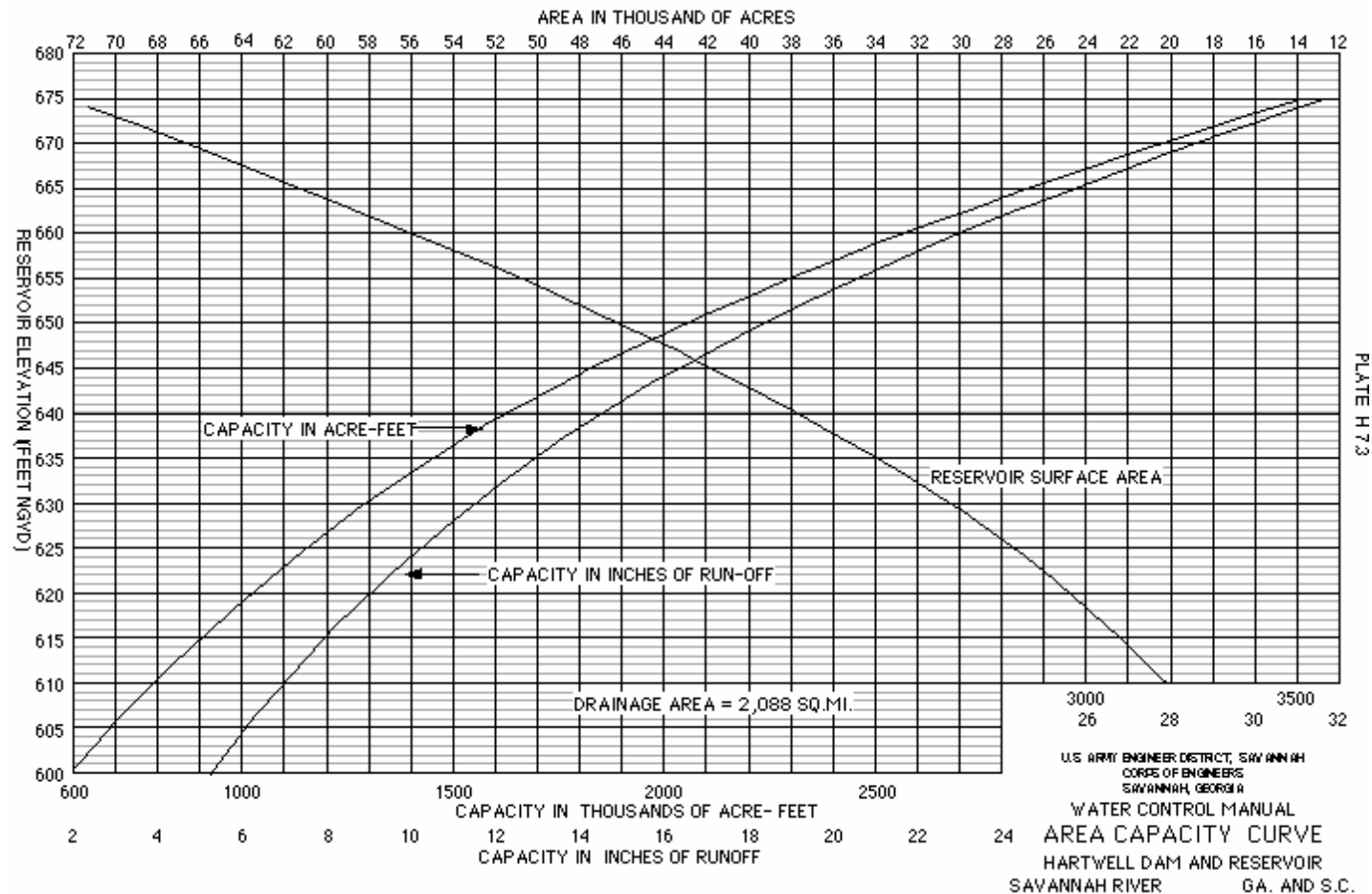
Source: USACE 1996

Figure 2.4.4-2 J. Strom Thurmond Area Capacity Curve



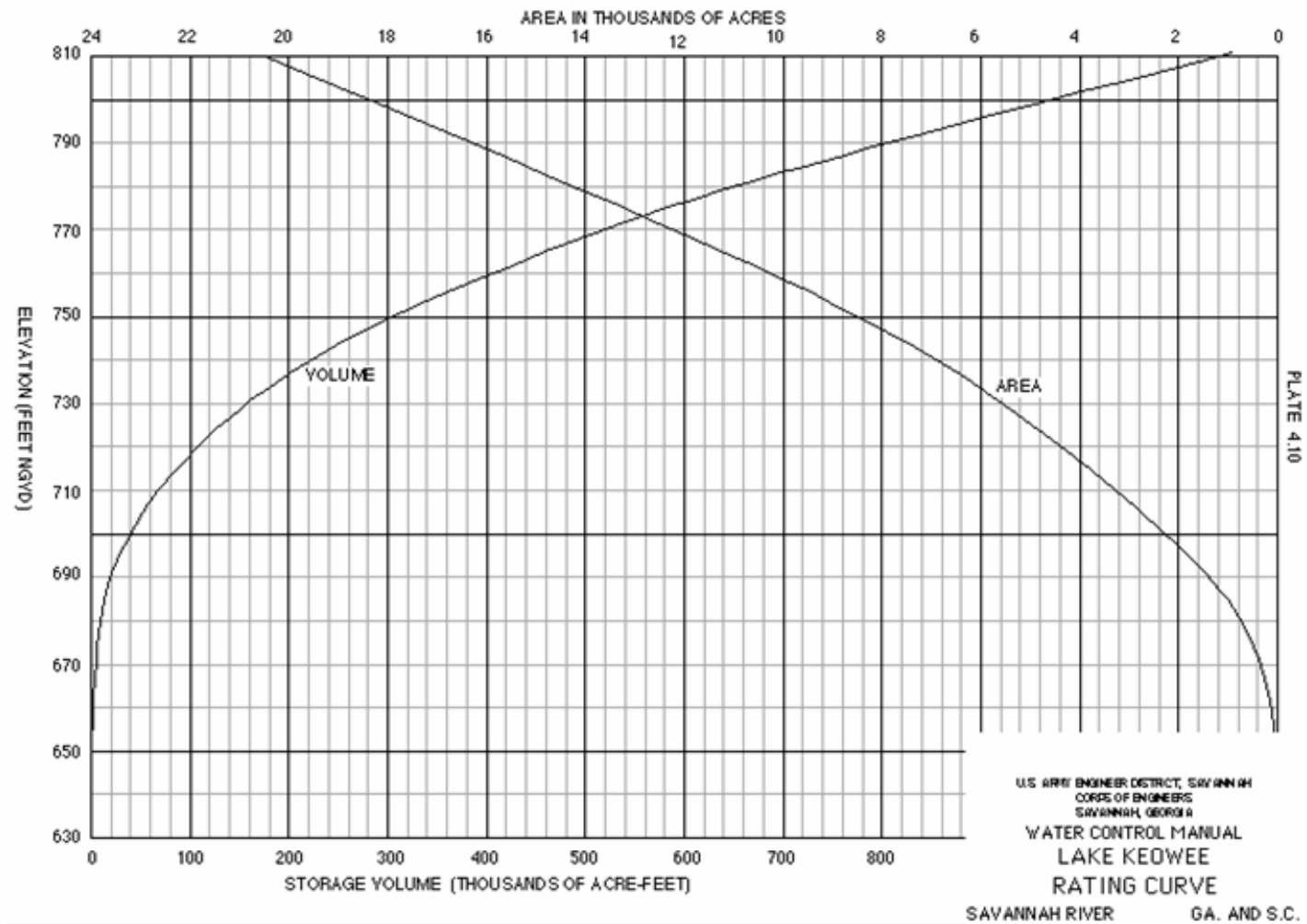
Source: USACE 1996

Figure 2.4.4-3 Richard B. Russell Area Capacity Curve



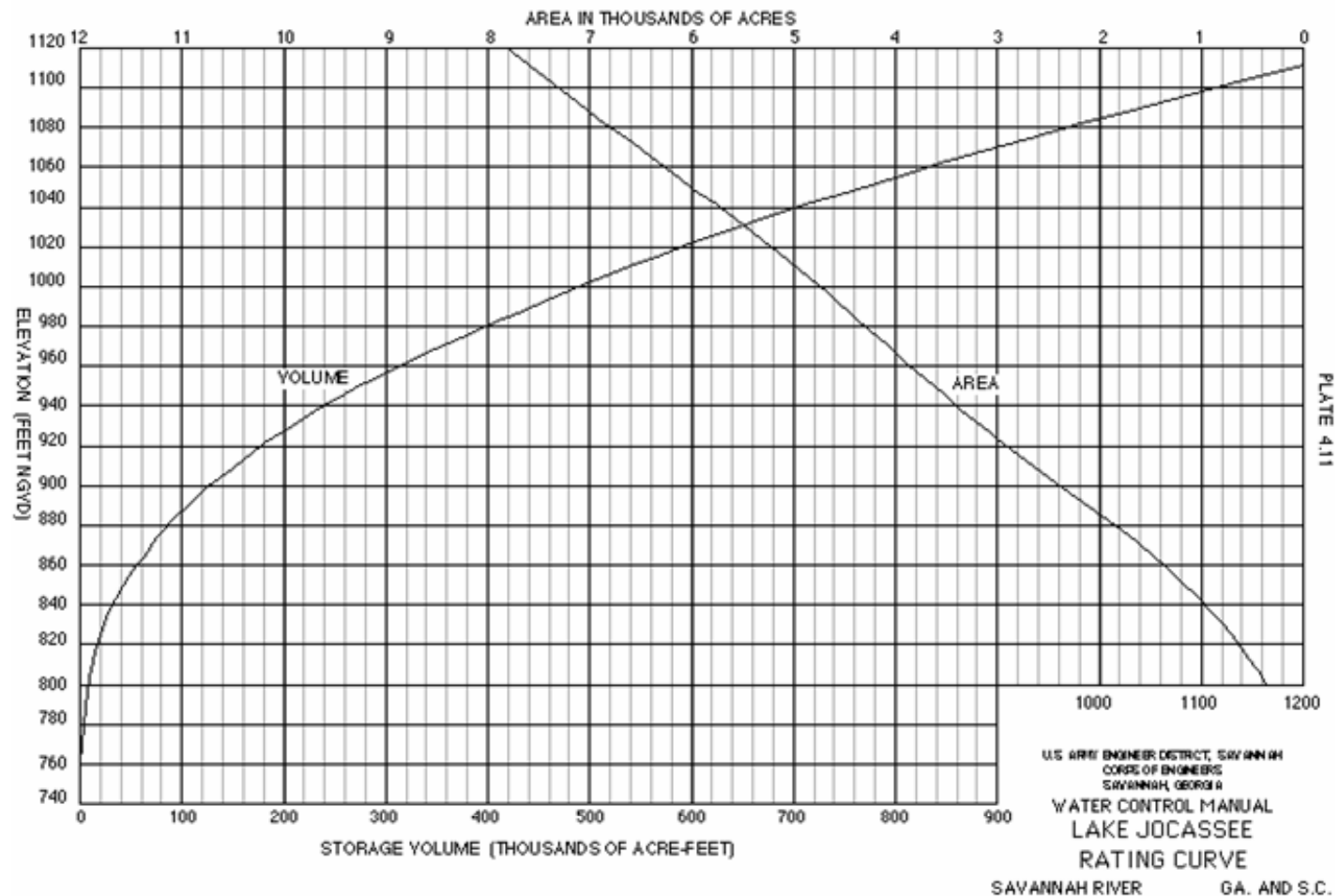
Source: USACE 1996

Figure 2.4.4-4 Hartwell Dam and Reservoir Area Capacity



Source: USACE 1996

Figure 2.4.4-5 Keowee Area Capacity Curve



Source: (USACE 1996)

Figure 2.4.4-6 Jocassee Area Capacity Curve

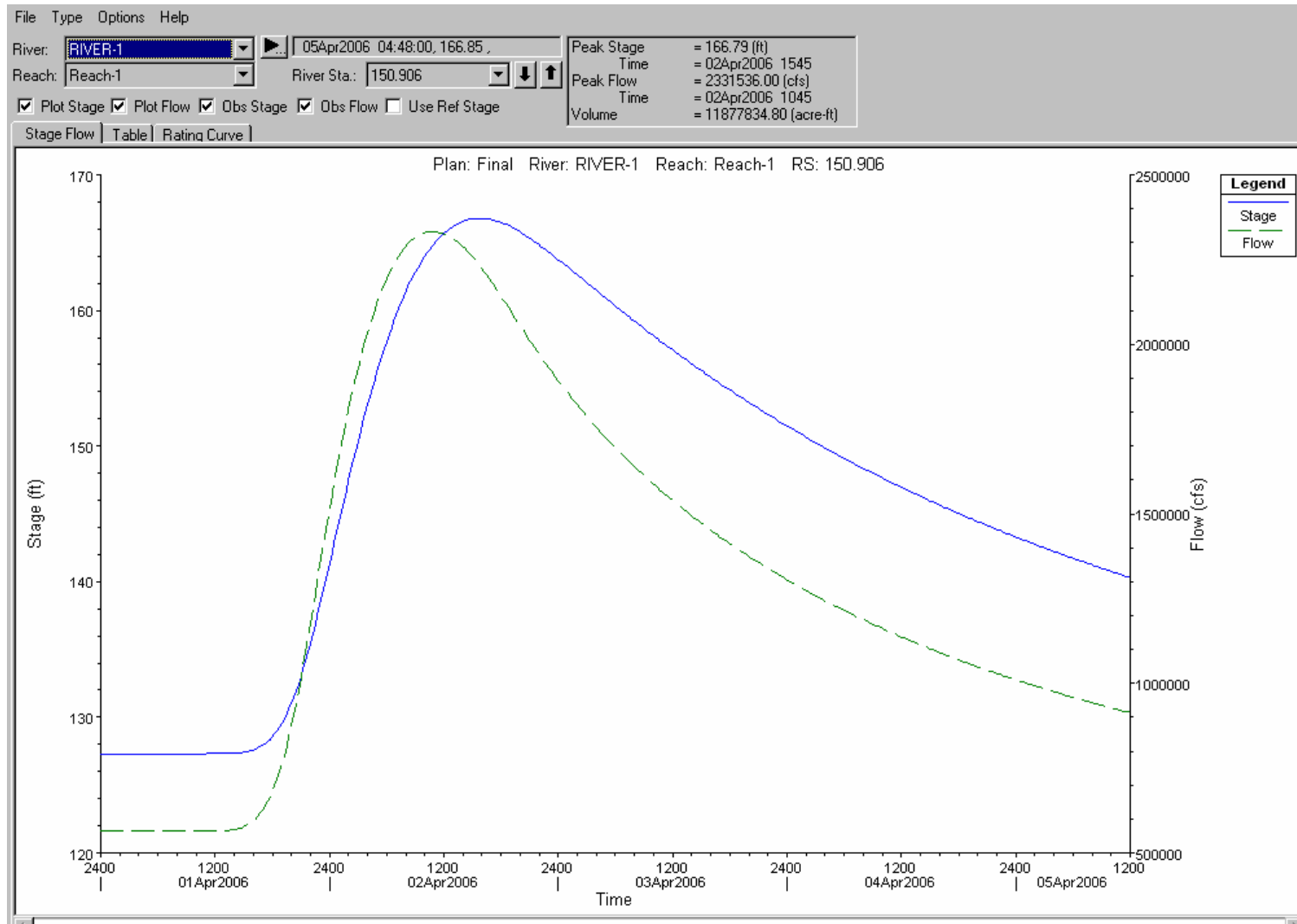


Figure 2.4.4-7 Dam Breach Flood Flow and Stage Hydrograph at the VEGP Site

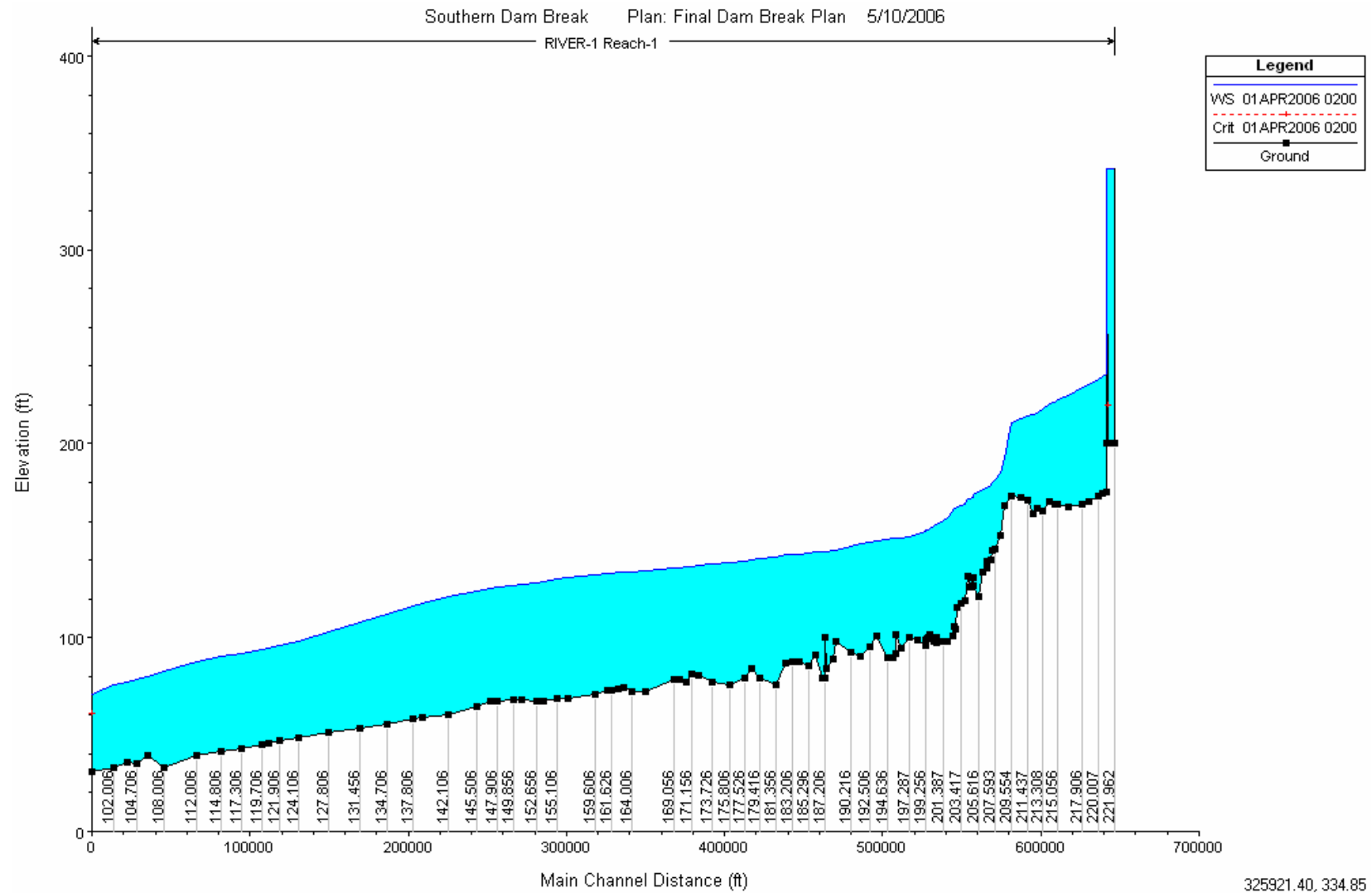


Figure 2.4.4-8 Savannah River SPF Water Surface Profile

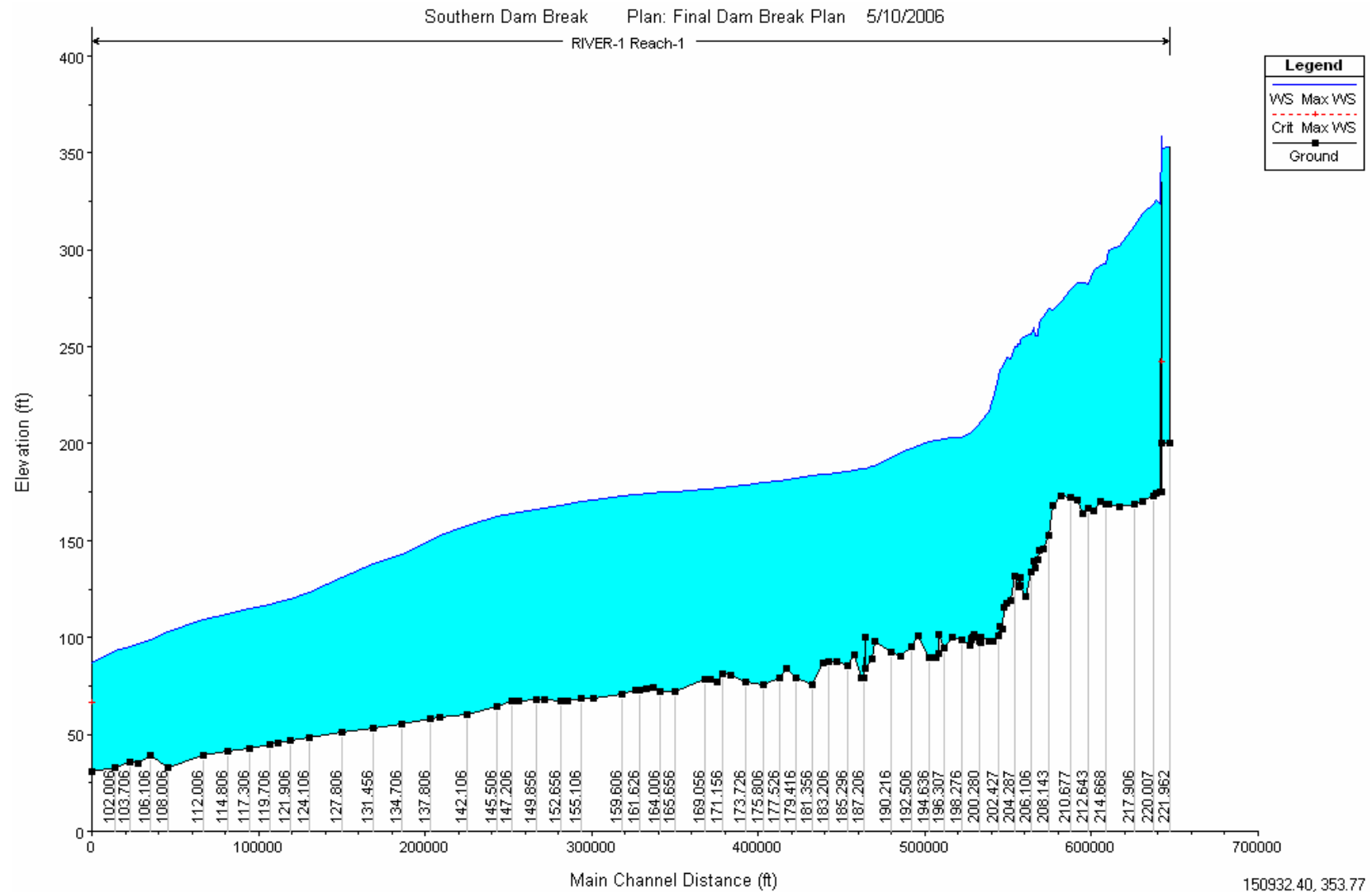


Figure 2.4.4-9 Savannah River Dam Breach Flood Maximum Water Surface Profile

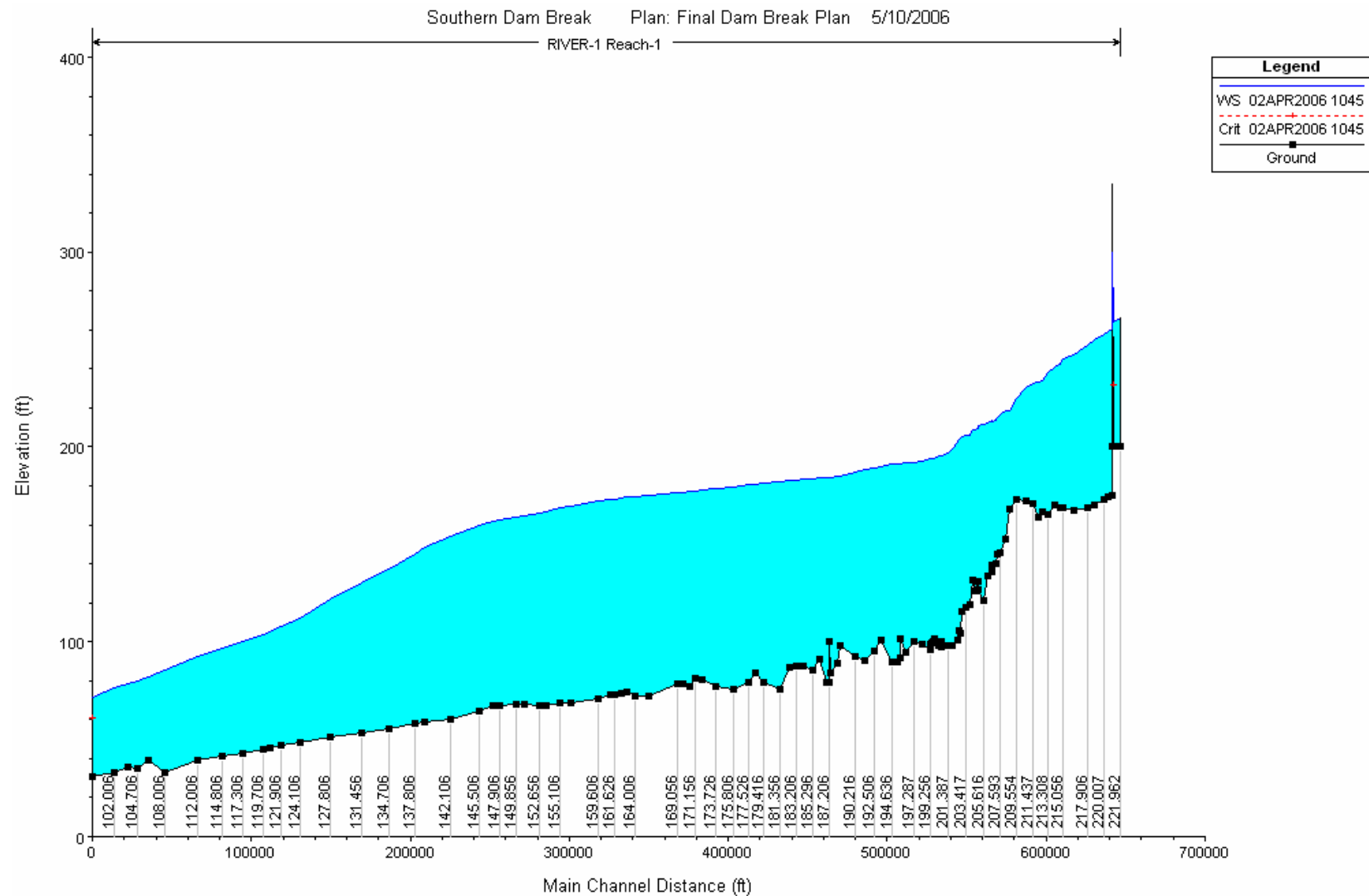


Figure 2.4.4-10 Savannah River Dam Breach Flood Water Surface Profile for Peak Discharge at VEGP Site

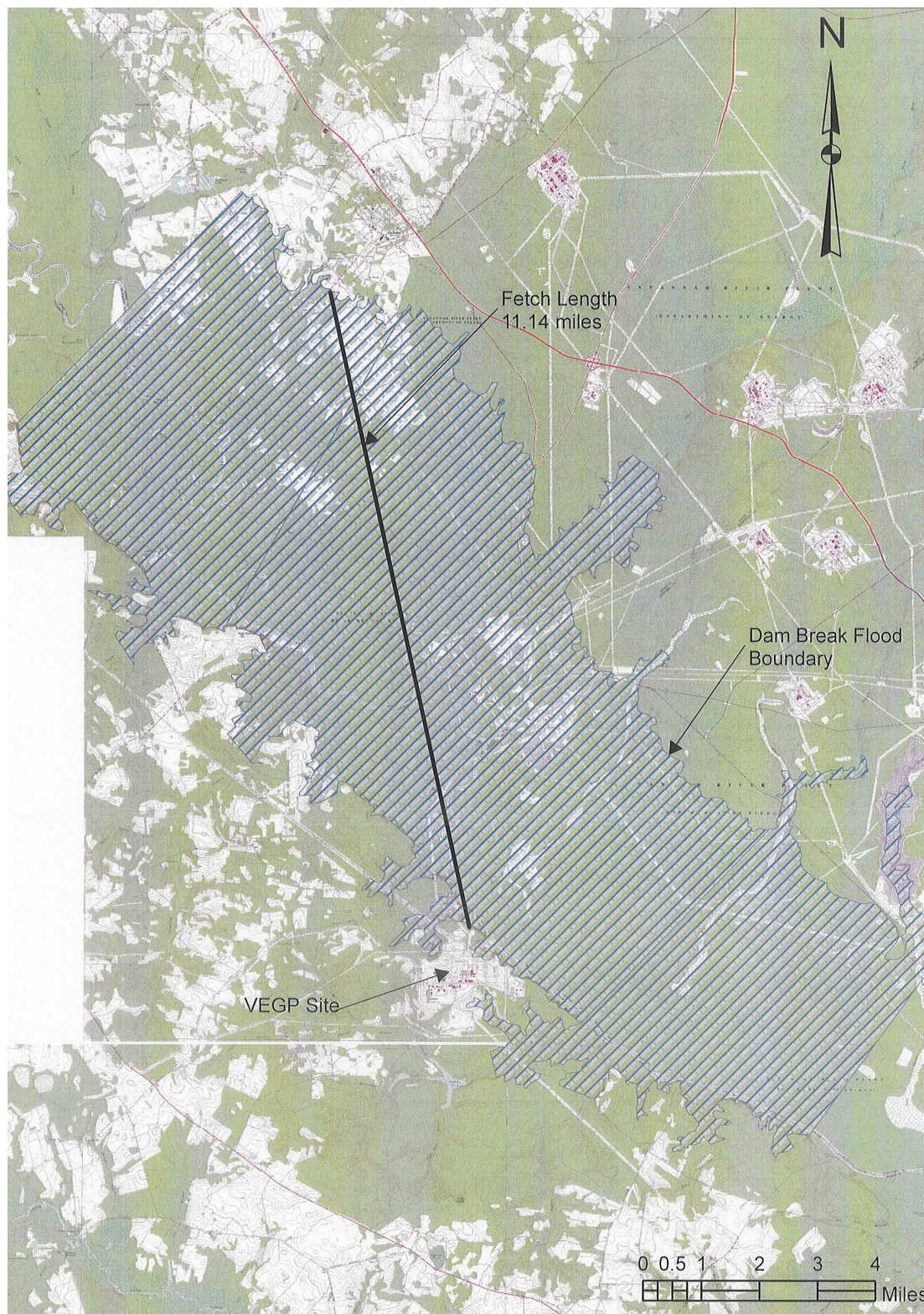


Figure 2.4.4-11 Maximum Fetch Length

Section 2.4.4 References

(ANSI/ANS-2.8 1992) ANSI 2.8-1992, Determining Design Basis Flooding at Power Reactor Sites, American National Standard Institute, American Nuclear Society, 1992.

(FHS L649) L649, Lake Russell, Georgia/South Carolina Series, Map, Fishing Hot Spots, Inc.

(FHS L650) L650, Clark's Hill Lake (J. Strom Thurmond Reservoir), Georgia/South Carolina Series, Map, Fishing Hot Spots, Inc.

(LBC&W 1972) NRC Accession Number 7912020110, Hydrologic Engineering Studies of Flood Potential for Keowee-Toxaway, Correspondence Letter; Lyles, Bissett, Carlisle, & Wolf Associates of South Carolina, 1972.

(USACE 1996) Water Control Manual, Savannah River Basin Multiple Purpose Projects: Hartwell Dam and Lake, Richard B. Russell Dam and Lake, J. Strom Thurmond Dam and Lake, Georgia and South Carolina, Water Control Manual, Savannah District, U.S. Army Corps of Engineers, 1996.

(USACE 2002) Savannah River HEC-2 Data File, Savannah District, U.S. Army Corps of Engineers, June 2002.

(USACE 2005a) HEC-RAS, River Analysis System, Version 3.1.3, Computer Program, Hydrologic Engineering Center, U.S. Army Corps of Engineers, May 2005.

(USACE 2005b) EM 1110-2-1100, Coastal Engineering Manual, (in 6 volumes) Engineering Manual, Coastal and Hydraulics Laboratory, U.S. Army Corps of Engineers, 2005.

(USBR 1998) DSO-98-004, Prediction of Embankment Dam Breach Parameters, A Literature Review and Needs Assessment, Dam Safety Research Report, Dam Safety Office, Water Resources Research Laboratory, US Bureau of Reclamation, July 1998.

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(USGS 1989) WSP2339, Guide for Selecting Manning's Roughness Coefficients for Natural Channels and Floodplains, Water Supply Paper, U.S. Geological Survey, 1989.

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2.4.5 Probable Maximum Surge and Seiche Flooding

The VEGP site is located on a coastal plain bluff on the west bank of the Savannah River approximately 151 River Miles inland from the Atlantic Ocean at grade El. 220 ft msl. Since the site is not located on an open or large body of water, surge or seiche flooding will not produce the maximum water levels at the site.

The Savannah River estuary region is occasionally exposed to extreme mid-Atlantic hurricanes. Between 1841 and 2004, only three major hurricanes, Category 3 or over (measured using the Saffir/Simpson Hurricane Scale), hit the coast of Georgia (**Blake et al. 2005**). The most devastating hurricane on record with a landfall within approximately 100 miles of the Savannah River estuary was Hurricane Hugo, which hit the coast of South Carolina near Charleston in 1989. This Category 4 hurricane produced a 20-foot-high storm surge in the Cape Romain-Bulls Bay area in South Carolina (**NHC 2006**).

Regulatory Guide 1.59, *Design Basis Floods for Nuclear Power Plant*, Revision 2, August 1977 (RG 1.59), Appendix C provides the distribution of probable maximum surge levels from hurricanes along the Atlantic coast. It shows maximum surge heights of 28.2 ft mean low water (mlw) at Folly Island, South Carolina, and 33.9 ft mlw at Jekyll Island, Georgia, located northeast and southwest of the Savannah River estuary, respectively. The probable maximum storm surge height at the mouth of the Savannah River can be estimated from these values following the procedure described in RG 1.59 Appendix C, as shown in Table 2.4.5-1.

The high tide at the estuary with a 10 percent exceedance level is defined as 9.0 ft mlw, and the mlw at the entrance to Savannah River, Georgia is 1.2 ft below msl (**ANSI/ANS-2.8 1992**). Considering the coincidence of the probable maximum surge with a 10-percent-exceedance high tide at the river mouth, a probable maximum surge height of 32.3 ft mlw or 31.1 ft msl may be obtained for the Savannah River estuary, as shown in Table 2.4.5-1.

If it is assumed that a storm surge of such a magnitude is generated in the Savannah River estuary moving inland, the surge height would dissipate before reaching the VEGP site (151 River Miles inland and at grade El. 220 ft msl), and the site would be free from any resultant flood. Also, because the VEGP site is not located on a large enclosed body of water, flooding due to seiche is precluded.

The probable maximum surge data from RG 1.59 have not included those from the hurricanes after 1975. The inclusion of the data from recent hurricanes, including Hurricane Hugo, may have changed the probable maximum surge data from RG 1.59 somewhat. However, because the VEGP site is 151 River Miles inland and at grade El. 220 ft msl, the effects of probable

maximum surge at the estuary of Savannah River would be insignificant at the site, and would not cause flooding of the site.

Table 2.4.5-1 Estimated Probable Maximum Surge at the Savannah River Mouth

| Components | Unit | Folly Island ^a | Jekyll Island ^b | Savannah Estuary ^c | Comments |
|------------------------------------|---------------------|---------------------------|----------------------------|-------------------------------|--|
| Wind Setup | ft mlw ^d | 17.15 | 20.63 | 18.89 | Taken as average of wind set-up from Folly Island and Jekyll Island |
| Pressure Set-up | ft mlw | 3.23 | 3.34 | 3.29 | Taken as average of pressure set-up from Folly Island and Jekyll Island |
| Initial Water Level | ft mlw | 1.00 | 1.20 | 1.10 | Taken as average of initial water level from Folly Island and Jekyll Island |
| 10 % Exceedence High Tide | ft mlw | 6.80 | 8.70 | 9.00 | Magnitude at the Savannah River estuary taken from ANSI/ANS-2.8-1992; others from NRC RG 1.59 1977 |
| Total Surge Height | ft mlw | 28.2 | 33.9 | 32.3 | Sum of wind and pressure set-up, initial water level, and 10% exceedence high tide |
| mlw to msl conversion ^e | ft | | | -1.2 | Magnitude at the Savannah estuary obtained from ANSI/ANS-2.8-1992 |
| Sea Surface Anomaly | ft | | | 0.0 | Magnitude at the Savannah estuary obtained from ANSI/ANS-2.8-1992 |
| Total Surge Height | ft msl | | | 31.1 | |

^a NRC RG 1.59 1977

^b NRC RG 1.59 1977

^c Wind and pressure set-up, and initial water level averaged from Folly Island and Jekyll Island, tidal data was obtained from ANSI/ANS-2.8-1992

^d Mean low water (mlw)

^e Mean sea level (msl) = (mlw +1.2) ft at the Savannah estuary (ANSI/ANS-2.8 1992)

Section 2.4.5 References

(ANSI/ANS-2.8 1992) Determining Design Basis Flooding at Power Reactor Sites, American National Standard/American Nuclear Society, July 1992.

(Blake et al. 2005) Blake, E.S., E.N. Rappaport, J.D. Jarrell, and C.W. Landsea, *The Deadliest, Costliest, and Most Intense United States Tropical Cyclones from 1851 to 2004 (and Other Frequently Requested Hurricane Facts)*, Tropical Prediction Center, National Hurricane Center, Miami, Florida, August 2005.

(NHC 2006) Hurricane History, National Hurricane Center, Web site address: <http://www.nhc.noaa.gov/HAW2/english/history.shtml#hugo>, accessed April 7, 2006.

2.4.6 Probable Maximum Tsunami Flooding

Since the VEGP site is not located on an open ocean coast or large body of water, tsunami-induced flooding will not produce the maximum water level at the site.

The Atlantic Ocean region is characterized by infrequent seismic and volcanic activities, resulting in few recorded tsunamis. The majority of tsunamis in the Atlantic Ocean and Caribbean Sea have been either triggered by seismic (earthquake) activity or the result of volcanic eruption. The most notable Atlantic tsunami was generated by the Great Lisbon Earthquake of 1755. The tsunami hit the coasts of Portugal, Spain, and northern Africa and traveled across the Atlantic Ocean with a 10-to-15-ft wave reportedly reaching the Caribbean coasts **(Maine DOC 2006)**. Computer models suggested a wave height of 10 ft along the east coast of the US **(NOAA 2006)** from this tsunami.

The effects of any tsunami with similar height approaching the Savannah River estuary would be dissipated before reaching the VEGP site (151 River Miles inland and at grade El. 220 ft msl), and the site would be free from any resultant flood.

Section 2.4.6 References

(Maine DOC 2006) *Tsunamis in the Atlantic Ocean*, Maine Geological Survey, Maine Department of Conservation, Web site address: <http://www.maine.gov/doc/nrimc/mgs/explore/hazards/tsunami/jan05.htm>, accessed April 10, 2006.

(NOAA 2006) *Tsunami, Tidal Waves and Other Extreme Waves*, National Weather Service Forecast Office, Philadelphia/Mount Holly, National Oceanic and Atmospheric Administration, Web site address: <http://www.erh.noaa.gov/er/phi/reports/tsunami.htm>, accessed April 10, 2006.

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2.4.7 Ice Effects

2.4.7.1 Ice Conditions and Historical Ice Formation

Long-term air temperature records available at the National Weather Service (NWS) weather station at Augusta, Georgia (Bush Field), and seven other cooperative observation stations around the VEGP site are used to analyze historical extreme air temperature variations at the VEGP site. The analysis was also supported by onsite temperature data measured at the VEGP site. A detailed description of station locations and data availability is presented in Section 2.3.2.

The climate at the VEGP site is characterized by short, mild winters and long, humid summers. Local climatology data at Augusta, Georgia, for a period of 129 years show an average annual air temperature of 64.2°F (17.9°C) (**NCDC 2003**). January is the coldest month, with an average temperature of 46.8°F (8.2°C). July is the warmest, with an average temperature of 81.3°F (27.4°C). Based on temperature records at Augusta and seven surrounding stations, the lowest air temperature on record was observed to be -4.0°F (-20.0°C) at Aiken in January 1985 (Table 2.3-3). The January 1985 event produced a minimum air temperature of -0.1°F (-17.8°C) at the VEGP site, with the air temperature remaining below freezing (32°F [0°C]) for only about 50 hours (Figure 2.4.7-1). VEGP temperature data from 1984 through 2002 show that the average daily air temperature has remained below freezing for a maximum of 3 consecutive days (Table 2.4.7-1). In three instances, the average daily air temperature remained above freezing the entire year.

Historical water temperatures recorded at five USGS stations located on the Savannah River (**Dyar and Alhadeff 1997**) are presented in Table 2.4.7-2. These USGS stations include: No. 02187500 near Iva, South Carolina, at River Mile 280.4; No. 02189000 near Calhoun Falls, South Carolina, at River Mile 263.6; No. 02197000 at Augusta, Georgia, at River Mile 187.4; No. 02197500 at Burtons Ferry near Milhaven, Georgia, at River Mile 118.7; and No. 02198500 near Clyo, Georgia, at River Mile 60.9. The data cover a river reach that includes the VEGP site. Within this river reach, the minimum water temperature is observed in February, which shows a variation between 39.2°F (4.0°C) and 42.8°F (6.0°C).

Based on the record of air and water temperatures, it is very unlikely that surface or frazil ice formation would occur in the Savannah River in the vicinity of the proposed VEGP Units 3 and 4 river intake location.

2.4.7.2 Ice Jam Events

There are no recorded ice jam events in the lower reach of the Savannah River based on a search of the *Ice Jam Database* of the US Army Corps of Engineers (**USACE 2006**).

The large dams and reservoirs on the Savannah River located upstream of the VEGP site reduce the possibility of any surface ice or ice floes moving downstream. Since the water temperatures in the lower reach of the Savannah River remain consistently above freezing, as seen in Table 2.4.7-2, the formation of frazil ice or ice jams would be very unlikely at the proposed VEGP Units 3 and 4 intake location.

2.4.7.3 Description of the Cooling Water System

The VEGP Units 3 and 4 will be Westinghouse AP1000 reactors and use a closed cycle cooling system with wet, natural-draft cooling towers for circulating water system cooling. The river intake system, comprising an intake canal and a pump intake structure, will be located upstream from the existing river intake structure for the VEGP Units 1 and 2. Makeup water from the Savannah River will be required to replace evaporative water losses, drift losses, and blowdown discharge from the circulating water system cooling towers.

For safety-related cooling, AP1000 reactors use passive ultimate heat sink (UHS) systems with in-plant storage water. These reactor plants do not require an external safety-related UHS system to reach safe shutdown. Also, the AP1000 design have a non-safety-related heat removal auxiliary heat sink–service water system (SWS) used for shutdown, normal operations, and anticipated operational events. Make-up water to the SWS will be supplied from site groundwater wells or a site water storage tank. Consequently, no water will be necessary from the Savannah River or from any other open surface water sources for the AP1000 UHS and SWS. Therefore, even a very unlikely ice event on the Savannah River will not have any impact on safety-related UHS or non-safety-related SWS of the proposed AP1000 units.

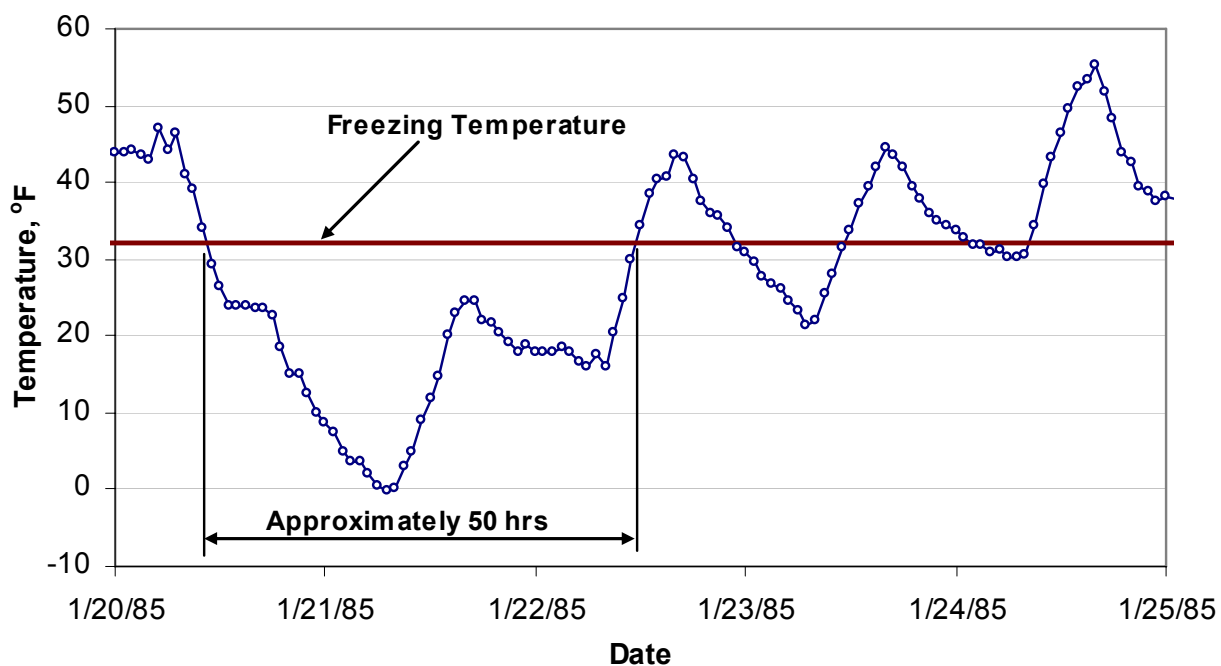
Table 2.4.7-1 Variation in Lowest Average Daily Temperatures and Number of Days with Average Daily Temperature Below Freezing

| Year | Lowest Average Daily Temp °F (°C) | | Date Lowest Average Daily Temp Occurred | No. of Consecutive Freezing Days | Total No. of Freezing Days |
|--------------|--------------------------------------|---------|---|----------------------------------|----------------------------|
| 1984 | 25.7 | -(3.5) | 12/7/1984 | 1 | 3 |
| 1985 | 11.9 | -(11.2) | 1/21/1985 | 3 | 5 |
| 1986 | 20.7 | -(6.3) | 1/28/1986 | 2 | 3 |
| 1987 | 31.2 | -(0.4) | 1/27/1987 | 1 | 1 |
| 1988 | 25.2 | -(3.8) | 1/8/1988 | 3 | 6 |
| 1989 | 19.0 | -(7.2) | 12/23/1989 | 3 | 6 |
| 1990 | 37.3 | (2.9) | 12/25/1990 | 0 | 0 |
| 1991 | 26.0 | -(3.3) | 2/16/1991 | 1 | 1 |
| 1992 | 33.4 | (0.8) | 1/16/1992 | 0 | 0 |
| 1993 | 30.4 | -(0.9) | 3/14/1993 | 1 | 1 |
| 1994 | 21.3 | -(5.9) | 1/19/1994 | 2 | 4 |
| 1995 | 29.2 | -(1.6) | 2/9/1995 | 2 | 4 |
| 1996 | 20.8 | -(6.2) | 1/8/1996 | 3 | 8 |
| 1997 | 28.9 | -(1.7) | 1/18/1997 | 2 | 2 |
| 1998 | 34.8 | (1.6) | 12/26/1998 | 0 | 0 |
| 1999 | 25.2 | -(3.8) | 1/14/1999 | 3 | 3 |
| 2000 | 26.5 | -(3.1) | 12/20/2000 | 2 | 4 |
| 2001 | 30.9 | -(0.6) | 1/3/2001 | 2 | 2 |
| 2002 | 29.7 | -(1.3) | 1/4/2002 | 2 | 2 |
| Average days | | | | 1.7 | 2.9 |

Table 2.4.7-2 Variation in the Minimum Water Temperatures at Five Locations on the Savannah River

| USGS Station No. | Location | River Mile | Data Period | Observed Minimum Temperature, °F (°C) | | | | | | | | | | | |
|------------------|---|------------|-------------|---------------------------------------|----------------|----------------|---------------|---------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | | | | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | Jun. | Jul. | Aug. | Sep. |
| 02187500 | Savannah River near Iva, SC | 280.4 | 1958-1984 | 62.6 (17.0) | 55.4 (13.0) | 46.4 (8.0) | 44.6 (7.0) | 39.2 (4.0) | 42.8 (6.0) | 48.2 (9.0) | 48.2 (9.0) | 57.2 (14.0) | 55.4 (13.0) | 53.6 (12.0) | 57.2 (14.0) |
| 02189000 | Savannah River near Calhoun Falls, SC | 263.6 | 1957-1974 | 65.3 (18.5) | 59 (15.0) | 46.4 (8.0) | 46.4 (8.0) | 42.8 (6.0) | 51.8 (11.0) | 53.6 (12.0) | 59.9 (15.5) | 64.4 (18.0) | 66.2 (19.0) | 68 (20.0) | 71.6 (22.0) |
| 02197000 | Savannah River at Augusta, GA | 207.0 | 1958 - 1973 | 64.4 (18.0) | 59 (15.0) | 51.8 (11.0) | 42.8 (6.0) | 42.8 (6.0) | 50 (10.0) | 57.2 (14.0) | 59.9 (15.5) | 66.2 (19.0) | 66.2 (19.0) | 64.4 (18.0) | 69.8 (21.0) |
| 02197500 | Savannah River at Burtons Ferry near Milhaven, GA | 118.7 | 1957-1979 | 63.5 (17.5) | 58.1 (14.5) | 46.4 (8.0) | 43.7 (6.5) | 39.2 (4.0) | 44.6 (7.0) | 55.4 (13.0) | 59 (15.0) | 66.2 (19.0) | 73.4 (23.0) | 71.6 (22.0) | 71.6 (22.0) |
| 02198500 | Savannah River near Cloy, GA | 60.9 | 1938 - 1984 | 59.9 (15.5) | 46.4 (8.0) | 44.6 (7.0) | 41 (5.0) | 40.1 (4.5) | 44.6 (7.0) | 57.2 (14.0) | 57.2 (14.0) | 68 (20.0) | 73.4 (23.0) | 71.6 (22.0) | 67.1 (19.5) |

Source: Dyer and Alhadeff 1997



(The temperature remained below freezing for approximately 50 consecutive hours.)

Figure 2.4.7-1 Lowest Temperature Observed at the VEGP Site in 1985

Section 2.4.7 References

(Dyar and Alhadeff 1997) Dyar, T.R., and S.J. Alhadeff, *Stream-Temperature Characteristics in Georgia*, U.S. Geological Survey, Water Resources Report 96-4203, Atlanta, Georgia, 1997.

(NCDC 2003) *Local Climatological Data, Annual Summary with Comparative Data, Augusta, Georgia*, National Climatic Data Center, ISSN 0198-1587, Asheville, North Carolina, 2003.

(USACE 2006) *Ice Jam Database*, U.S. Army Corps of Engineers, Cold Region Research and Engineering Laboratory, Web site address: <https://rsgis.crrel.usace.army.mil/icejam/index.html>, accessed April 11, 2006.

2.4.8 Cooling Water Canals and Reservoirs

2.4.8.1 Cooling Water Canals

The proposed VEGP Units 3 and 4 will use a closed cycle cooling system for condenser heat rejection and will use wet, natural-draft, cooling towers for circulating water system cooling. Makeup water from the Savannah River will be required to replace evaporative water losses, drift losses, and blowdown discharge. The river intake for VEGP Units 3 and 4 will withdraw makeup water from the Savannah River at a maximum rate of approximately 57,784 gpm (128.7 cfs). The intake system will be located upstream of the river intake of the existing VEGP units. The makeup water will be pumped directly to the cooling tower basin.

For safety related cooling, AP1000 reactor plants use passive ultimate heat sink (UHS) systems with sufficient in-plant storage water for safety-related water cooling. These reactor plants do not require an external safety-related UHS system to reach safe shutdown. Therefore, the river intake system will not be part of the safety-related facilities for VEGP Units 3 and 4, and the river intake canal and structure will have no safety-related functions. These reactor plants also have a non-safety-related heat removal auxiliary heat sink–service water system (SWS) used for shutdown, normal operations, and anticipated operational events. Make-up water to the SWS will be supplied from site groundwater wells; therefore, the SWS will not depend on the river intake system.

The river intake system for VEGP Units 3 and 4 would consist of an intake canal and an intake structure. The design details of the river intake system will be established during the COL applications. An overview of the conceptual design is provided below.

The river intake canal will be approximately 200 ft long and 150 ft wide, with a bottom elevation of about El. 70 ft msl. The bottom of the canal would be unpaved and bordered by vertical sheet piles, the tops of which would be extended to about El. 98 ft msl. The river intake canal would also act as a siltation basin and will incorporate a sill to reduce sediment inflow into the canal. At the minimum river operating level (78 ft msl), the flow velocity in the new canal would be about 0.1 fps, calculated based on a maximum makeup water demand of 128.7 cfs. Because the river intake canal would also act as the siltation basin, maintenance dredging may be necessary to maintain the canal invert elevation. Also, the canal embankment slopes would be protected using rip-rap of appropriate design specifications.

The intake structure, located at the end of the river intake canal, would house multiple makeup water pumps, traveling band screens, and trash racks with raking mechanisms. For each of the two new units, three 50-percent-capacity, vertical wet-pit pumps would be installed in the intake

structure, with one makeup water pump at each pump bay, along with one dedicated traveling band screen and a trash rack.

Because VEGP Units 3 and 4 will not rely on the Savannah River for safe shutdown, a minimum river water level will not be necessary for safety-related cooling water supply.

2.4.8.2 Reservoirs

VEGP Units 3 and 4 will not have any cooling water reservoirs.

2.4.9 Channel Diversions

The VEGP site area lies in the Upper Coastal Plain of the Atlantic Coastal Plain physiographic province and is bordered by the Savannah River to the east. The surrounding topography consists of gently rolling hills with surface topography elevation ranges from about 200 to nearly 300 ft msl. Local site drainage consists of a principally dendritic drainage pattern where all major streams are tributary to the Savannah River. The VEGP site and surrounding areas are shown in Figure 2.4.1-3.

Near the site area, incision of the Savannah River has produced a deep valley with topographic relief of nearly 150 ft from the river surface and a valley width of over 4 mi. The present-day river course is located at the western side of the valley, forming steep bluffs near the VEGP site. The river floodplain consists of a broad alluvial surface extended on the eastern side at heights of 5–10 ft above the riverbank.

Rivers in the Upper Coastal Plain are typically underlain by sands, clays, limestones, and gravels and exhibit gentle to moderate bed slopes, wide floodplain development, and increased sinuosity. Consequently, diversion of the river channel in this region cannot be completely discounted.

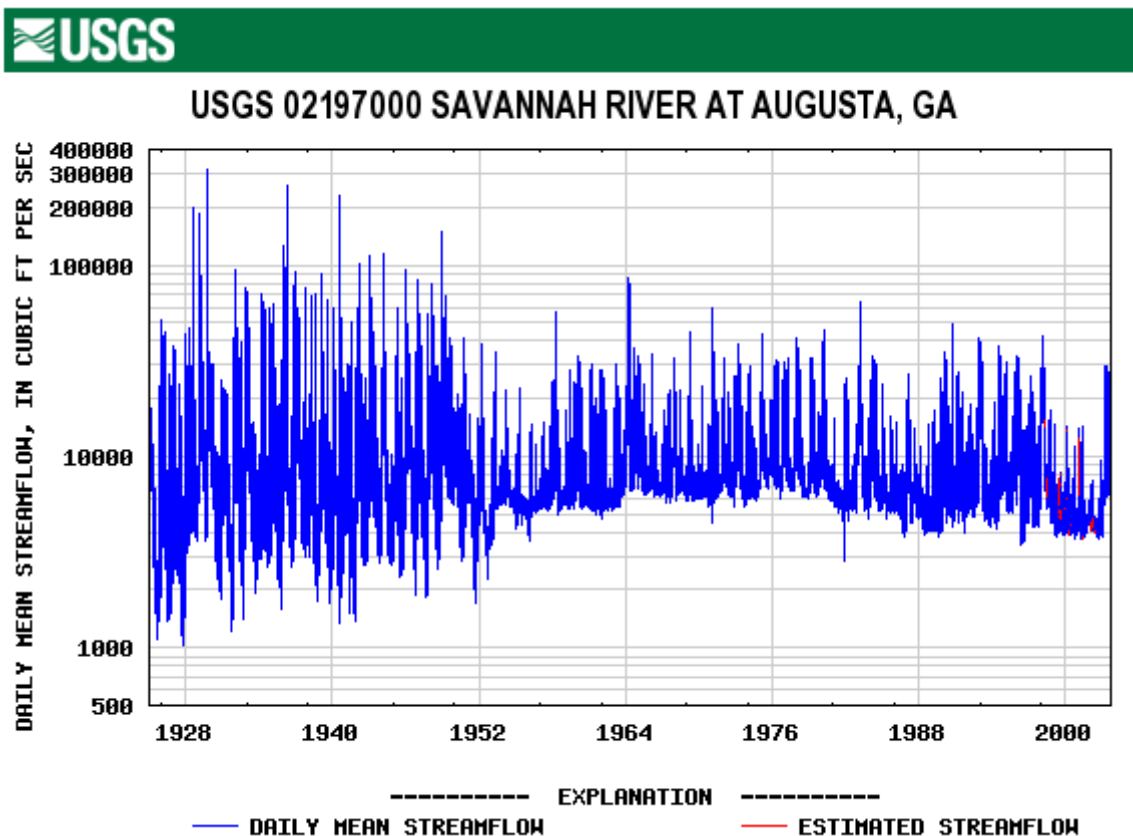
Historical development of the river plan-form, which is the shape on map of river bank-line, near the VEGP site is well-represented in the USGS 7.5-minute series (topographic) maps. Oxbow lakes, meander cutoffs, abandoned meanders, low-lying swamps, and forested wetlands provide considerable evidence of historical channel plan-form development. Although meander river plan-form is present upstream and downstream of the site, the Savannah 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 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 within the reach during this period.

Since 1952, the Savannah River flow has been regulated by large federal multipurpose projects: Hartwell Dam, Richard B. Russell Dam, and J. Strom Thurmond (also known as Clarks Hill) Dam. A major impact of dam operation on river flow downstream of the J. Strom Thurmond Dam is the modulation of the outflow hydrograph, with reduced peaks and increased low-flow rates, as can be seen from Figure 2.4.9-1. Such flow modulation results in much-reduced river morphological activity, and a sudden river plan-form change is unlikely.

It is, therefore, unlikely that the river at the VEGP site will be diverted from the river intake by natural causes. Furthermore, analysis for existing VEGP Units 1 and 2 indicate that any

possible effect on water supply to the intake from river channel diversion should come from extremely slow changes, which can be remedied as they occur.

While it is unlikely that a diversion of the main river channel will occur, such a diversion, either upstream or downstream of the proposed river intake, cannot be discounted. The river upstream and downstream from the proposed river intake has bluffs and steep slopes along the west bank. If it is assumed that a bluff slid into the river bed just upstream from the river intake structure, it may obstruct the flow of the main river channel, and river flow would divert over the floodplain on the eastern side of the river and away from the river intake. This could result in loss of the river intake due to river water starvation. Likewise, if a bluff slid into the river bed just downstream of the river intake structure, it again may obstruct the flow of the main river channel, but could possibly flood the river intake structure before diverting river water over the floodplain on the eastern side of the river. In this case, the river intake structure would be lost due to flooding. However, all the safety-related cooling water systems for the proposed AP1000 reactor plants would not use water from the river intake. Hence, the river intake would not be classified as a safety-related structure and loss of the river intake for either of these described scenarios would have no adverse affect on plant safety.



Source: USGS 2006b

Figure 2.4.9-1 Variation in Daily Mean Streamflow Rates at Augusta, Georgia, on the Savannah River (USGS Stream Gauging Station 02197000, Savannah River at Augusta, Georgia), Showing Streamflow Modulation After the Construction of the Dams

Section 2.4.9 References

(USGS 1989a) United States Geological Survey, Shell Bluff Landing Quadrangle, Georgia-South Carolina, 7.5 Minute Series (Topographic), DMA 4650 III NE – Series V845, 1965, Photorevised 1989.

(USGS 1989b) United States Geological Survey, Girard NW Quadrangle, Georgia-South Carolina, 7.5 Minute Series (Topographic), DMA 4650 III NW – Series V846, 1964, Photorevised 1989.

(USGS 1989d) United States Geological Survey, Girard Quadrangle, Georgia-South Carolina, 7.5 Minute Series (Topographic), DMA 4650 II SW – Series V845, 1964, Photorevised 1989.

(USGS 2006b) Daily Streamflow Data – Savannah River at Augusta, Website of the United States Geological Survey Surface Water for Georgia,
http://nwis.waterdata.usgs.gov/ga/nwis/discharge?site_no=02197000&agency_cd=USGS&begin_date=1925-01-01&end_date=2003-09-30&format=gif&set_logscale_y=1&date_format=YYYY-MM-DD&rdb_compression=file&survey_email_address=&submitted_form=brief_list, accessed March 29, 2006.

2.4.10 Flood Protection Requirements

The maximum design basis flood elevation, including wind setup and wave run-up, at the VEGP site is El. 178.10 ft msl, as discussed in Section 2.4.4. This elevation is well below the VEGP site grade at El. 220.0 ft msl. Entrances and openings to all safety-related structures for the proposed VEGP Units 3 and 4 will be located at or above the site grade. Since the site grade is well above the maximum design basis flood elevation, the possibility is precluded of flooding VEGP Units 3 and 4 safety-related structures, systems, and components.

The effects of intense local precipitation on the safety-related structures, systems, and components of VEGP Units 3 and 4 will be considered in the design of site drainage facilities. The VEGP Units 3 and 4 site is on locally high ground, and natural drainage flow-paths slope away from the site, as shown in Figure 2.4.1-3. Thus, the topography of the proposed site facilitates drainage of intense rainfall events. Drainage facilities for the VEGP Units 3 and 4 site will be designed so that the peak discharge from the local probable maximum precipitation (PMP) do not produce flood elevations that could cause a flooding hazard to any safety-related structure, system, or component at the VEGP Units 3 and 4 site. The design will also assume that all drainage structures (e.g., culverts, storm drains, and bridges) are blocked during the PMP event. The safety-related structures, systems, and components would still be safe from resulting flood hazards.

Additionally, the design of the drainage facilities and the development of construction and operation plans will incorporate measures to ensure that existing VEGP Units 1 and 2 safety-related facilities are not subject to flooding during construction and operation of VEGP Units 3 and 4. Drainage from the VEGP Units 3 and 4 site during construction and operation of the new VEGP units will be directed away from the existing drainage facilities of VEGP Units 1 and 2. Hence, drainage from the VEGP Units 3 and 4 site will not interfere with the safety-related structures, systems, and components of VEGP Units 1 and 2.

The roofs of all safety-related structures will be designed to prevent flooding of, or leakage into, safety-related structures, systems, and components as a result of PMP on the roofs.

Although the river intake will not be a safety-related facility, rip-rap protection of embankment slopes will be provided at the river intake location on the west bank of the Savannah River to prevent intake canal bank erosion.

Applicable NRC, federal, state, and local stormwater management regulations will be followed in the design of the drainage facilities.

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2.4.11 Low Water Considerations

This section identifies the natural events that may reduce or limit the available cooling water supply and demonstrates that an adequate water supply will exist to operate or shut down the plant under normal operations, anticipated operations, and emergency conditions.

2.4.11.1 Low Flow in Streams

VEGP Units 3 and 4 will be Westinghouse AP1000 reactors that do not require a conventional ultimate heat sink to provide safety-related cooling during emergency shutdown. Consequently, river water will not be necessary to achieve safe shutdown of the units. The only use of water from the Savannah River for the reactor units will be for the circulating water system/turbine plant cooling water system makeup, where river water will be required to replace evaporative water losses, drift losses, and blowdown discharge.

2.4.11.1.1 Observed Low Flow Data

The Savannah River flow near the VEGP site is regulated by the operation of three large federal multipurpose projects located upstream: Hartwell Dam, Richard B. Russell Dam (Russell Dam), and J. Strom Thurmond (also known as Clarks Hill) Dam. The operation of the dams during low flow periods is controlled by the drought contingency plan for the Savannah River basin (**USACE 1989**). The contingency plan was developed in 1989 during one of the most severe droughts in the region in recent history. The objectives (**USACE 1989**) of the plan are to:

- Maintain reservoir levels at or above the bottom of the conservation pools for the three reservoirs
- Maintain a minimum release no less than 3,600 cfs at J. Strom Thurmond Dam (Thurmond Dam) for downstream use
- Use most of the available storage in the reservoirs during the drought-of-record while maintaining reservoir levels above the bottom of the conservation pools as a contingency against a drought that exceeds the drought-of-record
- Maintain project capacity throughout the drought
- Maintain releases required to meet state water quality standards from J. Strom Thurmond Dam for as long as possible without jeopardizing water supplies
- Minimize impact to recreation during the recreational season, from the first of May through Labor Day

Depending on the pool elevations at Hartwell and Thurmond reservoirs, four levels of actions are defined in the drought contingency plan, as summarized in Table 2.4.11-1. Actions for Level 3, which corresponds to the severe drought of 1988–89 (drought-of-record), will maintain a minimum of 3,600 cfs of water released through Thurmond Dam. Thurmond Dam Level 4 actions require maintaining the minimum flow of 3,600 cfs for as long as possible and, thereafter, allow the same outflow as the reservoir inflow. Consequently, the drought contingency plan for the Savannah River basin will impact water availability at the VEGP site during low flow periods.

Low water conditions in the Savannah River in the vicinity of the VEGP site are analyzed using flow records at three USGS stream gage stations. These are USGS Station No. 02197000 at Augusta, Georgia, at River Mile 187.4; 02197320 at Jackson, South Carolina, at River Mile 156.8; and 02197500 at Burtons Ferry near Milhaven, Georgia, at River Mile 118.7. The VEGP site, located at River Mile 150.9, is nearest to the Jackson gage and nearly halfway between the gages at Augusta and Burtons Ferry.

Daily-mean stream flow data are available at these three stations from the USGS Web site (**USGS 2006g**). USGS maintains stream flow records covering a water year, which starts on October 1 of the preceding year and ends on September 30 of the current year. The longest daily-mean flow record is available at Augusta, with a period of record from the water years 1884–1891, 1896–1906, and 1925–2003. At Burtons Ferry, the flow period of record is available between the water years 1940 and 2003, with missing data periods from 1971 to 1982. The Jackson gage presents the shortest period of record of daily stream flow data, with data available between the water years 1972 and 2002. Data from the Jackson gage also include numerous periods of missing flow values. However, these periods with missing data are generally during peak flow discharges with the low flow data remained mostly unaffected.

Streamflow gage and water level measurement data are also available near the VEGP site at USGS Station No. 021973269 – Savannah River near Waynesboro at approximate River Mile 150.6. However, flow records at this gage are only available since January 2005. The short duration of the record for this gage makes it unsuitable for the calculation of low flow statistics. These data are used instead for developing a stage-discharge relationship near the site as discussed in Section 2.4.11.4. Details of gage locations and data availability are shown in Table 2.4.11-2.

Annual minimum daily-mean stream flow data from the three gages are shown in Figure 2.4.11-1 and Table 2.4.11-3. The data show that the annual minimum daily-mean flow within the river reach between Augusta and Burtons Ferry increased considerably after the construction of the Thurmond and Hartwell dams. The annual minimum daily-mean flow decreased during the drought-of-record (1986–1989) and has remained lower, since the

implementation of the drought contingency plan in 1989, than prior to the onset of the drought. Russell Dam, the last of the three major projects, was commissioned in 1985. Because of increased catchment area downstream from Augusta, the flow at Jackson and Burtons Ferry generally is higher than the flow at Augusta. However, occasionally, the annual minimum daily-mean flow at Augusta remains higher than that at Jackson or Burtons Ferry.

Figure 2.4.11-2 shows the variation of annual minimum daily-mean flow at Jackson and Burtons Ferry corresponding to that at Augusta for the period of available data. As indicated before, the annual minimum daily-mean flow at Jackson and Burtons Ferry remains higher than that at Augusta most of the time, except a few occasions when flow at Jackson or Burtons Ferry becomes similar to or less than that at Augusta. This may indicate that although the daily-mean flow generally increases at Jackson and Burtons Ferry compared to that at Augusta because of the increase in catchment area, during certain dry years the additional catchment area may not contribute additional flow to the low-flow available at Augusta.

Within the period from 1985 to 2003, after the completion of Richard B. Russell Dam and representing present-day river regulation, the lowest daily-mean flow at Augusta was observed as 3,460 cfs on May 16, 1996; at Jackson it was 3,940 cfs on September 13, 2002; and at Burtons Ferry a minimum flow of 3,920 cfs was observed on September 14, 2002 (Table 2.4.11-3). The low flow measured at Augusta is also the lowest observed after the completion of all three dams within the river reach that includes the VEGP site. This data period of record also includes two of the most severe droughts in recent history in the region, 1986–1989 (**USACE 1989**) and 1998–2003 (**USACE 2006c; USGS 2006h**).

American National Standard ANSI/ANS-2.13-1979, *Evaluation of Surface-Water Supplies for Nuclear Power Sites* (**ANSI/ANS-2.13 1979**), recommends that for ungaged sites that have gage stations located upstream and downstream, the flow at the site may be estimated by interpolation between the gaged records based on catchment areas at the site and at the gage stations. An analysis was performed following the procedure of ANSI/ANS-2.13 (1979), which showed that the data from the Augusta gage would be the most suitable for the analysis of low flow statistics at the VEGP site. Consequently, only data from the Augusta gage is used to obtain the low flow statistics at the VEGP site. Also, because the low flow data at Augusta are generally lower than the low flow data at Jackson or Burtons Ferry, it is more conservative to use the Augusta gage data to calculate low flow statistics at the VEGP site.

2.4.11.1.2 Low Flow Statistics

Analyses for low flow statistics were performed based on historical flow data at Augusta for daily-mean annual minimum flow conditions. Because of the regulation of the Savannah River due to the construction of the dams, the complete flow record at Augusta could not be used for

the analyses. Instead, flow statistics were computed within discrete segments of homogenous data periods of record. Historical annual minimum daily-mean flow data from the water years 1884 to 1952 were first analyzed using six different probability density functions: normal, log-normal, exponential, generalized extreme value – type 1 (Gumbel), Pearson – type 3 (P3), and log-Pearson – type 3 (LP3) distributions. Goodness-of-fit of the distributions was evaluated using standard χ^2 – and Kolmogorov-Smirnov tests. A distribution is considered acceptable when the test value is lower than a standard test value for a certain confidence interval. The results of the analyses are summarized in Table 2.4.11-4. It shows that only three distributions, normal, P3, and LP3, are acceptable when both goodness-of-fit tests are considered for 95 percent confidence interval. The LP3 distribution, as indicated in Table 2.4.11-4, fits the observed data the best. This distribution is also presented in Figure 2.4.11-3. Weibull plotting position formula was used for observed data, and the frequencies of the distributions were modified to reflect low flow conditions following the methodology proposed by Riggs (1972). LP3 distribution was then used to obtain flow statistics for annual minimum daily-mean flow values for the water years 1985–2003, the period representative of present-day river regulation.

Figure 2.4.11-4 shows the LP3 distribution of the data for the water years 1953–2003. This period of record corresponds to the first regulation of the Savannah River by J. Strom Thurmond Dam. However, additional regulation of the river was added in 1965 and 1985 when Hartwell Dam and Richard B. Russell Dam, respectively—the last two of the three major projects—were constructed. The effect of this additional river regulation can be observed in the figure with a reduced fit of the distribution with observed data. The distribution is also found to be unacceptable according to the χ^2 goodness-of-fit test, with a test value of 23.6 for a 95 percent confidence interval (Table 2.4.11-5).

Table 2.4.11-5 also shows the summary of low flow statistics for water years 1985–2003 for annual minimum daily-mean flow at Augusta. Although the period of record for this data is small, it represents the present-day full regulation of the river flow and shows acceptable goodness-of-fit for annual minimum daily-mean flows. The low flow volume thus estimated for a 100-year return period is 3,298 cfs, as shown in Table 2.4.11-5. A 7-day average 10 year return period minimum discharge (7Q10) of 3,828 cfs is obtained in ER Section 2.3.1 for the flow at Augusta.

The corresponding low flow for a 100-year return period at Jackson (3,426 cfs) is also presented in Table 2.4.11-5 to facilitate a comparison. Figure 2.4.11-5 is a plot of the low flow frequency curve derived using the minimum daily-mean flow data observed at the Augusta gage for the period of 1985-2003. A similar frequency curve for the Jackson gage is presented in Figure 2.4.11-6.

2.4.11.1.3 Probable Minimum Flow

Because the river water will not be used for any safety-related activities for VEGP Units 3 and 4, probable minimum flow at the VEGP site has not been determined.

2.4.11.1.4 River Water Level for the 100-year Drought Condition

The flow rate for a 100-year drought event is estimated as 3,298 cfs in Table 2.4.11-5. The river stage corresponding to this flow rate was estimated from the stage-discharge relationship developed at USGS stream gage station 021973269 at Waynesboro, Georgia on the Savannah River near the VEGP site. Details of the stream measurements at this gaging location are presented in Table 2.4.11-2.

Streamflow measurements by the USGS at this gage were established very recently, and only eight records of measured data are available from the USGS Web site (**USGS 2006j**). Details of these flow measurements and corresponding river stages are shown in Table 2.4.11-6. The data show five measurement events in 2005 and one each in 1986, 1987, and 1988. Flow measurements in 2005 were performed using an acoustic Doppler current profiler (ADCP). Measurements in the previous years were performed using current meters from boats.

The gage datum at this station is given on the USGS Web site as El. 90 ft above sea level NGVD29, which is equivalent to El. 90 ft msl. Using this datum, the converted water surface elevation for the measurements in 1988, 1987, and 1986 becomes close to El. 170 ft msl, which clearly is not correct. Based on the stage-discharge relationship presented in a VEGP Unit 1 and 2 analysis, it is assumed that these levels, which are shown as gage heights on the USGS Web site (also in Table 2.4.11-6), likely represent the river stage in feet msl after datum conversion.

Uncertainties also remain with the gage datum in converting the measured water surface gage heights from 2005, where the water levels become too high after conversion; for example, a flow of 8,120 cfs show a river stage of over El. 100 ft msl. This uncertainty in defining the gage datum for the Waynesboro gage was also identified at the site, where a gage datum of 70.75 ft msl was established based on a discussion with USGS and onsite geodetic marker of Georgia Power Company (GPC). Accordingly, a gage datum of 70.75 ft msl is used in this analysis.

The stage-discharge rating relationship at the site was developed using the measured flow discharges and river stages, as shown in Figure 2.4.11-7. The following approach was used to develop the rating relationship. First, the measured water levels for the years 1988, 1987, and 1986 were assumed to be the river stages in feet msl. Second, using data from all the measurement points, a best fit of the rating relation was investigated. A river stage corresponding to a no flow condition in the river at the station (H_0) was assumed, and all river

stage data were converted to $H-H_0$ values. $H-H_0$ was then plotted against corresponding measured streamflow values. Last, an optimization of the best-fit rating relation was performed by modifying the assumed H_0 to maximize the root-mean-square value (R^2) of the best-fit equation. The final estimated relationship is shown in Figure 2.4.11-7. The optimization provided a zero flow level (H_0) of El. 67.56 ft msl, and an R^2 value of nearly 100 percent. The H_0 magnitude of El. 67.56 ft msl also lies within the range of river bottom elevations measured near the VEGP Units 3 and 4 river intake location during a bathymetric survey conducted in January 2006, as shown in Figure 2.4.11-8.

Using the stage-discharge relationship developed in Figure 2.4.11-7, a river stage of El. 76.26 ft msl was estimated at the VEGP site for the drought event with 100-year return period (3,298 cfs).

2.4.11.2 Low Water Resulting from Surges, Seiches, Tsunamis, or Ice Effects

Since the VEGP site is not located on a large body of water or in a coastal region, low water conditions resulting from storm surges, seiches, or tsunamis do not apply. Since there is no evidence of ice jam events near the VEGP site (see Section 2.4.7), low water conditions due to ice effects are also precluded. There are no dams downstream from the VEGP site; therefore, downstream dam failure is not a factor that could cause low flow condition at the site. Furthermore, no VEGP Unit 3 and 4 safety-related facilities will be dependent on water supply from the Savannah River.

2.4.11.3 Historical Low Water

Table 2.4.11-3 shows the annual minimum daily-mean flow recorded at the three USGS stations: Augusta, Jackson, and Burtons Ferry. Within the period of data availability, the lowest recorded daily-mean flow at Augusta was 1,040 cfs on October 2, 1927. At Jackson the record lowest flow of 3,220 cfs was observed on December 9, 1981, and at Burtons Ferry it was 2,120 cfs on September 9, 1951. The lowest flow on record at Augusta and Burtons Ferry occurred prior to construction of the dams on the Savannah River. However, because of the short length of flow records, the lowest flow at Jackson occurred after the J. Strom Thurmond and Hartwell dams were completed. The corresponding low flow at Augusta was 2,810 cfs, observed on December 7, 1981. Burtons Ferry data for this water year are not available.

Low water conditions in the river reach between Augusta and Burtons Ferry after completion of all three dams are discussed in Section 2.4.11.1.1. Since construction of the dams, the lowest flow measurement of 3,460 cfs was observed at Augusta on May 16, 1996. The corresponding flow at Jackson and Burtons Ferry, however, was considerably higher, with 5,730 cfs at Jackson on May 17, 1996, and 5,590 cfs at Burtons Ferry on May 18, 1996.

The lowest ever-recorded instantaneous flow at Augusta was 648 cfs on September 24, 1939, which was caused by the operation of the gates at the New Savannah Bluff Lock and Dam. The low flow stage-discharge rating curve at the Augusta gage was established based on the lowest measured flow magnitude of 1,400 cfs. The instantaneous low flow magnitude in 1939 was estimated by extrapolating the stage-discharge relationship at the gage station below the lowest measured discharge value of 1,400 cfs. The daily-mean flow for that day, however, was higher, at 2,940 cfs.

2.4.11.4 Future Controls

Present consumptive use of water from the Savannah River includes public supply, industrial and commercial use, power generation, and irrigation. A compilation of water use data for Georgia indicates that surface water use within the state remained nearly unchanged between 1980 and 2000 (**Fanning 2003**). For South Carolina, while surface water use between 1990 and 2000 remained nearly the same, an increase of approximately 50 percent in surface water use is projected for the year 2045 (**SC DNR 2004**). The projected increase also includes water demand for power generation.

The US Army Corps of Engineers, Savannah District, along with the states of Georgia and South Carolina, are developing an updated comprehensive water resources management plan for the Savannah River basin. As part of the comprehensive water management scenarios, a revised drought management plan is now being actively considered. Under the proposed plan and for proposed alternative (Alternative 2), flow through Thurmond Dam would be increased (from 3,600 cfs) to 3,800 cfs for a Level 3 drought (**USACE 2006c**). This would also increase the low water flow available in the Savannah River near the VEGP site. The proposed drought triggers for this alternative are shown in Table 2.4.11-7.

2.4.11.5 Plant Requirements

VEGP Units 3 and 4 will be Westinghouse AP1000 reactor designs with a closed-cycle wet cooling system for condenser heat rejection. The only use of water from the Savannah River for the reactor units will be for the circulating water system/turbine plant cooling water system makeup, where river water will be required to replace evaporative water losses, drift losses, and blowdown discharge. Under normal operating conditions and design ambient conditions, river water demand for two-unit operation will be 82.9 cfs (37,212 gpm). The maximum water requirement for plant operation will be 128.7 cfs (57,784 gpm).

2.4.11.6 Heat Sink Dependability Requirements

The AP1000 reactor plants selected for VEGP Units 3 and 4 do not require a conventional ultimate heat sink to provide safety-related cooling during emergency shutdown. The AP1000 reactors make use of a passive cooling system and use water stored in onsite tanks. Consequently, river water will not be necessary to achieve safe shutdown of the units.

Table 2.4.11-1 Summary of Action Levels for Drought Management in the Savannah River Basin

| Level | Reservoir Pool Levels | | | | Action |
|-------|-----------------------|---------------|--------------------------------|----------------|--|
| | Hartwell Dam | | J.S. Thurmond Dam ^a | | |
| | Apr 18 – Oct 15 | Dec 1 – Jan 1 | May 1 – Oct 15 | Dec 15 – Jan 1 | |
| | ft msl ^b | ft msl | ft msl | ft msl | |
| 1 | 656 | 655 | 326 | 325 | Public Safety Information |
| 2 | 654 | 652 | 324 | 322 | Reduce Thurmond discharge to 4,500 cfs; reduce Hartwell discharge as appropriate to maintain balanced pool |
| 3 | 646 | 646 | 316 | 316 | Reduce Thurmond discharge to 3,600 cfs; reduce Hartwell discharge as appropriate to maintain balanced pool |
| 4 | 625 | 625 | 312 | 312 | Continue Level 3 discharge as long as possible; thereafter Inflow = Outflow |

^a J. Strom Thurmond Dam

^b mean sea level

Source: USACE 1989

Table 2.4.11-2 Locations, Catchment Areas, and Data Availability of the USGS Gage Stations

| Station Name | County/Town | USGS Station ID | Location | | | River Mile ^a | Catchment Area (mi ²) | Daily Streamflow Data Availability | | |
|--|---------------|-----------------|-----------|-----------|-----------------|-------------------------|-----------------------------------|------------------------------------|-----------|--------|
| | | | Latitude | Longitude | HU ^b | | | Start Date | End Date | Count |
| Savannah River at Augusta | Richmond, GA | 02197000 | 33°22'25" | 81°56'35" | 03060106 | 187.4 | 7,508 | 10/1/1883 | 9/30/2003 | 35,793 |
| Savannah River near Jackson | Aiken, SC | 02197320 | 33°13'01" | 81°46'04" | 03060106 | 156.8 | 8,110 | 10/1/1971 | 9/30/2002 | 10,733 |
| Savannah River at Burtons Ferry near Millhaven | Millhaven, GA | 02197500 | 32°56'20" | 81°30'10" | 03060106 | 118.7 | 8,650 | 10/1/1939 | 9/30/2003 | 18,993 |
| Savannah River near Waynesboro | Burke, GA | 021973269 | 33°08'59" | 81°45'18" | 03060106 | 150.6 ^c | 8,300 | 1/22/2005 | 9/30/2005 | 252 |

^a USACE 1996

^b Hydrological Unit

^c Approximate River Mile

Source: USGS 2006g

Table 2.4.11-3 Variation of Annual Minimum Daily-mean Flow in the Savannah River at Augusta, Jackson, and Burtons Ferry Gages

| | Flow (ft ³ /sec) at Locations | | | Comments |
|------------|--|---------|---------------|--|
| | Augusta | Jackson | Burtons Ferry | |
| River Mile | 187.7 | 156.8 | 118.7 | |
| 1884 | 2,060 | | | |
| 1885 | 1,980 | | | |
| 1886 | 3,500 | | | |
| 1887 | 2,780 | | | |
| 1888 | 3,300 | | | |
| 1889 | 4,340 | | | |
| 1890 | 2,700 | | | |
| 1891 | 4,480 | | | |
| 1896 | 2,230 | | | |
| 1897 | 1,990 | | | |
| 1898 | 2,080 | | | |
| 1899 | 2,350 | | | |
| 1900 | 3,000 | | | |
| 1901 | 3,940 | | | |
| 1902 | 3,920 | | | |
| 1903 | 3,740 | | | |
| 1904 | 2,060 | | | |
| 1905 | 1,450 | | | |
| 1906 | 2,650 | | | |
| 1925 | 1,100 | | | |
| 1926 | 1,380 | | | |
| 1927 | 1,160 | | | |
| 1928 | 1,040 | | | Historical low flow at Augusta on Oct. 2, 1927 |
| 1929 | 3,580 | | | |
| 1930 | 1,970 | | | |
| 1931 | 1,420 | | | |
| 1932 | 1,230 | | | |
| 1933 | 2,280 | | | |

Table 2.4.11-3 (cont.) Variation of Annual Minimum Daily-mean Flow in the Savannah River at Augusta, Jackson, and Burtons Ferry Gages

| | Flow (ft ³ /sec) at Locations | | | Comments |
|------------|--|---------|---------------|--|
| | Augusta | Jackson | Burtons Ferry | |
| River Mile | 187.7 | 156.8 | 118.7 | |
| 1934 | 1,950 | | | |
| 1935 | 2,090 | | | |
| 1936 | 1,590 | | | |
| 1937 | 2,970 | | | |
| 1938 | 1,860 | | | |
| 1939 | 1,770 | | | |
| 1940 | 1,340 | | 2,400 | |
| 1941 | 1,510 | | 2,320 | |
| 1942 | 1,390 | | 2,240 | |
| 1943 | 2,700 | | 3,600 | |
| 1944 | 2,780 | | 3,440 | |
| 1945 | 2,350 | | 3,120 | |
| 1946 | 2,550 | | 3,530 | |
| 1947 | 1,840 | | 2,720 | |
| 1948 | 1,900 | | 3,230 | |
| 1949 | 2,930 | | 4,900 | |
| 1950 | 2,850 | | 4,120 | |
| 1951 | 1,710 | | 2,120 | Lowest flow (within available data) at Burtons Ferry on Sep. 9, 1951 |
| 1952 | 1,770 | | 2,550 | J. Strom Thurmond Dam |
| 1953 | 3,260 | | 3,850 | |
| 1954 | 5,460 | | 5,500 | |
| 1955 | 4,180 | | 4,770 | |
| 1956 | 3,580 | | 4,590 | |
| 1957 | 5,170 | | 5,500 | |
| 1958 | 5,000 | | 5,500 | |
| 1959 | 5,260 | | 5,500 | |
| 1960 | 5,350 | | 6,440 | |
| 1961 | 4,930 | | 6,060 | |

Table 2.4.11-3 (cont.) Variation of Annual Minimum Daily-mean Flow in the Savannah River at Augusta, Jackson, and Burtons Ferry Gages

| | Flow (ft ³ /sec) at Locations | | | Comments |
|------------|--|---------|---------------|--|
| | Augusta | Jackson | Burtons Ferry | |
| River Mile | 187.7 | 156.8 | 118.7 | |
| 1962 | 4,760 | | 5,700 | |
| 1963 | 5,130 | | 6,260 | |
| 1964 | 6,120 | | 6,900 | |
| 1965 | 6,300 | | 7,600 | Hartwell Dam |
| 1966 | 6,160 | | 7,110 | |
| 1967 | 5,740 | | 6,780 | |
| 1968 | 5,890 | | 6,950 | |
| 1969 | 5,800 | | 6,900 | |
| 1970 | 5,870 | | 6,710 | |
| 1971 | 4,460 | | | |
| 1972 | 6,220 | 6,330 | | |
| 1973 | 5,460 | 6,390 | | |
| 1974 | 5,450 | 6,330 | | |
| 1975 | 5,830 | 6,760 | | |
| 1976 | 6,750 | 6,770 | | |
| 1977 | 6,000 | 6,420 | | |
| 1978 | 6,110 | 5,800 | | |
| 1979 | 5,940 | 5,770 | | |
| 1980 | 5,970 | 5,930 | | |
| 1981 | 5,120 | 5,190 | | |
| 1982 | 2,810 | 3,220 | | Lowest flow (within available data) at Jackson on Dec. 9, 1981 |
| 1983 | 5,080 | 5,050 | 5,870 | |
| 1984 | 4,740 | 4,900 | 5,210 | |
| 1985 | 4,750 | 4,760 | 4,830 | Richard B. Russell Dam |
| 1986 | 4,590 | 4,760 | 4,390 | |
| 1987 | 3,790 | 4,120 | 3,960 | |
| 1988 | 3,880 | 4,150 | 4,000 | |
| 1989 | 3,800 | 4,360 | 4,100 | |

Table 2.4.11-3 (cont.) Variation of Annual Minimum Daily-mean Flow in the Savannah River at Augusta, Jackson, and Burtons Ferry Gages

| | Flow (ft ³ /sec) at Locations | | | Comments |
|----------------------------|--|---------|---------------|--|
| | Augusta | Jackson | Burtons Ferry | |
| River Mile | 187.7 | 156.8 | 118.7 | |
| 1990 | 4,010 | 4,880 | 4,730 | |
| 1991 | 4,310 | 4,640 | 4,330 | |
| 1992 | 4,000 | 4,610 | 4,620 | |
| 1993 | 4,560 | 5,620 | 5,320 | |
| 1994 | 4,200 | 5,160 | 4,930 | |
| 1995 | 5,110 | 5,590 | 5,410 | |
| 1996 | 3,460 | 5,730 | 5,360 | After 1985, lowest flow at Augusta on May 16, 1996 |
| 1997 | 4,230 | 4,790 | 4,480 | |
| 1998 | 4,300 | 5,310 | 5,370 | |
| 1999 | 3,800 | 4,710 | 4,490 | |
| 2000 | 3,880 | 4,300 | 4,160 | |
| 2001 | 3,670 | 4,380 | 4,550 | |
| 2002 | 3,730 | 3,960 | 3,920 | After 1985, lowest flow at Jackson on Sep. 13, 2002; at Burtons Ferry on Sep. 14, 2002 |
| 2003 | 3,470 | | 4,360 | |
| Record Low Flow | 1,040 | 3,220 | 2,120 | |
| Low Flow between 1983–2002 | 3,460 | 3,960 | 3,920 | Period of common data availability |
| Low Flow after 1985 | 3,460 | 3,960 | 3,920 | Period after the completion of three major dams (present-day regulation of the Savannah River) |

Source: USGS 2006g

Table 2.4.11-4 Summary of Statistical Parameters for Different Probability Density Functions Calculated with Annual Minimum Daily-mean Streamflow Values at Augusta for the Water Years 1884–1952

| Distribution | Mean | SD ^a | Cs ^b | Goodness-of-Fit (95% confidence level) | | | | Comments |
|---------------------|--------|-----------------|-----------------|--|------------------|---------------------|-------|----------------------------|
| | | | | Standard Test Value | | Present set of Data | | |
| | | | | χ^2 | K-S ^c | χ^2 | K-S | |
| Normal | 2331.1 | 881.64 | 0.713 | 19.68 | 0.159 | 11.5 | 0.115 | Acceptable |
| Exponential | 2331.1 | 881.64 | 0.713 | | | 23.7 | 0.129 | Not acceptable |
| Gumbel ^d | 2331.1 | 881.64 | 0.713 | | | 24.7 | 0.216 | Not acceptable |
| P3 ^e | 2331.1 | 881.64 | 0.713 | | | 8.4 | 0.074 | Acceptable |
| Log-Normal | 7.7 | 0.37 | 0.013 | | | 19.6 | 0.103 | Marginal, not acceptable |
| LP3 ^f | 7.7 | 0.40 | 0.013 | | | 6.9 | 0.035 | Acceptable with best value |

^a Standard Deviation

^b Coefficient of Skewness

^c Kolmogorov-Smirnov

^d Extreme Value Type I

^e Pearson Type 3

^f Log-Pearson Type 3

Table 2.4.11-5 Summary of Low Flow Statistics for Log-Pearson Type 3 Distribution with Annual Minimum Daily-mean, 7-Day Moving-average, and 30-Day Moving-average Streamflow Values at Augusta and Jackson for the Water Years 1985–2003

| Gage Station | Water Years | Data Type | Mean Ln (cfs) | SD ^a | Cs ^b | Goodness-of-Fit ^c | | Low Flow Magnitudes (cfs) for Return Periods (years) | | | | |
|--------------|-------------|------------|------------------|-----------------|-----------------|------------------------------|------------------|---|-------|-------|-------|-------|
| | | | | | | χ^2 | K-S ^d | 5 | 10 | 20 | 50 | 100 |
| | | | | | | | | | | | | |
| Augusta | 1953-2003 | Daily-mean | 8.47 | 0.21 | 0.38 | 23.6 | 0.093 | 3,985 | 3,684 | 3,465 | 3,246 | 3,115 |
| | 1985-2003 | Daily-mean | 8.31 | 0.11 | 0.49 | 6.9 | 0.079 | 3,708 | 3,569 | 3,466 | 3,361 | 3,298 |
| Jackson | 1985-2002 | Daily-mean | 8.46 | 0.11 | 0.26 | 8.7 | 0.139 | 4,316 | 4,130 | 3,988 | 3,839 | 3,746 |

^a Standard deviation

^b Coefficient of Skewness

^c For 95% confidence limit, standard χ^2 test value is 19.68; for Kolmogorov-Smirnov tests the standard values are 0.154 for water years 1953-2003, 0.231 for 1985-2003, and 0.236 for 1985-2002

^d Kolmogorov-Smirnov

Table 2.4.11-6 Summary of Streamflow Measurement at USGS Station No. 021973269 Savannah River Near Waynesboro

| Measurement No. | Date | Width ft | Area ft ² | Mean Velocity fps | Gage Height ft | Streamflow cfs | Measurement Type |
|-----------------|------------|----------|----------------------|-------------------|----------------|----------------|------------------|
| 8 | 10/14/2005 | 359 | 2740 | 1.89 | 7.81 | 5,180 | ADCP |
| 7 | 5/18/2005 | 369 | 4000 | 2.03 | 10.56 | 8,120 | ADCP |
| 6 | 3/31/2005 | 423 | 6740 | 3.22 | 19.28 | 21,700 | ADCP |
| 5 | 3/17/2005 | 371 | 5540 | 2.63 | 14.80 | 14,600 | ADCP |
| 4 | 1/19/2005 | | | | 12.03 | 9,840 | ADCP |
| 3 | 8/29/1988 | 333 | 2270 | 1.96 | 77.56 | 4,450 | Boat |
| 2 | 2/4/1987 | 310 | 3300 | 2.32 | 80.60 | 7,640 | Boat |
| 1 | 9/24/1986 | 300 | 2300 | 1.98 | 77.84 | 4,570 | Boat |

Note: A detailed discussion on gage heights for different years is included in Section 2.4.11.1.4

Source: USGS 2006j

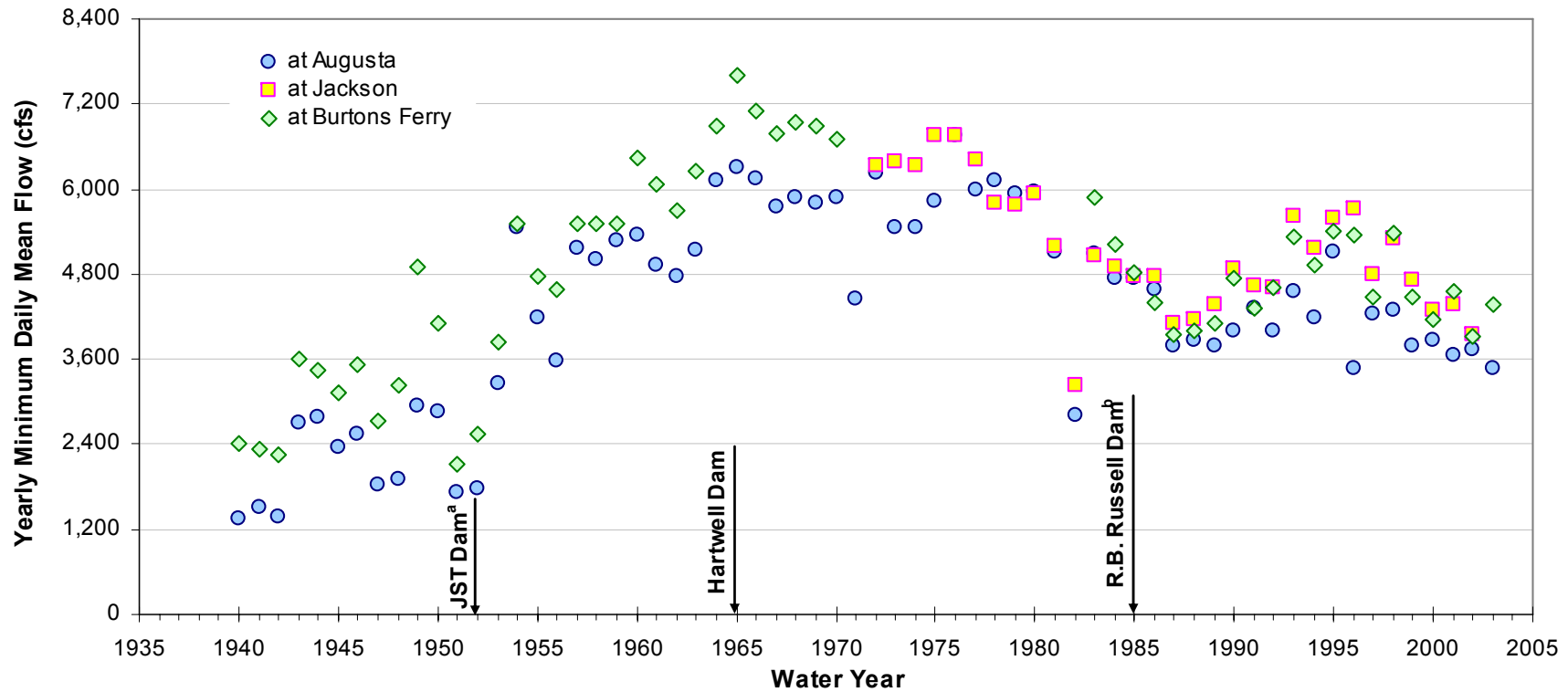
Table 2.4.11-7 Summary of Proposed Modifications in Action Levels for Drought Management in the Savannah River Basin

| Level | Reservoir Pool Levels | | | | Action |
|-------|--|-----------------------------|--------------------------------|-----------------------------|---|
| | Hartwell Dam | | J.S. Thurmond Dam ^a | | |
| | Apr 1 – Oct 15 ft msl ^b | Dec 15 – Jan 1 ft msl | Apr 1 – Oct 15 ft msl | Dec 15 – Jan 1 ft msl | |
| 1 | 656 | 654 | 326 | 324 | Reduce Thurmond discharge to 4,200 ft ³ /sec |
| 2 | 654 | 652 | 324 | 322 | Reduce Thurmond discharge to 4,000 ft ³ /sec |
| 3 | 646 | 646 | 316 | 316 | Reduce Thurmond discharge to 3,800 ft ³ /sec |
| 4 | 625 | 625 | 312 | 312 | Inflow = Outflow |

^a J. Strom Thurmond reservoir

^b mean sea level

Source: USACE 2006c

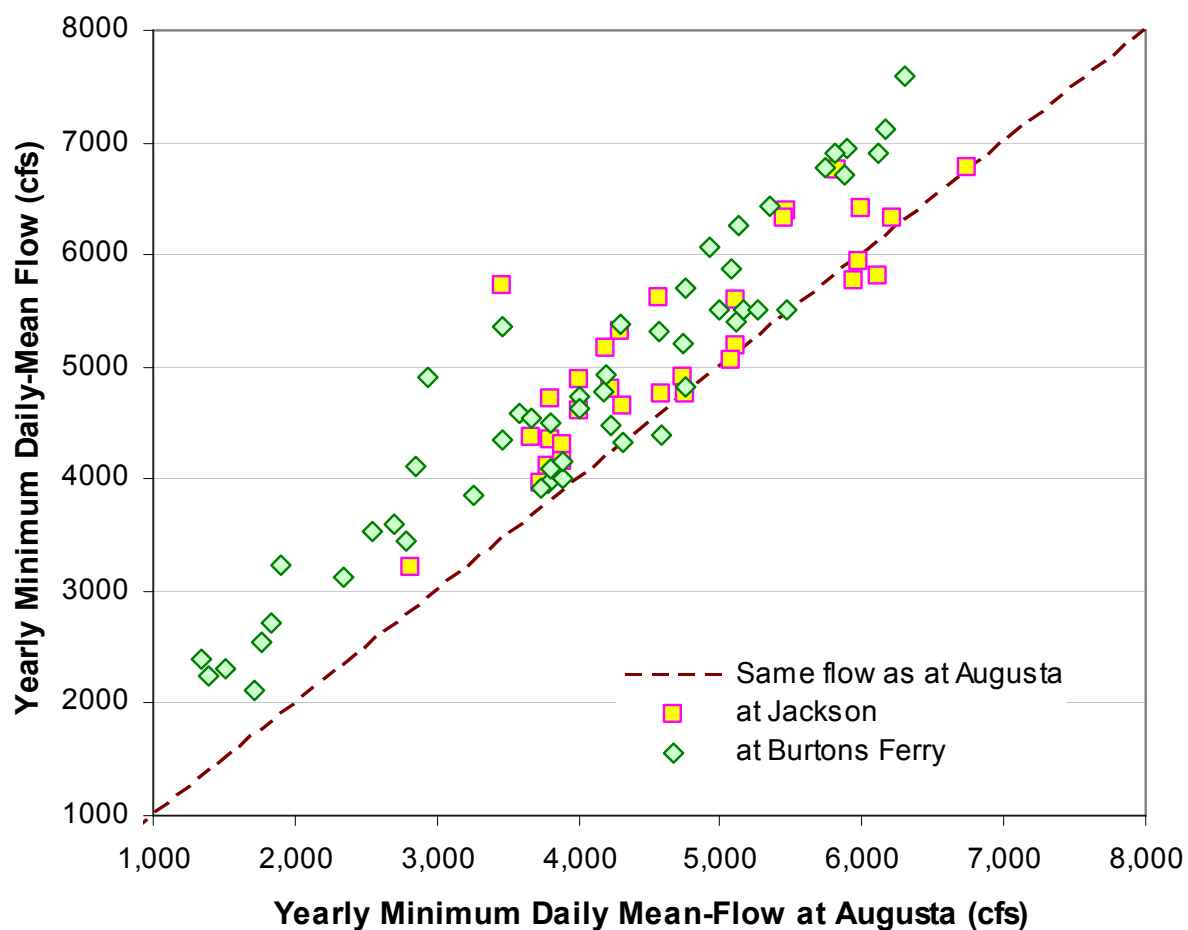


^a J. Strom Thurmond Dam

^b Richard B. Russell Dam

Source: USGS 2006g

Figure 2.4.11-1 Variation in Annual Minimum Daily-mean Stream Flow in the Savannah River at Augusta, Jackson, and Burtons Ferry Gages



Source: USGS 2006g

Figure 2.4.11-2 Change in Annual Minimum Daily-mean Flow at Jackson and Burtons Ferry Corresponding to that at Augusta for the Period of 1940-2003

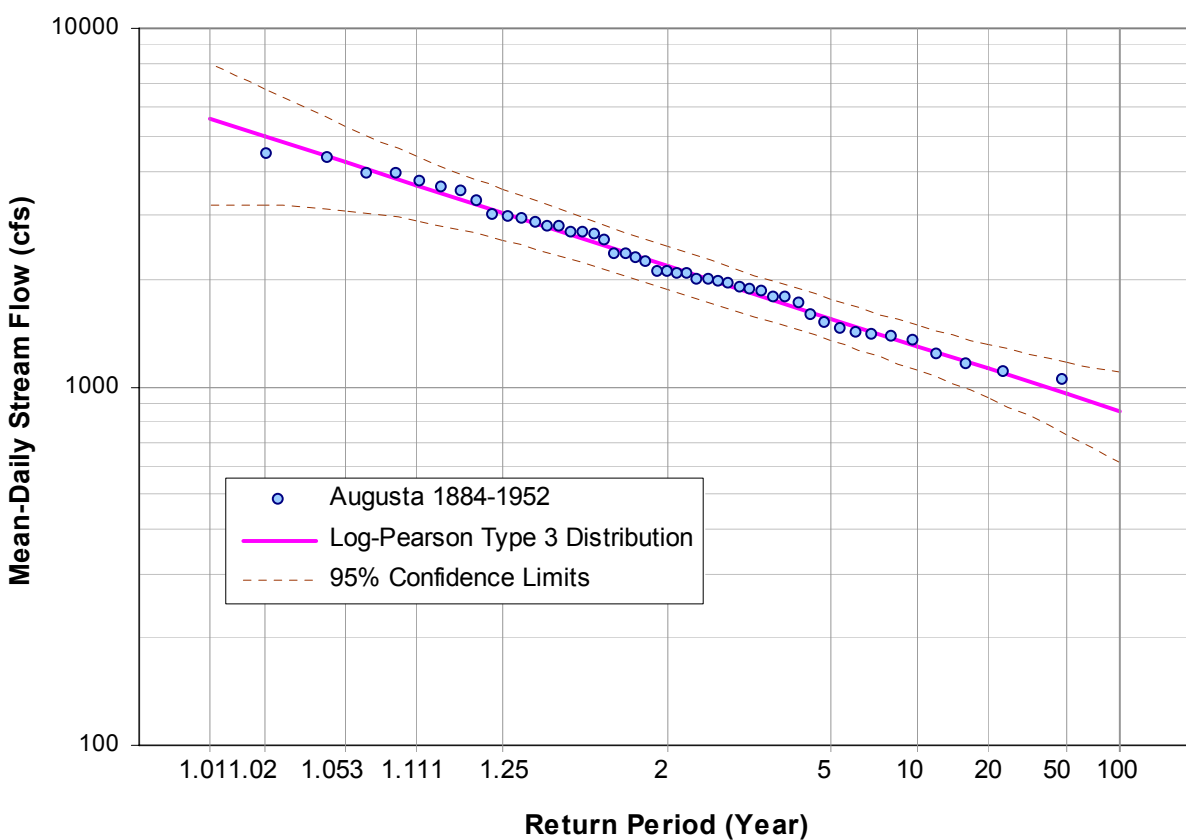


Figure 2.4.11-3 Log-Pearson Type 3 Distribution with Annual Minimum Daily-mean Flow Data from Augusta for the Water Years 1884–1952

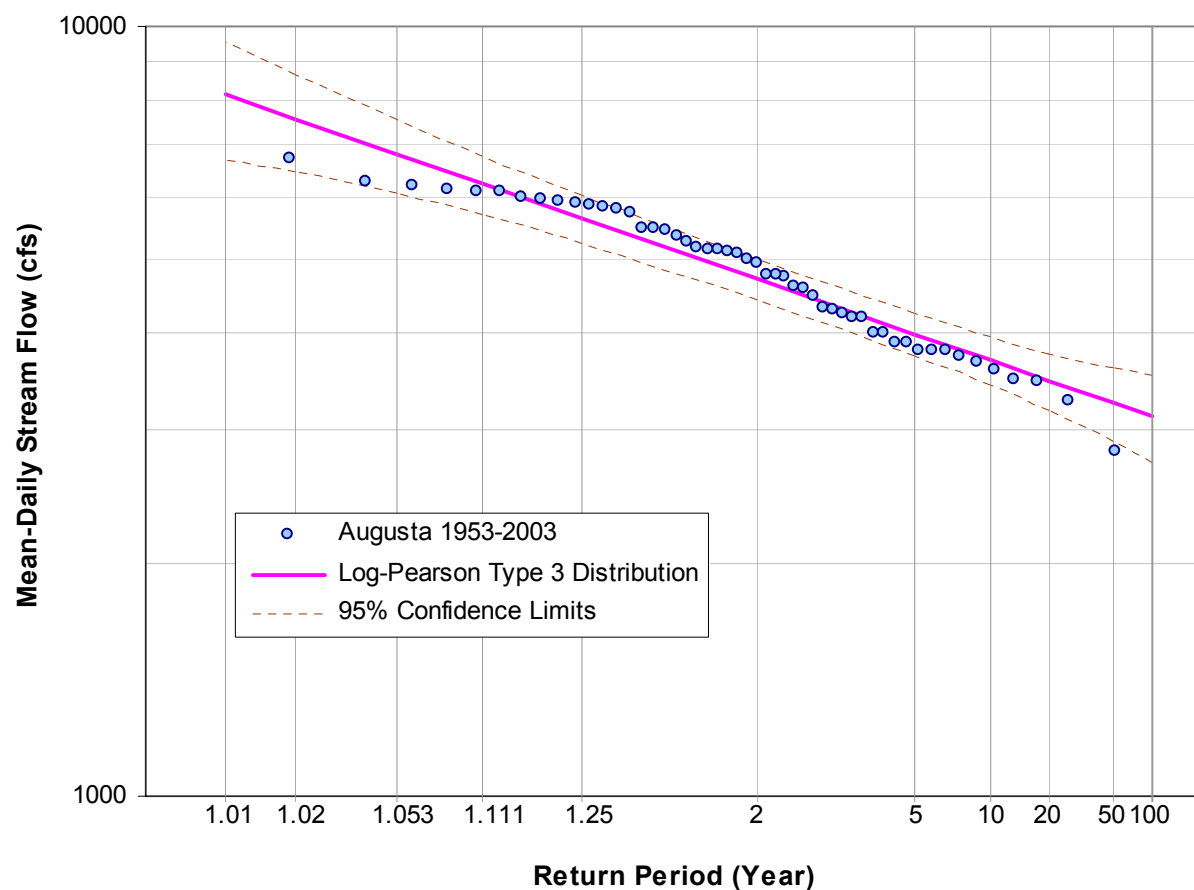


Figure 2.4.11-4 Log-Pearson Type 3 Distribution with Annual Minimum Daily-mean Flow Data from Augusta for the Water Years 1953–2003

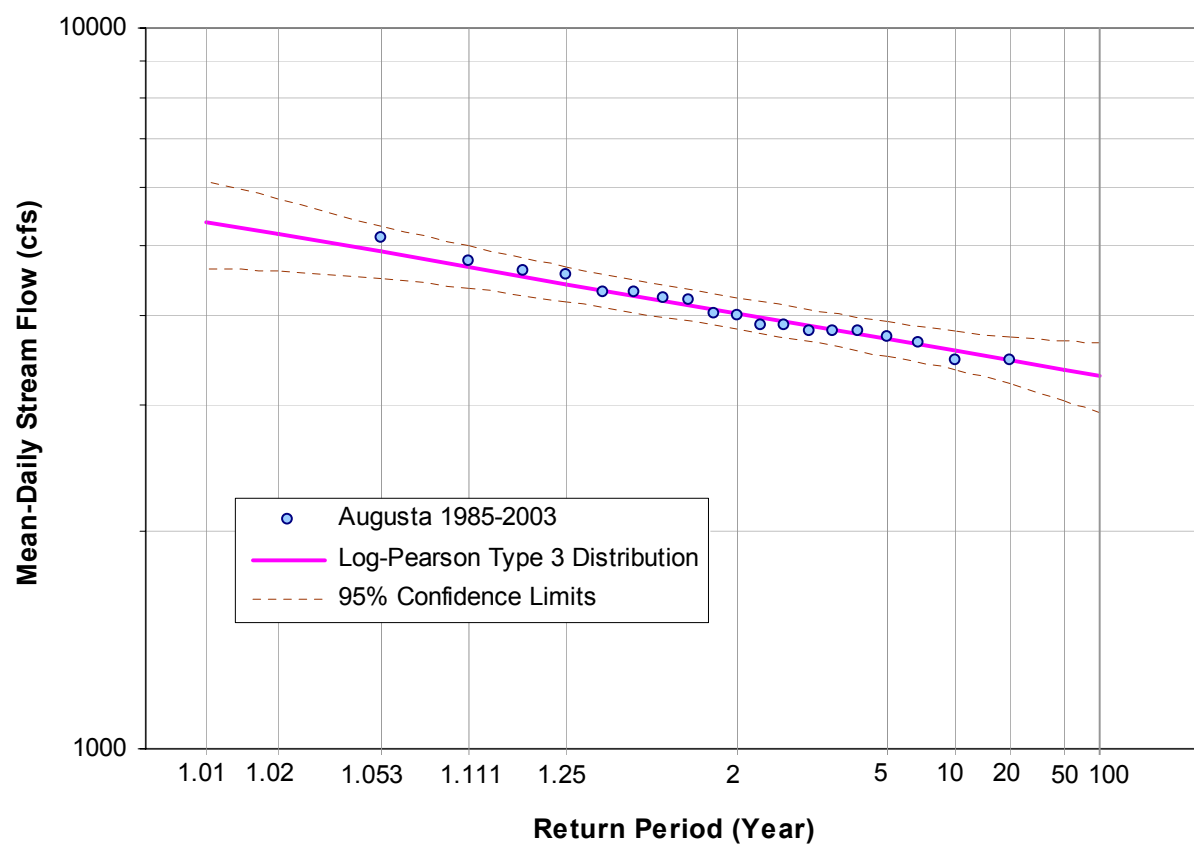


Figure 2.4.11-5 Log-Pearson Type 3 Distribution with Annual Minimum Daily-mean Flow Data from Augusta for the Water Years 1985–2003

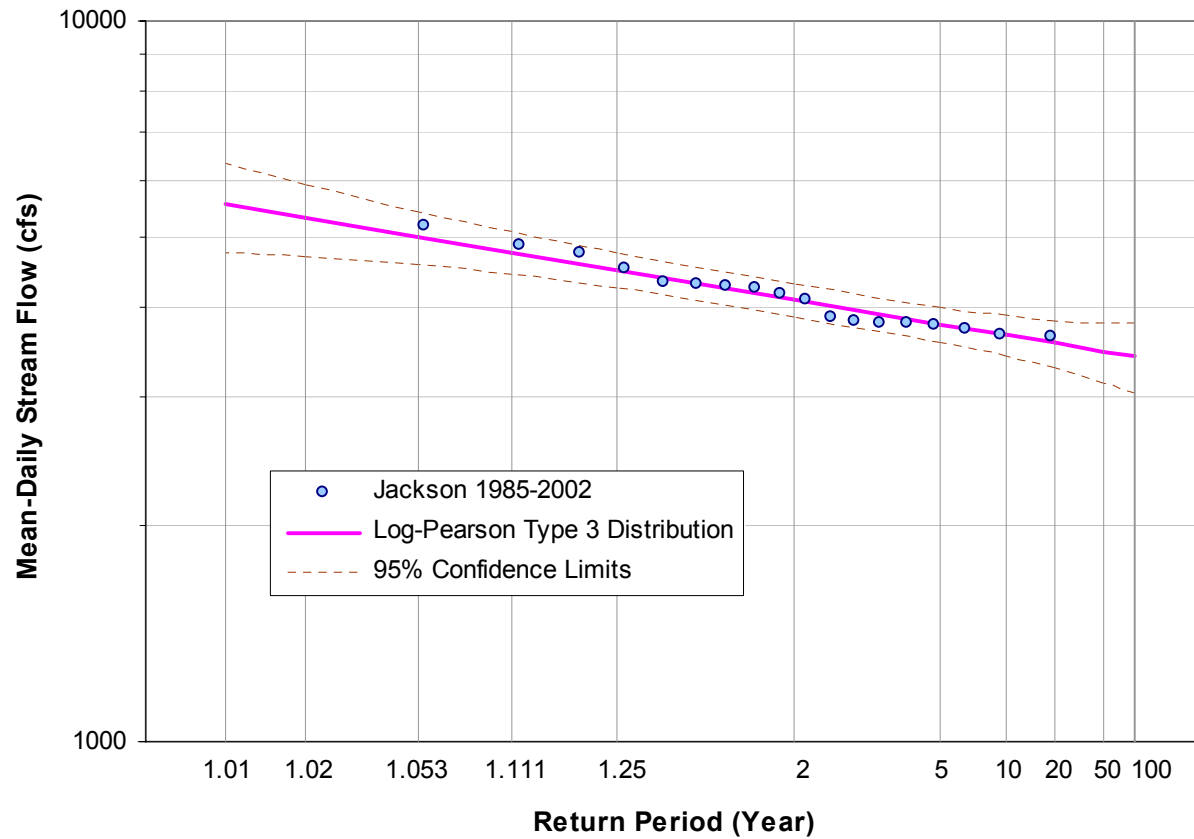
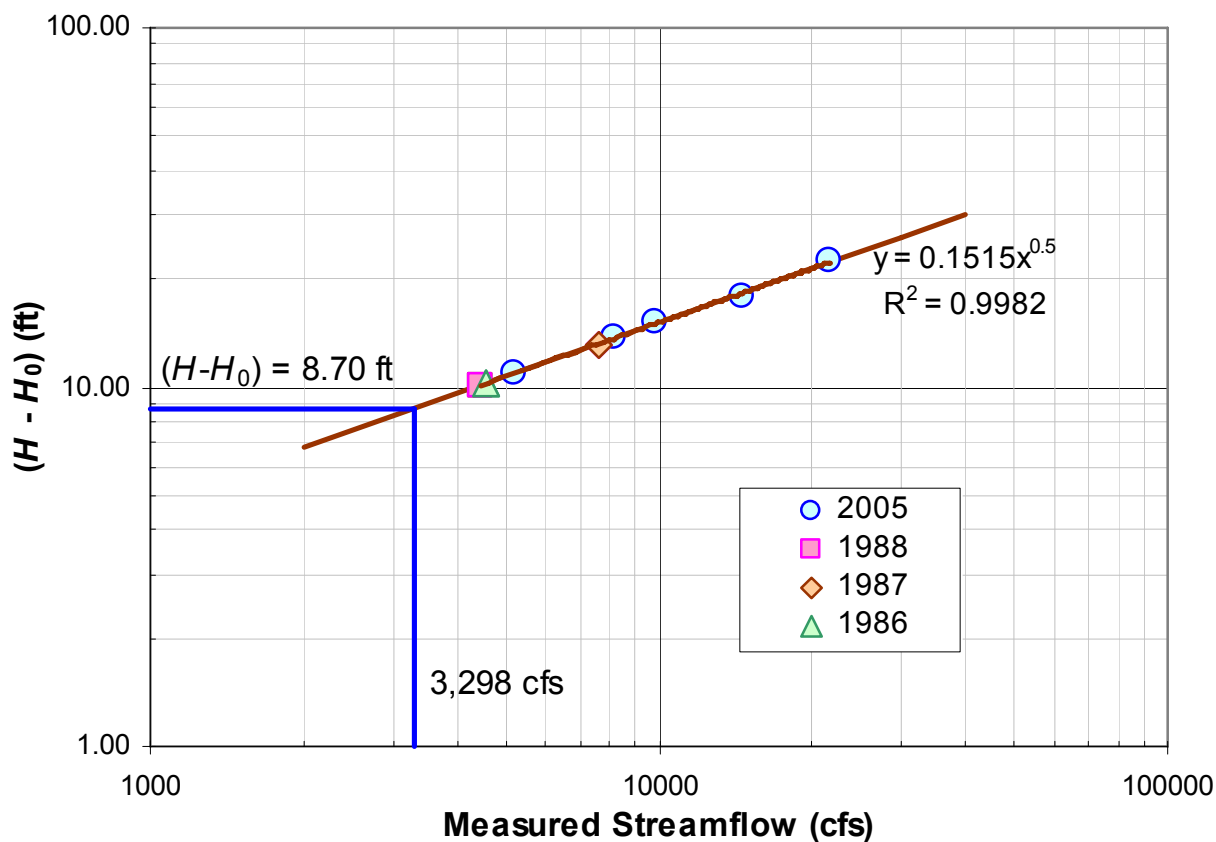


Figure 2.4.11-6 Log-Pearson Type 3 Distribution with Annual Minimum Daily-mean Streamflow from Jackson for the Water Years 1985–2002



H = Water surface elevation in El. ft msl

H_0 = Elevation corresponding to zero flow = El. 67.56 ft msl

Figure 2.4.11-7 River Stage-Discharge Rating Relationship at USGS Waynesboro Gage Station Near the VEGP Site Using Data for the Years 2005, 1988, 1987 and 1986

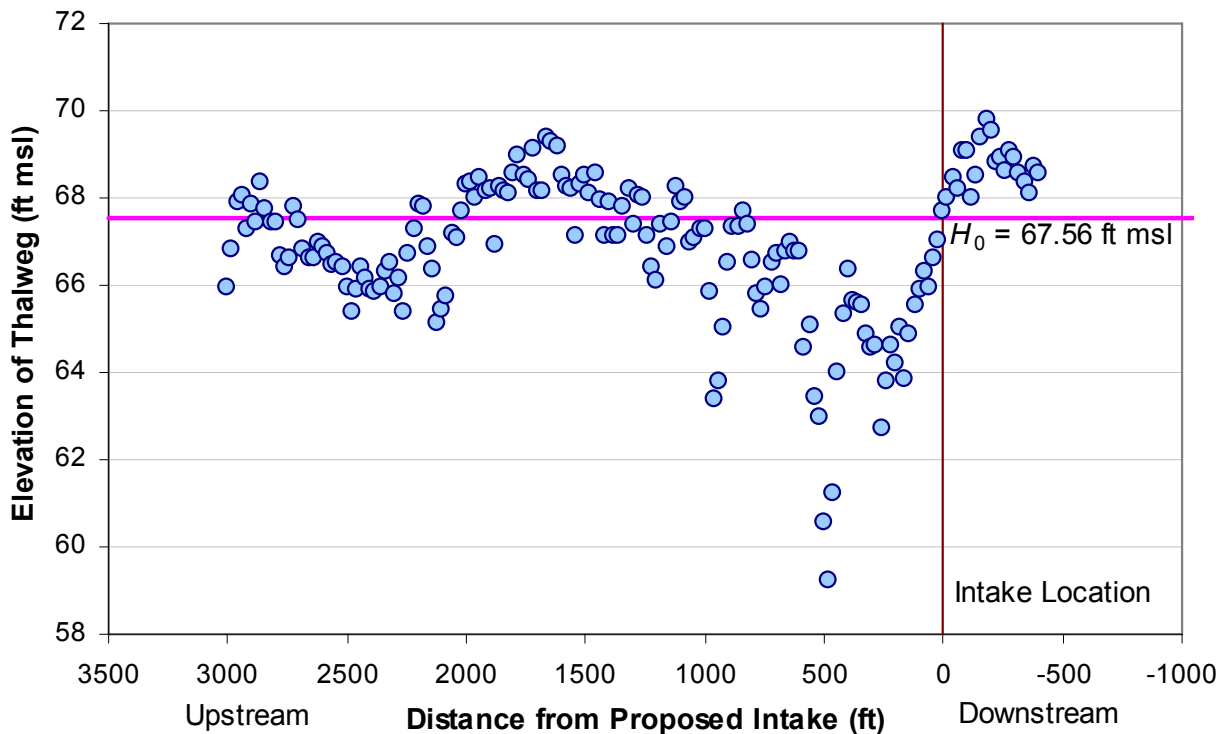


Figure 2.4.11-8 Comparison of Estimated River Stage Corresponding to Zero Discharge (H_0) with Measured River Thalweg Levels Near the Intake Location

Section 2.4.11 References

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(Riggs 1972) Riggs, H.C., *Techniques of Water-Resources Investigations of the United States Geological Survey, Chapter B1: Low-Flow Investigations*, Book 4, Hydrological Analysis and Interpretation, USGS, 1972.

(SC DNR 2004) *South Carolina Water Plan*, Land, Water, and Conservation Division, South Carolina Department of Natural Resources, 2nd Ed., January 2004.

(USACE 1989) U.S. Army Corps of Engineers, Savannah District, *Savannah River Basin Drought Management Plan*, March 1989.

(USACE 1996) *Water Control Manual – Savannah River Basin Multiple Purpose Projects: Hartwell Dam & Lake; Richard B. Russell Dam & Lake; J. Strom Thurmond Dam & Lake*, Georgia and South Carolina, Savannah District, US Army Corps of Engineers, 1996.

(USACE 2006c) U.S. Army Corps of Engineers, Savannah District, *Draft Environmental Assessment and Finding of No Significant Impact Drought Contingency Plan Update, Savannah River Basin*, May 2006.

(USGS 2006g) *Daily Stream Flow for Georgia*, U.S. Geological Survey, Web site: http://nwis.waterdata.usgs.gov/ga/nwis/discharge?search_criteria=county_cd&search_criteria=search_station_nm&submitted_form=introduction, accessed April 24, 2006.

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(USGS 2006j) *Streamflow Measurements for Georgia*, Savannah River near Waynesboro, GA, U.S. Geological Survey, Web site: http://nwis.waterdata.usgs.gov/ga/nwis/measurements/?site_no=021973269&agency_cd=USGS, accessed May 12, 2006.

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2.4.12 Groundwater

This section describes the groundwater resources as it relates to the design bases for the Westinghouse AP1000 reactor design. The hydrogeology of the VEGP regional and local area including the site and the interface with the new AP1000 units are discussed in this section. Current and projected groundwater uses in the VEGP region are also discussed.

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, Georgia. The proposed AP1000 units referred to as VEGP Units 3 and 4 will have a finished grade level elevation of approximately 220 ft msl. The below grade structural foundation for the safety related AP1000 containment structure will be 39.5 ft below grade level (180.5 ft msl). The Westinghouse AP1000 reactor design has no safety-related ultimate heat sink that relies on surface water or groundwater supplies. On-site wells will provide make-up water for the service water system (SWS). The wells will also supply water for power plant systems, including the fire protection system, the plant demineralized water supply system, and the potable water system. Groundwater withdrawn for the proposed 2 new units will be 752 gpm on average, with a maximum of 3,140 gpm. During normal operation, approximately 305 gpm of the withdrawn groundwater is returned as surface water to the Savannah River (**Westinghouse 2005**).

In constructing the new units, the site will be excavated approximately 80 to 140 ft below existing grade to remove the in situ soil down to the principal bearing strata, the Blue Bluff Marl. The in situ soil will be replaced with seismically designed fill material. Foundations for the new units will be poured on this new backfill material and the fill material will be placed around the structures and continue up to the finished grade elevation of 220 ft msl. Seismic analysis of the geological formations under the proposed new units including the seismically designed backfill are discussed in Section 2.5.

2.4.12.1 Regional and Local Groundwater Aquifers, Sources, and Sinks

The following primary sources of information were used to develop the regional and local hydrogeological description in this section:

- Vogtle ALWR ESP Project Final Data Report, ES1374, Southern Company Services Inc., November 2005. (Appendix 2.4A)
- Data Report of Geotechnical Investigation and Laboratory Testing MACTEC Engineering and Consulting Inc., January 2005. (Appendix 2.5A)

- Groundwater Atlas of the United States, Segment 6, Alabama, Florida, Georgia, and South Carolina, U.S. Geological Survey, Hydrologic Investigations Atlas 730-G, J.A. Miller, 1990. **(Miller 1990)**
- Huddlestun, P.F., and J.H. Summerour, The Lithostratigraphic Framework of the Upper Cretaceous and Lower Tertiary of Eastern Burke County, Georgia, Bulletin 127, Georgia Department of Natural Resources, 1996. **(Huddlestun and Summerour 1996)**

2.4.12.1.1 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. Figure 2.5.1-1 shows the physiographic provinces and indicates a 200-mi radius from the VEGP site. Several major aquifers or aquifer systems are present with these physiographic provinces. The VEGP site and associated groundwater are located within the Coastal Plain province **(Miller 1990)**. 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. The provinces are composed primarily of metamorphic rocks with igneous intrusions. Surface materials consist of overlying saprolite with 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 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) 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 in 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 for discharge 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 higher groundwater storage than for any other physiographic provinces in Georgia (**Miller 1990**).

Three regional Coastal Plain aquifer systems are identified within a 50-mi radius of the VEGP site: Surficial aquifer system, Floridan aquifer system, and Southeastern Coastal Plain aquifer system (**Miller 1990**). The Surficial aquifer system is described as localized water-bearing sediments of Miocene age or younger. Typical well depths range from 11 to 300 ft, with well yields of 2 to 25 gpm. Well depths are dependent on location and material thickness. The Floridan aquifer system has typical well depths of 40 to 900 ft, with average well yields of 1,000 to 5,000 gpm. Multiple unconsolidated and consolidated water-bearing sands exist within the aquifer system, separated by semi-confining to confining, fine-grained material. Typical well depths in the Southeastern Coastal Plain aquifer system are 30 to 800 ft, with well yields of 50 to 1,200 gpm. (**Leeth et al. 2005**)

The bedrock underlying the Coastal Plain sediments consists of crystalline rock and Paleozoic sedimentary rocks. Well yields for the rock units can range up to 50 gpm, correlating to saprolite, fractures, and solution features. Due to the sufficient amount of groundwater found in the overlying sediments, the bedrock is not typically used as a source of groundwater in the Coastal Plain Physiographic Province (**Miller 1990**).

No sole-source aquifers have been designated within the VEGP site region (**EPA 2006c**).

2.4.12.1.2 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 physiographic 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 and Paleozoic crystalline rock. 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. The geotechnical logs are provided in Appendix 2.5A and further discussed in Section 2.5.4. The

boring logs from the observation well installation are presented in Appendix 2.4A. In addition, reviews of the original site investigations, existing unit well monitoring programs, and published literature were included in the analysis. 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 being part of 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**) and was not encountered in the investigations performed for this ESP application. The Floridan aquifer system, also present regionally, is absent from the VEGP site as well (**Huddlestun and Summerour 1996**).

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 system is made up of Tertiary-age sediments occurring over the Cretaceous-age sediments described above. The middle aquifer is known locally as the Tertiary aquifer system. 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. Figure 2.4.12-1 illustrates the hydrostratigraphic column for the VEGP site and surrounding area, identifying geologic units, confining units, and aquifers. Figures 2.4.12-2A and 2B present hydrogeologic cross sections for the VEGP site. 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 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. 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 transmissive and is capable of providing 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 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 summarized 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 decline 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.
- Overlying 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.

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 completed eroded the Blue Bluff Marl confining layer allowing discharge from the aquifer to the river bed.

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. 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 elevations, thicknesses, and descriptions of geologic formations comprising the Barnwell Group were determined from VEGP geotechnical and hydrogeological borings and are described as follows:

- The 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. When encountered, the thickness of the stratum ranges from approximately 22 to 104 ft, and the top of the formation ranges from approximately El. 151 to 199 ft msl. The Utley limestone was encountered at boring B-1003. The stratum is approximately 38 ft thick at this location with a top elevation of approximately El. 175 ft msl.
- Overlying the Utley Limestone are undifferentiated sands, clays, and silts. The thickness of the group is variable with a range of approximately 48 to 164 ft. The top of the group extends to the ground surface and 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 direct precipitation. The presence of porous surface sands and the moderate topographic relief in the VEGP site area suggest that a significant fraction of the precipitation infiltrates the ground or is lost to the atmosphere by evapotranspiration. Discharge is to localized drainages and wells.

2.4.12.1.3 Observation Well Data

Data from a combination of new wells installed for the ESP application and existing VEGP site wells were used to develop groundwater elevation contour maps and present groundwater elevation trends. 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. The remaining five new wells 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 are associated with the Water Table aquifer. The locations of observation wells presently being monitored at the VEGP site area are shown in Figure 2.4.12-3. Table 2.4.12-1 lists the observation wells currently being used to monitor the Water Table aquifer, while Table 2.4.12-2 lists the observation wells currently being used to monitor the Tertiary aquifer.

Monthly water levels in the observation wells were measured to characterize seasonal trends in groundwater levels and flow directions for VEGP site. Monthly monitoring of these wells began in June 2005 and is continuing. A 12-month data set representing June 2005 through June 2006 is utilized for this ESP application. In addition, longer-term data are available for some of the existing wells completed in the Water Table and Tertiary aquifers, which are used to characterize historical trends.

The following groundwater piezometric surface trend discussion is based on the information presented in Figures 2.4.12-4 through 2.4.12-18 and Tables 2.4.12-1 and 2.4.12-2.

Water Table Aquifer

Historical groundwater elevations for the 1971-1985 period for the Water Table aquifer are provided in Figure 2.4.12-4 for wells 142, 179, 803A, 804, and 805A. This monitoring occurred before construction, during construction dewatering, and after dewatering of VEGP Units 1 and 2. These data show the effect of construction dewatering and the recovery of groundwater levels after dewatering activities were completed. Historical groundwater elevation data for the 1995-2004 period are shown in Figure 2.4.12-5 for Water Table aquifer wells LT-1B, LT-7A, LT-12, LT-13, 802A, 805A, 806B, and 808. Groundwater elevations were relatively steady from 1995 to 1999; however, groundwater elevations decreased from 2000 through 2002, with 2002 having the lowest values. These decreases correlate to a drought that affected the region in the 1999-2002 period. Groundwater levels have partly recovered in the subsequent years.

Recent groundwater data from 2005 and 2006 for the Water Table aquifer are shown in Figure 2.4.12-6. These data exhibit little variability and do not show any significant seasonal influences during this monitoring period. Groundwater elevations range from approximately El. 132.5 to 165.5 ft msl across the area monitored.

The groundwater elevation data summarized in Table 2.4.12-1 were used to develop groundwater surface elevation contour maps for the Water Table aquifer on a quarterly basis. These maps are presented in Figures 2.4.12-7 through 2.4.12-11 for June 2005 through June 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 0.012 ft/ft.

Tertiary Aquifer

Historical groundwater elevations from 1971 through 1985 for Tertiary aquifer wells 27 and 29 are provided in Figure 2.4.12-12.

Recent groundwater elevation data from 2005 and 2006 for the Tertiary aquifer are shown in Figure 2.4.12-13. 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 2.4.12-2 were used to develop piezometric surface maps for the Tertiary aquifer. The Tertiary aquifer piezometric surface is presented in Figures 2.4.12-14 through 2.4.12-18 for June 2005 through June 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 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. This 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.

2.4.12.1.4 Hydrogeologic Properties

The 15 new groundwater observation wells installed in connection with the ESP application were slug tested to determine in situ hydraulic conductivity values for the Water Table and Tertiary aquifers. Table 2.4.12-3 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 2.4.12-4 through 2.4.12-6. 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 previously measured 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 60 and 340 ft/yr (0.16 to 0.93 ft/day),

with a geometric mean of 0.55 ft/day. Laboratory values varied considerably beyond the range of the in situ tests. Well pumping tests conducted in the Utley Limestone resulted in hydraulic conductivities ranging from 1,530 to 125,400 ft/yr (4.2 to 340 ft/day), while falling and constant head tests suggested lower values, ranging from 96 to 5,800 ft/yr (0.26 to 16 ft/day). 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 site as part of the ESP investigation. Slug test results for the Water Table aquifer range from 0.074 to 2.7 ft/day, with a geometric mean of 0.41 ft/day (Table 2.4.12-3). Table 2.4.12-4 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. Specific gravity analysis was performed only for the samples collected from the observation well borings. Values range between 2.61 to 2.90 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, 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 0.012 ft/ft between observation wells OW-1010 and OW-1005, a hydraulic conductivity of 0.41 ft/day, and the effective porosity of 32 percent were selected to calculate an average horizontal groundwater velocity of 0.015 ft/day. Using a distance of approximately 2,200 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 400 years.

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 vertical barrier to 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 2.4.12-5 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. Assuming effective porosity is 80 percent of total porosity, the effective porosity for the confining unit is 35 percent (**de Marsily 1986**).

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 2.4.12-3). 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 2.4.12-6. 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 18 to 40 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, 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 has not been 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 0.0044 ft/ft, based on the average groundwater elevations between well OW-1011 and well 27. The average horizontal groundwater velocity was calculated at 0.012 ft/day using a hydraulic conductivity of 0.83 ft/day, a hydraulic gradient of 0.0044 ft/ft, and an effective porosity of 31 percent. 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 1300 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.

2.4.12.2 Regional and Local Groundwater Use

Present groundwater uses within 25 mi of the VEGP site are primarily municipal, industrial, and agricultural. Most of the groundwater wells withdraw water from the Cretaceous aquifer. Apart from water withdrawals for VEGP Units 1 and 2, the immediate area near the VEGP site has mainly domestic users, with no other large users nearby. The nearest domestic well is located west of the VEGP site across River Road.

The Georgia Environmental Protection Division (EPD) issues permits for wells having average daily withdrawals that exceed 100,000 gpd during any single month. Table 2.4.12-7 lists the permitted groundwater users, aquifer and withdrawal rates, and annual average withdrawal rates for municipal and industrial wells within 25 mi of the VEGP site and permitted by the Georgia EPD. Table 2.4.12-8 lists similar data for agricultural wells for the counties within 25 mi of the VEGP site and permitted by the Georgia EPD. The Safe Drinking Water Information System (SDWIS) maintained by the US EPA lists community, non-transient non-community, and transient non-community water systems serving the public. Community water systems are defined as those that serve the same people year-round (e.g., in homes or businesses). Non-transient non-community water systems are those that serve the same people, but not year-round (e.g., schools that have their own water system). Transient non-community water systems are those that do not consistently serve the same people (e.g., rest stops, campground, gas stations). Table 2.4.12-9 lists the community, non-transient non-community, and transient non-community water systems using groundwater as their primary water source within 25 mi of the VEGP site.

The locations of the agricultural, industrial, and municipal wells permitted by the Georgia EPD along with the public water system wells listed in the SDWIS database within 25 mi of the VEGP site are shown in Figure 2.4.12-19. These data indicate the nearest permitted agricultural well (William Hatcher, A-28) to be about 3.4 mi northwest of the VEGP site, while the nearest permitted industrial well (International Paper, I-1) is about 8.5 mi northwest of the site. The nearest municipal well (City of Waynesboro, M-1) is seen to be about 14.5 mi west-southwest of

the VEGP site. The nearest SDWIS-listed well (Dealigle Mobile Home Park, C-6) is about 4.9 mi southwest of the VEGP site. These wells are sufficiently distant from the VEGP site such that pumping these wells would have no effect on groundwater levels at the VEGP site. The recharge areas for the source aquifers for the nearest Georgia EPD-permitted wells are in their outcrop areas located up-gradient of the VEGP site and beyond the influence of the new units.

Regionally, projected overall water use is expected to increase through 2035 for Burke County. Surface water usage is increasing; however, it is increasing at a much slower rate than groundwater usage, approximately 5 percent versus 17 percent. Burke County's water usage, including both surface and groundwater, is projected as 100 to 120 mgpd for 2035 (**Fanning et al. 2003**). Projections for Burke County total water use in 2050 are provided in the Comprehensive Water Supply Management Plan for Burke County and its Municipalities (**Rutherford 2000**). Assuming the same water usage patterns, groundwater demand with the population increasing to 43,420 people is projected to be 10.94 mgpd for domestic use, 14.73 mgpd for industrial use, and 40.96 mgpd for agricultural use, which totals 66.63 mgpd (**Rutherford 2000**).

Local groundwater use includes domestic wells and wells supplying water to existing VEGP Units 1 and 2. Uses include makeup process water, utility water, potable water, and supply for the fire protection system. Table 2.4.12-10 lists these wells, while Figure 2.4.12-20 identifies their location. Current permitted withdrawal rates are a monthly average of 6 mgpd and an annual average of 5.5 mgpd, as permitted by the Georgia EPD. Three of the wells are in the Cretaceous aquifer at depths varying from 851 to 884 ft, with design yields of 1,000 to 2,000 gpm. These wells provide makeup water for the plant processes. The remaining six wells extend into the Tertiary aquifer, range in depth from 200 to 370 ft, and have design yields of 20 to 150 gpm. Average annual usage levels for 1999 to 2004 from all wells excluding SEC are from 0.79 to 1.44 mgpd (**SNS 2005a**). The SEC well was added in 2005 and will be included on water usage data from 2006. Recent groundwater usage from June 2005 to December 2005 is in Table 2.4.12-11.

Table 2.4.12-12 shows projected groundwater use for two AP1000 units with normal and maximum usage values. Service water system make-up, potable water system, demineralized water system, fire protection system, and miscellaneous users are the intended uses. Groundwater needed to supply VEGP Units 3 and 4 will be obtained from wells installed in the Tertiary and Cretaceous aquifers. The number and depths of the wells will be developed during the COL stage. SNC's groundwater use permit (**SNS 2005a**) will be modified accordingly.

2.4.12.3 Monitoring or Safeguard Requirements

Groundwater monitoring for the VEGP site takes place through programs implemented both for the existing units and as part of the ESP effort by SNC. Current groundwater monitoring

programs for the existing units are addressed in VEGP Procedure Number 30140-C, Revision 22 (**VEGP 2006**). The results of these programs are reported semiannually.

As part of detailed engineering, the existing SNC groundwater monitoring programs will be evaluated with respect to placement of the new units to determine if any additional monitoring of existing or construction of new observation wells will be required to adequately monitor impacts on groundwater. This evaluation will include a review of the observation wells installed for the ESP application to determine if they can be used as part of any longer-term groundwater monitoring program. The results will be described in the COL application.

Safeguards will be used to minimize the potential for adverse impacts to the groundwater by construction and operation of the new units. These safeguards could include the use of lined containment structures around storage tanks and hazardous materials storage areas, emergency cleanup procedures to capture and remove surface containments, and other measures deemed necessary to prevent or minimize adverse impacts to the groundwater beneath the VEGP site.

2.4.12.4 Design Basis for Subsurface Hydrostatic Loading

The design basis for subsurface hydrostatic loading for existing VEGP Units 1 and 2 is El. 165 ft msl. For new VEGP Units 3 and 4, the design basis for groundwater-induced loadings on subsurface portions of safety-related structures, systems, and components is also El. 165 ft msl as discussed in Section 2.5.4.6. Note that the lowest elevation of a safety-related structure, system, or component is El. 180.5 ft msl (bottom elevation of the auxiliary building slab). This elevation is about 20 ft above the highest water table elevation recorded in the power block area based on the contours plotted in Figures 2.4.12-7 through 2.4.12-11. Because the subsurface portions of all safety-related structures, systems, and components are well above the highest recorded water table elevations, there will be no groundwater-induced loadings. No permanent dewatering system will be employed to lower design basis groundwater levels. No wells will be used for safety-related purposes.

Table 2.4.12-1 Monthly Groundwater Level Elevations in the Water Table Aquifer

| Well No. | Well Depth (ft) | Groundwater Level Elevations (ft msl) | | | | | | | | | | | | |
|----------|-----------------|---------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | | Jun 2005 | Jul 2005 | Aug 2005 | Sep 2005 | Oct 2005 | Nov 2005 | Dec 2005 | Jan 2006 | Feb 2006 | Mar 2006 | Apr 2006 | May 2006 | Jun 2006 |
| 142 | 97 | 154.37 | 154.38 | 154.49 | 154.64 | 154.75 | 154.69 | 154.60 | 154.71 | 154.77 | 154.71 | 154.63 | 154.55 | 154.48 |
| 179 | 133 | 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 |
| 802A | 91 | 157.90 | 157.86 | 158.07 | 158.23 | 158.29 | 158.34 | 158.28 | 158.28 | 158.39 | 158.23 | 158.17 | 158.09 | 157.99 |
| 803A | 90 | 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 |
| 804 | 95 | 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 |
| 805A | 129 | 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 |
| 806B | 69 | 155.62 | 155.15 | 155.78 | 155.90 | 155.96 | 155.98 | 155.88 | 155.97 | 155.98 | 156.03 | 155.85 | 155.78 | 155.73 |
| 808 | 75 | 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 |
| 809 | 94 | 152.78 | 152.70 | 152.75 | 152.89 | 152.98 | 152.97 | 152.98 | 153.10 | 153.22 | 153.18 | 153.01 | 153.02 | 153.00 |
| LT-1B | 94 | 154.92 | 154.82 | 155.01 | 155.16 | 155.18 | 155.22 | 155.06 | 155.18 | 152.52 | 155.28 | 155.18 | 155.15 | 154.95 |
| LT-7A | 89 | 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 |
| LT-12 | 88 | 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 |
| LT-13 | 91 | 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 |
| OW-1001 | 133 | 113.35 | 118.03 | 118.36 | 117.95 | 117.69 | 116.54 | 116.56 | 116.93 | 117.22 | 117.34 | 117.56 | 117.13 | 116.63 |
| OW-1001A | 93 | | | | | 135.95 | 135.91 | 135.97 | 135.99 | 135.98 | 135.96 | 135.97 | 135.96 | 135.96 |
| OW-1003 | 91 | 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 |
| OW-1005 | 177 | 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 |
| OW-1006 | 135 | 147.66 | 147.48 | 147.57 | 147.60 | 147.49 | 147.20 | 147.18 | 147.41 | 147.40 | 147.37 | 147.35 | 147.21 | 147.05 |
| OW-1007 | 120 | 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 |
| OW-1009 | 98 | 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 |
| OW-1010 | 95 | 163.10 | 163.26 | 163.59 | 163.77 | 163.81 | 163.78 | 163.62 | 163.60 | 163.63 | 163.57 | 163.44 | 163.29 | 163.09 |
| OW-1012 | 94 | 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 |
| OW-1013 | 104 | 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 |
| OW-1015 | 120 | 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 |

Notes: Blank entries indicate data not available (OW-1001 had very little change in groundwater levels; a replacement well, OW-1001A, was installed in October 2005).

142- and 179-wells installed in 1971 for support of Units 1 and 2 pre-construction groundwater monitoring program.

800-series wells installed between 1979 and 1985 for support of Units 1 and 2 construction groundwater monitoring program.

LT-series wells installed in 1985 for support of the Units 1 and 2 post-construction groundwater monitoring program.

OW-wells installed in 2005 as part of the ESP subsurface investigation program (Appendix 2.4A).

Well depths are below ground surface at time of installation.

Table 2.4.12-2 Monthly Groundwater Level Elevations in the Tertiary Aquifer

| Well No. | Well Depth (ft) | Groundwater Level Elevations (ft msl) | | | | | | | | | | | | |
|----------|-----------------|---------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | | Jun 2005 | Jul 2005 | Aug 2005 | Sep 2005 | Oct 2005 | Nov 2005 | Dec 2005 | Jan 2006 | Feb 2006 | Mar 2006 | Apr 2006 | May 2006 | Jun 2006 |
| 27 | 190 | 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 |
| 29 | 212 | 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 |
| 850A | 194 | 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 |
| 851A | 285 | 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 |
| 852 | 223 | 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 |
| 853 | 221 | 108.60 | 108.17 | 107.98 | 104.53 | 103.64 | 103.45 | 104.18 | 105.32 | 105.14 | 104.97 | 104.65 | 103.58 | 103.15 |
| 854 | 222 | 107.06 | 106.88 | 106.65 | 103.37 | 102.38 | 102.23 | 103.03 | 104.13 | 103.85 | 103.73 | 103.45 | 102.31 | 101.86 |
| 855 | 225 | 102.63 | 101.74 | 102.00 | 97.22 | 96.08 | 96.21 | 96.85 | 98.43 | 98.49 | 98.15 | 97.53 | 96.75 | 95.93 |
| 856 | 182 | 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 |
| OW-1002 | 237 | 120.13 | 120.61 | 120.04 | 118.65 | 117.81 | 117.71 | 118.44 | 119.36 | 119.63 | 119.64 | 119.43 | 118.37 | 117.65 |
| OW-1004 | 187 | 108.27 | 108.14 | 108.01 | 105.06 | 104.05 | 103.75 | 104.51 | 105.56 | 105.83 | 105.28 | 105.12 | 103.88 | 103.54 |
| OW-1008 | 247 | 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 |
| OW-1011 | 218 | 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 |
| OW-1014 | 197 | 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 |

Notes: Blank entries indicate data not available.

27- and 29-wells installed in 1971 for support of Units 1 and 2 pre-construction groundwater monitoring program.

800-series wells installed between 1979 and 1985 for support of Units 1 and 2 construction groundwater monitoring program.

LT-series wells installed in 1985 for support of the Units 1 and 2 post-construction groundwater monitoring program.

OW-wells installed in 2005 as part of the ESP subsurface investigation program (Appendix 2.4A).

Well depths are below ground surface at time of installation.

Table 2.4.12-3 Hydraulic Conductivity Values

| Well No. | Depth Interval Tested (ft) | Elevation (ft msl) | Aquifer | Material | Hydraulic Conductivity | |
|------------------------------------|----------------------------|--------------------|-------------|------------------------------------|------------------------|----------|
| | | | | | (cm/sec) | (ft/day) |
| OW-1001A | 77 - 93 | 149.4 to 133.4 | Water Table | Sandy Clay | 2.6E-05 | 0.074 |
| OW-1003 | 72 - 91 | 151.0 to 132.0 | Water Table | Clayey Shell to Clayey Sand | 4.4E-05 | 0.12 |
| OW-1005 | 143 - 169 | 121.4 to 95.4 | Water Table | Silty Sand | 1.1E-04 | 0.32 |
| OW-1006 | 113 - 134 | 114.1 to 93.1 | Water Table | Fine Sand and Coarse Sand | 4.8E-04 | 1.4 |
| OW-1007 | 99 - 120 | 117.9 to 96.9 | Water Table | Silty Sand | 9.3E-04 | 2.7 |
| OW-1009 | 81 - 98 | 139.9 to 122.9 | Water Table | Silty Sand | 4.0E-04 | 1.1 |
| OW-1010 | 70 - 92 | 146.9 to 124.9 | Water Table | Sand and Clayey Silty Sand | 6.4E-05 | 0.18 |
| OW-1012 | 71 - 94 | 134.4 to 111.4 | Water Table | Sand and Silt | 1.4E-04 | 0.39 |
| OW-1013 | 81 - 104 | 135.9 to 112.9 | Water Table | Sand | 1.3E-04 | 0.38 |
| OW-1015 | 90 - 120 | 130.4 to 100.4 | Water Table | Clayey Sand and Sand | 1.5E-04 | 0.44 |
| OW-1002 | 216 - 237 | 11.4 to -9.6 | Tertiary | Silty Sand and Fine to Medium Sand | 3.2E-04 | 0.90 |
| OW-1004 | 150 - 187 | 72.92 to 53.92 | Tertiary | Sand to Silty Sand | 1.3E-04 | 0.35 |
| OW-1008 | 226 - 247 | -9.4 to -28.4 | Tertiary | Sand | 7.5E-04 | 2.1 |
| OW-1011 | 197 - 218 | 8.8 to -12.2 | Tertiary | Silty Sand and Coarse Sand | 3.8E-04 | 1.1 |
| OW-1014 | 179 - 197 | 41.9 to 23.9 | Tertiary | Silty Sand | 1.9E-04 | 0.54 |
| Geometric Mean Water Table Aquifer | | | | | 1.4E-04 | 0.41 |
| Geometric Mean Tertiary Aquifer | | | | | 3.0E-04 | 0.83 |

Source: Appendix 2.5A

Table 2.4.12-4 Summary of Laboratory Test Results on Grain Size, Moisture Content and Specific Gravity for the Barnwell Formation

| Borehole / Well No. | Sample Elevation (ft msl) | Grain Size Distribution | | | Moisture Content (%) | Specific Gravity |
|---------------------|---------------------------|-------------------------|----------|---------------|----------------------|------------------|
| | | Gravel (%) | Sand (%) | Clay/Silt (%) | | |
| 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 | 2.90 |
| 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 | 6.2 | 79.1 | 14.7 | 6.2 | ND |
| B-1002 | 203.5 | 0.0 | 50.5 | 49.7 | 24.4 | ND |
| B-1002 | 193.5 | 0.0 | 57.0 | 43.0 | 31.8 | ND |
| B-1002 | 188.5 | 0.0 | 43.1 | 56.9 | 58.8 | ND |
| B-1002 | 168.5 | 0.0 | 62.7 | 37.3 | 42.9 | ND |
| B-1002 | 158.5 | 0.0 | 71.8 | 28.2 | 29.3 | ND |
| B-1002 | 148.5 | 0.3 | 72.0 | 27.7 | 24.5 | ND |
| B-1002 | 138.5 | 0.0 | 73.6 | 26.4 | 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 | 0.0 | 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 | 66.4 | 33.6 | 13.8 | ND |
| B-1004 | 237.8 | 0.6 | 66.6 | 32.8 | 14.5 | ND |
| B-1004 | 226.3 | 0.2 | 71.6 | 28.2 | 18.5 | ND |
| B-1004 | 206.3 | 0.0 | 27.4 | 72.6 | 46.2 | ND |
| B-1004 | 196.3 | 0.0 | 36.2 | 63.8 | 62.9 | ND |
| B-1004 | 181.3 | 8.5 | 56.1 | 35.4 | 24.1 | ND |
| B-1004 | 166.3 | 0.0 | 68.7 | 31.3 | 28.8 | ND |
| B-1004 | 126.3 | 40.6 | 27.0 | 32.4 | 19.7 | ND |
| B-1006 | 248.5 | 0.0 | 89.4 | 10.6 | 3.8 | ND |
| B-1006 | 222.5 | 0.1 | 61.6 | 38.3 | 19.7 | ND |
| B-1006 | 197.5 | 0.0 | 21.6 | 78.4 | 92.8 | ND |
| B-1006 | 187.5 | 0.1 | 77.2 | 22.7 | 25.4 | ND |
| B-1006 | 167.5 | 0.0 | 55.5 | 44.5 | 51.9 | ND |

Table 2.4.12-4 (cont.) Summary of Laboratory Test Results on Grain Size, Moisture Content and Specific Gravity for the Barnwell Formation

| Borehole / Well No. | Sample Elevation (ft msl) | Grain Size Distribution | | | Moisture Content (%) | Specific Gravity |
|---------------------|---------------------------|-------------------------|----------|---------------|----------------------|------------------|
| | | Gravel (%) | Sand (%) | Clay/Silt (%) | | |
| B-1006 | 147.5 | 25.2 | 39.2 | 35.6 | 22.0 | ND |
| B-1010 | 211.1 | 0.0 | 87.2 | 12.8 | 5.7 | ND |
| B-1010 | 185.1 | 0.0 | 69.8 | 30.2 | 18.9 | ND |
| B-1010 | 160.1 | 0.0 | 68.1 | 31.9 | 27.3 | ND |
| Median | | | | | 25.0 | 2.66 |

Notes: ND - Not Determined.

OW-series data are provided in Appendix 2.4A.

B-series data are provided in Appendix 2.5A.

Moisture content is by weight percent.

Table 2.4.12-5 Summary of Laboratory Test Results on Grain Size, Moisture Content, and Porosity for the Lisbon Formation

| Borehole / Well No. | Sample Elevation (ft msl) | Grain Size Distribution | | | Moisture Content (%) | Porosity |
|---------------------|---------------------------|-------------------------|----------|---------------|----------------------|----------|
| | | Gravel (%) | Sand (%) | Clay/Silt (%) | | |
| B-1002 | 123.0 | 49.4 | 21.7 | 28.9 | 52.1 | 0.59 |
| B-1002 | 118.5 | 14.6 | 26.4 | 59.0 | 56.5 | 0.56 |
| B-1002 | 108.5 | 12.8 | 53.4 | 33.8 | 25.5 | 0.36 |
| B-1002 | 98.5 | 53.7 | 21.8 | 24.5 | 13.5 | 0.25 |
| B-1002 | 88.5 | 26.3 | 49.4 | 27.3 | 28.6 | 0.45 |
| B-1003 | 135.2 | 16.5 | 50.1 | 33.4 | 67.4 | ND |
| B-1003 | 130.2 | 1.6 | 57.8 | 40.6 | 30.6 | 0.46 |
| B-1003 | 118.5 | 1.2 | 67.1 | 31.7 | 40.6 | 0.52 |
| B-1003 | 101.5 | 11.7 | 45.8 | 42.5 | 28.0 | 0.42 |
| B-1003 | 81.5 | 7.3 | 58.5 | 34.2 | 25.9 | 0.39 |
| B-1004 | 105.9 | 1.0 | 52.7 | 46.3 | 44.6 | 0.56 |
| B-1004 | 96.3 | 0.7 | 57.6 | 41.7 | 30.1 | 0.45 |
| B-1004 | 86.3 | 38.0 | 29.8 | 32.2 | 25.1 | 0.43 |
| B-1004 | 72.8 | 20.9 | 37.4 | 41.7 | 20.8 | 0.38 |
| B-1004 | 61.3 | 34.9 | 41.3 | 23.8 | 29.0 | 0.44 |
| B-1004 | 51.3 | 5.2 | 60.3 | 34.5 | 26.2 | 0.39 |
| B-1004 | 132.5 | 0.0 | 23.4 | 76.6 | 53.7 | ND |
| Median | | | | | 29.0 | 0.44 |

Notes: ND - Not Determined.

B-series data are provided in Appendix 2.5A.

Moisture content is by weight percent.

Porosity calculated assuming a specific gravity of 2.65.

Table 2.4.12-6 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 (ft msl) | Grain Size Distribution | | | Moisture Content (%) | Specific Gravity |
|---------------------|---------------------------|-------------------------|----------|---------------|----------------------|------------------|
| | | Gravel (%) | Sand (%) | Clay/Silt (%) | | |
| 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 | 16.2 | 32.9 | 50.9 | 23.3 | ND |
| B-1002 | 33.5 | 0.0 | 66.4 | 33.6 | 40.7 | ND |
| B-1002 | 16.5 | 2.6 | 71.4 | 26.0 | 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 |

Notes: ND - Not Determined.

OW-series data are provided in Appendix 2.4A.

B-series data are provided in Appendix 2.5A.

Moisture content is by weight percent.

Table 2.4.12-7 Georgia EPD Permitted Municipal and Industrial Groundwater Users within 25 miles of the VEGP Site

| Well ID | Permit Holder | County | Aquifer | Year | Permitted Monthly Average, gpm (mgpd) | Permitted Annual Average, gpm (mgpd) | Average Annual Water Use, gpm (mgpd) |
|---------|---|----------|-----------------|------|---------------------------------------|--------------------------------------|--------------------------------------|
| C-2 | City of Sardis | Burke | Floridan | 2004 | 278 (0.40) | 278 (0.40) | 63 (0.09) |
| | | | | 2005 | 278 (0.40) | 278 (0.40) | NA |
| C-12 | East Central Regional Hospital - Gracewood Campus | Richmond | Cretaceous Sand | 2004 | 347 (0.50) | 278 (0.40) | 146 (0.21) |
| | | | | 2005 | NA | NA | 76 (0.11) |
| C-13 | City of Hephzibah | Richmond | Cretaceous Sand | 2004 | 833 (1.20) | 833 (1.20) | 160 (0.23) |
| | | | | 2005 | NA | NA | 236 (0.34) |
| C-19 | Olin Corporation | Richmond | Cretaceous Sand | 2004 | 847 (1.22) | 847 (1.22) | 514 (0.74) |
| | | | | 2005 | NA | NA | 486 (0.70) |
| C-19 | Olin Corporation - Corrective Action Wells | Richmond | Cretaceous Sand | 2004 | 632 (0.91) | 632 (0.91) | 229 (0.33) |
| | | | | 2005 | NA | NA | 250 (0.36) |
| I-1 | International Paper | Burke | Cretaceous Sand | 2004 | 660 (0.95) | 660 (0.95) | 181 (0.26) |
| | | | | 2005 | 660 (0.95) | 660 (0.95) | 35 (0.05) |
| I-2 | Prayon, Inc | Richmond | Cretaceous Sand | 2004 | 292 (0.42) | 264 (0.38) | 35 (0.05) |
| | | | | 2005 | NA | NA | 63 (0.09) |
| I-3 | Thermal Ceramics, Inc. | Richmond | Cretaceous Sand | 2004 | 625 (0.90) | 625 (0.90) | 313 (0.45) |
| | | | | 2005 | NA | NA | 208 (0.30) |
| I-4 | Procter & Gamble Manufacturing Company | Richmond | Cretaceous Sand | 2004 | 486 (0.70) | 486 (0.70) | 278 (0.40) |
| | | | | 2005 | NA | NA | 243 (0.35) |
| I-5 | Southern Wood Piedmont Company | Richmond | Cretaceous Sand | 2004 | 451 (0.65) | 451 (0.65) | 188 (0.27) |
| | | | | 2005 | NA | NA | 174 (0.25) |
| M-1 | City of Waynesboro | Burke | Cretaceous Sand | 2004 | 2778 (4.00) | 2431 (3.50) | NA |
| | | | | 2005 | 2778 (4.00) | 2431 (3.50) | NA |
| M-2 | Augusta-Richmond Utilities Department | Richmond | Cretaceous Sand | 2004 | 12778 (18.40) | 12083 (17.40) | 8285 (11.93) |
| | | | | 2005 | NA | NA | 8.40 |
| | Southern Nuclear Operating Co. | Burke | Cretaceous Sand | 2004 | 4167 (6.00) | 3819 (5.50) | 556 (0.80) |
| | | | | 2005 | 4167 (6.00) | 3819 (5.50) | 583 (0.84) |

Notes: NA – not available

Groundwater permit and usage data (**Voudy 2006**)

Groundwater aquifer description (**Georgia DNR 2006**)

Well locations are labeled in Figure 2.4.12-19 using the listed Well IDs.

Southern Nuclear Operating Co. well locations are shown on Figure 2.4.12-20.

Table 2.4.12-8 Georgia EPD Permitted Agricultural Groundwater Users within 25 miles of the VEGP Site

| Well ID | Permit Holder | County | Depth (ft) | Permit (gpm) |
|---------|-----------------------------|---------|------------|--------------|
| A-1 | ANDERSON JOHN | Burke | 363 | 1500 |
| A-2 | BLANCHARD HENRY | Burke | 500 | 1200 |
| A-3 | BLANCHARD HENRY | Burke | 450 | 1400 |
| A-4 | BOLLWEEVIL PLANATION | Burke | 300 | 190 |
| A-5 | Chance Bill | Burke | 500 | 450 |
| A-6 | CHANDLER FARM | Burke | 580 | 1600 |
| A-7 | Chandler Michael | Burke | 556 | 2400 |
| A-8 | Chandler Randall | Burke | 579 | 2500 |
| A-9 | COCHRAN IRBY | Burke | 420 | 1350 |
| A-10 | COLLINS ROBERT | Burke | 430 | 1350 |
| A-11 | COLLINS ROBERT | Burke | 530 | 1200 |
| A-12 | COLLINS ROBERT | Burke | 480 | 1100 |
| A-13 | COLLINS ROBERT | Burke | 440 | 1100 |
| A-14 | Collins Robert | Burke | 490 | 1700 |
| A-15 | DIXON CARL | Burke | 600 | 2000 |
| A-16 | DIXON JAMES | Burke | 210 | 400 |
| A-17 | DIXON JAMES | Burke | 200 | 200 |
| A-18 | DIXON JOANNE | Burke | 640 | 1150 |
| A-19 | DIXON PERCY | Screven | 560 | 2000 |
| A-20 | DIXON PERCY | Burke | 560 | 2000 |
| A-21 | DIXON PERCY | Burke | 350 | 115 |
| A-22 | DIXON PERCY | Burke | 350 | 115 |
| A-23 | DIXON PERCY | Burke | 550 | 3400 |
| A-24 | DIXON PERCY | Burke | 350 | 200 |
| A-25 | DIXON PERCY | Burke | 575 | 2500 |
| A-26 | DIXON PERCY | Burke | 550 | 2500 |
| A-27 | GWR Partnership LLP | Burke | 360 | 200 |
| A-28 | Hatcher William | Burke | 300 | 500 |
| A-29 | HEATH CLAXTON | Burke | 300 | 150 |
| A-30 | HEATH CLAXTON | Burke | 400 | 250 |
| A-31 | HEATWOLE BYARD | Burke | 325 | 200 |
| A-32 | HOPKINS HENRY | Burke | 363 | 350 |
| A-33 | Horst Isaac | Burke | 260 | 250 |
| A-34 | MALLARD CLYDE | Burke | 320 | 400 |
| A-35 | MALLARD CLYDE MALLARD FARMS | Burke | 210 | 250 |
| A-36 | MALLARD J. | Burke | 200 | 150 |
| A-37 | McGregor Charles | Burke | 430 | 350 |
| A-38 | MOBLEY DANNY | Burke | 396 | 350 |
| A-39 | Mobley Danny | Burke | 424 | 650 |
| A-40 | MOBLEY HERBERT | Burke | 465 | 1100 |
| A-41 | MOBLEY HERBERT | Burke | 500 | 1250 |
| A-42 | MOBLEY JAMES F. | Burke | 572 | 2000 |
| A-43 | PENNINGTON FARMS- INC. | Burke | 240 | 250 |
| A-44 | RAYMOND NEIL | Burke | 430 | 1350 |

Table 2.4.12-8 (cont.) Georgia EPD Permitted Agricultural Groundwater Users within 25 miles of the VEGP Site

| Well ID | Permit Holder | County | Depth (ft) | Permit (gpm) |
|---------|------------------------------|----------|------------|--------------|
| A-45 | Shepherd Joseph | Burke | 421 | 1500 |
| A-46 | SMART DARRELL | Burke | 300 | 350 |
| A-47 | SMART DARRELL | Burke | 300 | 350 |
| A-48 | SMART DARRELL | Burke | 300 | 350 |
| A-49 | SMART DARRELL | Burke | 300 | 400 |
| A-50 | MIMS JOHN | Jenkins | 445 | 1500 |
| A-51 | MIMS JOHN | Jenkins | 460 | 1500 |
| A-52 | MULKEY A. | Jenkins | 300 | 1000 |
| A-53 | MULKEY A. | Jenkins | 400 | 500 |
| A-54 | PARKER GEORGE | Jenkins | 450 | 700 |
| A-55 | PARKER GEORGE | Jenkins | 300 | 450 |
| A-56 | PARKER GEORGE | Jenkins | 300 | 450 |
| A-57 | Parker George | Jenkins | 450 | 450 |
| A-58 | POINTE SOUTH GOLF CLUB- INC. | Richmond | 311 | 400 |
| A-59 | BRAGG SOL | Screven | 380 | 240 |
| A-60 | BRIAR CREEK COUNTRY CLUB | Screven | 180 | 300 |
| A-61 | CAIN BRIAN | Screven | 390 | 600 |
| A-62 | Cain Brian | Screven | 493 | 1100 |
| A-63 | CLEMENT INVESTMENTS | Screven | 282 | 1250 |
| A-64 | FOREHAND FARMS | Screven | 160 | 250 |
| A-65 | Lee Mike | Screven | 480 | 1800 |
| A-66 | Mill Haven Company Inc. | Screven | 600 | 1200 |
| A-67 | MILLHAVEN CO.- INC. | Screven | 553 | 1900 |
| A-68 | MILLHAVEN CO.- INC. | Screven | 565 | 1400 |
| A-69 | NEWTON JAMES | Screven | 350 | 400 |
| A-70 | SOWELL CAROLYN | Screven | 275 | 300 |
| A-71 | STEPONGZI FRANK & PEARL | Screven | 225 | 300 |
| A-72 | THOMPSON JAMES | Screven | 475 | 750 |
| A-73 | THOMPSON ROGER | Screven | 500 | 1000 |
| A-74 | WADE PLANTATION | Screven | 215 | 200 |
| A-75 | WADE PLANTATION | Screven | 250 | 190 |
| A-76 | WADE PLANTATION | Screven | 460 | 1200 |
| A-77 | WADE PLANTATION | Screven | 119 | 1000 |
| A-78 | WADE PLANTATION | Screven | 750 | 1800 |
| A-79 | WADE PLANTATION | Screven | 494 | 900 |
| A-80 | WADE PLANTATION | Screven | 475 | 1200 |
| A-81 | WADE PLANTATION | Screven | 672 | 1100 |
| A-82 | WADE PLANTATION | Screven | 475 | 1100 |
| A-83 | WADE PLANTATION | Screven | 525 | 1400 |
| A-84 | Wade Plantation | Screven | 467 | 1100 |

Notes: Groundwater permit data (**Lewis 2006**)

Well locations are labeled in Figure 2.4.12-19 using the listed Well IDs.

Table 2.4.12-9 SDWIS Listed Public Water Systems Supplied From Groundwater Within 25 Miles of the VEGP Site in Georgia

| Well ID | Water System ID | Water System Name | County Served | Type | System Status |
|---------|-----------------|---------------------------------------|---------------|-----------------------------|---------------|
| C-1 | GA0330000 | Girard | Burke | Community | Active |
| C-2 | GA0330002 | Sardis | Burke | Community | Active |
| C-3 | GA0330013 | Mamie Joe Rhodes Harrison Subdivision | Burke | Community | Closed |
| C-4 | GA0330006 | Burke Academy | Burke | Non-Transient Non-Community | Active |
| C-5 | GA0330022 | Burke County Training Center | Burke | Non-Transient Non-Community | Active |
| C-6 | GA0330020 | Delaigle Mobile Home Park | Burke | Transient Non-Community | Closed |
| C-7 | GA1650000 | Millen | Jenkins | Community | Active |
| C-8 | GA1650001 | Perkins Water Authority | Jenkins | Community | Active |
| C-9 | GA1650006 | Jockey International, Inc. | Jenkins | Non-Transient Non-Community | Active |
| C-10 | GA1650005 | DNR - Magnolia Springs State Pk. | Jenkins | Transient Non-Community | Active |
| C-11 | GA1650008 | National Fish Hatchery | Jenkins | Transient Non-Community | Closed |
| C-12 | GA2450023 | East Central Regional Hospital | Richmond | Community | Active |
| C-13 | GA2450002 | Hephzibah | Richmond | Community | Active |
| C-14 | GA2450017 | Hephzibah - Oakridge | Richmond | Community | Active |
| C-15 | GA2450014 | Mars Trailer Park | Richmond | Community | Active |
| C-16 | GA2450016 | Mobile Home Country Club MHP | Richmond | Community | Active |
| C-17 | GA2450004 | Richmond County | Richmond | Community | Closed |
| C-18 | GA2450159 | Albion Kaolin Company | Richmond | Non-Transient Non-Community | Closed |
| C-19 | GA2450152 | Olin Chemicals | Richmond | Non-Transient Non-Community | Closed |
| C-20 | GA2510000 | Hiltonia | Screven | Community | Active |
| C-21 | GA2510015 | Buck Creek M.H.P. | Screven | Community | Closed |
| C-22 | GA2510052 | Millhaven Plantation | Screven | Community | Closed |
| C-23 | GA2510011 | DOT - Georgia Welcome Center | Screven | Transient Non-Community | Active |
| C-24 | GA2510057 | Savannah River Challenge Program | Screven | Transient Non-Community | Active |
| | GA0330035 | Southern Nuclear - Simulator Bld | Burke | Non-Transient Non-Community | Active |
| | GA0330017 | Southern Nuclear - Vogtle Makeup | Burke | Non-Transient Non-Community | Active |
| | GA0330036 | Southern Nuclear - Vogtle Rec | Burke | Transient Non-Community | Active |

Notes: US EPA SDWIS Database (**EPA 2006b**)
Well locations are labeled in Figure 2.4.12-19 using the listed Well IDs.
Southern Nuclear Operating Co. well locations are shown on Figure 2.4.12-20.

Table 2.4.12-10 Water-Supply Wells for the Existing VEGP Plant

| Water Supply Well No. | Well Depth (ft) | Aquifer | Design Yield (gpm) | Water Use |
|------------------------------|------------------------|----------------|---------------------------|---|
| MU-1 | 851 | Cretaceous | 2000 | Make-up water for plant use (nuclear service water system; make-up to the water treatment plant demineralizer, and potable water source). |
| MU-2A | 884 | Cretaceous | 1000 | Make-up water for plant use (nuclear service water system; make-up to the water treatment plant demineralizer, and potable water source). |
| TW-1 | 860 | Cretaceous | 1000 | Back-up water for the production make-up well system. |
| SW-5 | 200 | Tertiary | 20 | Water supply for old security tactical training area. |
| IW-4 | 370 | Tertiary | 120 | Irrigation water for ornamental vegetation. |
| CW-3 | 220 | Tertiary | NA | Water supply for nuclear operations garage. |
| REC | 265 | Tertiary | 150 | Potable water supply for recreation area. |
| SB | 340 | Tertiary | 50 | Potable water supply for simulator training building. |
| SEC | 320 | Tertiary | 10 | Non-potable water for lavatory use at a new plant entrance security building |

Notes: NA – not available

Water supply well data (excluding SEC well) (**SNS 2005b**)

SEC well data (**SNS 2005a**)

Well locations, excluding Well REC, are shown on Figure 2.4.12-20. Well REC is located approximately 9300 ft southwest from Well IW-4.

**Table 2.4.12-11 Groundwater Use of the existing VEGP Plant from January 1, 2005 to December 31, 2005, gpm
(Thousands of Gallons)**

| Month | Well MU-1 | Well MU-2A | Well TW-1 | Well SW-5 | Well IW-4 | Well CW-3 | Well REC | Well SB |
|-----------------|----------------|------------|-----------|-----------|------------|-----------|-------------|-------------|
| January | 445 (19,209) | 0 | 0 | 0 | 0 | 0.07 (3) | 0.88 (38) | 0.05 (2) |
| February | 403 (17,416) | 0 | 0 | 0 | 0 | 0.05 (2) | 1.16 (50) | 1.34 (58) |
| March | 500 (21,601) | 0 | 0 | 0 | 0 | 0.05 (2) | 0.95 (41) | 1.25 (54) |
| April | 607 (26,211) | 0 | 0 | 0 | 0 | 0.02 (1) | 1.09 (47) | 1.5 (65) |
| May | 686 (29,648) | 0 | 0 | 0 | 0 | 0.05 (2) | 1.55 (67) | 1.74 (75) |
| June | 825 (35,625) | 0 | 0 | 0 | 0.32 (14) | 0.05 (2) | 0.97 (42) | 1.92 (83) |
| July | 552 (23,846) | 0 | 0 | 0 | 1.27 (55) | 0.05 (2) | 2.89 (125) | 2.73 (118) |
| August | 569 (24,560) | 0 | 0 | 0 | 2.92 (126) | 0.14 (6) | 2.41 (104) | 1.53 (66) |
| September | 649 (28,020) | 0 | 0 | 0 | 3.1 (134) | 0.09 (4) | 1.94 (84) | 1.6 (69) |
| October | 701 (30,290) | 0 | 0 | 0 | 0 | 0.07 (3) | 1.83 (79) | 1.13 (49) |
| November | 469 (20,282) | 67 (2,880) | 0 | 0 | 0 | 0.05 (2) | 1.67 (72) | 2.41 (104) |
| December | 610 (26,363) | 0 | 0 | 0 | 0 | 0.05 (2) | 0.95 (41) | 3.7 (160) |
| Total | 7016 (303,071) | 67 (2,880) | 0 | 0 | 7.62 (329) | 0.72 (31) | 18.26 (789) | 22.55 (974) |
| Monthly Average | 585 (252,56) | 6 (240) | 0 | 0 | 0.625 (27) | 0.07 (3) | 1.53 (66) | 1.88 (81) |

Notes: Groundwater use data from Southern Nuclear Operating Company
SEC well is active in 2006

Table 2.4.12-12 Projected Groundwater Use for Two AP1000 Units

| Water Use | Normal Case (gpm) | Maximum Case (gpm) |
|------------------------------|------------------------------|-------------------------------|
| Service Water System Make-up | 537 | 2353 |
| Potable Water System | 42 | 140 |
| Demineralized Water System | 150 | 600 |
| Fire Protection System | 10 | 12 |
| Miscellaneous Users | 13 | 35 |
| Total | 752 | 3140 |

| 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. | |
| 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 2.4.12-1 Schematic Hydrostratigraphic Classification for VEGP Site

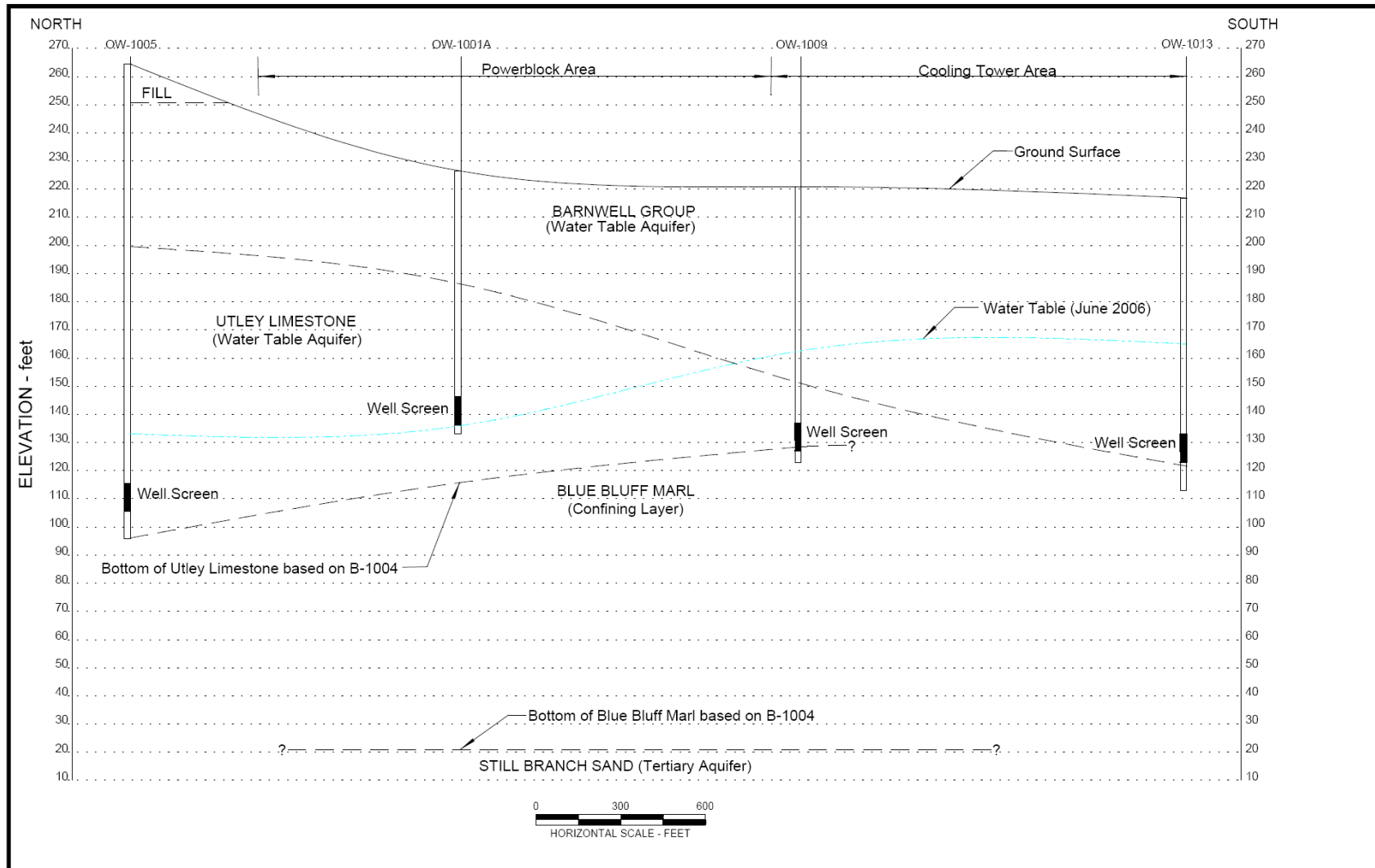


Figure 2.4.12-2A Hydrogeologic Cross-Section of the Water Table Aquifer at the VEGP Site

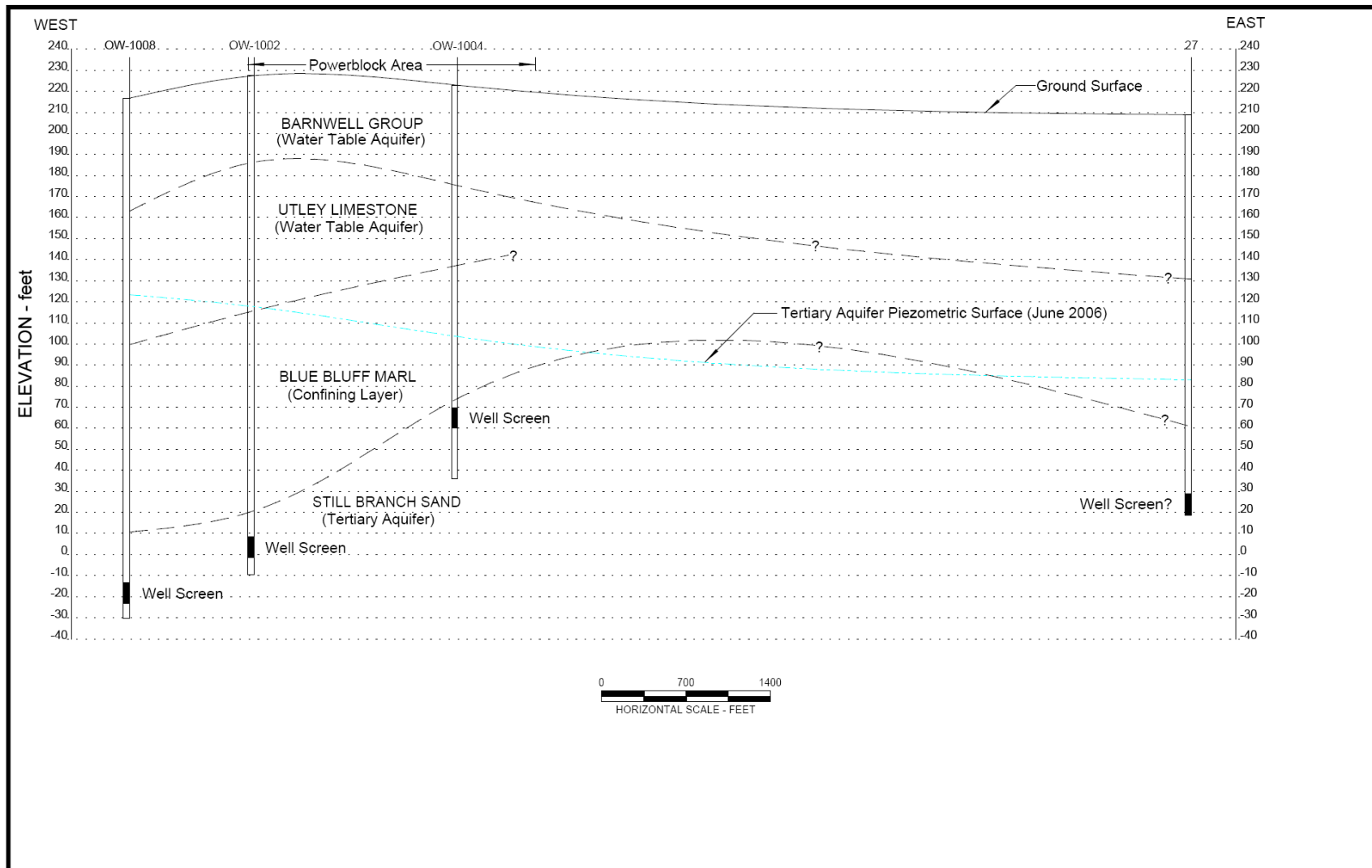


Figure 2.4.12-2B Hydrogeologic Cross-Section of the Tertiary Aquifer at the VEGP Site

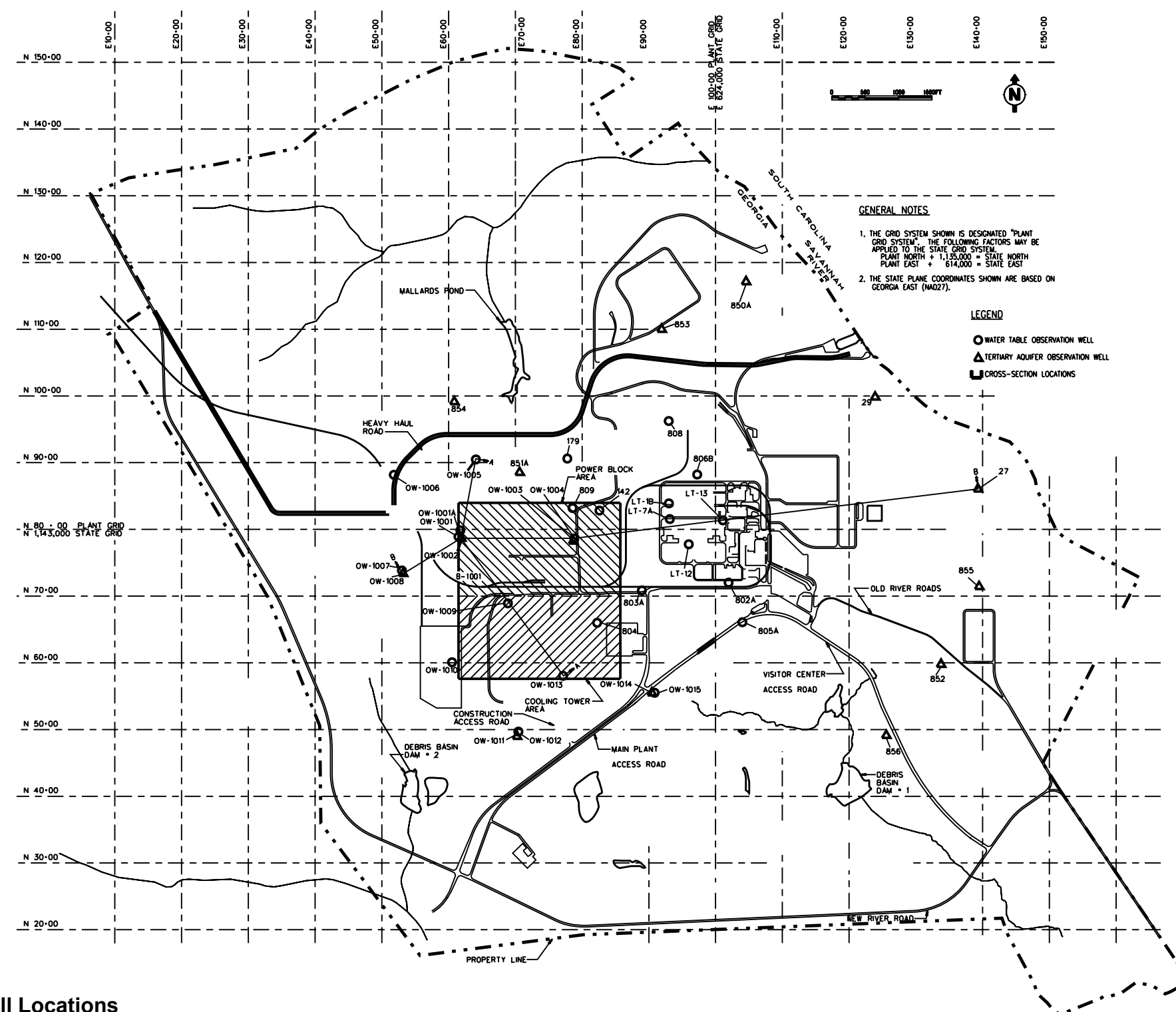


Figure 2.4.12-3 Observation Well Locations

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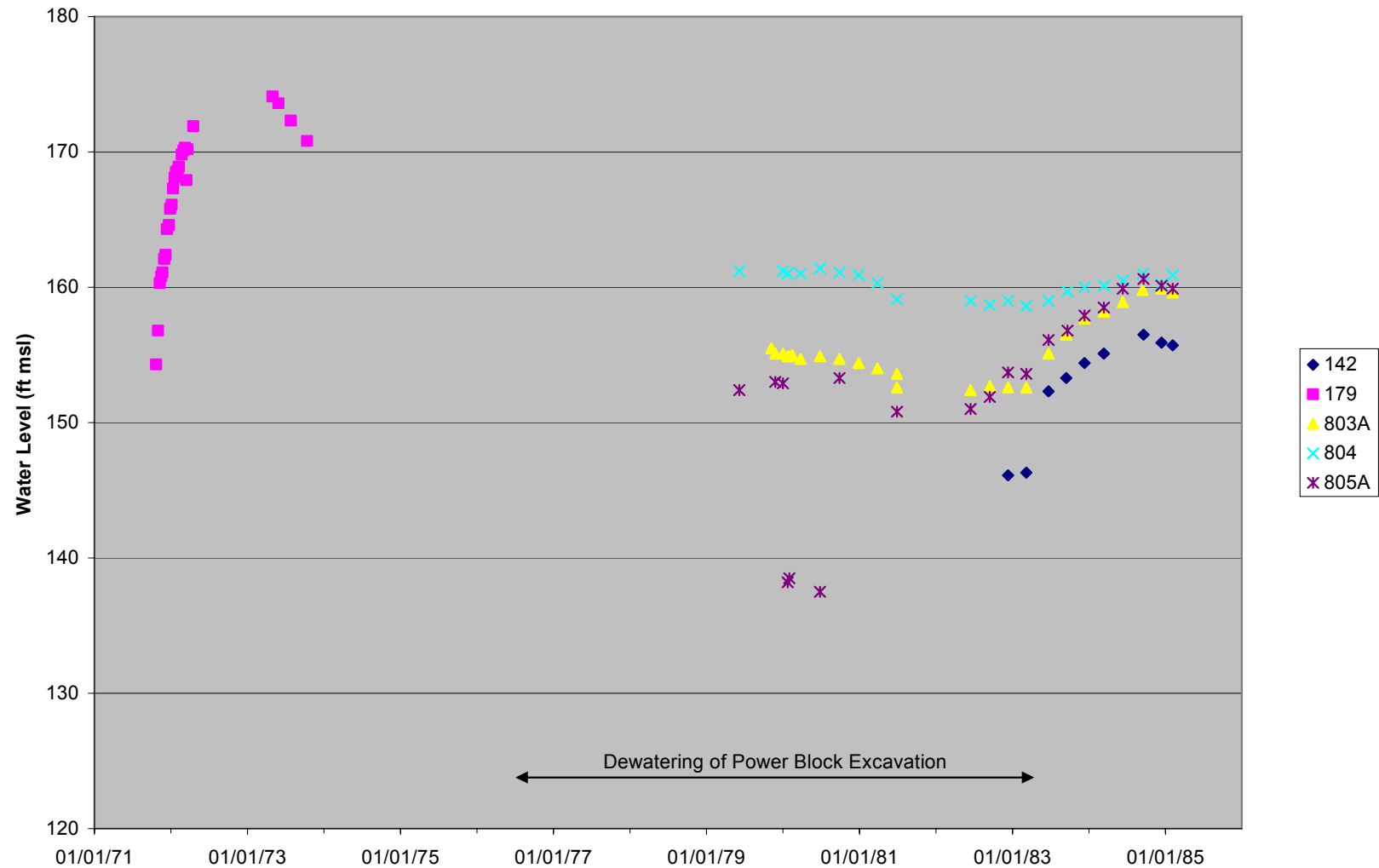


Figure 2.4.12-4 Water Table Aquifer: 1971–1985 Hydrographs

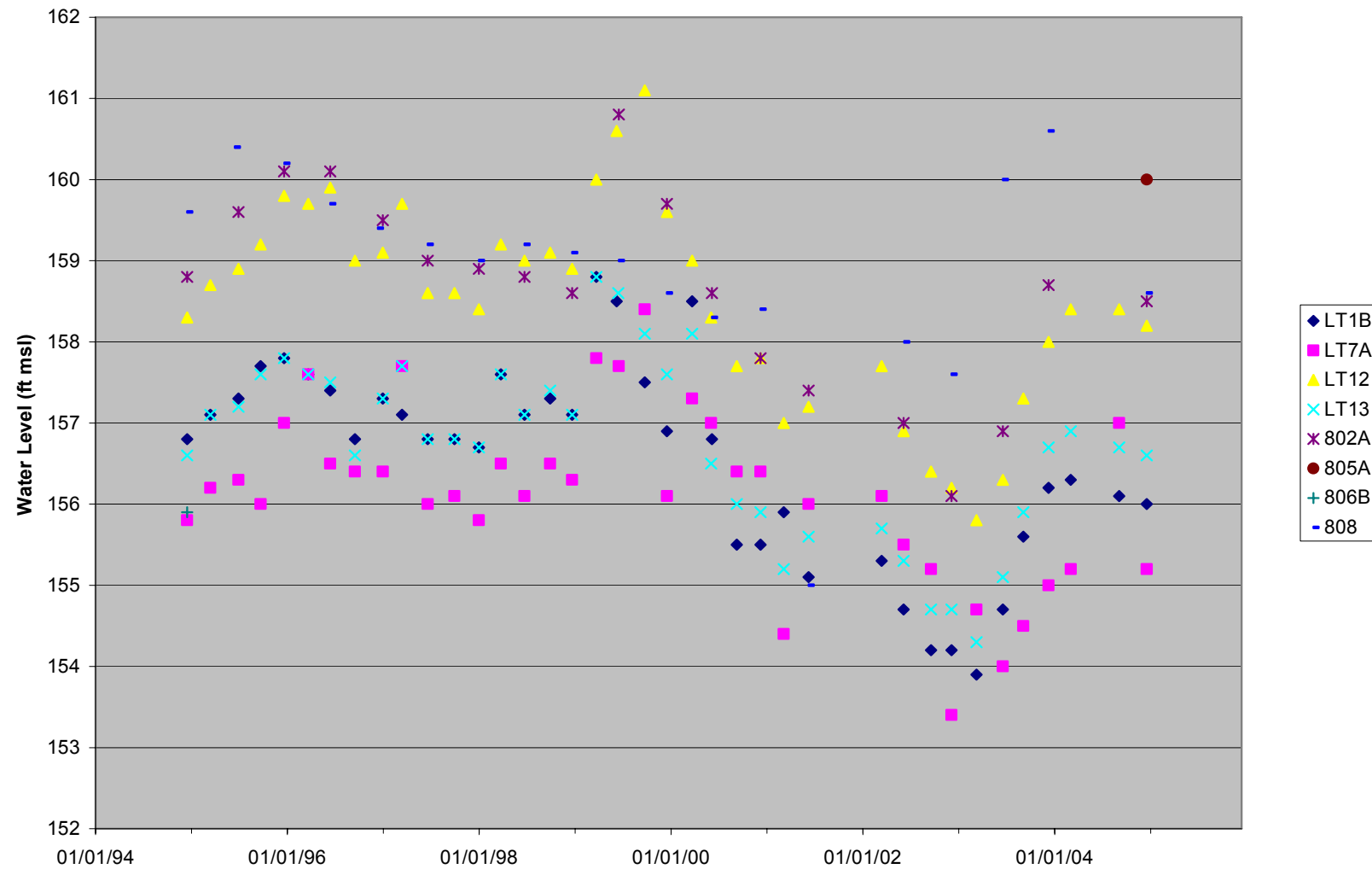


Figure 2.4.12-5 Water Table Aquifer: 1995–2004 Hydrographs

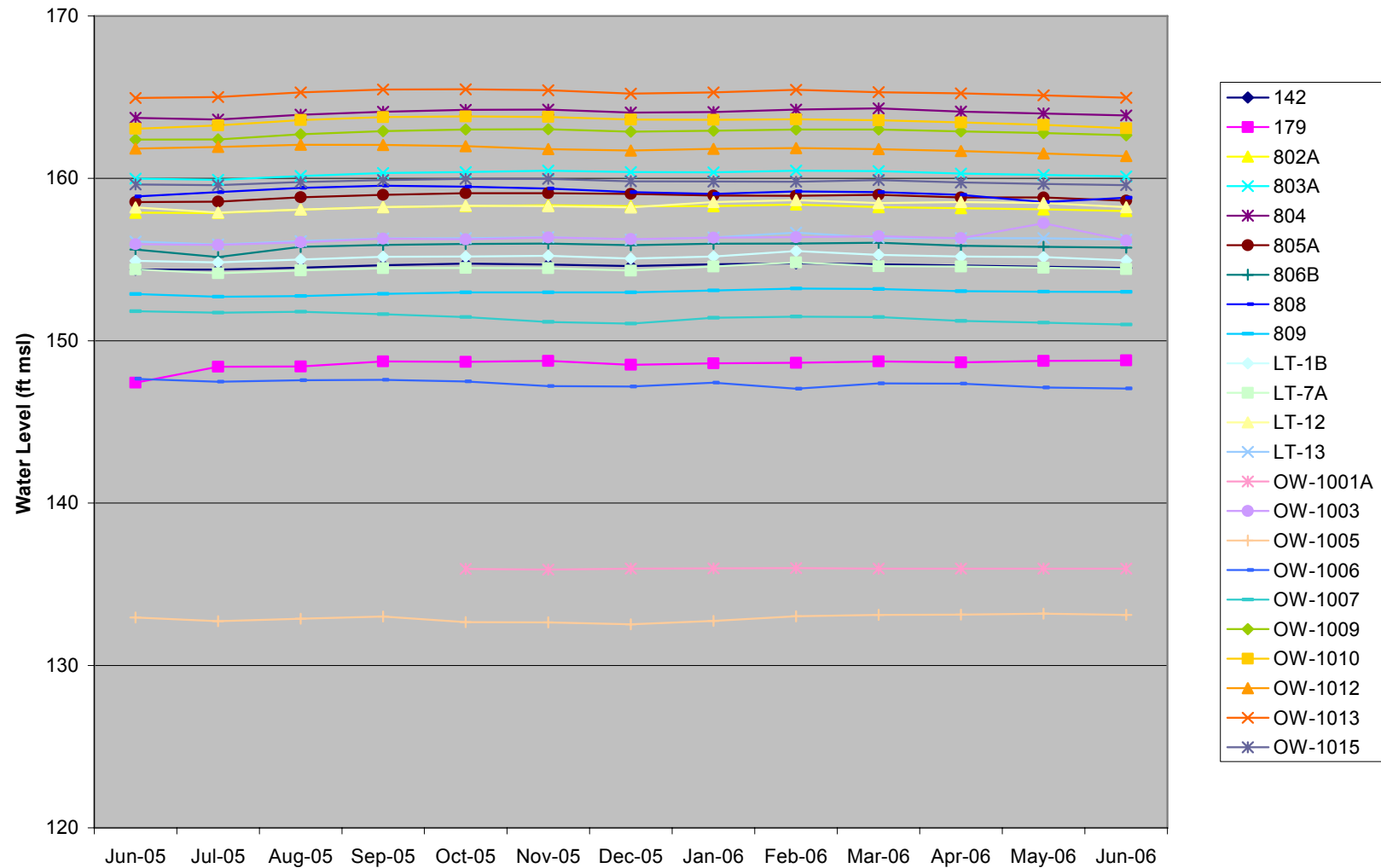


Figure 2.4.12-6 Water Table Aquifer: June 2005 – June 2006 Hydrographs

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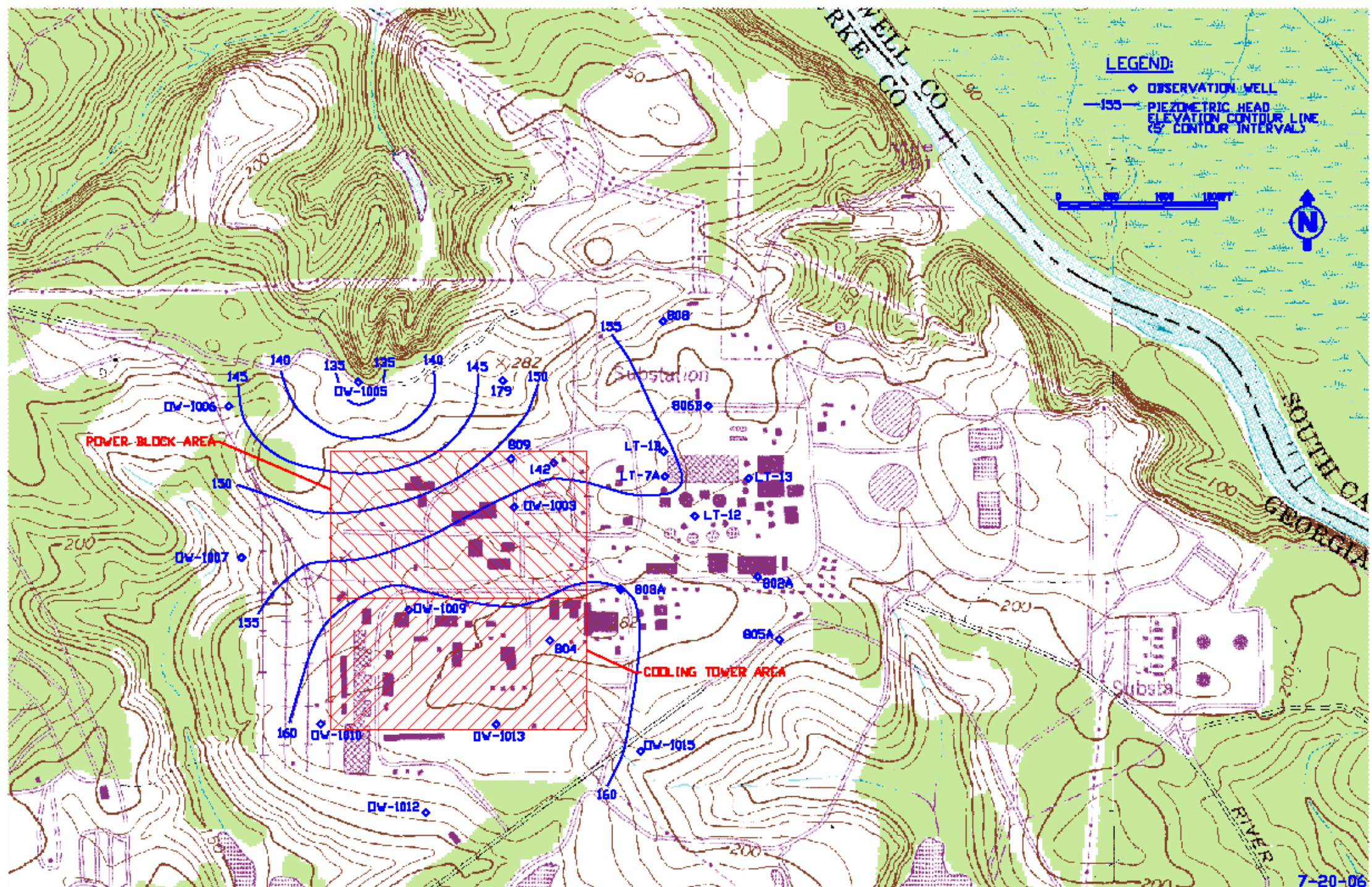


Figure 2.4.12-7 Water Table Aquifer: Piezometric Contour Map for June 2005

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Figure 2.4.12-8 Water Table Aquifer: Piezometric Contour Map for October 2005

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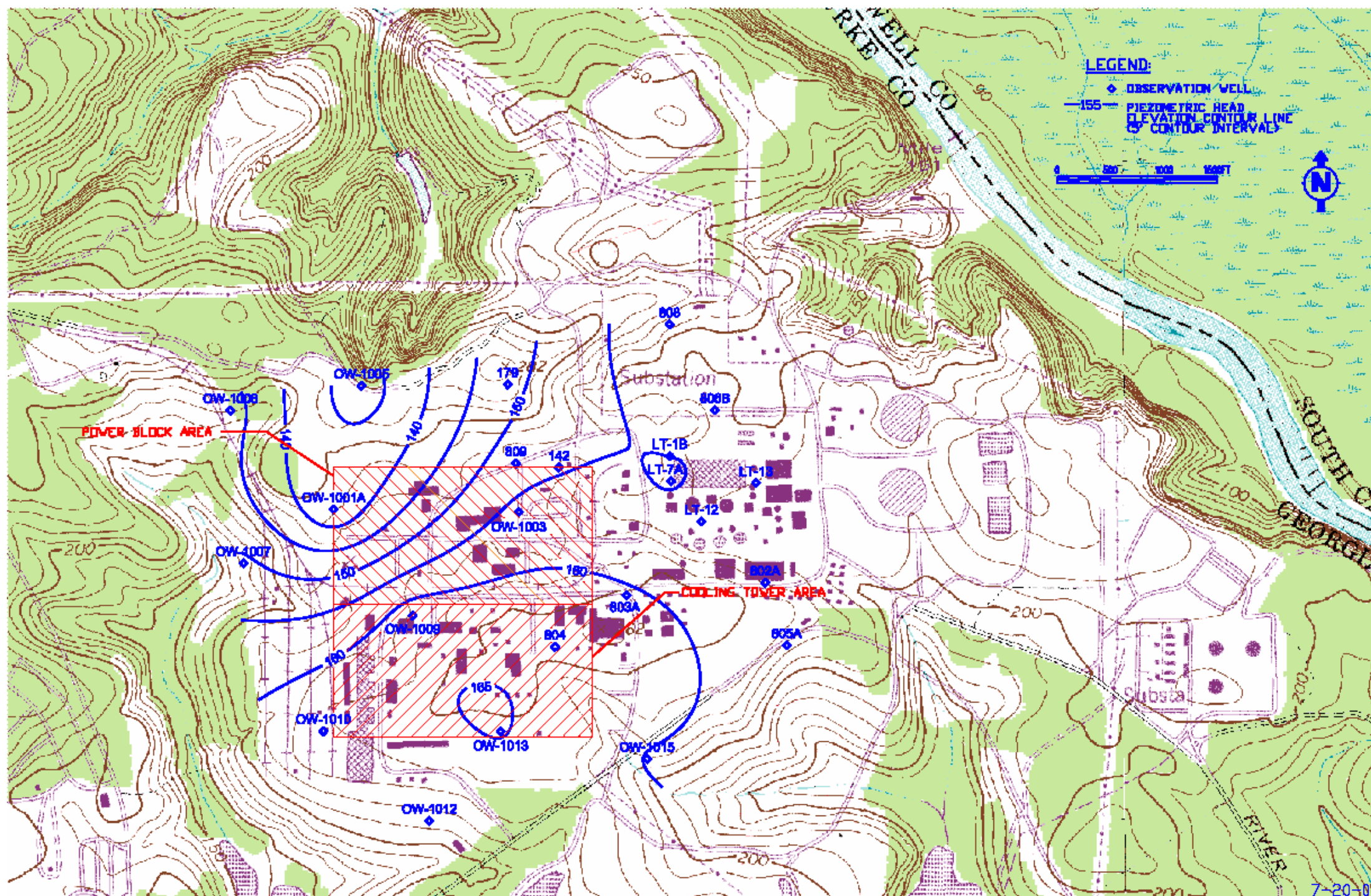


Figure 2.4.12-9 Water Table Aquifer: Piezometric Contour Map for December 2005

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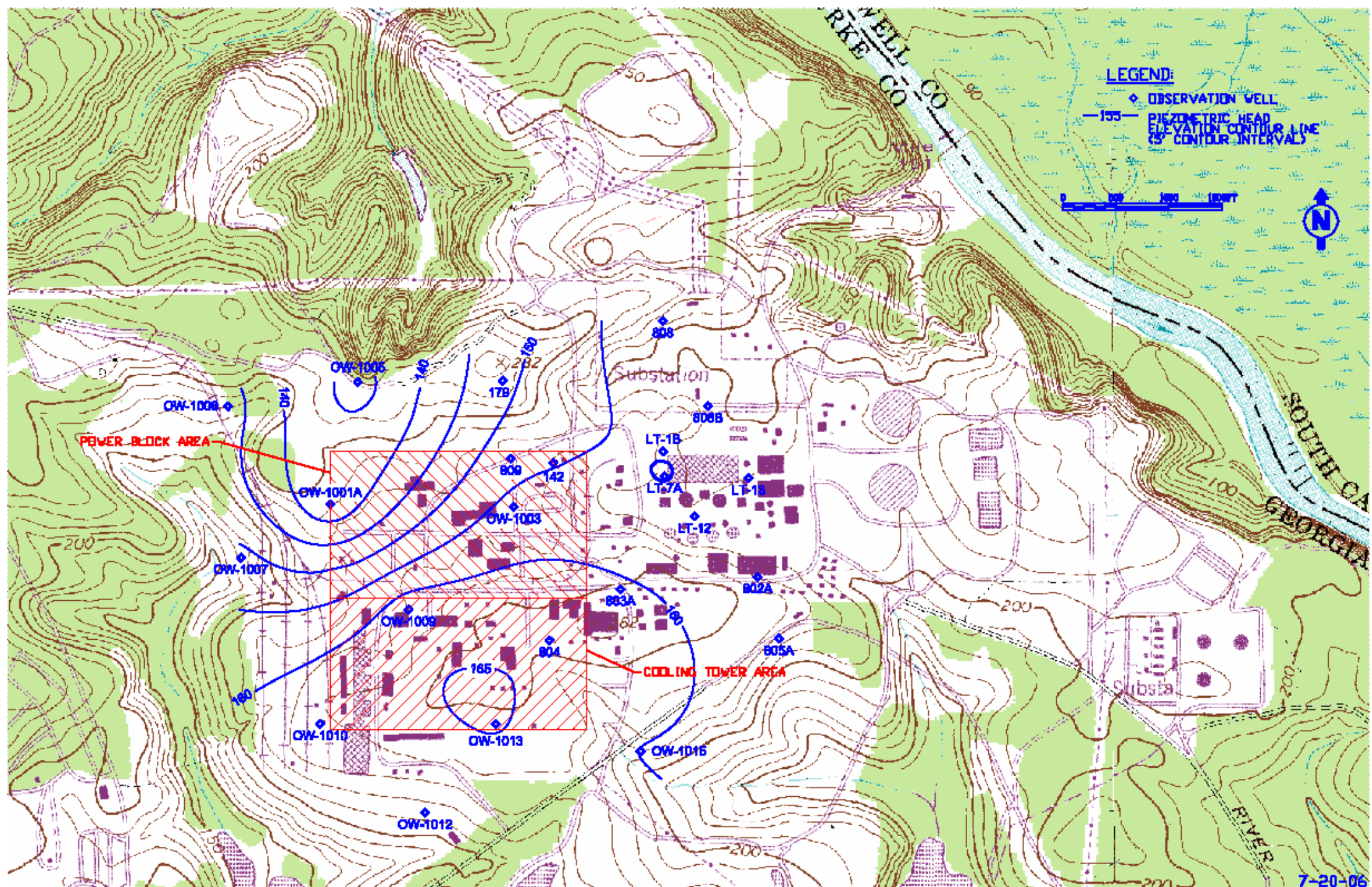


Figure 2.4.12-10 Water Table Aquifer: Piezometric Contour Map for March 2006

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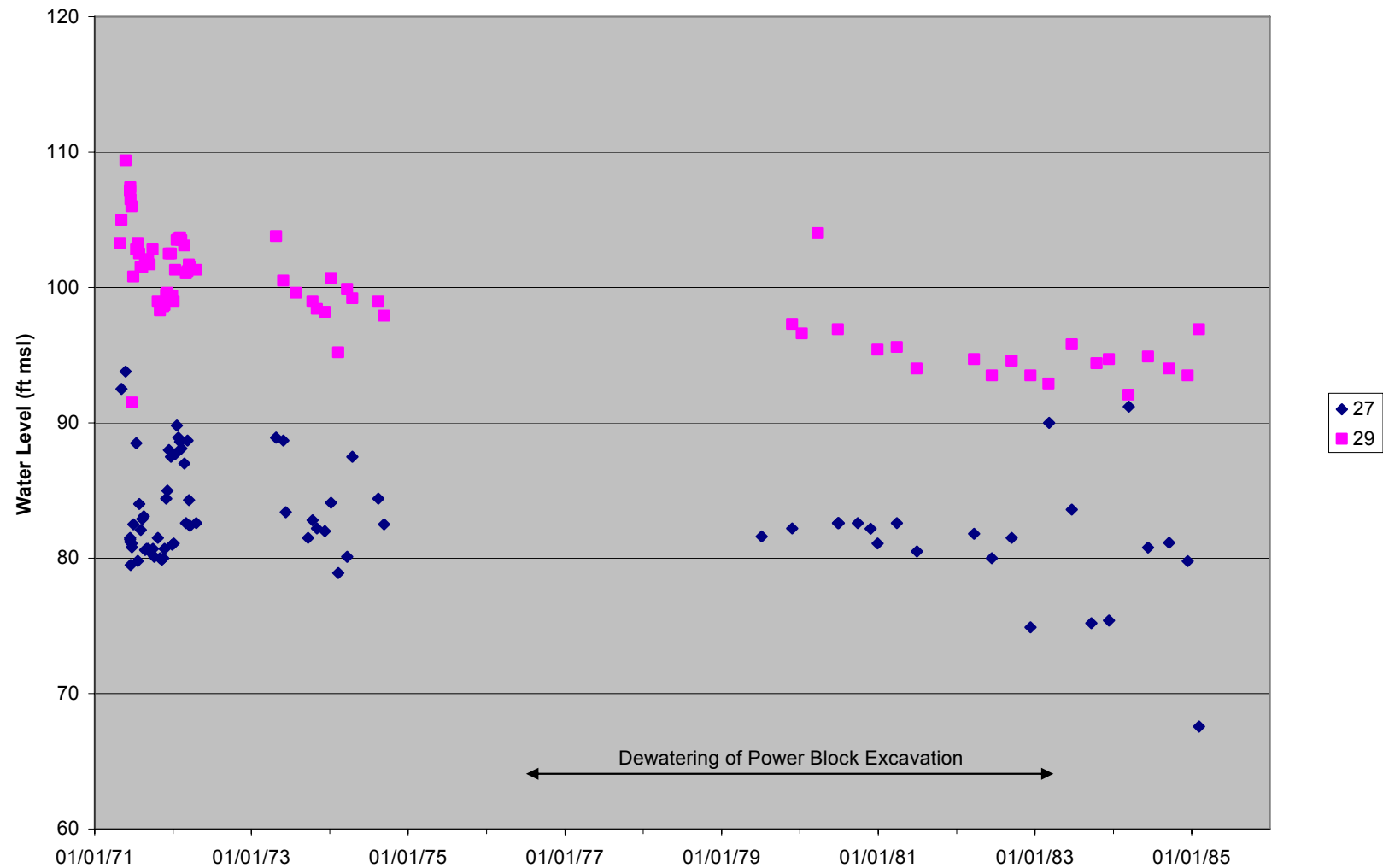


Figure 2.4.12-12 Tertiary Aquifer: 1971–1985 Hydrographs

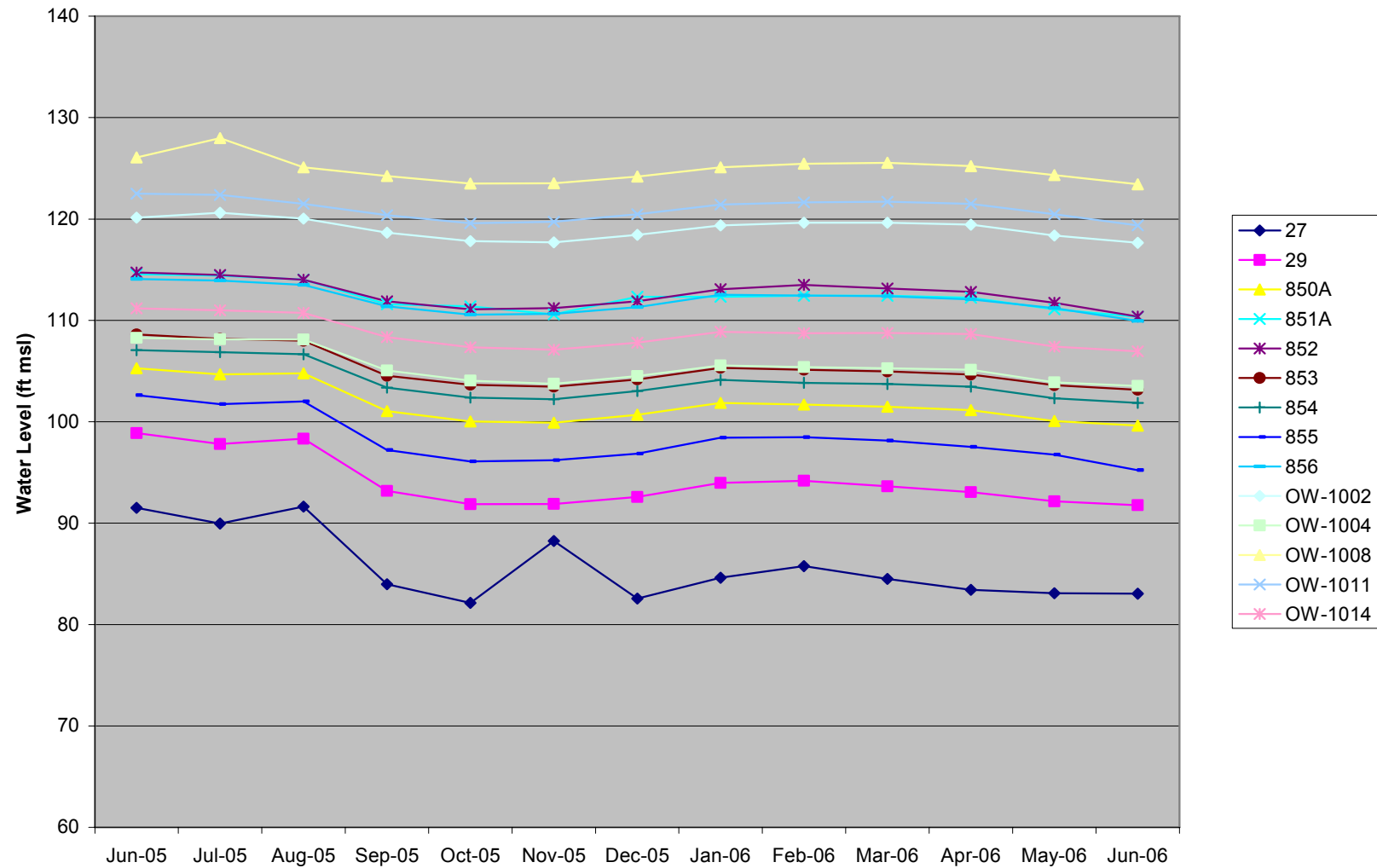


Figure 2.4.12-13 Tertiary Aquifer: June 2005 – June 2006 Hydrographs

Figure 2.4.12-14 Tertiary Aquifer: Piezometric Contour Map for June 2005

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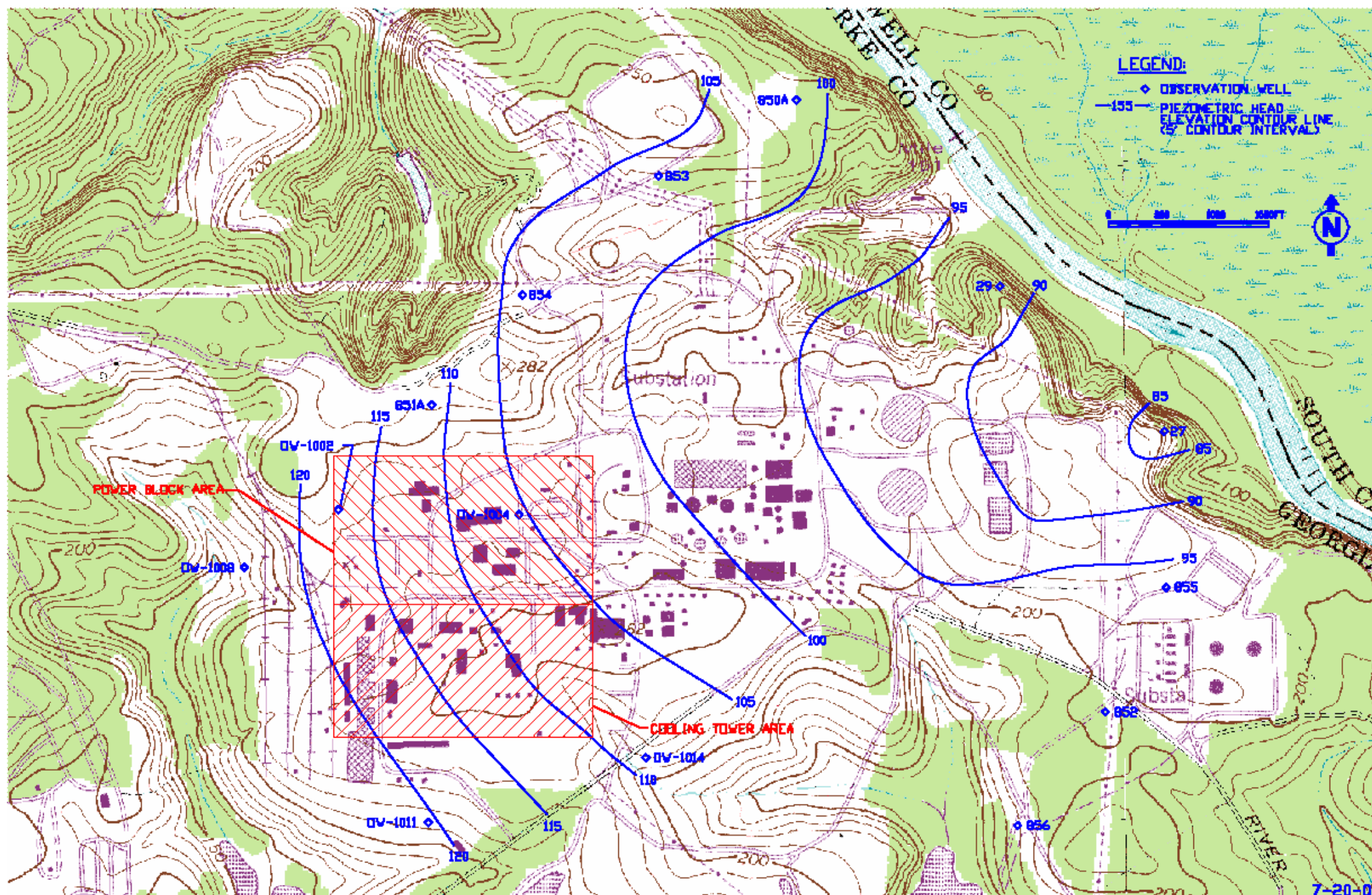


Figure 2.4.12-15 Tertiary Aquifer: Piezometric Contour Map for September 2005

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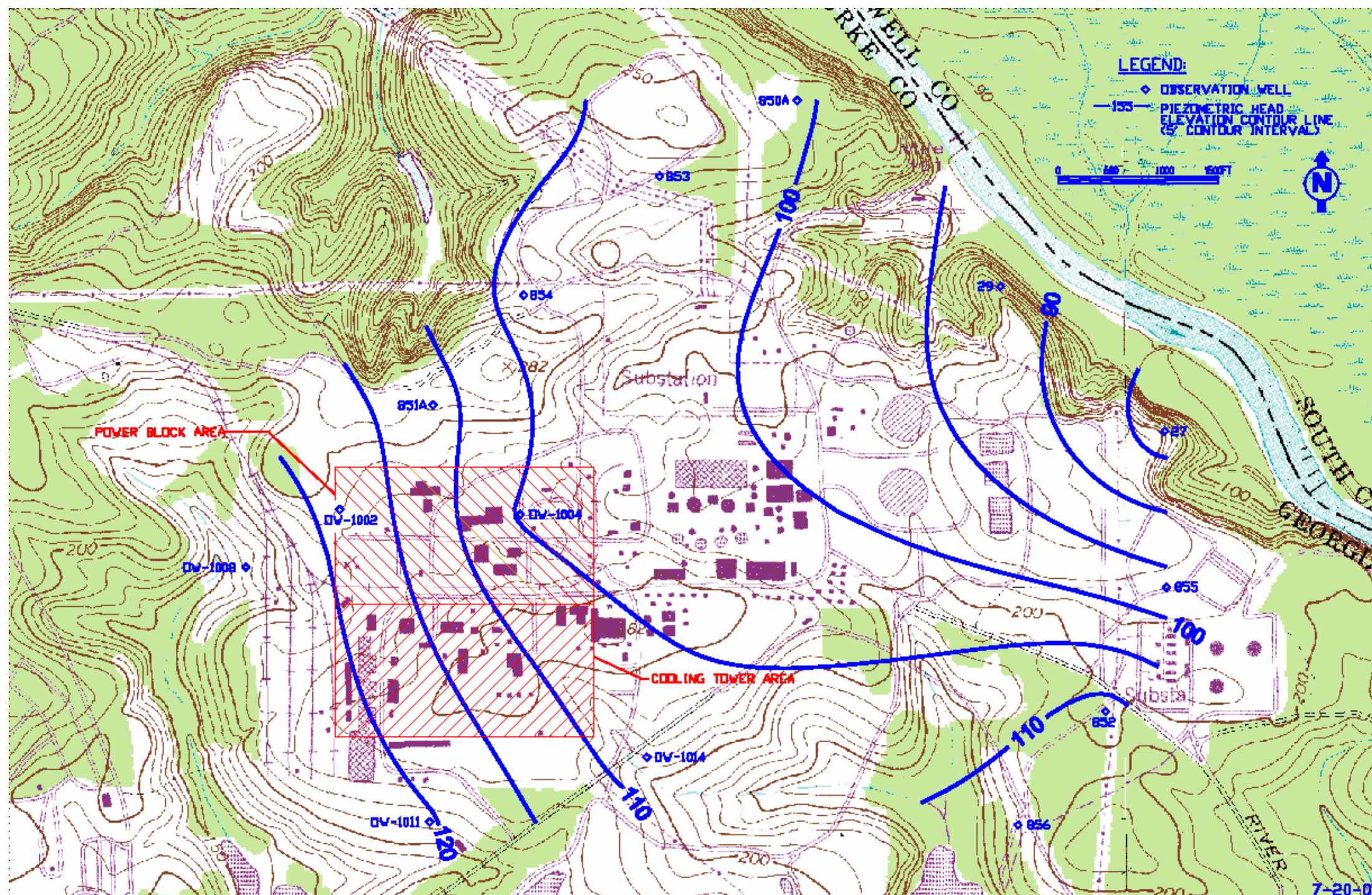


Figure 2.4.12-16 Tertiary Aquifer: Piezometric Contour Map for December 2005

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Figure 2.4.12-17 Tertiary Aquifer: Piezometric Contour Map for March 2006

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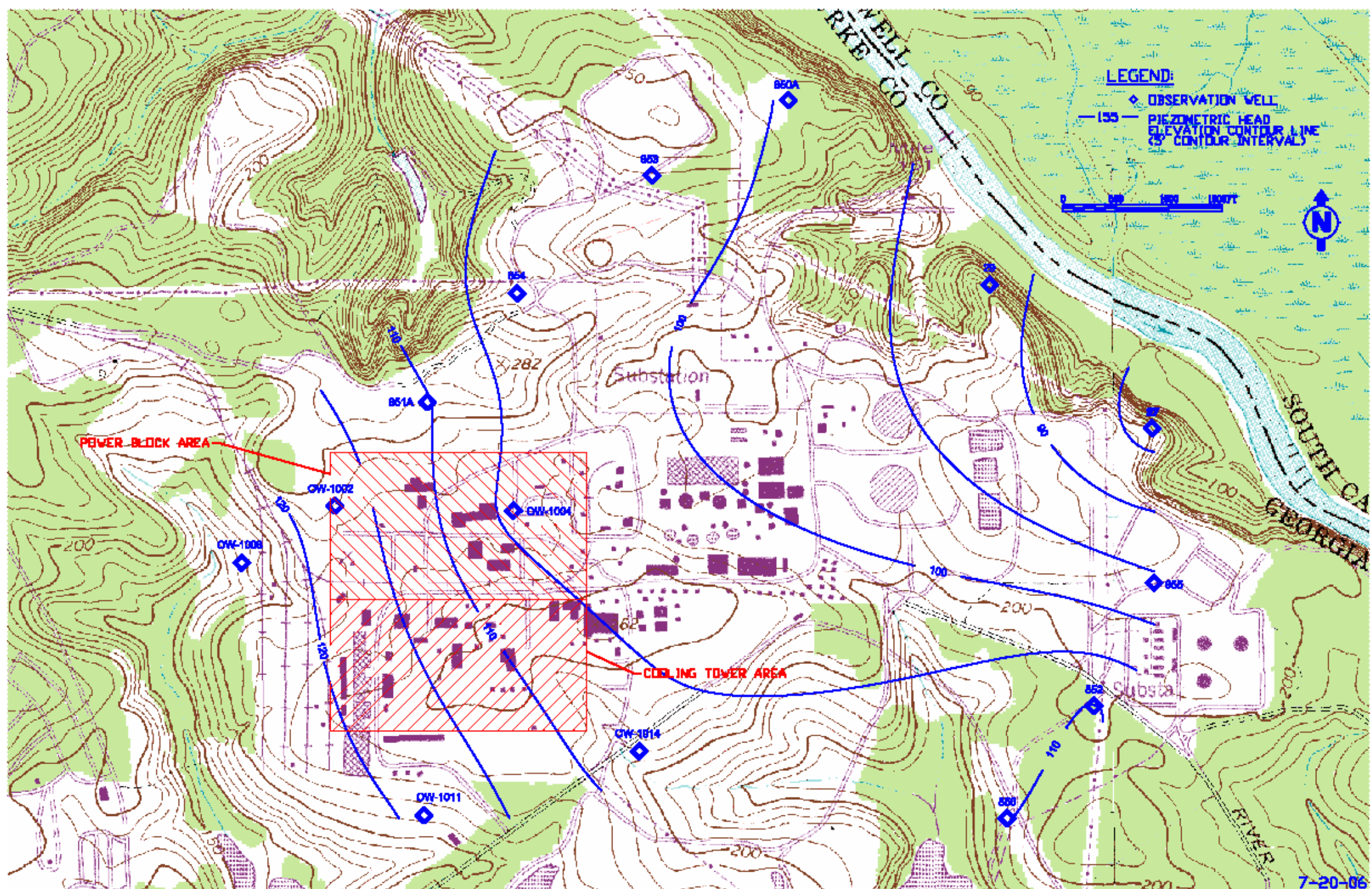


Figure 2.4.12-18 Tertiary Aquifer: Piezometric Contour Map for June 2006

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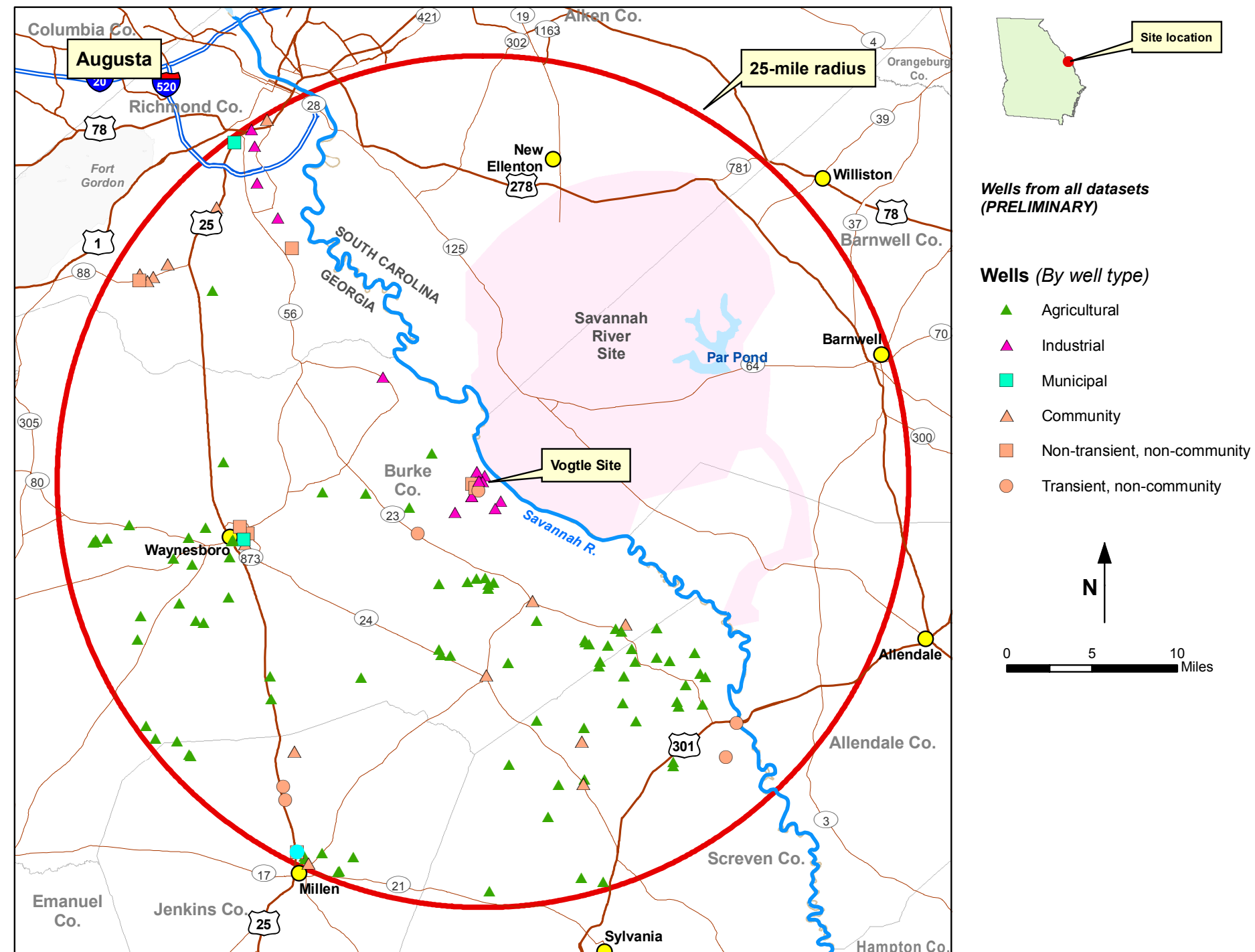


Figure 2.4.12-19 Locations of Agricultural, Industrial, Municipal, and Public Water Supply Wells Within 25 Miles of the VEGP Site

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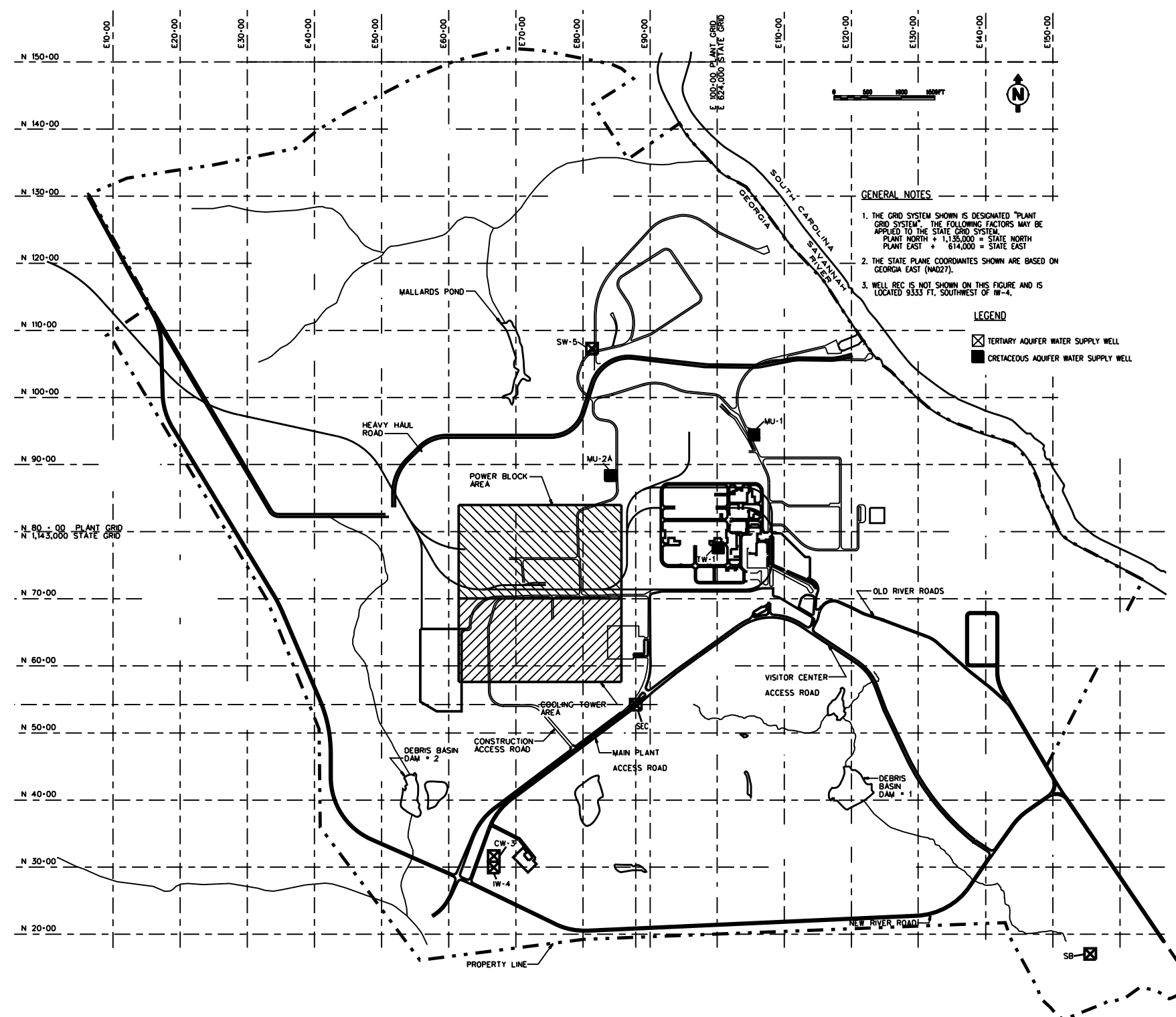


Figure 2.4.12-20 Locations of Existing Supply Wells at the VEGP Site

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2.4.13 Accidental Releases of Liquid Effluents in Ground and Surface Waters

2.4.13.1 Groundwater

This section provides a conservative analysis of a postulated, accidental liquid release of effluents to the groundwater at the VEGP site. The accident scenario is described. The conceptual model used to evaluate radionuclide transport is presented, along with potential pathways of contamination to water users. The radionuclide transport analysis is described, and the results are summarized. The radionuclide concentrations to which a water user might be exposed are compared against the regulatory limits.

2.4.13.1.1 Accident Scenario

The accident scenario has been selected based on information developed by Westinghouse to assist AP1000 COL applicants in evaluating the accidental liquid release of effluents (**Westinghouse 2006**). The accident scenario assumes an instantaneous release from one of the two effluent holdup tanks located in the lowest level of the AP1000 auxiliary building.

There are two effluent holdup tanks, each with a capacity of 28,000 gal., for each AP1000 unit. These tanks have both the highest potential radionuclide concentrations and the largest volume. Therefore, they have been selected by Westinghouse as the limiting tanks for evaluating an accidental release of liquid effluents that could lead to the most adverse contamination of groundwater or surface water, via the groundwater pathway.

Westinghouse estimated the radionuclides concentrations of the effluent holdup tanks to be 101 percent of the reactor coolant. Westinghouse determined the radionuclide concentrations in reactor coolant itself to be as follows:

- For tritium (H-3), a coolant concentration of 1.0 $\mu\text{Ci/g}$ should be used.
- Corrosion products (Cr-51, Mn-54, Mn-56, Fe-55, Fe-59, Co-58 and Co-60) should be taken directly from the AP1000 DCD, Table 11.1-2, *Design Basis Reactor Coolant Activity*.
- Other radionuclides should be based on the AP1000 DCD, Table 11.1-2 multiplied by 0.12/0.25 to adjust the failed fuel rate from the design basis to a conservatively bounding value for this analysis.

Based on these recommendations, the expected radionuclide concentrations in the effluent holdup tanks have been calculated, and the results are summarized in Table 2.4.13-1.

2.4.13.1.2 Conceptual Model

Figure 2.4.13-1 illustrates the conceptual model used to evaluate an accidental liquid release of effluent to groundwater, or to surface water via the groundwater pathway. The key elements and assumptions embodied in the conceptual model are described and discussed below.

As indicated in Section 2.4.13.1.1, the effluent holdup tanks are assumed to be the source of the release, with each tank having a volume of 28,000 gal. and the radionuclide concentrations as summarized in Table 2.4.13-1. These tanks are located at the lowest level of the auxiliary building, which has a floor elevation of approximately 186.5 ft msl and is approximately 30 to 35 ft above the water table. One of these tanks is postulated to fail, and the entire contents of the tank are conservatively assumed to enter the groundwater (unconfined aquifer) instantaneously. This assumption is very conservative because it requires failure of the floor drain system, plus it ignores the barriers presented by the 6-ft-thick basemat and the sealed, 3-ft-thick exterior walls of the AP1000 auxiliary building.

With the postulated instantaneous release of the contents of an effluent holdup tank to groundwater, radionuclides would enter the unconfined aquifer and migrate with the groundwater in the direction of decreasing hydraulic head. Hydraulic head contour maps for the unconfined aquifer presented in Figures 2.4.12-7 through 2.4.12-9 indicate that the groundwater pathway from a point of release in either of the AP1000 auxiliary buildings would be northward to Mallard Pond, a groundwater discharge area. Because the underlying Blue Bluff Marl has a very low vertical permeability, as is described in Section 2.4.12, groundwater flow in the unconfined aquifer is predominantly horizontal. The flow path is assumed to be a straight line between the auxiliary buildings and the south side of Mallard Pond, a distance of approximately 2,200 ft based on Figure 1.2-4. During saturated zone transport, radionuclide concentrations of the liquid released to the water table would be reduced by the processes of adsorption, hydrodynamic dispersion, and radioactive decay. There are no existing water-supply wells between the postulated release points and Mallard Pond that withdraw water from the unconfined aquifer.

Mallard Pond serves as a groundwater discharge area for the unconfined aquifer. The radionuclides associated with a liquid release would enter the surface water system via Mallard Pond. Radionuclide concentrations would be diluted in the pond and in the stream running from the pond to the Savannah River. Groundwater flow into Mallard Pond is continuous, and the pond level is held constant by a spillway. The rate of spillway overflow discharging from Mallard Pond was determined to be at least 250 gpm in previous site investigations conducted for VEGP Units 1 and 2. Measurements of stream flow at points downstream indicate that flow increases progressively in magnitude before discharging to the Savannah River. Upon discharge to the Savannah River, the stream flow would mix with the Savannah River flow, resulting in significantly further dilution prior to withdrawal by the nearest surface water user. As noted in Section 2.4.1, the nearest downstream industrial surface water users include the Fort James Operating Company and the Georgia Power Company. Both companies operate river intakes that withdraw water from the Savannah River near River Mile 45, which is about 106 miles downstream of the VEGP site. The City of Savannah Municipal and Industrial Plant, and the Beaufort-Jasper County Water and Sewer Authority are the nearest downstream municipal

water users. The City of Savannah obtains water from Abercorn Creek where it enters the Savannah River near River Mile 29, which is about 122 miles downstream from the VEGP site. Beaufort-Jasper County withdraws water from the Savannah River via an 18-mile canal.

2.4.13.1.3 Radionuclide Transport Analysis

A radionuclide transport analysis has been conducted to estimate the radionuclide concentrations that might expose existing and future water users based on an instantaneous release of the radioactive liquid of an AP1000 effluent holdup tank. Analysis of liquid effluent release commenced with the simplest of models, using demonstratively conservative assumptions and coefficients. Radionuclide concentrations resulting from the preliminary analysis were then compared against the maximum permissible concentrations (MPCs) identified in 10 CFR Part 20, Appendix B, Table 2, Column 2, to determine acceptability. Further analysis, using progressively more realistic and less conservative assumptions and modeling techniques, was conducted when the preliminary results were not acceptable.

Radionuclide transport along a groundwater pathline is governed by the advection-dispersion-reaction equation (**Javandel et al. 1984**), which is given as

$$R \frac{\partial C}{\partial t} = D \frac{\partial^2 C}{\partial x^2} - v \frac{\partial C}{\partial x} - \lambda RC \quad (2.4.13-1)$$

where: C = radionuclide concentration; R = retardation factor; D = coefficient of longitudinal hydrodynamic dispersion; v = average linear velocity; and λ = radioactive decay constant. The retardation factor is defined from the relationship

$$R = 1 + \frac{\rho_b K_d}{n} \quad (2.4.13-2)$$

where: ρ_b = bulk density; K_d = distribution coefficient; and n = total porosity. The average linear velocity is determined using Darcy's law, which is

$$v = - \frac{K}{n_e} \frac{dh}{dx} \quad (2.4.13-3)$$

where: K = hydraulic conductivity; n_e = effective porosity; and dh/dx = hydraulic gradient. The radioactive decay constant can be written as

$$\lambda = \frac{\ln 2}{t_{1/2}} \quad (2.4.13-4)$$

where $t_{1/2}$ = radionuclide half-life. Conservatively neglecting hydrodynamic dispersion, Equation 2.4.13-1 can be integrated to yield

$$C = C_0 \exp(-\lambda t) \quad (2.4.13-5)$$

where: C = radionuclide concentration; C_0 = initial radionuclide concentration; $t = LR/v$ = radionuclide travel time; and L = groundwater pathline length.

To estimate the radionuclide concentrations in groundwater discharging to Mallard Pond, Equation 2.4.13-5 was applied along the groundwater pathline that would originate at either of the liquid effluent release points beneath the AP1000 auxiliary buildings and terminate at Mallard Pond. The analysis was performed sequentially as described below.

2.4.13.1.3.1 Transport Considering Radioactive Decay Only

An initial screening analysis was performed considering radioactive decay only. This analysis assumed that all radionuclides migrate at the same rate as groundwater and considered no adsorption and retardation, which would otherwise result in a longer travel time and more radioactive decay. The concentrations of the radionuclides appearing in Table 2.4.13-1 were decayed for a period equal to the groundwater travel time from the point of release to Mallard Pond, using Equation 2.4.13-5 with $R = 1$. Radionuclides having concentrations less than 1 percent of their respective MPCs were eliminated from consideration because their concentrations would be well below their regulatory limits. Any radionuclides having a concentration greater than or equal to 1 percent of their MPC were retained for further evaluation.

Evaluating transport considering radioactive decay only requires an estimate of the groundwater travel time. The travel time in the unconfined aquifer between either of the AP1000 auxiliary buildings and Mallard Pond was conservatively determined based on site-specific data summarized in Section 2.4.12. The average linear velocity was calculated to be 0.1 ft/day, using Equation 2.4.13-3 with a maximum observed hydraulic conductivity of 2.65 ft/day, an effective porosity of 0.32, and a horizontal hydraulic gradient of 0.012 ft/ft. The straight-line distance from either AP1000 auxiliary building to Mallard Pond is approximately 2,200 ft, which would result in a conservatively estimated groundwater travel time of about 61 years (60.61 years). Using Equation 2.4.13-5, the initial concentrations given in Table 2.4.13-1 were decayed for a period of 60.61 years. Table 2.4.13-2 summarizes the results and identifies those radionuclides that would exceed their MPC by more than 1 percent. These include H-3, Co-60, Sr-90, Cs-137, and I-129.

2.4.13.1.3.2 Transport Considering Radioactive Decay and Adsorption

Radionuclides retained from the screening analysis (H-3, Co-60, Sr-90, Cs-137, and I-129) were further evaluated considering adsorption and retardation in addition to radioactive decay. The distribution coefficients for H-3 and I-129 were taken to be zero. The distribution coefficients for Co-60, Sr-90, and Cs-137 were based on the laboratory analysis of soil samples that were obtained from the VEGP site (**Kaplan 2006; MACTEC 2006**). Soil samples were taken from 18 shallow test pits located in potential borrow source areas for the backfill that will be required for

the new AP1000 units. Three additional soil samples were obtained from a boring located near B-1003. These samples were taken from below the water table and are representative of the sediments comprising the Barnwell Group and associated Water Table aquifer (see Section 2.4.12). The measured K_d values of these samples are summarized in Table 2.4.13-3.

Distribution coefficients for Co-60, Sr-90, and Cs-137 for transport analysis were selected considering the groundwater pathway for saturated zone transport in the Water Table aquifer. This pathway extends northward from the AP1000 auxiliary buildings, from where an accidental liquid release is postulated, and terminates at Mallard Pond, a total horizontal distance of about 2200 ft. The earth materials present along this pathway will include the material that will be used to backfill the power block excavation and the saturated sediments of the Barnwell Group. Of the total 2200 ft pathway length, about 140 ft of the pathway would be in backfill material with the remaining 2060 ft being in Water Table aquifer sediments. Because about 94% of the pathway occurs in Water Table aquifer sediments, it is appropriate to use distribution coefficients determined for these sediments (soil samples B-1003V-55-65, B-1003V-65-75, and B-1003V-75-82 in Table 2.3-3). These values range from 3.9 to 21.3 mL/g for Co, 14.4 to 17.4 mL/g for Sr, and 22.7 to greater than 30.1 mL/g for Cs. To ensure conservatism, K_d values representing the lower end of the each range were chosen for radionuclide transport analysis (i.e., 3.9 mL/g for Co, 14.4 mL/g for Sr, and 22.7 mL/g for Cs).

Retardation factors were then calculated using Equation 2.4.13-2 with a porosity of 0.40 and bulk density of 1.60 g/cm³, based on information provided in Section 2.4.12. Concentrations were then determined at the point of discharge to Mallard Pond using Equation 2.4.13-5 with the appropriate retardation factors. Results are summarized in Table 2.4.13-4. The only radionuclides having concentrations greater than 1 percent of their respective MPCs would be H-3 and I-129. Note that the H-3 and I-129 concentrations would be about 3,400 percent and 3.6 percent of their MPCs, respectively.

2.4.13.1.3.3 Transport Considering Radioactive Decay, Adsorption, and Dilution

The H-3 and I-129 discharging with the groundwater to Mallard Pond would mix with other, uncontaminated groundwater discharging to Mallard Pond. A dilution factor was, therefore, applied to the H-3 and I-129 concentrations given in Table 2.4.13-4 to account for dilution in Mallard Pond. This dilution factor was previously estimated to be 2.8×10^{-4} based on the ratio of Mallard Pond stream flow (250 gpm) to the rate at which the postulated release would discharge into Mallard Pond (0.7 gpm). This value was confirmed to be applicable to the VEGP site using the postulated 28,000 gallon spill volume and hydrogeological properties of the unconfined aquifer as characterized for the ESP application. Accounting for this dilution (i.e., Table 2.4.13-4 Groundwater Concentration multiplied by dilution factor), the resulting H-3 concentration would be 9.4×10^{-6} $\mu\text{Ci}/\text{cm}^3$ or 0.94 percent of its 1.0×10^{-3} $\mu\text{Ci}/\text{cm}^3$ MPC value. The resulting I-129 concentration would be 2.0×10^{-12} $\mu\text{Ci}/\text{cm}^3$, which is 0.001 percent of its

$2.0 \times 10^{-7} \mu\text{Ci}/\text{cm}^3$ MPC value. Note that the stream exiting Mallard Pond gains additional runoff water as it flows to the Savannah River, which would result in more dilution than was accounted for in this analysis. Significantly more dilution would occur as the stream discharges to, and mixes with, the Savannah River.

2.4.13.1.4 Compliance with 10 CFR Part 20

The radionuclide transport analysis presented in Section 2.4.13.1.3 demonstrates that each of the radionuclides that could be accidentally released to groundwater would be individually below its MPC. However, 10 CFR Part 20, Appendix B, Table 2, imposes additional requirements when the identity and concentration of each radionuclide in a mixture are known. In this case, the ratio present in the mixture and the concentration otherwise established in 10 CFR Part 20 Appendix B for the specific radionuclide not in a mixture must be determined. The sum of such ratios for all of the radionuclides in the mixture may not exceed “1” (i.e., “unity”).

This sum of fractions approach was applied to the radionuclide concentrations conservatively estimated in Section 2.4.13.1.3. Results are summarized in Table 2.4.13-5. The ratios for the mixture sum to 0.010, which is well below unity. Therefore, it is concluded that an accidental liquid release of effluents in groundwater would not exceed 10 CFR Part 20 limits.

2.4.13.2 Surface Water

No outdoor tanks contain radioactivity in the Westinghouse AP1000 design (**Westinghouse 2006**). In particular, the AP1000 design does not require boron changes for load follow and does not recycle boric acid or reactor coolant water, so the boric acid tank is not radioactive. Because no outdoor tanks contain radioactivity, no accident scenario could result in the release of liquid effluent directly to the surface water.

Table 2.4.13-1 Radionuclide Concentrations in the AP1000 Effluent Holdup Tanks

| Radionuclide | Design Basis Reactor Coolant Activity¹ ($\mu\text{Ci/g}$) | Reactor Coolant Concentrations² ($\mu\text{Ci/cm}^3$) | Effluent Holdup Tank Concentrations³ ($\mu\text{Ci/cm}^3$) |
|---------------------|--|--|---|
| H-3 | - | 1.00E+00 | 1.01E+00 |
| Cr-51 | 1.30E-03 | 1.30E-03 | 1.31E-03 |
| Mn-54 | 6.70E-04 | 6.70E-04 | 6.77E-04 |
| Mn-56 | 1.70E-01 | 1.70E-01 | 1.72E-01 |
| Fe-55 | 5.00E-04 | 5.00E-04 | 5.05E-04 |
| Fe-59 | 1.30E-04 | 1.30E-04 | 1.31E-04 |
| Co-58 | 1.90E-03 | 1.90E-03 | 1.92E-03 |
| Co-60 | 2.20E-04 | 2.20E-04 | 2.22E-04 |
| Br-83 | 3.20E-02 | 1.54E-02 | 1.55E-02 |
| Br-84 | 1.70E-02 | 8.16E-03 | 8.24E-03 |
| Br-85 | 2.00E-03 | 9.60E-04 | 9.70E-04 |
| Rb-88 | 1.50E+00 | 7.20E-01 | 7.27E-01 |
| Rb-89 | 6.90E-02 | 3.31E-02 | 3.35E-02 |
| Sr-89 | 1.10E-03 | 5.28E-04 | 5.33E-04 |
| Sr-90 | 4.90E-05 | 2.35E-05 | 2.38E-05 |
| Sr-91 | 1.70E-03 | 8.16E-04 | 8.24E-04 |
| Sr-92 | 4.10E-04 | 1.97E-04 | 1.99E-04 |
| Y-90 | 1.30E-05 | 6.24E-06 | 6.30E-06 |
| Y-91m | 9.20E-04 | 4.42E-04 | 4.46E-04 |
| Y-91 | 1.40E-04 | 6.72E-05 | 6.79E-05 |
| Y-92 | 3.40E-04 | 1.63E-04 | 1.65E-04 |
| Y-93 | 1.10E-04 | 5.28E-05 | 5.33E-05 |
| Nb-95 | 1.60E-04 | 7.68E-05 | 7.76E-05 |
| Zr-95 | 1.60E-04 | 7.68E-05 | 7.76E-05 |
| Mo-99 | 2.10E-01 | 1.01E-01 | 1.02E-01 |
| Tc-99m | 2.00E-01 | 9.60E-02 | 9.70E-02 |
| Ru-103 | 1.40E-04 | 6.72E-05 | 6.79E-05 |
| Rh-103m | 1.40E-04 | 6.72E-05 | 6.79E-05 |
| Rh-106 | 4.50E-05 | 2.16E-05 | 2.18E-05 |
| Ag-110m | 4.00E-04 | 1.92E-04 | 1.94E-04 |
| Te-127m | 7.60E-04 | 3.65E-04 | 3.68E-04 |
| Te-129m | 2.60E-03 | 1.25E-03 | 1.26E-03 |
| Te-129 | 3.80E-03 | 1.82E-03 | 1.84E-03 |
| Te-131m | 6.70E-03 | 3.22E-03 | 3.25E-03 |
| Te-131 | 4.30E-03 | 2.06E-03 | 2.08E-03 |
| Te-132 | 7.90E-02 | 3.79E-02 | 3.83E-02 |
| Te-134 | 1.10E-02 | 5.28E-03 | 5.33E-03 |
| I-129 | 1.50E-08 | 7.20E-09 | 7.27E-09 |

Table 2.4.13-1 (cont.) Radionuclide Inventory of the AP1000 Effluent Holdup Tanks

| Radionuclide | Design Basis Reactor Coolant Activity¹ ($\mu\text{Ci/g}$) | Reactor Coolant Concentrations² ($\mu\text{Ci/cm}^3$) | Effluent Holdup Tank Concentrations³ ($\mu\text{Ci/cm}^3$) |
|---------------------|--|--|---|
| I-130 | 1.10E-02 | 5.28E-03 | 5.33E-03 |
| I-131 | 7.10E-01 | 3.41E-01 | 3.44E-01 |
| I-132 | 9.40E-01 | 4.51E-01 | 4.56E-01 |
| I-133 | 1.30E+00 | 6.24E-01 | 6.30E-01 |
| I-134 | 2.20E-01 | 1.06E-01 | 1.07E-01 |
| I-135 | 7.80E-01 | 3.74E-01 | 3.78E-01 |
| Cs-134 | 6.90E-01 | 3.31E-01 | 3.35E-01 |
| Cs-136 | 1.00E+00 | 4.80E-01 | 4.85E-01 |
| Cs-137 | 5.00E-01 | 2.40E-01 | 2.42E-01 |
| Cs-138 | 3.70E-01 | 1.78E-01 | 1.79E-01 |
| Ba-137m | 4.70E-01 | 2.26E-01 | 2.28E-01 |
| Ba-140 | 1.00E-03 | 4.80E-04 | 4.85E-04 |
| La-140 | 3.10E-04 | 1.49E-04 | 1.50E-04 |
| Ce-141 | 1.60E-04 | 7.68E-05 | 7.76E-05 |
| Ce-143 | 1.40E-04 | 6.72E-05 | 6.79E-05 |
| Pr-143 | 1.50E-04 | 7.20E-05 | 7.27E-05 |
| Ce-144 | 1.20E-04 | 5.76E-05 | 5.82E-05 |
| Pr-144 | 1.20E-04 | 5.76E-05 | 5.82E-05 |

¹ Values from AP1000 Table 11.1-2

² For tritium (H-3) a coolant concentration of 1.0 $\mu\text{Ci/g}$ is used; corrosion products (Cr-51, Mn-54, Mn-56, Fe-55, Fe-59, Co-58 and Co-60) are taken directly from the AP1000 DCD, Table 11.1-2; and other radionuclides are based on the AP1000 DCD, Table 11.1-2 multiplied by 0.12/0.25. The density of all liquids is assumed to be 1 g/cm^3 .

³ Values are 101% of the reactor coolant concentrations.

Table 2.4.13-2 Results of Transport Analysis Considering Radioactive Decay Only

| Radionuclide | Effluent Holdup Tank Concentration ¹ ($\mu\text{Ci}/\text{cm}^3$) | Half-life ² (days) | Decay Rate ³ (days ⁻¹) | MPC ⁴ ($\mu\text{Ci}/\text{cm}^3$) | Groundwater Concentration ⁵ ($\mu\text{Ci}/\text{cm}^3$) | Groundwater Concentration/ MPC |
|--------------|---|----------------------------------|--|--|--|-----------------------------------|
| H-3 | 1.01E+00 | 4.51E+03 | 1.54E-04 | 1.00E-03 | 3.35E-02 | 3.35E+01 |
| Cr-51 | 1.31E-03 | 2.77E+01 | 2.50E-02 | 5.00E-04 | 2.03E-244 | 4.05E-241 |
| Mn-54 | 6.77E-04 | 3.13E+02 | 2.21E-03 | 3.00E-05 | 3.31E-25 | 1.10E-20 |
| Mn-56 | 1.72E-01 | 1.07E-01 | 6.48E+00 | 7.00E-05 | 0.00E+00 | 0.00E+00 |
| Fe-55 | 5.05E-04 | 9.86E+02 | 7.03E-04 | 1.00E-04 | 8.67E-11 | 8.67E-07 |
| Fe-59 | 1.31E-04 | 4.45E+01 | 1.56E-02 | 1.00E-05 | 1.66E-154 | 1.66E-149 |
| Co-58 | 1.92E-03 | 7.08E+01 | 9.79E-03 | 2.00E-05 | 1.17E-97 | 5.85E-93 |
| Co-60 | 2.22E-04 | 1.93E+03 | 3.59E-04 | 3.00E-06 | 7.77E-08 | 2.59E-02 |
| Br-83 | 1.55E-02 | 9.96E-02 | 6.96E+00 | 9.00E-04 | 0.00E+00 | 0.00E+00 |
| Br-84 | 8.24E-03 | 2.21E-02 | 3.14E+01 | 4.00E-04 | 0.00E+00 | 0.00E+00 |
| Br-85 | 9.70E-04 | 2.01E-03 | 3.44E+02 | 1.00E+00 | 0.00E+00 | 0.00E+00 |
| Rb-88 | 7.27E-01 | 1.24E-02 | 5.59E+01 | 4.00E-04 | 0.00E+00 | 0.00E+00 |
| Rb-89 | 3.35E-02 | 1.06E-02 | 6.54E+01 | 9.00E-04 | 0.00E+00 | 0.00E+00 |
| Sr-89 | 5.33E-04 | 5.05E+01 | 1.37E-02 | 8.00E-06 | 4.35E-136 | 5.44E-131 |
| Sr-90 | 2.38E-05 | 1.06E+04 | 6.54E-05 | 5.00E-07 | 5.59E-06 | 1.12E+01 |
| Sr-91 | 8.24E-04 | 3.96E-01 | 1.75E+00 | 2.00E-05 | 0.00E+00 | 0.00E+00 |
| Sr-92 | 1.99E-04 | 1.13E-01 | 6.16E+00 | 4.00E-05 | 0.00E+00 | 0.00E+00 |
| Y-90 | 6.30E-06 | 2.67E+00 | 2.60E-01 | 7.00E-06 | 0.00E+00 | 0.00E+00 |
| Y-91m | 4.46E-04 | 3.45E-02 | 2.01E+01 | 2.00E-03 | 0.00E+00 | 0.00E+00 |
| Y-91 | 6.79E-05 | 5.85E+01 | 1.18E-02 | 8.00E-06 | 6.41E-119 | 8.01E-114 |
| Y-92 | 1.65E-04 | 1.48E-01 | 4.68E+00 | 4.00E-05 | 0.00E+00 | 0.00E+00 |
| Y-93 | 5.33E-05 | 4.21E-01 | 1.65E+00 | 2.00E-05 | 0.00E+00 | 0.00E+00 |
| Nb-95 | 7.76E-05 | 3.52E+01 | 1.97E-02 | 3.00E-05 | 2.44E-194 | 8.15E-190 |
| Zr-95 | 7.76E-05 | 6.40E+01 | 1.08E-02 | 2.00E-05 | 4.61E-109 | 2.31E-104 |
| Mo-99 | 1.02E-01 | 2.75E+00 | 2.52E-01 | 2.00E-05 | 0.00E+00 | 0.00E+00 |
| Tc-99m | 9.70E-02 | 2.51E-01 | 2.76E+00 | 1.00E-03 | 0.00E+00 | 0.00E+00 |
| Ru-103 | 6.79E-05 | 3.93E+01 | 1.76E-02 | 3.00E-05 | 1.26E-174 | 4.20E-170 |
| Rh-103m | 6.79E-05 | 3.90E-02 | 1.78E+01 | 6.00E-03 | 0.00E+00 | 0.00E+00 |
| Rh-106 | 2.18E-05 | 4.63E-04 | 1.50E+03 | NA ⁶ | 0.00E+00 | |
| Ag-110m | 1.94E-04 | 2.50E+02 | 2.77E-03 | 6.00E-06 | 4.04E-31 | 6.73E-26 |
| Te-127m | 3.68E-04 | 1.09E+02 | 6.36E-03 | 9.00E-06 | 2.34E-65 | 2.60E-60 |
| Te-129m | 1.26E-03 | 3.36E+01 | 2.06E-02 | 7.00E-06 | 3.76E-202 | 5.37E-197 |
| Te-129 | 1.84E-03 | 4.83E-02 | 1.44E+01 | 4.00E-04 | 0.00E+00 | 0.00E+00 |
| Te-131m | 3.25E-03 | 1.25E+00 | 5.55E-01 | 8.00E-06 | 0.00E+00 | 0.00E+00 |
| Te-131 | 2.08E-03 | 1.74E-02 | 3.98E+01 | 8.00E-05 | 0.00E+00 | 0.00E+00 |
| Te-132 | 3.83E-02 | 3.26E+00 | 2.13E-01 | 9.00E-06 | 0.00E+00 | 0.00E+00 |
| Te-134 | 5.33E-03 | 2.90E-02 | 2.39E+01 | 3.00E-04 | 0.00E+00 | 0.00E+00 |
| I-129 | 7.27E-09 | 5.73E+09 | 1.21E-10 | 2.00E-07 | 7.27E-09 | 3.63E-02 |
| I-130 | 5.33E-03 | 5.15E-01 | 1.35E+00 | 2.00E-05 | 0.00E+00 | 0.00E+00 |
| I-131 | 3.44E-01 | 8.04E+00 | 8.62E-02 | 1.00E-06 | 0.00E+00 | 0.00E+00 |
| I-132 | 4.56E-01 | 9.58E-02 | 7.24E+00 | 1.00E-04 | 0.00E+00 | 0.00E+00 |
| I-133 | 6.30E-01 | 8.67E-01 | 7.99E-01 | 7.00E-06 | 0.00E+00 | 0.00E+00 |
| I-134 | 1.07E-01 | 3.65E-02 | 1.90E+01 | 4.00E-04 | 0.00E+00 | 0.00E+00 |
| I-135 | 3.78E-01 | 2.75E-01 | 2.52E+00 | 3.00E-05 | 0.00E+00 | 0.00E+00 |

Table 2.4.13-2 (cont.) Results of Transport Analysis Considering Radioactive Decay Only

| Radionuclide | Effluent Holdup Tank Concentration ¹ ($\mu\text{Ci}/\text{cm}^3$) | Half-life ² (days) | Decay Rate ³ (days ⁻¹) | MPC ⁴ ($\mu\text{Ci}/\text{cm}^3$) | Groundwater Concentration ⁵ ($\mu\text{Ci}/\text{cm}^3$) | Groundwater Concentration/ MPC |
|---------------|---|----------------------------------|--|--|--|-----------------------------------|
| Cs-134 | 3.35E-01 | 7.53E+02 | 9.21E-04 | 9.00E-07 | 4.64E-10 | 5.16E-04 |
| Cs-136 | 4.85E-01 | 1.31E+01 | 5.29E-02 | 6.00E-06 | 0.00E+00 | 0.00E+00 |
| Cs-137 | 2.42E-01 | 1.10E+04 | 6.30E-05 | 1.00E-06 | 5.99E-02 | 5.99E+04 |
| Cs-138 | 1.79E-01 | 2.24E-02 | 3.09E+01 | 4.00E-04 | 0.00E+00 | 0.00E+00 |
| Ba-137m | 2.28E-01 | 1.81E-03 | 3.84E+02 | NA ⁶ | 0.00E+00 | |
| Ba-140 | 4.85E-04 | 1.27E+01 | 5.46E-02 | 8.00E-06 | 0.00E+00 | 0.00E+00 |
| La-140 | 1.50E-04 | 1.68E+00 | 4.13E-01 | 9.00E-06 | 0.00E+00 | 0.00E+00 |
| Ce-141 | 7.76E-05 | 3.25E+01 | 2.13E-02 | 3.00E-05 | 4.42E-210 | 1.47E-205 |
| Ce-143 | 6.79E-05 | 1.38E+00 | 5.02E-01 | 2.00E-05 | 0.00E+00 | 0.00E+00 |
| Pr-143 | 7.27E-05 | 1.36E+01 | 5.10E-02 | 2.00E-05 | 0.00E+00 | 0.00E+00 |
| Ce-144 | 5.82E-05 | 2.84E+02 | 2.44E-03 | 3.00E-06 | 1.89E-28 | 6.31E-23 |
| Pr-144 | 5.82E-05 | 1.20E-02 | 5.78E+01 | 6.00E-04 | 0.00E+00 | 0.00E+00 |

¹ Values from Table 2.4.13-1

² Values from NUREG/CR-5512, Table E.1 (**Kennedy and Streng 1992**); U. S. Department of Health Radiological Health Handbook (**USDOH 1970**) for Sr-92, Rh-106, and Ba-137m

³ Values calculated from Equation 2.4.13-4

⁴ Values from 10 CFR Part 20, Appendix B, Table 2, Column 2

⁵ Values calculated from Equation 2.4.13-5

⁶ MPC is not available.

Table 2.4.13-3 Results of K_d Analysis

| Soil Sample | K_d Value (mL/g) | | |
|---------------|--------------------|------|--------|
| | Co | Sr | Cs |
| A-10(a) | 8.1 | 13.2 | 56.2 |
| C-7 | 3.9 | 9.0 | 14.8 |
| D-10 | 1.7 | 7.8 | 9.9 |
| E-7 | 10.1 | 25.7 | 19.9 |
| E-12 | 15.3 | 51.7 | 10.7 |
| G-9 | 7.9 | 9.8 | > 25.5 |
| J-11 | 13.5 | 9.2 | > 47.4 |
| K-10 | 15.2 | 10.0 | 19.3 |
| L-7 | 1.7 | 11.4 | 18.8 |
| M-5 | 7.3 | 9.3 | 16.8 |
| N-3 | 5.8 | 10.7 | 7.8 |
| P-8 | 6.5 | 7.0 | 5.3 |
| Q-7 | 3.2 | 9.3 | 14.6 |
| H-6 | 1.4 | 6.0 | 3.5 |
| S-9 | 3.0 | 8.6 | 19.3 |
| R-8 | 2.1 | 10.5 | 13.5 |
| B-1003V-55-65 | 10.9 | 17.4 | > 30.1 |
| B-1003V-65-75 | 3.9 | 15.0 | 22.7 |
| B-1003V-75-82 | 21.3 | 14.4 | 33.2 |

Source: Kaplan 2006

Table 2.4.13-4 Results of Transport Analysis Considering Radioactive Decay and Adsorption

| Radionuclide | Effluent Holdup Tank Conc. ¹ ($\mu\text{Ci}/\text{cm}^3$) | Distribution Coefficient (cm^3/g) | Retardation Factor ² | Groundwater Concentration ³ ($\mu\text{Ci}/\text{cm}^3$) | Groundwater Concentration/ MPC |
|--------------|---|--|---------------------------------|--|-----------------------------------|
| H-3 | 1.01E+00 | 0.0 | 1.0 | 3.35E-02 | 3.35E+01 |
| Co-60 | 2.22E-04 | 3.9 | 16.6 | 1.28E-61 | 4.28E-56 |
| Sr-90 | 2.38E-05 | 14.4 | 58.5 | 3.90E-42 | 7.80E-36 |
| I-129 | 7.27E-09 | 0.00 | 1.0 | 7.27E-09 | 3.63E-02 |
| Cs-137 | 2.42E-01 | 22.7 | 91.6 | 7.14E-57 | 7.14E-51 |

¹ Values from Table 2.4.13-1

² Values calculated from Equation 2.4.13-2

³ Values calculated from Equation 2.4.13-5

Table 2.4.13-5 Compliance with 10 CFR Part 20

| Radionuclide | Concentration / MPC | Radionuclide | Concentration / MPC |
|--------------|---------------------|--------------|---------------------|
| H-3 | 9.39E-03 | Rh-106 | 0.00E+00 |
| Cr-51 | 4.05E-241 | Ag-110m | 6.73E-26 |
| Mn-54 | 1.10E-20 | Te-127m | 2.60E-60 |
| Mn-56 | 0.00E+00 | Te-129m | 5.37E-197 |
| Fe-55 | 8.67E-07 | Te-129 | 0.00E+00 |
| Fe-59 | 1.66E-149 | Te-131m | 0.00E+00 |
| Co-58 | 5.85E-93 | Te-131 | 0.00E+00 |
| Co-60 | 4.28E-56 | Te-132 | 0.00E+00 |
| Br-83 | 0.00E+00 | Te-134 | 0.00E+00 |
| Br-84 | 0.00E+00 | I-129 | 1.02E-05 |
| Br-85 | 0.00E+00 | I-130 | 0.00E+00 |
| Rb-88 | 0.00E+00 | I-131 | 0.00E+00 |
| Rb-89 | 0.00E+00 | I-132 | 0.00E+00 |
| Sr-89 | 5.44E-131 | I-133 | 0.00E+00 |
| Sr-90 | 7.80E-36 | I-134 | 0.00E+00 |
| Sr-91 | 0.00E+00 | I-135 | 0.00E+00 |
| Sr-92 | 0.00E+00 | Cs-134 | 5.16E-04 |
| Y-90 | 0.00E+00 | Cs-136 | 0.00E+00 |
| Y-91m | 0.00E+00 | Cs-137 | 7.14E-51 |
| Y-91 | 8.01E-114 | Cs-138 | 0.00E+00 |
| Y-92 | 0.00E+00 | Ba-137m | 0.00E+00 |
| Y-93 | 0.00E+00 | Ba-140 | 0.00E+00 |
| Nb-95 | 8.15E-190 | La-140 | 0.00E+00 |
| Zr-95 | 2.31E-104 | Ce-141 | 1.47E-205 |
| Mo-99 | 0.00E+00 | Ce-143 | 0.00E+00 |
| Tc-99m | 0.00E+00 | Pr-143 | 0.00E+00 |
| Ru-103 | 4.20E-170 | Ce-144 | 6.31E-23 |
| Rh-103m | 0.00E+00 | Pr-144 | 0.00E+00 |

Sum of Ratios = 0.010

Note: Ratios for H-3 and I-129 are from Section 2.4.13.1.4. Ratios for Co-60, Sr-90, and Cs-137 are from Table 2.4.13-4. Ratios for the remaining radionuclides are from Table 2.4.13-2.

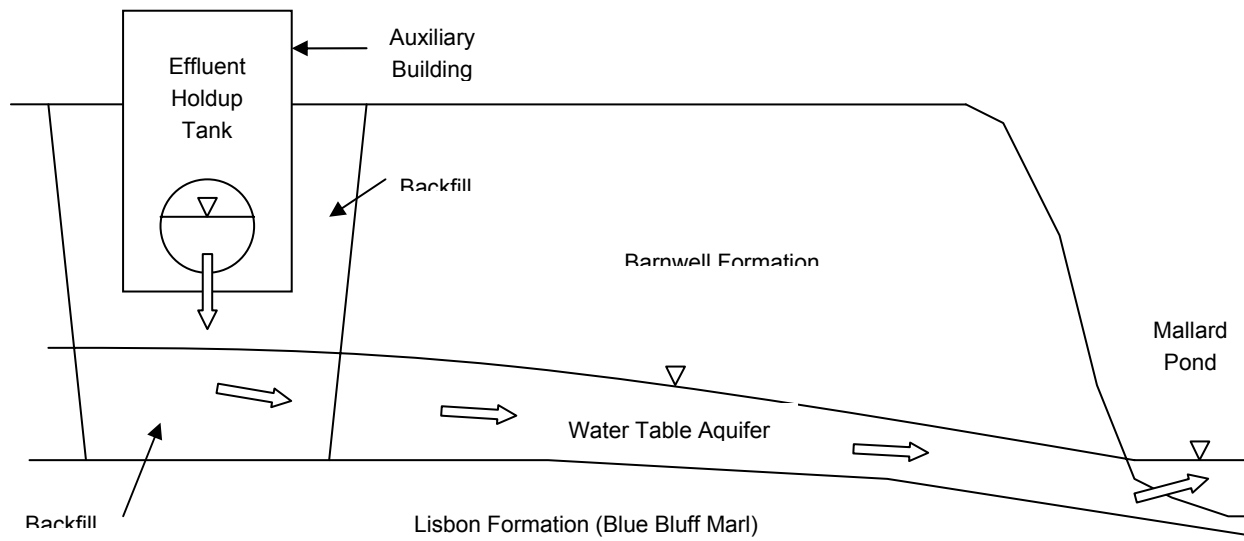


Figure 2.4.13-1 Conceptual Model for Evaluating Radionuclide Transport in Groundwater

Section 2.4.13 References

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Appendix 2.4A—Observation Well Installation and Development Report

(Excludes contents of report Appendix J)

Prepared by
Earth Sciences and Environmental Engineering,
Technical Services,
Southern Company Generation

November 2005

VOGTLE ALWR ESP PROJECT FINAL DATA REPORT ES1374

Prepared By

Earth Science and Environmental Engineering
Technical Services
Southern Company Generation

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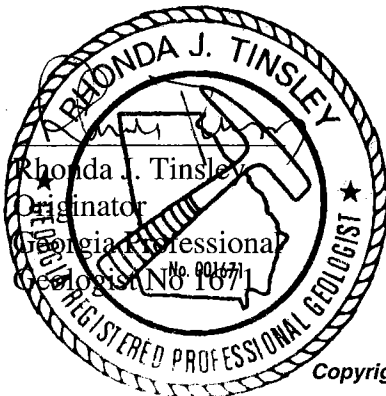
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VOGTLE ALWR ESP PROJECT FINAL DATA REPORT

Prepared By

Earth Science and Environmental Engineering
Technical Services
Southern Company Generation

November 2005



A handwritten signature in cursive script that reads "Steven C. Bearce".

Steven C. Bearce
Reviewer
Georgia Professional
Geologist No. 1268

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1.0 INTRODUCTION

This report presents the information specified in the Bechtel Corporation (Bechtel) document titled *Technical Specification for Groundwater Well Installation for Southern ALWR ESP Project, Burke County, Georgia* (Bechtel Specification Number 25144-002-3PS-CY00-00002-000). This work occurred from May 24 through June 17, 2005. Southern Company Generation provided field supervision, technical consultation, and drilling subcontractors under the technical direction of Bechtel and SNC ESP Project.

Daily and weekly logs were developed during the project. These are respectively included in Appendices A and B.

2.0 SURVEYING SERVICES

The final well survey was provided by Georgia Power Land Engineering Group, Atlanta, Georgia, following the completion of the well installation program. A new survey was also performed for the existing wells to be used in the project. Qualified land surveyors performed the survey and met all survey requirements of the State of Georgia.

The horizontal survey was based on the plant grid system and converted to the State of Georgia coordinate system of northing and easting. The survey originated at a benchmark established for Plant Vogtle. Ground surface elevations were based on the 1927 National Geodetic Vertical Datum (NGVD). The horizontal survey meets the third-order accuracy (1:5000) and the elevation survey is accurate to at least the nearest one-tenth of a foot. This survey data is included in Appendix C.

The locations of the boreholes were determined by SCS and Bechtel using a hand held GPS unit. The proposed well layout coordinates are from existing distribution system layout drawings provided by Georgia Power.

3.0 UNDERGROUND UTILITY DETECTION

A survey to locate underground utilities was completed before the drilling work began at the site. The survey was completed by Mr. John Lattner, Vogtle Engineering, on May 23, 2005. All locations were clear of obstructions with the exception of OW-1009, which was offset to avoid fire protection water and electrical lines.

4.0 DRILLING AND SAMPLING

The drilling program began on May 24, 2005. Drilling was performed by: Kilman Brothers, Stone Mountain, Georgia; Greene's Water Wells, Inc., Gray, Georgia; S&ME, Inc., Blountville, Tennessee; and Prosonic Corporation, New Ellenton, S.C. A list of the equipment used on site during the investigation is included in Appendix D.

Drilling initially used both 3-1/4" ID and 4-1/4" ID hollow-stem augers (HSA) using Central Mine Equipment (CME) drill rigs. After discovering the 3-1/4" HSAs were too small to adequately set a well, all shallow aquifer wells were drilled, sampled, and set using 4-1/4" ID HSAs. In addition to conventional drilling procedures, rotosonic drilling was provided by Prosonic. This drilling technique uses high-frequency resonant energy. This resonant energy is transferred down the drill string at various sonic frequencies to provide a continuous relatively undisturbed core sample. SCG recommended this method due to the depths necessary for deep well installation, difficult drilling conditions for the conventional equipment as well as its increased speed of drilling.

Soil samples were collected through the hollow stem augers at 5 foot intervals using standard 2' split-spoon samplers, driven 18" by a standard 140 pound hammer or approved automatic hammer. Samples were logged on the site and representative portions were placed in 8-ounce glass sample jars labeled with the sample number, boring number, date, depth, and standard penetration test (SPT) data, including *n* the number of blows over a one-foot sample interval. Bag sampling of representative portions of the continuous 4" rotosonic core samples proceeded at the same 5-foot intervals as the spoon samples. The rotosonic, grab-sample intervals are correlative to the SPT sample intervals. The rotosonic samples were double-bagged and labeled with the same information as the SPT samples, except for *n*.

The complete soil boring logs are included in Appendix E. Due to the initial use of incorrect auger size (3-1/4" ID HSA) for some of the initial wells, some holes were cement-bentonite grout abandoned and new holes were drilled, generally adjacent to the original borehole. The abandoned holes are labeled as 'A' (for example, OW-1002A). The borehole abandonment forms and well construction details are included in Appendix F.

A brief description of the drilling and sampling for each location follows.

OW-1001A

Boring OW-1001A was started and completed on May 25, 2005. The borehole was drilled to a depth of 100' with 3-1/4" ID HSAs by Greene's. It was determined that the auger size was incorrect for the installation of the pre-pack well screen. No boring log was created for this hole since OW-1002A, located adjacent to the hole, was logged from the surface to 108.5 feet below ground surface. The hole was abandoned and grouted by S&ME on June 5, 2005.

OW-1001

Shallow well OW-1001 is installed approximately 10 feet from boring OW-1001A. Drilling on this hole continued from May 24 to May 29, 2005. No log was created for the upper portion of this hole since the adjacent boring OW-1002 was logged from the surface down. This boring was completed by Greene's to a depth of 140 feet and logged by an SCS geologist from split-spoon samples. Shallow well OW-1001 is installed in this boring.

OW-1002A

Boring OW-1002A was drilled on May 24 and 25, 2005. The borehole was drilled to a depth of 108.5' with 3-1/4" ID HSAs by Greene's. The hole was logged by an SCS geologist from split-spoon samples. It was determined that the auger size was incorrect for the installation of the pre-pack well screen. The hole was abandoned and grouted by S&ME on June 5, 2005.

OW-1002

Boring OW-1002 was started on June 2 and completed on June 6, 2005 by Prosonic. The borehole was drilled to a depth of 237 feet. The hole was logged by an SCS geologist from continuous 4" samples. Deep well OW-1002 is installed in this boring.

OW-1001 and OW-1002 are a well pair.

OW-1003A

Boring OW-1003A was started and completed on May 24, 2005. The borehole was drilled to a depth of 88.5 feet with 3-1/4" ID HSAs by S&ME, Inc. The hole was logged by an SCS geologist from split-spoon samples. It was determined that the auger size was incorrect for the installation of the pre-pack well screen. The hole was abandoned and grouted by S&ME on June 5, 2005.

OW-1003

Boring OW-1003 was started and completed on May 25, 2005. This boring was drilled approximately ten feet south of OW-1003A with 4-1/4" ID HSAs by S&ME. No log was prepared for this hole due to the proximity of OW-1003A. The hole was drilled down to 90.5' with no sampling and shallow observation well OW-1003 was installed.

OW-1004

Boring OW-1004 was started on June 3 and completed on June 11, 2005. The boring was drilled to a depth of 187 feet by Prosonic and logged by an SCS geologist from continuous 4" ID samples. Sampling in this boring began at 87' since OW-1003, the adjacent shallow well, was sampled to 88.5' feet. Prosonic had to shut down from June 4 to June 8 for training. Deep observation well OW-1004 was installed.

OW-1003 and OW-1004 are a well pair.

OW-1005A

Boring OW-1005A was started and completed on May 31, 2005. The auger boring was drilled to depth of 75 feet with 3-1/4" ID HSAs by Kilman. It was determined that the auger size was incorrect for the installation of the pre-pack well screen. This well was abandoned and grouted by S&ME on June 5, 2005. The hole was logged by an SCS geologist from samples collected in jars at the time of boring.

OW-1005

Boring OW-1005 was started on June 2 and completed on June 7, 2005. Due to the incorrect size of the augers used at OW-1005A, this new hole was offset approximately 10' from that boring. The boring was drilled to 170' with 4-1/4" ID HSAs by S&ME. No sampling was performed in the upper portion of the hole due to the proximity of OW-1005A. The hole was logged by an SCS geologist from split spoon samples from 68.5 feet to 170.0 below ground surface. OW-1005 is installed in this boring.

OW-1006A

Boring OW-1006A was started on June 3 and completed on June 4, 2005. This boring was drilled to 125' by S&ME with 4-1/4" ID HSAs. The hole was logged by an SCS geologist from split-spoon samples. This boring was abandoned due to a shortage of augers. Additional augers necessary to reach the marl unit could not be brought onsite quickly and the potential for HAS deviation in the existing hole warranted a decision to start in a new hole when sufficient augers were available. The hole was abandoned and grouted by S&ME on June 5, 2005.

OW-1006

Boring OW-1006 was started on June 9 and completed on June 14, 2005, by S&ME. No sampling was performed in the upper 118.5' feet due to the proximity of boring OW-1006A which was taken to 125'. No standard penetration tests were obtained from this hole due to drilling problems. The split-spoon sampler was pushed to collect samples. Shallow well OW-1006 is installed in this boring.

OW-1007

Boring OW-1007 was started on June 4 and completed on June 8, 2005. The boring was drilled to 122 feet by Greene's with 4-1/4" ID HSAs. No sampling was performed in the upper 98.5' due to the proximity of boring OW-1008 which was logged down to 105' by an SCS geologist from split-spoon samples. Shallow well OW-1007 is installed in this boring.

OW-1008

Boring OW-1008 was started on May 31 and completed on June 1, 2005. The upper portion of the hole was drilled by Kilman with 3-1/4" ID HSAs to 105 feet and logged by an SCS geologist from split-spoon samples. The remainder of the hole was drilled by PROSONIC to a depth of 247 feet. The lower portion of the hole was logged from continuous 4" ID samples. Deep well OW-1008 was installed in this boring.

OW-1007 and OW-1008 are a well pair.

OW-1009

Boring OW-1009 was started on May 24 and completed on May 25, 2005. The boring was drilled by S&ME with 4-1/4" ID HSAs to 100' and logged by an SCS geologist from split-spoon samples. Shallow well OW-1009 is installed in this hole.

OW-1010

Boring OW-1010 was started and completed on June 1, 2005. The boring was drilled by S&ME with 4-1/4" ID HSAs to 93.5 feet and logged by an SCS geologist from split-spoon samples taken to 95 feet. Shallow well OW-1010 is installed in this hole.

OW-1011

Boring OW-1011 was started on June 11 and completed on June 12, 2005. The boring was drilled by Prosonic to a depth of 217 feet and logged by an SCS geologist from continuous 4" ID samples taken from 87 feet to the bottom of the hole. Sampling of the upper 87 feet was not performed in this hole due to the proximity of OW-1012, which was sampled and logged from the surface to 93.6 feet. Deep well OW-1011 is installed in this boring.

OW-1012

Boring OW-1012 was started on May 31 and completed on June 1, 2005. The boring was drilled by S&ME with 4-1/4" ID HSAs to 93.6 feet and logged by an SCS geologist from split-spoon samples taken to 95 feet. Shallow well OW-1012 is installed in this hole.

OW-1011 and OW-1012 are a well pair.

OW-1013

Boring OW-1013 was started on June 9 and completed on June 10, 2005. The boring was drilled by S&ME with 4-1/4" ID HSAs to 103.5 feet and logged by an SCS geologist from split-spoon samples taken to 105 feet. Shallow well OW-10013 is installed in this hole.

OW-1014

Boring OW-1014 was started and finished June 11, 2005. The boring was drilled to a depth of 197.4 feet by Prosonic and logged by an SCS geologist from continuous 4" samples. Sampling in this boring began at 97 feet since OW-1015, the adjacent shallow well, was logged to 88.5 feet. Deep observation well OW-1014 was installed in this boring.

OW-1015

Boring OW-1015 was started May 30 and completed June 3, 2005. The boring was drilled to 120 feet by Greene's with 4-1/4" ID HSAs. The boring was logged by an SCS geologist from split-spoon samples. Shallow observation well OW-1015 was installed in this boring.

OW-1014 and OW-1015 are a well pair.

5.0 GROUNDWATER OBSERVATION WELLS

Fifteen wells were installed at the site between the dates of May 26 and June 15, 2005. Twenty-two observation wells were previously installed. Details of the new wells are provided in Appendix F. Table 5-1 summarizes this data.

Table 5-1 Observation well construction details

| Well ID | Date Installed | Ground Elev. | Top of Casing Elev. | Well Dia. (in) | Screen Slot Size (in) | Total Well Depth (ft) | Screen Length (ft) | Screened Interval, Depth (ft) | Screened Interval, El. (ft) | Unit |
|---------|----------------|--------------|---------------------|----------------|-----------------------|-----------------------|--------------------|-------------------------------|-----------------------------|---------|
| OW-1001 | 5/29/05 | 230.854 | 233.494 | 2 | 0.01 | 133 | 10 | 121 - 130 | 109.724 - 100.224 | shallow |
| OW-1002 | 6/6/05 | 227.442 | 230.502 | 2 | 0.01 | 237 | 10 | 219 - 229 | 7.812 - (-)2.188 | deep |
| OW-1003 | 5/26/05 | 223.044 | 226.284 | 2 | 0.01 | 90.5 | 10 | 75.5 - 84.8 | 146.914 - 137.614 | shallow |
| OW-1004 | 6/10/05 | 222.92 | 225.671 | 2 | 0.01 | 187 | 10 | 153.25 - 163.26 | 69.04 - 59.04 | deep |
| OW-1005 | 6/7/05 | 264.389 | 267.289 | 2 | 0.01 | 176.8 | 10 | 157.3 - 167.3 | 106.459 - 96.459 | shallow |
| OW-1006 | 6/14-15/05 | 223.044 | 226.284 | 2 | 0.01 | 135.5 | 10 | 116 - 126 | 110.491 - 100.491 | shallow |
| OW-1007 | 6/7/05 | 216.91 | 219.96 | 2 | 0.01 | 120 | 10 | 102 - 111.5 | 114.28 - 104.28 | shallow |
| OW-1008 | 6/1/05 | 216.65 | 219.71 | 2 | 0.01 | 247 | 10 | 230 - 240 | (-)13.98 - (-)23.98 | deep |
| OW-1009 | 5/27/05 | 220.887 | 223.647 | 2 | 0.01 | 97.9 | 10 | 84 - 94 | 136.257 - 126.257 | shallow |
| OW-1010 | 6/1/05 | 216.895 | 219.905 | 2 | 0.01 | 94.8 | 10 | 73.3 - 83.3 | 142.965 - 132.965 | shallow |
| OW-1011 | 6/13/05 | 205.785 | 209.043 | 2 | 0.01 | 217.6 | 10 | 200.6 - 210.6 | 4.555 - (-)5.445 | deep |
| OW-1012 | 6/1/05 | 205.355 | 208.684 | 2 | 0.01 | 93.5 | 10 | 74.0 - 83.4 | 130.725 - 121.325 | shallow |
| OW-1013 | 6/10/05 | 216.869 | 219.809 | 2 | 0.01 | 103.5 | 10 | 83.5 - 93.5 | 132.775 - 122.775 | shallow |
| OW-1014 | 6/11/05 | 220.867 | 223.856 | 2 | 0.01 | 197 | 10 | 182 - 192 | 38.237 - 28.237 | deep |
| OW-1015 | 6/3/05 | 220.427 | 223.157 | 2 | 0.01 | 120 | 10 | 93 - 103 | 126.797 - 116.797 | shallow |

All new wells and the inactive wells were developed by S&ME, Inc. Well development forms are included in Appendix G. The existing wells were also inspected by SCS and Bechtel. Well inspection forms are included in Appendix H. Water level measurements are being performed by the Plant under its existing Quality Assurance Program.

6.0 SAMPLE STORAGE

Soil samples collected from split-spoon and continuous sampling are stored onsite. Glass sample jars were used for split-spoon samples and zip-lock bags were labeled and double-bagged for the continuous 4" samples from the Prosonic rig. All samples, with the exception of those sent to the laboratory for analysis, are stored in a secure building within the plant site.

7.0 LABORATORY TESTING

Soil testing for selected samples was assigned by Bechtel. The samples were collected and delivered to the Southern Company Generation Construction Field Services soil laboratory in Alabaster, Alabama. Soil classification tests with hydrometer were performed. The laboratory results are presented in Appendix I.

8.0 SITE CLEAN UP

Site clean up to the plant's satisfaction was performed by the drillers.

9.0 SITE PHOTOGRAPHY

Digital photography of the site investigation is included as a courtesy, although the specifications did not require this work. The photographs (Appendix J) of the site investigation include selected soil samples, equipment, and site conditions.

APPENDIX A

DAILY FIELD LOGS

Daily Field Log

| | |
|-----------|--|
| 5/24/2005 | <ul style="list-style-type: none"> Started OW-1002A (Greene). Started OW-1009 (S&ME) Started OW-1003. Drilled to 88.5' with 3-1/4" ID HSAs. |
| 5/25/2005 | <ul style="list-style-type: none"> Completed OW-1002A. This hole was abandoned due to incorrect auger size. Drilled to 100' at OW-1001A. Abandoned this hole due to incorrect auger size. Continuing at OW-1003 with 4/14" ID HSAs to bottom of yesterday's 3-1/4" ID HSA borehole. Restarted sampling at ~75'. Completed OW-1003. Well at OW-1003 offset 10' due to 10' of cave-in in boring. Drilled down without sampling. OW-1003 well installation notes attempting to set pre-pack in open hole S&ME development crew standing by for direction. Kilman crew dropped supplies by OW-1003, OW-1002 and then heading to OW-1008. Had to standby till ~2 o'clock while well was relocated due to accessibility. Kilman did not bring enough HSA and rod to complete holes Greene sampled OW-1002A to 115'. Offset and drilled OW-1001A since no well materials were available to set well at the time. Wrong size augers were used. Had to pull out and re-drill with correct 4-1/4" ID HSAs. Greene not able to grout up hole since they did not have necessary equipment Continue sampling on OW-1009 (S&ME). Equipment breakdown in coquina. |
| 5/26/2005 | <ul style="list-style-type: none"> Started OW-1001 (Greene). Thin bed of hard crystalline limestone at 100' and again at 110'. Completed OW-1003 (S&ME) Development team completes 803A and 809 |
| 5/27/2005 | <ul style="list-style-type: none"> Completed OW-1009 (S&ME) Development team pump burns out Completed OW-1001 except grout installation |
| 5/28/2005 | OFF |
| 5/29/2005 | <ul style="list-style-type: none"> Greene moves chemical grout pump to OW-1001. No grout delivered so grout taken from OW-1003 (6 bags). 2 additional bags brought in and 1 bag CETCO Super GeL X. Grouted hole up to 70' |
| 5/30/2005 | <ul style="list-style-type: none"> Intermittent rain Started OW-1015 (Greene) |
| 5/31/2005 | <ul style="list-style-type: none"> Kilman at OW-1005. Drilled to 78.5' and encountered flowing sand Intermittent rain. Hard rain set in by 3:00 Sand up in augers at OW-1015. Continuing on this hole Prosonic onsite. Tom Moorer walked them through security. Brought only 150' drilling capability but sent helper to get additional tooling to reach 300'. Discussed vibrations from Prosonic rig on plant equipment with Don Moore.. He did not see need for additional calcs to proceed Green successfully cleans auger and took 98.5 to 100' sample. Discuss number swap on well labeling with Louise Headland Started lower portion OW-1008 (Prosonic) Started OW-1012 (S&ME) Showed location for OW-1006 to Kilman. They request road improvement |
| 5/31/2005 | |
| 6/1/2005 | <ul style="list-style-type: none"> Started OW-1002B (Prosonic) |

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| | <ul style="list-style-type: none"> S&ME drilling OW-1012. Well completed S&ME drilling OW-1010. Development completed on 804, 805A, 853, 854, 856 |
| 6/2/2005 | <ul style="list-style-type: none"> Prosonic continues with OW-1002 Completion of OW-1010. Well is accidentally lifted during grouting but returned to planned depth. Bechtel approves well as is. S&ME moves to OW-1005. Kilman drilled original OW-1005 but pulled out. Well abandoned by S&ME. Cable broke and grazed S&ME Ted's shoulder. Ted declined emergency room visit S&ME second rig moves to OW-1006 Development completed on 27, 850A 852, 855 |
| 6/3/2005 | <ul style="list-style-type: none"> OW-1002B completed (Prosonic) Started OW-1004 (Prosonic) OW-1005B and OW-1006A started by S&ME rigs. Out of auger on OW-1005 at ~3 pm. OW-1015 completed (Greene) Development completed on OW-1003, OW-1009, OW-1010, OW-1012, OW-1015 |
| 6/4/2005 | <ul style="list-style-type: none"> Greene encounters difficult drilling at 105'. Had to retool for mud to stabilize borehole and clean flowing sand from HAS Surface completion by S&ME at OW-1002' Prosonic leaves site for training OW-1015 surface completion by S&ME Started OW-1007 (Greene) |
| 6/5/2005 | <ul style="list-style-type: none"> OW-1001A abandoned by S&ME OW-1001 and OW-1006 surface completion by S&ME OW-1002A abandoned by S&ME OW-1003A abandoned by S&ME OW-1005A abandoned by S&ME OW-1006A abandoned by S&ME |
| 6/6/2005 | <ul style="list-style-type: none"> Started 1007 (Greene) Development completed for OW-1001 GPS locations taken for new wells Drillers report using 32 bags of grout in OW-1001 on top of 70 feet of grout already in hole. This shrank to about 20' bgs and additional 10 bags were used to top it off. S&ME used a total of 120 bags to abandon OW-1001A, OW-1002A, and top off OW-1001 and OW-1002 |
| 6/7/2005 | <ul style="list-style-type: none"> OW-1005 completed (S&ME) OW-1007 completed (Greene) Conversation with Bechtel to confirm using Schedule 80 PVC in holes over 100', due to inability to insert well pumps. Southern Co expresses concerns about representativeness of water table conditions at OW-1001 and multiple saturated zones in OW-1005 and OW-1006. Attempted to rig a 'stand off' on water level meter to aid in getting reliable water level measurement down PVC. Capillary attraction making reading difficult in 1008 and other deep wells. 'Stand-off' initially worked but then held water, which continuously trickled over GeoSlope probe thus negating its usefulness. Bechtel calls to say OW-1001 appears to be OK because of recovery and another well and boring are not required there |
| 6/8/2005 | <ul style="list-style-type: none"> OW-1006 assigned to Greene OW-013 assigned to S&ME |
| 6/9/2005 | <ul style="list-style-type: none"> OW-1006 started (Greene) Started OW-1013 (S&ME) |
| 6/10/2005 | <ul style="list-style-type: none"> OW-1006 continues |

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| | <ul style="list-style-type: none"> OW-1013 completed (S&ME) |
| 6/11/2005 | <ul style="list-style-type: none"> OW-1014 started and completed (Prosonic) OW-1011 started (Prosonic) |
| 6/12/2005 | <ul style="list-style-type: none"> OW-1011 completed (Prosonic) |
| 6/13/2005 | <ul style="list-style-type: none"> OW-1004 surface completion (S&ME development team) OW-1011 surface completion (S&ME development team) OW-1014 surface completion (S&ME development team) OW-1006 continues |
| 6/14/2005 | <ul style="list-style-type: none"> Development completed on OW-1002, OW-1004, OW-1007, OW-1008, OW-1011, OW-1014 OW-1006 completed |
| 6/15/2005 | <ul style="list-style-type: none"> Development completed on 142, 179, 27, OW-1005, OW-1013 |
| 6/16/2005 | <ul style="list-style-type: none"> OW-1006 surface completion and development (S&ME development team) Inspected wells LT-1B, LT-12, and LT-7A. Made note of depth to water and bottom of wells. No redevelopment recommended |

APPENDIX B

WEEKLY FIELD LOG

Vogtle ALWR ESP Project
Weekly Field Log

| Well | Purpose | Status | Driller | Tuesday 24-May-05 | Wednesday 25-May-05 | Thursday 26-May-05 | Friday 27-May-05 | Saturday 28-May-05 | Sunday 29-May-05 | Monday 30-May-05 | Tuesday 31-May-05 | Wednesday 1-Jun-05 | Thursday 2-Jun-05 | Friday 3-Jun-05 | Saturday 4-Jun-05 | Sunday 5-Jun-05 | Monday 6-Jun-05 | Tuesday 7-Jun-05 | Wednesday 8-Jun-05 | Thursday 9-Jun-05 | Friday 10-Jun-05 | Saturday 11-Jun-05 | Sunday 12-Jun-05 | Monday 13-Jun-05 | Tuesday 14-Jun-05 | Wednesday 15-Jun-05 | Thursday 16-Jun-05 |
|------------------|---------|-----------|------------------|----------------------|------------------------|-----------------------|----------------------------|-----------------------|---------------------|---------------------|---|------------------------------------|---|---|-------------------------------------|-------------------------------------|--------------------|---|-----------------------|----------------------------|---------------------|-----------------------|---|--|--|------------------------|-----------------------|
| OW-1001 | Shallow | Completed | Greene | | | | | | | | | | | | | | | | | | | | | | | | |
| OW-1001A | Shallow | Abandoned | Kilman | | | | | | | | | | | | | Abandoned by S&ME | | | | | | | | | | | |
| OW-1002A | Shallow | Abandoned | Greene | | | | | | | | | | | | | Abandoned by S&ME | | | | | | | | | | | |
| OW-1002 | Deep | Completed | Prosonic | | | | | | | | | | | | | | | | | | | | | | | | |
| OW-1003A | Shallow | Abandoned | S&ME Tim | | | | | | | | | | | | | Abandoned by S&ME | | | | | | | | | | | |
| OW-1003 | Shallow | Completed | S&ME Tim | | | | | | | | | | | | | | | | | | | | | | | | |
| OW-1004 | Deep | Started | Prosonic | | | | | | | | | | | | | | | | | | | | | | | | |
| OW-1005A | Shallow | Abandoned | Kilman | | | | | | | | | | | | | Abandoned by S&ME | | | | | | | | | | | |
| OW-1005 | Shallow | Completed | S&ME Ted | | | | | | | | | | | | | | | | | | | | | | | | |
| OW-1006A | Shallow | Abandoned | S&ME Tim | | | | | | | | | | | | | Abandoned by S&ME | | | | | | | | | | | |
| OW-1006 | Shallow | Located | Greene | | | | | | | | | | | | | | | | | | | | | | | | |
| OW-1007 | Shallow | Completed | Greene | | | | | | | | | | | | | | | | | | | | | | | | |
| OW-1008 | Deep | Completed | Kilman/Prosonic* | | | | | | | | | | | | | | | | | | | | | | | | |
| OW-1009 | Shallow | Completed | S&ME Ted | | | | | | | | | | | | | | | | | | | | | | | | |
| OW-1010 | Shallow | Completed | S&ME Tim | | | | | | | | | | | | | | | | | | | | | | | | |
| OW-1011 | Deep | Completed | Prosonic | | | | | | | | | | | | | | | | | | | | | | | | |
| OW-1012 | Shallow | Completed | S&ME Ted | | | | | | | | | | | | | | | | | | | | | | | | |
| OW-1013 | Shallow | Completed | S&ME Ted | | | | | | | | | | | | | | | | | | | | | | | | |
| OW-1014 | Deep | Completed | Prosonic | | | | | | | | | | | | | | | | | | | | | | | | |
| OW-1015 | Shallow | Completed | Greene | | | | | | | | | | | | | | | | | | | | | | | | |
| Development Team | | | | | | Developed 803a, 809 | Surface Completion OW-1009 | | | | Helped gather supplies and assembled new pump | Developed 804, 805a, 853, 854, 856 | Developed 850a, 852, 855 Surface Completion OW-1010 | Surface completion OW-1003 Developed OW-1003, OW-1009, OW-1010, OW-1012, OW-1015 | Surface completions OW-1002 OW-1015 | Surface completions OW-1001 OW-1006 | | Surface completions OW-1005, OW-1007, OW-1012 | | Surface completion OW-1013 | | | Developed and surface completion OW-1002, OW-1004, OW-1007, OW-1008, OW-1011, OW-1014 | Developed 142, 179, 27, OW-1005, OW-1013 | Surface Completion and development OW-1006 | | |

* Kilman 5/25 - 26. Prosonic 5/31-6/1

Drilling/well installation period - start to finish

Time offsite, no drilling (Holiday, training, week-end)

APPENDIX C

SURVEY DATA

**EXISTING WELL SURVEY
NEW WELL SURVEY**

Vogtle Existing Well Survey (NAD27)

| Well | Northing | Easting | El. Ground (ft.) | El. Top of Casing (TOC ft.) |
|-------|-------------|------------|------------------|--------------------------------|
| | (NAD27) | (NAD27) | | |
| 142 | 1143282.409 | 622260.403 | 222.377 | 223.797 |
| 179 | 1144061.205 | 621778.747 | 274.668 | 275.068 |
| 802A | 1142201.703 | 624195 | 215.558 | 218.258 |
| 803A | 1142085.387 | 622896.031 | 218.394 | 219.574 |
| 804 | 1141599.597 | 622224.797 | 223.603 | 225.373 |
| 805A | 1141616.153 | 624395.699 | 233.988 | 235.76 |
| 806B | 1143821.568 | 623724.453 | 214.314 | 215.414 |
| 808 | 1144624.291 | 623297.746 | 214.871 | 215.771 |
| 809 | 1143320.36 | 621857.189 | NA | 223.671 |
| LT-1B | 1143390.484 | 623301.286 | 218.053 | 220.654 |
| LT-7A | 1143154.107 | 623314.265 | 217.813 | 218.563 |
| LT-12 | 1142776.798 | 623597.644 | 218.274 | 219.024 |
| LT-13 | 1143136.424 | 624108.674 | 218.273 | 220.073 |
| 27 | 1143622.414 | 627928.859 | 208.836 | 210.406 |
| 29 | 1144982.746 | 626389.789 | 190.83 | 192.61 |
| 850A | 1146728.881 | 624482.466 | 225.225 | 227.025 |
| 851A | 1143869.697 | 621064.25 | 261.685 | 263.325 |
| 852 | 1140993.937 | 627377.483 | 199.408 | 201.308 |
| 853 | 1146016.483 | 623191.496 | 226.599 | 229.969 |
| 854 | 1144900.49 | 621914.54 | 235.584 | 237.324 |
| 855 | 1142159.143 | 627948.361 | 216.767 | 218.668 |
| 856 | 1139928.479 | 626555.6 | 185.495 | 187.107 |

Vogtle New Well Survey (NAD27)

| Location | Northing | Easting | El. Ground (ft.) | El. Top of Casing (TOC ft.) |
|----------|-------------|------------|------------------|--------------------------------|
| 1001 | 1142888.724 | 620148.556 | 230.224 | 232.864 |
| 1002 | 1142887.782 | 620189.341 | 226.812 | 229.872 |
| 1003 | 1142864.056 | 621884.337 | 222.414 | 225.654 |
| 1004 | 1142842.176 | 621880.794 | 222.29 | 225.041 |
| 1005 | 1144047.86 | 620408.765 | 263.759 | 266.659 |
| 1006 | 1143817.854 | 619179.749 | 226.491 | 229.971 |
| 1007 | 1142383.767 | 619301.009 | 216.28 | 219.33 |
| 1008 | 1142347.939 | 619306.686 | 216.02 | 219.08 |
| 1009 | 1141891.645 | 620888.608 | 220.257 | 223.017 |
| 1010 | 1140808.986 | 620051.708 | 216.265 | 219.275 |
| 1011 | 1139956.246 | 621033.045 | 205.155 | 208.413 |
| 1012 | 1139969.496 | 621045.924 | 204.725 | 208.054 |
| 1013 | 1140805.4 | 621715.032 | 216.239 | 219.179 |
| 1014 | 1140565.502 | 623070.234 | 220.237 | 223.226 |
| 1015 | 1140550.576 | 623086.318 | 219.797 | 222.527 |

APPENDIX D

FIELD INSTRUMENTS/EQUIPMENT

Vogtle ALWR ESP Project

| Contractor | Tools/Rig Description |
|-------------------------|--|
| Greene Water Well, Inc. | CME 75 Auger drill with water tank; manual hammer 1-ton crew truck Chevrolet Pickup HD 4-1/4" ID hollow stem auger – 125' 3-1/4" ID hollow stem auger 90' NWJ rod |
| Kilman Brothers | CME 45; 4X4; no water tank, auto hammer 125' of 3 1/4" ID hollow stem auger 110' N rod 2 cutter heads |
| S&ME (2 rigs) | 3 F-Series, 3/4-ton trucks 1 personal vehicle 2 CME 55 Auger/Wash drill rigs with SPT Autohammers Grundfos pump Static water level indicator Generator Steam Junny 2 grout plants with tremie pipe 3-1/4" ID hollow stem augers – 90' 4-1/4" ID hollow stem augers – 180' NWJ rods with 4" fishtail or 6" rollercone – 180' 6 2' split spoons |
| PROSONIC | SR-083 drill rig w/ 6" outer drive casing and 4" sampling tube Two 1-ton crew trucks Onboard grout machine Pressure washer |
| SCS | Provided 60' 4 1/4" ID hollow stem augers |
| | Extra – 1 bundle (19) 5' AWJ rods 9 loose 5' AWJ rods 14 loose 10' NWJ rods Chemical grouting machine |

| Contractor | Well Development Tools |
|------------|---|
| S&ME | Grundfos Rediflo2 submersible pump 200' of hose and power lead 1 Generac 5000 Watt, 10 HP 110/240V AC generator |

| Well Supplies |
|---|
| Schedule 80 PVC slotted screens - 10' length Schedule 80 PVC risers - 10' length |

Vogtle ALWR ESP Project

Schedule 80 PVC riser - 2 1/2' length

Schedule 80 PVC riser - 5' length

Schedule 40 PVC slotted screens - 10' length

Schedule 40 PVC risers - 10' length

Schedule 40 PVC risers - 5' length

Schedule 40 PVC risers - 2 1/2' length

DSI 1A filter sand

JC50FS by Unimen filter sand

Foster Dixiana

CETCO Goldseal 3/8" bentonite chips

CETCO Puregold medium

APPENDIX E

BORING LOGS

OW-1001
OW-1002
OW-1002A
OW-1003
OW-1004
OW-1005
OW-1005A
OW-1006
OW-1006A
OW-1007
OW-1008
OW-1008A
OW-1009
OW-1010
OW-1011
OW-1012
OW-1013
OW-1014
OW-1015

LEGEND

| | |
|-----|--|
| N | Standard Penetration Resistance. The sum of the number of blows from a 140 pound hammer needed to drive the sampler over the sampling depth of 6 to 18 inches. |
| Bpf | Blows per foot. Unit of measure for 'N'. |
| WOR | Split spoon sampler penetrates by weight of the sampling rods alone. |
| WOH | Split spoon sampler penetrates by the weight of 140 pound hammer alone, with no blows from the hammer. |



DRILLING LOG **GEOLOGICAL SERVICES**

Hole No. **OW-1001**
Sheet 1 of 5

| | | | |
|--|----------------------------|-----------------------------------|---------------------------------------|
| SIT: Vogtle ALWR SSAR | | HOLE DEPTH: 140' | SURF. ELEV.: 230.854 |
| LOCATION: Burke County, Georgia | | COORDINATES N: 1142888.724 | E: 620148.556 |
| ANC: NA | BEARING: NA | CONTRACTOR: Greene | DRILL NO.: CME 75 |
| DRILLING METHOD: 4 1/4" HSA | | NO. SAMPLES: 4 | NO. U.D. SAMPLES: NA |
| WATER TABLE DEPT: 108.7' | ELEV.: NA | TIME AFTER COMP.: NA | DATE TAKEN: 5/24/2005 |
| TYPE GROUT: NA | QUANTITY: NA | MIX: NA | DRILLING START DATE: 5/24/2005 |
| DRILLER: Arthur | RECORDER: S. Bearce | APPROVED: NA | DRILLING COMP. DATE: 5/29/2005 |

| Depth | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-------|-----------|--|------------|---------------------------|-------|-------|----------|
| | | | | From To Ft. | Blows | N BPF | |
| 0 | 230.85 | | | | | | |
| 1 | 229.85 | OW-1001 was installed in this borehole. OW-1001 is a well pair with OW-1002 | | | | | |
| 2 | 228.85 | Soil sampling for the upper portion was completed in OW-1002A to the top of the MARL at 105' bgs. Sampling in this hole began at 113.5 feet bgs. (Sheet 4) | | | | | |
| 3 | 227.85 | | | | | | |
| 4 | 226.85 | | | | | | |
| 5 | 227.86 | A previous borehole (OW-1001A) was made for this well but was abandoned. No log was prepared. | | | | | |
| 6 | 224.85 | | | | | | |
| 7 | 223.85 | | | | | | |
| | 222.85 | | | | | | |
| 9 | 221.85 | | | | | | |
| 10 | 222.86 | | | | | | |
| 11 | 219.85 | | | | | | |
| 12 | 218.85 | | | | | | |
| 13 | 217.85 | | | | | | |
| 14 | 216.85 | | | | | | |
| 15 | 217.86 | | | | | | |
| 16 | 214.85 | | | | | | |
| 17 | 213.85 | | | | | | |
| 18 | 212.85 | | | | | | |
| 19 | 211.85 | | | | | | |
| 20 | 210.85 | | | | | | |
| 21 | 209.85 | | | | | | |
| 22 | 208.85 | | | | | | |
| 23 | 207.85 | | | | | | |
| 24 | 206.85 | | | | | | |

Form GS9901 7-26-2001

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. OW-1001

Sheet 2 of 5

SITE **Vogtle ALWR SSAR** TOTAL DEPTH **140'** SURF.ELEV. **230.854**

| Depth | Elev. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-------|--------|--|------------|---------------------------|-------|---|----------|
| | | | | From To | Blows | N | |
| 25 | 205.85 | See Page 1 | | | | | |
| 26 | 204.85 | | | | | | |
| 27 | 203.85 | | | | | | |
| 28 | 202.85 | | | | | | |
| 29 | 201.85 | | | | | | |
| 30 | 200.85 | | | | | | |
| 31 | 199.85 | | | | | | |
| 32 | 198.85 | | | | | | |
| 33 | 197.85 | | | | | | |
| 34 | 196.85 | | | | | | |
| 35 | 195.85 | | | | | | |
| 36 | 194.85 | | | | | | |
| 37 | 193.85 | | | | | | |
| 38 | 192.85 | | | | | | |
| 39 | 191.85 | | | | | | |
| 40 | 190.85 | | | | | | |
| 41 | 189.85 | | | | | | |
| 42 | 188.85 | | | | | | |
| 43 | 187.85 | | | | | | |
| 44 | 186.85 | | | | | | |
| 45 | 185.85 | | | | | | |
| 46 | 184.85 | | | | | | |
| 47 | 183.85 | | | | | | |
| 48 | 182.85 | | | | | | |
| 49 | 181.85 | | | | | | |
| 50 | 180.85 | | | | | | |
| 51 | 179.85 | | | | | | |
| 52 | 178.85 | | | | | | |
| 53 | 177.85 | | | | | | |
| 54 | 178.86 | | | | | | |
| 55 | 175.85 | | | | | | |
| 56 | 174.85 | | | | | | |

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. OW-1001

Sheet 3 of 5

SITE **Vogtle ALWR SSAR** TOTAL DEPTH **140'** ELEV. **230.854**

| Depth | Elev. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-------|--------|--|------------|---------------------------|-------|---|----------|
| | | | | From To | Blows | N | |
| 57 | 173.85 | See Page 1 | | | | | |
| 58 | 172.85 | | | | | | |
| 59 | 171.85 | | | | | | |
| 60 | 170.85 | | | | | | |
| 61 | 169.85 | | | | | | |
| 62 | 168.85 | | | | | | |
| 63 | 167.85 | | | | | | |
| 64 | 166.85 | | | | | | |
| 65 | 165.85 | | | | | | |
| 66 | 164.85 | | | | | | |
| 67 | 163.85 | | | | | | |
| 68 | 162.85 | | | | | | |
| 69 | 161.85 | | | | | | |
| 70 | 160.85 | | | | | | |
| 71 | 159.85 | | | | | | |
| 72 | 158.85 | | | | | | |
| 73 | 157.85 | | | | | | |
| 74 | 156.85 | | | | | | |
| 75 | 155.85 | | | | | | |
| 76 | 154.85 | | | | | | |
| 77 | 153.85 | | | | | | |
| 78 | 152.85 | | | | | | |
| 79 | 151.85 | | | | | | |
| 80 | 150.85 | | | | | | |
| 81 | 149.85 | | | | | | |
| 82 | 148.85 | | | | | | |
| 83 | 147.85 | | | | | | |
| 84 | 146.85 | | | | | | |
| 85 | 145.85 | | | | | | |
| 86 | | | | | | | |
| 87 | 143.85 | | | | | | |
| 88 | 142.85 | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1001

Sheet 4 of 5

SITE **Vogtle ALWR SSAR** TOTAL DEPTH **140'** SURF.ELEV. **230.854**

| Depth FT. | Elev. FT. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|--|------------|---------------------------|-------|-------|---|
| | | | | From To FT. | Blows | N BPF | |
| 89 | 141.85 | | | | | | |
| 90 | 140.85 | | | | | | |
| 91 | 139.85 | | | | | | |
| 92 | 138.85 | | | | | | |
| 93 | 137.85 | | | | | | |
| 94 | 136.85 | | | | | | |
| 95 | 135.85 | | | | | | |
| 96 | 134.85 | | | | | | |
| 97 | 133.85 | | | | | | |
| 98 | 132.85 | | | | | | |
| 99 | 131.85 | | | | | | 5/29/05 ▼ 99' from ground surface |
| 100 | 130.85 | | | | | | Difficult drilling at 100' |
| 101 | 129.85 | | | | | | |
| 102 | 128.85 | | | | | | |
| 103 | 127.85 | | | | | | |
| 104 | 126.85 | | | | | | |
| 105 | 125.85 | | | | | | |
| 106 | 124.85 | | | | | | |
| 107 | 123.85 | | | | | | |
| 108 | 122.85 | | | | | | 5/24/05 ▼ 108.7' from TOC |
| 109 | 121.85 | | | | | | Difficult drilling at 110' |
| 110 | 120.85 | | | | | | |
| 111 | 119.85 | | | | | | |
| 112 | 118.85 | | | | | | |
| 113 | 117.85 | Sampling begins at 113.5' | | | | | |
| 114 | 116.85 | Dark grey LIMESTONE bed, 0.2' thick with black macro fossils, thin laminae (~0.05') of CHALK on bottom | 1 | 113.50-115 | 50/3" | 50/3" | |
| 115 | 115.85 | | | | | | |
| 116 | 114.85 | | | | | | |
| 117 | 113.85 | | | | | | |
| 118 | | Buff sandy COQUINA | 2 | 118.5-120 | 50/2" | 50/2" | |
| 119 | | | | | | | |
| 120 | 110.85 | | | | | | |

| DRILLING LOG GEOLOGICAL SERVICES | | | | | | | Hole No. | OW-1001 |
|-------------------------------------|-----------|--|------------|---------------------------|----------|-------|---|---------|
| SITE Vogtle ALWR SSAR | | | | | | | Sheet 5 of 5 | |
| TOTAL DEPTH 140' | | | | | | | SURF.ELEV. | 230.854 |
| Depth FT. | Elev. FT. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | |
| | | | | From To Ft. | Blows | N BPF | | |
| 121 | 109.85 | Buff sandy COQUINA | | | | | | |
| 122 | 108.85 | | | | | | | |
| 123 | 107.85 | | | | | | | |
| 124 | 106.85 | No recovery, auger used to grind through interval | | 123.5-125 | 50/0" | 50/0" | | |
| 125 | 105.85 | | | | | | | |
| 126 | 104.85 | | | | | | | |
| 127 | 103.85 | | | | | | | |
| 128 | 102.85 | | | | | | | |
| 129 | 101.85 | Dark grey LIMESTONE 2" layer | 3 | 128.5-130 | 50/2" | 50/2" | | |
| 130 | 100.85 | | | | | | | |
| 131 | 99.85 | | | | | | | |
| 132 | 98.85 | | | | | | | |
| 133 | 97.85 | | | | | | | |
| 134 | 96.85 | | 4 | 133.5-135 | 18-19-25 | 44 | | |
| 135 | 95.85 | Approximately 3" of dark greenish grey MARL in spoon | | | | | | |
| 136 | 94.85 | | | | | | | |
| 137 | 93.85 | Greenish gray MARL | | 136.5-138 | 50/2" | 50/2" | | |
| 138 | 92.85 | | | | | | | |
| 139 | 91.85 | | | | | | | |
| 140 | 90.85 | | | 138.5-140 | 50/2" | 50/2" | | |
| 141 | 89.85 | Boring Terminated at 140' | | | | | | |
| 142 | 88.85 | | | | | | 1500 gallons of water lost cleaning bottom of hole. Pumped at 60 gpm. | |
| 143 | 87.85 | | | | | | | |
| 144 | 86.85 | | | | | | | |
| 145 | 85.85 | | | | | | | |
| 146 | 84.85 | | | | | | | |
| 147 | 83.85 | | | | | | | |
| 148 | 82.85 | | | | | | | |
| 149 | 81.85 | | | | | | | |
| 150 | 82.86 | | | | | | | |
| 151 | 79.85 | | | | | | | |
| 152 | 78.85 | | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1002

Sheet 1 of 8

| | | | |
|---------------------------------------|-------------------|-------------------------------------|-------------------------------------|
| SITE Vogtle ALWR SSAR | | HOLE DEPTH 237 | SURF.ELEV. 227.442 |
| LOCATION Burke County, Georgia | | COORDINATES N 1142887.782 | E 620189.341 |
| ANGLE NA | BEARING NA | CONTRACTOR Prosonic | DRILL NO. SR-083 |
| DRILLING METHOD Sonic | | NO. SAMPLES continuous | NO. U.D. SAMPLES NA |
| WATER TABLE DEPTH 93.5' | | ELEV. 133.312' | TIME AFTER COMP. NA |
| TYPE GROUT NA | | QUANTITY NA | MIX NA |
| DRILLER Tony | | RECORDER Steve Bearce | APPROVED NA |
| | | DATE TAKEN 6/6/2005 | DRILLING START DATE 6/2/2005 |
| | | DRILLING COMP. DATE 6/6/2005 | |

| Depth Ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|--|------------|---------------------------|-------|---|----------|
| | | | | From To | Blows | N | |
| 0 | 227.44 | | | | | | |
| 1 | | Sampling not started until 87' below ground surface. Because drill technology changed, the hole had to be offset approximately 20' North of original borehole. | | | | | |
| 2 | 226.44 | | | | | | |
| 3 | 225.44 | Well OW-1002 is installed in this borehole. | | | | | |
| 4 | 224.44 | | | | | | |
| 5 | 223.44 | | | | | | |
| 6 | 222.44 | | | | | | |
| 7 | 221.44 | | | | | | |
| 8 | 220.44 | | | | | | |
| 9 | 219.44 | | | | | | |
| 10 | 218.44 | | | | | | |
| 11 | 217.44 | | | | | | |
| 12 | 216.44 | | | | | | |
| 13 | 215.44 | | | | | | |
| 14 | 214.44 | | | | | | |
| 15 | 213.44 | | | | | | |
| 16 | 212.44 | | | | | | |
| 17 | 211.44 | | | | | | |
| 18 | 210.44 | | | | | | |
| 19 | 209.44 | | | | | | |
| 20 | 208.44 | | | | | | |
| 21 | 207.44 | | | | | | |
| 22 | 206.44 | | | | | | |
| 23 | 205.44 | | | | | | |
| 24 | 204.44 | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1002

Sheet 2 of 8

SITE **Vogle ALWR SSAR** TOTAL DEPTH **237** SURF.ELEV. **227.442**

| Depth | Elev. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | % Rec | RQD |
|-------|--------|--|------------|---------------------------|-------|---|----------|-------|-----|
| | | | | From To | Blows | N | | | |
| 25 | 202.44 | See page 1 | | | | | | | |
| 26 | 201.44 | | | | | | | | |
| 27 | 200.44 | | | | | | | | |
| 28 | 199.44 | | | | | | | | |
| 29 | 198.44 | | | | | | | | |
| 30 | 197.44 | | | | | | | | |
| 31 | 196.44 | | | | | | | | |
| 32 | 195.44 | | | | | | | | |
| 33 | 194.44 | | | | | | | | |
| 34 | 193.44 | | | | | | | | |
| 35 | 192.44 | | | | | | | | |
| 36 | 191.44 | | | | | | | | |
| 37 | 190.44 | | | | | | | | |
| 38 | 189.44 | | | | | | | | |
| 39 | 188.44 | | | | | | | | |
| 40 | 187.44 | | | | | | | | |
| 41 | 186.44 | | | | | | | | |
| 42 | 185.44 | | | | | | | | |
| 43 | 184.44 | | | | | | | | |
| 44 | 183.44 | | | | | | | | |
| 45 | 182.44 | | | | | | | | |
| 46 | 181.44 | | | | | | | | |
| 47 | 180.44 | | | | | | | | |
| 48 | 179.44 | | | | | | | | |
| 49 | 178.44 | | | | | | | | |
| 50 | 177.44 | | | | | | | | |
| 51 | 176.44 | | | | | | | | |
| 52 | 175.44 | | | | | | | | |
| 53 | 174.44 | | | | | | | | |
| 54 | | | | | | | | | |
| 55 | 172.44 | | | | | | | | |
| 56 | 171.44 | | | | | | | | |

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. OW-1002

Sheet 3 of 8

SITE **Vogle ALWR SSAR** TOTAL DEPTH **237** SURF.ELEV. **227.442**

| Depth | Elev. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | % Rec | RQD |
|-------|--------|--|------------|---------------------------|-------|---|----------|-------|-----|
| | | | | From To | Blows | N | | | |
| 57 | 170.44 | See page 1 | | | | | | | |
| 58 | 169.44 | | | | | | | | |
| 59 | 168.44 | | | | | | | | |
| 60 | 167.44 | | | | | | | | |
| 61 | 166.44 | | | | | | | | |
| 62 | 165.44 | | | | | | | | |
| 63 | 164.44 | | | | | | | | |
| 64 | 163.44 | | | | | | | | |
| 65 | 162.44 | | | | | | | | |
| 66 | 161.44 | | | | | | | | |
| 67 | 160.44 | | | | | | | | |
| 68 | 159.44 | | | | | | | | |
| 69 | 158.44 | | | | | | | | |
| 70 | 157.44 | | | | | | | | |
| 71 | 156.44 | | | | | | | | |
| 72 | 155.44 | | | | | | | | |
| 73 | 154.44 | | | | | | | | |
| 74 | 153.44 | | | | | | | | |
| 75 | 152.44 | | | | | | | | |
| 76 | 151.44 | | | | | | | | |
| 77 | 150.44 | | | | | | | | |
| 78 | 149.44 | | | | | | | | |
| 79 | 148.44 | | | | | | | | |
| 80 | 147.44 | | | | | | | | |
| 81 | 146.44 | | | | | | | | |
| 82 | 145.44 | | | | | | | | |
| 83 | 144.44 | | | | | | | | |
| 84 | 143.44 | | | | | | | | |
| 85 | 142.44 | | | | | | | | |
| 86 | 140.81 | | | | | | | | |
| 87 | 140.44 | | | | | | | | |
| 88 | 139.44 | Sampling started with ProSonic drill rig | 240 - 31 | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1002

Sheet 4 of 8

| SITE | | Vogtle ALWR SSAR | | TOTAL DEPTH | | 237 | | SURF.ELEV. | | 227.442 | |
|-----------|-----------|---|------------|---------------------------|-------|-----|----------|------------|--|---------|--|
| Depth Ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | | | | |
| | | | | From To | Blows | N | | | | | |
| | 138.44 | Yellow tan, shelly, sandy CLAY (CH), interbedded w/ occasional fine-grained shelly SAND, (SW) | 1 | | NA | NA | | | | | |
| 89 | | | | 88.5 | | | | | | | |
| | 137.44 | | | - | | | | | | | |
| 90 | | | | 90 | | | | | | | |
| | 136.44 | | | | | | | | | | |
| 91 | | | | | | | | | | | |
| | 135.44 | | | | | | | | | | |
| 92 | | | | | | | | | | | |
| | 134.44 | | | | | | | | | | |
| 93 | | | | | | | | | | | |
| | 133.44 | | | | | | | | | | |
| 94 | | Sharp contact into greenish grey MARL | 2 | 93.5 | | | | | | | |
| | 132.44 | | | - | | | | | | | |
| 95 | | | | 95 | | | | | | | |
| | 131.44 | | | | | | | | | | |
| 96 | | | | | | | | | | | |
| | 130.44 | | | | | | | | | | |
| 97 | | | | | | | | | | | |
| | 129.44 | | | | | | | | | | |
| 98 | | | | | | | | | | | |
| | 128.44 | | | | | | | | | | |
| 99 | | | 3 | 98.5 | NA | NA | | | | | |
| | 127.44 | | | 100 | | | | | | | |
| 100 | | | | | | | | | | | |
| | 126.44 | | | | | | | | | | |
| 101 | | | | | | | | | | | |
| | 125.44 | | | | | | | | | | |
| 102 | | | | | | | | | | | |
| | 124.44 | | | | | | | | | | |
| 103 | | | | | | | | | | | |
| | 123.44 | | | | | | | | | | |
| 104 | | | 4 | 103.5 | NA | NA | | | | | |
| | 122.44 | | | - | | | | | | | |
| 105 | | | | 105 | | | | | | | |
| | 121.44 | | | | | | | | | | |
| 106 | | | | | | | | | | | |
| | 120.44 | | | | | | | | | | |
| 107 | | | | | | | | | | | |
| | 119.44 | | | | | | | | | | |
| 108 | | | | | | | | | | | |
| | 118.44 | | | | | | | | | | |
| 109 | | | 5 | 108. | NS | NS | | | | | |
| | 117.44 | | | - | | | | | | | |
| 110 | | | | 110 | | | | | | | |
| | 116.44 | | | | | | | | | | |
| 111 | | | | | | | | | | | |
| | 115.44 | | | | | | | | | | |
| 112 | | | | | | | | | | | |
| | 113.81 | | | | | | | | | | |
| 113 | | | | | | | | | | | |
| | 113.44 | | | | | | | | | | |
| 114 | | | 6 | 113.5 | NA | NA | | | | | |
| | 112.44 | | | - | | | | | | | |
| 115 | | | | 115 | | | | | | | |
| | 111.44 | | | | | | | | | | |
| 116 | | | | | | | | | | | |
| | 110.44 | | | | | | | | | | |
| 117 | | | | | | | | | | | |
| | 108.81 | | | | | | | | | | |
| 118 | | | | | | | | | | | |
| | 108.44 | | | | | | | | | | |
| 119 | | | 7 | 118.5 | NA | NA | | | | | |
| | 107.44 | | | - | | | | | | | |
| 120 | | | | 120 | | | | | | | |

| DRILLING LOG GEOLOGICAL SERVICES | | | | | | | Hole No. | OW-1002 | |
|-------------------------------------|-----------|--|-----------------|---------------------------|-------------|-----|------------|---------|-----|
| | | | | | | | Sheet 5 of | 8 | |
| SITE | | | Vogle ALWR SSAR | | TOTAL DEPTH | 237 | SURF.ELEV. | 227.442 | |
| Depth Ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | % Rec | RQD |
| | | | | From To | Blows | N | | | |
| 121 | 106.44 | Greenish grey MARL | 8 | 123.5 - 125 | NA | NA | | | |
| 122 | 105.44 | | | | | | | | |
| 123 | 104.44 | | | | | | | | |
| 124 | 103.44 | | | | | | | | |
| 125 | 102.44 | | | | | | | | |
| 126 | 101.44 | | | | | | | | |
| 127 | 100.44 | | | | | | | | |
| 128 | 99.44 | | | | | | | | |
| 129 | 98.44 | Thin bedded, light grey, "soft" or "friable" LIMESTONE occurs in this interval | 9 | 128.5 - 130 | NA | NA | | | |
| 130 | 97.44 | | | | | | | | |
| 131 | 96.44 | | | | | | | | |
| 132 | 95.44 | | | | | | | | |
| 133 | 94.44 | | | | | | | | |
| 134 | 93.44 | | | | | | | | |
| 135 | 92.44 | | | | | | | | |
| 136 | 91.44 | | | | | | | | |
| 137 | 90.44 | Greenish grey MARL, becoming lighter in color | 10 | 133.5 - 135 | NA | NA | | | |
| 138 | 89.44 | | | | | | | | |
| 139 | 88.44 | | | | | | | | |
| 140 | 87.44 | | | | | | | | |
| 141 | 86.44 | | | | | | | | |
| 142 | 85.44 | | | | | | | | |
| 143 | 84.44 | | | | | | | | |
| 144 | 83.44 | | | | | | | | |
| 145 | | 2 thin LIMESTONE beds between 147' and 157' | 11 | 143.5 - 145 | NA | NA | | | |
| 146 | 81.44 | | | | | | | | |
| 147 | 80.44 | | | | | | | | |
| 148 | 79.44 | | | | | | | | |
| 149 | 78.44 | | | | | | | | |
| 150 | | | | | | | | | |
| 151 | 76.44 | | | | | | | | |
| 152 | 75.44 | | | | | | | | |
| | | | 1'2 | 148.5 - 150 | NA | NA | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

| DRILLING LOG GEOLOGICAL SERVICES | | | | | | Hole No. OW-1002 | |
|-------------------------------------|-----------|--|-------------|---------------------------|--------------------|------------------|----------|
| | | | | | | Sheet 6 of 8 | |
| SITE Vogtle ALWR SSAR | | | TOTAL DEPTH | | SURF.ELEV. 227.442 | | |
| Depth Ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
| | | | | From To | Blows | N | |
| 153 | 73.44 | Greenish grey MARL | 14 | 153.5 | NA | NA | |
| 154 | 72.44 | | | - | | | |
| 155 | 71.44 | | | 155 | | | |
| 156 | 70.44 | | | | | | |
| 157 | 69.44 | | 15 | 158.5 | NA | NA | |
| 158 | 68.44 | | | - | | | |
| 159 | 67.44 | | | 160 | | | |
| 160 | 66.44 | | | | | | |
| 161 | 65.44 | | 16 | 163.5 | NA | NA | |
| 162 | 64.44 | | | - | | | |
| 163 | 63.44 | 165 | | | | | |
| 164 | 62.44 | | | | | | |
| 165 | 61.44 | 17 | 168.5 | NA | NA | | |
| 166 | 60.44 | | - | | | | |
| 167 | 59.44 | | 170 | | | | |
| 168 | 58.44 | | | | | | |
| 169 | 57.44 | 18 | 173.5 | NA | NA | | |
| 170 | 56.44 | | - | | | | |
| 171 | 55.44 | | 175 | | | | |
| 172 | 54.44 | | | | | | |
| 173 | 53.44 | Light olive grey fine- to coarse-grained SAND composed of shell fragments and CLAY | 18 | 173.5 | NA | NA | |
| 174 | 52.44 | | | | | | - |
| 175 | 51.44 | | | | | | 175 |
| 176 | 50.44 | Greenish grey MARL | 19 | 178.5 | NA | NA | |
| 177 | 49.44 | | | - | | | |
| 178 | 48.44 | | | 180 | | | |
| 179 | 47.44 | | | | | | |
| 180 | 46.44 | | 20 | 183.5 | NA | NA | |
| 181 | 45.44 | | | - | | | |
| 182 | 43.81 | | | 185 | | | |
| 183 | 43.44 | | | | | | |
| 184 | 41.81 | | | | | | |

| DRILLING LOG GEOLOGICAL SERVICES | | | | | | Hole No. OW-1002 |
|-------------------------------------|-----------|--|-------------------|---------------------------|--------------------|------------------|
| SITE Vogtle ALWR SSAR | | | | | | Sheet 7 of 8 |
| | | | | TOTAL DEPTH 237 | SURF.ELEV. 227.442 | |
| Depth Ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | |
| | | | From To | Blows | N | Comments |
| 185 | 42.44 | Greenish grey MARL | 21 | 188.5 - 190 | NA | NA |
| 186 | 41.44 | | | | | |
| 187 | 40.44 | | | | | |
| 188 | 39.44 | | | | | |
| 189 | 38.44 | | | | | |
| 190 | 37.44 | | | | | |
| 191 | 36.44 | | 22 | 193.5 - 195 | NA | NA |
| 192 | 35.44 | | | | | |
| 193 | 34.44 | | | | | |
| 194 | 33.44 | | | | | |
| 195 | 32.44 | | | | | |
| 196 | 31.44 | | | | | |
| 197 | 30.44 | | 23 | 198.5 - 200 | NA | NA |
| 198 | 29.44 | | | | | |
| 199 | 28.44 | | | | | |
| 200 | 27.44 | | | | | |
| 201 | 26.44 | | | | | |
| 202 | 25.44 | | | | | |
| 203 | 24.44 | 24 | 203.5 - 205 | NA | NA | |
| 204 | 23.44 | | | | | |
| 205 | 22.44 | | | | | |
| 206 | 21.44 | | | | | |
| 207 | 20.44 | | | | | |
| 208 | 19.44 | | | | | |
| 209 | 18.44 | 25 | 208.5 - 210 | NA | NA | |
| 210 | 17.44 | | | | | |
| 211 | 16.44 | | | | | |
| 212 | 15.44 | | | | | |
| 213 | 14.44 | | | | | |
| 214 | | | | | | |
| 215 | 12.44 | 26 | 213.5 - 215 | NA | NA | |
| 216 | 11.44 | | | | | |

| DRILLING LOG GEOLOGICAL SERVICES | | | | | | Hole No. OW-1002 | |
|-------------------------------------|-----------|--|------------|---------------------------|--------------------|------------------|----------|
| SITE Vogtle ALWR SSAR | | | | | | Sheet 8 of 8 | |
| | | | | TOTAL DEPTH 237 | SURF.ELEV. 227.442 | | |
| Depth Ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
| | | | | From To | Blows | N | |
| 217 | 10.44 | | | | | | |
| 218 | 9.44 | 6" grey CLAY layer | | | | | |
| 219 | 8.44 | | 27 | 218.5 - 220 | NA | NA | |
| 220 | 7.44 | | | | | | |
| 221 | 6.44 | Light greenish grey fine- to medium-grained, silty glauconitic SAND (SM) | | | | | |
| 222 | 5.44 | | | | | | |
| 223 | 4.44 | | | | | | |
| 224 | 3.44 | | 28 | 223.5 - 225 | NA | NA | |
| 225 | 2.44 | | | | | | |
| 226 | 1.44 | | | | | | |
| 227 | 0.44 | | | | | | |
| 228 | -0.56 | | 29 | 228.5 - 230 | NA | NA | |
| 229 | -1.56 | | | | | | |
| 230 | -2.56 | | | | | | |
| 231 | -3.56 | | | | | | |
| 232 | -4.56 | | | | | | |
| 233 | -5.56 | | | | | | |
| 234 | -6.56 | | 30 | 233.5 - 235 | NA | NA | |
| 235 | -7.56 | | | | | | |
| 236 | -8.56 | | | | | | |
| 237 | -9.56 | | | | | | |
| 238 | -10.56 | Boring terminated at 237'. Well OW-1002 installed in this borehole. | | | | | |
| 239 | -11.56 | | | | | | |
| 240 | -12.56 | | | | | | |
| 241 | -13.56 | | | | | | |
| 242 | -14.56 | | | | | | |
| 243 | -15.56 | | | | | | |
| 244 | -16.56 | | | | | | |
| 245 | -17.56 | | | | | | |
| 246 | -18.56 | | | | | | |
| 247 | -20.19 | | | | | | |
| 248 | -20.56 | | | | | | |
| 249 | -21.56 | | | | | | |

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. OW-1002A

Sheet 1 of 4

| | | | |
|---------------------------------------|-------------------|--------------------------------------|--------------------------------------|
| SITE Vogtle ALWR SSAR | | HOLE DEPTH 108.5 | SURF.ELEV. NA |
| LOCATION Burke County, Georgia | | COORDINATES N NA | E NA |
| ANGLE NA | BEARING NA | CONTRACTOR Greene | DRILL NO. CME 75 |
| DRILLING METHOD HSA 3 1/4" | | NO. SAMPLES 22 | NO. U.D. SAMPLES NA |
| WATER TABLE DEPTH 90' | | ELEV. NA | DATE TAKEN 5/25/2005 |
| TYPE GROUT NA | | QUANTITY NA | MIX NA |
| DRILLER Greene/Arthur | | RECORDER Steve Bearce | APPROVED NA |
| | | DRILLING START DATE 5/24/2005 | DRILLING COMP. DATE 5/25/2005 |

| Depth FT. | Elev. FT. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|---|------------|---------------------------|----------|-------|----------|
| | | | | From To Ft. | Blows | N BPF | |
| 0 | | | | | | | |
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | Red brown silty SAND (SM) to SAND (SW), fine- to coarse-grained | 1A | 3.5-5 | 11-13-15 | 28 | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |
| 9 | | Yellow brown SAND (SW), fine- to medium-grained | 2A | 8.5-10 | 6-8-10 | 18 | |
| 10 | | | | | | | |
| 11 | | | | | | | |
| 12 | | | | | | | |
| 13 | | | | | | | |
| 14 | | Light brown clayey SAND (SC), fine- to medium-grained | 3A | 13.5-15 | 3-4-5 | 9 | |
| 15 | | | | | | | |
| 16 | | | | | | | |
| 17 | | | | | | | |
| 18 | | | | | | | |
| 19 | | | 4A | 18.5-20 | 4-4-3 | 7 | |
| 20 | | | | | | | |
| 21 | | | | | | | |
| 22 | | | | | | | |
| 23 | | | | | | | |
| 24 | | | | | | | |

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. OW-1002A

Sheet 2 of 4

| SITE | | Vogle ALWR SSAR | | TOTAL DEPTH | | 108.5 | | SURF.ELEV. | |
|-----------|-----------|--|---|---------------------------|-----------|-------|----------|------------|--|
| Depth FT. | Elev. FT. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | | |
| | | | | From To FT. | Blows | N BPF | | | |
| 25 | | Light tan sandy Clay (CL) | 5A | 23.5-25 | 4-4-5 | 9 | | | |
| 26 | | | | | | | | | |
| 27 | | | | | | | | | |
| 28 | | | | | | | | | |
| 29 | | | | | | | | | |
| 30 | | | 6A | 28.5 - 30 | 3-3-3 | 6 | | | |
| 31 | | | | | | | | | |
| 32 | | | | | | | | | |
| 33 | | | | | | | | | |
| 34 | | | Buff COQUINA in layers ~1/2 recovery of coquina | 7A | 33.5 - 35 | 50/3" | 50/3" | | |
| 35 | | | | | | | | | |
| 36 | | | | | | | | | |
| 37 | | | | | | | | | |
| 38 | | | | | | | | | |
| 39 | | Buff colored, white shelly (<10%) clayey SAND (SC) | 8A | 38.5 - 40 | 10-9-8 | 17 | | | |
| 40 | | | | | | | | | |
| 41 | | | | | | | | | |
| 42 | | | | | | | | | |
| 43 | | | | | | | | | |
| 44 | | Same as above but no shells | 9A | 43.5 - 45 | 3-4-5 | 9 | | | |
| 45 | | | | | | | | | |
| 46 | | | | | | | | | |
| 47 | | | | | | | | | |
| 48 | | | | | | | | | |
| 49 | | Buff colored fine sandy CLAY (CL) | 10A | 48.5 - 50 | 7-2-9 | 11 | | | |
| 50 | | | | | | | | | |
| 51 | | | | | | | | | |
| 52 | | | | | | | | | |
| 53 | | | | | | | | | |
| 54 | | Grading to clayey fine SAND (SC) | 11A | 53.5 - 55 | 4-2-10 | 12 | | | |
| 55 | | | | | | | | | |
| 56 | | | | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1002A

Sheet 3 of 4

| SITE | | Vogtle ALWR SSAR | | TOTAL DEPTH | | 108.5' | | SURF.ELEV. | |
|-----------|-----------|--|------------|---------------------------|----------|--------|----------------------|------------|--|
| Depth Ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | | |
| | | | | From | To Ft. | Blows | | N BPF | |
| 57 | | Buff colored, sandy shelly (15%) CLAY (CL) | 12A | 58.5-60 | 28-26-13 | 39 | high N due to shells | | |
| 58 | | | | | | | | | |
| 59 | | | | | | | | | |
| 60 | | | | | | | | | |
| 61 | | | | | | | | | |
| 62 | | Buff colored fine-grained clayey SAND (SC) moist | 13A | 63.5-65 | 11-13-19 | 32 | | | |
| 63 | | | | | | | | | |
| 64 | | | | | | | | | |
| 65 | | | | | | | | | |
| 66 | | | | | | | | | |
| 67 | | Tan, slightly pink fine-grained sandy CLAY (CL), with fine-grained SAND, (SC) slightly moist | 14A | 68.5-70 | 8-12-50 | 62 | | | |
| 68 | | | | | | | | | |
| 69 | | | | | | | | | |
| 70 | | | | | | | | | |
| 71 | | | | | | | | | |
| 72 | | Buff colored slightly green shelly, clayey, SAND (SC) | 15A | 73.5-75 | 8-12-27 | 39 | | | |
| 73 | | | | | | | | | |
| 74 | | | | | | | | | |
| 75 | | | | | | | | | |
| 76 | | | | | | | | | |
| 77 | | Light brown, silty, fine-grained SAND (SM), moist | 16A | 78.5-80 | 5-20-25 | 45 | | | |
| 78 | | | | | | | | | |
| 79 | | | | | | | | | |
| 80 | | | | | | | | | |
| 81 | | | | | | | | | |
| 82 | | | 17A | 83.5-85 | 11-21-25 | 46 | | | |
| 83 | | | | | | | | | |
| 84 | | | | | | | | | |
| 85 | | | | | | | | | |
| 86 | | | | | | | | | |
| 87 | | | | | | | | | |
| 88 | | | | | | | | | |

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. OW-1002A

Sheet 4 of 4

SITE **Vogle ALWR SSAR**

TOTAL DEPTH **108.5**

SURF.ELEV. _____

| Depth | Elev. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-------|-------|--|------------|---------------------------|----------|----------|---|
| | | | | From To | Blows | N | |
| 89 | | Tan fine-grained SAND, (SP), wet | 18A | 88.5-90 | 12-25-31 | 56 | 5/24/05 ▼ 90' from ground surface |
| 90 | | | | | | | |
| 91 | | | | | | | |
| 92 | | | | | | | |
| 93 | | | | | | | |
| 94 | | Buff silty, SAND, (SM), wet | 19A | 93.5-95 | 50/4" | 50/4" | |
| 95 | | | | | | | |
| 96 | | | | | | | |
| 97 | | | | | | | |
| 98 | | | | | | | |
| 99 | | Saturated with shell fragments (thin, 4mm, to thick, ~1cm) | 20A | 98.5-100 | 12-50/3" | 12-50/3" | |
| 100 | | | | | | | |
| 101 | | | | | | | |
| 102 | | | | | | | |
| 103 | | | | | | | |
| 104 | | Greenish grey, MARL, damp | 21A | 103.5-105 | 3-1-50 | 51 | |
| 105 | | | | | | | |
| 106 | | | | | | | |
| 107 | | | | | | | |
| 108 | | | | | | | |
| 109 | | Boring Terminated @ 108.5'. This borehole was abandoned due to use of 3 1/4" augers. Moved over approximately 20 feet north and drilled OW-1002 with ProSonic rig. Well was installed in borehole OW-1002. | 22A | 108.5-110 | 11-50 | 61 | |
| 110 | | | | | | | |
| 111 | | | | | | | |
| 112 | | | | | | | |
| 113 | | | | | | | |
| 114 | | | | | | | |
| 115 | | | | | | | |
| 116 | | | | | | | |
| 117 | | | | | | | |
| 118 | | | | | | | |
| 119 | | | | | | | |
| 120 | | | | | | | |

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. **OW-1003**
Sheet 1 of 4

| | | | |
|---------------------------------------|------------------------------|----------------------------|--------------------------------------|
| SITE Vogtle ALWR SSAR | | HOLE DEPTH 90 | SURF. ELEV. NA |
| LOCATION Burke County, Georgia | | COORDINATES N NA | E NA |
| ANGLE NA | BEARING NA | CONTRACTOR S&ME | DRILL NO. CME 550 |
| DRILLING METHOD 31/4" HSA | | NO. SAMPLES 18 | NO. U.D. SAMPLES NA |
| WATER TABLE DEPTH 63.6' | ELEV. NA | TIME AFTER COMP. NA | DATE TAKEN 5/25/2005 |
| TYPE GROUT NA | QUANTITY NA | MIX NA | DRILLING START DATE 5/24/2005 |
| DRILLER TIM | RECORDER Steve Bearce | APPROVED NA | DRILLING COMP. DATE 5/24/2005 |

| Depth Ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|---|------------|---------------------------|---------|-------|----------|
| | | | | From To Ft. | Blows | N BPF | |
| 0 | | | | | | | |
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | Red-brown silty-clayey SAND (SM-SC) fine- to medium-grained, moist | | | | | |
| 4 | | | | | | | |
| 5 | | | 1 | 3.5-5 | 7-13-17 | 30 | |
| 6 | | | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |
| 9 | | Light brown, silty SAND, (SM) to SAND (SW) fine- to medium-grained | | | | | |
| 10 | | | 2 | 8.5-10 | 9-6-6 | 12 | |
| 11 | | | | | | | |
| 12 | | | | | | | |
| 13 | | | | | | | |
| 14 | | Red-brown silty-clayey SAND (SM-SC), fine-grained | | | | | |
| 15 | | | 3 | 13.5-15 | 8-11-13 | 24 | |
| 16 | | | | | | | |
| 17 | | | | | | | |
| 18 | | | | | | | |
| 19 | | Red brown sandy SILT (ML) and Red-brown silty-clayey SAND, (SM-SC) fine-grained | | | | | |
| 20 | | | 4 | 18.5-20 | 9-14-15 | 29 | |
| 21 | | | | | | | |
| 22 | | | | | | | |
| 23 | | | | | | | |
| 24 | | Yellow-brown SAND, (SW) | | | | | |

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. OW-1003

Sheet 2 of 4

SITE **Vogle ALWR SSAR** TOTAL DEPTH **90** SURF.ELEV. **NA**

| Depth Ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|---|------------|---------------------------|---------|-------|----------|
| | | | | From To Ft. | Blows | N BPF | |
| 25 | | Fine- to medium-grained SAND, (SW) damp | 5 | 23.5-25 | 8-11-17 | 28 | |
| 26 | | | | | | | |
| 27 | | | | | | | |
| 28 | | | | | | | |
| 29 | | Red-Brown silty SAND (SM) with laminations of clayey SAND (SM), clay and silt | | | | | |
| 30 | | | 6 | 28.5-30 | 6-5-7 | 12 | |
| 31 | | | | | | | |
| 32 | | | | | | | |
| 33 | | Yellow-brown with mottled grey clayey SAND (SC) and fine-grained SAND, damp | | | | | |
| 34 | | | 7 | 33.5-35 | 7-5-5 | 10 | |
| 35 | | | | | | | |
| 36 | | | | | | | |
| 37 | | Same as above with some sandy CLAY laminations, damp | | | | | |
| 38 | | | | | | | |
| 39 | | | 8 | 38.5-40 | 4-4-4 | 8 | |
| 40 | | | | | | | |
| 41 | | Yellow brown sandy CLAY (CL) fine-grained SAND, damp | | | | | |
| 42 | | | | | | | |
| 43 | | | | | | | |
| 44 | | | 9 | 43.5-45 | 3-3-4 | 7 | |
| 45 | | Layered yellow brown clayey SAND, (SC) and yellow brown sandy CLAY, moist | | | | | |
| 46 | | | | | | | |
| 47 | | | | | | | |
| 48 | | | | | | | |
| 49 | | very moist | 10 | 48.5-50 | 3-3-4 | 7 | |
| 50 | | | | | | | |
| 51 | | | | | | | |
| 52 | | | | | | | |
| 53 | | | | | | | |
| 54 | | | | | | | |
| 55 | | | | | | | |
| 56 | | | 11 | 53.5-55 | 2-2-5 | 7 | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1003

Sheet 3 of 4

| SITE | | Vogle ALWR SSAR | | TOTAL DEPTH | | 90 | | SURF.ELEV. | | NA | |
|-----------|-----------|--|------------|---------------------------|---------|---------|---|------------|--|----|--|
| Depth Ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | | | | |
| | | | | From To Ft. | Blows | N BPF | | | | | |
| 57 | | Light pinkish tan SAND (SW), fine- to medium-grained | 12 | 58.5-60 | 2-7-9 | 16 | | | | | |
| 58 | | | | | | | | | | | |
| 59 | | | | | | | | | | | |
| 60 | | | | | | | | | | | |
| 61 | | | | | | | | | | | |
| 62 | | Light tan clayey SAND (SC) | 13 | 63.5-65 | WOR | WOR | 5/25/05 ▼ 63.6' from ground surface | | | | |
| 63 | | | | | | | | | | | |
| 64 | | | | | | | | | | | |
| 65 | | | | | | | | | | | |
| 66 | | | | | | | | | | | |
| 67 | | Buff colored clayey SAND, (SC) fine to medium grained SAND | 14 | 68.5-70 | WOR 18" | WOR 18" | Saturated | | | | |
| 68 | | | | | | | | | | | |
| 69 | | | | | | | | | | | |
| 70 | | | | | | | | | | | |
| 71 | | | | | | | | | | | |
| 72 | | Same as above | 15 | 73.5-75 | WOR 12" | WOR 12" | | | | | |
| 73 | | | | | | | | | | | |
| 74 | | | | | | | | | | | |
| 75 | | | | | | | | | | | |
| 76 | | | | | | | | | | | |
| 77 | | Reddish brown silty SAND (SM) | 16 | 78.5-80 | 1-1-2 | 3 | | | | | |
| 78 | | | | | | | | | | | |
| 79 | | | | | | | | | | | |
| 80 | | | | | | | | | | | |
| 81 | | | | | | | | | | | |
| 82 | | Light tan silty SAND (SM) | 17 | 83.5-85 | 1-1-2 | 3 | | | | | |
| 83 | | | | | | | | | | | |
| 84 | | | | | | | | | | | |
| 85 | | | | | | | | | | | |
| 86 | | | | | | | | | | | |
| 87 | | Tan and grey clayey COQUINA | | | | | | | | | |
| 88 | | | | | | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1003

Sheet 4 of 4

| SITE | | Vogtle ALWR SSAR | | TOTAL DEPTH | | 90 | | SURF.ELEV. | | NA | |
|-----------|-----|---|------------|---------------------------|----------|-------|----------|------------|--|----|--|
| Depth Ft. | Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | | | | |
| | | | | From To Ft. | Blows | N BPF | | | | | |
| 89 | | Greenish grey MARL | 18 | 88.5-90 | 13-21-23 | 44 | | | | | |
| 90 | | | | | | | | | | | |
| 91 | | BORING Terminated at 90.0' | | | | | | | | | |
| 92 | | This borehole was abandoned due to the use of 3 1/4" augers. | | | | | | | | | |
| 93 | | | | | | | | | | | |
| 94 | | | | | | | | | | | |
| 95 | | Shallow well OW-1003 was installed approximately 10' south of this borehole. No boring log was prepared for the hole due to the proximity of this borehole. | | | | | | | | | |
| 96 | | | | | | | | | | | |
| 97 | | | | | | | | | | | |
| 98 | | | | | | | | | | | |
| 99 | | | | | | | | | | | |
| 100 | | | | | | | | | | | |
| 101 | | | | | | | | | | | |
| 102 | | | | | | | | | | | |
| 103 | | | | | | | | | | | |
| 104 | | | | | | | | | | | |
| 105 | | | | | | | | | | | |
| 106 | | | | | | | | | | | |
| 107 | | | | | | | | | | | |
| 108 | | | | | | | | | | | |
| 109 | | | | | | | | | | | |
| 110 | | | | | | | | | | | |
| 111 | | | | | | | | | | | |
| 112 | | | | | | | | | | | |
| 113 | | | | | | | | | | | |
| 114 | | | | | | | | | | | |
| 115 | | | | | | | | | | | |
| 116 | | | | | | | | | | | |
| 117 | | | | | | | | | | | |
| 118 | | | | | | | | | | | |
| 119 | | | | | | | | | | | |
| 120 | | | | | | | | | | | |

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. OW-1004

Sheet 1 of 7

SIT Vogtle ALWR SSAR HOLE DEPTH 187 SURF. ELEV. 222.92
 LOCATION Burke County, Georgia COORDINATES N 1142842.176 E 621880.794
 AN NA BEARING NA CONTRACTOR Prosonic DRILL NO. SR-083
 DRILLING METHOD Sonic NO. SAMPLES 20 NO. U.D. SAMPLES NA
 WATER TABLE DEP NA ELEV. NA TIME AFTER COMP. NA DATE TAKEN 6/3/2005
 TYPE GROUT NA QUANTITY NA MIX NA DRILLING START DATE 6/3/2005
 DRILLER Tony, Mike RECORDER S. Bearce APPROVED NA DRILLING COMP. DATE 6/11/2005

| Depth | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-------|-----------|--|------------|---------------------------|-------|-------|----------|
| | | | | From To Ft. | Blows | N BPF | |
| 0 | 222.92 | | | | | | |
| 1 | 221.92 | This borehole was not sampled until 87'. | | | | | |
| 2 | 220.92 | OW-1004 is a well pair with OW-1003. The well is approximately ---feet --- of OW-1003. | | | | | |
| 3 | 219.92 | See boring log | | | | | |
| 4 | 218.92 | OW-1003 for description of upper sediments. | | | | | |
| 5 | 217.92 | | | | | | |
| 6 | 216.92 | | | | | | |
| 7 | 215.92 | | | | | | |
| 8 | 214.92 | | | | | | |
| 9 | 213.92 | | | | | | |
| 10 | 212.92 | | | | | | |
| 11 | 211.92 | | | | | | |
| 12 | 210.92 | | | | | | |
| 13 | 209.92 | | | | | | |
| 14 | 208.92 | | | | | | |
| 15 | 207.92 | | | | | | |
| 16 | 206.92 | | | | | | |
| 17 | 205.92 | | | | | | |
| 18 | 204.92 | | | | | | |
| 19 | 203.92 | | | | | | |
| 20 | 202.92 | | | | | | |
| 21 | 201.92 | | | | | | |
| 22 | 200.92 | | | | | | |
| 23 | 199.92 | | | | | | |
| 24 | 198.92 | | | | | | |

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. OW-1004

Sheet 2 of 7

SITE **Vogtle ALWR SSAR** TOTAL DEPTH **187** SURF.ELEV. **222.92**

| Depth | Elev. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | % Rec | RQD |
|-------|--------|--|------------|---------------------------|-------|---|----------|-------|-----|
| | | | | From To | Blows | N | | | |
| 25 | 196.92 | See page 1 | | | | | | | |
| 26 | 195.92 | | | | | | | | |
| 27 | 194.92 | | | | | | | | |
| 28 | 193.92 | | | | | | | | |
| 29 | 192.92 | | | | | | | | |
| 30 | 191.92 | | | | | | | | |
| 31 | 190.92 | | | | | | | | |
| 32 | 189.92 | | | | | | | | |
| 33 | 188.92 | | | | | | | | |
| 34 | 187.92 | | | | | | | | |
| 35 | 186.92 | | | | | | | | |
| 36 | 185.92 | | | | | | | | |
| 37 | 184.92 | | | | | | | | |
| 38 | 183.92 | | | | | | | | |
| 39 | 182.92 | | | | | | | | |
| 40 | 181.92 | | | | | | | | |
| 41 | 180.92 | | | | | | | | |
| 42 | 179.92 | | | | | | | | |
| 43 | 178.92 | | | | | | | | |
| 44 | 177.92 | | | | | | | | |
| 45 | 176.92 | | | | | | | | |
| 46 | 175.92 | | | | | | | | |
| 47 | 174.92 | | | | | | | | |
| 48 | 173.92 | | | | | | | | |
| 49 | 172.92 | | | | | | | | |
| 50 | 171.92 | | | | | | | | |
| 51 | 170.92 | | | | | | | | |
| 52 | 169.92 | | | | | | | | |
| 53 | 168.92 | | | | | | | | |
| 54 | 163.39 | | | | | | | | |
| 55 | 166.92 | | | | | | | | |
| 56 | 161.39 | | | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1004

Sheet 3 of 7

SITE **Vogtle ALWR SSAR** TOTAL DEPTH **187** SURF.ELEV. **222.92**

| Depth | Elev. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | % Rec | RQD |
|-------|--------|--|------------|---------------------------|-------|---|----------|-------|-----|
| | | | | From To | Blows | N | | | |
| 57 | 165.92 | See page 1 | | | | | | | |
| 58 | 164.92 | | | | | | | | |
| 59 | 163.92 | | | | | | | | |
| 60 | 162.92 | | | | | | | | |
| 61 | 161.92 | | | | | | | | |
| 62 | 160.92 | | | | | | | | |
| 63 | 159.92 | | | | | | | | |
| 64 | 158.92 | | | | | | | | |
| 65 | 157.92 | | | | | | | | |
| 66 | 156.92 | | | | | | | | |
| 67 | 155.92 | | | | | | | | |
| 68 | 154.92 | | | | | | | | |
| 69 | 153.92 | | | | | | | | |
| 70 | 152.92 | | | | | | | | |
| 71 | 151.92 | | | | | | | | |
| 72 | 150.92 | | | | | | | | |
| 73 | 149.92 | | | | | | | | |
| 74 | 148.92 | | | | | | | | |
| 75 | 147.92 | | | | | | | | |
| 76 | 146.92 | | | | | | | | |
| 77 | 145.92 | | | | | | | | |
| 78 | 144.92 | | | | | | | | |
| 79 | 143.92 | | | | | | | | |
| 80 | 142.92 | | | | | | | | |
| 81 | 141.92 | | | | | | | | |
| 82 | 140.92 | | | | | | | | |
| 83 | 139.92 | | | | | | | | |
| 84 | 138.92 | | | | | | | | |
| 85 | 137.92 | | | | | | | | |
| 86 | 132.39 | | | | | | | | |
| 87 | 135.92 | Start sampling at 87' | | | | | | | |
| 88 | 134.92 | Olive-tan, wet CLAY (CL) | | | | | | | |

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. OW-1004

Sheet 4 of 7

SITE **Vogtle ALWR SSAR**

TOTAL DEPTH **187**

SURF.ELEV. **222.92**

| Depth Ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|--|------------|---------------------------|-------|-------|----------|
| | | | | From To Ft. | Blows | N BPF | |
| 89 | 133.92 | Greenish grey MARL | 1 | 88.5 - 90.0 | NA | NA | |
| 90 | 132.92 | | | | | | |
| 91 | 131.92 | | | | | | |
| 92 | 130.92 | | | | | | |
| 93 | 129.92 | | | | | | |
| 94 | 128.92 | Greenish grey shelly MARL with white fossils | 2 | 93.5 - 95 | NA | NA | |
| 95 | 127.92 | | | | | | |
| 96 | 126.92 | | | | | | |
| 97 | 125.92 | | | | | | |
| 98 | 124.92 | | | | | | |
| 99 | 123.92 | | 3 | 98.5 - 100 | NA | NA | |
| 100 | 122.92 | | | | | | |
| 101 | 121.92 | | | | | | |
| 102 | 120.92 | | | | | | |
| 103 | 119.92 | | | | | | |
| 104 | 118.92 | | 4 | 103.5 - 105 | NA | NA | |
| 105 | 117.92 | | | | | | |
| 106 | 116.92 | | | | | | |
| 107 | 115.92 | | | | | | |
| 108 | 114.92 | | | | | | |
| 109 | 113.92 | | 5 | 108.5 - 110 | NA | NA | |
| 110 | 112.92 | | | | | | |
| 111 | 111.92 | | | | | | |
| 112 | 110.92 | | | | | | |
| 113 | 109.92 | | | | | | |
| 114 | 108.92 | | 6 | 113.5 - 115 | NA | NA | |
| 115 | 107.92 | | | | | | |
| 116 | 106.92 | | | | | | |
| 117 | 105.92 | | | | | | |
| 118 | 100.39 | | | | | | |
| 119 | 103.92 | | 7 | 118.5 - 120. | NA | NA | |
| 120 | 102.92 | | | | | | |

| DRILLING LOG GEOLOGICAL SERVICES | | | | | | Hole No. | OW-1004 |
|-------------------------------------|-----------|---|------------|---------------------------|-------|------------|----------|
| | | | | | | Sheet 5 of | 7 |
| SITE | | Vogtle ALWR SSAR | | TOTAL DEPTH | 187 | SURF.ELEV. | 222.92 |
| Depth Ft. | Elev. FT. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
| | | | | From To FT. | Blows | N BPF | |
| 121 | 101.92 | Shelly greenish grey MARL | 8 | 123.5 - 125 | NA | NA | |
| 122 | 100.92 | | | | | | |
| 123 | 99.92 | | | | | | |
| 124 | 98.92 | | | | | | |
| 125 | 97.92 | | | | | | |
| 126 | 96.92 | | | | | | |
| 127 | 95.92 | | | | | | |
| 128 | 94.92 | | | | | | |
| 129 | 93.92 | abundant (30%) gravel | 9 | 130 - 131.5 | NA | NA | |
| 130 | 92.92 | | | | | | |
| 131 | 91.92 | | | | | | |
| 132 | 90.92 | | | | | | |
| 133 | 89.92 | | | | | | |
| 134 | 88.92 | | | | | | |
| 135 | 87.92 | | | | | | |
| 136 | 86.92 | | | | | | |
| 137 | 85.92 | | 10 | 133.5 - 135 | NA | NA | |
| 138 | 84.92 | | | | | | |
| 139 | 83.92 | | | | | | |
| 140 | 82.92 | | | | | | |
| 141 | 81.92 | | | | | | |
| 142 | 80.92 | | | | | | |
| 143 | 79.92 | | | | | | |
| 144 | 78.92 | | | | | | |
| 145 | 77.92 | | 11 | 138.5 - 140 | NA | NA | |
| 146 | 76.92 | | | | | | |
| 147 | 75.92 | | | | | | |
| 148 | 74.92 | | | | | | |
| 149 | 73.92 | | | | | | |
| 150 | 68.39 | | | | | | |
| 151 | 71.92 | | | | | | |
| 152 | 70.92 | | | | | | |
| | | 6" gradational contact with abundant shells (white) Dark grey, fine- to coarse-grained SAND, (SW) with green sand grains (glauconite or dolomite?) | 12 | 143.5 - 145 | NA | NA | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | 13 | 148.5 - 150 | NA | NA | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
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| | | | | | | | |
| | | | | | | | |
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| DRILLING LOG GEOLOGICAL SERVICES | | | | | | Hole No. | OW-1004 |
|-------------------------------------|-----------|--|------------|---------------------------|-------|------------|----------|
| | | | | | | Sheet 6 of | 7 |
| SITE | | Vogtle ALWR SSAR | | TOTAL DEPTH | 187 | SURF.ELEV. | 222.92 |
| Depth Ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
| | | | | From To Ft. | Blows | N BPF | |
| 153 | 69.92 | grades to fine- to medium-grained dark grey SAND w/ organics, cohesive leaving core barrel, wet, poorly graded with silt (SP-SM) | 14 | 153.5 | NA | NA | |
| 154 | 68.92 | | | - | | | |
| 155 | 67.92 | | | 155 | | | |
| 156 | 66.92 | | | | | | |
| 157 | 65.92 | | | | | | |
| 158 | 64.92 | | 15 | 158.5 | NA | NA | |
| 159 | 63.92 | | | - | | | |
| 160 | 62.92 | | | 169 | | | |
| 161 | 61.92 | | | | | | |
| 162 | 60.92 | | | | | | |
| 163 | 59.92 | Light grey, becomes loose coming out of core barrel fine-grained SAND (SP) with clay and silt | 16 | 163.5 | NA | NA | |
| 164 | 58.92 | | | - | | | |
| 165 | 57.92 | | | 170 | | | |
| 166 | 56.92 | | | | | | |
| 167 | 55.92 | | | | | | |
| 168 | 54.92 | | 17 | 168.5 | NA | NA | |
| 169 | 53.92 | | | - | | | |
| 170 | 52.92 | | | 170 | | | |
| 171 | 51.92 | | | | | | |
| 172 | 50.92 | | | | | | |
| 173 | 49.92 | Dark grey organic, silty SAND (SM) | 18 | 173.5 | NA | NA | |
| 174 | 48.92 | | | - | | | |
| 175 | 47.92 | | | 175 | | | |
| 176 | 46.92 | | | | | | |
| 177 | 45.92 | | | | | | |
| 178 | 44.92 | | 19 | 178.5 | NA | NA | |
| 179 | 43.92 | | | - | | | |
| 180 | 42.92 | | | 180 | | | |
| 181 | 41.92 | | | | | | |
| 182 | 36.39 | | | | | | |
| 183 | 39.92 | | 20 | 183.5 | NA | NA | |
| 184 | 34.39 | | | - | | | |
| | | | | 185 | | | |

| DRILLING LOG GEOLOGICAL SERVICES | | | | | | Hole No. | OW-1004 |
|-------------------------------------|-----------|--|------------|---------------------------|-------|-------------------|----------|
| SITE Vogtle ALWR SSAR | | | | | | Sheet 7 of 7 | |
| TOTAL DEPTH 187 | | | | | | SURF.ELEV. 222.92 | |
| Depth Ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
| | | | | From To Ft. | Blows | N BPF | |
| 185 | 37.92 | Dark grey organic, silty SAND (SM) | 20 | 188.5 | NA | NA | |
| 186 | 36.92 | | | - | | | |
| 187 | 35.92 | | | 190 | | | |
| 188 | 34.92 | Boring terminated at 187' | | | | | |
| 189 | 33.92 | Well OW-1004 is installed in this borehole. | | | | | |
| 190 | 32.92 | | | | | | |
| 191 | 31.92 | | | | | | |
| 192 | 30.92 | | | | | | |
| 193 | 29.92 | | | | | | |
| 194 | 28.92 | | | | | | |
| 195 | 27.92 | | | | | | |
| 196 | 26.92 | | | | | | |
| 197 | 25.92 | | | | | | |
| 198 | 24.92 | | | | | | |
| 199 | 23.92 | | | | | | |
| 200 | 22.92 | | | | | | |
| 201 | 21.92 | | | | | | |
| 202 | 20.92 | | | | | | |
| 203 | 19.92 | | | | | | |
| 204 | 18.92 | | | | | | |
| 205 | 17.92 | | | | | | |
| 206 | 16.92 | | | | | | |
| 206 | 16.92 | | | | | | |
| 208 | 14.92 | | | | | | |
| 209 | 13.92 | | | | | | |
| 210 | 12.92 | | | | | | |
| 211 | 11.92 | | | | | | |
| 212 | 10.92 | | | | | | |
| 213 | 9.92 | | | | | | |
| 214 | 4.39 | | | | | | |
| 215 | 7.92 | | | | | | |
| 216 | 6.92 | | | | | | |

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. OW-1005

Sheet 1 of 6

| | | | |
|---------------------------------------|-------------------|---------------------------------|-------------------------------------|
| SITE Vogtle ALWR SSAR | | HOLE DEPTH 170 | SURF.ELEV. 264.389 |
| LOCATION Burke County, Georgia | | COORDINATES N 1144047.86 | E 620408.765 |
| ANGLE NA | BEARING NA | CONTRACTOR S&ME | DRILL NO. CME B55 |
| DRILLING METHOD 4/14" HSA | | NO. SAMPLES 19 | NO. U.D. SAMPLES NA |
| WATER TABLE DEPTH NA | | ELEV. NA | TIME AFTER COMP. NA |
| TYPE GROUT NA | | QUANTITY NA | MIX NA |
| DRILLER Ted | | RECORDER R Tinsley/SCB | APPROVED NA |
| | | DATE TAKEN 6/2/2005 | DRILLING COMP. DATE 6/7/2005 |

| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|---|------------|---------------------------|-------|-------|----------|
| | | | | From To ft. | Blows | N BPF | |
| 0 | 264.39 | | | | | | |
| 1 | 263.39 | Sampling in this borehole began at 68.5'. The adjacent borehole OW-1005A was drilled to 75'. The borehole was abandoned due to the use of 3 1/4" augers, which were incorrect size for well installation. | | | | | |
| 2 | 262.39 | | | | | | |
| 3 | 261.39 | | | | | | |
| 4 | 260.39 | This borehole OW-1005 was located approximately 10' from feet from OW-1005A. | | | | | |
| 5 | 259.39 | Monitoring well OW-1005 is installed in this borehole. | | | | | |
| 6 | 258.39 | | | | | | |
| 7 | 257.39 | | | | | | |
| 8 | 256.39 | | | | | | |
| 9 | 255.39 | | | | | | |
| 10 | 254.39 | | | | | | |
| 11 | 253.39 | | | | | | |
| 12 | 252.39 | | | | | | |
| 13 | 251.39 | | | | | | |
| 14 | 250.39 | | | | | | |
| 15 | 249.39 | | | | | | |
| 16 | 248.39 | | | | | | |
| 17 | 247.39 | | | | | | |
| 18 | 246.39 | | | | | | |
| 19 | 245.39 | | | | | | |
| 20 | 244.39 | | | | | | |
| 21 | 243.39 | | | | | | |
| 22 | 242.39 | | | | | | |
| 23 | 241.39 | | | | | | |
| 24 | 240.39 | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1005

Sheet 2 of 6

SITE **Vogle ALWR SSAR**

TOTAL DEPTH **170**

SURF.ELEV. **264.389**

| Depth | Elev. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-------|--------|--|------------|---------------------------|-------|---|----------|
| | | | | From To | Blows | N | |
| 25 | 239.39 | See page 1 | | | | | |
| 26 | 238.39 | | | | | | |
| 27 | 237.39 | | | | | | |
| 28 | 236.39 | | | | | | |
| 29 | 235.39 | | | | | | |
| 30 | 234.39 | | | | | | |
| 31 | 233.39 | | | | | | |
| 32 | 232.39 | | | | | | |
| 33 | 231.39 | | | | | | |
| 34 | 230.39 | | | | | | |
| 35 | 229.39 | | | | | | |
| 36 | 228.39 | | | | | | |
| 37 | 227.39 | | | | | | |
| 38 | 226.39 | | | | | | |
| 39 | 225.39 | | | | | | |
| 40 | 224.39 | | | | | | |
| 41 | 223.39 | | | | | | |
| 42 | 222.39 | | | | | | |
| 43 | 221.39 | | | | | | |
| 44 | 220.39 | | | | | | |
| 45 | 219.39 | | | | | | |
| 46 | 218.39 | | | | | | |
| 47 | 217.39 | | | | | | |
| 48 | 216.39 | | | | | | |
| 49 | 215.39 | | | | | | |
| 50 | 214.39 | | | | | | |
| 51 | 213.39 | | | | | | |
| 52 | 212.39 | | | | | | |
| 53 | 211.39 | | | | | | |
| 54 | | | | | | | |
| 55 | 209.39 | | | | | | |
| 56 | 208.39 | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1005

Sheet 3 of 6

SITE **Vogtle ALWR SSAR** TOTAL DEPTH **170** SURF.ELEV. **264.389**

| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | |
|-----------|-----------|--|------------|---------------------------|-----------|-------------|----------|---|
| | | | | From To ft. | Blows | N BPF | | |
| 57 | 207.39 | See page 1 | 1B | 68.5-70 | 2-36-50/1 | 36 50/1" | | |
| 58 | 206.39 | | | | | | | |
| 59 | 205.39 | | | | | | | |
| 60 | 204.39 | | | | | | | |
| 61 | 203.39 | | | | | | | |
| 62 | 202.39 | | | | | | | |
| 63 | 201.39 | | | | | | | |
| 64 | 200.39 | | | | | | | |
| 65 | 199.39 | | | | | | | |
| 66 | 198.39 | | | | | | | |
| 67 | 197.39 | | | | | | | |
| 68 | 196.39 | | | | | | | |
| 69 | 195.39 | Sampling begins at 68.5' | 2B | 73.5-75 | 9-14-36 | 50 | | |
| 70 | 194.39 | Light grey to white sandy SILT (ML), calcareous with large and small shell fragments, very stiff | | | | | | |
| 71 | 193.39 | | | | | | | |
| 72 | 192.39 | | | | | | | |
| 73 | 191.39 | | | | | | | |
| 74 | 190.39 | | | | | | | |
| 75 | 74.90 | | | | | | | fewer shells, less sand |
| 76 | 188.39 | | | | | | | Greenish grey MARL |
| 77 | 76.20 | | | | | | | |
| 78 | 187.39 | | | | | | | Light grey SILT, very stiff, calcareous with scattered shell fragments (ML) |
| 79 | 186.39 | | | | | | | |
| 80 | 185.39 | | | | | | | |
| 81 | 184.39 | | | | | | | |
| 82 | 183.39 | | | | | | | |
| 83 | 182.39 | | | | | | | |
| 84 | 181.39 | | | | | | | |
| 85 | 180.39 | | | | | | | |
| 86 | | | | | | | | |
| 87 | 177.39 | | | | | | | |
| 88 | 176.39 | 4B | 83.5-85 | 50/2" | 50/2" | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1005

Sheet 4 of 6

SITE **Vogle ALWR SSAR** TOTAL DEPTH **170** SURF.ELEV. **264.389**

| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|--|------------|---------------------------|----------|-------|----------|
| | | | | From To ft. | Blows | N BPF | |
| 89 | 175.39 | Light brownish grey SAND, fine to medium-grained, slightly silty (SW), calcareous | 5B | 88.5-90 | 7-17-30 | 47 | |
| 90 | 174.39 | | | | | | |
| 91 | 173.39 | | | | | | |
| 92 | 172.39 | Mottled white to yellowish orange, silty SAND, with small to large shell fragments, Dense (SM) | 6B | 93.5-95 | 7-9-14 | 23 | |
| 93 | 171.39 | | | | | | |
| 94 | 170.39 | | | | | | |
| 95 | 169.39 | Light grey SILT, very stiff (ML) | 7B | 98.5-100 | 7-17-34 | 51 | |
| 96 | 168.39 | | | | | | |
| 97 | 167.39 | | | | | | |
| 98 | 166.39 | Pale yellow sandy SILT (ML) and silty SAND (SM) | 8B | 103.5-105 | 18-34-29 | 63 | |
| 99 | 165.39 | | | | | | |
| 100 | 164.39 | | | | | | |
| 101 | 163.39 | Greenish grey MARL | 9B | 108.5-110 | 8-18-39 | 57 | |
| 102 | 162.39 | | | | | | |
| 103 | 161.39 | | | | | | |
| 104 | 160.39 | Pale yellow sandy SILT (ML) and silty SAND (SM) | 10B | 113.5-115 | 12-30-30 | 60 | |
| 105 | 159.39 | | | | | | |
| 106 | 158.39 | | | | | | |
| 107 | 157.39 | White SHELL HASH with fine-coarse-grained SAND and large shell fragments | 11B | 118.5-120 | 16-20-40 | 60 | |
| 108 | 156.39 | | | | | | |
| 109 | 155.39 | | | | | | |
| 110 | 154.39 | Same as above with increase in fines | | | | | |
| 111 | 153.39 | | | | | | |
| 112 | 152.39 | | | | | | |
| 113 | 151.39 | | | | | | |
| 114 | 150.39 | | | | | | |
| 115 | 149.39 | | | | | | |
| 116 | 148.39 | | | | | | |
| 117 | 147.39 | | | | | | |
| 118 | 145.76 | | | | | | |
| 119 | 145.39 | | | | | | |
| 120 | 144.39 | | | | | | |

| <div> <div>DRILLING LOG</div> <div>GEOLOGICAL SERVICES</div> </div> | | | | | | | Hole No. | OW-1005 |
|---|-----------|---|------------|---------------------------|----------|----------|--------------|---------|
| <div> <div>SITE</div> <div>Vogtle ALWR SSAR</div> </div> | | | | | | | Sheet 5 of 6 | |
| <div> <div>TOTAL DEPTH</div> <div>170</div> </div> | | | | | | | SURF.ELEV. | 264.389 |
| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | |
| | | | | From | To ft. | Blows | N BPF | |
| 121 | 143.39 | White SHELL HASH with fine-coarse-grained SAND (SW) and large shell fragments | 12B | 123.5-125 | 8-8-9 | 17 | | |
| 122 | 142.39 | | | | | | | |
| 123 | 141.39 | | | | | | | |
| 124 | 140.39 | | | | | | | |
| 125 | 139.39 | | | | | | | |
| 126 | 138.39 | | 13B | 128.5-130 | 15-48-40 | 88 | | |
| 127 | 137.39 | | | | | | | |
| 128 | 136.39 | | | | | | | |
| 129 | 135.39 | | | | | | | |
| 130 | 134.39 | | | | | | | |
| 131 | 133.39 | Pale yellow SAND, fine to very fine- grained, clean (SP) | 14B | 133.5-135 | 7-9-21 | 30 | | |
| 132 | 132.39 | | | | | | | |
| 133 | 131.39 | | | | | | | |
| 134 | 130.39 | | | | | | | |
| 135 | 129.39 | | | | | | | |
| 136 | 128.39 | scattered shell pieces, dense | 15B | 138.5-140 | 10-13-30 | 43 | | |
| 137 | 127.39 | | | | | | | |
| 138 | 126.39 | | | | | | | |
| 139 | 125.39 | | | | | | | |
| 140 | 124.39 | | | | | | | |
| 141 | 123.39 | increasing fines | 16B | 143.5-145 | 8-12-30 | 42 | | |
| 142 | 122.39 | | | | | | | |
| 143 | 121.39 | | | | | | | |
| 144 | 120.39 | | | | | | | |
| 145 | 119.39 | | | | | | | |
| 146 | 118.39 | Pale yellow, silty SAND, calcareous (SM), fine-coarse-grained with shell pieces | 17B | 148.5-150 | 49/50/3" | 49/50/3" | | |
| 147 | 117.39 | | | | | | | |
| 148 | 116.39 | | | | | | | |
| 149 | 115.39 | | | | | | | |
| 150 | | | | | | | | |
| 151 | 113.39 | | | | | | | |
| 152 | 112.39 | | | | | | | |

| DRILLING LOG GEOLOGICAL SERVICES | | | | | | | Hole No. | OW-1005 |
|-------------------------------------|--------|--|------------|---------------------------|------------|----------|---|---------|
| SITE Vogtle ALWR SSAR | | | | | | | Sheet 6 of 6 | |
| TOTAL DEPTH 170 | | | | | | | SURF.ELEV. | 264.389 |
| Depth | Elev. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | |
| | | | | From To | Blows | N | | |
| 153 | 111.39 | Pale yellow, silty SAND, calcareous (SM), fine- to coarse-grained with shell pieces. | 18B | 153.5-155 | 12-33-50/2 | 33/50/2" | | |
| 154 | 110.39 | | | | | | | |
| 155 | 109.39 | | | | | | | |
| 156 | 108.39 | | | | | | | |
| 157 | 107.39 | | | | | | | |
| 158 | 106.39 | | | | | | | |
| 159 | 105.39 | | | | | | | |
| 160 | 104.39 | Same as above, slightly more consolidated | 19B | 158.5-160 | 25-22-44 | 66 | Boring paused to procure more auger 6/04/05 | |
| 161 | 103.39 | | | | | | | |
| 162 | 102.39 | | | | | | | |
| 163 | 101.39 | | | | | | | |
| 164 | 100.39 | | | | | | | |
| 165 | 99.39 | | | | | | | |
| 166 | 98.39 | | | | | | | |
| 167 | 97.39 | Dark greenish grey MARL | | 163.5-165 | 25-50/2" | 25/50/2" | | |
| 168 | 96.39 | | | | | | | |
| 169 | 95.39 | | | | | | | |
| 170 | 94.39 | | | | | | | |
| 171 | 93.39 | | | | | | | |
| 172 | 92.39 | | | | | | | |
| 173 | 91.39 | | | | | | | |
| 174 | 90.39 | Boring Terminated at 168.5 | | 168.5 - 170 | NA | NA | | |
| 175 | 89.39 | | | | | | | |
| 176 | 88.39 | | | | | | | |
| 177 | 87.39 | | | | | | | |
| 178 | 86.39 | | | | | | | |
| 179 | 85.39 | | | | | | | |
| 180 | 84.39 | | | | | | | |
| 181 | 83.39 | | | | | | | |
| 182 | 81.76 | | | | | | | |
| 183 | 81.39 | | | | | | | |
| 184 | 80.39 | | | | | | | |

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. OW-1005A

Sheet 1 of 3

SITE Vogtle ALWR SSAR HOLE DEPTH 75 SURF. ELEV. 263
LOCATION Burke County, Georgia COORDINATES N NA E NA
ANGLE NA BEARING NA CONTRACTOR Kilman DRILL NO. CME 45
DRILLING METHOD 3 1/4" HAS NO. SAMPLES 15 NO. U.D. SAMPLES NA
WATER TABLE DEPTH NA ELEV. NA TIME AFTER COMP. NA DATE TAKEN NA
TYPE GROUT NA QUANTITY NA MIX NA DRILLING START DATE 5/31/2005
DRILLER Kilman RECORDER Tinsley APPROVED NA DRILLING COMP. DATE 5/31/2005

| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|---|------------|---------------------------|---------|-------|----------|
| | | | | From To ft. | Blows | N BPF | |
| 0 | 263.00 | | | | | | |
| 1 | | | | | | | |
| 2 | 262.00 | Brown to reddish yellow SAND (SP), fine- to medium-grained, loose | | | | | |
| 3 | 261.00 | | | | | | |
| 4 | 260.00 | | 1A | 3.5-5 | 4-12-11 | 23 | |
| 5 | 259.00 | | | | | | |
| 6 | 258.00 | | | | | | |
| 7 | 257.00 | | | | | | |
| 8 | 256.00 | Mottled red and yellow silty SAND, fine- medium-grained (SW) to sandy silt (ML) | | | | | |
| 9 | 255.00 | | | | | | |
| 10 | 254.00 | | 2A | 8.5-10 | 2-10-14 | 24 | |
| 11 | 253.00 | | | | | | |
| 12 | 252.00 | | | | | | |
| 13 | 251.00 | Red SAND, fine-grained, loose (SP) | | | | | |
| 14 | 250.00 | | 3A | 13.5-15 | 3-7-7 | 14 | |
| 15 | 249.00 | | | | | | |
| 16 | 248.00 | | | | | | |
| 17 | 247.00 | | | | | | |
| 18 | 246.00 | Dark red, SAND, fine-grained (SP), loose | | | | | |
| 19 | 245.00 | | 4A | 18.5-20 | 7-6-6 | 12 | |
| 20 | 244.00 | | | | | | |
| 21 | 243.00 | | | | | | |
| 22 | 242.00 | | | | | | |
| 23 | 241.00 | | | | | | |
| 24 | 240.00 | | | | | | |

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. OW-1005A

Sheet 2 of 3

| SITE | | Vogtle ALWR SSAR | | TOTAL DEPTH | | 75 | | SURF.ELEV. | | 263.759 | |
|-----------|-----------|---|------------|---------------------------|---------|-------|----------|------------|-----|---------|--|
| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | % Rec | RQD | | |
| | | | | From | To ft. | Blows | | | | N BPF | |
| 25 | 238.76 | Red and yellow SAND, fine-grained (SP), loose | 5A | 23.5-25 | 11-7-8 | 15 | | | | | |
| 26 | 237.76 | | | | | | | | | | |
| 27 | 236.76 | | | | | | | | | | |
| 28 | 235.76 | | | | | | | | | | |
| 29 | 234.76 | Yellow SAND, fine-grained (SP), loose | 6A | 28.5-30 | 6-7-8 | 15 | | | | | |
| 30 | 233.76 | | | | | | | | | | |
| 31 | 232.76 | | | | | | | | | | |
| 32 | 231.76 | | | | | | | | | | |
| 33 | 230.76 | | 7A | 33.5-35 | 7-10-11 | 21 | | | | | |
| 34 | 229.76 | | | | | | | | | | |
| 35 | 228.76 | | | | | | | | | | |
| 36 | 227.76 | | | | | | | | | | |
| 37 | 226.76 | | 8A | 38.5-40 | 8-7-8 | 15 | | | | | |
| 38 | 225.76 | | | | | | | | | | |
| 39 | 224.76 | | | | | | | | | | |
| 40 | 223.76 | | | | | | | | | | |
| 41 | 222.76 | | 9A | 43.5-45 | 13-8-8 | 16 | | | | | |
| 42 | 221.76 | | | | | | | | | | |
| 43 | 220.76 | | | | | | | | | | |
| 44 | 219.76 | | | | | | | | | | |
| 45 | 218.76 | Strong Brown, SAND, fine-coarse grained with some fines, (SW) | 10A | 48.5-50 | 13-7-5 | 12 | | | | | |
| 46 | 217.76 | | | | | | | | | | |
| 47 | 216.76 | | | | | | | | | | |
| 48 | 215.76 | | | | | | | | | | |
| 49 | 214.76 | Brown to grey silty SAND, fine-coarse grained (SM) | 11A | 53.5-55 | 3-3-3 | 6 | | | | | |
| 50 | 213.76 | | | | | | | | | | |
| 51 | 212.76 | | | | | | | | | | |
| 52 | 211.76 | | | | | | | | | | |
| 53 | 210.76 | | | | | | | | | | |
| 54 | 209.76 | | | | | | | | | | |
| 55 | 208.76 | | | | | | | | | | |
| 56 | 207.76 | | | | | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1005A

Sheet 3 of 3

| SITE | | Vogtle ALWR SSAR | | TOTAL DEPTH | | 75 | | SURF.ELEV. | | | | | |
|--|-----------|--|------------|---------------------------|---------|-------|----------|---|-----|---------|--------|----|--|
| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | | | | | | |
| | | | | From To ft. | Blows | N BPF | | | | | | | |
| 57 | -57.00 | Light grey silty SAND very fine to fine grained, (SW) | 12A | 58.5-60 | 4-7-9 | 16 | | | | | | | |
| 58 | -58.00 | | | | | | | | | | | | |
| 59 | -59.00 | | | | | | | | | | | | |
| 60 | -60.00 | | | | | | | | | | | | |
| 61 | -61.00 | | | | | | | | | | | | |
| 62 | -62.00 | | | | | | | | | | | | |
| 63 | -63.00 | | | | | | | | | | | | |
| 64 | -64.00 | | | | | | | Light grey CLAY, (CL) stiff, calcareous | 13A | 63.5-65 | 4-5-25 | 30 | |
| 65 | -65.00 | | | | | | | | | | | | |
| 66 | -66.00 | | | | | | | | | | | | |
| 67 | -67.00 | | | | | | | | | | | | |
| 68 | -68.00 | | | | | | | | | | | | |
| 69 | -69.00 | | | | | | | | | | | | |
| 70 | -70.00 | | | | | | | | | | | | |
| 71 | -71.00 | | | | | | | | | | | | |
| 72 | -72.00 | | | | | | | | | | | | |
| 73 | -73.00 | | 14A | 68.5-70 | 8-12-23 | 35 | | | | | | | |
| 74 | -74.00 | | | | | | | | | | | | |
| 75 | | | | | | | | | | | | | |
| 76 | -76.00 | | | | | | | Boring terminated at 75'. | | | | | |
| 77 | -77.00 | | | | | | | | | | | | |
| 78 | -78.00 | | | | | | | | | | | | |
| 79 | -79.00 | | | | | | | | | | | | |
| 80 | -80.00 | | | | | | | | | | | | |
| 81 | -81.00 | | | | | | | | | | | | |
| 82 | -82.00 | | | | | | | | | | | | |
| 83 | -83.00 | | | | | | | | | | | | |
| 84 | -84.00 | | | | | | | | | | | | |
| 85 | -85.00 | This borehole was abandoned due to the use of 3 1/4" augers, which are incorrect size for well installation. | | | | | | | | | | | |
| 86 | -86.00 | | | | | | | | | | | | |
| 87 | -87.00 | | | | | | | | | | | | |
| 88 | -88.00 | | | | | | | | | | | | |
| Borehole OW-1005 was completed approximately 10' from this hole using 4 1/4" augers. Well OW-1005 is installed in that hole. | | | | | | | | | | | | | |

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. OW-1006

Sheet 1 of 5

| | | | |
|---------------------------------------|-------------------|----------------------------------|--------------------------------------|
| SITE Vogtle ALWR SSAR | | HOLE DEPTH 135 | SURF.ELEV. 227.121 |
| LOCATION Burke County, Georgia | | COORDINATES N 1143817.854 | E 619179.749 |
| ANGLE NA | BEARING NA | CONTRACTOR Greene | DRILL NO. CME 75 |
| DRILLING METHOD HSA | | NO. SAMPLES 4 | NO. U.D. SAMPLES NA |
| WATER TABLE DEPTH NA | | ELEV. NA | TIME AFTER COMP. NA |
| TYPE GROUT NA | | QUANTITY NA | MIX NA |
| DRILLER Arthur, Jarred | | RECORDER SC Bearce | APPROVED NA |
| | | DATE TAKEN 6/9/2005 | DRILLING COMP. DATE 6/14/2005 |

| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|---|------------|---------------------------|--------|-------|----------|
| | | | | From | To ft. | Blows | |
| 0 | 227.12 | | | | | | |
| 1 | 226.12 | No sampling prior to 118.5. See log for 1006A for soil descriptions through 120-130' depth. OW-1006A was abandoned. Drilling was terminated due to shortage of auger. | | | | | |
| 2 | 225.12 | | | | | | |
| 3 | 224.12 | | | | | | |
| 4 | 223.12 | | | | | | |
| 5 | 222.12 | | | | | | |
| 6 | 221.12 | | | | | | |
| 7 | 220.12 | | | | | | |
| 8 | 219.12 | | | | | | |
| 9 | 218.12 | | | | | | |
| 10 | 217.12 | | | | | | |
| 11 | 216.12 | | | | | | |
| 12 | 215.12 | | | | | | |
| 13 | 214.12 | | | | | | |
| 14 | 213.12 | | | | | | |
| 15 | 212.12 | | | | | | |
| 16 | 211.12 | | | | | | |
| 17 | 210.12 | | | | | | |
| 18 | 209.12 | | | | | | |
| 19 | 208.12 | | | | | | |
| 20 | 207.12 | | | | | | |
| 21 | 206.12 | | | | | | |
| 22 | 205.12 | | | | | | |
| 23 | 204.12 | | | | | | |
| 24 | 203.12 | | | | | | |

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. OW-1006

Sheet 2 of 5

SITE **Vogtle ALWR SSAR**

TOTAL DEPTH **135**

SURF.ELEV. **227.121**

| Depth | Elev. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | | |
|-------|--------|--|------------|---------------------------|-------|---|----------|--|--|
| | | | | From To | Blows | N | | | |
| 25 | 202.12 | See page 1 | | | | | | | |
| 26 | 201.12 | | | | | | | | |
| 27 | 200.12 | | | | | | | | |
| 28 | 199.12 | | | | | | | | |
| 29 | 198.12 | | | | | | | | |
| 30 | 197.12 | | | | | | | | |
| 31 | 196.12 | | | | | | | | |
| 32 | 195.12 | | | | | | | | |
| 33 | 194.12 | | | | | | | | |
| 34 | 193.12 | | | | | | | | |
| 35 | 192.12 | | | | | | | | |
| 36 | 191.12 | | | | | | | | |
| 37 | 190.12 | | | | | | | | |
| 38 | 189.12 | | | | | | | | |
| 39 | 188.12 | | | | | | | | |
| 40 | 187.12 | | | | | | | | |
| 41 | 186.12 | | | | | | | | |
| 42 | 185.12 | | | | | | | | |
| 43 | 184.12 | | | | | | | | |
| 44 | 183.12 | | | | | | | | |
| 45 | 182.12 | | | | | | | | |
| 46 | 181.12 | | | | | | | | |
| 47 | 180.12 | | | | | | | | |
| 48 | 179.12 | | | | | | | | |
| 49 | 178.12 | | | | | | | | |
| 50 | 177.12 | | | | | | | | |
| 51 | 176.12 | | | | | | | | |
| 52 | 175.12 | | | | | | | | |
| 53 | 174.12 | | | | | | | | |
| 54 | 172.49 | | | | | | | | |
| 55 | 172.12 | | | | | | | | |
| 56 | 171.12 | | | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1006

Sheet 3 of 5

SITE **Vogle ALWR SSAR**

TOTAL DEPTH **135**

SURF.ELEV. **227.121**

| Depth | Elev. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | | |
|-------|--------|--|------------|---------------------------|-------|---|----------|--|--|
| | | | | From To | Blows | N | | | |
| 57 | 170.12 | See page 1 | | | | | | | |
| 58 | 169.12 | | | | | | | | |
| 59 | 168.12 | | | | | | | | |
| 60 | 167.12 | | | | | | | | |
| 61 | 166.12 | | | | | | | | |
| 62 | 165.12 | | | | | | | | |
| 63 | 164.12 | | | | | | | | |
| 64 | 163.12 | | | | | | | | |
| 65 | 162.12 | | | | | | | | |
| 66 | 161.12 | | | | | | | | |
| 67 | 160.12 | | | | | | | | |
| 68 | 159.12 | | | | | | | | |
| 69 | 158.12 | | | | | | | | |
| 70 | 157.12 | | | | | | | | |
| 71 | 156.12 | | | | | | | | |
| 72 | 155.12 | | | | | | | | |
| 73 | 154.12 | | | | | | | | |
| 74 | 153.12 | | | | | | | | |
| 75 | 152.12 | | | | | | | | |
| 76 | 151.12 | | | | | | | | |
| 77 | 150.12 | | | | | | | | |
| 78 | 149.12 | | | | | | | | |
| 79 | 148.12 | | | | | | | | |
| 80 | 147.12 | | | | | | | | |
| 81 | 146.12 | | | | | | | | |
| 82 | 145.12 | | | | | | | | |
| 83 | 144.12 | | | | | | | | |
| 84 | 143.12 | | | | | | | | |
| 85 | 142.12 | | | | | | | | |
| 86 | 140.49 | | | | | | | | |
| 87 | 140.12 | | | | | | | | |
| 88 | 139.12 | | | | | | | | |

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. OW-1006

Sheet 4 of 5

SITE **Vogtle ALWR SSAR**

TOTAL DEPTH **135**

SURF.ELEV. **227.121**

| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|--|------------|---------------------------|---------|-------|----------------------------|
| | | | | From To ft. | Blows | N BPF | |
| 89 | | | | | | | |
| 90 | | | | | | | |
| 91 | | | | | | | |
| 92 | | | | | | | |
| 93 | | | | | | | |
| 94 | | | | | | | |
| 95 | | | | | | | |
| 96 | | | | | | | |
| 97 | | | | | | | |
| 98 | | | | | | | |
| 99 | | | | | | | |
| 100 | | | | | | | |
| 101 | | | | | | | |
| 102 | | | | | | | |
| 103 | | | | | | | |
| 104 | | | | | | | |
| 105 | | | | | | | |
| 106 | | | | | | | |
| 107 | | | | | | | |
| 108 | | | | | | | |
| 109 | | | | | | | |
| 110 | | | | | | | |
| 111 | | | | | | | |
| 112 | | | | | | | |
| 113 | | | | | | | |
| 114 | | | | | | | |
| 115 | | | | | | | |
| 116 | | | | | | | |
| 117 | | | | | | | |
| 118 | | Sampling begins at 118.5' | 1 | 118.5-120 | No SPTs | | Pushed because of problems |
| 119 | | Tan sandy and shelly CLAY (CH), saturated | | | | | |
| 120 | | | | | | | |

| DRILLING LOG GEOLOGICAL SERVICES | | | | | | | Hole No. OW-1006 |
|-------------------------------------|-----------|---|-----------------|---------------------------|--------------------|----|--|
| | | | | | | | Sheet 5 of 5 |
| SITE Vogtle ALWR SSAR | | | TOTAL DEPTH 135 | | SURF.ELEV. 227.121 | | |
| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
| | | | | From To ft. | Blows | N | |
| 121 | 106.12 | Tan sandy and shelly CLAY (CH), saturated | 2 | 123.5-125 | NA | NA | No SPTs Pushed because of drilling problems |
| 122 | 105.12 | | | | | | |
| 123 | 104.12 | | | | | | |
| 124 | 103.12 | | | | | | |
| 125 | 102.12 | | | | | | |
| 126 | 101.12 | | | | | | |
| 127 | 100.12 | | | | | | |
| 128 | 99.12 | Light tan, fine-coarse grained SAND with shell (SW) | 3 | 128.5-130 | NA | NA | |
| 129 | 98.12 | | | | | | |
| 130 | 97.12 | | | | | | |
| 131 | 96.12 | | | | | | |
| 132 | 95.12 | | | | | | |
| 133 | 94.12 | Greenish grey MARL | 4 | 133.5-135 | NA | NA | last sample at 135.0' |
| 134 | 93.12 | | | | | | |
| 135 | 92.12 | | | | | | |
| 136 | 91.12 | Boring terminated at 133.5 | | | | | ~six 150 gallon tubs of water used during drilling |
| 137 | 90.12 | | | | | | |
| 138 | 89.12 | | | | | | |
| 139 | 88.12 | | | | | | |
| 140 | 87.12 | | | | | | |
| 141 | 86.12 | | | | | | |
| 142 | 85.12 | | | | | | |
| 143 | 84.12 | | | | | | |
| 144 | 83.12 | | | | | | |
| 145 | 82.12 | | | | | | |
| 146 | 81.12 | | | | | | |
| 147 | 80.12 | | | | | | |
| 148 | 79.12 | | | | | | |
| 149 | 78.12 | | | | | | |
| 150 | 76.49 | | | | | | |
| 151 | 76.12 | | | | | | |
| 152 | 75.12 | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1006A

Sheet 1 of 5

| | | | |
|---------------------------------------|-------------------------|----------------------------------|-------------------------------------|
| SITE Vogtle ALWR SSAR | | HOLE DEPTH 125 | SURF.ELEV. 226.491 |
| LOCATION Burke County, Georgia | | COORDINATES N 1143910.384 | E 775393.399 |
| ANGLE NA | BEARING NA | CONTRACTOR S&ME | DRILL NO. CME 55 |
| DRILLING METHOD 4-1/4" HAS | | NO. SAMPLES 25 | NO. U.D. SAMPLES NA |
| WATER TABLE DEPTH 79' | ELEV. NA | TIME AFTER COMP. NA | DATE TAKEN 6/3/2005 |
| TYPE GROUT NA | QUANTITY NA | MIX NA | DRILLING START DATE 6/3/2005 |
| DRILLER Tim Hall | RECORDER Tinsley | APPROVED NA | DRILLING COMP. DATE 6/4/2005 |

| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|--|------------|---------------------------|-------|-------|----------|
| | | | | From To ft. | Blows | N BPF | |
| 0 | 225.49 | | | | | | |
| 1 | 224.49 | | | | | | |
| 2 | 223.49 | | | | | | |
| 3 | 222.49 | | | | | | |
| 4 | 221.49 | Yellowish brown SAND, fine-grained, loose (SP) | 1 | 3.5-5 | 5-5-7 | 12 | |
| 5 | 220.49 | | | | | | |
| 6 | 219.49 | | | | | | |
| 7 | 218.49 | | | | | | |
| 8 | 217.49 | | | | | | |
| 9 | 216.49 | Strong brown SAND, fine-grained, loose (SP) | 2 | 8.5-10 | 3-3-3 | 6 | |
| 10 | 215.49 | | | | | | |
| 11 | 214.49 | | | | | | |
| 12 | 213.49 | | | | | | |
| 13 | 212.49 | | | | | | |
| 14 | 211.49 | Reddish yellow SAND, fine-grained, loose (SP) | 3 | 13.5-15 | 3-5-7 | 12 | |
| 15 | 210.49 | | | | | | |
| 16 | 209.49 | | | | | | |
| 17 | 208.49 | | | | | | |
| 18 | 207.49 | | | | | | |
| 19 | 206.49 | Red and yellow SAND, fine-grained, loose (SP) | 4 | 18.5-20 | 3-4-5 | 9 | |
| 20 | 205.49 | | | | | | |
| 21 | 204.49 | | | | | | |
| 22 | 203.49 | | | | | | |
| 23 | 202.49 | | | | | | |
| 24 | 201.49 | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1006A

Sheet 2 of 5

| SITE | | Vogtle ALWR SSAR | | TOTAL DEPTH | | 125 | | SURF.ELEV. | | 226.491 | |
|-----------|-----------|---|------------|---------------------------|---------|---------|----------|------------|--|---------|--|
| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | | | | |
| | | | | From | To ft. | Blows | | N BPF | | | |
| 25 | 201.49 | Red and yellow SAND, fine-grained, loose (SP) | 5 | 23.5-25 | 4-4-4 | 8 | | | | | |
| 26 | 200.49 | | | | | | | | | | |
| 27 | 199.49 | | | | | | | | | | |
| 28 | 198.49 | | | | | | | | | | |
| 29 | 197.49 | | | | | | | | | | |
| 30 | 196.49 | | | | | | | | | | |
| 31 | 195.49 | | | | | | | | | | |
| 32 | 194.49 | | 6 | 28.5-30 | 3-4-6 | 10 | | | | | |
| 33 | 193.49 | | | | | | | | | | |
| 34 | 192.49 | | | | | | | | | | |
| 35 | 191.49 | | | | | | | | | | |
| 36 | 190.49 | | | | | | | | | | |
| 37 | 189.49 | | | | | | | | | | |
| 38 | 188.49 | | | | | | | | | | |
| 39 | 187.49 | Yellowish red silty SAND, fine-grained (SM) | 8 | 38.5-40 | WOR/18" | WOR/18" | | | | | |
| 40 | 186.49 | | | | | | | | | | |
| 41 | 185.49 | | | | | | | | | | |
| 42 | 184.49 | | | | | | | | | | |
| 43 | 183.49 | | | | | | | | | | |
| 44 | 182.49 | | | | | | | | | | |
| 45 | 181.49 | | | | | | | | | | |
| 46 | 180.49 | White SAND, fine-grained, loose, with black minerals (SP) | 9 | 43.5-45 | WOR 1-1 | 2 | | | | | |
| 47 | 179.49 | | | | | | | | | | |
| 48 | 178.49 | | | | | | | | | | |
| 49 | 177.49 | | | | | | | | | | |
| 50 | 176.49 | | | | | | | | | | |
| 51 | 175.49 | | | | | | | | | | |
| 52 | 174.49 | | | | | | | | | | |
| 53 | 173.49 | light gray CLAY, slightly sandy, medium stiff (CL) | 10 | 48.5-50 | 1-2-2 | 4 | | | | | |
| 54 | 172.49 | | | | | | | | | | |
| 55 | 171.49 | | | | | | | | | | |
| 56 | 170.49 | | | | | | | | | | |
| | | Reddish yellow clayey SAND (SC) | 11 | 53.5-55 | WOR/18 | WOR/18" | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. OW-1006A

Sheet 3 of 6

| SITE | | Vogle ALWR SSAR | | OTAL DEPTH | | 125 | | SURF.ELEV. | | 226.491 | | | |
|-----------|-----------|---|------------|---------------------------|----------|---------|----------|--|----|---------|----------|----|--|
| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | | | | | | |
| | | | | From To ft. | Blows | N BPF | | | | | | | |
| 57 | 169.49 | Light gray and reddish yellow sandy CLAY (CL), soft | 12 | 58.5-60 | 1-1-1 | 2 | | | | | | | |
| 58 | 168.49 | | | | | | | | | | | | |
| 59 | 167.49 | | | | | | | | | | | | |
| 60 | 166.49 | | | | | | | | | | | | |
| 61 | 165.49 | | | | | | | | | | | | |
| 62 | 164.49 | | | | | | | | | | | | |
| 63 | 163.49 | | | | | | | | | | | | |
| 64 | 162.49 | Yellow slightly sandy SILT (MH) | 13 | 63.5-65 | WOH/18" | WHO/18" | | | | | | | |
| 65 | 161.49 | | | | | | | | | | | | |
| 66 | 160.49 | | | | | | | | | | | | |
| 67 | 159.49 | | | | | | | | | | | | |
| 68 | 158.49 | | | | | | | | | | | | |
| 69 | 157.49 | | | | | | | | | | | | |
| 70 | 156.49 | | | | | | | Mottled red to gray clayey SAND, fine- to medium-grained (SC) | 14 | 68.5-70 | WOH/12/5 | 17 | |
| 71 | 155.49 | | | | | | | | | | | | |
| 72 | 154.49 | | | | | | | | | | | | |
| 73 | 153.49 | | | | | | | | | | | | |
| 74 | 152.49 | | | | | | | | | | | | |
| 75 | 151.49 | | | | | | | | | | | | |
| 76 | 150.49 | | 15 | 73.5-75 | 2-4-3 | 7 | | | | | | | |
| 77 | 149.49 | | | | | | | | | | | | |
| 78 | 148.49 | | | | | | | | | | | | |
| 79 | 147.49 | | | | | | | | | | | | |
| 80 | 146.49 | | | | | | | Yellowish brown SAND, fine- to coarse-grained slight fines (SW), loose | 16 | 78.5-80 | 3-2-2 | 4 | 6/3/2005 ▼ 79' from ground surface |
| 81 | 145.49 | | | | | | | | | | | | |
| 82 | 144.49 | | | | | | | | | | | | |
| 83 | 143.49 | Pale yellow clayey SAND, to sandy CLAY with small to large shell fragments, stiff (SC-CL) | 17 | 83.5-85 | 12-16-17 | 33 | | | | | | | |
| 84 | 142.49 | | | | | | | | | | | | |
| 85 | 141.49 | | | | | | | | | | | | |
| 86 | 140.49 | | | | | | | | | | | | |
| 87 | 139.49 | | | | | | | | | | | | |
| 88 | 138.49 | | | | | | | | | | | | |

6/3/2005
▼
79' from ground surface

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1006A

Sheet 4 of 5

| SITE | | Vogtle ALWR SSAR | | TOTAL DEPTH | | 125 | | SURF.ELEV. | | 226.491 | |
|-----------|-----------|--|------------|---------------------------|----------|-------|----------|------------|--|---------|--|
| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | | | | |
| | | | | From To ft. | Blows | N BPF | | | | | |
| 89 | 137.49 | Pale yellow sandy CLAY, stiff, calcareous (shell fragments) (CL) | 18 | 88.5-90 | 7-7-9 | 16 | | | | | |
| 90 | 136.49 | | | | | | | | | | |
| 91 | 135.49 | | | | | | | | | | |
| 92 | 134.49 | | | | | | | | | | |
| 93 | 133.49 | Pinkish white clayey SAND, fine - coarse-grained with shell fragments (SC) | 19 | 93.5-95 | 8-8-9 | 17 | | | | | |
| 94 | 132.49 | | | | | | | | | | |
| 95 | 131.49 | | | | | | | | | | |
| 96 | 130.49 | | | | | | | | | | |
| 97 | 129.49 | Light gray SAND, fine-grained (SP) | 20 | 98.5-100 | 12-14-17 | 31 | | | | | |
| 98 | 128.49 | | | | | | | | | | |
| 99 | 127.49 | | | | | | | | | | |
| 100 | 126.49 | | | | | | | | | | |
| 101 | 125.49 | | 21 | 103.5-105 | 7-7-8 | 15 | | | | | |
| 102 | 124.49 | | | | | | | | | | |
| 103 | 123.49 | | | | | | | | | | |
| 104 | 122.49 | | | | | | | | | | |
| 105 | 121.49 | Light gray SAND, fine-to medium grained, increase in fines (SW) | 22 | 108.5-110 | 10-10-10 | 20 | | | | | |
| 106 | 120.49 | | | | | | | | | | |
| 107 | 119.49 | | | | | | | | | | |
| 108 | 118.49 | | | | | | | | | | |
| 109 | 117.49 | Very light tan silty SAND (SM) | 23 | 113.5-115 | 10-11-14 | 25 | | | | | |
| 110 | 116.49 | | | | | | | | | | |
| 111 | 115.49 | | | | | | | | | | |
| 112 | 114.49 | | | | | | | | | | |
| 113 | 113.49 | | 24 | 118.5-120 | 8-9-10 | 19 | | | | | |
| 114 | 112.49 | | | | | | | | | | |
| 115 | 111.49 | | | | | | | | | | |
| 116 | 110.49 | | | | | | | | | | |
| 117 | 109.49 | light gray COQUINA, unconsolidated | 25 | | | | | | | | |
| 118 | 108.49 | | | | | | | | | | |
| 119 | 107.49 | | | | | | | | | | |
| 120 | 106.49 | | | | | | | | | | |

| DRILLING LOG GEOLOGICAL SERVICES | | | | | | Hole No. OW-1006A | |
|-------------------------------------|-----------|---|-----------------|---------------------------|--------------------|-------------------|----------|
| | | | | | | Sheet 5 of 5 | |
| SITE Vogtle ALWR SSAR | | | TOTAL DEPTH 125 | | SURF.ELEV. 226.491 | | |
| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
| | | | | From | To ft. | Blows | |
| 121 | 105.49 | light gray COQUINA, unconsolidated | 25 | 23.5-12 | 9-16-16 | 32 | |
| 122 | 104.49 | | | | | | |
| 123 | 103.49 | | | | | | |
| 124 | 102.49 | | | | | | |
| 125 | 101.49 | | | | | | |
| 126 | 100.49 | Boring terminated at 125' due to shortage of auger. This borehole was abandoned. | | | | | |
| 127 | 99.49 | | | | | | |
| 128 | 98.49 | | | | | | |
| 129 | 97.49 | | | | | | |
| 130 | 96.49 | | | | | | |
| 131 | 95.49 | | | | | | |
| 132 | 94.49 | | | | | | |
| 133 | 93.49 | | | | | | |
| 134 | 92.49 | | | | | | |
| 135 | 91.49 | | | | | | |
| 136 | 90.49 | | | | | | |
| 137 | 89.49 | | | | | | |
| 138 | 88.49 | | | | | | |
| 139 | 87.49 | | | | | | |
| 140 | 86.49 | | | | | | |
| 141 | 85.49 | | | | | | |
| 142 | 84.49 | | | | | | |
| 143 | 83.49 | | | | | | |
| 144 | 82.49 | | | | | | |
| 145 | 81.49 | | | | | | |
| 146 | 80.49 | | | | | | |
| 147 | 79.49 | | | | | | |
| 148 | 78.49 | | | | | | |
| 149 | 77.49 | | | | | | |
| 150 | 76.49 | | | | | | |
| 151 | 75.49 | | | | | | |
| 152 | 74.49 | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. **OW-1007**

Sheet 1 of 5

| | | | |
|---------------------------------------|-------------------|----------------------------------|-------------------------------------|
| SITE Vogtle ALWR SSAR | | IOLE DEPTH 122 | SURF.ELEV. 216.91 |
| LOCATION Burke County, Georgia | | COORDINATES N 1142383.767 | E 619301.009 |
| ANGLE NA | BEARING NA | CONTRACTOR Greene | DRILL NO. CME 75 1993 |
| DRILLING METHOD 4 1/4" HSA | | NO. SAMPLES 6 | NO. U.D. SAMPLES NA |
| WATER TABLE DEPTH NA | | ELEV. NA | TIME AFTER COMP. NA |
| TYPE GROUT NA | | QUANTITY NA | MIX NA |
| DRILLER Arthur/Jarrell | | RECORDER SC Bearce | APPROVED NA |
| | | DATE TAKEN 6/4/2005 | DRILLING COMP. DATE 6/7/2005 |

| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|---|------------|---------------------------|-------|-------|----------|
| | | | | From To ft. | Blows | N BPF | |
| 0 | 216.91 | | | | | | |
| 1 | 215.91 | Sampling in this borehole began at 98.5' (Sheet 4). | | | | | |
| 2 | 214.91 | | | | | | |
| 3 | 213.91 | OW-1007 is a well pair with OW-1008. See boring log for OW-1008 for description of upper sediments. | | | | | |
| 4 | 212.91 | | | | | | |
| 5 | 211.91 | | | | | | |
| 6 | 210.91 | | | | | | |
| 7 | 209.91 | | | | | | |
| 8 | 208.91 | | | | | | |
| 9 | 207.91 | | | | | | |
| 10 | 206.91 | | | | | | |
| 11 | 205.91 | | | | | | |
| 12 | 204.91 | | | | | | |
| 13 | 203.91 | | | | | | |
| 14 | 202.91 | | | | | | |
| 15 | 201.91 | | | | | | |
| 16 | 200.91 | | | | | | |
| 17 | 199.91 | | | | | | |
| 18 | 198.91 | | | | | | |
| 19 | 197.91 | | | | | | |
| 20 | 196.91 | | | | | | |
| 21 | 195.91 | | | | | | |
| 22 | 194.91 | | | | | | |
| 23 | 193.91 | | | | | | |
| 24 | 192.91 | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1007

Sheet 2 of 5

SITE **Vogtle ALWR SSAR**

TOTAL DEPTH **122**

SURF.ELEV. **216.91**

| Depth | Elev. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-------|--------|--|------------|---------------------------|-------|---|----------|
| | | | | From To | Blows | N | |
| 25 | 191.91 | See page 1 | | | | | |
| 26 | 190.91 | | | | | | |
| 27 | 189.91 | | | | | | |
| 28 | 188.91 | | | | | | |
| 29 | 187.91 | | | | | | |
| 30 | 186.91 | | | | | | |
| 31 | 185.91 | | | | | | |
| 32 | 184.91 | | | | | | |
| 33 | 183.91 | | | | | | |
| 34 | 182.91 | | | | | | |
| 35 | 181.91 | | | | | | |
| 36 | 180.91 | | | | | | |
| 37 | 179.91 | | | | | | |
| 38 | 178.91 | | | | | | |
| 39 | 177.91 | | | | | | |
| 40 | 176.91 | | | | | | |
| 41 | 175.91 | | | | | | |
| 42 | 174.91 | | | | | | |
| 43 | 173.91 | | | | | | |
| 44 | 172.91 | | | | | | |
| 45 | 171.91 | | | | | | |
| 46 | 170.91 | | | | | | |
| 47 | 169.91 | | | | | | |
| 48 | 168.91 | | | | | | |
| 49 | 167.91 | | | | | | |
| 50 | 166.91 | | | | | | |
| 51 | 165.91 | | | | | | |
| 52 | 164.91 | | | | | | |
| 53 | 163.91 | | | | | | |
| 54 | 162.28 | | | | | | |
| 55 | 161.91 | | | | | | |
| 56 | 160.91 | | | | | | |

216.28



DRILLING LOG GEOLOGICAL SERVICES

Hole No. OW-1007

Sheet 3 of 5

SITE Vogtle ALWR SSAR

TOTAL DEPTH 122

SURF.ELEV. 216.91

| Depth | Elev. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-------|--------|--|------------|---------------------------|-------|---|----------|
| | | | | From To | Blows | N | |
| 57 | 159.91 | See page 1 | | | | | |
| 58 | 158.91 | | | | | | |
| 59 | 157.91 | | | | | | |
| 60 | 156.91 | | | | | | |
| 61 | 155.91 | | | | | | |
| 62 | 154.91 | | | | | | |
| 63 | 153.91 | | | | | | |
| 64 | 152.91 | | | | | | |
| 65 | 151.91 | | | | | | |
| 66 | 150.91 | | | | | | |
| 67 | 149.91 | | | | | | |
| 68 | 148.91 | | | | | | |
| 69 | 147.91 | | | | | | |
| 70 | 146.91 | | | | | | |
| 71 | 145.91 | | | | | | |
| 72 | 144.91 | | | | | | |
| 73 | 143.91 | | | | | | |
| 74 | 142.91 | | | | | | |
| 75 | 141.91 | | | | | | |
| 76 | 140.91 | | | | | | |
| 77 | 139.91 | | | | | | |
| 78 | 138.91 | | | | | | |
| 79 | 137.91 | | | | | | |
| 80 | 136.91 | | | | | | |
| 81 | 135.91 | | | | | | |
| 82 | 134.91 | | | | | | |
| 83 | 133.91 | | | | | | |
| 84 | 132.91 | | | | | | |
| 85 | 131.91 | | | | | | |
| 86 | 130.28 | | | | | | |
| 87 | 129.91 | | | | | | |
| 88 | 128.91 | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1007

Sheet 4 of 5

SITE **Vogtle ALWR SSAR**

TOTAL DEPTH **122**

SURF.ELEV. **216.91**

| Depth Ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|--|------------|---------------------------|-------|-------|----------|
| | | | | From To Ft. | Blows | N BPF | |
| 89 | 127.91 | | | | | | |
| 90 | 126.91 | | | | | | |
| 91 | 125.91 | | | | | | |
| 92 | 124.91 | | | | | | |
| 93 | 123.91 | | | | | | |
| 94 | 122.91 | | | | | | |
| 95 | 121.91 | | | | | | |
| 96 | 120.91 | | | | | | |
| 97 | 119.91 | | | | | | |
| 98 | 118.91 | Drilling begins at 98.5' | | | | | |
| 99 | 117.91 | | 1 | 98.5-100 | WOR | | |
| 100 | 116.91 | | | | | | |
| 101 | 115.91 | | | | | | |
| 102 | 114.91 | | | | | | |
| 103 | 113.91 | | | | | | |
| 104 | 112.91 | Tan fine-grained silty SAND (SM), saturated | 2 | 103.5-105 | 2-4-6 | 10 | |
| 105 | 111.91 | | | | | | |
| 106 | 110.91 | | | | | | |
| 107 | 109.91 | | | | | | |
| 108 | 108.91 | | | | | | |
| 109 | 107.91 | Very light tan silty SAND (SM) becoming shelly | 3 | 108.5-110 | 50/5" | 50/5" | |
| 110 | 106.91 | | | | | | |
| 111 | 105.91 | | | | | | |
| 112 | 104.91 | | | | | | |
| 113 | 103.91 | | | | | | |
| 114 | 102.91 | light olive grey CLAY(CH) | 4 | 113.5-115 | 80/3" | 50/3" | |
| 115 | 101.91 | | | | | | |
| 116 | 100.91 | | | | | | |
| 117 | 99.91 | | | | | | |
| 118 | | | | | | | |
| 119 | 97.91 | Greenish grey MARL | 5 | 118.5-120 | NA | NA | |
| 120 | 96.91 | | | | | | |

| DRILLING LOG | | | | | | | Hole No. | OW-1007 |
|-----------------------|-----------|--|------------|---------------------------|-------|---------|---|---------|
| GEOLOGICAL SERVICES | | | | | | | Sheet 5 of 5 | |
| SITE Vogtle ALWR SSAR | | | | TOTAL DEPTH | | 122 | SURF.ELEV. | 216.91 |
| Depth Ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | |
| | | | | From To Ft. | Blows | N (BPF) | | |
| 121 | 95.91 | Greenish grey MARL | 5 | 120-122 | NA | NA | ss pushed with hydraulics because cat-head broke | |
| 122 | 94.91 | Boring terminated at 122' | | | | | | |
| 123 | 93.91 | | | | | | Estimated 3 auger volumes of light drilling fluid lost in this hole. | |
| 124 | 92.91 | | | | | | | |
| 125 | 91.91 | | | | | | Approximately 100 gallons of water used in drilling and installation activities in addition to fluid. | |
| 126 | 90.91 | | | | | | | |
| 127 | 89.91 | | | | | | | |
| 128 | 88.91 | | | | | | | |
| 129 | 87.91 | | | | | | | |
| 130 | 86.91 | | | | | | | |
| 131 | 85.91 | | | | | | | |
| 132 | 84.91 | | | | | | | |
| 133 | 83.91 | | | | | | | |
| 134 | 82.91 | | | | | | | |
| 135 | 81.91 | | | | | | | |
| 136 | 80.91 | | | | | | | |
| 137 | 79.91 | | | | | | | |
| 138 | 78.91 | | | | | | | |
| 139 | 77.91 | | | | | | | |
| 140 | 76.91 | | | | | | | |
| 141 | 75.91 | | | | | | | |
| 142 | 74.91 | | | | | | | |
| 143 | 73.91 | | | | | | | |
| 144 | 72.91 | | | | | | | |
| 145 | 71.91 | | | | | | | |
| 146 | 70.91 | | | | | | | |
| 147 | 69.91 | | | | | | | |
| 148 | 68.91 | | | | | | | |
| 149 | 67.91 | | | | | | | |
| 150 | 66.28 | | | | | | | |
| 151 | 65.91 | | | | | | | |
| 152 | 64.91 | | | | | | | |

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. OW-1008

Sheet 1 of 8

SITE Vogtle ALWR SSAR HOLE DEPTH 247 SURF. ELEV. 216.65

LOCATION Burke County, Georgia COORDINATES N 1142347.939 E 619306.686

ANGLE NA BEARING NA CONTRACTOR Kilman/Prosonic DRILL NO. CME 45/SR-083

DRILLING METHOD 3-1/4" HSA and Rotosonic NO. SAMPLES 47 NO. U.D. SAMPLES NA

WATER TABLE DEPTH 89.78' TOC ELEV. 128.24' TIME AFTER COMP. NA DATE TAKEN 6/7/2005

TYPE GROUT NA QUANTITY NA MIX NA DRILLING START DATE 5/25-26/2005 - Kilman

DRILLER Tony RECORDER S Bearce APPROVED NA DRILLING COMP. DATE 5/31-6/1/2005 - Prosonic

| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|--|------------|---------------------------|----------|---------|----------|
| | | | | From To ft. | Blows | N (bpf) | |
| 0 | 216.65 | | | | | | |
| 1 | 215.65 | | | | | | |
| 2 | 214.65 | | | | | | |
| 3 | 213.65 | | | | | | |
| 4 | 212.65 | | | | | | |
| 5 | 211.02 | Light red fine-grained silty SAND | 1A | 3.5-5 | 24-25-15 | 40 | |
| 6 | 210.65 | | | | | | |
| 7 | 209.65 | | | | | | |
| 8 | 208.65 | | | | | | |
| 9 | 207.65 | | | | | | |
| 10 | 206.65 | | 2A | 8.5-10 | 21-22-7 | 29 | |
| 11 | 205.65 | | | | | | |
| 12 | 204.65 | | | | | | |
| 13 | 203.65 | | | | | | |
| 14 | 202.65 | | | | | | |
| 15 | 201.65 | | 3A | 13.5-15 | 10-15-14 | 29 | |
| 16 | 200.65 | | | | | | |
| 17 | 199.65 | | | | | | |
| 18 | 198.65 | | | | | | |
| 19 | 197.65 | | | | | | |
| 20 | 196.65 | | 4A | 18.5-20 | 6-4-7 | 11 | |
| 21 | 195.65 | | | | | | |
| 22 | 194.65 | | | | | | |
| 23 | 193.65 | | | | | | |
| 24 | 192.65 | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1008

Sheet 2 of 8

SITE **Vogle ALWR SSAR**

TOTAL DEPTH **247**

SURF.ELEV. **216.65**

| Depth | Elev. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | % Rec | RQD |
|-------|--------|--|------------|---------------------------|----------|----|----------|-------|-----|
| | | | | From To | Blows | N | | | |
| 25 | 191.65 | Light yellow fine-grained SAND | 5A | 23.5-25 | 15-24-47 | 71 | | | |
| 26 | 190.65 | | | | | | | | |
| 27 | 189.65 | | | | | | | | |
| 28 | 188.65 | | | | | | | | |
| 29 | 187.65 | | | | | | | | |
| 30 | 186.65 | | | | | | | | |
| 31 | 185.65 | Light yellow fine-grained silty SAND | 6A | 28.5-30 | 19-14-18 | 32 | | | |
| 32 | 184.65 | | | | | | | | |
| 33 | 183.65 | | | | | | | | |
| 34 | 182.65 | | | | | | | | |
| 35 | 181.65 | | | | | | | | |
| 36 | 180.65 | | | | | | | | |
| 37 | 179.65 | Light red fine-grained silty SAND | 7A | 33.5-35 | 28-24-19 | 43 | | | |
| 38 | 178.65 | | | | | | | | |
| 39 | 177.65 | | | | | | | | |
| 40 | 176.65 | | | | | | | | |
| 41 | 175.65 | | | | | | | | |
| 42 | 174.65 | | | | | | | | |
| 43 | 173.65 | | 8A | 38.5-40 | 3-8-16 | 24 | | | |
| 44 | 172.65 | | | | | | | | |
| 45 | 171.65 | | | | | | | | |
| 46 | 170.65 | | | | | | | | |
| 47 | 169.65 | | | | | | | | |
| 48 | 168.65 | | | | | | | | |
| 49 | 167.65 | | 9A | 43.5-45 | 18-27-35 | 62 | | | |
| 50 | 166.65 | | | | | | | | |
| 51 | 165.65 | | | | | | | | |
| 52 | 164.65 | | | | | | | | |
| 53 | 163.65 | | | | | | | | |
| 54 | 162.02 | | | | | | | | |
| 55 | 161.65 | | 10A | 48.5-50 | 14-5-6 | 11 | | | |
| 56 | 160.65 | | | | | | | | |
| 57 | 160.65 | | 11A | 53.5-55 | 20-21-23 | 44 | | | |
| 58 | 160.65 | | | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1008

Sheet 3 of 8

SITE **Vogtle ALWR SSAR**

TOTAL DEPTH **247**

SURF.ELEV. **216.65**

| Depth | Elev. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | % Rec | RQD |
|-------|--------|--|------------|---------------------------|-------|----|-----------------------|-------|-----|
| | | | | From To | Blows | N | | | |
| 57 | 159.65 | Mottled reddish yellow brown fine-grained silty SAND | 12A | 58.5-60 | 4-6-6 | 12 | | | |
| 58 | 158.65 | | | | | | | | |
| 59 | 157.65 | | | | | | | | |
| 60 | 156.65 | | | | | | | | |
| 61 | 155.65 | | | | | | | | |
| 62 | 154.65 | Mottled light-red fine-grained silty sand | 13A | 63.5-65 | 4-4-5 | 9 | | | |
| 63 | 153.65 | | | | | | | | |
| 64 | 152.65 | | | | | | | | |
| 65 | 151.65 | | | | | | | | |
| 66 | 150.65 | | | | | | | | |
| 67 | 149.65 | Light red fine-grained silty SAND, moist | 14A | 68.5-70 | 3-2-3 | 5 | | | |
| 68 | 148.65 | | | | | | | | |
| 69 | 147.65 | | | | | | | | |
| 70 | 146.65 | | | | | | | | |
| 71 | 145.65 | | | | | | | | |
| 72 | 144.65 | White medium grained silty SAND - moist | 15A | 73.5-75 | 2-2-2 | 4 | | | |
| 73 | 143.65 | | | | | | | | |
| 74 | 142.65 | | | | | | | | |
| 75 | 141.65 | | | | | | | | |
| 76 | 140.65 | | | | | | | | |
| 77 | 139.65 | White silty medium-grained SAND with shell fragments | 16A | 78.5-80 | 2-3-3 | 6 | 5/25.2005 ▼ 80' | | |
| 78 | 138.65 | | | | | | | | |
| 79 | 137.65 | | | | | | | | |
| 80 | 136.65 | | | | | | | | |
| 81 | 135.65 | | | | | | | | |
| 82 | 134.65 | White silty sandy SHELL HASH | 17A | 83.5-85 | 2-2-2 | 4 | | | |
| 83 | 133.65 | | | | | | | | |
| 84 | 132.65 | | | | | | | | |
| 85 | 131.65 | | | | | | | | |
| 86 | 130.02 | | | | | | | | |
| 87 | 129.65 | | | | | | | | |
| 88 | 128.65 | | | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1008

Sheet 4 of 8

SITE **Vogtle ALWR SSAR**

247

SURF.ELEV. 216.65

| Depth ft. | Elev.ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|----------|--|------------|---------------------------|----------|---------|-----------------------------------|
| | | | | From To ft. | Blows | N (bpf) | |
| 89 | 127.65 | White medium-grained silty SAND, moist | 18A | 88.5-90 | 3-4-4 | 8 | 6/7/05 ▼ 89.78' from TOC |
| 90 | 126.65 | | | | | | |
| 91 | 125.65 | | | | | | |
| 92 | 124.65 | | | | | | |
| 93 | 123.65 | | | | | | |
| 94 | 122.65 | White medium-grained silty SAND, with shell fragments and sharks teeth | 19A | 93.5-95 | 17-24-21 | 45 | |
| 95 | 121.65 | | | | | | |
| 96 | 120.65 | | | | | | |
| 97 | 119.65 | | | | | | |
| 98 | 118.65 | | | | | | |
| 99 | 117.65 | White silty SHELL HASH, saturated | 20A | 98.5-100 | 50/2" | 50.2" | |
| 100 | 116.65 | | | | | | |
| 101 | 115.65 | | | | | | |
| 102 | 114.65 | | | | | | |
| 103 | 113.65 | | | | | | |
| 104 | 112.65 | White medium-grained silty SAND, saturated | 21A | 102.5-105 | 18-20-22 | 44 | Kilman drills to 105' |
| 105 | 111.65 | | | | | | |
| 106 | 110.65 | | | | | | |
| 107 | 109.65 | | | | | | |
| 108 | 108.65 | | | | | | |
| 109 | 107.65 | Yellowish tan, fine-medium and coarse grained SAND (SW) clay and silt present but generally less than 10% Coarse sand fraction composed of angular shell fragments ranging in size from 2mm to 1 cm. Occasional larger shell fragments. Abrupt change/contact between sample intervals | 1 | 108.5 - 110 | | | Prosonic completes hole from 107' |
| 110 | 106.65 | | | | | | |
| 111 | 105.65 | | | | | | |
| 112 | 104.65 | | | | | | |
| 113 | 103.65 | | | | | | |
| 114 | 102.65 | Medium greenish grey MARL with occasional fossils. | 2 | 113.5-115 | NA | NA | |
| 115 | 101.65 | | | | | | |
| 116 | 100.65 | | | | | | |
| 117 | 99.65 | | | | | | |
| 118 | 98.02 | | | | | | |
| 119 | 97.65 | | 3 | 118.5-120 | NA | NA | |
| 120 | 96.65 | | | | | | |

DRILLING LOG **GEOLOGICAL SERVICES**

Hole No. OW-1008

Sheet 5 of 8

SITE **Vogtle ALWR SSAR**

TOTAL DEPTH **247**

SURF.ELEV. **216.65**

| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|---|------------|---------------------------|-------|---------|----------|
| | | | | From To ft. | Blows | N (bpf) | |
| 121 | 95.65 | Medium greenish grey MARL with occassional fossils. | 4 | 123.5-125 | NA | NA | |
| 122 | 94.65 | | | | | | |
| 123 | 93.65 | | | | | | |
| 124 | 92.65 | | | | | | |
| 125 | 91.65 | | | | | | |
| 126 | 90.65 | | | | | | |
| 127 | 89.65 | | 5 | 128.5-130 | NA | NA | |
| 128 | 88.65 | | | | | | |
| 129 | 87.65 | | | | | | |
| 130 | 86.65 | | | | | | |
| 131 | 85.65 | | | | | | |
| 132 | 84.65 | | | | | | |
| 133 | 83.65 | | 6 | 133.5-135 | NA | NA | |
| 134 | 82.65 | | | | | | |
| 135 | 81.65 | | | | | | |
| 136 | 80.65 | | | | | | |
| 137 | 79.65 | | | | | | |
| 138 | 78.65 | | | | | | |
| 139 | 77.65 | | 7 | 138.5-140 | NA | NA | |
| 140 | 76.65 | | | | | | |
| 141 | 75.65 | | | | | | |
| 142 | 74.65 | | | | | | |
| 143 | 73.65 | | | | | | |
| 144 | 72.65 | | | | | | |
| 145 | 71.65 | | 8 | 148.5-150 | Na | NA | |
| 146 | 70.65 | | | | | | |
| 147 | 69.65 | | | | | | |
| 148 | 68.65 | | | | | | |
| 149 | 67.65 | | | | | | |
| 150 | | | | | | | |
| 151 | 65.65 | | | | | | |
| 152 | 64.65 | | | | | | |

| DRILLING LOG GEOLOGICAL SERVICES | | | | | | Hole No. OW-1008 |
|-------------------------------------|-----------|---|------------|---------------------------|-------------------|------------------|
| SITE Vogtle ALWR SSAR | | | | | | Sheet 6 of 8 |
| TOTAL DEPTH 247 | | | | | SURF.ELEV. 216.65 | |
| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | Comments |
| | | | | From To ft. | Blows | N (bpf) |
| 153 | 63.65 | | | | | |
| 154 | 62.65 | | | | | |
| 155 | 61.65 | | | | | |
| 156 | 60.65 | | | | | |
| 157 | 59.65 | Medium greenish grey MARL with occassional fossils. | | | | |
| 158 | 58.65 | | 9 | 158.5-160 | NA | NA |
| 159 | 57.65 | | | | | |
| 160 | 56.65 | | | | | |
| 161 | 55.65 | | | | | |
| 162 | 54.65 | | | | | |
| 163 | 53.65 | | 10 | 163.5-165 | NA | NA |
| 164 | 52.65 | | | | | |
| 165 | 51.65 | | | | | |
| 166 | 50.65 | | | | | |
| 167 | 49.65 | Same MARL | | | | |
| 168 | 48.65 | | 11 | 168.5-170 | NA | NA |
| 169 | 47.65 | | | | | |
| 170 | 46.65 | | | | | |
| 171 | 45.65 | | | | | |
| 172 | 44.65 | | | | | |
| 173 | 43.65 | | 12 | 173.5-175 | NA | NA |
| 174 | 42.65 | | | | | |
| 175 | 41.65 | | | | | |
| 176 | 40.65 | Grades to Shelly or fine to coarse grained SAND (SP) composed of whole and angular shell fragments in a MARL matrix (70%) | | | | |
| 177 | 39.65 | | | | | |
| 178 | 38.65 | | 13 | 178.5-180 | NA | NA |
| 179 | 37.65 | | | | | |
| 180 | 36.65 | "Sand" ranges from 10-30% | | | | |
| 181 | 35.65 | | | | | |
| 182 | | | | | | |
| 183 | 33.65 | | 14 | 183.5-185 | NA | NA |
| 184 | 32.65 | | | | | |

DRILLING LOG **GEOLOGICAL SERVICES**

Hole No. OW-1008

Sheet 7 of 8

SITE **Vogtle ALWR SSAR**

TAL DEPTH

247

SURF.ELEV.

216.65

| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|---|------------|---------------------------|-------|---------|----------|
| | | | | From To ft. | Blows | N (bpf) | |
| 185 | 31.65 | Same shelly MARL | 15 | 188.5-190 | NA | NA | |
| 186 | 30.65 | | | | | | |
| 187 | 29.65 | | | | | | |
| 188 | 28.65 | | | | | | |
| 189 | 27.65 | | | | | | |
| 190 | 26.65 | | | | | | |
| 191 | 25.65 | Same shelly MARL | 16 | 193.5-195 | NA | NA | |
| 192 | 24.65 | | | | | | |
| 193 | 23.65 | | | | | | |
| 194 | 22.65 | | | | | | |
| 195 | 21.65 | | | | | | |
| 196 | 20.65 | | | | | | |
| 197 | 19.65 | | | | | | |
| 198 | 18.65 | | | | | | |
| 199 | 17.65 | | | | | | |
| 200 | 16.65 | | | | | | |
| 201 | 15.65 | Dark grey silty SAND, (SM) fine grained SAND with some zones (1-2) feet of fine to coarse grained silty SAND (SM) | 18 | 203.5-205 | NA | NA | |
| 202 | 14.65 | | | | | | |
| 203 | 13.65 | | | | | | |
| 204 | 12.65 | | | | | | |
| 205 | 11.65 | | | | | | |
| 206 | 10.65 | | | | | | |
| 206 | 10.65 | | | | | | |
| 208 | 8.65 | | | | | | |
| 209 | 7.65 | | | | | | |
| 210 | 6.65 | | | | | | |
| 211 | 5.65 | | 19 | 208.5-210 | NA | NA | |
| 212 | 4.65 | | | | | | |
| 213 | 3.65 | | | | | | |
| 214 | 2.02 | | | | | | |
| 215 | 1.65 | | | | | | |
| 216 | 0.65 | | | | | | |
| | | | 20 | 213.5-215 | NA | NA | |

| DRILLING LOG | | | | | | | Hole No. | OW-1008 |
|-----------------------|-----------|--|------------|---------------------------|-------|-------------------|--------------|---------|
| GEOLOGICAL SERVICES | | | | | | | Sheet 8 of 8 | |
| SITE Vogtle ALWR SSAR | | | | TAL DEPTH | | SURF.ELEV. 216.65 | | |
| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | |
| | | | | From To ft. | Blows | N (bpf) | | |
| 217 | -0.35 | Dark grey silty SAND, (SM) fine-grained SAND with some zones (1-2) feet of fine- to coarse-grained silty SAND (SM) | 21 | 218.5-220 | NA | NA | | |
| 218 | -1.35 | | | | | | | |
| 219 | -2.35 | | | | | | | |
| 220 | -3.35 | | | | | | | |
| 221 | -4.35 | | | | | | | |
| 222 | -6.35 | Gradual change to grey fine SAND (SW) Light grey fine SAND (SW) | 22 | 223.5-225 | NA | NA | | |
| 223 | -6.35 | | | | | | | |
| 224 | -7.35 | | | | | | | |
| 225 | -8.35 | | | | | | | |
| 226 | -9.35 | | | | | | | |
| 227 | -10.35 | | 23 | 228.5-230 | NA | NA | | |
| 228 | -11.35 | | | | | | | |
| 229 | -12.35 | | | | | | | |
| 230 | -13.35 | | | | | | | |
| 231 | -14.35 | | | | | | | |
| 232 | -15.35 | | 24 | 233.5-235 | NA | NA | | |
| 233 | -16.35 | | | | | | | |
| 234 | -17.35 | | | | | | | |
| 235 | -18.35 | | | | | | | |
| 236 | -19.35 | | | | | | | |
| 237 | -20.35 | Grey silty SAND (SM) | 25 | 238.5-240 | NA | NA | | |
| 238 | -21.35 | | | | | | | |
| 239 | -22.35 | | | | | | | |
| 240 | -23.35 | | | | | | | |
| 241 | -24.35 | | | | | | | |
| 242 | -25.35 | Abrupt change to light grey siliceous clay, (CL), to weak SHALE | 26 | 243.5-245 | NA | NA | | |
| 243 | -26.35 | | | | | | | |
| 244 | -27.35 | | | | | | | |
| 245 | -28.35 | | | | | | | |
| 246 | -29.35 | | | | | | | |
| 247 | -30.98 | Boring terminated at 247'. Well OW-1008 installed in this borehole. | | | | | | |
| 248 | -31.35 | | | | | | | |
| 249 | -32.35 | | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1008A

Sheet 1 of 4

| | | | |
|------------------------------------|-----------------------------|-------------------------------|--------------------------------------|
| SITE Vogtle ALWR SSAR - ESP | | OLE DEPTH 107.5 | SURF.ELEV. NA |
| LOCATION Burke County, GA | | COORDINATES N | E |
| ANGLE NA | BEARING NA | CONTRACTOR Kilman Bro. | DRILL NO. CME-55 |
| DRILLING METHOD 3 1/4" HAS | | NO. SAMPLES 21 | NO. U.D. SAMPLES 0 |
| WATER TABLE DEPTH 80 | ELEV. 136 | TIME AFTER COMP. NA | DATE TAKEN 5/26/2005 |
| TYPE GROUT NA | QUANTITY NA | MIX NA | DRILLING START DATE 5/26/2005 |
| DRILLER Kilman Bro. | RECORDER RA Esposito | APPROVED NA | DRILLING COMP. DATE 5/26/2005 |

| Depth FT. | Elev. FT. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|--|------------|---------------------------|----------|---------|----------|
| | | | | From To FT. | Blows | N (bpf) | |
| 0 | | | | | | | |
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | | Light red fine-grained silty SAND | 1 | 3.5-5 | 24-25-15 | 40 | |
| 6 | | | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |
| 9 | | | | | | | |
| 10 | | | 2 | 8.5-10 | 21-22-7 | 29 | |
| 11 | | | | | | | |
| 12 | | | | | | | |
| 13 | | | | | | | |
| 14 | | | | | | | |
| 15 | | | S-3 | 13.5-15 | 10-15-14 | 29 | |
| 16 | | | | | | | |
| 17 | | | | | | | |
| 18 | | | | | | | |
| 19 | | | | | | | |
| 20 | | | S-4 | 18.5-20 | 6-4-7 | 11 | |
| 21 | | | | | | | |
| 22 | | | | | | | |
| 23 | | | | | | | |
| 24 | | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1008A

Sheet 2 of 4

SITE **Vogtle ALWR SSAR** TOTAL DEPTH **107.5** SURF.ELEV. **NA**

| Depth FT. | Elev. FT. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|--|------------|---------------------------|----------|---------|----------|
| | | | | From To FT. | Blows | N (bpf) | |
| 25 | | Light yellow fine-grained SAND | 5 | 23.5-25 | 15-24-47 | 71 | |
| 26 | | | | | | | |
| 27 | | | | | | | |
| 28 | | | | | | | |
| 29 | | | | | | | |
| 30 | | | 6 | 28.5-30 | 19-14-18 | 32 | |
| 31 | | | | | | | |
| 32 | | | | | | | |
| 33 | | | | | | | |
| 34 | | | | | | | |
| 35 | | Light yellow fine-grained silty SAND | 7 | 33.5-35 | 28-24-19 | 43 | |
| 36 | | | | | | | |
| 37 | | | | | | | |
| 38 | | | | | | | |
| 39 | | | | | | | |
| 40 | | Light red fine-grained silty SAND | 8 | 38.5-40 | 3-8-16 | 24 | |
| 41 | | | | | | | |
| 42 | | | | | | | |
| 43 | | | | | | | |
| 44 | | | | | | | |
| 45 | | | 9 | 43.5-45 | 18-27-35 | 62 | |
| 46 | | | | | | | |
| 47 | | | | | | | |
| 48 | | | | | | | |
| 49 | | | | | | | |
| 50 | | | 10 | 48.5-50 | 14-5-6 | 11 | |
| 51 | | | | | | | |
| 52 | | | | | | | |
| 53 | | | | | | | |
| 54 | | | | | | | |
| 55 | | | 11 | 53.5-55 | 20-21-23 | 44 | |
| 56 | | | | | | | |

2 4A - 85

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1008A

Sheet 3 of 4

SITE **Vogtle ALWR SSAR** TOTAL DEPTH **107.5** SURF.ELEV. **NA**

| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|--|------------|---------------------------|-------|---------|---|
| | | | | From To ft. | Blows | N (bpf) | |
| 57 | | | | | | | |
| 58 | | | | | | | |
| 59 | | | | | | | |
| 60 | | Mottled reddish yellow brown fine-grained silty SAND | 12 | 58.5-60 | 4-6-6 | 12 | |
| 61 | | | | | | | |
| 62 | | | | | | | |
| 63 | | | | | | | |
| 64 | | | | | | | |
| 65 | | Mottled light-red fine-grained silty sand | 13 | 63.5-65 | 4-4-5 | 9 | |
| 66 | | | | | | | |
| 67 | | | | | | | |
| 68 | | | | | | | |
| 69 | | | | | | | |
| 70 | | Light red fine-grained silty SAND, moist | 14 | 68.5-70 | 3-2-3 | 5 | |
| 71 | | | | | | | |
| 72 | | | | | | | |
| 73 | | | | | | | |
| 74 | | | | | | | |
| 75 | | White medium grained silty SAND - moist | 15 | 73.5-75 | 2-2-2 | 4 | |
| 76 | | | | | | | |
| 77 | | | | | | | |
| 78 | | | | | | | |
| 79 | | | | | | | |
| 80 | | White silty medium-grained SAND with shell fragments | 16 | 78.5-80 | 2-3-3 | 6 | 5/26/2005 ▼ 80' from ground surface |
| 81 | | | | | | | |
| 82 | | | | | | | |
| 83 | | | | | | | |
| 84 | | | | | | | |
| 85 | | White silty sandy SHELL HASH | 17 | 83.5-85 | 2-2-2 | 4 | |
| 86 | | | | | | | |
| 87 | | | | | | | |
| 88 | | | | | | | |

2.4A - 86

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1008A

Sheet 4 of 4

| SITE | | Vogtle ALWR SSAR | | TOTAL DEPTH | | 107.5 | | SURF.ELEV. | | NA | |
|-----------|-----------|--|------------|---------------------------|----------|---------|----------|------------|--|----|--|
| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | | | | |
| | | | | From To ft. | Blows | N (bpf) | | | | | |
| 89 | | White medium-grained silty SAND, moist | 18 | 88.5-90 | 3-4-4 | 8 | | | | | |
| 90 | | | | | | | | | | | |
| 91 | | | | | | | | | | | |
| 92 | | | | | | | | | | | |
| 93 | | | | | | | | | | | |
| 94 | | White medium-grained silty SAND, with shell fragments and sharks teeth | 19 | 93.5-95 | 17-24-21 | 45 | | | | | |
| 95 | | | | | | | | | | | |
| 96 | | | | | | | | | | | |
| 97 | | | | | | | | | | | |
| 98 | | | | | | | | | | | |
| 99 | | White silty SHELL HASH, saturated | 20 | 98.5-100 | 50/2" | 100+ | | | | | |
| 100 | | | | | | | | | | | |
| 101 | | | | | | | | | | | |
| 102 | | | | | | | | | | | |
| 103 | | | | | | | | | | | |
| 104 | | White medium-grained silty SAND, saturated | 21 | 102.5-105 | 18-20-22 | 44 | | | | | |
| 105 | | | | | | | | | | | |
| 106 | | | | | | | | | | | |
| 107 | | | | | | | | | | | |
| 108 | | | | | | | | | | | |
| 109 | | Boring terminated at 107.5' due to use of 3 1/4" augers. | | | | | | | | | |
| 110 | | This borehole was abandoned. | | | | | | | | | |
| 111 | | Well OW-1008 is installed in adjacent borehole OW-1008. | | | | | | | | | |
| 112 | | | | | | | | | | | |
| 113 | | | | | | | | | | | |
| 114 | | | | | | | | | | | |
| 115 | | | | | | | | | | | |
| 116 | | | | | | | | | | | |
| 117 | | | | | | | | | | | |
| 118 | | | | | | | | | | | |
| 119 | | | | | | | | | | | |
| 120 | | | | | | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1009

Sheet 1 of 4

| | | | | | | | |
|-------------------|-----------------------|----------|-------------|------------------|-------------|---------------------|------------|
| SITE | Vogle ALWR SSAR - ESP | | | SOLE DEPTH | 100 | SURF.ELEV. | 220.887 |
| LOCATION | Burke County, Georgia | | | COORDINATES N | 1141891.645 | E | 620888.608 |
| ANGLE | NA | BEARING | NA | CONTRACTOR | S&ME | DRILL NO. | CME 55 |
| DRILLING METHOD | 4-1/4" HAS | | | NO. SAMPLES | 21 | NO. U.D. SAMPLES | NA |
| WATER TABLE DEPTH | 70' | ELEV. | 150.257' | TIME AFTER COMP. | NA | DATE TAKEN | 5/24/2005 |
| TYPE GROUT | NA | QUANTITY | NA | MIX | NA | DRILLING START DATE | 5/24/2005 |
| DRILLER | Ted | RECORDER | RA Esposito | APPROVED | NA | DRILLING COMP. DATE | 5/27/2005 |

| Depth Ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|--|------------|---------------------------|---------|-------|----------|
| | | | | From To Ft. | Blows | N BPF | |
| 0 | 220.89 | | | | | | |
| 1 | 219.89 | | | | | | |
| 2 | 218.89 | White to red fine-grained SAND | | | | | |
| 3 | 217.89 | | 1 | 3.5-5 | 4-10-10 | 20 | |
| 4 | 216.89 | | | | | | |
| 5 | 215.89 | Dark red fine-grained silty SAND | | | | | |
| 6 | 214.89 | | | | | | |
| 7 | 213.89 | | | | | | |
| 8 | 212.89 | | | | | | |
| 9 | 211.89 | | | | | | |
| 10 | 210.89 | | 2 | 8.5-10 | 3-3-5 | 8 | |
| 11 | 209.89 | | | | | | |
| 12 | 208.89 | | | | | | |
| 13 | 207.89 | | | | | | |
| 14 | 206.89 | | | | | | |
| 15 | 205.89 | | 3 | 13.5-15 | 2-4-4 | 8 | |
| 16 | 204.89 | | | | | | |
| 17 | 203.89 | | | | | | |
| 18 | 202.89 | | | | | | |
| 19 | 201.89 | | | | | | |
| 20 | 200.89 | | 4 | 18.5-20 | 4-5-7 | 12 | |
| 21 | 199.89 | moist | | | | | |
| 22 | 198.89 | | | | | | |
| 23 | 197.89 | | | | | | |
| 24 | 196.89 | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1009

Sheet 2 of 2

SITE **Vogtle ALWR SSAR** TOTAL DEPTH **100** SURF.ELEV. **220.887**

| Depth Ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|--|------------|---------------------------|-------|-------|----------|
| | | | | From To Ft. | Blows | N BPF | |
| 25 | 195.89 | Light yellow fine-grained SAND | 5 | 23.5-25 | 5-5-6 | 11 | |
| 26 | 194.89 | | | | | | |
| 27 | 193.89 | | | | | | |
| 28 | 192.89 | | | | | | |
| 29 | 191.89 | | | | | | |
| 30 | 190.89 | Light yellow fine-grained silty SAND | 6 | 28.5-30 | 3-6-7 | 13 | |
| 31 | 189.89 | | | | | | |
| 32 | 188.89 | | | | | | |
| 33 | 187.89 | | | | | | |
| 34 | 186.89 | | | | | | |
| 35 | 185.89 | | 7 | 33.5-35 | 3-4-5 | 9 | |
| 36 | 184.89 | | | | | | |
| 37 | 183.89 | | | | | | |
| 38 | 182.89 | | | | | | |
| 39 | 181.89 | | | | | | |
| 40 | 180.89 | Light yellow fine-grained silty clayey SAND, moist | 8 | 38.5-40 | 2-2-3 | 5 | |
| 41 | 179.89 | | | | | | |
| 42 | 178.89 | | | | | | |
| 43 | 177.89 | | | | | | |
| 44 | 176.89 | | | | | | |
| 45 | 175.89 | Light yellow silty CLAY, moist-plastic | 9 | 43.5-45 | 2-4-6 | 10 | |
| 46 | 174.89 | | | | | | |
| 47 | 173.89 | | | | | | |
| 48 | 172.89 | | | | | | |
| 49 | 171.89 | | | | | | |
| 50 | 170.89 | Light yellow fine- to medium-grained silty SAND, moist | 10 | 48.5-50 | 3-7-8 | 15 | |
| 51 | 169.89 | | | | | | |
| 52 | 168.89 | | | | | | |
| 53 | 167.89 | | | | | | |
| 54 | 166.26 | | | | | | |
| 55 | 165.89 | Light yellow fine- to medium-grained silty SAND, moist | 11 | 53.5-55 | 4-6-7 | 13 | |
| 56 | 164.89 | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1009

Sheet 3 of 4

SITE **Vogle ALWR SSAR** TOTAL DEPTH **100** SURF.ELEV. **220.887**

| Depth Ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|--|------------|---------------------------|---------|-------|---|
| | | | | From To | Blows | N BPF | |
| 57 | 163.89 | Light yellow silty fine grained SAND - moist | 12 | 58.5-60 | 4-6-6 | 12 | |
| 58 | 162.89 | | | | | | |
| 59 | 161.89 | | | | | | |
| 60 | 160.89 | | | | | | |
| 61 | 159.89 | | | | | | |
| 62 | 158.89 | Light yellow silty fine grained SAND - moist | 13 | 63.5-65 | 0-1-2 | 3 | |
| 63 | 157.89 | | | | | | |
| 64 | 156.89 | | | | | | |
| 65 | 155.89 | | | | | | |
| 66 | 154.89 | | | | | | |
| 67 | 153.89 | White silty fine-grained SAND - saturated | 14 | 68.5-70 | 1-2-2 | 4 | 5/24/2005 ▼ 70 feet from ground surface |
| 68 | 152.89 | | | | | | |
| 69 | 151.89 | | | | | | |
| 70 | 150.89 | | | | | | |
| 71 | 149.89 | | | | | | |
| 72 | 148.89 | White medium-to coarse-grained SAND, saturated | 15 | 73.5-75 | 0-0-1 | 1 | |
| 73 | 147.89 | | | | | | |
| 74 | 146.89 | | | | | | |
| 75 | 145.89 | | | | | | |
| 76 | 144.89 | | | | | | |
| 77 | 143.89 | | 16 | 78.5-80 | 4-5-6 | 11 | |
| 78 | 142.89 | | | | | | |
| 79 | 141.89 | | | | | | |
| 80 | 140.89 | | | | | | |
| 81 | 139.89 | | | | | | |
| 82 | 138.89 | Very light tan silty SAND (SM) | 17 | 83.5-85 | 6-50/4" | 100+ | |
| 83 | 137.89 | | | | | | |
| 84 | 136.89 | | | | | | |
| 85 | 135.89 | | | | | | |
| 86 | 134.26 | | | | | | |
| 87 | 133.89 | | | | | | |
| 88 | 132.89 | | | | | | |

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**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1009

Sheet 4 of 4

| SITE | | Vogle ALWR SSAR | | OTAL DEPTH | | 100 | | SURF.ELEV. | | 220.887 | |
|-----------|-----------|--|------------|---------------------------|-----------|-------|----------|------------|-----|---------|--|
| Depth Ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | % Rec | RQD | | |
| | | | | From To Ft. | Blows | N BPF | | | | | |
| 89 | 131.89 | Tan LIMESTONE shell hash, very light tan silty SAND (SM) | 18 | 88.5-90 | 50/1" | 100+ | | | | | |
| 90 | 130.89 | | | | | | | | | | |
| 91 | 129.89 | | | | | | | | | | |
| 92 | 128.89 | | | | | | | | | | |
| 93 | 127.89 | | | | | | | | | | |
| 94 | 126.89 | Brown silty CLAY | 19 | 93.5-95 | 6-18-3 | 21 | | | | | |
| 95 | 125.89 | | | | | | | | | | |
| 96 | 124.89 | | | | | | | | | | |
| 97 | 123.89 | | | | | | | | | | |
| 98 | 122.89 | | | | | | | | | | |
| 99 | 121.89 | Green MARL Boring terminated at 100' OW-1009 installed in this borehole. | 20 | 98.5-100 | 13 / 50/2 | 100+ | | | | | |
| 100 | 120.89 | | | | | | | | | | |
| 101 | 119.89 | | | | | | | | | | |
| 102 | 118.89 | | | | | | | | | | |
| 103 | 117.89 | | | | | | | | | | |
| 104 | 116.89 | | | | | | | | | | |
| 105 | 115.89 | | | | | | | | | | |
| 106 | 114.89 | | | | | | | | | | |
| 107 | 113.89 | | | | | | | | | | |
| 108 | 112.89 | | | | | | | | | | |
| 109 | 111.89 | | | | | | | | | | |
| 110 | 110.89 | | | | | | | | | | |
| 111 | 109.89 | | | | | | | | | | |
| 112 | 108.89 | | | | | | | | | | |
| 113 | 107.89 | | | | | | | | | | |
| 114 | 106.89 | | | | | | | | | | |
| 115 | 105.89 | | | | | | | | | | |
| 116 | 104.89 | | | | | | | | | | |
| 117 | 103.89 | | | | | | | | | | |
| 118 | 102.26 | | | | | | | | | | |
| 119 | 101.89 | | | | | | | | | | |
| 120 | 100.89 | | | | | | | | | | |

2.4A - 91

2.4A - 91

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1010

Sheet 1 of 4

| | | | |
|---------------------------------------|-------------------|-------------------------------------|-------------------------------------|
| SITE Vogtle ALWR SSAR | | LE DEPTH 93.5 | SURF.ELEV. 216.895 |
| LOCATION Burke County, Georgia | | COORDINATES N 1140808.986 | E 620051.708 |
| ANGLE NA | BEARING NA | CONTRACTOR S&ME | DRILL NO. CME550 |
| DRILLING METHOD 4 1/4" HAS | | NO. SAMPLES 19 | NO. U.D. SAMPLES NA |
| WATER TABLE DEPTH 58.5' | | ELEV. 157.765' | TIME AFTER COMP. NA |
| TYPE GROUT NA | | QUANTITY NA | MIX NA |
| DRILLER Tim Hall | | RECORDER R. Tinsley | APPROVED NA |
| | | DATE TAKEN 6/1/2005 | DRILLING START DATE 6/1/2005 |
| | | DRILLING COMP. DATE 6/1/2005 | |

| Depth Ft. | Elev.Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|----------|---|------------|---------------------------|----------|-------|----------|
| | | | | From To Ft. | Blows | N BPF | |
| 0 | 216.90 | | | | | | |
| 1 | 215.90 | | | | | | |
| 2 | 214.90 | | | | | | |
| 3 | 213.90 | | | | | | |
| 4 | 212.90 | | | | | | |
| 5 | 211.90 | Reddish yellow SAND, fine- to medium-grained with coarse grains and hematite concretions, loose, (SW) | 1 | 3.5-5 | 11-17-17 | 34 | |
| 6 | 210.90 | | | | | | |
| 7 | 209.90 | | | | | | |
| 8 | 208.90 | | | | | | |
| 9 | 207.90 | | | | | | |
| 10 | 206.90 | Mottled weak red and brown SAND, fine-grained, Loose (SP) | 2 | 8.5-10 | 7-8-11 | 19 | |
| 11 | 205.90 | | | | | | |
| 12 | 204.90 | | | | | | |
| 13 | 203.90 | | | | | | |
| 14 | 202.90 | | | | | | |
| 15 | 201.90 | | 3 | 13.5-15 | 6-7-7 | 14 | |
| 16 | 200.90 | | | | | | |
| 17 | 199.90 | | | | | | |
| 18 | 198.90 | | | | | | |
| 19 | 197.90 | | | | | | |
| 20 | 196.90 | | 4 | 18.5-20 | 7-7-8 | 15 | |
| 21 | 195.90 | | | | | | |
| 22 | 194.90 | | | | | | |
| 23 | 193.90 | | | | | | |
| 24 | 192.90 | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1010

Sheet 2 of 4

SITE **Vogtle ALWR SSAR**

TOTAL DEPTH **93.5**

SURF.ELEV. **216.895**

| Depth | Elev. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-------|--------|---|------------|---------------------------|---------|----|----------|
| | | | | From To | Blows | N | |
| 25 | 191.90 | Mottled weak red and brown SAND, fine- to medium-grained with some coarse grains (SW) | 5 | 23.5-25 | 9-9-6 | 15 | |
| 26 | 190.90 | | | | | | |
| 27 | 189.90 | | | | | | |
| 28 | 188.90 | | | | | | |
| 29 | 187.90 | | | | | | |
| 30 | 186.90 | Reddish yellow SAND fine- to medium-grained, loose (SW) | 6 | 28.5-30 | 9-31-42 | 73 | |
| 31 | 185.90 | | | | | | |
| 32 | 184.90 | | | | | | |
| 33 | 183.90 | | | | | | |
| 34 | 182.90 | | | | | | |
| 35 | 181.90 | | 7 | 33.5-35 | 7-6-5 | 11 | |
| 36 | 180.90 | | | | | | |
| 37 | 179.90 | | | | | | |
| 38 | 178.90 | | | | | | |
| 39 | 177.90 | | | | | | |
| 40 | 176.90 | Same as above with some coarse grains | 8 | 38.5-40 | 5-5-5 | 10 | |
| 41 | 175.90 | | | | | | |
| 42 | 174.90 | | | | | | |
| 43 | 173.90 | | | | | | |
| 44 | 172.90 | | | | | | |
| 45 | 171.90 | Brownish yellow clayey SAND, soft, (SC) | 9 | 43.5-45 | 5-2-2 | 4 | |
| 46 | 170.90 | | | | | | |
| 47 | 169.90 | | | | | | |
| 48 | 168.90 | | | | | | |
| 49 | 167.90 | | | | | | |
| 50 | 166.90 | Mottled yellowish red clayey SAND, medium-grained (SC) with organics | 10 | 48.5-50 | 2-3-3 | 6 | |
| 51 | 165.90 | | | | | | |
| 52 | 164.90 | | | | | | |
| 53 | 163.90 | | | | | | |
| 54 | 162.27 | | | | | | |
| 55 | 161.90 | Strong brown sand, medium-grained with slight fines (SP) | 11 | 53.5-55 | 2-4-5 | 9 | |
| 56 | 160.90 | | | | | | |

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**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1010

Sheet 3 of 4

SITE **Vogtle ALWR SSAR**

TOTAL DEPTH **93.5**

SURF.ELEV. **216.895**

| Depth Ft. | Elev.Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|----------|---|------------|---------------------------|---------|---------|--|
| | | | | From To Ft. | Blows | N BPF | |
| 57 | 159.90 | Mottled white to brown clayey SAND, medium-grained (SP), medium dense | 12 | 58.5-60 | 2-7-7 | 14 | 6/1/2005 ▼ 58.5' from ground surface |
| 58 | 158.90 | | | | | | |
| 59 | 157.90 | | | | | | |
| 60 | 156.90 | | | | | | |
| 61 | 155.90 | | | | | | |
| 62 | 154.90 | Strong brown clayey SAND, fine- to medium-grained (SC) | 13 | 63.5-65 | WOR-2-3 | 5 | |
| 63 | 153.90 | | | | | | |
| 64 | 152.90 | | | | | | |
| 65 | 151.90 | | | | | | |
| 66 | 150.90 | | | | | | |
| 67 | 149.90 | Brownish yellow silty SAND, medium-grained, (SM) | 14 | 68.5-70 | WOH/18" | WHO/18" | |
| 68 | 148.90 | | | | | | |
| 69 | 147.90 | | | | | | |
| 70 | 146.90 | | | | | | |
| 71 | 145.90 | | | | | | |
| 72 | 144.90 | Tan poorly graded SAND with silt (SP-SM) | 15 | 73.5-75 | WOR 2' | WOR/2' | |
| 73 | 143.90 | | | | | | |
| 74 | 142.90 | | | | | | |
| 75 | 141.90 | | | | | | |
| 76 | 140.90 | | | | | | |
| 77 | 139.90 | Brownish yellow clayey, silty SAND (SC-SM), soft | 16 | 78.5-80 | WOR/18" | WOR/18" | |
| 78 | 138.90 | | | | | | |
| 79 | 137.90 | | | | | | |
| 80 | 136.90 | | | | | | |
| 81 | 135.90 | | | | | | |
| 82 | 134.90 | White SHELL HASH | 17 | 83.5-85 | 50/3" | 50/3" | |
| 83 | 133.90 | | | | | | |
| 84 | 132.90 | | | | | | |
| 85 | 131.90 | | | | | | |
| 86 | | | | | | | |
| 87 | 129.90 | Grayish green MARL | 18 | | | | |
| 88 | 128.90 | | | | | | |

2.4A 94

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1010

Sheet 4 of 4

SITE **Vogtle ALWR SSAR**

DEPTH **93.5**

SURF.ELEV. **216.895**

| Depth Ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|--|------------|---------------------------|----------|-------|----------|
| | | | | From To Ft. | Blows | N BPF | |
| 89 | 127.90 | Grayish green MARL, very stiff | 18 | 88.5-90 | 18-9-12 | 21 | |
| 90 | 126.90 | | | | | | |
| 91 | 125.90 | | | | | | |
| 92 | 124.90 | | | | | | |
| 93 | 123.90 | Boring terminated at 93.5' Well OW-1010 installed in this boring. | 19 | 93.5-95 | 21-50/4" | 50/4" | |
| 94 | 122.90 | | | | | | |
| 95 | 121.90 | | | | | | |
| 96 | 120.90 | | | | | | |
| 97 | 119.90 | | | | | | |
| 98 | 118.90 | | | | | | |
| 99 | 117.90 | | | | | | |
| 100 | 116.90 | | | | | | |
| 101 | 115.90 | | | | | | |
| 102 | 114.90 | | | | | | |
| 103 | 113.90 | | | | | | |
| 104 | 112.90 | | | | | | |
| 105 | 111.90 | | | | | | |
| 106 | 110.90 | | | | | | |
| 107 | 109.90 | | | | | | |
| 108 | 108.90 | | | | | | |
| 109 | 107.90 | | | | | | |
| 110 | 106.90 | | | | | | |
| 111 | 105.90 | | | | | | |
| 112 | 104.90 | | | | | | |
| 113 | 103.90 | | | | | | |
| 114 | 102.90 | | | | | | |
| 115 | 101.90 | | | | | | |
| 116 | 100.90 | | | | | | |
| 117 | 99.90 | | | | | | |
| 118 | | | | | | | |
| 119 | 97.90 | | | | | | |
| 120 | 96.90 | | | | | | |

2.4A 195

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. OW-1011

Sheet 1 of 7

| | | | |
|---------------------------------------|---------------------------|----------------------------------|--------------------------------------|
| SITE Vogtle ALWR SSAR | | HOLE DEPTH 217 | SURF.ELEV. 205.785 |
| LOCATION Burke County, Georgia | | COORDINATES N 1139956.246 | E 621033.045 |
| ANGLE NA | BEARING NA | CONTRACTOR Prosonic | DRILL NO. SR-083 |
| DRILLING METHOD Sonic | | NO. SAMPLES continuous | NO. U.D. SAMPLES NA |
| WATER TABLE DEPTH NA | ELEV. NA | TIME AFTER COMP. NA | DATE TAKEN NA |
| TYPE GROUT NA | QUANTITY NA | MIX NA | DRILLING START DATE 6/11/2005 |
| DRILLER Tony | RECORDER John Pugh | APPROVED NA | DRILLING COMP. DATE 6/12/2005 |

| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | % Rec | RQD |
|-----------|-----------|--|------------|---------------------------|-------|---|----------|-------|-----|
| | | | | From To | Blows | N | | | |
| 0 | 205.79 | | | | | | | | |
| 1 | 204.79 | Sampling in this boring started at 87'. Borehole OW-1012 was sampled from the surface to 93.6'. These two are a well pair. | | | | | | | |
| 2 | 203.79 | | | | | | | | |
| 3 | 202.79 | | | | | | | | |
| 4 | 201.79 | | | | | | | | |
| 5 | 200.79 | | | | | | | | |
| 6 | 199.79 | | | | | | | | |
| 7 | 198.79 | | | | | | | | |
| 8 | 197.79 | | | | | | | | |
| 9 | 196.79 | | | | | | | | |
| 10 | 195.79 | | | | | | | | |
| 11 | 194.79 | | | | | | | | |
| 12 | 193.79 | | | | | | | | |
| 13 | 192.79 | | | | | | | | |
| 14 | 191.79 | | | | | | | | |
| 15 | 190.79 | | | | | | | | |
| 16 | 189.79 | | | | | | | | |
| 17 | 188.79 | | | | | | | | |
| 18 | 187.79 | | | | | | | | |
| 19 | 186.79 | | | | | | | | |
| 20 | 185.79 | | | | | | | | |
| 21 | 184.79 | | | | | | | | |
| 22 | 183.79 | | | | | | | | |
| 23 | 182.79 | | | | | | | | |
| 24 | 181.79 | | | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1011

Sheet 2 of 7

SITE **Vogtle ALWR SSAR** OTAL DEPTH **217** SURF.ELEV. **205.785**

| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|--|------------|---------------------------|-------|-------|----------|
| | | | | From To ft. | Blows | N BPF | |
| 25 | 180.79 | See page one. | | | | | |
| 26 | 179.79 | | | | | | |
| 27 | 178.79 | | | | | | |
| 28 | 177.79 | | | | | | |
| 29 | 176.79 | | | | | | |
| 30 | 175.79 | | | | | | |
| 31 | 174.79 | | | | | | |
| 32 | 173.79 | | | | | | |
| 33 | 172.79 | | | | | | |
| 34 | 171.79 | | | | | | |
| 35 | 170.79 | | | | | | |
| 36 | 169.79 | | | | | | |
| 37 | 168.79 | | | | | | |
| 38 | 167.79 | | | | | | |
| 39 | 166.79 | | | | | | |
| 40 | 165.79 | | | | | | |
| 41 | 164.79 | | | | | | |
| 42 | 163.79 | | | | | | |
| 43 | 162.79 | | | | | | |
| 44 | 161.79 | | | | | | |
| 45 | 160.79 | | | | | | |
| 46 | 159.79 | | | | | | |
| 47 | 158.79 | | | | | | |
| 48 | 157.79 | | | | | | |
| 49 | 156.79 | | | | | | |
| 50 | 155.79 | | | | | | |
| 51 | 154.79 | | | | | | |
| 52 | 153.79 | | | | | | |
| 53 | 152.79 | | | | | | |
| 54 | | | | | | | |
| 55 | 150.79 | | | | | | |
| 56 | 149.79 | | | | | | |

2.4A-97

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. OW-1011

Sheet 3 of 7

SITE **Vogtle ALWR SSAR**

OTAL DEPTH **217**

SURF.ELEV. **205.785**

| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|--|------------|---------------------------|-------|-------|----------|
| | | | | From To ft. | Blows | N BPF | |
| 57 | 148.79 | See page one. | | | | | |
| 58 | 147.79 | | | | | | |
| 59 | 146.79 | | | | | | |
| 60 | 145.79 | | | | | | |
| 61 | 144.79 | | | | | | |
| 62 | 143.79 | | | | | | |
| 63 | 142.79 | | | | | | |
| 64 | 141.79 | | | | | | |
| 65 | 140.79 | | | | | | |
| 66 | 139.79 | | | | | | |
| 67 | 138.79 | | | | | | |
| 68 | 137.79 | | | | | | |
| 69 | 136.79 | | | | | | |
| 70 | 135.79 | | | | | | |
| 71 | 134.79 | | | | | | |
| 72 | 133.79 | | | | | | |
| 73 | 132.79 | | | | | | |
| 74 | 131.79 | | | | | | |
| 75 | 130.79 | | | | | | |
| 76 | 129.79 | | | | | | |
| 77 | 128.79 | | | | | | |
| 78 | 127.79 | | | | | | |
| 79 | 126.79 | | | | | | |
| 80 | 125.79 | | | | | | |
| 81 | 124.79 | | | | | | |
| 82 | 123.79 | | | | | | |
| 83 | 122.79 | | | | | | |
| 84 | 121.79 | | | | | | |
| 85 | 120.79 | | | | | | |
| 86 | 119.16 | | | | | | |
| 87 | 118.79 | Begin sampling at 87' with ProSonic rig. | | | | | |
| 88 | 117.79 | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1011

Sheet 4 of 7

SITE **Vogtle ALWR SSAR**

TOTAL DEPTH **217**

SURF.ELEV. **205.785**

| Depth | Elev. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-------|--------|---|------------|---------------------------|-------|----|----------|
| | | | | From To | Blows | N | |
| 89 | 116.79 | Greenish grey CLAY, stiff | | | | | |
| 90 | 115.79 | | 1 | 88.5-90 | NA | NA | |
| 91 | 114.79 | | | | | | |
| 92 | 113.79 | | | | | | |
| 93 | 112.79 | | | | | | |
| 94 | 111.79 | Dark greenish to olive-grey CLAY, moist, stiff, light gray mottling | 2 | 93.5-95 | NA | NA | |
| 95 | 110.79 | | | | | | |
| 96 | 109.79 | | | | | | |
| 97 | 108.79 | | | | | | |
| 98 | 107.79 | | | | | | |
| 99 | 106.79 | Greenish grey CLAY, stiff, moist, small shell fragments | 3 | 98.5-100 | NA | NA | |
| 100 | 105.79 | | | | | | |
| 101 | 104.79 | | | | | | |
| 102 | 103.79 | | | | | | |
| 103 | 102.79 | | | | | | |
| 104 | 101.79 | Greenish grey CLAY, stiff, small shell fragments, not moist | 4 | 103.5-105 | NA | NA | |
| 105 | 100.79 | | | | | | |
| 106 | 99.79 | | | | | | |
| 107 | 98.79 | | | | | | |
| 108 | 97.16 | | | | | | |
| 109 | 96.79 | LIMESTONE 2" | | | | | |
| 110 | 95.79 | Greenish grey CLAY, slightly moist, limestone fragments | 5 | 108.5-110 | NA | NA | |
| 111 | 94.79 | | | | | | |
| 112 | 93.79 | | | | | | |
| 113 | 92.79 | | | | | | |
| 114 | 91.79 | Greenish grey CLAY, not moist, larger shell fragments | 6 | 113.5-115 | NA | NA | |
| 115 | 90.79 | | | | | | |
| 116 | 89.79 | | | | | | |
| 117 | 88.79 | | | | | | |
| 118 | 87.16 | | | | | | |
| 119 | 86.16 | Light greenish grey CLAY, moist, w/ Limestone chunks | 7 | 118.5-120 | NA | NA | |
| 120 | 85.79 | | 2.4A-99 | | | | |

| DRILLING LOG GEOLOGICAL SERVICES | | | | | | Hole No. | OW-1011 |
|-------------------------------------|-----------|--|------------|---------------------------|-------|------------|----------|
| | | | | | | Sheet 5 of | 7 |
| SITE Vogtle ALWR SSAR | | | | TOTAL DEPTH | 217 | SURF.ELEV. | 205.785 |
| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
| | | | | From To ft. | Blows | N BPF | |
| 121 | 84.79 | | | | | | |
| 122 | 83.79 | | | | | | |
| 123 | 82.79 | Light grey LIMESTONE 4" | | | | | |
| 124 | 81.79 | Greenish grey CLAY, slightly moist | | | | | |
| 125 | 80.79 | | 8 | 123.5-125 | NA | NA | |
| 126 | 79.79 | | | | | | |
| 127 | 78.79 | | | | | | |
| 128 | 77.79 | | | | | | |
| 129 | 76.79 | Light-grey CLAY, stiff | | | | | |
| 130 | 75.79 | | 9 | 128.5-130 | NA | NA | |
| 131 | 74.79 | | | | | | |
| 132 | 73.79 | | | | | | |
| 133 | 72.79 | | | | | | |
| 134 | 71.79 | | | | | | |
| 135 | 70.79 | | 10 | 133.5-135 | NA | NA | |
| 136 | 69.79 | | | | | | |
| 137 | 68.79 | | | | | | |
| 138 | 67.79 | | | | | | |
| 139 | 66.79 | | | | | | |
| 140 | 65.79 | Greenish grey CLAY, stiff | 11 | 138.5-140 | NA | NA | |
| 141 | 64.79 | | | | | | |
| 142 | 63.79 | | | | | | |
| 143 | 62.79 | | | | | | |
| 144 | 61.79 | | | | | | |
| 145 | 60.79 | | 12 | 143.5-145 | NA | NA | |
| 146 | 59.79 | | | | | | |
| 147 | 58.79 | | | | | | |
| 148 | 57.79 | potential void | | | | | |
| 149 | 56.79 | | | | | | |
| 150 | 55.16 | Greenish grey CLAY, stiff | 13 | 148.5-150 | NA | NA | |
| 151 | 54.79 | | | | | | |
| 152 | 53.79 | | | | | | |

| DRILLING LOG GEOLOGICAL SERVICES | | | | | | Hole No. | OW-1011 |
|-------------------------------------|-----------------|--|-------------|---------------------------|-------|--------------------|----------|
| | | | | | | Sheet 6 of | 7 |
| SITE Vogtle ALWR SSAR | | | TOTAL DEPTH | | 217 | SURF.ELEV. 205.785 | |
| Depth | Elev. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
| | | | | From To | Blows | N BPF | |
| 153 | 152.50 52.79 | | | | | | |
| 154 | 51.79 | Light bluish-grey, very fine sands to sandy CLAY, Loose, moist, clayey | | | | | |
| 155 | 50.79 | | 14 | 153.5-155 | NA | NA | |
| 156 | 49.79 | | | | | | |
| 157 | 48.79 | | | | | | |
| 158 | 47.79 | | | | | | |
| 159 | 46.79 | Light grey, slightly sandy CLAY, moist | | | | | |
| 160 | 45.79 | | 15 | 158.5-160 | NA | NA | |
| 161 | 44.79 | | | | | | |
| 162 | 43.79 | | | | | | |
| 163 | 42.79 | | | | | | |
| 164 | 41.79 | Light grey, silty, slightly sandy CLAY, moist | | | | | |
| 165 | 40.79 | | 16 | 163.5-165 | NA | NA | |
| 166 | 39.79 | | | | | | |
| 167 | 38.79 | | | | | | |
| 168 | 37.79 | | | | | | |
| 169 | 36.79 | Greenish grey sandy silty CLAY, bright green and tan nodules | | | | | |
| 170 | 35.79 | | 17 | 168.5-170 | NA | NA | |
| 171 | 34.79 | | | | | | |
| 172 | 33.79 | | | | | | |
| 173 | 32.79 | | | | | | |
| 174 | 31.79 | | | | | | |
| 175 | 30.79 | | 18 | 173.5-175 | NA | NA | |
| 176 | 29.79 | | | | | | |
| 177 | 28.79 | | | | | | |
| 178 | 27.79 | Dark olive grey CLAY, stiff | | | | | |
| 179 | 26.79 | | | | | | |
| 180 | 25.79 | | 19 | 178.5-180 | NA | NA | |
| 181 | 24.79 | | | | | | |
| 182 | | | | | | | |
| 183 | 22.79 | Dark olive grey sandy CLAY | | | | | |
| 184 | 21.79 | | | | | | |

| DRILLING LOG GEOLOGICAL SERVICES | | | | | | Hole No. | OW-1011 |
|-------------------------------------|-----------|--|------------|---------------------------|-------|------------|----------|
| SITE Vogtle ALWR SSAR | | | | TOTAL DEPTH | 217 | SURF.ELEV. | 205.785 |
| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
| | | | | From To ft. | Blows | N BPF | |
| 185 | 20.79 | Dark grey sandy CLAY | 20 | 183.5-185 | NA | NA | |
| 186 | 19.79 | | | | | | |
| 187 | 18.79 | | | | | | |
| 188 | 17.79 | | | | | | |
| 189 | 16.79 | | | | | | |
| 190 | 15.79 | Dark grey clayey fine SAND grading to | 21 | 188.5-190 | NA | NA | |
| 191 | 14.79 | | | | | | |
| 192 | 13.79 | | | | | | |
| 193 | 12.79 | | | | | | |
| 194 | 11.79 | | | | | | |
| 195 | 10.79 | Clayey medium-grained SAND | 22 | 193.5-195 | NA | NA | |
| 196 | 9.79 | | | | | | |
| 197 | 8.79 | | | | | | |
| 198 | 7.79 | | | | | | |
| 199 | 6.79 | | | | | | |
| 200 | 5.79 | Dark bluish-gray silty fine- to medium-grained SAND very moist | 23 | 198.5-200 | NA | NA | |
| 201 | 4.79 | | | | | | |
| 202 | 3.79 | | | | | | |
| 203 | 2.79 | | | | | | |
| 204 | 1.79 | | | | | | |
| 205 | 0.78 | Gray poorly graded sand with silt (SP-SM) | 24 | 203.5-205 | NA | NA | |
| 206 | -0.22 | | | | | | |
| 206 | -0.22 | | | | | | |
| 208 | -2.22 | | | | | | |
| 209 | -3.22 | | | | | | |
| 210 | -4.22 | Gray poorly graded sand with silt (SP-SM) | 25 | 208.5-210 | NA | NA | |
| 211 | -5.22 | | | | | | |
| 212 | -6.22 | | | | | | |
| 213 | -7.22 | | | | | | |
| 214 | -8.85 | | | | | | |
| 215 | -9.22 | Dark bluish gray medium- to coarse-grained SAND | 26 | 213.5 | 215 | NA | |
| 216 | -10.22 | | | | | | |
| | | Boring terminated at 217' | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. **OW-1012**
Sheet 1 of 4

| | | | | | |
|---------------------------------------|-------------------|----------------------------------|----------------------------|--------------------------------------|--|
| SITE Vogle ALWR SSAR | | HOLE DEPTH 93.6 | | SURF. ELEV. 205.355 | |
| LOCATION Burke County, Georgia | | COORDINATES N 1139969.496 | | E 621045.924 | |
| ANGLE NA | BEARING NA | CONTRACTOR S&ME | DRILL NO. CME 55 | | |
| DRILLING METHOD HSA 4 1/4" ID | | NO. SAMPLES 19 | NO. U.D. SAMPLES NA | | |
| WATER TABLE DEPTH 49.5' | | ELEV. 155.225' | TIME AFTER COMP. NA | DATE TAKEN 6/1/2005 | |
| TYPE GROUT NA | | QUANTITY NA | MIX NA | DRILLING START DATE 5/31/2005 | |
| DRILLER Ted/Rick | | RECORDER Tinsley | APPROVED NA | DRILLING COMP. DATE 6/1/2005 | |

| Depth Ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|--|------------|---------------------------|---------|-------|----------|
| | | | | From To Ft. | Blows | N BPF | |
| 0 | 205.36 | | | | | | |
| 1 | 204.36 | | | | | | |
| 2 | 203.36 | | | | | | |
| 3 | 202.36 | | | | | | |
| 4 | 201.36 | Weak red SAND (SW), very fine - fine grained, loose, mottled | | | | | |
| 5 | 200.36 | | 1 | 3.5-5 | 2-2-3 | 5 | |
| 6 | 199.36 | | | | | | |
| 7 | 198.36 | | | | | | |
| 8 | 197.36 | | | | | | |
| 9 | 196.36 | | | | | | |
| 10 | 195.36 | | 2 | 8.5-10 | 2-5-5 | 10 | |
| 11 | 194.36 | | | | | | |
| 12 | 193.36 | | | | | | |
| 13 | 192.36 | | | | | | |
| 14 | 191.36 | | | | | | |
| 15 | 190.36 | Same as above with stronger mottling | 3 | 13.5-15 | 3-5-5 | 10 | |
| 16 | 189.36 | | | | | | |
| 17 | 188.36 | | | | | | |
| 18 | 187.36 | Brown SAND, fine to medium grained, loose, (SW) | | | | | |
| 19 | 186.36 | | | | | | |
| 20 | 185.36 | | 4 | 18.5-20 | 5-15-26 | 41 | |
| 21 | 184.36 | | | | | | |
| 22 | 183.36 | | | | | | |
| 23 | 182.36 | Reddish yellow SAND | | | | | |
| 24 | 181.36 | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1012

Sheet 2 of 4

SITE **Vogtle ALWR SSAR**

TOTAL DEPTH **93.6**

SURF.ELEV. **205.355**

| Depth Ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|--|------------|---------------------------|---------|-------|--|
| | | | | From To | Blows | N BPF | |
| 25 | 180.36 | Reddish yellow SAND (SP), fine- to medium-grained with fines | 5 | 23.5-25 | 6-16-17 | 33 | |
| 26 | 179.36 | | | | | | |
| 27 | 178.36 | | | | | | |
| 28 | 177.36 | | | | | | |
| 29 | 176.36 | Reddish yellow SAND (SP), fine-grained, loose | 6 | 28.5-30 | 3-7-7 | 14 | |
| 30 | 175.36 | | | | | | |
| 31 | 174.36 | | | | | | |
| 32 | 173.36 | | | | | | |
| 33 | 172.36 | | | | | | |
| 34 | 171.36 | | | | | | |
| 35 | 170.36 | | | | | | |
| 36 | 169.36 | | | | | | |
| 37 | 168.36 | | 7 | 33.5-35 | 3-5-6 | 11 | |
| 38 | 167.36 | | | | | | |
| 39 | 166.36 | | | | | | |
| 40 | 165.36 | | | | | | |
| 41 | 164.36 | | | | | | |
| 42 | 163.36 | | | | | | |
| 43 | 162.36 | | | | | | |
| 44 | 161.36 | | | | | | |
| 45 | 160.36 | | 9 | 43.5-45 | 3-2-2 | 4 | |
| 46 | 159.36 | | | | | | |
| 47 | 158.36 | | | | | | |
| 48 | 157.36 | | | | | | |
| 49 | 156.36 | | | | | | |
| 50 | 155.36 | | | | | | |
| 51 | 154.36 | | | | | | |
| 52 | 153.36 | | | | | | |
| 53 | 152.36 | Pale yellow CLAY (CL), slightly sandy | 10 | 48.5-50 | 1-1-2 | 3 | 6/1/2005 ▼ 49.5' from ground surface |
| 54 | | | | | | | |
| 55 | 150.36 | | | | | | |
| 56 | 149.36 | | | | | | |
| | | | 11 | 53.5-55 | WHO/2/3 | 5 | micas |

H



DRILLING LOG **GEOLOGICAL SERVICES**

Hole No. OW-1012

Sheet 3 of 4

SITE Vogtle ALWR SSAR

93.6

SURF.ELEV. 205.355

| Depth Ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|--|------------|---------------------------|-------------------|-----------|----------------|
| | | | | From To Ft. | Blows | N BPF | |
| 57 | 148.36 | Pale yellow CLAY (CL), slightly sandy | 12 | 58.5-60 | 1-1-2 | 3 | |
| 58 | 147.36 | | | | | | |
| 59 | 146.36 | | | | | | |
| 60 | 145.36 | | | | | | |
| 61 | 144.36 | | | | | | |
| 62 | 143.36 | | | | | | |
| 63 | 142.36 | | | | | | |
| 64 | 141.36 | | | | | | |
| 65 | 140.36 | | | | | | |
| 66 | 139.36 | | | | | | |
| 67 | 138.36 | | | | | | |
| 68 | 137.36 | | | | | | |
| 69 | 136.36 | | | | | | |
| 70 | 135.36 | | | | | | |
| 71 | 134.36 | | | | | | |
| 72 | 133.36 | Pale yellow sandy CLAY, soft (CL) | 14 | 68.5-70 | WOH/ WOH/ 1 | WHO/1 | |
| 73 | 132.36 | | | | | | |
| 74 | 131.36 | | | | | | |
| 75 | 130.36 | | | | | | |
| 76 | 129.36 | | | | | | |
| 77 | 128.36 | Brown SAND, fine- to medium-grained with pale yellow silt (SM) | 15 | 73.5-75 | WOH/ WOH/ 1 | WOH/ 1 | |
| 78 | 127.36 | | | | | | |
| 79 | 126.36 | | | | | | |
| 80 | 125.36 | | | | | | |
| 81 | 124.36 | | | | | | |
| 82 | 123.36 | Pale olive SILT (ML) | 16 | 78.5-80 | 2-4-6 | 10 | |
| 83 | 122.36 | | | | | | |
| 84 | 121.36 | | | | | | |
| 85 | 120.36 | | | | | | |
| 86 | | | | | | | |
| 87 | 118.36 | Pale yellow SILT, micaceous (ML) | 17 | 83.5-85 | 2-3-4 | 7 | Black minerals |
| 88 | 117.36 | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1012

Sheet 4 of 4

SITE **Vogtle ALWR SSAR**

TOTAL DEPTH **93.6**

SURF.ELEV. **205.355**

| Depth Ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|--|------------|---------------------------|----------|-------|----------|
| | | | | From To Ft. | Blows | N BPF | |
| 89 | 116.36 | Grayish green MARL, very stiff | 18 | 88.5-90 | 18-25-50 | 75 | |
| 90 | 115.36 | | | | | | |
| 91 | 114.36 | | | | | | |
| 92 | 113.36 | | | | | | |
| 93 | 112.36 | | | | | | |
| 94 | 111.36 | | | | | | |
| 95 | 110.36 | Boring Terminated at 93.6' Well OW-1012 installed in this borehole. | 19 | 93.5-95 | 50/1" | 50/1" | |
| 96 | 109.36 | | | | | | |
| 97 | 108.36 | | | | | | |
| 98 | 107.36 | | | | | | |
| 99 | 106.36 | | | | | | |
| 100 | 105.36 | | | | | | |
| 101 | 104.36 | | | | | | |
| 102 | 103.36 | | | | | | |
| 103 | 102.36 | | | | | | |
| 104 | 101.36 | | | | | | |
| 105 | 100.36 | | | | | | |
| 106 | 99.36 | | | | | | |
| 107 | 98.36 | | | | | | |
| 108 | 97.36 | | | | | | |
| 109 | 96.36 | | | | | | |
| 110 | 95.36 | | | | | | |
| 111 | 94.36 | | | | | | |
| 112 | 93.36 | | | | | | |
| 113 | 92.36 | | | | | | |
| 114 | 91.36 | | | | | | |
| 115 | 90.36 | | | | | | |
| 116 | 89.36 | | | | | | |
| 117 | 88.36 | | | | | | |
| 118 | | | | | | | |
| 119 | 86.36 | | | | | | |
| 120 | 85.36 | | | | | | |

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. OW-1013

Sheet 1 of 4

| | | | |
|---|---------------------------|--------------------------------|--------------------------------------|
| SITE Vogtle ALWR SSAR | | HOLE DEPTH 103.5 | SURF.ELEV. 216.869 |
| LOCATION Burke County, Georgia | | COORDINATES N 1140805.4 | E 621715.032 |
| ANGLE NA | BEARING NA | CONTRACTOR S&ME | DRILL NO. CME 55 |
| DRILLING METHOD 4 1/4" Hollow stem auger | | NO. SAMPLES 20 | NO. U.D. SAMPLES NA |
| WATER TABLE DEPTH 49' | ELEV. 167.239' | TIME AFTER COMP. NA | DATE TAKEN 6/9/2005 |
| TYPE GROUT NA | QUANTITY NA | MIX NA | DRILLING START DATE 6/9/2005 |
| DRILLER Ted Miller | RECORDER S. Bearce | APPROVED NA | DRILLING COMP. DATE 6/10/2005 |

| Depth Ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|---|------------|---------------------------|--------|-------|----------|
| | | | | From To Ft. | Blows | N BPF | |
| 0 | 216.87 | | | | | | |
| 1 | 215.87 | | | | | | |
| 2 | 214.87 | | | | | | |
| 3 | 213.87 | | | | | | |
| 4 | 212.87 | Orange brown clayey SAND (SC) | | | | | |
| 5 | 211.87 | | 1 | 3.5-5 | 8-8-9 | 17 | |
| 6 | 210.87 | | | | | | |
| 7 | 209.87 | | | | | | |
| 8 | 208.87 | | | | | | |
| 9 | 207.87 | | | | | | |
| 10 | 206.87 | | 2 | 8.5-10 | 5-10-9 | 19 | |
| 11 | 205.87 | | | | | | |
| 12 | 204.87 | | | | | | |
| 13 | 203.87 | | | | | | |
| 14 | 202.87 | Burgundy or hematitic clayey SAND (SC) | | | | | |
| 15 | 201.87 | | 3 | 13.5-15 | 2-2-3 | 5 | |
| 16 | 200.87 | | | | | | |
| 17 | 199.87 | | | | | | |
| 18 | 198.87 | | | | | | |
| 19 | 197.87 | Mottled orange, brown, and light gray sandy CLAY (CL) | | | | | |
| 20 | 196.87 | | 4 | 18.5-20 | 3-4-5 | 9 | |
| 21 | 195.87 | | | | | | |
| 22 | 194.87 | | | | | | |
| 23 | 193.87 | | | | | | |
| 24 | 192.87 | Burgundy hematite coated fine-grained to coarse-grained SAND (SW) | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1013

Sheet 2 of 4

SITE **Vogtle ALWR SSAR**

TOTAL DEPTH **103.5**

SURF.ELEV. **216.869**

| Depth Ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|---|------------|---------------------------|--------|-------|---|
| | | | | From To Ft. | Blows | N BPF | |
| 25 | 191.87 | Fine- to coarse-grained SAND (SW) with minor amounts of clay, moist | 5 | 23.5-25 | 4-5-6 | 11 | |
| 26 | 190.87 | | | | | | |
| 27 | 189.87 | | | | | | |
| 28 | 188.87 | | | | | | |
| 29 | 187.87 | | | | | | |
| 30 | 186.87 | Yellow brown fine SAND (SP) minor clay, moist | 6 | 28.5-30 | 2-3-5 | 8 | |
| 31 | 185.87 | | | | | | |
| 32 | 184.87 | | | | | | |
| 33 | 183.87 | | | | | | |
| 34 | 182.87 | | | | | | |
| 35 | 181.87 | | | | | | |
| 36 | 180.87 | | | | | | |
| 37 | 179.87 | | | | | | |
| 38 | 178.87 | | | | | | |
| 39 | 177.87 | | | | | | |
| 40 | 176.87 | Same as above, wet | 7 | 33.5-35 | 3-6-10 | 16 | |
| 41 | 175.87 | | | | | | |
| 42 | 174.87 | | | | | | |
| 43 | 173.87 | | | | | | |
| 44 | 172.87 | | | | | | |
| 45 | 171.87 | | | | | | |
| 46 | 170.87 | | | | | | |
| 47 | 169.87 | | | | | | |
| 48 | 168.87 | | | | | | |
| 49 | 167.87 | | | | | | |
| 50 | 166.87 | Same as above - saturated | 8 | 38.5-40 | 3-6-9 | 15 | |
| 51 | 165.87 | | | | | | |
| 52 | 164.87 | | | | | | |
| 53 | 163.87 | Yellow brown, wet, SAND (SC) clay content higher | 9 | 43.5-45 | 2-2-5 | 7 | 6/9/2005 ▼ 49 from ground surface |
| 54 | 162.24 | | | | | | |
| 55 | 161.87 | | | | | | |
| 56 | 160.87 | | | | | | |
| | | | 10 | 48.5-50 | 1-3-5 | 8 | |
| | | | 11 | 53.5-55 | 3-2-5 | 7 | |

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. OW-1013

Sheet 3 of 4

| SITE | | Vogtle ALWR SSAR | | TOTAL DEPTH | | 103.5 | | SURF.ELEV. | | 216.869 | |
|-----------|-----------|--|------------|---------------------------|---------|-------|----------|------------|--|---------|--|
| Depth Ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | | | | |
| | | | | From To Ft. | Blows | N BPF | | | | | |
| 57 | 159.87 | No recovery | 12 | 58.5-60 | 2-2-2 | 4 | | | | | |
| 58 | 158.87 | | | | | | | | | | |
| 59 | 157.87 | | | | | | | | | | |
| 60 | 156.87 | | | | | | | | | | |
| 61 | 155.87 | | | | | | | | | | |
| 62 | 154.87 | Same as above with clay blobs, saturated | 13 | 63.5-65 | 1-3-5 | 8 | | | | | |
| 63 | 153.87 | | | | | | | | | | |
| 64 | 152.87 | | | | | | | | | | |
| 65 | 151.87 | | | | | | | | | | |
| 66 | 150.87 | | | | | | | | | | |
| 67 | 149.87 | | | | | | | | | | |
| 68 | 148.87 | | | | | | | | | | |
| 69 | 147.87 | | | | | | | | | | |
| 70 | 146.87 | | | | | | | | | | |
| 71 | 145.87 | | | | | | | | | | |
| 72 | 144.87 | | 14 | 68.5-70 | 2-3-4 | 7 | | | | | |
| 73 | 143.87 | | | | | | | | | | |
| 74 | 142.87 | | | | | | | | | | |
| 75 | 141.87 | | | | | | | | | | |
| 76 | 140.87 | | | | | | | | | | |
| 77 | 139.87 | | 15 | 73.5-75 | 2-4-6 | 10 | | | | | |
| 78 | 138.87 | | | | | | | | | | |
| 79 | 137.87 | | | | | | | | | | |
| 80 | 136.87 | | | | | | | | | | |
| 81 | 135.87 | | | | | | | | | | |
| 82 | 134.87 | Tan fine- to coarse-grained SAND (SW) with medium to coarse-grained black organic material | 16 | 78.5-80 | 5-10-10 | 20 | | | | | |
| 83 | 133.87 | | | | | | | | | | |
| 84 | 132.87 | | | | | | | | | | |
| 85 | 131.87 | | | | | | | | | | |
| 86 | 130.24 | | | | | | | | | | |
| 87 | 129.87 | Tan fine- to medium-grained SAND (SP-SM) with tan or gray clay "tubes" or bioturbation | 17 | 83.5-85 | 3-2-4 | 6 | | | | | |
| 88 | 128.87 | | | | | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1013

Sheet 4 of 4

SITE **Vogtle ALWR SSAR**

OTAL DEPTH **103.5**

SURF.ELEV. **216.869**

| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|---|------------|---------------------------|------------|--------------|----------|
| | | | | From To Ft. | Blows | N BPF | |
| 89 | 127.87 | Light olive tan calcareous silty fine-grained SAND (SP - SM) | 18 | 88.5-90 | 6-7-9 | 16 | |
| 90 | 126.87 | | | | | | |
| 91 | 125.87 | | | | | | |
| 92 | 124.87 | | | | | | |
| 93 | 123.87 | | | | | | |
| 94 | 122.87 | light olive tan calcareous CLAY (CL), wet but not saturated | 19 | 93.5-95 | 4-19-15 | 24 | |
| 95 | 121.87 | | | | | | |
| 96 | 120.87 | | | | | | |
| 97 | 119.87 | | | | | | |
| 98 | 118.87 | | | | | | |
| 99 | 117.87 | | | | | | |
| 100 | 116.87 | Greenish gray MARL | 20 | 98.5-100 | 13-28-50/3 | 28/ 50/3" | |
| 101 | 115.87 | | | | | | |
| 102 | 114.87 | | | | | | |
| 103 | 113.87 | | | | | | |
| 104 | 112.87 | Boring terminated at 103.5' Well OW-1013 installed in this borehole. | | | | | |
| 105 | 111.87 | | | | | | |
| 106 | 110.87 | | | | | | |
| 107 | 109.87 | | | | | | |
| 108 | 108.87 | | | | | | |
| 109 | 107.87 | | | | | | |
| 110 | 106.87 | | | | | | |
| 111 | 105.87 | | | | | | |
| 112 | 104.87 | | | | | | |
| 113 | 103.87 | | | | | | |
| 114 | 102.87 | | | | | | |
| 115 | 101.87 | | | | | | |
| 116 | 100.87 | | | | | | |
| 117 | 99.87 | | | | | | |
| 118 | | | | | | | |
| 119 | 97.87 | | | | | | |
| 120 | 96.87 | | | | | | |

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. OW-1014

Sheet 1 of 7

| | | | |
|---------------------------------------|--------------------------|----------------------------------|--------------------------------------|
| SITE Vogtle ALWR SSAR | | HOLE DEPTH 197.4 | SURF.ELEV. 220.867 |
| LOCATION Burke County, Georgia | | COORDINATES N 1140565.502 | E 623070.234 |
| ANGLE NA | BEARING NA | CONTRACTOR Prosonic | DRILL NO. SR-083 |
| DRILLING METHOD Sonic | | NO. SAMPLES continuous | NO. U.D. SAMPLES NA |
| WATER TABLE DEPTH NA | ELEV. NA | TIME AFTER COMP. NA | DATE TAKEN NA |
| TYPE GROUT NA | QUANTITY NA | MIX NA | DRILLING START DATE 6/11/2005 |
| DRILLER Michael | RECORDER S Bearce | APPROVED NA | DRILLING COMP. DATE 6/11/2005 |

| Depth | Elev. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | % Rec | RQD |
|-------|--------|---|------------|---------------------------|-------|---|----------|-------|-----|
| | | | | From To | Blows | N | | | |
| 0 | 220.87 | | | | | | | | |
| 1 | 219.87 | This borehole was not sampled until 97'. | | | | | | | |
| 2 | 218.87 | OW-1014 is a well pair with OW-1015. See boring log OW-1015 for description of the upper sediments. | | | | | | | |
| 3 | 217.87 | | | | | | | | |
| 4 | 216.87 | | | | | | | | |
| 5 | 215.87 | | | | | | | | |
| 6 | 214.87 | | | | | | | | |
| 7 | 213.87 | | | | | | | | |
| 8 | 212.87 | | | | | | | | |
| 9 | 211.87 | | | | | | | | |
| 10 | 210.87 | | | | | | | | |
| 11 | 209.87 | | | | | | | | |
| 12 | 208.87 | | | | | | | | |
| 13 | 207.87 | | | | | | | | |
| 14 | 206.87 | | | | | | | | |
| 15 | 205.87 | | | | | | | | |
| 16 | 204.87 | | | | | | | | |
| 17 | 203.87 | | | | | | | | |
| 18 | 202.87 | | | | | | | | |
| 19 | 201.87 | | | | | | | | |
| 20 | 200.87 | | | | | | | | |
| 21 | 199.87 | | | | | | | | |
| 22 | 198.87 | | | | | | | | |
| 23 | 197.87 | | | | | | | | |
| 24 | 196.87 | | | | | | | | |

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. OW-1014

Sheet 2 of 7

SITE **Vogle ALWR SSAR** TOTAL DEPTH **197.4** SURF.ELEV. **220.867**

| Depth | Elev. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | % Rec | RQD |
|-------|--------|--|------------|---------------------------|-------|---|----------|-------|-----|
| | | | | From To | Blows | N | | | |
| 25 | 195.87 | See page 1 | | | | | | | |
| 26 | 194.87 | | | | | | | | |
| 27 | 193.87 | | | | | | | | |
| 28 | 192.87 | | | | | | | | |
| 29 | 191.87 | | | | | | | | |
| 30 | 190.87 | | | | | | | | |
| 31 | 189.87 | | | | | | | | |
| 32 | 188.87 | | | | | | | | |
| 33 | 187.87 | | | | | | | | |
| 34 | 186.87 | | | | | | | | |
| 35 | 185.87 | | | | | | | | |
| 36 | 184.87 | | | | | | | | |
| 37 | 183.87 | | | | | | | | |
| 38 | 182.87 | | | | | | | | |
| 39 | 181.87 | | | | | | | | |
| 40 | 180.87 | | | | | | | | |
| 41 | 179.87 | | | | | | | | |
| 42 | 178.87 | | | | | | | | |
| 43 | 177.87 | | | | | | | | |
| 44 | 176.87 | | | | | | | | |
| 45 | 175.87 | | | | | | | | |
| 46 | 174.87 | | | | | | | | |
| 47 | 173.87 | | | | | | | | |
| 48 | 172.87 | | | | | | | | |
| 49 | 171.87 | | | | | | | | |
| 50 | 170.87 | | | | | | | | |
| 51 | 169.87 | | | | | | | | |
| 52 | 168.87 | | | | | | | | |
| 53 | 167.87 | | | | | | | | |
| 54 | | | | | | | | | |
| 55 | 165.87 | | | | | | | | |
| 56 | 164.87 | | | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1014

Sheet 3 of 7

SITE **Vogle ALWR SSAR** TOTAL DEPTH **197.4** SURF.ELEV. **220.867**

| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|--|------------|---------------------------|-------|-------|----------|
| | | | | From To Ft. | Blows | N BPF | |
| 57 | 163.87 | See Page 1 | | | | | |
| 58 | 162.87 | | | | | | |
| 59 | 161.87 | | | | | | |
| 60 | 160.87 | | | | | | |
| 61 | 159.87 | | | | | | |
| 62 | 158.87 | | | | | | |
| 63 | 157.87 | | | | | | |
| 64 | 156.87 | | | | | | |
| 65 | 155.87 | | | | | | |
| 66 | 154.87 | | | | | | |
| 67 | 153.87 | | | | | | |
| 68 | 152.87 | | | | | | |
| 69 | 151.87 | | | | | | |
| 70 | 150.87 | | | | | | |
| 71 | 149.87 | | | | | | |
| 72 | 148.87 | | | | | | |
| 73 | 147.87 | | | | | | |
| 74 | 146.87 | | | | | | |
| 75 | 145.87 | | | | | | |
| 76 | 144.87 | | | | | | |
| 77 | 143.87 | | | | | | |
| 78 | 142.87 | | | | | | |
| 79 | 141.87 | | | | | | |
| 80 | 140.87 | | | | | | |
| 81 | 139.87 | | | | | | |
| 82 | 138.87 | | | | | | |
| 83 | 137.87 | | | | | | |
| 84 | 136.87 | | | | | | |
| 85 | 135.87 | | | | | | |
| 86 | | | | | | | |
| 87 | 133.87 | | | | | | |
| 88 | 132.87 | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1014

Sheet 4 of 7

| SITE | | Vogtle ALWR SSAR | | TOTAL DEPTH | | 197.4 | | SURF.ELEV. | | 220.867 | |
|-----------|-----------|--|------------|---------------------------|-------|-------|----------|------------|-----------|---------|----|
| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | | | | |
| | | | | From To ft. | Blows | N BPF | | | | | |
| 89 | 131.87 | See page 1 | | | | | | | | | |
| 90 | 130.87 | | | | | | | | | | |
| 91 | 129.87 | | | | | | | | | | |
| 92 | 128.87 | | | | | | | | | | |
| 93 | 127.87 | | | | | | | | | | |
| 94 | 126.87 | | | | | | | | | | |
| 95 | 125.87 | | | | | | | | | | |
| 96 | 124.87 | | | | | | | | | | |
| 97 | 123.87 | Sampling begins at 97' | | | | | | | | | |
| 98 | 122.87 | Red orange silty clayey SAND | | | | | | | | | |
| 99 | 121.87 | | | | | | | | | | |
| 100 | 120.87 | White-tan fine- to medium-grained SAND | | | | | | 1 | 98.5-100 | NA | NA |
| 101 | 119.87 | | | | | | | | | | |
| 102 | 118.87 | Brownish-yellow silty CLAY with shell fragments | | | | | | | | | |
| 103 | 117.87 | | | | | | | | | | |
| 104 | 116.87 | Light greenish-brown carbonaceous stiff CLAY with Limestone pieces | | | | | | 2 | 103.5-105 | NA | NA |
| 105 | 115.87 | | | | | | | | | | |
| 106 | 114.87 | | | | | | | | | | |
| 107 | 113.87 | | | | | | | | | | |
| 108 | 112.87 | Moderately stiff greenish-grey carbonaceous clay with shell hash | 3 | 108.5-110 | NA | NA | fizz | | | | |
| 109 | 111.87 | | | | | | | | | | |
| 110 | 110.87 | | | | | | | | | | |
| 111 | 109.87 | | | | | | | | | | |
| 112 | 108.87 | Greenish grey stiff calcareous CLAY with small shell fragments | | | | | | | | | |
| 113 | 107.87 | | | | | | | | | | |
| 114 | 106.87 | | | | | | | | | | |
| 115 | 105.87 | | | | | | | 4 | 113.5-115 | NA | NA |
| 116 | 104.87 | | | | | | | | | | |
| 117 | 103.87 | | | | | | | | | | |
| 118 | | | | | | | | | | | |
| 119 | 101.87 | | | | | | | | | | |
| 120 | 100.87 | | 5 | 118.5-120 | NA | NA | | | | | |

| DRILLING LOG GEOLOGICAL SERVICES | | | | | | Hole No. | OW-1014 |
|-------------------------------------|-----------|--|------------|---------------------------|-------|------------|----------|
| | | | | | | Sheet 5 of | 7 |
| SITE | | Vogle ALWR SSAR | | TOTAL DEPTH | 197.4 | SURF.ELEV. | 220.867 |
| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
| | | | | From To ft. | Blows | N BPF | |
| 121 | 99.87 | Greenish grey stiff calcareous CLAY with small shell fragments | 6 | 123.5-125 | NA | NA | |
| 122 | 98.87 | | | | | | |
| 123 | 97.87 | | | | | | |
| 124 | 96.87 | | | | | | |
| 125 | 95.87 | | | | | | |
| 126 | 94.87 | | | | | | |
| 127 | 93.87 | | | | | | |
| 128 | 92.87 | Same as above with coarse shell fragments and limestone chunks | 7 | 128.5-130 | NA | NA | |
| 129 | 91.87 | | | | | | |
| 130 | 90.87 | | | | | | |
| 131 | 89.87 | | | | | | |
| 132 | 88.87 | | | | | | |
| 133 | 87.87 | | | | | | |
| 134 | 86.87 | | | | | | |
| 135 | 85.87 | | 8 | 133.5-135 | NA | NA | |
| 136 | 84.87 | | | | | | |
| 137 | 83.87 | | | | | | |
| 138 | 82.87 | | | | | | |
| 139 | 81.87 | | | | | | |
| 140 | 80.87 | | | | | | |
| 141 | 79.87 | | | | | | |
| 142 | 78.87 | | 9 | 138.5-140 | NA | NA | |
| 143 | 77.87 | | | | | | |
| 144 | 76.87 | | | | | | |
| 145 | 75.87 | | | | | | |
| 146 | 74.87 | | | | | | |
| 147 | 73.87 | | | | | | |
| 148 | 72.87 | | | | | | |
| 149 | 71.87 | | 10 | 143.5-145 | NA | NA | |
| 150 | 70.24 | | | | | | |
| 151 | 69.87 | | | | | | |
| 152 | 68.87 | | | | | | |

| DRILLING LOG GEOLOGICAL SERVICES | | | | | | | Hole No. | OW-1014 |
|-------------------------------------|-----------|--|------------|---------------------------|-------|--------|--------------|---------|
| SITE Vogtle ALWR SSAR | | | | | | | Sheet 6 of 7 | |
| TOTAL DEPTH 197.4 | | | | | | | SURF.ELEV. | 220.867 |
| Depth FT. | Elev. FT. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments | |
| | | | | From To FT. | Blows | N Bbp/ | | |
| 153 | 67.87 | Greenish grey stiff calcareous CLAY with small shell fragments | 12 | 153.5-155 | NA | NA | | |
| 154 | 66.87 | | | | | | | |
| 155 | 65.87 | | | | | | | |
| 156 | 64.87 | | | | | | | |
| 157 | 63.87 | | | | | | | |
| 158 | 62.87 | | | | | | | |
| 159 | 61.87 | | | | | | | |
| 160 | 60.87 | | 13 | 158.5-160 | NA | NA | | |
| 161 | 59.87 | | | | | | | |
| 162 | 58.87 | | | | | | | |
| 163 | 57.87 | | | | | | | |
| 164 | 56.87 | | | | | | | |
| 165 | 55.87 | | | | | | | |
| 166 | 54.87 | | | | | | | |
| 167 | 53.87 | Light green slightly clayey SAND, turns light grey with brief (~1 hour) exposure to air, with bioturbation saturated | 14 | 163.5-165 | NA | NA | | |
| 168 | 52.87 | | | | | | | |
| 169 | 51.87 | | | | | | | |
| 170 | 50.87 | | | | | | | |
| 171 | 49.87 | | | | | | | |
| 172 | 48.87 | | | | | | | |
| 173 | 47.87 | | | | | | | |
| 174 | 46.87 | Bottom of carbonate clay or confining layer | 15 | 168.5-170 | NA | NA | | |
| 175 | 45.87 | | | | | | | |
| 176 | 44.87 | | | | | | | |
| 177 | 43.87 | | | | | | | |
| 178 | 42.87 | | | | | | | |
| 179 | 41.87 | | | | | | | |
| 180 | 40.87 | | | | | | | |
| 181 | 39.87 | Dark grey silty SAND, (SM - SP), high organic content, saturated | 16 | 173.5-175 | NA | NA | | |
| 182 | | | | | | | | |
| 183 | 37.87 | | | | | | | |
| 184 | 36.87 | | | | | | | |
| | | Light grey, fine quartz SAND (SP), saturated | 17 | 178.5-180 | NA | NA | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

| DRILLING LOG GEOLOGICAL SERVICES | | | | | | | Hole No. OW-1014 |
|-------------------------------------|-----------|--|-------------------|---------------------------|-------|-------|------------------|
| | | | | | | | Sheet 7 of 7 |
| SITE Vogtle ALWR SSAR | | | TOTAL DEPTH 197.4 | SURF.ELEV. 220.867 | | | |
| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
| | | | | From To ft. | Blows | N BPF | |
| 185 | 35.87 | Light grey, silty, fine-grained SAND (SM), saturated | 18 | 183.5-185 | NA | NA | |
| 186 | 34.87 | Dark grey fine sandy SILT (ML) | | | | | |
| 187 | 33.87 | | | | | | |
| 188 | 32.87 | | | | | | |
| 189 | 31.87 | | | | | | |
| 190 | 30.87 | Grey poorly graded SAND with silt (SP-SM) | 19 | 188.5-190 | NA | NA | |
| 191 | 29.87 | | | | | | |
| 192 | 28.87 | | | | | | |
| 193 | 27.87 | | | | | | |
| 194 | 26.87 | | | | | | |
| 195 | 25.87 | | 20 | 193.5-195 | NA | NA | |
| 196 | 24.87 | | | | | | |
| 197 | 23.87 | | 21 | 195-197.4 | NA | NA | |
| 198 | 22.87 | Boring terminated at 197.4' | | | | | |
| 199 | 21.87 | Well OW-1014 installed in this borehole. | | | | | |
| 200 | 20.87 | | | | | | |
| 201 | 19.87 | | | | | | |
| 202 | 18.87 | | | | | | |
| 203 | 17.87 | | | | | | |
| 204 | 16.87 | | | | | | |
| 205 | 15.87 | | | | | | |
| 206 | 14.87 | | | | | | |
| 206 | 14.87 | | | | | | |
| 208 | 12.87 | | | | | | |
| 209 | 11.87 | | | | | | |
| 210 | 10.87 | | | | | | |
| 211 | 9.87 | | | | | | |
| 212 | 8.87 | | | | | | |
| 213 | 7.87 | | | | | | |
| 214 | | | | | | | |
| 215 | 5.87 | | | | | | |
| 216 | 4.87 | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1015

Sheet 1 of 4

SITE Vogtle ALWR SSAR HOLE DEPTH 120 SURF.ELEV. 220.427
 LOCATION Burke County, Georgia COORDINATES N 1140550.576 E 623086.318
 ANGLE NA BEARING NA CONTRACTOR Greene DRILL NO. CME 75
 DRILLING METHOD 4 1/4" HSA NO. SAMPLES 24 NO. U.D. SAMPLES NA
 WATER TABLE DEPTH 73' ELEV. NA TIME AFTER COMP. NA DATE TAKEN 5/30/2005
 TYPE GROUT NA QUANTITY NA MIX NA DRILLING START DATE 5/30/2005
 DRILLER Greene, Dulong RECORDER S Bearce APPROVED NA DRILLING COMP. DATE 6/3/2005

| Depth Ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|---|------------|---------------------------|----------|-------|----------|
| | | | | From To Ft. | Blows | N BPF | |
| 0 | 220.43 | | | | | | |
| 1 | 219.43 | | | | | | |
| 2 | 218.43 | | | | | | |
| 3 | 217.43 | | | | | | |
| 4 | 216.43 | Brown, fine- to medium -grained SAND (SW) <5% silt | | | | | |
| 5 | 215.43 | | 1 | 3.5-5 | 3-9-8 | 17 | |
| 6 | 214.43 | | | | | | |
| 7 | 213.43 | | | | | | |
| 8 | 212.43 | | | | | | |
| 9 | 211.43 | Red-brown, hematitic clayey SAND (SC) | | | | | |
| 10 | 210.43 | | 2 | 8.5-10 | 8-10-13 | 23 | |
| 11 | 209.43 | | | | | | |
| 12 | 208.43 | | | | | | |
| 13 | 207.43 | | | | | | |
| 14 | 206.43 | Red and tan mottled fine- to medium-grained SAND (SP), traces of silt (<5%) | | | | | |
| 15 | 205.43 | | 3 | 13.5-15 | 9-9-13 | 22 | |
| 16 | 204.43 | | | | | | |
| 17 | 203.43 | | | | | | |
| 18 | 202.43 | | | | | | |
| 19 | 201.43 | Reddish-brown, sandy CLAY (CL) sand laminae are light tan | | | | | |
| 20 | 200.43 | | 4 | 18.5-20 | 10-11-14 | 25 | |
| 21 | 199.43 | | | | | | |
| 22 | 198.43 | | | | | | |
| 23 | 197.43 | | | | | | |
| 24 | 196.43 | | | | | | |

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. OW-1015

Sheet 2 of 4

SITE **Vogtle ALWR SSAR**

TOTAL DEPTH **120**

SURF.ELEV. **220.427**

| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|---|------------|---------------------------|----------|-------|----------|
| | | | | From To ft. | Blows | N BPF | |
| 25 | 195.43 | Reddish-brown, sandy CLAY (CL) sand laminae are light tan | 5 | 23.5-25 | 8-11-14 | 25 | |
| 26 | 194.43 | | | | | | |
| 27 | 193.43 | | | | | | |
| 28 | 192.43 | | | | | | |
| 29 | 191.43 | | | | | | |
| 30 | 190.43 | Orange-brown fine- to medium-grained SAND (SP) damp | 6 | 28.5-30 | 6-7-8 | 15 | |
| 31 | 189.43 | | | | | | |
| 32 | 188.43 | | | | | | |
| 33 | 187.43 | | | | | | |
| 34 | 186.43 | | | | | | |
| 35 | 185.43 | | 7 | 33.5-35 | 7-7-8 | 15 | |
| 36 | 184.43 | | | | | | |
| 37 | 183.43 | | | | | | |
| 38 | 182.43 | | | | | | |
| 39 | 181.43 | | | | | | |
| 40 | 180.43 | | 8 | 38.5-40 | 6-8-14 | 22 | |
| 41 | 179.43 | | | | | | |
| 42 | 178.43 | | | | | | |
| 43 | 177.43 | | | | | | |
| 44 | 176.43 | | | | | | |
| 45 | 175.43 | | 9 | 43.5-45 | 10-13-15 | 28 | |
| 46 | 174.43 | | | | | | |
| 47 | 173.43 | | | | | | |
| 48 | 172.43 | | | | | | |
| 49 | 171.43 | | | | | | |
| 50 | 170.43 | Yellowish brown sandy CLAY (CL-CH), moist | 10 | 48.5-50 | 6-7-9 | 16 | |
| 51 | 169.43 | | | | | | |
| 52 | 168.43 | | | | | | |
| 53 | 167.43 | | | | | | |
| 54 | | | | | | | |
| 55 | 165.43 | | 11 | 53.5-55 | 8-11-11 | 22 | |
| 56 | 164.43 | | | | | | |

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. OW-1015

Sheet 3 of 4

SITE **Vogtle ALWR SSAR**

TOTAL DEPTH **120**

SURF.ELEV. **220.427**

| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|--|------------|---------------------------|---------|-------|--|
| | | | | From To ft. | Blows | N BPF | |
| 57 | 163.43 | Yellowish brown clayey SAND (SC) fine-grained, moist | 12 | 58.5-60 | 9-12-14 | 26 | 6/2/2005 ▼ Water Table 59.5 |
| 58 | 162.43 | | | | | | |
| 59 | 161.43 | | | | | | |
| 60 | 160.43 | | | | | | |
| 61 | 159.43 | Tan fine- to coarse-grained SAND (SP) saturated | 13 | 63.5-65 | 1-3-5 | 8 | |
| 62 | 158.43 | | | | | | |
| 63 | 157.43 | | | | | | |
| 64 | 156.43 | | | | | | |
| 65 | 155.43 | Yellow brown clayey SAND (SC) saturated | 14 | 68.5-70 | 5-6-9 | 15 | |
| 66 | 154.43 | | | | | | |
| 67 | 153.43 | | | | | | |
| 68 | 152.43 | | | | | | |
| 69 | 151.43 | | 15 | 73.5-75 | 3-11-13 | 26 | ▼ Water Table during drilling 5/30/2005 |
| 70 | 150.43 | | | | | | |
| 71 | 149.43 | | | | | | |
| 72 | 148.43 | | | | | | |
| 73 | 147.43 | | 16 | 78.5-80 | 3-3-5 | 8 | |
| 74 | 146.43 | | | | | | |
| 75 | 145.43 | | | | | | |
| 76 | 144.43 | | | | | | |
| 77 | 143.43 | | 17 | 83.5-85 | 2-3-3 | 6 | |
| 78 | 142.43 | | | | | | |
| 79 | 141.43 | | | | | | |
| 80 | 140.43 | | | | | | |
| 81 | 139.43 | Same as above, though orange in appearance | | | | | |
| 82 | 138.43 | | | | | | |
| 83 | 137.43 | | | | | | |
| 84 | 136.43 | | | | | | |
| 85 | 135.43 | Yellow brown clayey SAND (SC) saturated | | | | | |
| 86 | | | | | | | |
| 87 | 133.43 | | | | | | |
| 88 | 132.43 | | | | | | |

**DRILLING LOG
GEOLOGICAL SERVICES**

Hole No. OW-1015

Sheet 4 of 4

SITE **Vogtle ALWR SSAR**

TOTAL DEPTH **120**

SURF.ELEV. **220.427**

| Depth ft. | Elev. Ft. | Material Description, Classification and Remarks | Sample No. | Standard Penetration Test | | | Comments |
|-----------|-----------|---|------------|---------------------------|-------------|----------|--|
| | | | | From To ft. | Blows | N BPF | |
| 89 | 131.43 | Yellow brown clayey SAND (SC) saturated | 18 | 88.5-90 | 4-9-6 | 15 | sand flowed up into augers. used water and SuperGel X to attempt to flush. |
| 90 | 130.43 | | | | | | |
| 91 | 129.43 | | | | | | |
| 92 | 128.43 | | | | | | |
| 93 | 127.43 | Greyish white, fine- to medium-grained SAND (SP) saturated | 19 | 93.5-95 | 13-26-39 | 65 | |
| 94 | 126.43 | | | | | | |
| 95 | 125.43 | | | | | | |
| 96 | 124.43 | | | | | | |
| 97 | 123.43 | | 20 | 98.5-100 | 10-13-6 | 19 | |
| 98 | 122.43 | | | | | | |
| 99 | 121.43 | | | | | | |
| 100 | 120.43 | | | | | | |
| 101 | 119.43 | Very light tan poorly graded SAND with silt (SP-SM) | 21 | 103.5-105 | 8-9-16 | 25 | |
| 102 | 118.43 | | | | | | |
| 103 | 117.43 | | | | | | |
| 104 | 116.43 | | | | | | |
| 105 | 115.43 | Tan shelly (coarse) fine to medium grained clayey SAND (SC) | 22 | 108.5-110 | 6-12-33 | 45 | |
| 106 | 114.43 | | | | | | |
| 107 | 113.43 | | | | | | |
| 108 | 112.43 | | | | | | |
| 109 | 111.43 | Greenish Gray MARL | 23 | 113.5-115 | NA | NA | |
| 110 | 110.43 | | | | | | |
| 111 | 109.43 | | | | | | |
| 112 | 108.43 | | | | | | |
| 113 | 107.43 | | 24 | 118.5-120 | 20-30-50/3" | 30/50/3" | |
| 114 | 106.43 | | | | | | |
| 115 | 105.43 | | | | | | |
| 116 | 104.43 | | | | | | |
| 117 | 103.43 | Boring terminated at 120' | | | | | |
| 118 | | | | | | | |
| 119 | 101.43 | | | | | | |
| 120 | 100.43 | | | | | | |

APPENDIX F

ABANDONMENT FORMS

AND

AS BUILT

WELL CONSTRUCTION LOGS

WELL ABANDONMENT DATA

| | |
|---|--|
| PROJECT: SOUTHERN ALWR ESP PROJECT | WELL/HOLE NO: OW-1001A DEPTH: 100' HOLE DIAMETER: ~7 5/8" |
| ABANDONMENT BY: S&ME, Inc. | DATE ABANDONED: 6/5/2005 |
| REASON FOR ABANDONMENT: This hole was drilled with incorrect size augers. | VOLUME USED: 32 cubic feet |
| REMARKS: 32 bags of grout were used to abandon this hole. | |

| | |
|---|--|
| PROJECT: SOUTHERN ALWR ESP PROJECT | WELL/HOLE NO: OW-1002A DEPTH: 108.5' HOLE DIAMETER: ~7 5/8" |
| ABANDONMENT BY: S&ME, Inc. | DATE ABANDONED: 6/5/2005 |
| REASON FOR ABANDONMENT: This hole was drilled with incorrect size augers. | VOLUME USED: 35 cubic feet |
| REMARKS: 35 bags of grout were used to abandon this hole. | |

| | |
|---|--|
| PROJECT: SOUTHERN ALWR ESP PROJECT | WELL/HOLE NO: OW-1003A DEPTH: 90.00' HOLE DIAMETER: ~7 5/8" |
| ABANDONMENT BY: S&ME, Inc. | DATE ABANDONED: 5/25/2005 |
| REASON FOR ABANDONMENT: This hole was drilled with incorrect size augers. | VOLUME USED: 25 cubic feet |
| REMARKS: 25 bags of grout were used to abandon this hole. | |

| | |
|---|--|
| PROJECT: SOUTHERN ALWR ESP PROJECT | WELL/HOLE NO: OW-1006A DEPTH: 125' HOLE DIAMETER: ~7 5/8" |
| ABANDONMENT BY: S&ME, Inc. | DATE ABANDONED: 6/5/2005 |
| REASON FOR ABANDONMENT: This hole was drilled with incorrect size augers. | VOLUME USED: 40 cubic feet |
| REMARKS: 40 bags of grout were used to abandon this hole. | |

| | |
|---|--------------------------------------|
| PROJECT: SOUTHERN ALWR ESP PROJECT | WELL/HOLE NO: OW-1005A |
| | DEPTH: 75' |
| | HOLE DIAMETER: ~7 5/8" |
| ABANDONMENT BY: S&ME, Inc. | DATE ABANDONED: 6/5/2005 |
| REASON FOR ABANDONMENT: This hole was drilled with incorrect size augers. | VOLUME USED: 25 cubic feet |
| REMARKS: 25 bags of grout were used to abandon this hole. | |

SOUTHERN COMPANY GENERATION

WELL CONSTRUCTION LOG

PROJECT

Vogtle ALWR SSAR

WELL NO

Coords N 1142888.724 E 620148.556

LOCATION

Burke County, Georgia

DATE INSTALLED 5/29/2005

PREPARED 7/18/2005

OW-1001

| | | DEPTH (ft.) | ELEVATION (ft.) |
|--------------------------------------|---|----------------|--------------------|
| | Top of 2" PVC Casing | | 233.494 |
| | 3' X 3' CONCRETE PAD 4-6" THICK GROUND SURFACE | 0 | 230.854 |
| | PROTECTIVE CASING DIA 4" x 4" x 4" TYPE Plated steel | | |
| | BACKFILL MATERIAL TYPE Cement/bentonite grout | | |
| | RISER CASING DIA 2" TYPE Sch 40 PVC | | |
| STANDUP CASING: hinge lid, welded | | | |
| | TOP OF SEAL | 113 | 117.854 |
| | ANNULAR SEAL TYPE Cetco Goldseal 3/8" chips | | |
| | TOP OF FILTER PACK | 116 | 114.854 |
| | FILTER PACK TYPE: JC50FS by Unimen | | |
| centralizer | BOTTOM OF RISER/ TOP OF SCREEN | 121 | 109.854 |
| | SCREEN DIA 2" TYPE Sch 40 PVC OPENING WIDTH 0.01" spaced 0.125" OPENING TYPE machine slotted | | |
| centralizer | BOTTOM OF SCREEN | 130 | 100.854 |
| | BOTTOM OF CASING | 133 | 97.854 |
| | BOTTOM OF HOLE | 133 | 97.854 |
| HOLE DIA: 9" | | | |

SOUTHERN COMPANY GENERATION

WELL CONSTRUCTION LOG

PROJECT

Vogtle ALWR SSAR

WELL NO.

Coords N 1142887.782 E 620189.341

LOCATION

Burke County, Georgia

DATE INSTALLED 6/6/2005

PREPARED 7/18/2005

OW-1002

| | | DEPTH | ELEVATION |
|---|---|-------|-----------|
| Top of 2" PVC casing | | | 230.502 |
| 3' X 3' CONCRETE PAD 4-6" THICK GROUND SURFACE | | 0 | 227.442 |
| | PROTECTIVE CASING DIA 4"x4"x4' TYPE Plated steel | | |
| | BACKFILL MATERIAL TYPE Cement/bentonite grout | | |
| | RISER CASING DIA 2" TYPE Sch 80 PVC | | |
| | TOP OF SEAL | 212 | 15.442 |
| | ANNULAR SEAL TYPE Cetco Goldseal 3/8" chips | | |
| | TOP OF FILTER PACK | 216 | 11.442 |
| | FILTER PACK TYPE: 1A by DSI | | |
| | BOTTOM OF RISER/ TOP OF SCREEN | 219 | 8.442 |
| | SCREEN DIA 2" TYPE Sch 80 PVC OPENING WIDTH 0.01" spaced 0.125" OPENING TYPE machine slotted | | |
| | BOTTOM OF SCREEN | 229 | -1.558 |
| centralizer | | | |
| centralizer | | | |
| HOLE DIA: 6" | | | |
| BOTTOM OF CASING | | 237 | -9.558 |
| BOTTOM OF HOLE | | 237 | -9.558 |

SOUTHERN COMPANY GENERATION

WELL CONSTRUCTION LOG

PROJECT

Vogtle ALWR SSAR

WELL NO.

Coords N 1142864.05 E 621884.337

LOCATION

Burke County, Georgia

DATE INSTALLED 5/26/2005

PREPARED 7/16/2005

OW-1003

| | | DEPTH (ft.) | ELEVATION (ft.) |
|--------------------------------------|--|----------------|--------------------|
| | Top of 2" PVC casing | | 226.284 |
| | 3' X 3' CONCRETE PAD 4-6" THICK GROUND SURFACE | 0 | 223.044 |
| | PROTECTIVE CASING DIA 4"x4"x4" TYPE Plated steel | | |
| | BACKFILL MATERIAL TYPE Cement/bentonite grout | | |
| | RISER CASING DIA 2" TYPE Sch 40 PVC | | |
| STANDUP CASING: hinge lid, welded | | | |
| | TOP OF SEAL | 68.5 | 154.544 |
| | ANNULAR SEAL TYPE Cetco Goldseal 3/8" chips | | |
| | TOP OF FILTER PACK | 72 | 151.044 |
| | FILTER PACK TYPE: 1A by DSI | | |
| centralizer | BOTTOM OF RISER/ TOP OF SCREEN | 75.5 | 147.544 |
| | SCREEN DIA 2" TYPE Sch 40 PVC OPENING WITH 0.01" spaced 0.125" OPENING TYPE machine slotted | | |
| centralizer | BOTTOM OF SCREEN | 84.8 | 138.244 |
| | BOTTOM OF CASING | 90.5 | 132.544 |
| | BOTTOM OF HOLE | 90.5 | 132.544 |
| HOLE DIA: 9" | | | |

SOUTHERN COMPANY GENERATION

WELL CONSTRUCTION LOG

PROJECT

Vogtle ALWR SSAR

WELL NO.

Coords N 1142842.17 E 621880.794

LOCATION

Burke County, Georgia

DATE INSTALLED 6/10/2005

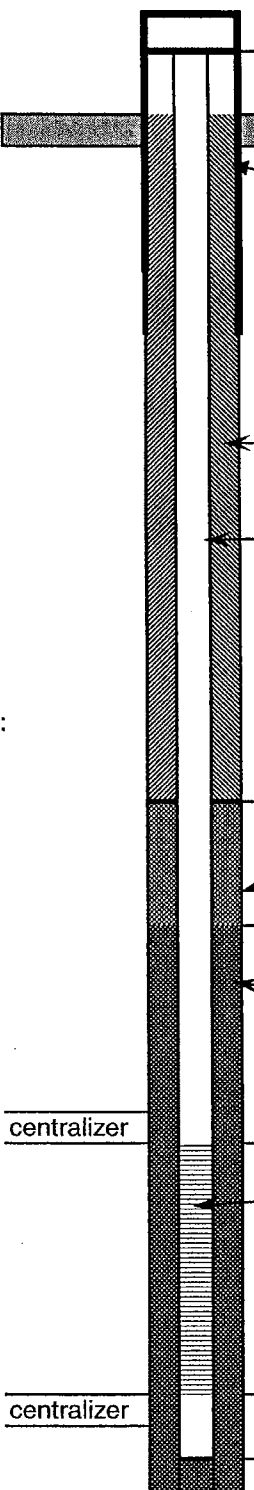
PREPARED 7/18/2005

OW-1004

| | | DEPTH (ft.) | ELEVATION (ft.) |
|--------------------------------------|---|----------------|--------------------|
| | Top of 2" PVC CASING | | 225.671 |
| | 3' X 3' CONCRETE PAD 4-6" THICK GROUND SURFACE | 0 | 222.92 |
| | PROTECTIVE CASING DIA 4"X4"X4' TYPE Plated steel | | |
| | BACKFILL MATERIAL TYPE Cement/bentonite grout | | |
| | RISER CASING DIA 2" TYPE Sch 80 PVC | | |
| STANDUP CASING: hinge lid, welded | | | |
| | TOP OF SEAL | 147 | 75.92 |
| | ANNULAR SEAL TYPE Cetco Goldseal 3/8" chips | | |
| | TOP OF FILTER PACK | 150 | 72.92 |
| | FILTER PACK TYPE: 1A by DSI | | |
| centralizer | BOTTOM OF RISER/ TOP OF SCREEN | 153 | 69.92 |
| | SCREEN DIA 2" TYPE Sch 80 PVC OPENING WIDTH 0.01" spaced 0.125" OPENING TYPE Machine slotted | | |
| centralizer | BOTTOM OF SCREEN | 163 | 59.92 |
| | BOTTOM OF CASING | 169 | 53.92 |
| | BOTTOM OF HOLE | 187 | 35.92 |
| | HOLE DIA 6" | | |

SOUTHERN COMPANY GENERATION

| WELL CONSTRUCTION LOG | | PROJECT | Vogtle ALWR SSAR | WELL NO. |
|-----------------------|---------------------------|----------|-----------------------|----------------|
| Coords | N 1144047.86 E 620408.765 | LOCATION | Burke County, Georgia | |
| DATE INSTALLED | 6/7/2005 | PREPARED | 7/18/2005 | OW-1005 |

| | DEPTH (ft.) | ELEVATION (ft.) |
|---|----------------|--------------------|
| TOP OF 2" PVC CASING | | 267.289 |
| 3' X 3' CONCRETE PAD 4-6" THICK GROUND SURFACE | 0 | 264.389 |
|  <p>PROTECTIVE CASING DIA 4"X4"X4" TYPE Plated steel</p> <p>BACKFILL MATERIAL TYPE Cement/bentonite grout</p> <p>RISER CASING DIA 2" TYPE Sch 80 PVC</p> <p>ANNULAR SEAL TYPE Cetco Goldseal 3/8" chips</p> <p>FILTER PACK TYPE: 1A by DSI</p> <p>SCREEN DIA 2" TYPE Sch 80 PVC OPENING WIDTH 0.01" spaced 0.125" OPENING TYPE Machine slotted</p> <p>STANDUP CASING: hinge lid, welded</p> <p>centralizer</p> <p>centralizer</p> <p>HOLE DIA: 9"</p> | | |
| TOP OF SEAL | 140 | 124.389 |
| TOP OF FILTER PACK | 143 | 121.389 |
| TOP OF SCREEN | 149 | 115.389 |
| BOTTOM OF SCREEN | 159 | 105.389 |
| BOTTOM OF CASING | 168.5 | 95.889 |
| BOTTOM OF HOLE | 168.5 | 95.889 |

SOUTHERN COMPANY GENERATION

WELL CONSTRUCTION LOG

Coords N 1143817.85 E 619179.749

PROJECT

Vogtle ALWR SSAR

WELL NO.

LOCATION

Burke County, Georgia

DATE INSTALLED 6/14-15/2005

PREPARED 7/18/2005

OW-1006

| | DEPTH (ft.) | ELEVATION (ft.) |
|---|----------------|--------------------|
| TOP OF 2" PVC CASING | | 230.601 |
| 3' X 3' CONCRETE PAD 4-6" THICK GROUND SURFACE | 0 | 227.121 |
| PROTECTIVE CASING DIA 4"X4"X4" TYPE Plated steel | | |
| BACKFILL MATERIAL TYPE Cement/bentonite grout | | |
| RISER CASING DIA 2" TYPE Sch 80 PVC | | |
| STANDUP CASING: hinge lid, welded | | |
| TOP OF SEAL | 110 | 117.121 |
| ANNULAR SEAL TYPE Cetco Goldseal 3/8" chips | | |
| TOP OF FILTER PACK | 113 | 114.121 |
| FILTER PACK TYPE: 1A by DSI | | |
| centralizer BOTTOM OF RISER/ TOP OF SCREEN | 116 | 111.121 |
| SCREEN DIA 2" TYPE Sch 80 PVC OPENING WIDTH 0.01" spaced 0.125" OPENING TYPE Machine slotted | | |
| centralizer BOTTOM OF SCREEN | 126 | 101.121 |
| BOTTOM OF CASING | 136 | 91.121 |
| BOTTOM OF HOLE | 136 | 91.121 |
| HOLE DIA: 9" | | |

SOUTHERN COMPANY GENERATION

WELL CONSTRUCTION LOG

PROJECT

Vogle ALWR SSAR

WELL NO.

Coords N 1142383.76 E 619301.009

LOCATION

Burke County, Georgia

DATE INSTALLED 6/7/2005

PREPARED 7/18/2005

OW-1007

| | DEPTH (Ft.) | ELEVATION (ft.) |
|---|----------------|--------------------|
| TOP OF 2" PVC CASING | | 219.96 |
| 3' X 3' CONCRETE PAD 4-6" THICK GROUND SURFACE | 0 | 216.91 |
| PROTECTIVE CASING DIA 4"X4"X4" TYPE Plated steel | | |
| BACKFILL MATERIAL TYPE Cement/bentonite grout | | |
| RISER CASING DIA 2" TYPE Sch 40 PVC | | |
| STANDUP CASING: hinge lid, welded | | |
| TOP OF SEAL | 96 | 120.91 |
| ANNULAR SEAL TYPE Cetco Goldseal 3/8" chips | | |
| TOP OF FILTER PACK | 99 | 117.91 |
| FILTER PACK TYPE: 1A by DSI | | |
| centralizer BOTTOM OF RISER/ TOP OF SCREEN | 102 | 114.91 |
| SCREEN DIA 2" TYPE Sch 40 PVC OPENING WIDTH 0.01" spaced 0.125" OPENING TYPE Machine slotted | | |
| centralizer BOTTOM OF SCREEN | 112 | 104.91 |
| BOTTOM OF CASING | 120 | 96.91 |
| BOTTOM OF HOLE | 120 | 96.91 |
| HOLE DIA: 9" | | |

SOUTHERN COMPANY GENERATION

| WELL CONSTRUCTION LOG | | PROJECT | Vogtle ALWR SSAR | WELL NO. |
|-----------------------|---------------------------|----------|-----------------------|----------|
| Coords | N 1142347.93 E 619306.686 | LOCATION | Burke County, Georgia | OW-1008 |
| DATE STARTED | 6/1/2005 | PREPARED | 7/18/2005 | |

| | DEPTH (ft.) | ELEVATION (ft.) |
|---|----------------|--------------------|
| TOP OF 2" PVC CASING | | 219.71 |
| 3' X 3' CONCRETE PAD 4-6" THICK GROUND SURFACE | 0 | 216.65 |
| PROTECTIVE CASING DIA 4"X4"X4" TYPE Plated steel | | |
| BACKFILL MATERIAL TYPE Cement/bentonite grout | | |
| RISER CASING DIA 2" TYPE Sch 80 PVC | | |
| STANDUP CASING: hinge lid, welded | | |
| ANNULAR SEAL TYPE Cetco Goldseal 3/8" chips | 224 | -7.35 |
| TOP OF SEAL | | |
| FILTER PACK TYPE: 1A by DSI | 226 | -9.35 |
| TOP OF FILTER PACK | | |
| SCREEN DIA 2" TYPE Sch 80 PVC OPENING WIDTH 0.01" spaced 0.125" OPENING TYPE Machine slotted | | |
| BOTTOM OF RISER/ TOP OF SCREEN | 230 | -13.35 |
| centralizer | | |
| SCREEN DIA 2" TYPE Sch 80 PVC OPENING WIDTH 0.01" spaced 0.125" OPENING TYPE Machine slotted | | |
| BOTTOM OF SCREEN | 240 | -23.35 |
| centralizer | | |
| BOTTOM OF CASING | 245 | -28.35 |
| BOTTOM OF HOLE | 247 | -30.35 |
| HOLE DIA: 6" | | |

SOUTHERN COMPANY GENERATION

WELL CONSTRUCTION LOG

PROJECT

Vogtle ALWR SSAR

WELL NO.

Coords N 1141891.64 E 620888.608

LOCATION

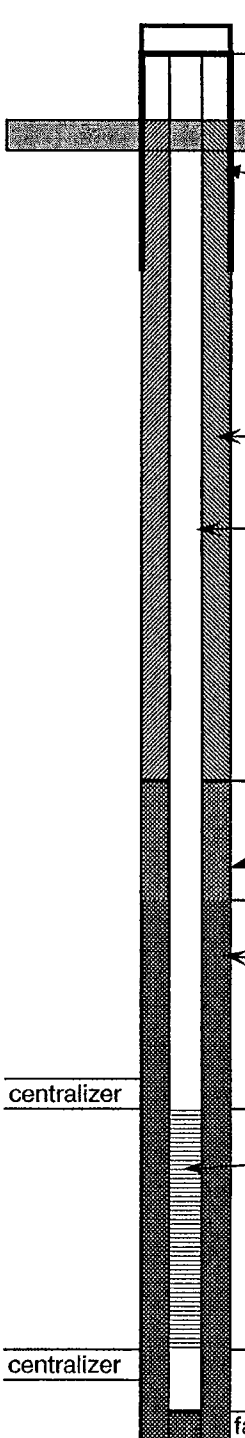
Burke County, Georgia

DATE INSTALLED 5/27/2005

PREPARED 7/18/2005

OW-1009

| | | DEPTH (ft.) | ELEVATION (ft.) |
|--------------------------------------|---|----------------|--------------------|
| | TOP OF 2" PVC CASING | | 223.647 |
| | 3' X 3' CONCRETE PAD 4-6" THICK GROUND SURFACE | 0 | 220.887 |
| | PROTECTIVE CASING DIA 4"X4"X4" TYPE Plated steel | | |
| | BACKFILL MATERIAL TYPE Cement/bentonite grout | | |
| | RISER CASING DIA 2" TYPE Sch 40 PVC | | |
| STANDUP CASING: hinge lid, welded | | | |
| | TOP OF SEAL | 78 | 142.887 |
| | ANNULAR SEAL TYPE Cetco Goldseal 3/8" chips | | |
| | TOP OF FILTER PACK | 81 | 139.887 |
| | FILTER PACK TYPE: 1A by DSI | | |
| centralizer | BOTTOM OF RISER/ TOP OF SCREEN | 84 | 136.887 |
| | SCREEN DIA 2" TYPE Sch 40 PVC OPENING WIDTH 0.01" spaced 0.125" OPENING TYPE Machine slotted | | |
| centralizer | BOTTOM OF SCREEN | 94 | 126.887 |
| | BOTTOM OF CASING | 98 | 122.887 |
| | BOTTOM OF HOLE | 98 | 122.887 |
| HOLE DIA: 9" | | | |

| SOUTHERN COMPANY GENERATION | | | | | |
|---|---------------------------|----------|-----------------------|----------------|--------------------|
| WELL CONSTRUCTION LOG | | PROJECT | Vogtle ALWR SSAR | WELL NO. | |
| Coords | N 1140808.98 E 620051.708 | LOCATION | Burke County, Georgia | | |
| DATE INSTALLED | 6/1/2005 | PREPARED | 7/18/2005 | OW-1010 | |
| | | | | DEPTH (ft.) | ELEVATION (ft.) |
| TOP OF 2" PVC CASING | | | | | 219.905 |
| 3' X 3' CONCRETE PAD 4-6" THICK GROUND SURFACE | | | | 0 | 216.895 |
|  <p>PROTECTIVE CASING DIA 4"X4"X4" TYPE Plated steel</p> <p>BACKFILL MATERIAL TYPE Cement/bentonite grout</p> <p>RISER CASING DIA 2" TYPE Sch 40 PVC</p> <p>ANNULAR SEAL TYPE Cetco Goldseal 3/8" chips</p> <p>FILTER PACK TYPE: 1A by DSI</p> <p>SCREEN DIA 2" TYPE Sch 40 PVC OPENING WIDTH 0.01" spaced 0.125" OPENING TYPE Machine slotted</p> <p>centralizer</p> <p>centralizer</p> <p>fall-in</p> | | | | | |
| TOP OF SEAL | | | | 67.0 | 149.895 |
| TOP OF FILTER PACK | | | | 70.1 | 146.795 |
| BOTTOM OF RISER/ TOP OF SCREEN | | | | 73 | 143.895 |
| BOTTOM OF SCREEN | | | | 83 | 133.895 |
| BOTTOM OF CASING | | | | 92 | 124.895 |
| BOTTOM OF HOLE | | | | 94 | 122.895 |
| HOLE DIA: 9" | | | | | |

STANDUP CASING:
hinge lid, welded

SOUTHERN COMPANY GENERATION

WELL CONSTRUCTION LOG

PROJECT

Vogtle ALWR SSAR

WELL NO

Coords N 1139956.24 E 621033.045

LOCATION

Burke County, Georgia

DATE INSTALLED 6/18/2005

PREPARED 7/18/2005

OW-1011

| | | DEPTH (ft.) | ELEVATION (ft.) |
|-------------|---|----------------|--------------------|
| | TOP OF 2" PVC CASING | | 209.043 |
| | 3' X 3' CONCRETE PAD 4-6" THICK GROUND SURFACE | 0 | 205.785 |
| | PROTECTIVE CASING DIA 4"X4"X4" TYPE Plated steel | | |
| | BACKFILL MATERIAL TYPE Cement/bentonite grout | | |
| | RISER CASING DIA 2" TYPE Sch 80 PVC | | |
| | TOP OF SEAL | 193 | 12.785 |
| | ANNULAR SEAL TYPE Cetco Puregold med chips | | |
| | TOP OF FILTER PACK | 197 | 8.785 |
| | FILTER PACK TYPE: Foster Dixiana | | |
| centralizer | BOTTOM OF RISER/ TOP OF SCREEN | 200 | 5.785 |
| | SCREEN DIA 2" TYPE Sch 80 PVC OPENING WIDTH 0.01" spaced 0.125" OPENING TYPE Machine slotted | | |
| | BOTTOM OF SCREEN | 210 | -4.215 |
| centralizer | BOTTOM OF CASING | 218 | -12.215 |
| | BOTTOM OF HOLE | 218 | -12.215 |
| | | | |

HOLE DIA: 6"

SOUTHERN COMPANY GENERATION

WELL CONSTRUCTION LOG

Coords N 1139969.49 E 621045.924

PROJECT

Vogtle ALWR SSAR

WELL NO

LOCATION Burke County, Georgia

DATE INSTALLED 6/1/2005

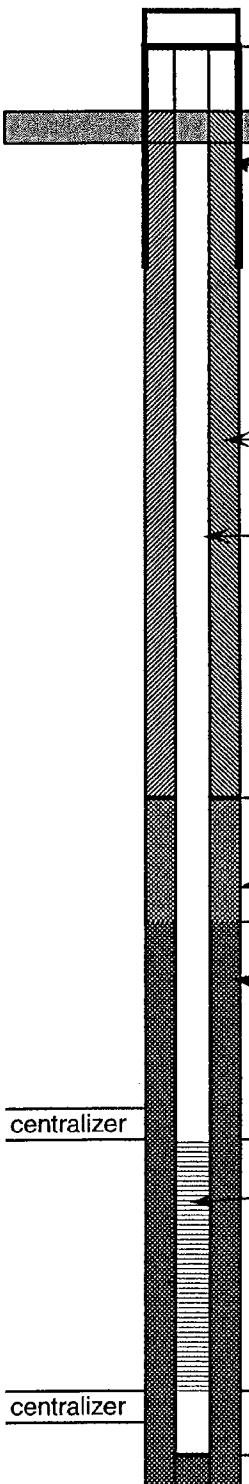
PREPARED 7/18/2005

OW-1012

| | DEPTH (ft.) | ELEVATION (ft.) |
|--|----------------|--------------------|
| TOP OF 2" PVC CASING | | 208.684 |
| 3' x 3' CONCRETE PAD 4 - 6" THICK GROUND SURFACE | 0 | 205.355 |
| PROTECTIVE CASING DIA 4"X4"X4" TYPE Plated steel | | |
| BACKFILL MATERIAL TYPE Cement/bentonite grout | | |
| RISER CASING DIA 2" TYPE Sch 40 PVC | | |
| STANDUP CASING hinge lid, welded | | |
| TOP OF SEAL | 67.0 | 138.355 |
| ANNULAR SEAL TYPE Cetco Goldseal 3/8" chips | | |
| TOP OF FILTER PACK | 71 | 134.355 |
| FILTER PACK TYPE: 1A BY DSI | | |
| BOTTOM OF RISER/ TOP OF SCREEN | 74.0 | 131.355 |
| centralizer | | |
| SCREEN DIA TYPE 2" TYPE Sch 40 PVC OPENING WIDTH 0.01" spaced 0.125" OPENING TYPE Machine slotted | | |
| BOTTOM OF SCREEN | 83 | 122.355 |
| centralizer | | |
| BOTTOM OF CASING | 94 | 111.355 |
| BOTTOM OF HOLE | 94 | 111.355 |
| HOLE DIA: 9" | | |

SOUTHERN COMPANY GENERATION

| WELL CONSTRUCTION LOG | | PROJECT | Vogtle ALWR SSAR | WELL NO. |
|-----------------------|--------------------------|----------|-----------------------|----------------|
| Coords | N 1140805.4 E 621715.032 | LOCATION | Burke County, Georgia | |
| DATE INSTALLED | 6/10/2005 | PREPARED | 7/18/2005 | OW-1013 |

| | DEPTH (ft.) | ELEVATION (ft.) |
|--|----------------|--------------------|
| TOP OF 2" PVC CASING | | 219.809 |
| 3' x 3' CONCRETE PAD 4 - 6" THICK GROUND SURFACE | 0 | 216.869 |
|  <p>PROTECTIVE CASING DIA 4"x4"x4" TYPE Plated steel</p> <p>BACKFILL MATERIAL TYPE Cement/bentonite grout</p> <p>RISER CASING DIA 2" TYPE Sch 40</p> <p>ANNULAR SEAL TYPE Cetco Goldseal 3/8" chips</p> <p>FILTER PACK TYPE: 1A by DSI</p> <p>SCREEN DIA 2" TYPE Sch 40 PVC OPENING WIDTH 0.01" spaced 0.125" OPENING TYPE Machine slotted</p> <p>STANDUP CASING hinge lid, welded</p> <p>centralizer</p> <p>centralizer</p> <p>HOLE DIA: 9"</p> | | |
| TOP OF SEAL | 78 | 138.369 |
| TOP OF FILTER PACK | 81.0 | 135.869 |
| BOTTOM OF RISER/ TOP OF SCREEN | 84 | 132.369 |
| BOTTOM OF SCREEN | 94 | 122.869 |
| BOTTOM OF CASING | 104 | 112.869 |
| BOTTOM OF HOLE | 104 | 112.869 |

SOUTHERN COMPANY GENERATION

WELL CONSTRUCTION LOG

PROJECT

Vogtle ALWR SSAR

WELL NO.

Coords N 1140565.502 E 623070.234

LOCATION

Burke County, Georgia

DATE INSTALLED 6/11/2005

PREPARED 7/18/2005

OW-1014

| | DEPTH (ft.) | ELEVATION (ft.) |
|---|----------------|--------------------|
| TOP OF 2" PVC CASING | | 223.856 |
| 3' x 3' CONCRETE PAD 4 - 6" THICK GROUND SURFACE | 0 | 220.867 |
| PROTECTIVE CASING DIA 4"X4" TYPE Plated steel | | |
| BACKFILL MATERIAL TYPE Cement/bentonite grout | | |
| RISER CASING DIA 2" TYPE Sch 80 PVC | | |
| STANDUP CASING hinge lid, welded | | |
| TOP OF SEAL | 176 | 44.867 |
| ANNULAR SEAL TYPE Cetco Puregold 3/8" chips | | |
| TOP OF FILTER PACK | 179 | 41.867 |
| FILTER PACK TYPE: Foster Dixiana Filter Sand | | |
| centralizer BOTTOM OF RISER/ TOP OF SCREEN | 182 | 38.867 |
| SCREEN DIA 2" TYPE Sch 80 PVC OPENING WIDTH 0.01" spaced 0.125" OPENING TYPE Machine slotted | | |
| centralizer BOTTOM OF SCREEN | 192 | 28.867 |
| BOTTOM OF CASING | 197 | 23.867 |
| BOTTOM OF HOLE | 197 | 23.867 |
| HOLE DIA: 6" | | |

SOUTHERN COMPANY GENERATION

WELL CONSTRUCTION LOG

PROJECT

Vogle ALWR SSAR

WELL NO.

Coords N 1140550.57 E 629086.318

LOCATION

Burke County, Georgia

DATE INSTALLED 6/8/2005

PREPARED 7/18/2005

OW-1015

| | DEPTH (ft.) | ELEVATION (ft.) |
|---|----------------|--------------------|
| TOP OF 2" PVC CASING | | 223.157 |
| 3' x 3' CONCRETE PAD 4 - 6" THICK GROUND SURFACE | 0 | 220.427 |
| PROTECTIVE CASING DIA 4"X4"X4" TYPE Plated steel | | |
| BACKFILL MATERIAL TYPE Cement/bentonite grout | | |
| RISER CASING DIA 2" TYPE Sch 40 PVC | | |
| STANDUP CASING hinge lid, welded | | |
| TOP OF SEAL | 86 | 134.427 |
| ANNULAR SEAL TYPE Cetco Goldseal 3/8" chips | | |
| TOP OF FILTER PACK | 89.6 | 130.827 |
| FILTER PACK TYPE: 1A BY DSI | | |
| centralizer | | |
| BOTTOM OF RISER/ TOP OF SCREEN | 93 | 127.427 |
| SCREEN DIA 2" TYPE Sch 40 PVC OPENING WIDTH 0.01" spaced 0.125" OPENING TYPE Machine slotted | | |
| centralizer | | |
| BOTTOM OF SCREEN | 103 | 117.427 |
| BOTTOM OF CASING | 120 | 100.427 |
| BOTTOM OF HOLE | 120 | 100.427 |
| HOLE DIA: 9" | | |

APPENDIX G

WELL DEVELOPMENT FORMS

MONITORING WELL DEVELOPMENT

| | | |
|---|------------------------|------------------------|
| Facility/Project Name <u>Voalte 55AR</u> | County <u>Burke</u> | Well Name <u>27</u> |
| Facility License, Permit or Monitoring Number | | |

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method:
- | | |
|---------------------------------------|--|
| surged with bailer and bailed | <input type="checkbox"/> 41 |
| surged with bailer and pumped | <input type="checkbox"/> 61 |
| surged with block and bailed | <input type="checkbox"/> 42 |
| surged with block and pumped | <input type="checkbox"/> 62 |
| surged with block, bailed, and pumped | <input type="checkbox"/> 70 |
| compressed air | <input type="checkbox"/> 20 |
| bailed only | <input type="checkbox"/> 10 |
| pumped only | <input checked="" type="checkbox"/> 51 |
| pumped slowly | <input type="checkbox"/> 50 |
| other | <input checked="" type="checkbox"/> |

3. Time spent developing well min.

4. Depth of well (from top of well casing) 190.55' ft.

5. Inside diameter of well 1 3/4" or 1 1/2" in.

6. Volume of water in filter pack and well casing gal.

7. Volume of water removed from well gal.

8. Volume of water added (if any) NONE gal.

9. Source of water added None

10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

Before Development After Development

11. Depth to Water (from top of well casing) a. 124.85' ft.

Date b. 6-2-05

Time c.

12. Sediment in well bottom inches inches

13. Water clarity Clear ☐ 10 Turbid ☒ 15 (Describe) Clear ☒ 20 Turbid ☐ 25 (Describe)

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids mg/l mg/l

15. COD mg/l mg/l

16. Well developed by: Person's Name and Firm

TIM KELLY
RICK FREDRICK } SIME

17. Additional comments on development:

WELL COULD NOT BE PURGED DUE TO DIAMETER SIZE OF PVC CASING.
PUMP WOULD NOT FIT INTO CASING.

Facility Address or Owner/Responsible Party Address

Name: _____

Firm: _____

Street: _____ 2.4A - 144

City/State/Zip: _____

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: _____

Print Name: _____

Firm: _____

MONITORING WELL DEVELOPMENT

| | | |
|---|------------------------|-------------------------|
| Facility/Project Name <u>Vogtle 55AR</u> | County <u>Burke</u> | Well Name <u>179</u> |
| Facility License, Permit or Monitoring Number | | |

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method:
- surged with bailer and bailed ☐ 41
 - surged with bailer and pumped ☐ 61
 - surged with block and bailed ☐ 42
 - surged with block and pumped ☐ 62
 - surged with block, bailed, and pumped ☐ 70
 - compressed air ☐ 20
 - bailed only ☐ 10
 - pumped only ☒ 51
 - pumped slowly ☐ 50
 - other ☒ ☒

3. Time spent developing well min.

4. Depth of well (from top of well casing) 133.62' ft.

5. Inside diameter of well 1 3/4" or 1 1/2" in.

6. Volume of water in filter pack and well casing gal.

7. Volume of water removed from well gal.

8. Volume of water added (if any) NONE gal.

9. Source of water added None

10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

17. Additional comments on development:

WELL COULD NOT BE PURGED DUE TO DIAMETER SIZE OF PVC CASING
PUMP WOULD NOT FIT INTO CASING.

11. Depth to Water (from top of well casing) Before Development After Development
a. 127.26' ft.

Date b. 6-1-05

Time c.

12. Sediment in well bottom inches inches

13. Water clarity Clear ☐ 10 Clear ☒ 20
Turbid ☒ 15 Turbid ☐ 25
(Describe) (Describe)

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids mg/l mg/l

15. COD mg/l mg/l

16. Well developed by: Person's Name and Firm

TIM KELLY } S: ME
RIK FREDRICK

Facility Address or Owner/Responsible Party Address

Name: _____

Firm: _____

Street: _____ 2.4A - 147

City/State/Zip: _____

I hereby certify that the above information is true and correct to the best of knowledge.

Signature: _____

Print Name: _____

Firm: _____

| | | |
|---|-----------------|-------------------|
| Facility/Project Name Vogtle 554R | County Burke | Well Name 803A |
| Facility License, Permit or Monitoring Number | | |

☒ Yes ☐ No

| | | |
|---------------------------------------|-------------------------------------|----|
| surged with bailer and bailed | <input type="checkbox"/> | 41 |
| surged with bailer and pumped | <input type="checkbox"/> | 61 |
| surged with block and bailed | <input type="checkbox"/> | 42 |
| surged with block and pumped | <input type="checkbox"/> | 62 |
| surged with block, bailed, and pumped | <input type="checkbox"/> | 70 |
| compressed air | <input type="checkbox"/> | 20 |
| bailed only | <input type="checkbox"/> | 10 |
| pumped only | <input checked="" type="checkbox"/> | 51 |
| pumped slowly | <input type="checkbox"/> | 50 |
| other | <input checked="" type="checkbox"/> | |

30 min.

89.20' ft.

2" in.

4.7 gal.

21 gal.

NONE gal.

None

☐ Yes ☒ No

a. 60.23 ft. Day ft.

b. 5/26/05 5/26/05

c. 2:30 pm 3:00 pm

89.20' inches 89.20' inches

Clear ☐ 10 Clear ☒ 20
Turbid ☒ 15 Turbid ☐ 25
(Describe) (Describe)

(Describe) (Describe)
TURBID (cloudy) TURBID (cloudy)

14. Total suspended solids mg/l mg/l

| | | |
|---------|------|------|
| 15. COD | mg/l | mg/l |
|---------|------|------|

Tim KELLY - SOME
Rick FREDRICK - SOME

Min 3 Well Volumes Required
Max 4 Well Volumes Removed (Dry) 1st Development
Noted: Pump Rate ≈ 2.0 gallon per min.

Name: _____

Firm: _____

Street: _____ 2.4A 148

City/State/Zip: _____

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: _____

Print Name: _____

Firm: _____

MONITORING WELL DEVELOPMENT

| | | |
|---|------------------------|---------------------------|
| Facility/Project Name <u>Vogtle 55AR</u> | County <u>Burke</u> | Well Name <u>803 A</u> |
| Facility License, Permit or Monitoring Number | | |

1. Can this well be purged dry?

☒ Yes ☐ No

2. Well development method:

- | | |
|---------------------------------------|--|
| surged with bailer and bailed | <input type="checkbox"/> 41 |
| surged with bailer and pumped | <input type="checkbox"/> 61 |
| surged with block and bailed | <input type="checkbox"/> 42 |
| surged with block and pumped | <input type="checkbox"/> 62 |
| surged with block, bailed, and pumped | <input type="checkbox"/> 70 |
| compressed air | <input type="checkbox"/> 20 |
| bailed only | <input type="checkbox"/> 10 |
| pumped only | <input checked="" type="checkbox"/> 51 |
| pumped slowly | <input type="checkbox"/> 50 |
| other | <input checked="" type="checkbox"/> |

3. Time spent developing well

20 min.

4. Depth of well (from top of well casing)

89.20' ft.

5. Inside diameter of well

2" in.

6. Volume of water in filter pack and well casing

4.7 gal.

7. Volume of water removed from well

20 gal.

8. Volume of water added (if any)

None gal.

9. Source of water added

None

10. Analysis performed on water added?
(If yes, attach results)

☐ Yes ☒ No

17. Additional comments on development:

Min of 3 well Volumes Required
Max of 4 removed (Dry) 2nd DEVELOPMENT
Note! Pump RATE ≈ 2.0 gal/min per min.

Before Development After Development

11. Depth to Water
(from top of well casing)

a. 60.30' ft. Dry ft.

Date

b. 5/26/05 5/26/05

Time

c. 4:30 4:50

12. Sediment in well
bottom

89.20 inches

89.20 inches

13. Water clarity

Clear ☐ 10
Turbid ☒ 15
(Describe)

Clear ☐ 20
Turbid ☒ 25
(Describe)

Turbid (cloudy) Turbid (cloudy)

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids

mg/l

mg/l

15. COD

mg/l

mg/l

16. Well developed by: Person's Name and Firm

Facility Address or Owner/Responsible Party Address

Name:

Firm:

Street:

2.4A - 149

City/State/Zip:

I hereby certify that the above information is true and correct to the best of knowledge.

Signature:

Print Name:

Firm:

Pg 2 of 2

MONITORING WELL DEVELOPMENT

| | | |
|---|-----------------|------------------|
| Facility/Project Name Vogtle 55AR | County Burke | Well Name 804 |
| Facility License, Permit or Monitoring Number | | |

1. Can this well be purged dry? ☐ Yes ☒ No

| | |
|---------------------------------------|--|
| 2. Well development method: | |
| surged with bailer and bailed | <input type="checkbox"/> 41 |
| surged with bailer and pumped | <input type="checkbox"/> 61 |
| surged with block and bailed | <input type="checkbox"/> 42 |
| surged with block and pumped | <input type="checkbox"/> 62 |
| surged with block, bailed, and pumped | <input type="checkbox"/> 70 |
| compressed air | <input type="checkbox"/> 20 |
| bailed only | <input type="checkbox"/> 10 |
| pumped only | <input checked="" type="checkbox"/> 51 |
| pumped slowly | <input type="checkbox"/> 50 |
| other | <input checked="" type="checkbox"/> XXXX |

3. Time spent developing well 20 min.

4. Depth of well (from top of well casing) 95.09 ft.

5. Inside diameter of well in.

6. Volume of water in ~~the~~ well casing 5.3 gal.

7. Volume of water removed from well 16.0 gal.

8. Volume of water added (if any) *None* gal.

9. Source of water added None

10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

17. Additional comments on development:

3 Well Volumes Removed
PUMP RATE ≈ 1.0 gal / per min.

| | Before Development | After Development |
|---|---|--|
| 11. Depth to Water (from top of well casing) | a. 62.31' ft. | 63.10' ft. |
| Date | b. 6-1-05 | 6-1-05 |
| Time | c. 4:45 pm | 5:05 pm |
| 12. Sediment in well bottom | inches | inches |
| 13. Water clarity | Clear <input type="checkbox"/> 10 Turbid <input checked="" type="checkbox"/> 15 (Describe) <u>VERY CLOUDY</u> | Clear <input checked="" type="checkbox"/> 20 Turbid <input type="checkbox"/> 25 (Describe) <u>WATER CLEARED AFTER APPRAISAL WELL VOLUME REMOVED.</u> |

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids _____ mg/l _____ mg/l

| Sl. No. | Parameter | Unit | Value |
|---------|-----------|------|-------|
| 15. | COD | mg/l | mg/l |

16. Well developed by: Person's Name and Firm

Tim Kelly } SAME
Rick Frederick }

Facility Address or Owner/Responsible Party Address

Name: _____

Firm: _____

Street: _____ 2.4A - 150

City/State/Zip: _____

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: _____

Print Name: _____

Firm: _____

MONITORING WELL DEVELOPMENT

| | | |
|---|-----------------|------------------|
| Facility/Project Name Voalte 55AR | County Burke | Well Name B09 |
| Facility License, Permit or Monitoring Number | | |

- Tim KELLY } SIME, INC.
Rick FREDRICK }

Firm: _____

Facility/Project Name

County

Burke

| Well Name |
|-----------|
|-----------|

850 A

☐ Yes ☒ No

surged with bailer and bailed
surged with bailer and pumped
surged with block and bailed
surged with block and pumped
surged with block, bailed, and pumped
compressed air
bailed only
pumped only
pumped slowly
other _____

| | |
|-------------------------------------|----|
| <input type="checkbox"/> | 41 |
| <input type="checkbox"/> | 61 |
| <input type="checkbox"/> | 42 |
| <input type="checkbox"/> | 62 |
| <input type="checkbox"/> | 70 |
| <input type="checkbox"/> | 20 |
| <input type="checkbox"/> | 10 |
| <input checked="" type="checkbox"/> | 51 |
| <input type="checkbox"/> | 50 |
| <input checked="" type="checkbox"/> | |

5'5 min.

193.21' ft.

2" in.

11.1 gal.

33.4 gal.

NONE gal.

None

☐ Yes ☒ No

| | Before Development | After Development |
|---|--------------------|-------------------|
| 1. Market Size | Small | Large |
| 2. Market Growth | Low | High |
| 3. Market Saturation | Low | High |
| 4. Market Competition | Low | High |
| 5. Market Profitability | Low | High |
| 6. Market Risk | Low | High |
| 7. Market Stability | Low | High |
| 8. Market Resilience | Low | High |
| 9. Market Flexibility | Low | High |
| 10. Market Adaptability | Low | High |
| 11. Market Innovation | Low | High |
| 12. Market Sustainability | Low | High |
| 13. Market Scalability | Low | High |
| 14. Market Efficiency | Low | High |
| 15. Market Effectiveness | Low | High |
| 16. Market Reliability | Low | High |
| 17. Market Consistency | Low | High |
| 18. Market Predictability | Low | High |
| 19. Market Transparency | Low | High |
| 20. Market Accountability | Low | High |
| 21. Market Integrity | Low | High |
| 22. Market Honesty | Low | High |
| 23. Market Fairness | Low | High |
| 24. Market Justice | Low | High |
| 25. Market Equity | Low | High |
| 26. Market Equality | Low | High |
| 27. Market Inclusion | Low | High |
| 28. Market Diversity | Low | High |
| 29. Market Unity | Low | High |
| 30. Market Cohesion | Low | High |
| 31. Market Collaboration | Low | High |
| 32. Market Cooperation | Low | High |
| 33. Market Partnership | Low | High |
| 34. Market Alliance | Low | High |
| 35. Market Consortium | Low | High |
| 36. Market Joint Venture | Low | High |
| 37. Market Strategic Partnership | Low | High |
| 38. Market Collaborative Partnership | Low | High |
| 39. Market Cooperative Partnership | Low | High |
| 40. Market Partnership Agreement | Low | High |
| 41. Market Partnership Contract | Low | High |
| 42. Market Partnership Document | Low | High |
| 43. Market Partnership Agreement | Low | High |
| 44. Market Partnership Contract | Low | High |
| 45. Market Partnership Document | Low | High |
| 46. Market Partnership Agreement | Low | High |
| 47. Market Partnership Contract | Low | High |
| 48. Market Partnership Document | Low | High |
| 49. Market Partnership Agreement | Low | High |
| 50. Market Partnership Contract | Low | High |
| 51. Market Partnership Document | Low | High |
| 52. Market Partnership Agreement | Low | High |
| 53. Market Partnership Contract | Low | High |
| 54. Market Partnership Document | Low | High |
| 55. Market Partnership Agreement | Low | High |
| 56. Market Partnership Contract | Low | High |
| 57. Market Partnership Document | Low | High |
| 58. Market Partnership Agreement | Low | High |
| 59. Market Partnership Contract | Low | High |
| 60. Market Partnership Document | Low | High |
| 61. Market Partnership Agreement | Low | High |
| 62. Market Partnership Contract | Low | High |
| 63. Market Partnership Document | Low | High |
| 64. Market Partnership Agreement | Low | High |
| 65. Market Partnership Contract | Low | High |
| 66. Market Partnership Document | Low | High |
| 67. Market Partnership Agreement | Low | High |
| 68. Market Partnership Contract | Low | High |
| 69. Market Partnership Document | Low | High |
| 70. Market Partnership Agreement | Low | High |
| 71. Market Partnership Contract | Low | High |
| 72. Market Partnership Document | Low | High |
| 73. Market Partnership Agreement | Low | High |
| 74. Market Partnership Contract | Low | High |
| 75. Market Partnership Document | Low | High |
| 76. Market Partnership Agreement | Low | High |
| 77. Market Partnership Contract | Low | High |
| 78. Market Partnership Document | Low | High |
| 79. Market Partnership Agreement | Low | High |
| 80. Market Partnership Contract | Low | High |
| 81. Market Partnership Document | Low | High |
| 82. Market Partnership Agreement | Low | High |
| 83. Market Partnership Contract | Low | High |
| 84. Market Partnership Document | Low | High |
| 85. Market Partnership Agreement | Low | High |
| 86. Market Partnership Contract | Low | High |
| 87. Market Partnership Document | Low | High |
| 88. Market Partnership Agreement | Low | High |
| 89. Market Partnership Contract | Low | High |
| 90. Market Partnership Document | Low | High |
| 91. Market Partnership Agreement | Low | High |
| 92. Market Partnership Contract | Low | High |
| 93. Market Partnership Document | Low | High |
| 94. Market Partnership Agreement | Low | High |
| 95. Market Partnership Contract | Low | High |
| 96. Market Partnership Document | Low | High |
| 97. Market Partnership Agreement | Low | High |
| 98. Market Partnership Contract | Low | High |
| 99. Market Partnership Document | Low | High |
| 100. Market Partnership Agreement | Low | High |

a. 124.90 ft. 125.26 ft.

b. 6-2-05 6-2-05

c. 3:15 pm 4:10 pm

inches

inches

Clear ☐ 10
Turbid ☒ 15
(Describe).

Clear ☒ 20
Turbid ☐ 25
(Describe)

SLIGHTLY TURBID CLEAR AFTER
29 gallons
REMOVED.

14. Total suspended solids

mg/l

mg/L

15. COD

mg/l

mg/l

Tim KELLY
Rick FREDRICK

Facility Address or Owner/Responsible Party Address

Name:

Firm:

Street:

City/State/Zip:

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I hereby certify that the above information is true and correct to the best of my knowledge.

Signature:

Print Name:

Firm:

MONITORING WELL DEVELOPMENT

| | | |
|---|------------------------|-------------------------|
| Facility/Project Name <u>Voatile 55AA</u> | County <u>Burke</u> | Well Name <u>852</u> |
| Facility License, Permit or Monitoring Number | | |

1. Can this well be purged dry? ☐ Yes ☒ No

2. Well development method:

| | |
|---------------------------------------|---|
| surged with bailer and bailed | <input type="checkbox"/> 41 |
| surged with bailer and pumped | <input type="checkbox"/> 61 |
| surged with block and bailed | <input type="checkbox"/> 42 |
| surged with block and pumped | <input type="checkbox"/> 62 |
| surged with block, bailed, and pumped | <input type="checkbox"/> 70 |
| compressed air | <input type="checkbox"/> 20 |
| bailed only | <input type="checkbox"/> 10 |
| pumped only | <input checked="" type="checkbox"/> 51 |
| pumped slowly | <input type="checkbox"/> 50 |
| other | <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> |

3. Time spent developing well 90 min.

4. Depth of well (from top of well casing) 221.63' ft.

5. Inside diameter of well 2" in.

6. Volume of water in ~~fill~~ well casing 21.7 gal.

7. Volume of water removed from well 65 gal.

8. Volume of water added (if any) NONE gal.

9. Source of water added None

10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

| | Before Development | After Development |
|---|--|--|
| 11. Depth to Water (from top of well casing) | a. <u>88.62'</u> ft. | <u>96.13'</u> ft. |
| Date | b. <u>6-2-05</u> | <u>6-2-05</u> |
| Time | c. <u>10:10 Am</u> | <u>11:40 Am</u> |
| 12. Sediment in well bottom | inches | inches |
| 13. Water clarity | Clear <input checked="" type="checkbox"/> 10 Turbid <input type="checkbox"/> 15 (Describe) | Clear <input checked="" type="checkbox"/> 20 Turbid <input type="checkbox"/> 25 (Describe) |
| Fill in if drilling fluids were used and well is at solid waste facility: | | |
| 14. Total suspended solids | <u> </u> mg/l | <u> </u> mg/l |
| 15. COD | <u> </u> mg/l | <u> </u> mg/l |
| 16. Well developed by: Person's Name and Firm <u>Tim Kelly</u> } <u>S&ME</u> <u>RICK FREDRICK</u> | | |

17. Additional comments on development:

3 WELL VOLUMES REMOVED
PUMP RATE \approx 1.0 gal per min.

Facility Address or Owner/Responsible Party Address

Name: _____

Firm: _____

Street: _____

City/State/Zip: _____

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I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: _____

Print Name: _____

Firm: _____

MONITORING WELL DEVELOPMENT

| | | |
|---|------------------------|-------------------------|
| Facility/Project Name <u>Vogtle 55AR</u> | County <u>Burke</u> | Well Name <u>853</u> |
| Facility License, Permit or Monitoring Number | | |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|---|-------------------------------|-----------------------------|------------------------------|-----------------------------|------------------------------|-----------------------------|---------------------------------------|-----------------------------|----------------|-----------------------------|-------------|-----------------------------|-------------|--|---------------|-----------------------------|-------|-------------------------------------|--|--|--------------------|-------------------|----|-------------------|-------------------|------|---------------|---------------|------|-----------------|----------------|--|--------|--------|-------------------|---|---|
| <p>1. Can this well be purged dry? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>2. Well development method:</p> <table border="0"> <tr><td>surged with bailer and bailed</td><td><input type="checkbox"/> 41</td></tr> <tr><td>surged with bailer and pumped</td><td><input type="checkbox"/> 61</td></tr> <tr><td>surged with block and bailed</td><td><input type="checkbox"/> 42</td></tr> <tr><td>surged with block and pumped</td><td><input type="checkbox"/> 62</td></tr> <tr><td>surged with block, bailed, and pumped</td><td><input type="checkbox"/> 70</td></tr> <tr><td>compressed air</td><td><input type="checkbox"/> 20</td></tr> <tr><td>bailed only</td><td><input type="checkbox"/> 10</td></tr> <tr><td>pumped only</td><td><input checked="" type="checkbox"/> 51</td></tr> <tr><td>pumped slowly</td><td><input type="checkbox"/> 50</td></tr> <tr><td>other</td><td><input checked="" type="checkbox"/></td></tr> </table> <p>3. Time spent developing well <u>55</u> min.</p> <p>4. Depth of well (from top of well casing) <u>224.0'</u> ft.</p> <p>5. Inside diameter of well <u>2"</u> in.</p> <p>6. Volume of water in surge well casing <u>16.2</u> gal.</p> <p>7. Volume of water removed from well <u>55</u> gal.</p> <p>8. Volume of water added (if any) <u>NONE</u> gal.</p> <p>9. Source of water added <u>None</u></p> <p>10. Analysis performed on water added? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (If yes, attach results)</p> | surged with bailer and bailed | <input type="checkbox"/> 41 | surged with bailer and pumped | <input type="checkbox"/> 61 | surged with block and bailed | <input type="checkbox"/> 42 | surged with block and pumped | <input type="checkbox"/> 62 | surged with block, bailed, and pumped | <input type="checkbox"/> 70 | compressed air | <input type="checkbox"/> 20 | bailed only | <input type="checkbox"/> 10 | pumped only | <input checked="" type="checkbox"/> 51 | pumped slowly | <input type="checkbox"/> 50 | other | <input checked="" type="checkbox"/> | <p>11. Depth to Water (from top of well casing)</p> <table border="0"> <tr> <td></td> <td>Before Development</td> <td>After Development</td> </tr> <tr> <td>a.</td> <td><u>124.50'</u> ft</td> <td><u>124.62'</u> ft</td> </tr> <tr> <td>Date</td> <td><u>6-1-05</u></td> <td><u>6-1-05</u></td> </tr> <tr> <td>Time</td> <td><u>12:30 pm</u></td> <td><u>1:25 pm</u></td> </tr> </table> <p>12. Sediment in well bottom</p> <table border="0"> <tr> <td></td> <td>inches</td> <td>inches</td> </tr> <tr> <td>13. Water clarity</td> <td>Clear <input type="checkbox"/> 10 Turbid <input checked="" type="checkbox"/> 15 (Describe) <u>SLIGHTLY TURBID</u></td> <td>Clear <input type="checkbox"/> 20 Turbid <input type="checkbox"/> 25 (Describe) <u>CLEAR AFTER ≈ 2 gallons Remo</u></td> </tr> </table> <p>Fill in if drilling fluids were used and well is at solid waste facility:</p> <p>14. Total suspended solids <u> </u> mg/l <u> </u> mg/l</p> <p>15. COD <u> </u> mg/l <u> </u> mg/l</p> <p>16. Well developed by: Person's Name and Firm <u>TIM KELLY</u> } <u>SIME</u> <u>RICK FREDRICK</u></p> | | Before Development | After Development | a. | <u>124.50'</u> ft | <u>124.62'</u> ft | Date | <u>6-1-05</u> | <u>6-1-05</u> | Time | <u>12:30 pm</u> | <u>1:25 pm</u> | | inches | inches | 13. Water clarity | Clear <input type="checkbox"/> 10 Turbid <input checked="" type="checkbox"/> 15 (Describe) <u>SLIGHTLY TURBID</u> | Clear <input type="checkbox"/> 20 Turbid <input type="checkbox"/> 25 (Describe) <u>CLEAR AFTER ≈ 2 gallons Remo</u> |
| surged with bailer and bailed | <input type="checkbox"/> 41 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| surged with bailer and pumped | <input type="checkbox"/> 61 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| surged with block and bailed | <input type="checkbox"/> 42 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| surged with block and pumped | <input type="checkbox"/> 62 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| surged with block, bailed, and pumped | <input type="checkbox"/> 70 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| compressed air | <input type="checkbox"/> 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| bailed only | <input type="checkbox"/> 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| pumped only | <input checked="" type="checkbox"/> 51 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| pumped slowly | <input type="checkbox"/> 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| other | <input checked="" type="checkbox"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Before Development | After Development | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| a. | <u>124.50'</u> ft | <u>124.62'</u> ft | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Date | <u>6-1-05</u> | <u>6-1-05</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Time | <u>12:30 pm</u> | <u>1:25 pm</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | inches | inches | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13. Water clarity | Clear <input type="checkbox"/> 10 Turbid <input checked="" type="checkbox"/> 15 (Describe) <u>SLIGHTLY TURBID</u> | Clear <input type="checkbox"/> 20 Turbid <input type="checkbox"/> 25 (Describe) <u>CLEAR AFTER ≈ 2 gallons Remo</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

17. Additional comments on development:

3 WELL VOLUMES REMOVED
PUMP RATE 1.0 gal per min.

Facility Address or Owner/Responsible Party Address

Name: _____

Firm: _____

Street: _____ 24A - 155

City/State/Zip: _____

I hereby certify that the above information is true and correct to the best of knowledge.

Signature: _____

Print Name: _____

Firm: _____

| | | |
|---|------------------------|-------------------------|
| Facility/Project Name <i>Vogtle 55AR</i> | County <i>Burke</i> | Well Name <i>854</i> |
| Facility License, Permit or Monitoring Number | | |

1. Can this well be purged dry? ⁷ ☐ Yes ☐ No
(SEE COMMENTS)

2. Well development method:

| | | |
|---------------------------------------|-------------------------------------|----|
| surged with bailer and bailed | <input type="checkbox"/> | 41 |
| surged with bailer and pumped | <input type="checkbox"/> | 61 |
| surged with block and bailed | <input type="checkbox"/> | 42 |
| surged with block and pumped | <input type="checkbox"/> | 62 |
| surged with block, bailed, and pumped | <input type="checkbox"/> | 70 |
| compressed air | <input type="checkbox"/> | 20 |
| bailed only | <input type="checkbox"/> | 10 |
| pumped only | <input checked="" type="checkbox"/> | 51 |
| pumped slowly | <input type="checkbox"/> | 50 |
| other | <input checked="" type="checkbox"/> | |

3. Time spent developing well 10 min.

4. Depth of well (from top of well casing) 221.31' ft.

5. Inside diameter of well 2" in.

6. Volume of water in first pack and well casing 14.4 gal.

7. Volume of water removed from well 10.0 gal.

8. Volume of water added (if any) NONE gal.

9. Source of water added None

10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

Before Development After Development

11. Depth to Water (from top of well casing)

a. 132.99' ft 140.0' ft

Date b. 6-1-05 6-1-05

Time c. 3:00 pm 3:10 pm

12. Sediment in well bottom inches inches

13. Water clarity

Clear ☐ 10 Clear ☒ 20

Turbid ☒ 15 Turbid ☐ 25

(Describe) (Describe)

SLIGHTLY AFTER 10 gals
TURBID REMOVED.

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids mg/l mg/l

15. COD mg/l mg/l

16. Well developed by: Person's Name and Firm

TIM KELLY } S&ME
RICK FREDRICK }

17. Additional comments on development:

Additional comments on development:
THE PUMP WOULD NOT GO DEEPER THAN APPROX 140.0' SOME TYPE
OF OBSTRUCTION IN WELL.
APPROX 10.0 GALLONS REMOVED AND THEN WENT DRY.
PUMP RATE 1.0 gal per min.

Facility Address or Owner/Responsible Party Address

Name: _____

Firm: _____

Street: _____

City/State/Zip: _____

I hereby certify that the above information is true and correct to the best of knowledge.

Signature: _____

Print Name: _____

Firm: _____

MONITORING WELL DEVELOPMENT

| | | |
|---|-----------------|------------------|
| Facility/Project Name Voalte 55AA | County Burke | Well Name B55 |
| Facility License, Permit or Monitoring Number | | |

1. Can this well be purged dry? ☐ Yes ☒ No
2. Well development method:
- | | |
|---------------------------------------|---|
| surged with bailer and bailed | <input type="checkbox"/> 4 1 |
| surged with bailer and pumped | <input type="checkbox"/> 6 1 |
| surged with block and bailed | <input type="checkbox"/> 4 2 |
| surged with block and pumped | <input type="checkbox"/> 6 2 |
| surged with block, bailed, and pumped | <input type="checkbox"/> 7 0 |
| compressed air | <input type="checkbox"/> 2 0 |
| bailed only | <input type="checkbox"/> 1 0 |
| pumped only | <input checked="" type="checkbox"/> 5 1 |
| pumped slowly | <input type="checkbox"/> 5 0 |
| other _____ | <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> |
3. Time spent developing well 65 min.
4. Depth of well (from top of well casing) 225.50' ft.
5. Inside diameter of well 2" in.
6. Volume of water in filter-pack-lined well casing 17.2 gal.
7. Volume of water removed from well 51.4 gal.
8. Volume of water added (if any) NONE gal.
9. Source of water added None
10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

- | | Before Development | After Development |
|--|--|--|
| 11. Depth to Water (from top of well casing) | a. 120.04' ft | 120.64' ft |
| Date | b. 6-2-05 | 6-2-05 |
| Time | c. 8:45 AM | 9:50 AM |
| 12. Sediment in well bottom | inches | inches |
| 13. Water clarity | Clear <input checked="" type="checkbox"/> 10 Turbid <input type="checkbox"/> 15 (Describe) | Clear <input checked="" type="checkbox"/> 20 Turbid <input type="checkbox"/> 25 (Describe) |

Fill in if drilling fluids were used and well is at solid waste facility:

- | | | |
|----------------------------|------|------|
| 14. Total suspended solids | mg/l | mg/l |
| 15. COD | mg/l | mg/l |

16. Well developed by: Person's Name and Firm

Tim Kelly } S:ME
Rick Frederick }

17. Additional comments on development:

3 WELL VOLUMES REMOVED
PUMP RATE ≈ 1.0 gal per min.

Facility Address or Owner/Responsible Party Address

Name: _____

Firm: _____

Street: _____ 2.4A - 157

City/State/Zip: _____

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: _____

Print Name: _____

Firm: _____

| | | |
|---|-----------------|-------------------|
| Facility/Project Name Vogtle 55AR | County Burke | Well Name 1001 |
| Facility License, Permit or Monitoring Number | | |

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method:

| | |
|---------------------------------------|---|
| surged with bailer and bailed | <input type="checkbox"/> 41 |
| surged with bailer and pumped | <input type="checkbox"/> 61 |
| surged with block and bailed | <input type="checkbox"/> 42 |
| surged with block and pumped | <input type="checkbox"/> 62 |
| surged with block, bailed, and pumped | <input type="checkbox"/> 70 |
| compressed air | <input type="checkbox"/> 20 |
| bailed only | <input type="checkbox"/> 10 |
| pumped only | <input checked="" type="checkbox"/> 51 |
| pumped slowly | <input type="checkbox"/> 50 |
| other _____ | <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> |

3. Time spent developing well 15 min.

4. Depth of well (from top of well casing) 137.15' ft.

5. Inside diameter of well 2" in.

6. Volume of water in filter pack and well casing 4.44 gal.

7. Volume of water removed from well 8.0 gal.

8. Volume of water added (if any) None gal.

9. Source of water added None

10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

Before Development After Development

11. Depth to Water (from top of well casing) a. 109.93 ft. Dry ft.

Date b. 6-6-05

Time c. 2:30pm

12. Sediment in well bottom inches inches

13. Water clarity Clear ☐ 10 Clear ☒ 20
Turbid ☒ 15 Turbid ☐ 25
(Describe) (Describe)
Gray in Color

14. Total suspended solids mg/l

15. COD mg/l

16. Well developed by: Person's Name and Firm
Tim Kelly
Rick Fredrick S:ME

17. Additional comments on development:

WELL WHEN DRY AFTER ONLY 8 gallons REMOVED.

WATER LEVEL @ 125.49' @ 5:10 pm (6-6-05) } WATER LEVEL @ 124.62 (6-7-05)
WATER LEVEL @ 125.39' @ 5:50 pm (6-6-05)

Facility Address or Owner/Responsible Party Address

Name: _____

Firm: _____

Street: _____ 24A 150

City/State/Zip: _____

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: _____

Print Name: _____

Firm: _____

| | | |
|---|------------------------|--------------------------|
| Facility/Project Name <i>Voalte 55AR</i> | County <i>Burke</i> | Well Name <i>1003</i> |
| Facility License, Permit or Monitoring Number | | |

☒ Yes ☐ No

surged with bailer and bailed
 surged with bailer and pumped
 surged with block and bailed
 surged with block and pumped
 surged with block, bailed, and pumped
 compressed air
 bailed only
 pumped only
 pumped slowly
 other

| | |
|-------------------------------------|----|
| <input type="checkbox"/> | 41 |
| <input type="checkbox"/> | 61 |
| <input type="checkbox"/> | 42 |
| <input type="checkbox"/> | 62 |
| <input type="checkbox"/> | 70 |
| <input type="checkbox"/> | 20 |
| <input type="checkbox"/> | 10 |
| <input checked="" type="checkbox"/> | 51 |
| <input type="checkbox"/> | 50 |
| <input checked="" type="checkbox"/> | |

65 min.

97.0' ft.

2" in.

4.2 gal.

13.0 gal.

None gal.

None

☐ Yes ☒ No

Date _____

Time

12. Sediment in well bottom

13. Water clarity

Clear ☐ 10
Turbid ☒ 15
(Describe)

Clear ☒ 20
Turbid ☐ 25
(Describe)

14. Total suspended solids

15. COD

16. Well developed by: Person's Name and Firm

TIM KELLY
RICK FREDRICK } SOME

7. Additional comments on development:

3 Well Volumes Removed. THE WELL WAS DRY AFTER EACH VOLUME REMOVED
ALLOWED THE WELL TO RECHARGE & PURGE 3 TIMES.
PUMP RATE ≈ 1.0 gallon per min.

Name:

Firm:

Street:

City/State/Zip:

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature:

Print Name:

Firm:

MONITORING WELL DEVELOPMENT

| | | |
|---|-----------------|-------------------|
| Facility/Project Name Vogtle 55AR | County Burke | Well Name 1004 |
| Facility License, Permit or Monitoring Number | | |

1. Can this well be purged dry? ☒ Yes ☐ No

- | | |
|---------------------------------------|--|
| 2. Well development method: | |
| surged with bailer and bailed | <input type="checkbox"/> 41 |
| surged with bailer and pumped | <input type="checkbox"/> 61 |
| surged with block and bailed | <input type="checkbox"/> 42 |
| surged with block and pumped | <input type="checkbox"/> 62 |
| surged with block, bailed, and pumped | <input type="checkbox"/> 70 |
| compressed air | <input checked="" type="checkbox"/> 20 |
| bailed only | <input type="checkbox"/> 10 |
| pumped only | <input type="checkbox"/> 51 |
| pumped slowly | <input type="checkbox"/> 50 |
| other | <input checked="" type="checkbox"/> 00 |

3. Time spent developing well: 15 min.

4. Depth of well (from top of well casing) 175.0' ft.

5. Inside diameter of well 2" in.

6. Volume of water in filter pack and well casing 9.3 gal.

7. Volume of water removed from well *Approx 20* gal.

8. Volume of water added (if any) *None* gal.

9. Source of water added None

10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

17. Additional comments on development:

WELL WAS DEVELOPED USING AIR COMPRESSOR
~ 50 PSI OF PRESSURE USED AT BOTTOM OF WELL

| | Before Development | After Development |
|--|--------------------|-------------------|
| 11. Depth to Water (from top of well casing) | a. 117.80' ft. | Dry ft. |

Date b. 6-14-05

Time c. 1:00 1:15

| | | |
|-----------------------------|--------|--------|
| 12. Sediment in well bottom | inches | inches |
|-----------------------------|--------|--------|

13. Water clarity Clear ☒ 10 Clear ☒ 20
 Turbid ☐ 15 Turbid ☐ 25
 (Describe) (Describe)

| | |
|-------------------------|-------------------|
| <u>WATER WAS</u> | <u>WATER WAS</u> |
| <u>CLEAR AT</u> | <u>CLEAR WHEN</u> |
| <u>TIME OF DEVELOP.</u> | <u>WELL WENT</u> |
| | <u>DRY.</u> |

Fill in if drilling fluids were used and well is at solid waste facility:

| 14. Total suspended solids | mg/l | mg/l |
|----------------------------|------|------|
| | | |

| 15. COD | mg/l | mg/l |
|---------|------|------|
| | | |

16. Well developed by: Person's Name and Firm

Tim Kelly } SAME
Rick Frederick }

Facility Address or Owner/Responsible Party Address

Name: _____

Firm: _____

Street: _____ 2.4A -

City/State/Zip: _____

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: _____

Print Name: _____

Firm: _____

MONITORING WELL DEVELOPMENT

| | | |
|---|------------------------|--------------------------|
| Facility/Project Name Voalte 55AR | County Burke | Well Name 1005 |
| Facility License, Permit or Monitoring Number | | |

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method:

| | |
|---------------------------------------|---|
| surged with bailer and bailed | <input type="checkbox"/> 41 |
| surged with bailer and pumped | <input type="checkbox"/> 61 |
| surged with block and bailed | <input type="checkbox"/> 42 |
| surged with block and pumped | <input type="checkbox"/> 62 |
| surged with block, bailed, and pumped | <input type="checkbox"/> 70 |
| compressed air | <input checked="" type="checkbox"/> 20 |
| bailed only | <input type="checkbox"/> 10 |
| pumped only | <input type="checkbox"/> 51 |
| pumped slowly | <input type="checkbox"/> 50 |
| other | <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> |

3. Time spent developing well **20** min.

4. Depth of well (from top of well casing) **173.05'** ft.

5. Inside diameter of well **2"** in.

6. Volume of water in filter pack and well casing **7.0** gal.

7. Volume of water removed from well **25** gal.

8. Volume of water added (if any) **None** gal.

9. Source of water added **None**

10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

| | Before Development | After Development |
|--|---|---|
| 11. Depth to Water (from top of well casing) | a. 130.07' 173.05 | 171.33' ft. |
| Date | b. 6-15-05 | 6-15-05 |
| Time | c. 8:55 am | 9:15 am |
| 12. Sediment in well bottom | inches | inches |
| 13. Water clarity | Clear <input type="checkbox"/> 10 Turbid <input checked="" type="checkbox"/> 15 (Describe) SLIGHTLY TURBID | Clear <input checked="" type="checkbox"/> 20 Turbid <input type="checkbox"/> 25 (Describe) CLEAR AFTER 3 WELL VOLUMES REMOVED. |
| Fill in if drilling fluids were used and well is at solid waste facility: | | |
| 14. Total suspended solids | / mg/l | / mg/l |
| 15. COD | / mg/l | / mg/l |
| 16. Well developed by: Person's Name and Firm TIM KELLY RICK FREDRICK } S-M-E | | |

17. Additional comments on development:

**WELL DEVELOPED USING AIR COMPRESSOR
~50 PSI OF PRESSURE AT BOTTOM OF WELL**

Facility Address or Owner/Responsible Party Address

Name: _____

Firm: _____

Street: _____

City/State/Zip: _____

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I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: _____

Print Name: _____

Firm: _____

MONITORING WELL DEVELOPMENT

| | | |
|---|------------------------|--------------------------|
| Facility/Project Name <u>Vogtle 55AR</u> | County <u>Burke</u> | Well Name <u>1006</u> |
| Facility License, Permit or Monitoring Number | | |

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method:
- | | |
|---------------------------------------|---|
| surged with bailer and bailed | <input type="checkbox"/> 41 |
| surged with bailer and pumped | <input type="checkbox"/> 61 |
| surged with block and bailed | <input type="checkbox"/> 42 |
| surged with block and pumped | <input type="checkbox"/> 62 |
| surged with block, bailed, and pumped | <input type="checkbox"/> 70 |
| compressed air | <input checked="" type="checkbox"/> 20 |
| bailed only | <input type="checkbox"/> 10 |
| pumped only | <input checked="" type="checkbox"/> 51 |
| pumped slowly | <input type="checkbox"/> 50 |
| other | <input checked="" type="checkbox"/> <u>20</u> |

3. Time spent developing well 25 min.

4. Depth of well (from top of well casing) 139.00' ft.

5. Inside diameter of well 2" in.

6. Volume of water in filter pack and well casing 9.7 gal.

7. Volume of water removed from well 30.0 gal.

8. Volume of water added (if any) _____ gal.

9. Source of water added None

10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

11. Depth to Water (from top of well casing)

| | Before Development | After Development |
|----|--------------------|-------------------|
| a. | <u>79.81'</u> ft. | <u>85.14'</u> ft. |

Date b. 6-16-05 6-16-05

Time c. 7:50 AM 8:15 AM

12. Sediment in well bottom _____ inches _____ inches

13. Water clarity

| | Before Development | After Development |
|---|--|--|
| Clear <input type="checkbox"/> 10 | <input type="checkbox"/> 10 | <input checked="" type="checkbox"/> 20 |
| Turbid <input checked="" type="checkbox"/> 15 | <input checked="" type="checkbox"/> 15 | <input type="checkbox"/> 25 |

(Describe) Slightly CLEAR
TURBID AT COMPLETION
CLEARED AFTER
VOLUME
REMOVED

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids _____ mg/l _____ mg/l

15. COD _____ mg/l _____ mg/l

16. Well developed by: Person's Name and Firm
TIM KELLY
RICK FREDRICK SSME

17. Additional comments on development:

WELL DEVELOPED USING AIR COMPRESSOR
250PSI OF PRESSURE AT BOTTOM OF WELL

Facility Address or Owner/Responsible Party Address

Name: _____

Firm: _____

Street: _____ 2.4A - 164

City/State/Zip: _____

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: _____

Print Name: _____

Firm: _____

MONITORING WELL DEVELOPMENT

| | | |
|---|-----------------|-------------------|
| Facility/Project Name Vogtle 55A | County Burke | Well Name 1007 |
| Facility License, Permit or Monitoring Number | | |

1. Can this well be purged dry? ☐ Yes ☒ No

- | | |
|---------------------------------------|--|
| 2. Well development method: | |
| surged with bailer and bailed | <input type="checkbox"/> 41 |
| surged with bailer and pumped | <input type="checkbox"/> 61 |
| surged with block and bailed | <input type="checkbox"/> 42 |
| surged with block and pumped | <input type="checkbox"/> 62 |
| surged with block, bailed, and pumped | <input type="checkbox"/> 70 |
| compressed air | <input checked="" type="checkbox"/> 20 |
| bailed only | <input type="checkbox"/> 10 |
| pumped only | 51 |
| pumped slowly | <input type="checkbox"/> 50 |
| other | <input checked="" type="checkbox"/> 00 |

3. Time spent developing well 15 min.

4. Depth of well (from top of well casing) 115.0' ft.

5. Inside diameter of well 2" in.

6. Volume of water in filter pack and well casing 7.6 gal.

7. Volume of water removed from well *APP/AY 30 gal.*

8. Volume of water added (if any) None gal.

9. Source of water added None

10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

- | | Before Development | After Development |
|--|--------------------|-------------------|
| 11. Depth to Water (from top of well casing) | a. 68.09 ft. | 68.47' ft. |

- Date b. 6-14-05 6-14-05

- Time c. 5:40 5:58

- | | | |
|-----------------------------|--------|--------|
| 12. Sediment in well bottom | inches | inches |
|-----------------------------|--------|--------|

13. Water clarity Clear ☐ 1.0 Clear ☒ 2.0
 Turbid ☒ 1.5 Turbid ☐ 2.5
 (Describe) (Describe)

SLIGHTLY TURBID. WATER CLEAR
AFTER DEVELOPMENT
COMPLETED.

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended _____ mg/l _____ mg/l

15. COD _____ mg/l _____ mg/l

16. Well developed by: Person's Name and Firm

Tim Kelly
Rick Fredrick) same

- 17. Additional comments on development:**

WELL DEVELOPED USING AIR COMPRESSOR
 ≈ 50 PSI OF PRESSURE AT BOTTOM OF WELL

Facility Address or Owner/Responsible Party Address

Name: _____

Firm: _____

Street: _____ 2.4A - 165

City/State/Zip: _____

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: _____

Print Name: _____

Firm: _____

MONITORING WELL DEVELOPMENT

| | | |
|---|-----------------|-------------------|
| Facility/Project Name Vogtle 55AR | County Burke | Well Name 100B |
| Facility License, Permit or Monitoring Number | | |

1. Can this well be purged dry? ☐ Yes ☒ No

2. Well development method:

| | | |
|---------------------------------------|-------------------------------------|----|
| surged with bailer and bailed | <input type="checkbox"/> | 41 |
| surged with bailer and pumped | <input type="checkbox"/> | 61 |
| surged with block and bailed | <input type="checkbox"/> | 42 |
| surged with block and pumped | <input type="checkbox"/> | 62 |
| surged with block, bailed, and pumped | <input type="checkbox"/> | 70 |
| compressed air | <input checked="" type="checkbox"/> | 20 |
| bailed only | <input type="checkbox"/> | 10 |
| pumped only | | 51 |
| pumped slowly | <input type="checkbox"/> | 50 |
| other | <input checked="" type="checkbox"/> | |

3. Time spent developing well 25 min.

4. Depth of well (from top of well casing) 252.8 ft.

5. Inside diameter of well 2" in.

6. Volume of water in filter pack and well casing 26.0 gal.

7. Volume of water removed from well *Approx 80* gal.

8. Volume of water added (if any) *None* gal.

9. Source of water added None

10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

17. Additional comments on development:

WELL DEVELOPED USING AIR COMPRESSOR
 ≈ 50 PSI OF PRESSURE AT BOTTOM OF WELL

| | Before Development | After Development |
|--|--------------------|-------------------|
| 11. Depth to Water (from top of well casing) | a. 93.52 ft. | 94.85 ft. |

Date b. 6-14-05 6-14-05

Time c. 5:00 pm 5:25 pm

| | | |
|-----------------------------|--------|--------|
| 12. Sediment in well bottom | inches | inches |
|-----------------------------|--------|--------|

| | | | | | | |
|-------------------|------------|-------------------------------------|----|------------|-------------------------------------|----|
| 13. Water clarity | Clear | <input type="checkbox"/> | 10 | Clear | <input checked="" type="checkbox"/> | 20 |
| | Turbid | <input checked="" type="checkbox"/> | 15 | Turbid | <input type="checkbox"/> | 25 |
| | (Describe) | | | (Describe) | | |

SETHRY TURBID CLEAR WATER
WITH DEVELOPMENT
COMPLETED.

Fill in if drilling fluids were used and well is at solid waste facility:

| 14. Total suspended solids | mg/l | mg/l |
|----------------------------|------|------|
| | | |

15. COD mg/l mg/l

16. Well developed by: Person's Name and Firm

Tim Kelly } S₂ ME
Rick Fredrick }

Facility Address or Owner/Responsible Party Address

Name: _____

Firm: _____

Street: _____ 2.4A - 166

City/State/Zip: _____

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: _____

Print Name: _____

Firm: _____

MONITORING WELL DEVELOPMENT

| | | |
|---|------------------------|--------------------------|
| Facility/Project Name <u>Vogtle 55AR</u> | County <u>Burke</u> | Well Name <u>1010</u> |
| Facility License, Permit or Monitoring Number | | |

1. Can this well be purged dry? ☐ Yes ☒ No

2. Well development method:

- surged with bailer and bailed ☐ 41
- surged with bailer and pumped ☐ 61
- surged with block and bailed ☐ 42
- surged with block and pumped ☐ 62
- surged with block, bailed, and pumped ☐ 70
- compressed air ☐ 20
- bailed only ☐ 10
- pumped only ☒ 51
- pumped slowly ☐ 50
- other ☒ ☒

3. Time spent developing well 80 min.

4. Depth of well (from top of well casing) 92.0' ft.

5. Inside diameter of well 2" in.

6. Volume of water in ~~the~~ well casing 6.0 gal.

7. Volume of water removed from well 36.0 gal.

8. Volume of water added (if any) None gal.

9. Source of water added None

10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

17. Additional comments on development:

6 WELL VOLUMES REMOVED - THE WELL WAS STILL SLIGHTLY TURBID AFTER 6-WELL VOLUMES REMOVED.
PUMP RATE \approx 1.0 gallon per min.

| | Before Development | After Development |
|--|---|--|
| 11. Depth to Water (from top of well casing) | a. <u>55.41'</u> ft. | <u>90.52'</u> ft. |
| Date | b. <u>6-3-05</u> | <u>6-3-05</u> |
| Time | c. <u>11:30 am</u> | <u>12:40 pm</u> |
| 12. Sediment in well bottom | inches | inches |
| 13. Water clarity | Clear <input type="checkbox"/> 10 Turbid <input checked="" type="checkbox"/> 15 (Describe) <u>VERY TURBID</u> | Clear <input type="checkbox"/> 20 Turbid <input checked="" type="checkbox"/> 25 (Describe) <u>SLIGHTLY TURBID AFTER 6 WELL VOLUMES REMOVED</u> |

Fill in if drilling fluids were used and well is at solid waste facility:

| | | |
|----------------------------|----------------------------------|----------------------------------|
| 14. Total suspended solids | <u> </u> mg/l | <u> </u> mg/l |
| 15. COD | <u> </u> mg/l | <u> </u> mg/l |

16. Well developed by: Person's Name and Firm

TIM KELLY
RICK FREDRICK } S:ME

Facility Address or Owner/Responsible Party Address

Name: _____
Firm: _____
Street: _____
City/State/Zip: _____

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: _____
Print Name: _____
Firm: _____

MONITORING WELL DEVELOPMENT

| | | |
|---|------------------------|--------------------------|
| Facility/Project Name <u>Voalte 55AR</u> | County <u>Burke</u> | Well Name <u>1011</u> |
| Facility License, Permit or Monitoring Number | | |

1. Can this well be purged dry? ☐ Yes ☒ No

2. Well development method:

- surged with bailer and bailed ☐ 41
- surged with bailer and pumped ☐ 61
- surged with block and bailed ☐ 42
- surged with block and pumped ☐ 62
- surged with block, bailed, and pumped ☐ 70
- compressed air ☒ 20
- bailed only ☐ 10
- pumped only ☐ 51
- pumped slowly ☐ 50
- other ☒ ☒

3. Time spent developing well 25 min.

4. Depth of well (from top of well casing) 225.0' ft.

5. Inside diameter of well 2" in.

6. Volume of water in filter pack and well casing 22.7 gal.

7. Volume of water removed from well Approx 70 gal.

8. Volume of water added (if any) _____ gal.

9. Source of water added None

10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

17. Additional comments on development:

WELL WAS DEVELOPED USING AIR COMPRESSOR
~ 50 PSI OF PRESSURE USED AT BOTTOM OF WELL

11. Depth to Water (from top of well casing)

| | Before Development | After Development |
|----|--------------------|-------------------|
| a. | <u>86.12</u> ft. | <u>90.10'</u> ft. |

Date b. 6-14-05 6-14-05

Time c. 2:40 pm 3:05 pm

12. Sediment in well bottom _____ inches _____ inches

13. Water clarity

| Before Development | After Development |
|---|--|
| Clear <input type="checkbox"/> 10 | Clear <input checked="" type="checkbox"/> 20 |
| Turbid <input checked="" type="checkbox"/> 15 | Turbid <input type="checkbox"/> 25 |
| (Describe) | (Describe) |

TURBID UNTIL WATER CLEAR
APPROX 1 WELL WHEN DEVELOPMENT
VOLUME REMOVED COMPLETE

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids _____ mg/l _____ mg/l

15. COD _____ mg/l _____ mg/l

16. Well developed by: Person's Name and Firm

TIM KELLY } SOME
RICK FREDRICK

Facility Address or Owner/Responsible Party Address

Name: _____

Firm: _____

Street: _____

City/State/Zip: _____

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: _____

Print Name: _____

Firm: _____

MONITORING WELL DEVELOPMENT

| | | |
|---|-----------------|-------------------|
| Facility/Project Name Vogtle 55AA | County Burke | Well Name 1012 |
| Facility License, Permit or Monitoring Number | | |

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method:

| | |
|---------------------------------------|--|
| surged with bailer and bailed | <input type="checkbox"/> 41 |
| surged with bailer and pumped | <input type="checkbox"/> 61 |
| surged with block and bailed | <input type="checkbox"/> 42 |
| surged with block and pumped | <input type="checkbox"/> 62 |
| surged with block, bailed, and pumped | <input type="checkbox"/> 70 |
| compressed air | <input type="checkbox"/> 20 |
| bailed only | <input type="checkbox"/> 10 |
| pumped only | <input checked="" type="checkbox"/> 51 |
| pumped slowly | <input type="checkbox"/> 50 |
| other | <input checked="" type="checkbox"/> <input type="checkbox"/> |

3. Time spent developing well 40 min.

4. Depth of well (from top of well casing) 98.0' ft.

5. Inside diameter of well 2" in.

6. Volume of water in ~~fill~~ ~~space~~ ~~and~~ well casing 8.5 gal.

7. Volume of water removed from well 26.0 gal.

8. Volume of water added (if any) None gal.

9. Source of water added None

10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

| | Before Development | After Development |
|--|---|--|
| 11. Depth to Water (from top of well casing) | a. 45.85' ft. | 52.78' ft. |
| Date | b. 6-3-05 | 6-3-05 |
| Time | c. 9:55 AM | 10:35 AM |
| 12. Sediment in well bottom | inches | inches |
| 13. Water clarity | Clear <input type="checkbox"/> 10 Turbid <input checked="" type="checkbox"/> 15 (Describe) <u>VERY TURBID TAN COLOR</u> | Clear <input checked="" type="checkbox"/> 20 Turbid <input type="checkbox"/> 25 (Describe) <u>CLEAR AFTER 1 WELL VOLUME REMOVED.</u> |
| Fill in if drilling fluids were used and well is at solid waste facility: | | |
| 14. Total suspended solids | _____ mg/l | _____ mg/l |
| 15. COD | _____ mg/l | _____ mg/l |
| 16. Well developed by: Person's Name and Firm <u>Tim Kelly</u> <u>Rick Frederick</u> } <u>SIME</u> | | |

17. Additional comments on development:

3 WAL VOLUMES REMOVED
PUMP RATE ≈ 1.0 gallon per min.

Facility Address or Owner/Responsible Party Address

Name: _____

Firm: _____

Street: _____ 2.4A - 170

City/State/Zip: _____

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: _____

Print Name: _____

Firm: _____

MONITORING WELL DEVELOPMENT

| | | |
|---|------------------------|--------------------------|
| Facility/Project Name <u>Voagtle 55AR</u> | County <u>Burke</u> | Well Name <u>1013</u> |
| Facility License, Permit or Monitoring Number | | |

1. Can this well be purged dry? ☐ Yes ☒ No
2. Well development method:
- | | |
|---------------------------------------|--|
| surged with bailer and bailed | <input type="checkbox"/> 41 |
| surged with bailer and pumped | <input type="checkbox"/> 61 |
| surged with block and bailed | <input type="checkbox"/> 42 |
| surged with block and pumped | <input type="checkbox"/> 62 |
| surged with block, bailed, and pumped | <input type="checkbox"/> 70 |
| compressed air | <input type="checkbox"/> 20 |
| bailed only | <input type="checkbox"/> 10 |
| pumped only | <input checked="" type="checkbox"/> 51 |
| pumped slowly | <input type="checkbox"/> 50 |
| other | <input checked="" type="checkbox"/> |
3. Time spent developing well 50 min.
4. Depth of well (from top of well casing) 108.25 ft.
5. Inside diameter of well 2" in.
6. Volume of water in filter pack and well casing 8.7 gal.
7. Volume of water removed from well 26 gal.
8. Volume of water added (if any) None gal.
9. Source of water added None
10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

- | | Before Development | After Development |
|---|---|--|
| 11. Depth to Water (from top of well casing) | a. <u>54.86'</u> ft. | <u>69.96'</u> ft. |
| Date | b. <u>6-15-05</u> | <u>6-15-05</u> |
| Time | c. <u>7:40 AM</u> | <u>8:30</u> |
| 12. Sediment in well bottom | inches | inches |
| 13. Water clarity | Clear <input type="checkbox"/> 10 Turbid <input checked="" type="checkbox"/> 15 (Describe) <u>SLIGHTLY TURBID</u> | Clear <input checked="" type="checkbox"/> 20 Turbid <input type="checkbox"/> 25 (Describe) <u>CLEAR AFTER 3 WELL VOLUMES REMOVED</u> |
| Fill in if drilling fluids were used and well is at solid waste facility: | | |
| 14. Total suspended solids | <u> </u> mg/l | <u> </u> mg/l |
| 15. COD | <u> </u> mg/l | <u> </u> mg/l |
| 16. Well developed by: Person's Name and Firm <u>TIM KELLY</u> <u>RICK FREDRICK</u> } <u>S&ME</u> | | |

17. Additional comments on development:

APPROX 3 WELL VOLUMES REMOVED
PUMP RATE AT 1.0 GALLON PER MIN.

Facility Address or Owner/Responsible Party Address

Name: _____

Firm: _____

Street: _____

City/State/Zip: _____

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I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: _____

Print Name: _____

Firm: _____

MONITORING WELL DEVELOPMENT

| | | |
|---|-----------------|-------------------|
| Facility/Project Name Vogtle 55AR | County Burke | Well Name 1014 |
| Facility License, Permit or Monitoring Number | | |

1. Can this well be purged dry? ☐ Yes ☒ No

2. Well development method:

| | |
|---------------------------------------|---|
| surged with bailer and bailed | <input type="checkbox"/> 41 |
| surged with bailer and pumped | <input type="checkbox"/> 61 |
| surged with block and bailed | <input type="checkbox"/> 42 |
| surged with block and pumped | <input type="checkbox"/> 62 |
| surged with block, bailed, and pumped | <input type="checkbox"/> 70 |
| compressed air | <input checked="" type="checkbox"/> 20 |
| bailed only | <input type="checkbox"/> 10 |
| pumped only | <input type="checkbox"/> 51 |
| pumped slowly | <input type="checkbox"/> 50 |
| other _____ | <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> |

3. Time spent developing well 25 min.

4. Depth of well (from top of well casing) 205 ft.

5. Inside diameter of well 2" in.

6. Volume of water in filter pack and well casing 15.0 gal.

7. Volume of water removed from well Approx 45 gal.

8. Volume of water added (if any) None gal.

9. Source of water added None

10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

| | Before Development | After Development |
|--|--|--|
| 11. Depth to Water (from top of well casing) | a. 113.0' ft. | 119.51' ft. |
| Date | b. 6-14-05 | 6-14-05 |
| Time | c. 1:50 pm | 2:15 pm |
| 12. Sediment in well bottom | inches | inches |
| 13. Water clarity | Clear <input type="checkbox"/> 10 Turbid <input checked="" type="checkbox"/> 15 (Describe) | Clear <input checked="" type="checkbox"/> 20 Turbid <input type="checkbox"/> 25 (Describe) |
| <u>WATER CLEAR -</u> <u>AFTER 10 MIN.</u> <u>OF DEVELOPMENT</u> | | |
| Fill in if drilling fluids were used and well is at solid waste facility: | | |
| 14. Total suspended solids | mg/l | mg/l |
| 15. COD | mg/l | mg/l |
| 16. Well developed by: Person's Name and Firm Tim Kelly } SIME Rick Fredrick } | | |

17. Additional comments on development:

WELL WAS DEVELOPED USING AIR COMPRESSOR
 ≈ 50 PSI OF PRESSURE USED AT BOTTOM OF WELL

Facility Address or Owner/Responsible Party Address

Name: _____

Firm: _____

Street: _____

City/State/Zip: _____

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I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: _____

Print Name: _____

Firm: _____

MONITORING WELL DEVELOPMENT

| | | |
|---|-----------------|-------------------|
| Facility/Project Name Voalte 55AR | County Burke | Well Name 1015 |
| Facility License, Permit or Monitoring Number | | |

1. Can this well be purged dry? ☐ Yes ☒ No
2. Well development method:
- | | |
|---------------------------------------|---|
| surged with bailer and bailed | <input type="checkbox"/> 41 |
| surged with bailer and pumped | <input type="checkbox"/> 61 |
| surged with block and bailed | <input type="checkbox"/> 42 |
| surged with block and pumped | <input type="checkbox"/> 62 |
| surged with block, bailed, and pumped | <input type="checkbox"/> 70 |
| compressed air | <input type="checkbox"/> 20 |
| bailed only | <input type="checkbox"/> 10 |
| pumped only | <input checked="" type="checkbox"/> 51 |
| pumped slowly | <input type="checkbox"/> 50 |
| other _____ | <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> |
3. Time spent developing well 60 min.
4. Depth of well (from top of well casing) 122.40' ft.
5. Inside diameter of well 2" in.
6. Volume of water in ~~the pump~~ well casing 9.6 gal.
7. Volume of water removed from well 30.0 gal.
8. Volume of water added (if any) None gal.
9. Source of water added None
10. Analysis performed on water added? ☐ Yes ☒ No
(If yes, attach results)

- | | Before Development | After Development |
|--|--|--|
| 11. Depth to Water (from top of well casing) | a. 63.47' ft. | 70.97' ft. |
| Date | b. 6-3-05 | 6-3-05 |
| Time | c. 1:30 pm | 2:30 pm |
| 12. Sediment in well bottom | inches | inches |
| 13. Water clarity | Clear <input type="checkbox"/> 10 Turbid <input checked="" type="checkbox"/> 15 (Describe) <u>VERY MUDDY</u> <u>THICK, BROWN</u> <u>IN COLOR</u> | Clear <input checked="" type="checkbox"/> 20 Turbid <input type="checkbox"/> 25 (Describe) <u>WATER BECAME</u> <u>CLEAR AFTER</u> <u>3 WELL VOLUMES</u> <u>REMOVED.</u> |

Fill in if drilling fluids were used and well is at solid waste facility:

- | | | | | |
|----------------------------|-------|------|-------|------|
| 14. Total suspended solids | _____ | mg/l | _____ | mg/l |
| 15. COD | _____ | mg/l | _____ | mg/l |

16. Well developed by: Person's Name and Firm
Tim Kelly } SIME
Rick Fredrick }

17. Additional comments on development:

3 WELL VOLUMES REMOVED
PUMP RATE ≈ 1.0 gallon per min.

Facility Address or Owner/Responsible Party Address

Name: _____

Firm: _____

Street: _____ 2.4A - 173

City/State/Zip: _____

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: _____

Print Name: _____

Firm: _____

APPENDIX H

WELL INSPECTION FORMS

**SNC ALWR ESP PROJECT
EXISTING OBSERVATION WELL INSPECTION REPORT**

Well Number LT-1B
Inspected by S.C. Baskie
Company SCS

Well Status active
Date 6/16/05

Well Surface Description:

Stickup (ground surface to top of riser casing): 2.61'
Riser casing diameter: 2"
Steel surface protective casing: ☒ Yes ☐ No
Protective casing diameter: 0.55'
Cap: ☒ Yes ☐ No Locked: ☒ Yes ☐ No
Concrete surface seal: ☐ Yes ☒ No
Surface seal condition/integrity:

Remarks: _____

Well Description:

Depth to water (measured from top of riser casing): 66.36'
Well depth (measured from top of riser casing to bottom of well): 93.48'
Evidence of sediment in bottom of well: ☒ Yes ☐ No ☐ Maybe
Remarks: ~ 0.2' red mud in bottom

Recommended for Development: ☐ Yes ☒ No

Notes:

**SNC ALWR ESP PROJECT
EXISTING OBSERVATION WELL INSPECTION REPORT**

Well Number LT -7A
Inspected by S.C. BERRY
Company SCS

Well Status active
Date 6/16/05

Well Surface Description:

Stickup (ground surface to top of riser casing): 1.74'
Riser casing diameter: 2"
Steel surface protective casing: ☒ Yes ☐ No
Protective casing diameter: 0.55
Cap: ☒ Yes ☐ No Locked: ☒ Yes ☐ No
Concrete surface seal: ☐ Yes ☒ No
Surface seal condition/integrity:

Remarks: no concrete surround

Well Description:

Depth to water (measured from top of riser casing): 64.80'
Well depth (measured from top of riser casing to bottom of well): 89.02
Evidence of sediment in bottom of well: ☐ Yes ☒ No ☐ Maybe
Remarks:

Recommended for Development: ☐ Yes ☒ No

Notes:

**SNC ALWR ESP PROJECT
EXISTING OBSERVATION WELL INSPECTION REPORT**

Well Number LT-12
Inspected by S.C. Bearce
Company SCS

Well Status active
Date 6/16/05

Well Surface Description:

Stickup (ground surface to top of riser casing): 0.18'
Riser casing diameter: 2" NO
Steel surface protective casing: ☒ Yes ☐ No
Protective casing diameter: 0.55
Cap: ☒ Yes ☐ No Locked: ☒ Yes ☐ No
Concrete surface seal: ☐ Yes ☒ No
Surface seal condition/integrity:

Remarks: no concrete surround

Well Description:

Depth to water (measured from top of riser casing): 61.44'
Well depth (measured from top of riser casing to bottom of well): 88.35'
Evidence of sediment in bottom of well: ☒ Yes ☐ No ☐ Maybe
Remarks: little sediment on end of probe after recording water level

Recommended for Development: ☐ Yes ☒ No

Notes:

**SNC ALWR ESP PROJECT
EXISTING OBSERVATION WELL INSPECTION REPORT**

Well Number LT-13 Well Status active
Inspected by ScBeaver/L. Heidland Date 6/16/05
Company GCS / Bechtel

Well Surface Description:

Stickup (ground surface to top of riser casing): 2.26 - 0.52
Riser casing diameter: 4" ND sch 40 4" ND sched 40 PVC
Steel surface protective casing: ☒ Yes ☐ No
Protective casing diameter: .55 0.55
Cap: ☐ Yes ☒ No Locked: ☒ Yes ☐ No
Concrete surface seal: ☒ Yes ☐ No
Surface seal condition/integrity:

Remarks: difficult positioning because of
steves level recorder. In small steel building

Well Description:

Depth to water (measured from top of riser casing): 64.60
Well depth (measured from top of riser casing to bottom of well): 90.65
Evidence of sediment in bottom of well: ☒ Yes ☐ No ☐ Maybe
Remarks: _____

Recommended for Development: ☐ Yes ☒ No

Notes:

**SNC ALWR ESP PROJECT
EXISTING OBSERVATION WELL INSPECTION REPORT**

Well Number 27

Well Status inactive

Inspected by John Pugh

Date 5-18-05

Company Southern Company Services

12:38 EDT

Well Surface Description:

Stickup (ground surface to top of riser casing): 1.4 ft

Riser casing diameter: 2"

Steel surface protective casing: ☒ Yes ☐ No

Protective casing diameter: 0.75 ft

Cap: ☒ Yes ☐ No Locked: ☒ Yes ☐ No

Concrete surface seal: ☐ Yes ☒ No

Surface seal condition/integrity: N/A

Remarks: _____

Well Description:

Depth to water (measured from top of riser casing): 126.40 ft

Well depth (measured from top of riser casing to bottom of well): 190.40 ft

Evidence of sediment in bottom of well: ☐ Yes ☒ No ☐ Maybe

Remarks: NO EVIDENCE OF SEDIMENT

OBSERVED

Recommended for Development: ☒ Yes ☐ No

Notes:

**SNC ALWR ESP PROJECT
EXISTING OBSERVATION WELL INSPECTION REPORT**

Well Number 29

Well Status Inactive

Inspected by John Pugh / L. Headland

Date 5/19/05

Company SCS / Bechtel

Well Surface Description:

Stickup (ground surface to top of riser casing): 1.9' - 0.12' = 1.78'

Riser casing diameter: 2"

Steel surface protective casing: ☒ Yes ☐ No

Protective casing diameter: 0.66'

Cap: ☒ Yes ☐ No Locked: ☐ Yes ☒ No (lock on top of well)

Concrete surface seal: ☐ Yes ☒ No

Surface seal condition/integrity: N/A

Remarks: _____

Well Description:

Depth to water (measured from top of riser casing): 211.94' ↓

Well depth (measured from top of riser casing to bottom of well): 99.6' ↓

Evidence of sediment in bottom of well: ☐ Yes ☒ No ☐ Maybe

Remarks: tip clear

Recommended for Development: ☒ Yes ☐ No

Notes:

**SNC ALWR ESP PROJECT
EXISTING OBSERVATION WELL INSPECTION REPORT**

Well Number 142

Well Status Inactive

Inspected by J. Pugh / L. Headland

Date 5/19/05

Company SCS / Bechtel

11:55 AM

Well Surface Description:

Stickup (ground surface to top of riser casing): $1.94' - 0.58' = 1.36'$
 Riser casing diameter: 2"
 Steel surface protective casing: ☒ Yes ☐ No
 Protective casing diameter: 0.66'
 Cap: ☒ Yes ☐ No Locked: ☒ Yes ☐ No (lock cut)
 Concrete surface seal: ☐ Yes ☒ No
 Surface seal condition/integrity: N/A

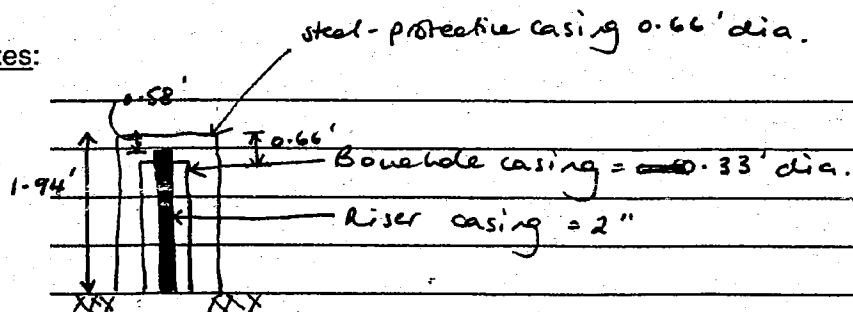
Remarks: Borehole casing diameter (steel) = 0.33'
well consists of :- protective casing, borehole casing + riser casing.

Well Description:

Depth to water (measured from top of riser casing): 70.5'
 Well depth (measured from top of riser casing to bottom of well): 97.37'
 Evidence of sediment in bottom of well: ☐ Yes ☒ No ☐ Maybe
 Remarks: clean tip

Recommended for Development: ☒ Yes ☐ No

Notes:



**SNC ALWR ESP PROJECT
EXISTING OBSERVATION WELL INSPECTION REPORT**

Well Number 179

Well Status inactive

Inspected by JOHN PUGH

Date 05/18/05
16:44

Company SOUTHERN COMPANY SERVICES

Well Surface Description:

Stickup (ground surface to top of riser casing): 0.25 FT

Riser casing diameter: 2 IN.

Steel surface protective casing: ☒ Yes ☐ No

Protective casing diameter: 0.71 FT

Cap: ☒ Yes ☐ No Locked: ☒ Yes ☐ No

Concrete surface seal: ☐ Yes ☒ No

Surface seal condition/integrity: N/A

Remarks: _____

Well Description:

Depth to water (measured from top of riser casing): 127.23 FT

Well depth (measured from top of riser casing to bottom of well): 132.62 FT

Evidence of sediment in bottom of well: ☒ Yes ☐ No ☐ Maybe

Remarks: PROBE STAINED W/ VERY FINE SILT

Recommended for Development: ☒ Yes ☐ No

Notes:

**SNC ALWR ESP PROJECT
EXISTING OBSERVATION WELL INSPECTION REPORT**

Well Number 802A
Inspected by S. Beare / J. Headland
Company SCS / Bechtel

Well Status active
Date 6/16/05

Well Surface Description:

Stickup (ground surface to top of riser casing): $3.27 - 0.49 = 2.78'$
Riser casing diameter: 4" ND sch 40 PVC
Steel surface protective casing: ☒ Yes ☐ No
Protective casing diameter: 0.55'
Cap: ☐ Yes ☒ No Locked: ☒ Yes ☐ No
Concrete surface seal: ☐ Yes ☒ No
Surface seal condition/integrity:
cover in good shape
Remarks: needs casing cap

Well Description:

Depth to water (measured from top of riser casing): 61.01
Well depth (measured from top of riser casing to bottom of well): 90.50
Evidence of sediment in bottom of well: ☒ Yes ☐ No ☐ Maybe
Remarks: no sediment on probe

Recommended for Development: ☐ Yes ☐ No

Notes:

**SNC ALWR ESP PROJECT
EXISTING OBSERVATION WELL INSPECTION REPORT**

Well Number 803 A Well Status Inactive
Inspected by John Pugh + Haisel Kaddal Date 5-19-05
Company Southern Company 9:30 AM EST

Well Surface Description:

Stickup (ground surface to top of riser casing): $1.53' - 0.42' = 1.11'$
Riser casing diameter: 2"
Steel surface protective casing: ☒ Yes ☐ No
Protective casing diameter: 0.83'
Cap: ☒ Yes ☐ No Locked: ☒ Yes ☐ No (corrosion)
Concrete surface seal: ☐ Yes ☒ No
Surface seal condition/integrity: N/A four surrounding posts

Remarks: _____

Well Description:

Depth to water (measured from top of riser casing): 60.25'
Well depth (measured from top of riser casing to bottom of well): 89.51'
Evidence of sediment in bottom of well: ☐ Yes ☐ No ☒ Maybe
Remarks: Soft @ bottom, silt on tip of dipmeter

Recommended for Development: ☒ Yes ☐ No

Notes:

Current riser casing / protective casing measurements (5-19-05 - 5/18/05)

Diagram illustrating casing measurements:
- Riser casing height: 0.42'
- Steel casing height: 1.53'
- Total height from top of riser casing to top of steel casing: 1.11'

**SNC ALWR ESP PROJECT
EXISTING OBSERVATION WELL INSPECTION REPORT**

Well Number 804

Well Status Inactive

Inspected by John Pugh / L. Headcol

Date 5/19/05

Company SCS

9:55 AM

Well Surface Description:

Stickup (ground surface to top of riser casing): 2.11' - 0.39' = 1.72'
Riser casing diameter: 2"
Steel surface protective casing: ☒ Yes ☐ No
Protective casing diameter: 0.83'
Cap: ☒ Yes ☐ No Locked: ☒ Yes ☐ No
Concrete surface seal: ☐ Yes ☒ No
Surface seal condition/integrity: N/A Four concrete posts
surrounding well.
Remarks:

Well Description:

Depth to water (measured from top of riser casing): 62.13'
Well depth (measured from top of riser casing to bottom of well): 95.2'
Evidence of sediment in bottom of well: ☒ Yes ☐ No ☐ Maybe
Remarks: silt on tip of dipmeter

Recommended for Development: ☒ Yes ☐ No

Notes:

**SNC ALWR ESP PROJECT
EXISTING OBSERVATION WELL INSPECTION REPORT**

Well Number 805A

Well Status Inactive

Inspected by J. Pugh / L. Heald and

Date 5/19/05

Company SCS / Bechtel

Well Surface Description:

Stickup (ground surface to top of riser casing): $2.0 - 0.42 = 1.58$ '

Riser casing diameter: 2"

Steel surface protective casing: ☒ Yes ☐ No

Protective casing diameter: 0.83'

Cap: ☒ Yes ☐ No Locked: ☒ Yes ☐ No

Concrete surface seal: ☐ Yes ☒ No

Surface seal condition/integrity: N/A

Remarks: _____

Well Description:

Depth to water (measured from top of riser casing): 77.72'

Well depth (measured from top of riser casing to bottom of well): 128.55'

Evidence of sediment in bottom of well: ☒ Yes ☐ No ☐ Maybe

Remarks: soft ~silt on tip.

Recommended for Development: ☒ Yes ☐ No

Notes:

**SNC ALWR ESP PROJECT
EXISTING OBSERVATION WELL INSPECTION REPORT**

Well Number 806B
Inspected by S. Bearce
Company SCS

Well Status active
Date _____

Well Surface Description:

Stickup (ground surface to top of riser casing): $1.8 - 0.65 = 1.15$
Riser casing diameter: 2" ND Sch 40 PVC
Steel surface protective casing: ☒ Yes ☐ No
Protective casing diameter: 0.95'
Cap: ☐ Yes ☒ No Locked: ☒ Yes ☐ No
Concrete surface seal: ☐ Yes ☒ No
Surface seal condition/integrity: NA

Remarks: _____

Well Description:

Depth to water (measured from top of riser casing): 60.42
Well depth (measured from top of riser casing to bottom of well): 69.35
Evidence of sediment in bottom of well: ☐ Yes ☒ No ☐ Maybe
Remarks: hard bottom touch

Recommended for Development: ☐ Yes ☒ No

Notes:

**SNC ALWR ESP PROJECT
EXISTING OBSERVATION WELL INSPECTION REPORT**

Well Number 808
Inspected by S. Beere / L. Headland
Company SCS

Well Status active
Date 6/16/05

Well Surface Description:

Stickup (ground surface to top of riser casing): 0.98 ± 0.12
Riser casing diameter: 4" ND Sch 40 PVC
Steel surface protective casing: ☒ Yes ☐ No
Protective casing diameter: 0.55
Cap: ☐ Yes ☒ No Locked: ☒ Yes ☒ No
Concrete surface seal: ☒ Yes ☐ No SCB
Surface seal condition/integrity:

Remarks: In steel building

Well Description:

Depth to water (measured from top of riser casing): 57.52
Well depth (measured from top of riser casing to bottom of well): ~75.40
Evidence of sediment in bottom of well: ☒ Yes ☐ No ☐ Maybe
Remarks: soft bottom

Recommended for Development: ☐ Yes ☒ No

Notes:

**SNC ALWR ESP PROJECT
EXISTING OBSERVATION WELL INSPECTION REPORT**

Well Number 809

Well Status inactive

Inspected by John Pugh

Date 5-18-05

Company Southern Company Services

Well Surface Description:

Stickup (ground surface to top of riser casing): 1.23 ft

Riser casing diameter: 2"

Steel surface protective casing: ☒ Yes ☐ No

Protective casing diameter: 0.56 ft

Cap: ☒ Yes ☐ No Locked: ☒ Yes ☐ No

Concrete surface seal: ☐ Yes ☒ No

Surface seal condition/integrity: _____

Remarks: _____

Well Description:

Depth to water (measured from top of riser casing): 71.41 ft

Well depth (measured from top of riser casing to bottom of well): 94.35 ft

Evidence of sediment in bottom of well: ☒ Yes ☐ No ☐ Maybe

Remarks: brown substance on point of water level
indicator when bottom was measured

Recommended for Development: ☒ Yes ☐ No

Notes:

**SNC ALWR ESP PROJECT
EXISTING OBSERVATION WELL INSPECTION REPORT**

Well Number 850 A

Well Status inactive

Inspected by John Pugh

Date 5-18-05

Company SOUTHERN COMPANY SERVICES

15:30 EDT

Well Surface Description:

Stickup (ground surface to top of riser casing): 1.96 ft

Riser casing diameter: 2"

Steel surface protective casing: ☒ Yes ☐ No

Protective casing diameter: 0.56 ft

Cap: ☒ Yes ☐ No Locked: ☒ Yes ☐ No

Concrete surface seal: ☐ Yes ☒ No

Surface seal condition/integrity: _____

Remarks: _____

Well Description:

Depth to water (measured from top of riser casing): 126.12 ft

Well depth (measured from top of riser casing to bottom of well): 193.68

Evidence of sediment in bottom of well: ☐ Yes ☒ No ☐ Maybe

Remarks: _____

Recommended for Development: ☒ Yes ☐ No

Notes:

**SNC ALWR ESP PROJECT
EXISTING OBSERVATION WELL INSPECTION REPORT**

Well Number 851A

Well Status inactive

Inspected by JOHN PUGH

Date 05/18/05

Company SOUTHERN COMPANY SERVICES

17:00 EDT

Well Surface Description:

Stickup (ground surface to top of riser casing): 2.0 FT

Riser casing diameter: 2 IN.

Steel surface protective casing: ☒ Yes ☐ No

Protective casing diameter: 0.56 FT

Cap: ☒ Yes ☐ No Locked: ☒ Yes ☐ No

Concrete surface seal: ☐ Yes ☒ No

Surface seal condition/integrity: N/A

Remarks: _____

Well Description:

Depth to water (measured from top of riser casing): 149.65 FT

Well depth (measured from top of riser casing to bottom of well): 285.18 FT

Evidence of sediment in bottom of well: ☐ Yes ☒ No ☐ Maybe

Remarks: _____

Recommended for Development: ☒ Yes ☐ No

Notes:

**SNC ALWR ESP PROJECT
EXISTING OBSERVATION WELL INSPECTION REPORT**

Well Number 852

Well Status inactive

Inspected by John Pugh

Date 5-18-05
13:19 EDT

Company SOUTHERN COMPANY SERVICES

Well Surface Description:

Stickup (ground surface to top of riser casing): 2.0 FT

Riser casing diameter: 2"

Steel surface protective casing: ☒ Yes ☐ No

Protective casing diameter: 0.52 FT

Cap: ☒ Yes ☐ No Locked: ☒ Yes ☐ No

Concrete surface seal: ☐ Yes ☒ No

Surface seal condition/integrity: N/A

Remarks: _____

Well Description:

Depth to water (measured from top of riser casing): 89.27 FT

Well depth (measured from top of riser casing to bottom of well): 222.90 FT

Evidence of sediment in bottom of well: ☐ Yes ☒ No ☐ Maybe

Remarks: NO EVIDENCE OF SEDIMENT OBSERVED

Recommended for Development: ☒ Yes ☐ No

Notes:

**SNC ALWR ESP PROJECT
EXISTING OBSERVATION WELL INSPECTION REPORT**

Well Number 853

Well Status inactive

Inspected by John BGM

Date 05/18/05
16:10 EDT

Company Southern Company Services

Well Surface Description:

Stickup (ground surface to top of riser casing): 1.86 FT

Riser casing diameter: 2 in.

Steel surface protective casing: ☒ Yes ☐ No

Protective casing diameter: 0.56 FT

Cap: ☒ Yes ☐ No Locked: ☒ Yes ☐ No

Concrete surface seal: ☐ Yes ☒ No

Surface seal condition/integrity: N/A

Remarks: _____

Well Description:

Depth to water (measured from top of riser casing): 125.69 FT

Well depth (measured from top of riser casing to bottom of well): 220.86 FT

Evidence of sediment in bottom of well: ☒ Yes ☐ No ☐ Maybe

Remarks: FINE SAND & ORGANIC MTL. ON PROBE

Recommended for Development: ☒ Yes ☐ No

Notes:

**SNC ALWR ESP PROJECT
EXISTING OBSERVATION WELL INSPECTION REPORT**

Well Number 854

Well Status inactive

Inspected by JOHN ROTH

Date 05/18/05

Company SOUTHERN COMPANY SERVICES

16:24 EDT
IN 16:24

Well Surface Description:

Stickup (ground surface to top of riser casing): 1.85 FT

Riser casing diameter: 2 IN.

Steel surface protective casing: ☒ Yes ☐ No

Protective casing diameter: 0.56 FT

Cap: ☒ Yes ☐ No Locked: ☒ Yes ☐ No

Concrete surface seal: ☐ Yes ☒ No

Surface seal condition/integrity: N/A

Remarks: _____

Well Description:

Depth to water (measured from top of riser casing): 134.24 FT

Well depth (measured from top of riser casing to bottom of well): 222.33

Evidence of sediment in bottom of well: ☒ Yes ☐ No ☐ Maybe

Remarks: SOFT BOTTOM BELOW SCREENED INTERVAL
PROBE CONTAINS ORGANIC & SILT MATERIAL TRACES

Recommended for Development: ☒ Yes ☐ No

Notes:

**SNC ALWR ESP PROJECT
EXISTING OBSERVATION WELL INSPECTION REPORT**

Well Number 855
Inspected by John Pugh
Company SOUTHERN CO. SERVICES

Well Status inactive
Date 5-18-05
12:58 EDT

Well Surface Description:

Stickup (ground surface to top of riser casing): 2.0 FT.
Riser casing diameter: 2"
Steel surface protective casing: ☒ Yes ☐ No
Protective casing diameter: 0.52 FT
Cap: ☒ Yes ☐ No Locked: ☒ Yes ☐ No
Concrete surface seal: ☐ Yes ☒ No
Surface seal condition/integrity: N/A

Remarks: _____

Well Description:

Depth to water (measured from top of riser casing): 120.40 FT
Well depth (measured from top of riser casing to bottom of well): 224.50 FT
Evidence of sediment in bottom of well: ☐ Yes ☐ No ☐ Maybe

Remarks: NO EVIDENCE OF SEDIMENT

OBSERVED --- HOWEVER, MEASURED DEPTH OF 224.50 FT
IS LESS THAN DOCUMENTED BOTTOM OF SCREENED
INTERVAL.

Recommended for Development: ☒ Yes ☐ No

Notes:

**SNC ALWR ESP PROJECT
EXISTING OBSERVATION WELL INSPECTION REPORT**

Well Number 856

Well Status inactive

Inspected by JOHN RUGN

Date 05/18/05

Company SOUTHERN COMPANY SERVICES

13:47 EDT

Well Surface Description:

Stickup (ground surface to top of riser casing): 2.0 FT
Riser casing diameter: ~~0.52 FT~~ 2"
Steel surface protective casing: ☒ Yes ☐ No
Protective casing diameter: 0.52 FT
Cap: ☒ Yes ☐ No Locked: ☒ Yes ☐ No
Concrete surface seal: ☐ Yes ☒ No
Surface seal condition/integrity: N/A

Remarks: _____

Well Description:

Depth to water (measured from top of riser casing): 75.70 FT
Well depth (measured from top of riser casing to bottom of well): 182.14 FT

Evidence of sediment in bottom of well: ☐ Yes ☐ No ☐ Maybe

Remarks: MEASURED DEPTH LESS THAN ORIGINAL
BOTTOM OF SCREENED INTERVAL. NO EVIDENCE
OF SEDIMENT OBSERVED ON PROBE

Recommended for Development: ☒ Yes ☐ No

Notes:

APPENDIX I

LABORATORY DATA

Intracompany Correspondence



Date: August 24, 2005

To: Ms. Rhonda Tinsley

From: Mr. Bobby Williams

Subject: Plant Vogtle ESP

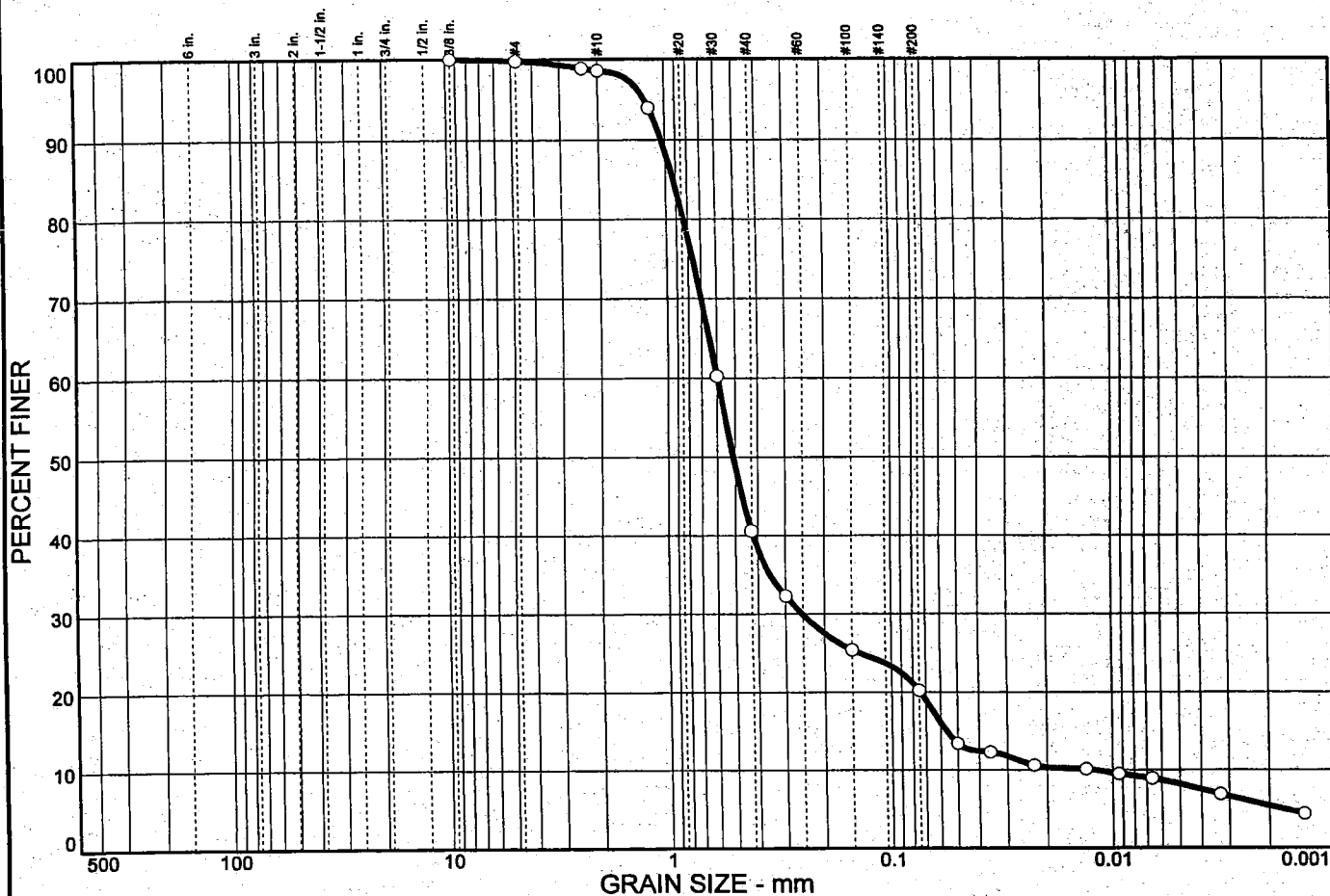
Enclosed are the test results for the Plant Vogtle ESP Project soil samples delivered to the Southern Company Central Laboratory on July 28, 2005. Tests performed include, Soil Particle Size Analysis with Hydrometer (ASTM D-422), and Specific Gravity of Soil (ASTM D-854).

We appreciate the opportunity to assist you on this project. If there are any questions, or if we can be of any further assistance, please call me at 8-255-6508 or Sam Moore at 8-255-6061.

Sincerely,

Bobby Williams, PE
Geostructural Services

Particle Size Distribution Report



| % COBBLES | % GRAVEL | % SAND | % SILT | % CLAY |
|-----------|----------|--------|--------|--------|
| 0.0 | 0.2 | 79.6 | 12.0 | 8.2 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|------------|---------------|----------------|--------------|
| .375 in. | 100.0 | | |
| #4 | 99.8 | | |
| #8 | 98.9 | | |
| #10 | 98.6 | | |
| #16 | 94.0 | | |
| #30 | 60.2 | | |
| #40 | 40.6 | | |
| #50 | 32.3 | | |
| #100 | 25.4 | | |
| #200 | 20.2 | | |

* (no specification provided)

Soil Description

Light Gray Silty sand

PL= NA

Atterberg Limits

LL= NA

PI= NA

Coefficients

D₈₅= 0.925

D₆₀= 0.598

D₅₀= 0.510

D₃₀= 0.252

D₁₅= 0.0564

D₁₀= 0.0122

C_u= 49.11

C_c= 8.71

Classification

USCS= SM

AASHTO=

Remarks

Bag Sample
Specific Gravity - 2.65

Sample No.: #27

Source of Sample:

Date: 08/22/05

Location: Boring #1002

Elev./Depth: 218.5'-220.0'

SOUTHERN COMPANY

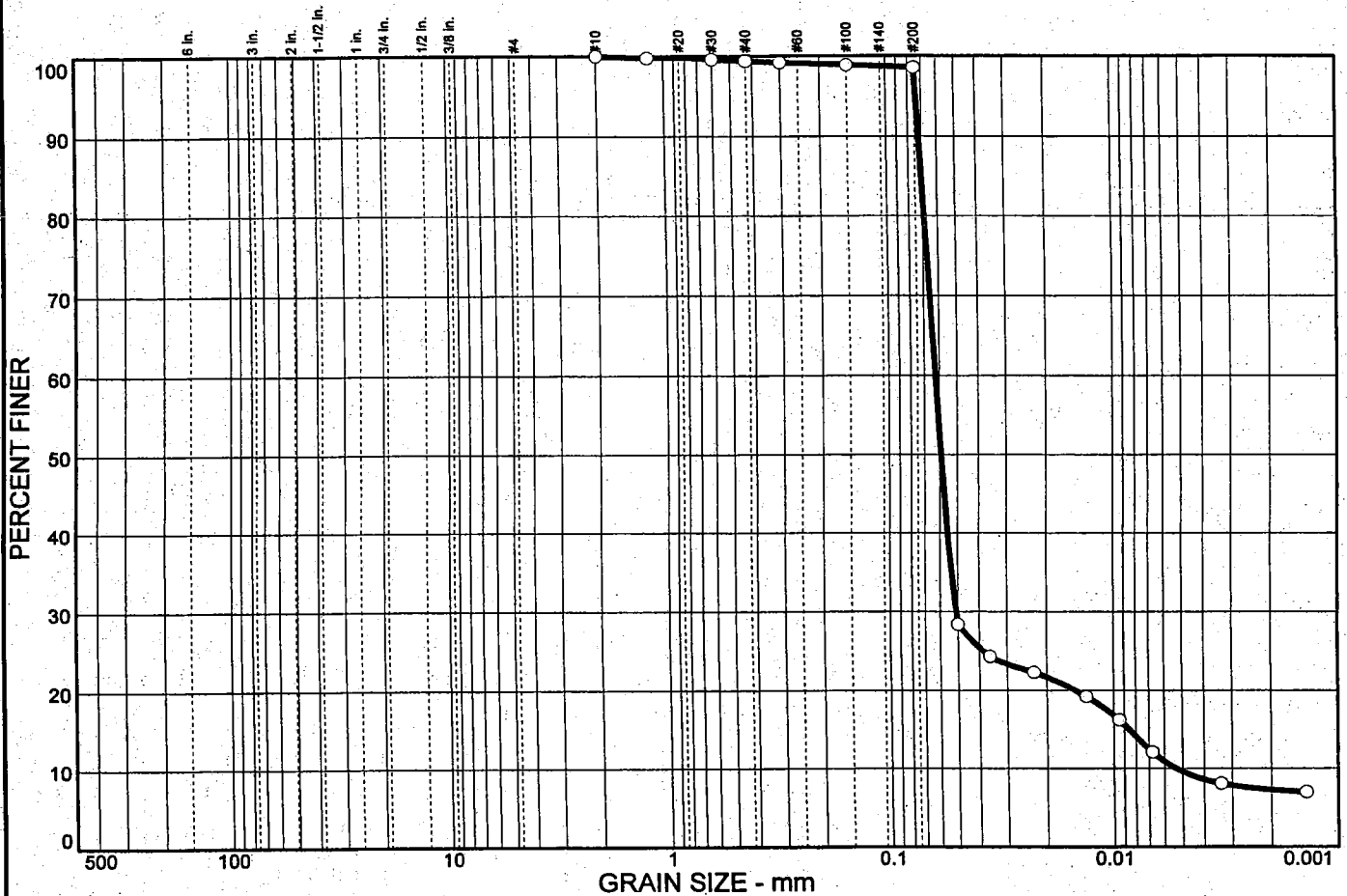
Client: SCS-Rhonda Tinsley and Steve Bearce

Project: Southern Nuclear/Plant Vogtle ESP

Project No: V003-DE

Lab# 1

Particle Size Distribution Report



| % COBBLES | % GRAVEL | % SAND | % SILT | % CLAY |
|-----------|----------|--------|--------|--------|
| 0.0 | 0.0 | 1.4 | 89.0 | 9.6 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|------------|---------------|----------------|--------------|
| #10 | 100.0 | | |
| #16 | 99.8 | | |
| #30 | 99.6 | | |
| #40 | 99.4 | | |
| #50 | 99.2 | | |
| #100 | 98.9 | | |
| #200 | 98.6 | | |

* (no specification provided)

Soil Description

Dark Gray Silt

Atterberg Limits

PL= NA

LL= NA

PI= NA

Coefficients

D₈₅= 0.0705

D₆₀= 0.0624

D₅₀= 0.0590

D₃₀= 0.0509

D₁₅= 0.0086

D₁₀= 0.0053

C_u= 11.73

C_c= 7.81

Classification

USCS= ML

AASHTO=

Remarks

Bag Sample
Specific Gravity - 2.62

Sample No.: #29
Location: Boring #1002

Source of Sample:

Date: 08/22/05
Elev./Depth: 237'

SOUTHERN COMPANY

Client: SCS-Rhonda Tinsley and Steve Bearce

Project: Southern Nuclear/Plant Vogtle ESP

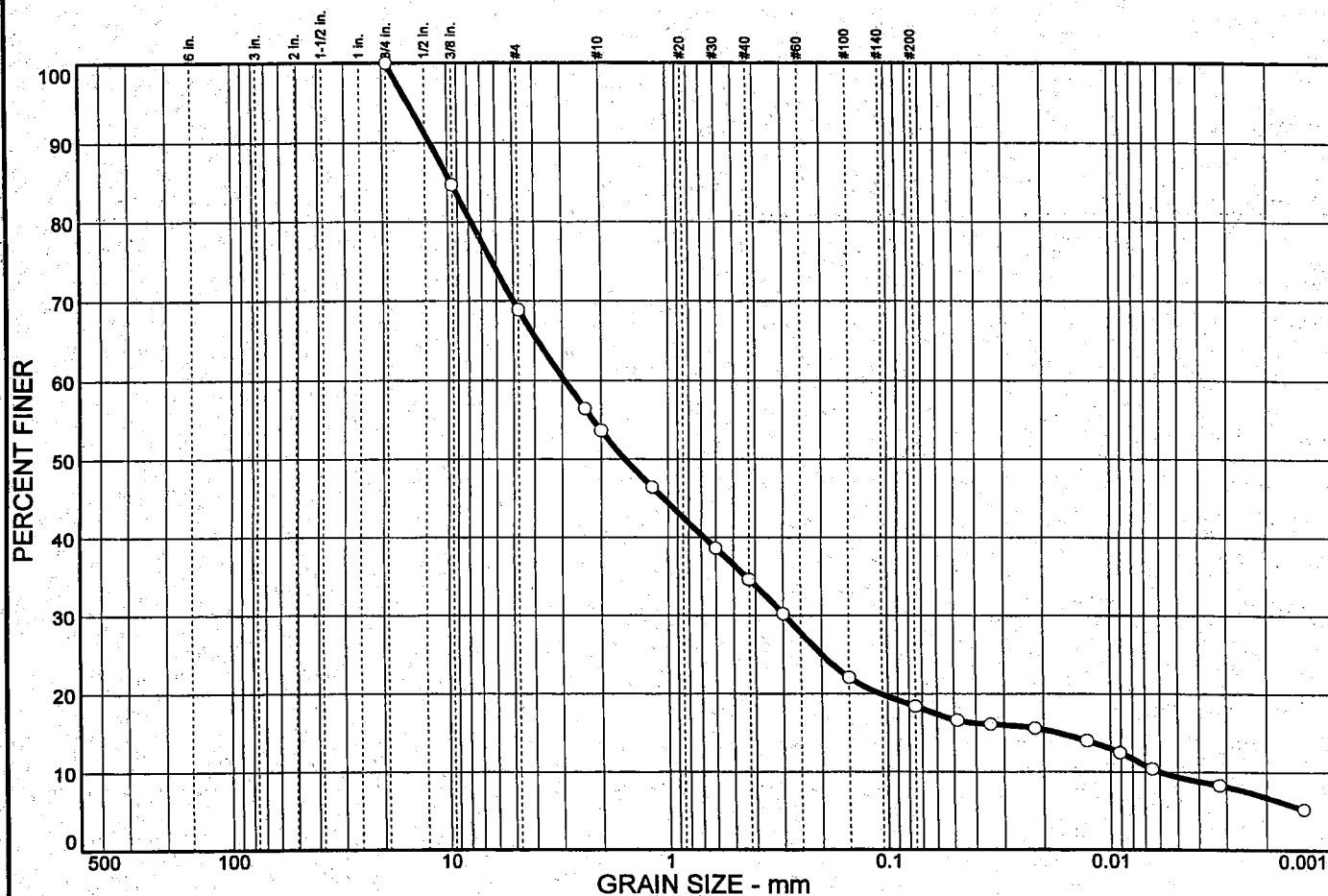
Project No: V003-DE

Lab# 2

| Grain Size (mm) | Percent Finer (%) |
|-----------------|-------------------|
| 4.75 | 100 |
| 2.0 | 100 |
| 1.0 | 100 |
| 0.75 | 99 |
| 0.6 | 98 |
| 0.425 | 89 |
| 0.3 | 77 |
| 0.25 | 66 |
| 0.15 | 45 |
| 0.106 | 35 |
| 0.075 | 30 |
| 0.05 | 28 |
| 0.0375 | 26 |
| 0.025 | 25 |
| 0.015 | 24 |
| 0.0106 | 22 |
| 0.0075 | 22 |
| 0.005 | 22 |
| 0.0025 | 21 |
| 0.001 | 21 |

SOUTHERN COMPANY

Particle Size Distribution Report



| % COBBLES | % GRAVEL | % SAND | % SILT | % CLAY |
|-----------|----------|--------|--------|--------|
| 0.0 | 31.1 | 50.5 | 9.1 | 9.3 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|------------|---------------|----------------|--------------|
| 0.75 in. | 100.0 | | |
| .375 in. | 84.7 | | |
| #4 | 68.9 | | |
| #8 | 56.4 | | |
| #10 | 53.6 | | |
| #16 | 46.4 | | |
| #30 | 38.6 | | |
| #40 | 34.6 | | |
| #50 | 30.2 | | |
| #100 | 22.1 | | |
| #200 | 18.4 | | |

* (no specification provided)

| | | |
|----------------------------------|--------------------------|--------------------------|
| Soil Description | | |
| Light Tan Silty sand with gravel | | |
| Atterberg Limits | | |
| PL= NA | LL= NA | PI= NA |
| Coefficients | | |
| D ₈₅ = 9.65 | D ₆₀ = 2.92 | D ₅₀ = 1.57 |
| D ₃₀ = 0.295 | D ₁₅ = 0.0171 | D ₁₀ = 0.0060 |
| C _u = 486.69 | C _c = 4.99 | |
| Classification | | |
| USCS= SM | AASHTO= | |
| Remarks | | |
| Jar Sample | | |
| Specific Gravity - 2.68 | | |

Sample No.: #17
Location: Boring #1003

Source of Sample:

Date: 08/23/05
Elev./Depth: 83.5'

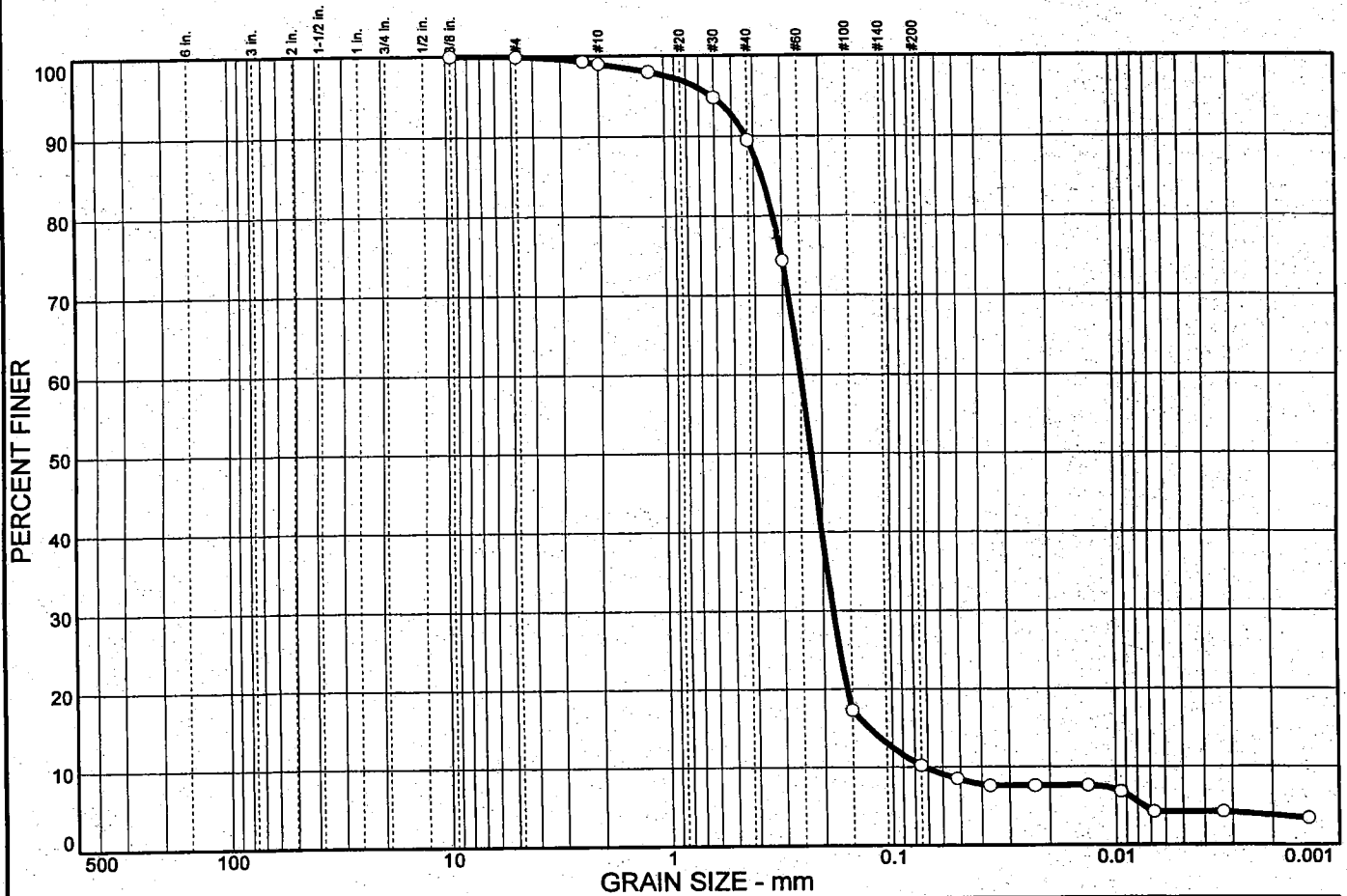
SOUTHERN COMPANY

Client: SCS-Rhonda Tinsley and Steve Bearce
Project: Southern Nuclear/Plant Vogtle ESP

Project No: V003-DE

Lab# 4

Particle Size Distribution Report



| % COBBLES | % GRAVEL | % SAND | % SILT | % CLAY |
|-----------|----------|--------|--------|--------|
| 0.0 | 0.1 | 89.7 | 6.0 | 4.2 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|------------|---------------|----------------|--------------|
| .375 in. | 100.0 | | |
| #4 | 99.9 | | |
| #8 | 99.3 | | |
| #10 | 99.0 | | |
| #16 | 98.0 | | |
| #30 | 94.8 | | |
| #40 | 89.5 | | |
| #50 | 74.4 | | |
| #100 | 17.3 | | |
| #200 | 10.2 | | |

* (no specification provided)

Soil Description

Gray Poorly graded sand with silt

Atterberg Limits

PL= NA

LL= NA

PI= NA

Coefficients

D₈₅= 0.368

D₆₀= 0.251

D₅₀= 0.225

D₃₀= 0.180

D₁₅= 0.126

D₁₀= 0.0725

C_u= 3.46

C_c= 1.79

Classification

USCS= SP-SM

AASHTO=

Remarks

Bag Sample

Specific Gravity - 2.69

Sample No.: #14
Location: Boring #1004

Source of Sample:

Date: 08/23/05
Elev./Depth: 153.5'- 155.0'

SOUTHERN COMPANY

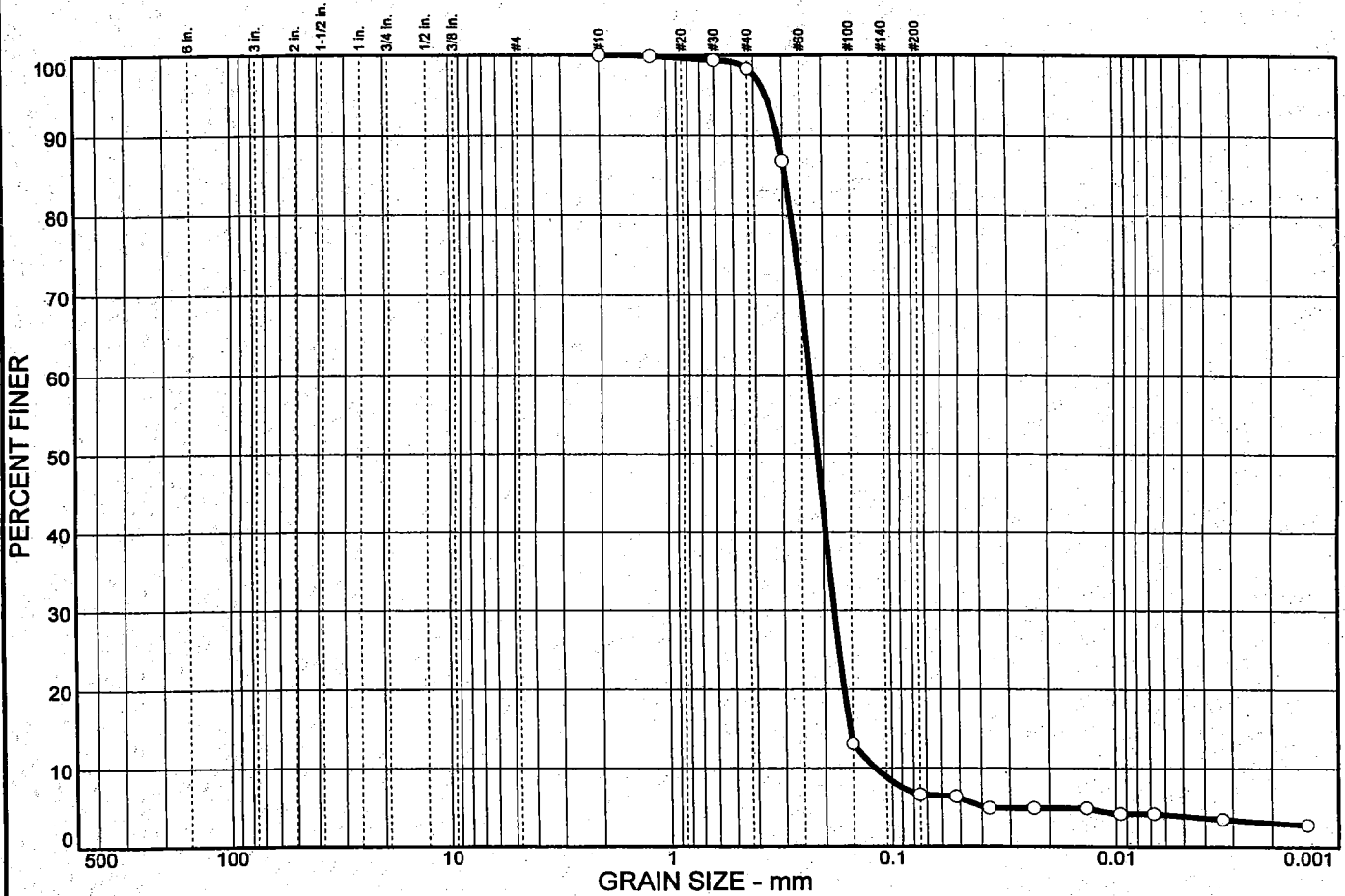
Client: SCS-Rhonda Tinsley and Steve Bearce

Project: Southern Nuclear/Plant Vogtle ESP

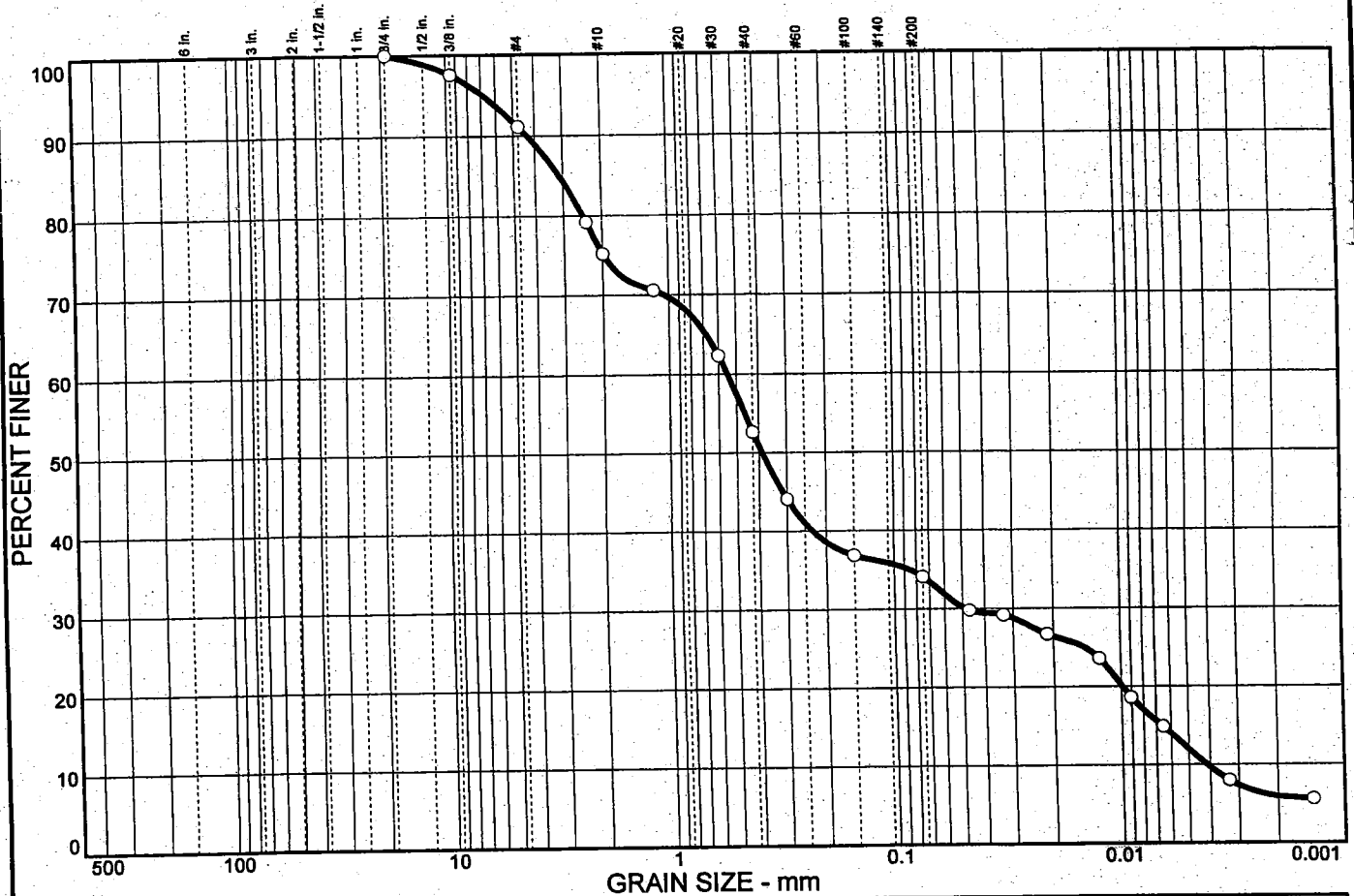
Project No: 24A-203 V003-DE

Lab# 5

Particle Size Distribution Report



Particle Size Distribution Report



| % COBBLES | % GRAVEL | % SAND | % SILT | % CLAY |
|-----------|----------|--------|--------|--------|
| 0.0 | 8.9 | 57.0 | 22.1 | 12.0 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|------------|---------------|----------------|--------------|
| 0.75 in. | 100.0 | | |
| .375 in. | 97.6 | | |
| #4 | 91.1 | | |
| #8 | 79.2 | | |
| #10 | 75.2 | | |
| #16 | 70.6 | | |
| #30 | 62.3 | | |
| #40 | 52.6 | | |
| #50 | 44.1 | | |
| #100 | 36.9 | | |
| #200 | 34.1 | | |

* (no specification provided)

Sample No.: #17B
Location: Boring #1005

Source of Sample:

Date: 08/23/05
Elev./Depth: 148.5'-150.0'

Soil Description

Very Light Tan Silty sand

Atterberg Limits

PL= NA

LL= NA

PI= NA

Coefficients

D₈₅= 3.11
D₃₀= 0.0484
C_u= 132.85

D₆₀= 0.549
D₁₅= 0.0066
C_c= 1.03

D₅₀= 0.387
D₁₀= 0.0041

Classification

USCS= SM

AASHTO=

Remarks

Jar Sample
Specific Gravity - 2.63

SOUTHERN COMPANY

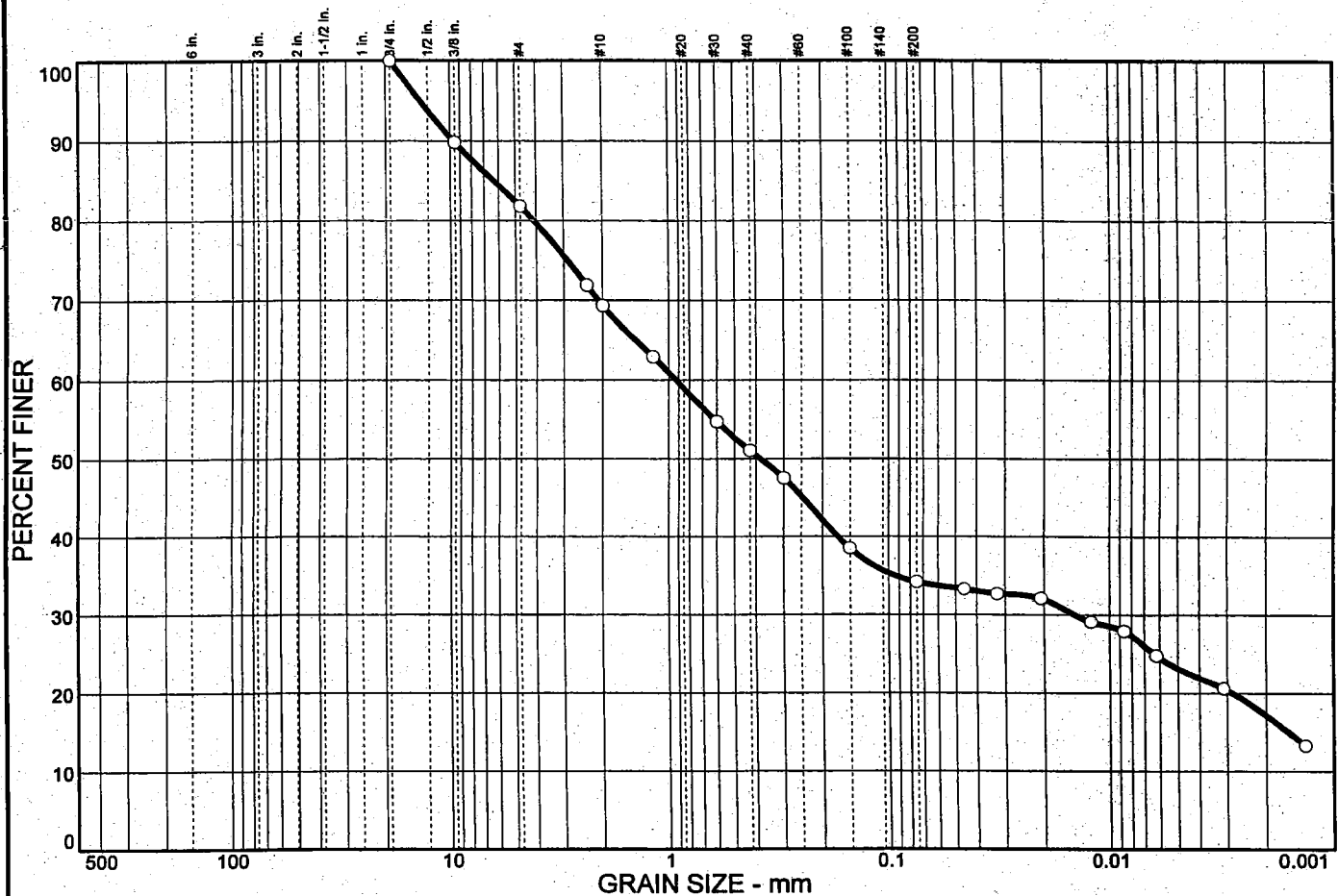
Client: SCS-Rhonda Tinsley and Steve Bearce
Project: Southern Nuclear/Plant Vogtle ESP

Project No: V003-DE

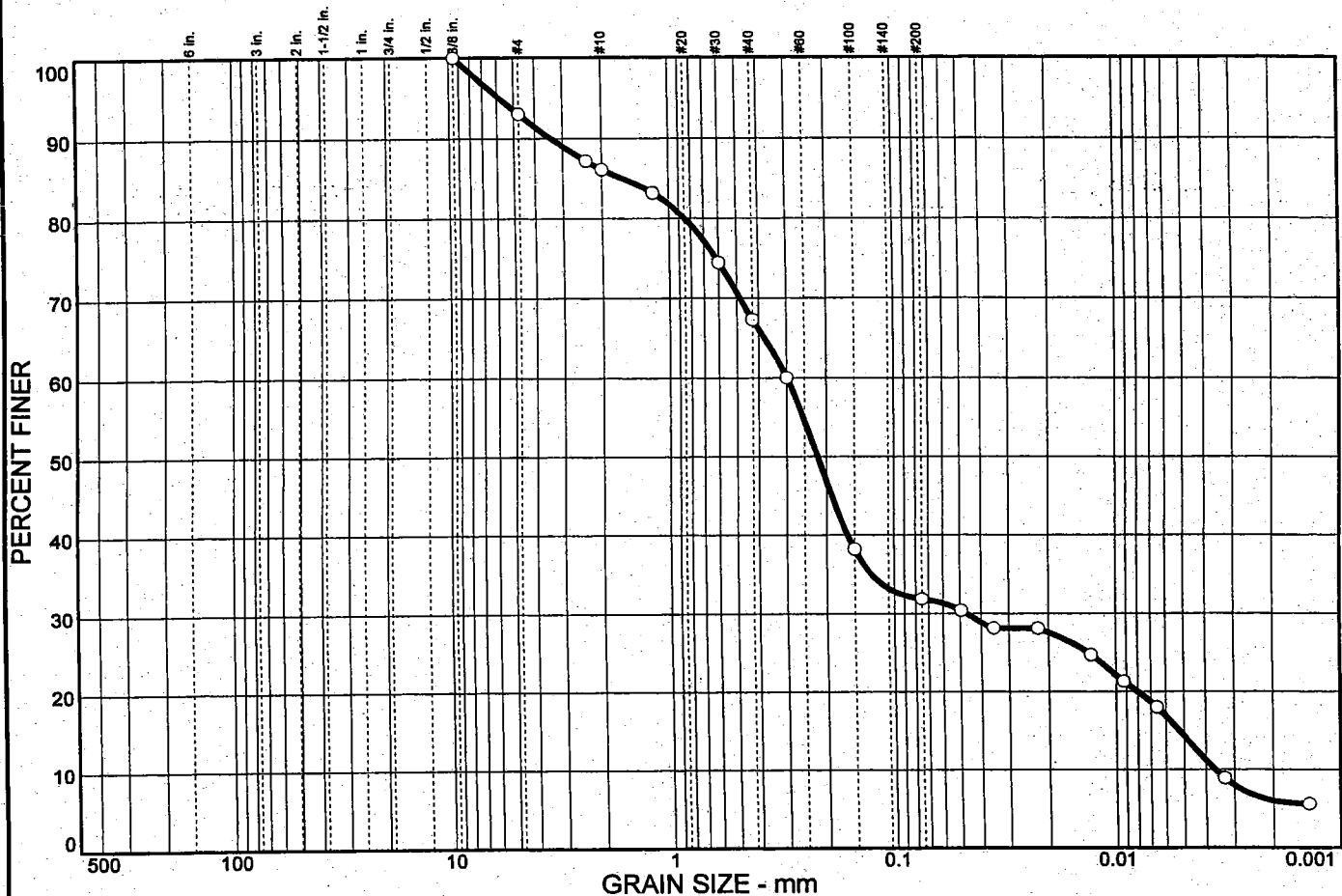
Lab#

7

Particle Size Distribution Report



Particle Size Distribution Report



| % COBBLES | % GRAVEL | % SAND | % SILT | % CLAY |
|-----------|----------|--------|--------|--------|
| 0.0 | 7.0 | 61.1 | 17.6 | 14.3 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|------------|---------------|----------------|--------------|
| .375 in. | 100.0 | | |
| #4 | 93.0 | | |
| #8 | 87.2 | | |
| #10 | 86.1 | | |
| #16 | 83.2 | | |
| #30 | 74.5 | | |
| #40 | 67.3 | | |
| #50 | 60.0 | | |
| #100 | 38.2 | | |
| #200 | 31.9 | | |

* (no specification provided)

| | | |
|--------------------------------|--------------------------|--------------------------|
| <u>Soil Description</u> | | |
| Very Light Tan Silty sand | | |
| <u>Atterberg Limits</u> | | |
| PL= NA | LL= NA | PI= NA |
| <u>Coefficients</u> | | |
| D ₈₅ = 1.62 | D ₆₀ = 0.300 | D ₅₀ = 0.219 |
| D ₃₀ = 0.0467 | D ₁₅ = 0.0052 | D ₁₀ = 0.0036 |
| C _u = 82.37 | C _c = 1.99 | |
| <u>Classification</u> | | |
| USCS= SM | AASHTO= | |
| <u>Remarks</u> | | |
| Jar Sample | | |
| Specific Gravity - 2.67 | | |

Sample No.: #23
Location: Boring #1006

Source of Sample:

Date: 08/23/05
Elev./Depth: 113.5'-115.0'

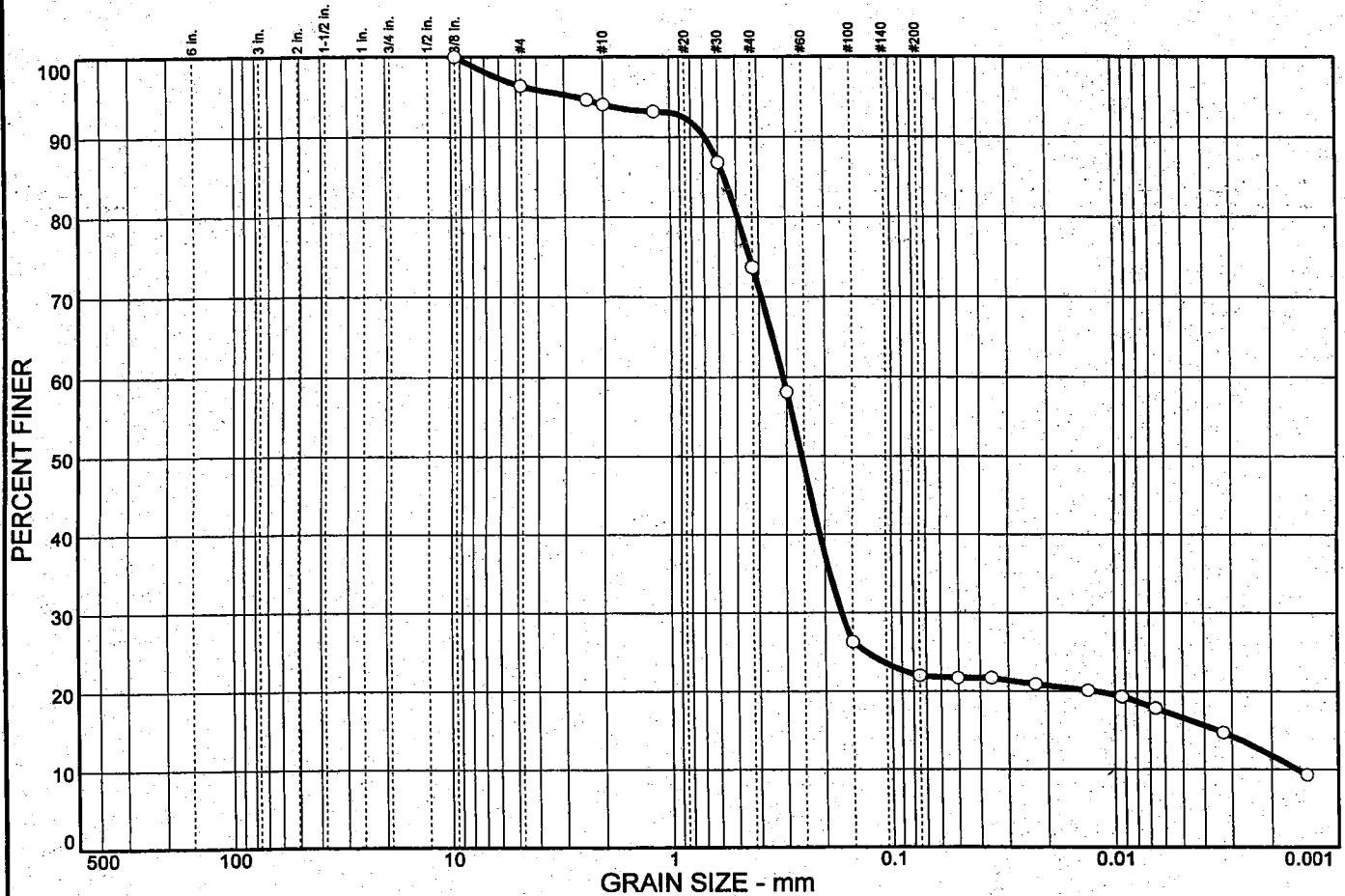
SOUTHERN COMPANY

Client: SCS-Rhonda Tinsley and Steve Bearce
Project: Southern Nuclear/Plant Vogtle ESP

Project No.: V003-DE

Lab# 9

Particle Size Distribution Report



| % COBBLES | % GRAVEL | % SAND | % SILT | % CLAY |
|-----------|----------|--------|--------|--------|
| 0.0 | 3.6 | 74.4 | 5.4 | 16.6 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|------------|---------------|----------------|--------------|
| .375 in. | 100.0 | | |
| #4 | 96.4 | | |
| #8 | 94.7 | | |
| #10 | 94.1 | | |
| #16 | 93.2 | | |
| #30 | 86.8 | | |
| #40 | 73.7 | | |
| #50 | 58.1 | | |
| #100 | 26.3 | | |
| #200 | 22.0 | | |

* (no specification provided)

Soil Description

Very Light Tan Silty sand

Atterberg Limits

PL= NA

LL= NA

PI= NA

Coefficients

D₈₅= 0.566

D₆₀= 0.312

D₅₀= 0.256

D₃₀= 0.168

D₁₅= 0.0035

D₁₀= 0.0015

C_u= 202.26

C_c= 58.75

Classification

USCS= SM

AASHTO=

Remarks

Jar Sample
Specific Gravity - 2.59

Sample No.: #24
Location: Boring #1006

Source of Sample:

Date: 08/23/05
Elev./Depth: 118.5'-120.0'

SOUTHERN COMPANY

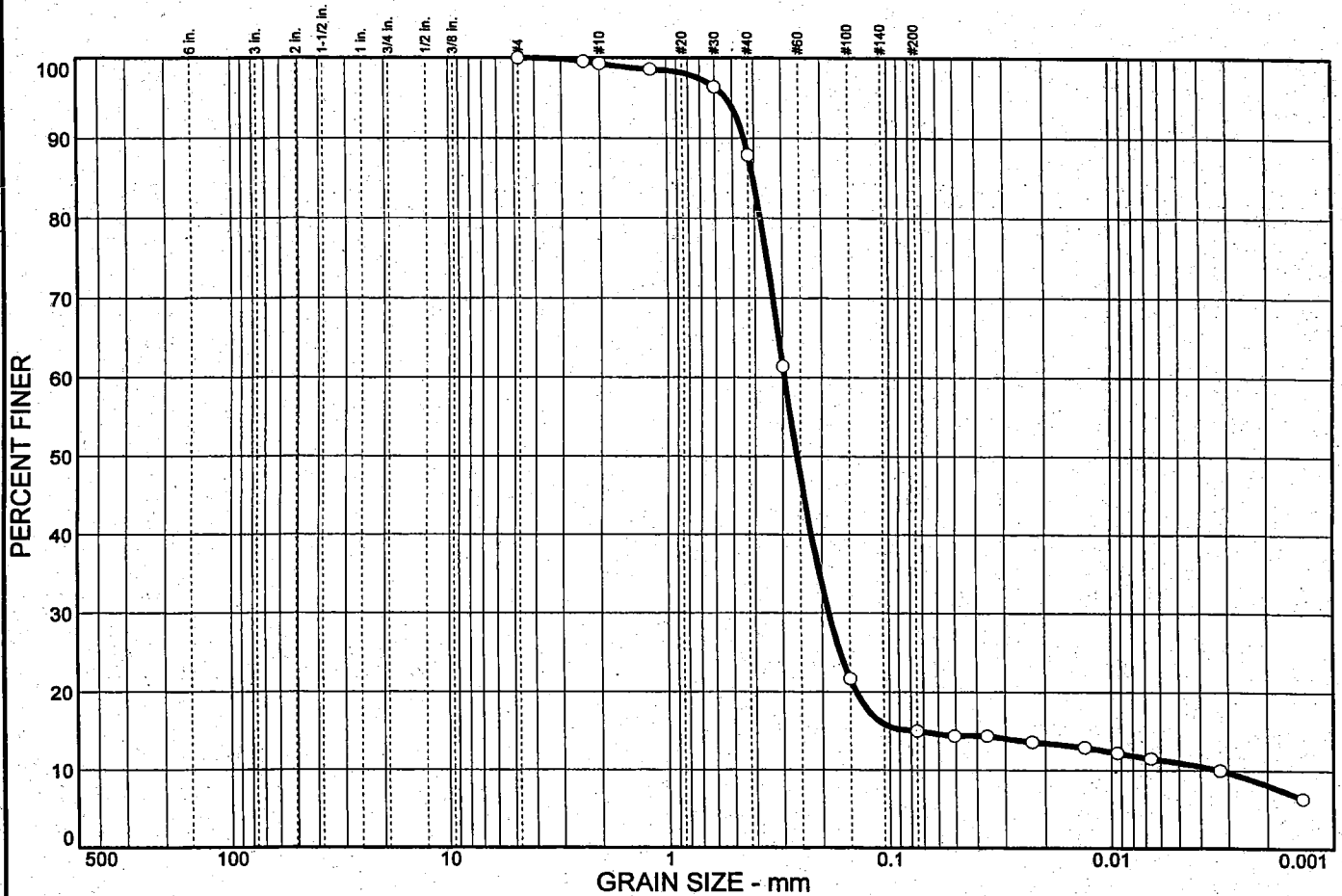
Client: SCS-Rhonda Tinsley and Steve Bearce

Project: Southern Nuclear/Plant Vogtle ESP

Project No: V003-DE

Lab# 10

Particle Size Distribution Report



| % COBBLES | % GRAVEL | % SAND | % SILT | % CLAY |
|-----------|----------|--------|--------|--------|
| 0.0 | 0.0 | 85.0 | 4.0 | 11.0 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|------------|---------------|----------------|--------------|
| #4 | 100.0 | | |
| #8 | 99.6 | | |
| #10 | 99.3 | | |
| #16 | 98.6 | | |
| #30 | 96.4 | | |
| #40 | 87.9 | | |
| #50 | 61.4 | | |
| #100 | 21.7 | | |
| #200 | 15.0 | | |

* (no specification provided)

Soil Description

Very Light Tan Silty sand

Atterberg Limits

PL= NA

LL= NA

PI= NA

Coefficients

D₈₅= 0.404

D₆₀= 0.295

D₅₀= 0.259

D₃₀= 0.186

D₁₅= 0.0750

D₁₀= 0.0033

C_u= 90.28

C_c= 35.89

Classification

USCS= SM

AASHTO=

Remarks

Jar Sample
Specific Gravity - 2.65

Sample No.: #2
Location: Boring #1007

Source of Sample:

Date: 08/23/05
Elev./Depth: 103.5'-105.0'

SOUTHERN COMPANY

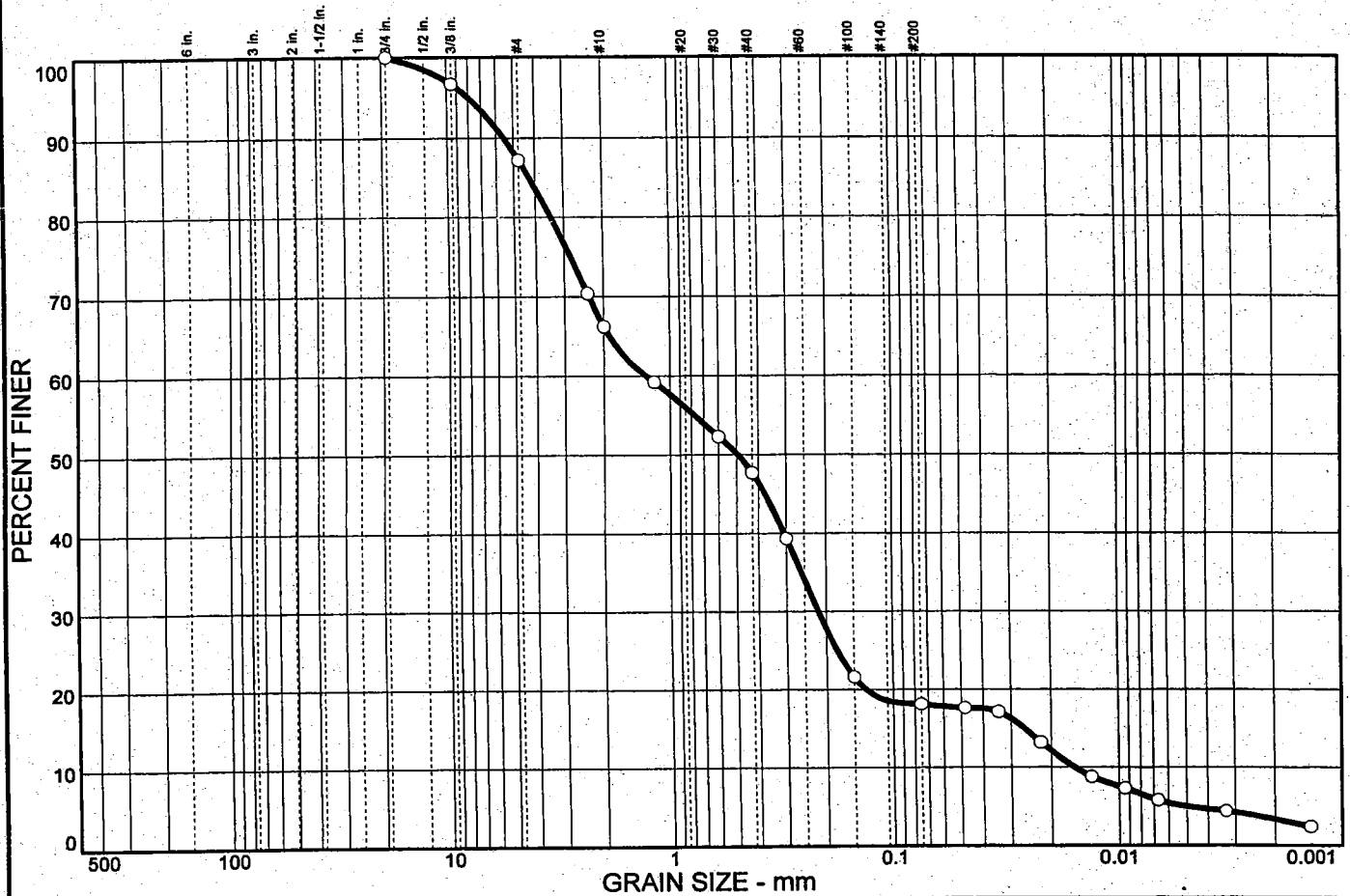
Client: SCS-Rhonda Tinsley and Steve Bearce

Project: Southern Nuclear/Plant Vogtle ESP

Project No. 24A-209 V003-DE

Lab# 11

Particle Size Distribution Report



| % COBBLES | % GRAVEL | % SAND | % SILT | % CLAY |
|-----------|----------|--------|--------|--------|
| 0.0 | 12.8 | 69.1 | 13.1 | 5.0 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|------------|---------------|----------------|--------------|
| 0.75 in. | 100.0 | | |
| .375 in. | 96.7 | | |
| #4 | 87.2 | | |
| #8 | 70.4 | | |
| #10 | 66.2 | | |
| #16 | 59.2 | | |
| #30 | 52.3 | | |
| #40 | 47.7 | | |
| #50 | 39.3 | | |
| #100 | 21.6 | | |
| #200 | 18.1 | | |

* (no specification provided)

Soil Description
 Very Light Tan Silty sand

Atterberg Limits
 PL= NA LL= NA PI= NA

Coefficients
 D₈₅= 4.27 D₆₀= 1.29 D₅₀= 0.493
 D₃₀= 0.217 D₁₅= 0.0263 D₁₀= 0.0157
 C_u= 81.97 C_c= 2.33

Classification
 USCS= SM AASHTO=

Remarks
 Jar Sample
 Specific Gravity - 2.66

Sample No.: #3
Location: Boring #1007

Source of Sample:

Date: 08/23/05
Elev./Depth: 108.5'-110.0'

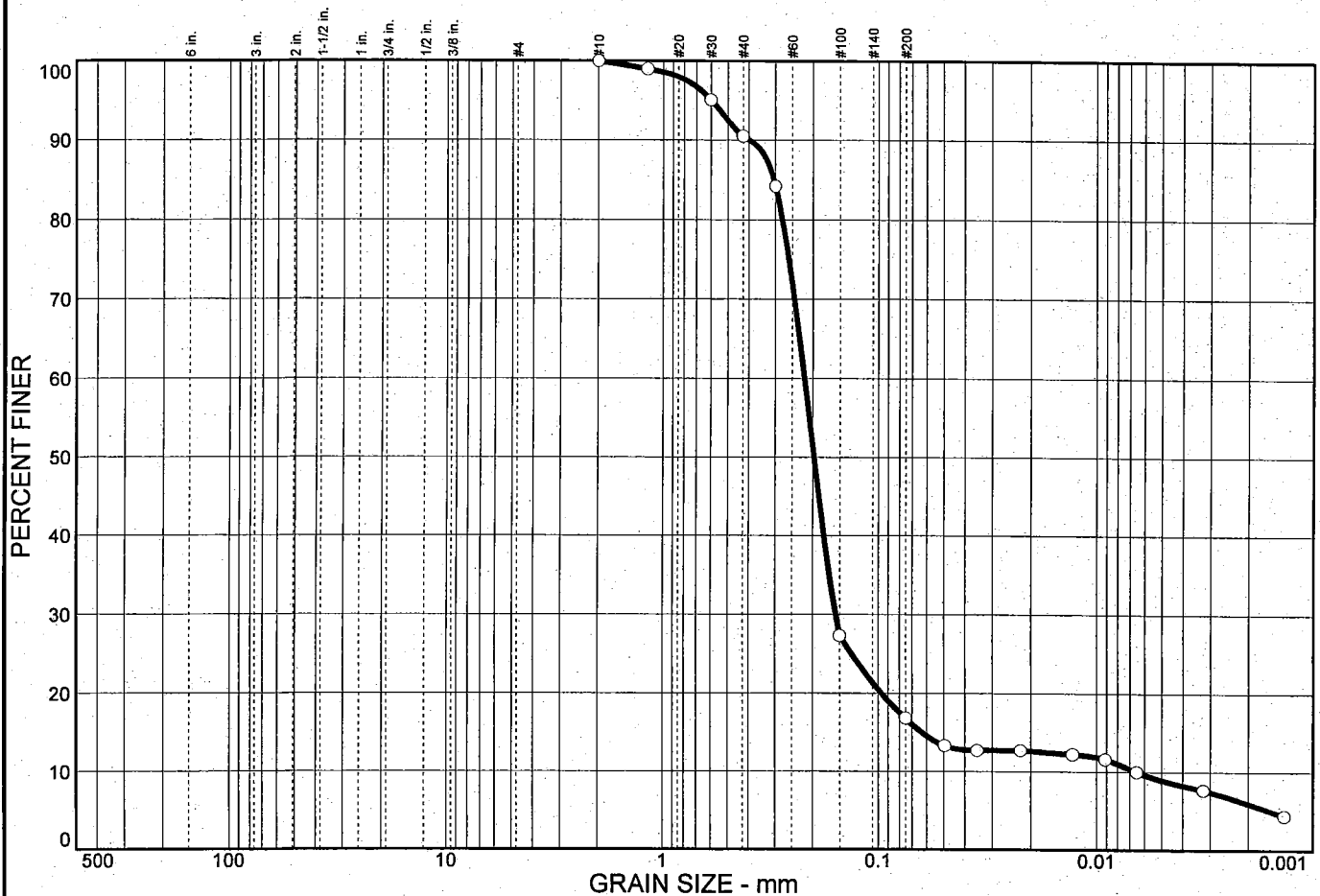
SOUTHERN COMPANY

Client: SCS-Rhonda Tinsley and Steve Bearce
Project: Southern Nuclear/Plant Vogtle ESP

Project No: V003-DE

Lab# 12

Particle Size Distribution Report



| % COBBLES | % GRAVEL | % SAND | % SILT | % CLAY |
|-----------|----------|--------|--------|--------|
| 0.0 | 0.0 | 83.2 | 7.8 | 9.0 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|------------|---------------|----------------|--------------|
| #10 | 100.0 | | |
| #16 | 99.0 | | |
| #30 | 95.1 | | |
| #40 | 90.5 | | |
| #50 | 84.2 | | |
| #100 | 27.3 | | |
| #200 | 16.8 | | |

* (no specification provided)

Soil Description
 Light Tan Silty sand

Atterberg Limits
 PL= NA LL= NA PI= NA

Coefficients
 D₈₅= 0.306 D₆₀= 0.219 D₅₀= 0.197
 D₃₀= 0.156 D₁₅= 0.0632 D₁₀= 0.0065
 C_u= 33.60 C_c= 17.15

Classification
 USCS= SM AASHTO=

Remarks
 Bag Sample
 Specific Gravity - 2.69

Sample No.: #24
Location: Boring #1008

Source of Sample:

Date: 08/23/05
Elev./Depth: 228.5'-230.0'

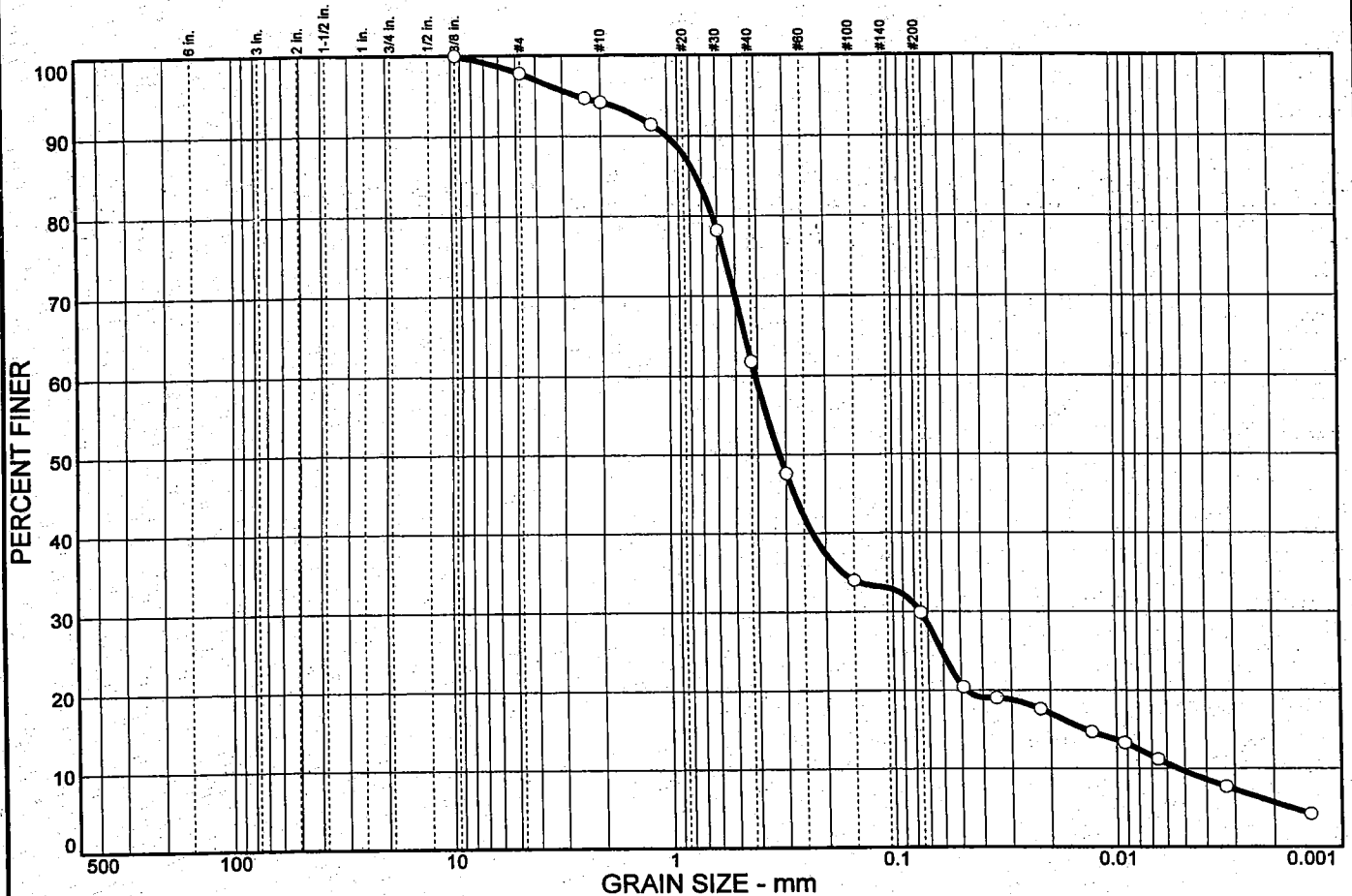
SOUTHERN COMPANY

Client: SCS-Rhonda Tinsley and Steve Bearce
Project: Southern Nuclear/Plant Vogtle ESP

Project No.: 21V003-DE

Lab# 13

Particle Size Distribution Report



| % COBBLES | % GRAVEL | % SAND | % SILT | % CLAY |
|-----------|----------|--------|--------|--------|
| 0.0 | 2.2 | 67.9 | 20.3 | 9.6 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|------------|---------------|----------------|--------------|
| .375 in. | 100.0 | | |
| #4 | 97.8 | | |
| #8 | 94.7 | | |
| #10 | 94.2 | | |
| #16 | 91.4 | | |
| #30 | 78.2 | | |
| #40 | 61.8 | | |
| #50 | 47.6 | | |
| #100 | 34.0 | | |
| #200 | 29.9 | | |

* (no specification provided)

| | | |
|--------------------------|--------------------------|--------------------------|
| Soil Description | | |
| Gray Silty sand | | |
| Atterberg Limits | | |
| PL= NA | LL= NA | PI= NA |
| Coefficients | | |
| D ₈₅ = 0.744 | D ₆₀ = 0.409 | D ₅₀ = 0.321 |
| D ₃₀ = 0.0754 | D ₁₅ = 0.0138 | D ₁₀ = 0.0053 |
| C _u = 76.50 | C _c = 2.60 | |
| Classification | | |
| USCS= SM | AASHTO= | |
| Remarks | | |
| Bag Sample | | |

Sample No.: #25
Location: Boring #1008

Source of Sample:

Date: 08/23/05
Elev./Depth: 238.5'-240.0'

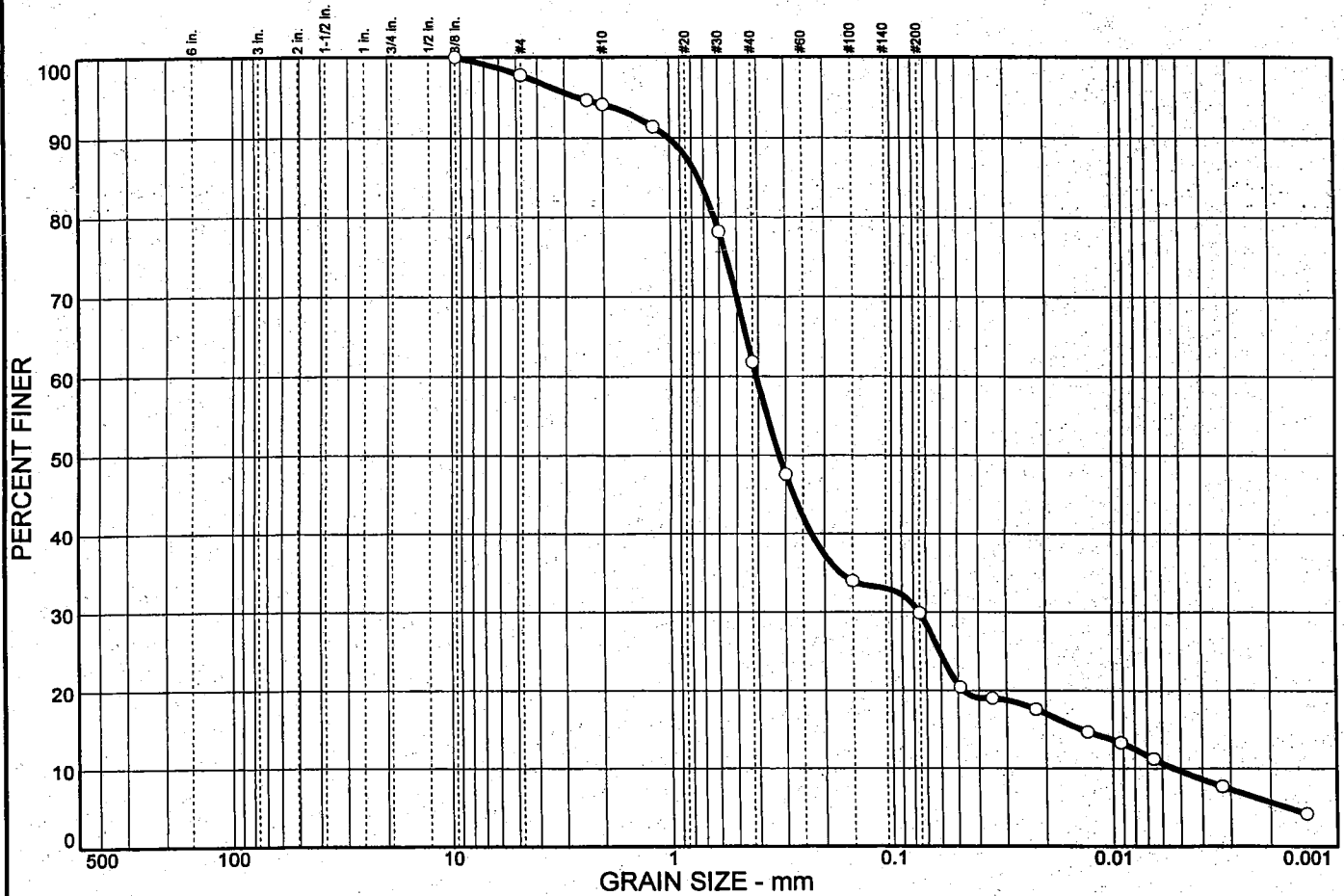
SOUTHERN COMPANY

Client: SCS-Rhonda Tinsley and Steve Bearce
Project: Southern Nuclear/Plant Vogtle ESP

Project No2 V003-DE

Lab# 13

Particle Size Distribution Report



| % COBBLES | % GRAVEL | % SAND | % SILT | % CLAY |
|-----------|----------|--------|--------|--------|
| 0.0 | 2.2 | 67.9 | 20.3 | 9.6 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|------------|---------------|----------------|--------------|
| .375 in. | 100.0 | | |
| #4 | 97.8 | | |
| #8 | 94.7 | | |
| #10 | 94.2 | | |
| #16 | 91.4 | | |
| #30 | 78.2 | | |
| #40 | 61.8 | | |
| #50 | 47.6 | | |
| #100 | 34.0 | | |
| #200 | 29.9 | | |

* (no specification provided)

Soil Description
Gray Silty sand

Atterberg Limits
 PL= NA LL= NA PI= NA

Coefficients
 D₈₅= 0.744 D₆₀= 0.409 D₅₀= 0.321
 D₃₀= 0.0754 D₁₅= 0.0138 D₁₀= 0.0053
 C_u= 76.50 C_c= 2.60

Classification
 USCS= SM AASHTO=

Remarks
 Bag Sample
 Specific Gravity - 2.68

Sample No.: #25
Location: Boring #1008

Source of Sample:

Date: 08/23/05
Elev./Depth: 238.5'-240.0'

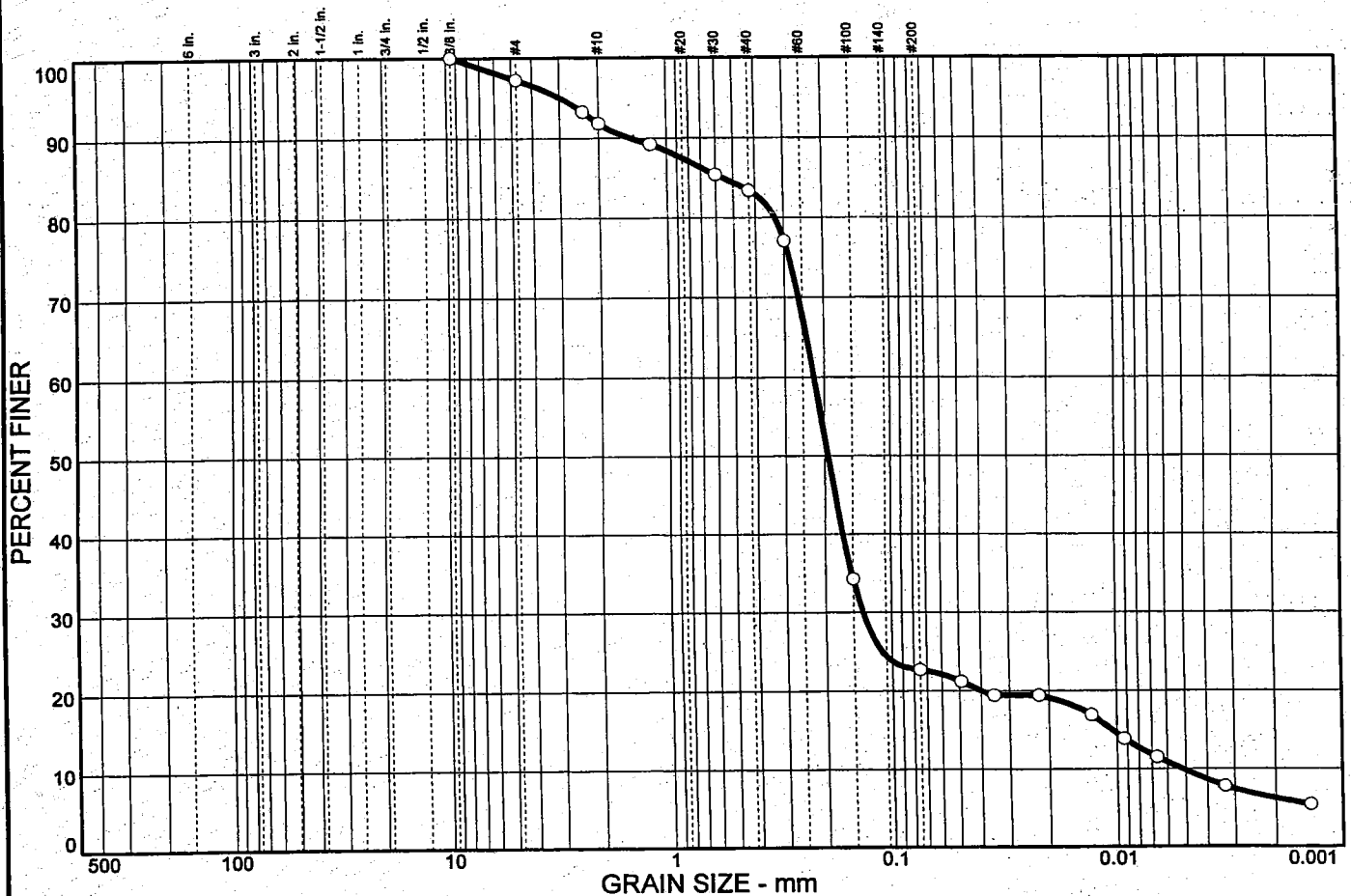
SOUTHERN COMPANY

Client: SCS-Rhonda Tinsley and Steve Bearce
Project: Southern Nuclear/Plant Vogtle ESP

Project No: V003-DE

Lab# 14

Particle Size Distribution Report



| % COBBLES | % GRAVEL | % SAND | % SILT | % CLAY |
|-----------|----------|--------|--------|--------|
| 0.0 | 2.7 | 74.6 | 12.9 | 9.8 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|------------|---------------|----------------|--------------|
| .375 in. | 100.0 | | |
| #4 | 97.3 | | |
| #8 | 93.3 | | |
| #10 | 91.8 | | |
| #16 | 89.2 | | |
| #30 | 85.4 | | |
| #40 | 83.4 | | |
| #50 | 77.1 | | |
| #100 | 34.3 | | |
| #200 | 22.7 | | |

* (no specification provided)

Soil Description

Very Light Tan Silty sand

Atterberg Limits

PL= NA

LL= NA

PI= NA

Coefficients

D₈₅= 0.558

D₆₀= 0.223

D₅₀= 0.193

D₃₀= 0.135

D₁₅= 0.0105

D₁₀= 0.0052

C_u= 42.99

C_c= 15.88

Classification

USCS= SM

AASHTO=

Remarks

Jar Sample
Specific Gravity - 2.61

Sample No.: #17

Location: Boring #1009

Source of Sample:

Date: 08/24/05

Elev./Depth: 85'

SOUTHERN COMPANY

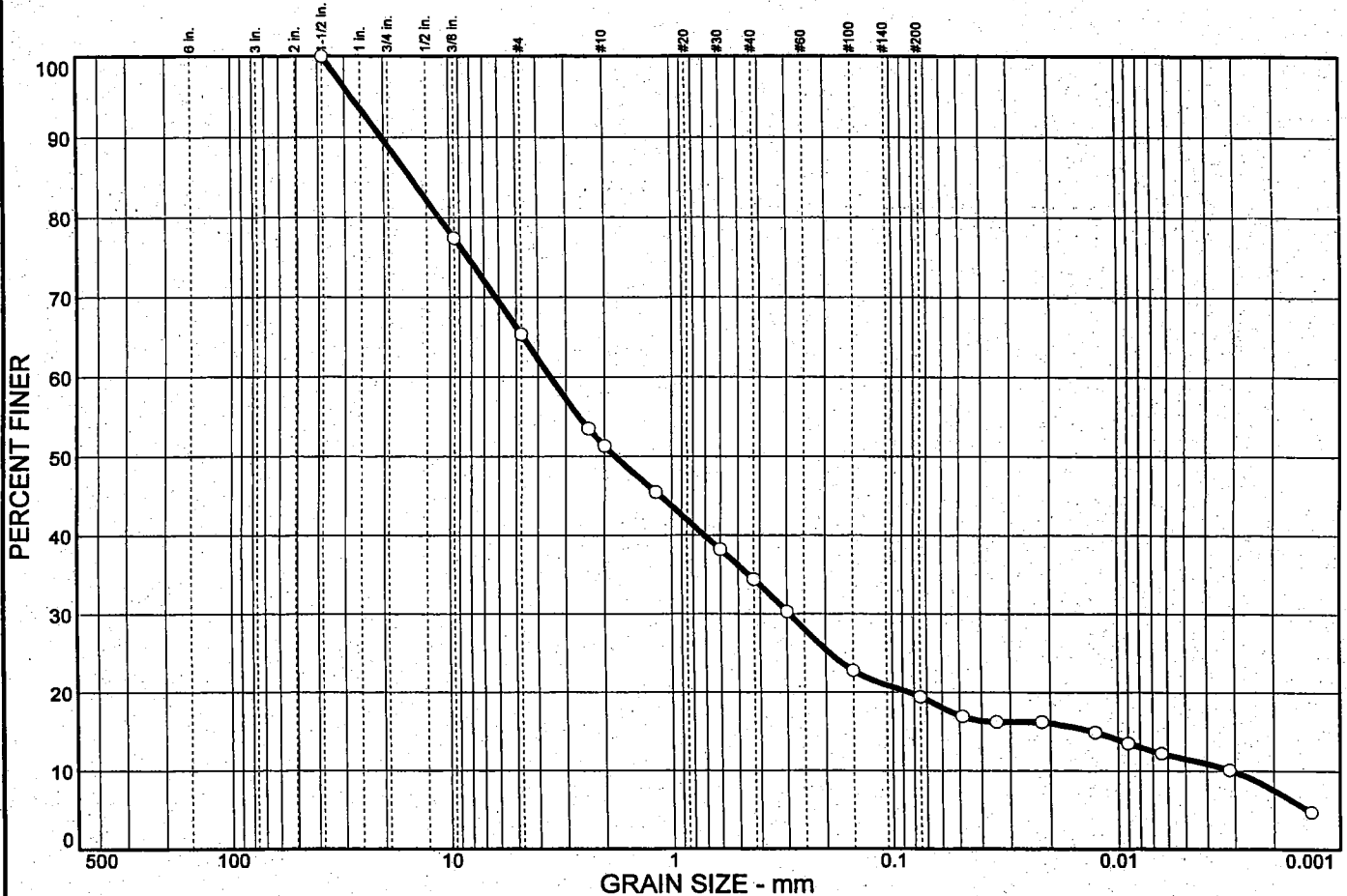
Client: SCS-Rhonda Tinsley and Steve Bearce

Project: Southern Nuclear/Plant Vogtle ESP

Project No: V003-DE

Lab# 15

Particle Size Distribution Report



| % COBBLES | % GRAVEL | % SAND | % SILT | % CLAY |
|-----------|----------|--------|--------|--------|
| 0.0 | 34.7 | 45.9 | 7.9 | 11.5 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|------------|---------------|----------------|--------------|
| 1.50 in. | 100.0 | | |
| .375 in. | 77.4 | | |
| #4 | 65.3 | | |
| #8 | 53.5 | | |
| #10 | 51.3 | | |
| #16 | 45.5 | | |
| #30 | 38.2 | | |
| #40 | 34.4 | | |
| #50 | 30.3 | | |
| #100 | 22.8 | | |
| #200 | 19.4 | | |

* (no specification provided)

Sample No.: #18
Location: Boring #1009

Source of Sample:

Date: 08/24/05
Elev./Depth: 90'

SOUTHERN COMPANY

Client: SCS-Rhonda Tinsley and Steve Bearce
Project: Southern Nuclear/Plant Vogtle ESP

Project No: V003-DE

Lab# 16

Soil Description

Very Light Tan Silty sand with gravel

Atterberg Limits

PL= NA LL= NA PI= NA

Coefficients

D₈₅= 15.0 D₆₀= 3.53 D₅₀= 1.79
D₃₀= 0.293 D₁₅= 0.0130 D₁₀= 0.0031
C_u= 1142.64 C_c= 7.85

Classification

USCS= SM AASHTO=

Remarks

Jar Sample
Specific Gravity 2.75

Grain size distribution curve for a sample of sand. The graph plots Percent Finer (0-100) against Grain Size in mm (log scale, 500 to 0.001). The curve shows a sharp drop between 0.425 mm and 0.075 mm, indicating a well-sorted sand. The percentage of material finer than 0.075 mm is approximately 71%.

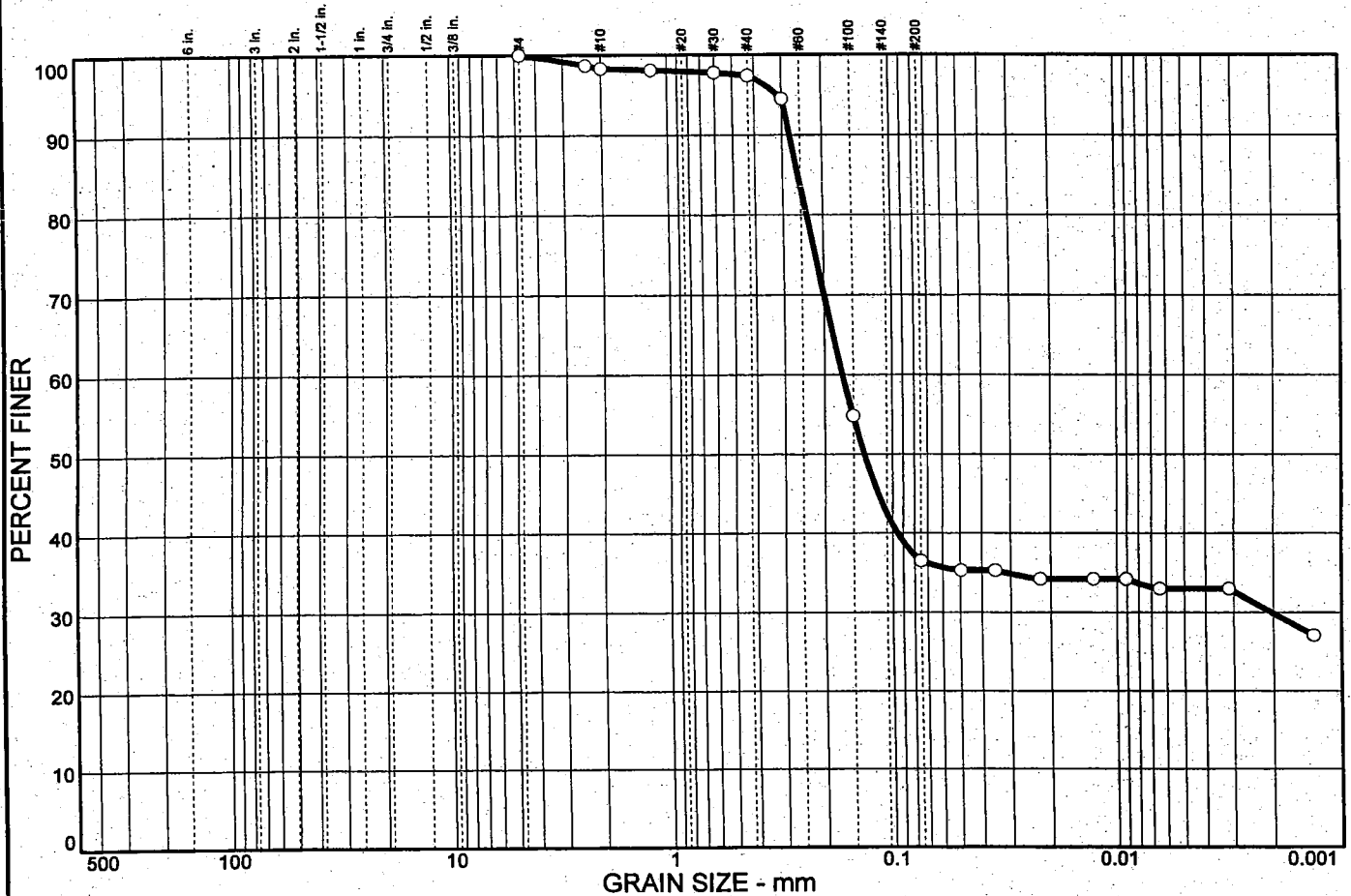
| Grain Size (mm) | Percent Finer (%) |
|-----------------|-------------------|
| 500 | 100 |
| 250 | 100 |
| 125 | 100 |
| 63 | 100 |
| 31.5 | 100 |
| 15.75 | 100 |
| 7.75 | 100 |
| 3.75 | 100 |
| 1.9 | 100 |
| 0.85 | 100 |
| 0.425 | 98 |
| 0.25 | 74 |
| 0.15 | 71 |
| 0.075 | 12 |
| 0.0475 | 10 |
| 0.025 | 10 |
| 0.015 | 10 |
| 0.0075 | 10 |
| 0.00475 | 10 |
| 0.0025 | 10 |
| 0.0015 | 10 |
| 0.00075 | 10 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|---------------|------------------|-------------------|-----------------|
| #10 | 100.0 | | |
| #16 | 99.7 | | |
| #30 | 98.8 | | |
| #40 | 95.9 | | |
| #50 | 73.2 | | |
| #100 | 69.6 | | |
| #200 | 10.7 | | |

Jar Sample
Specific Gravity - 2.67

Lab# 17

Particle Size Distribution Report



| % COBBLES | % GRAVEL | % SAND | % SILT | % CLAY |
|-----------|----------|--------|--------|--------|
| 0.0 | 0.0 | 63.5 | 3.5 | 33.0 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|------------|---------------|----------------|--------------|
| #4 | 100.0 | | |
| #8 | 98.7 | | |
| #10 | 98.3 | | |
| #16 | 98.1 | | |
| #30 | 97.8 | | |
| #40 | 97.4 | | |
| #50 | 94.5 | | |
| #100 | 54.8 | | |
| #200 | 36.5 | | |

* (no specification provided)

Soil Description

Tan Silty sand

Atterberg Limits

PL= NA

LL= NA

PI= NA

Coefficients

D₈₅= 0.257

D₃₀= 0.0020

C_u=

D₆₀= 0.167

D₁₅=

C_c=

D₅₀= 0.134

D₁₀=

Classification

USCS= SM

AASHTO=

Remarks

Jar Sample

Specific Gravity - 2.63

Sample No.: #16
Location: Boring #1010

Source of Sample:

Date: 08/24/05
Elev./Depth: 78.5'-80.0'

SOUTHERN COMPANY

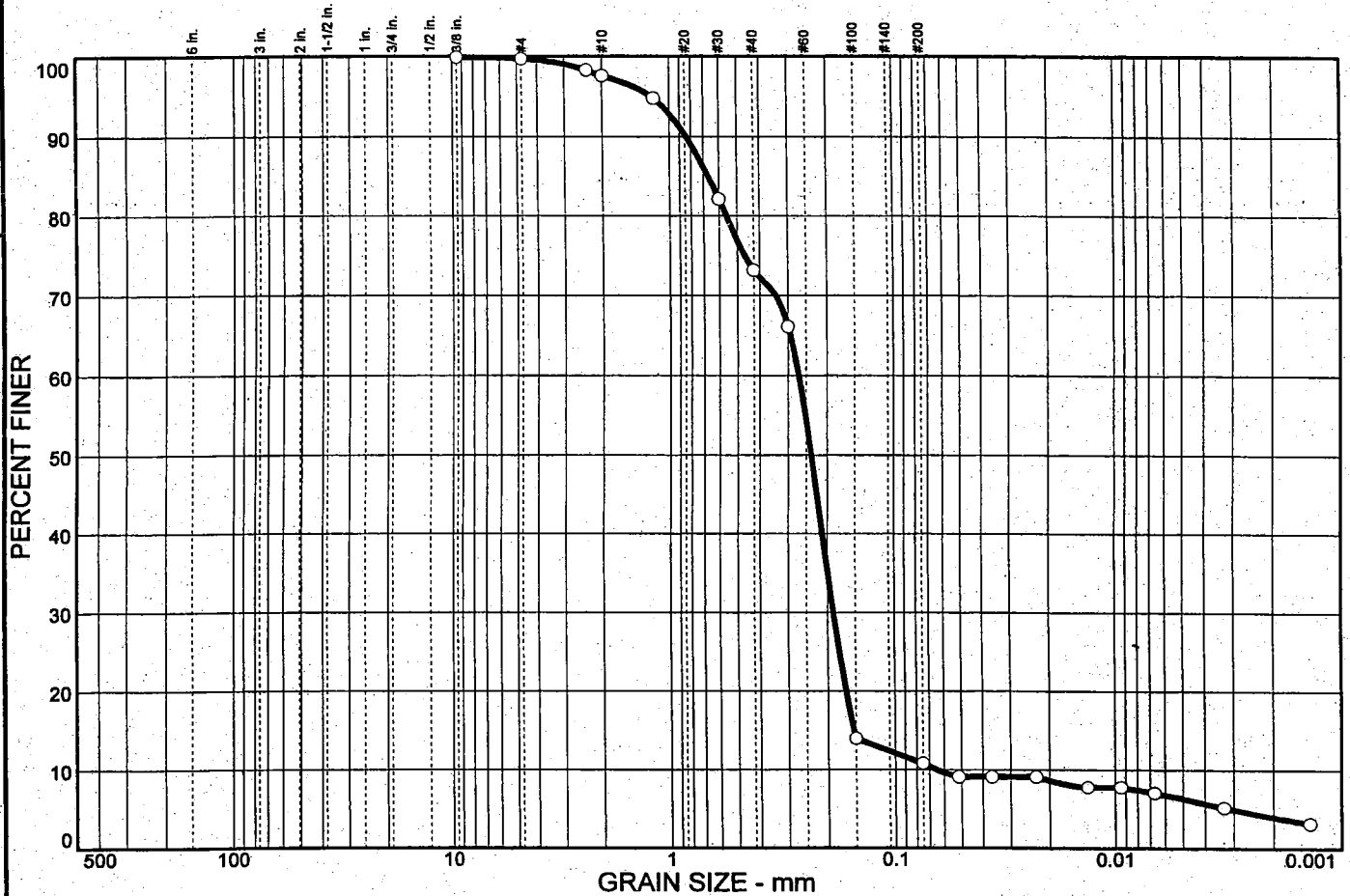
Client: SCS-Rhonda Tinsley and Steve Bearce

Project: Southern Nuclear/Plant Vogtle ESP

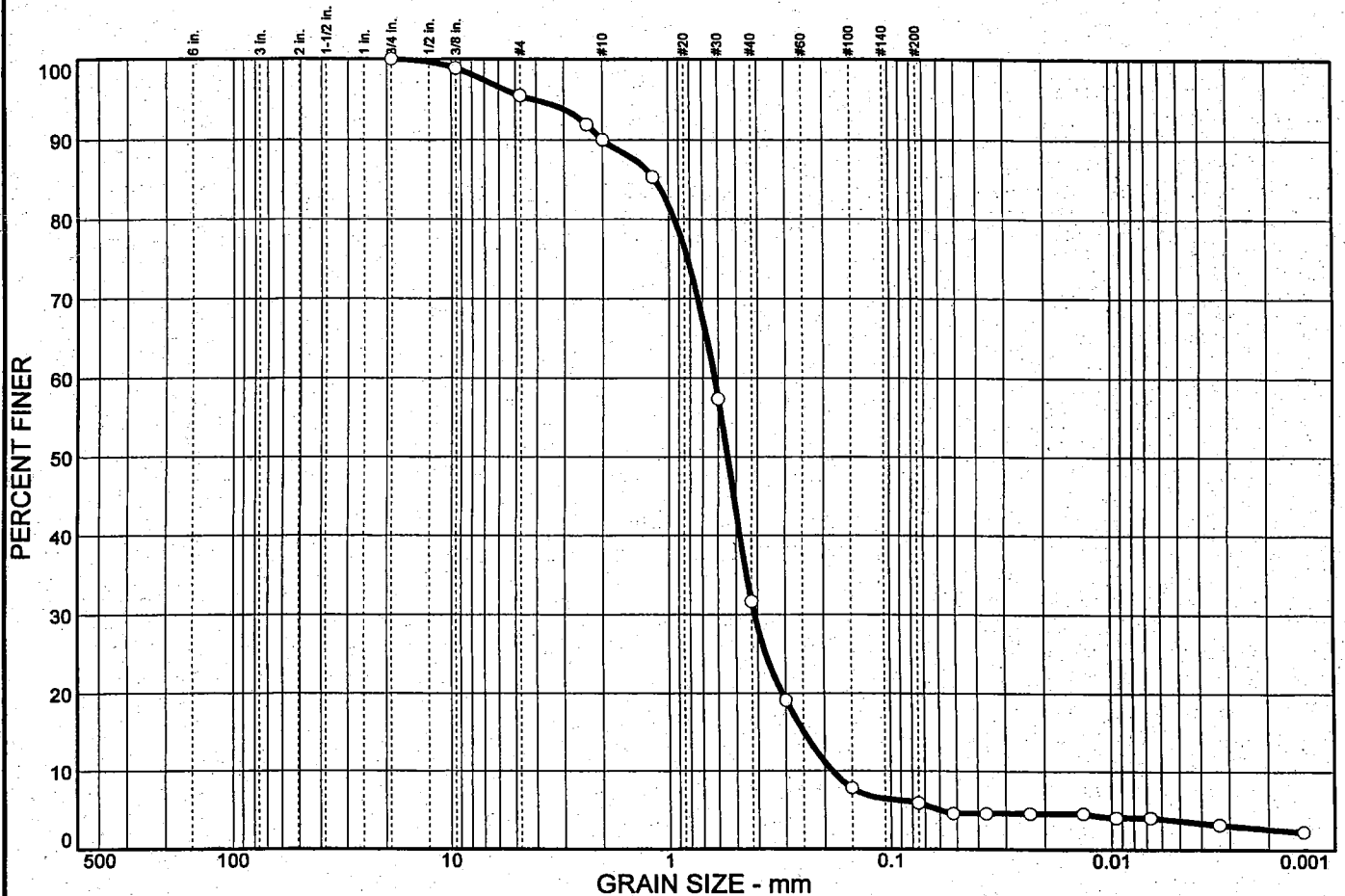
Project No: V003-DE

Lab# 18

Particle Size Distribution Report



Particle Size Distribution Report



| % COBBLES | % GRAVEL | % SAND | % SILT | % CLAY |
|-----------|----------|--------|--------|--------|
| 0.0 | 4.5 | 89.6 | 2.2 | 3.7 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|------------|---------------|----------------|--------------|
| 0.75 in. | 100.0 | | |
| .375 in. | 98.9 | | |
| #4 | 95.5 | | |
| #8 | 91.9 | | |
| #10 | 90.0 | | |
| #16 | 85.3 | | |
| #30 | 57.3 | | |
| #40 | 31.7 | | |
| #50 | 19.1 | | |
| #100 | 7.8 | | |
| #200 | 5.9 | | |

* (no specification provided)

Soil Description

Gray Poorly graded sand with silt

Atterberg Limits

PL= NA

LL= NA

PI= NA

Coefficients

D₈₅= 1.16

D₆₀= 0.623

D₅₀= 0.545

D₃₀= 0.412

D₁₅= 0.249

D₁₀= 0.185

C_u= 3.38

C_c= 1.48

Classification

USCS= SP-SM

AASHTO=

Remarks

Bag Sample

Specific Gravity - 2.66

Sample No.: #25

Location: Boring #1011

Source of Sample:

Date: 08/24/05

Elev./Depth: 208.5'-210.0'

SOUTHERN COMPANY

Client: SCS-Rhonda Tinsley and Steve Bearce

Project: Southern Nuclear/Plant Vogtle ESP

Project No. 24A-219 V003-DE

Lab# 20

The graph illustrates the grain size distribution of a material. The y-axis represents the percentage of material finer than a given grain size, ranging from 0 to 100. The x-axis represents the grain size in millimeters on a logarithmic scale, ranging from 500 mm to 0.001 mm. A secondary x-axis at the top lists corresponding sieve sizes. The distribution curve shows that approximately 100% of the material is finer than 2.5 mm, and about 83% is finer than 1.0 mm. The most significant portion of the material falls between 0.6 mm and 0.075 mm. Below 0.075 mm, the material is predominantly fine, with the percentage finer leveling off at approximately 23% for grain sizes down to 0.001 mm.

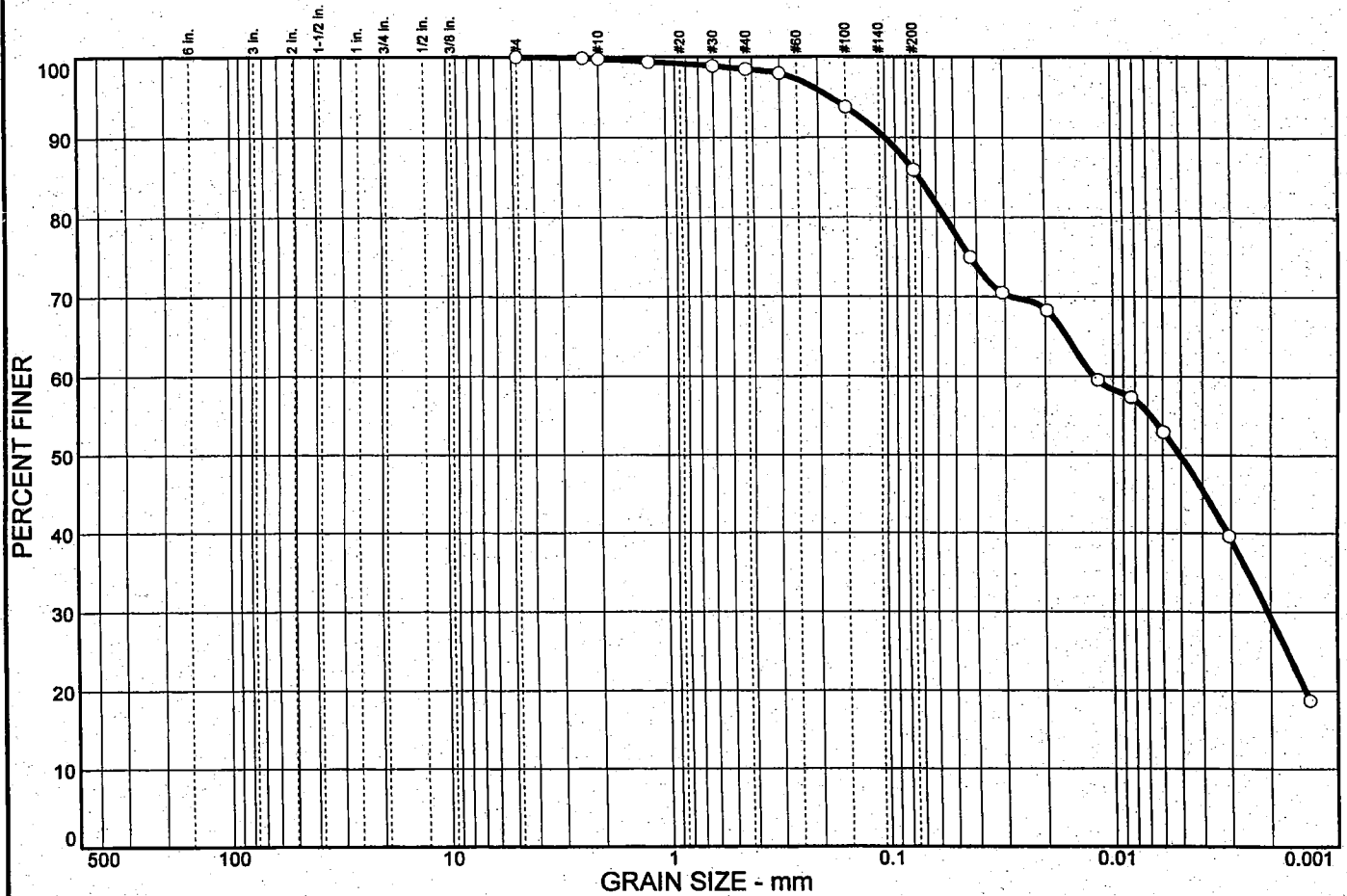
| Grain Size (mm) | Sieve Size | Percent Finer (%) |
|-----------------|------------|-------------------|
| 2.5 | #10 | 100 |
| 2.0 | #20 | 100 |
| 1.0 | #30 | 83 |
| 0.6 | #40 | 64 |
| 0.425 | #60 | 48 |
| 0.3 | #80 | 35 |
| 0.25 | #100 | 24 |
| 0.2 | #120 | 23 |
| 0.15 | #140 | 23 |
| 0.125 | #160 | 23 |
| 0.106 | #180 | 22 |
| 0.09 | #200 | 22 |
| 0.075 | #20 | 21 |
| 0.06 | - | 20 |
| 0.05 | - | 18 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|---------------|------------------|-------------------|-----------------|
| #10 | 100.0 | | |
| #16 | 99.4 | | |
| #30 | 83.0 | | |
| #40 | 63.9 | | |
| #50 | 48.2 | | |
| #100 | 35.2 | | |
| #200 | 23.9 | | |

Specific Gravity - 2.66

Lab# 21

Particle Size Distribution Report



| % COBBLES | % GRAVEL | % SAND | % SILT | % CLAY |
|-----------|----------|--------|--------|--------|
| 0.0 | 0.0 | 14.1 | 36.1 | 49.8 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|------------|---------------|----------------|--------------|
| #4 | 100.0 | | |
| #8 | 99.9 | | |
| #10 | 99.8 | | |
| #16 | 99.4 | | |
| #30 | 98.9 | | |
| #40 | 98.5 | | |
| #50 | 98.0 | | |
| #100 | 93.8 | | |
| #200 | 85.9 | | |

* (no specification provided)

Soil Description

Light Tan Silt

Atterberg Limits

PL= NA

LL= NA

PI= NA

Coefficients

D₈₅= 0.0712

D₆₀= 0.0121

D₅₀= 0.0051

D₃₀= 0.0021

D₁₅=

D₁₀=

C_u=

C_c=

Classification

USCS= ML

AASHTO=

Remarks

Jar Sample

Specific Gravity - 2.66

Sample No.: #16
Location: Boring #1012

Source of Sample:

Date: 08/24/05
Elev./Depth: 78.5'-80.0'

SOUTHERN COMPANY

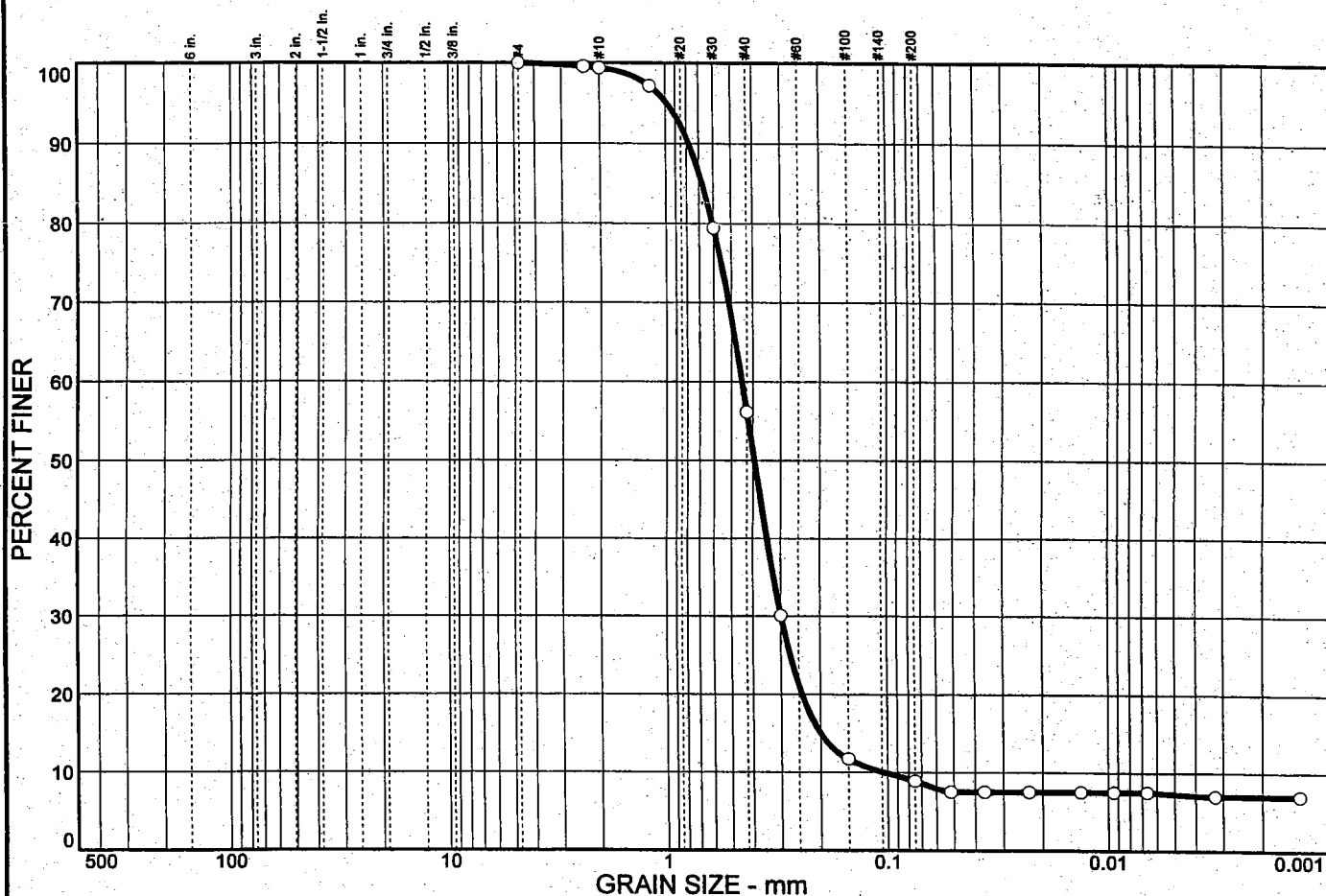
Client: SCS-Rhonda Tinsley and Steve Bearce

Project: Southern Nuclear/Plant Vogtle ESP

Project No: 24A-031 V003-DE

Lab# 22

Particle Size Distribution Report



| % COBBLES | % GRAVEL | % SAND | % SILT | % CLAY |
|-----------|----------|--------|--------|--------|
| 0.0 | 0.0 | 91.1 | 1.6 | 7.3 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|------------|---------------|----------------|--------------|
| #4 | 100.0 | | |
| #8 | 99.6 | | |
| #10 | 99.4 | | |
| #16 | 97.2 | | |
| #30 | 79.4 | | |
| #40 | 56.1 | | |
| #50 | 30.1 | | |
| #100 | 11.7 | | |
| #200 | 8.9 | | |

* (no specification provided)

Soil Description

Tan Poorly graded sand with silt

Atterberg Limits

PL= NA

LL= NA

PI= NA

Coefficients

D₈₅= 0.676

D₆₀= 0.447

D₅₀= 0.393

D₃₀= 0.300

D₁₅= 0.200

D₁₀= 0.104

C_u= 4.28

C_c= 1.92

Classification

USCS= SP-SM

AASHTO=

Remarks

Jar Sample
Specific Gravity - 2.65

Sample No.: #17

Source of Sample:

Date: 08/24/05

Location: Boring #1013

Elev./Depth: 84.0'

SOUTHERN COMPANY

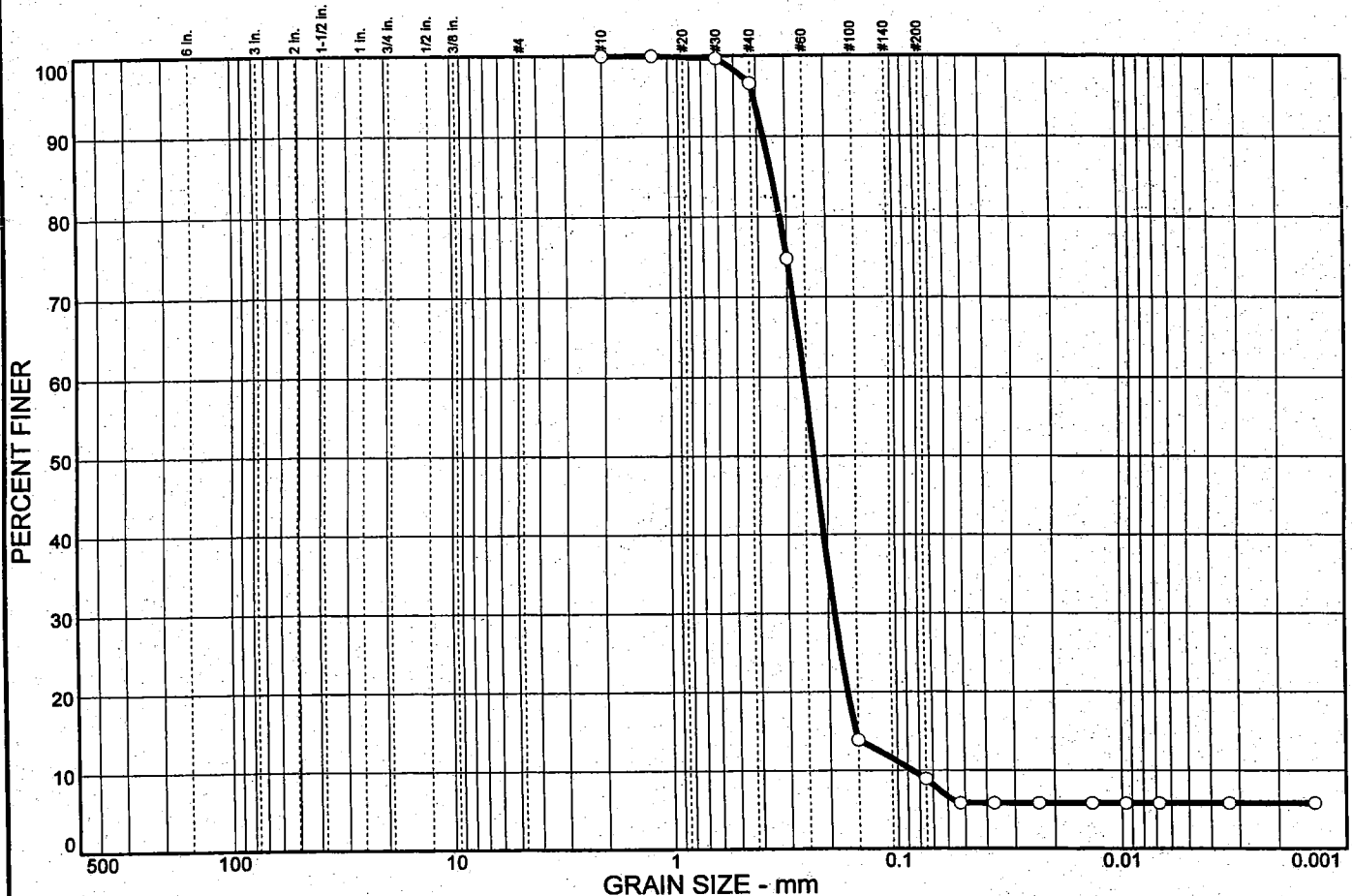
Client: SCS-Rhonda Tinsley and Steve Bearce

Project: Southern Nuclear/Plant Vogtle ESP

Project No: V003-DE

Lab# 23

Particle Size Distribution Report



| % COBBLES | % GRAVEL | % SAND | % SILT | % CLAY |
|-----------|----------|--------|--------|--------|
| 0.0 | 0.0 | 91.1 | 3.1 | 5.8 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|------------|---------------|----------------|--------------|
| #10 | 100.0 | | |
| #16 | 100.0 | | |
| #30 | 99.7 | | |
| #40 | 96.6 | | |
| #50 | 74.8 | | |
| #100 | 13.9 | | |
| #200 | 8.9 | | |

* (no specification provided)

Soil Description
Light Tan Poorly graded sand with silt

PL= NA **Atterberg Limits** LL= NA PI= NA

Coefficients
D₈₅= 0.346 D₆₀= 0.255 D₅₀= 0.230
D₃₀= 0.187 D₁₅= 0.153 D₁₀= 0.0861
C_u= 2.96 C_c= 1.60

Classification
USCS= SP-SM AASHTO=

Remarks
Jar Sample
Specific Gravity - 2.65

Sample No.: #18
Location: Boring #1013

Source of Sample:

Date: 08/24/05
Elev./Depth: 94.0'

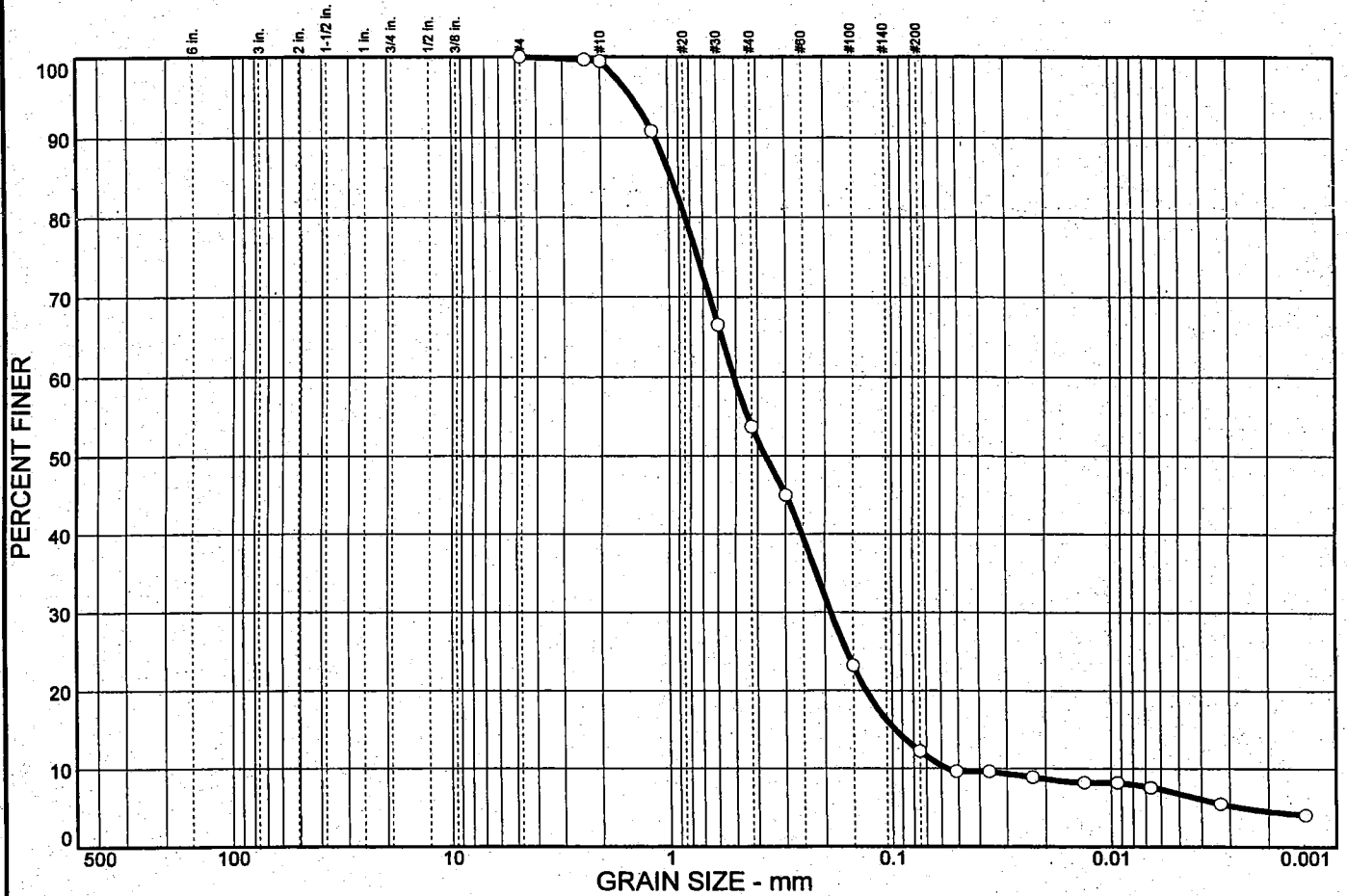
SOUTHERN COMPANY

Client: SCS-Rhonda Tinsley and Steve Bearce
Project: Southern Nuclear/Plant Vogtle ESP

Project No: V003-DE

Lab# 24

Particle Size Distribution Report



| % COBBLES | % GRAVEL | % SAND | % SILT | % CLAY |
|-----------|----------|--------|--------|--------|
| 0.0 | 0.0 | 87.8 | 5.4 | 6.8 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|------------|---------------|----------------|--------------|
| #4 | 100.0 | | |
| #8 | 99.7 | | |
| #10 | 99.5 | | |
| #16 | 90.8 | | |
| #30 | 66.5 | | |
| #40 | 53.7 | | |
| #50 | 45.0 | | |
| #100 | 23.2 | | |
| #200 | 12.2 | | |

* (no specification provided)

Soil Description
Gray Silty sand

Atterberg Limits
PL= NA LL= NA PI= NA

Coefficients
D₈₅= 0.969 D₆₀= 0.510 D₅₀= 0.369
D₃₀= 0.188 D₁₅= 0.0971 D₁₀= 0.0564
C_u= 9.04 C_c= 1.22

Classification
USCS= SM AASHTO=

Remarks
Bag Sample
Specific Gravity - 2.69

Sample No.: #18
Location: Boring #1014

Source of Sample:

Date: 09/24/05
Elev./Depth: 183.5'-185.0'

SOUTHERN COMPANY

Client: SCS-Rhonda Tinsley and Steve Bearce
Project: Southern Nuclear/Plant Vogtle ESP

Project No: 24A-224 V003-DE

Lab# 25

Grain size distribution curve for a sample of sand. The graph plots Percent Finer (0 to 100) against Grain Size in mm (500 to 0.001). The curve shows that approximately 100% of the sand is finer than 4.75 mm, and about 42% is finer than 0.075 mm. The curve is smooth and continuous, indicating a well-sorted material.

| Grain Size (mm) | Percent Finer (%) |
|-----------------|-------------------|
| 4.75 | 100 |
| 2.5 | 100 |
| 1.18 | 100 |
| 0.85 | 100 |
| 0.6 | 100 |
| 0.425 | 98 |
| 0.3 | 88 |
| 0.25 | 82 |
| 0.15 | 42 |
| 0.106 | 11 |
| 0.075 | 7 |
| 0.05 | 7 |
| 0.0375 | 7 |
| 0.025 | 6 |
| 0.015 | 5 |
| 0.0075 | 3 |
| 0.00425 | 2 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|---------------|------------------|-------------------|-----------------|
| #4 | 100.0 | | |
| #8 | 100.0 | | |
| #10 | 99.9 | | |
| #16 | 99.8 | | |
| #30 | 99.5 | | |
| #40 | 97.1 | | |
| #50 | 87.0 | | |
| #100 | 42.1 | | |
| #200 | 10.4 | | |

Bag Sample
Specific Gravity - 2.66

Lab# 26

| Grain Size (mm) | Percent Finer (%) |
|-----------------|-------------------|
| 500 | 100 |
| 250 | 100 |
| 125 | 100 |
| 60 | 100 |
| 30 | 100 |
| 15 | 100 |
| 7.5 | 100 |
| 3.75 | 100 |
| 1.9 | 100 |
| 0.85 | 100 |
| 0.425 | 96 |
| 0.25 | 68 |
| 0.15 | 31 |
| 0.075 | 8 |
| 0.0425 | 2 |
| 0.025 | 2 |
| 0.015 | 2 |
| 0.0075 | 2 |
| 0.00425 | 2 |
| 0.0025 | 2 |
| 0.001 | 2 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|---------------|------------------|-------------------|-----------------|
| #10 | 100.0 | | |
| #16 | 99.7 | | |
| #30 | 95.1 | | |
| #40 | 67.6 | | |
| #50 | 30.7 | | |
| #100 | 8.1 | | |
| #200 | 2.3 | | |

Jar Sample
Specific Gravity - 2.63

Lab# 27

Grain size distribution curve showing Percent Finer versus Grain Size (mm). The curve is plotted on a semi-logarithmic scale. The Y-axis represents Percent Finer (0 to 100). The X-axis represents Grain Size in mm (logarithmic scale from 500 to 0.001). The curve shows a well-graded soil with a peak at 100% finer for grain sizes down to approximately 2.0 mm, followed by a sharp drop to about 30% finer at 0.425 mm, and then a gradual decrease to about 5% finer at 0.0075 mm.

| Grain Size (mm) | Percent Finer (%) |
|-----------------|-------------------|
| 500 | 100 |
| 100 | 100 |
| 60 | 100 |
| 40 | 100 |
| 30 | 100 |
| 20 | 100 |
| 15 | 100 |
| 12.5 | 100 |
| 10 | 100 |
| 7.5 | 100 |
| 6 | 100 |
| 4.75 | 100 |
| 3.75 | 100 |
| 3.0 | 100 |
| 2.5 | 100 |
| 2.0 | 100 |
| 1.5 | 100 |
| 1.18 | 100 |
| 0.85 | 100 |
| 0.75 | 100 |
| 0.60 | 100 |
| 0.425 | 92 |
| 0.375 | 65 |
| 0.25 | 30 |
| 0.15 | 10 |
| 0.10 | 8 |
| 0.075 | 7 |
| 0.060 | 6 |
| 0.0475 | 6 |
| 0.0375 | 6 |
| 0.030 | 6 |
| 0.025 | 6 |
| 0.020 | 6 |
| 0.015 | 6 |
| 0.0118 | 6 |
| 0.0085 | 5 |
| 0.0075 | 4 |
| 0.0060 | 4 |
| 0.00425 | 4 |
| 0.00375 | 4 |
| 0.0030 | 4 |
| 0.0025 | 4 |
| 0.0020 | 4 |
| 0.0015 | 4 |
| 0.00118 | 4 |
| 0.00085 | 4 |
| 0.00075 | 4 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|---------------|------------------|-------------------|-----------------|
| #4 | 100.0 | | |
| #8 | 100.0 | | |
| #10 | 99.9 | | |
| #16 | 99.3 | | |
| #30 | 90.9 | | |
| #40 | 64.7 | | |
| #50 | 30.0 | | |
| #100 | 8.9 | | |
| #200 | 6.8 | | |

Specific Gravity - 2.67

Lab# 28

APPENDIX J

SITE PHOTOS