CHAPTER 1 INTRODUCTION AND GENERAL DESCRIPTION

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Part 2 SITE SAFETY ANALYSIS REPORT

Chapter 1 Introduction and General Description

1.1 Introduction

This Site Safety Analysis Report (SSAR) supports Southern Nuclear Operating Company's (SNC's or Southern Nuclear's) Early Site Permit (ESP) application. The SSAR addresses site suitability issues and complies with the applicable portions of Title 10, Part 52 of the Code of Federal Regulations (10 CFR 52), Subpart A, *Early Site Permits*.

The site selected for the ESP is the Vogtle Electric Generating Plant (VEGP) site in eastern Burke County, Georgia; approximately 26 miles southeast of Augusta, Georgia and 100 miles northwest of Savannah, Georgia; directly across the Savannah River from the US Department of Energy's Savannah River Site in Barnwell County, South Carolina. VEGP Units 1 and 2, two Westinghouse Electric Company, LLC (Westinghouse) pressurized water reactors (PWRs), each with a thermal power rating of 3,625.6 megawatts thermal (MWt), are located on the VEGP site. VEGP Units 1 and 2 have been in commercial operation since 1987 and 1989, respectively. Plant Wilson, a six-unit oil-fueled combustion turbine facility owned by Georgia Power Company (GPC), is also located on the VEGP site.

SNC has selected the Westinghouse AP1000 certified reactor design for the VEGP ESP application. The AP1000 has a thermal power rating of 3,400 MWt, with a net electrical output of 1,117 megawatts electrical (MWe) **(Westinghouse 2005)**. Two units are proposed, with projected commercial operation dates of May 2015 and May 2016, respectively.

The ESP units, VEGP Units 3 and 4, are adjacent to and west of the existing VEGP units.

The existing VEGP units are co-owned by Georgia Power Company, Oglethorpe Power Corporation, the Municipal Electric Authority of Georgia, and the City of Dalton, Georgia, an incorporated municipality in the State of Georgia acting by and through its Board of Water, Light and Sinking Fund Commissioners ("Dalton Utilities"). SNC is the licensed operator of the existing facilities at the VEGP site, with control of the existing facilities, including complete authority to regulate any and all access and activity within the plant exclusion area boundary. SNC has been authorized by GPC, acting as agent for the other owners (also known as co-owners) of the existing VEGP, to apply for an ESP for the VEGP site. SNC has no ownership interest in the VEGP.

GPC and SNC are subsidiaries of Southern Company, and SNC is the licensed operator for all Southern Company nuclear generating facilities. SNC's business purpose is management and operation of nuclear generating facilities owned or co-owned by Southern Company subsidiaries. SNC ESP Application Part 1, *Administrative Information*, Chapter 3, provides additional information about Southern Company, GPC, VEGP co-owners, and SNC.

The SSAR discusses the design parameters, site characteristics, and site interface values for the two units that would form the basis for NRC's issuance of an ESP. The SSAR also contains information about site safety, emergency preparedness, and quality assurance. The following paragraphs briefly describe the contents of the SSAR:

- Chapter 1, Introduction and General Description, includes a general site description; an overview of the AP1000; the design parameter, site characteristic, and site interface value approach; and a summary of regulatory compliance (CFR, Regulatory Guides, and NUREG-0800/RS-002).
- Chapter 2, Site Characteristics, includes geography and demography; nearby industrial installations; transportation and military facilities; and meteorologic, hydrologic, geologic, and seismic characteristics of the site. It also includes descriptions of effluents; thermal discharges; and conformance with 10 CFR 100, *Reactor Site Criteria*, requirements.
- Chapter 3, Design of Structures, Components, Equipment, and Systems, contains information in Section 3.5.1.6 on aircraft hazards, and in Section 3.8.5 on safety-related structure foundations and embedments.
- Chapter 11, Radioactive Waste Management, contains analysis of liquid and gaseous effluents from normal operations.
- Chapter 13, Conduct of Operations, includes emergency planning, fitness for duty, and industrial security information.
- Chapter 15, Accident Analyses, includes accident and dose consequence analyses required by 10 CFR 52.17(a)(1), 10 CFR 50.34(a)(1), and 10 CFR 100.21(c)(2).
- Chapter 17, Quality Assurance, includes the Quality Assurance Program (QAP) under which the ESP application has been prepared. The QAP also addresses ESP activities prior to Combined Operating License (COL) receipt, such as site preparation, earthwork, preconstruction activities, and procurement.

SNC is revising the previously submitted LWA-1 and LWA-2 requests to conform to the new Limited Work Authorizations for Nuclear Power Plants; Final Rule, published October 9, 2007. In accordance with 10 CFR 52.17 (c) SNC is requesting a LWA authorization under 10 CFR 50.10 be issued in conjunction with the early site permit. The ESP application includes a site redress plan (ESP Part 4) in accordance with § 52.17 (c). The scope of LWA activities requested include placement of engineered backfill including retaining walls and preparation of the Nuclear Island foundation including installation of mudmats, water proofing, formwork, rebar, and foundation embedments necessary to prepare the foundation for placement of concrete subsequent to the issuance of the COL.

Additional information to support safety-related construction activities has been included in the SSAR to address the LWA activities. The following list identifies the additional information and its location in the application:

- "LWA Request is contained in Chapter 1.0 Introduction and General Description.
- "Engineered Backfill is described in Section 2.5.4 Stability of Subsurface Materials and foundations
- "Preparation of Nuclear Island basemat for COL concrete placement addressed in the new Section 3.8.5 Foundation
- "Fitness for Duty is described in new Section 13.7 Fitness for Duty
- "Construction Quality Assurance information is included in 17.1A Nuclear Development Quality Assurance Manual

1.2 General Site Description

1.2.1 Site Location

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 exclusion area boundary (EAB) is bounded by River Road, Hancock Landing Road and 1.7 miles of the Savannah River (River Miles 150.0 to 151.7). The property boundary entirely encompasses the EAB and extends beyond River Road in some areas. The site is approximately 30 river miles above the U.S. 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 from Savannah, Georgia and 150 river miles from the mouth of the Savannah River. Numerous small towns exist within 50 miles of the site. A major Interstate highway, I-20, crosses the northern portion of the 50-mile radius. Access to the site is via US Route 25; Georgia Routes 56, 80, 24, 23; and New River Road. A navigation channel is authorized on the Savannah River from the Port of Savannah to Augusta, Georgia. A railroad spur connects the site to the Norfolk Southern Savannah-to-Augusta track.

Figures 1-1 and 1-2 show the site location and a 6-mile and 50-mile radius, respectively.

1.2.2 Site Development

The VEGP site currently has two Westinghouse pressurized water reactors (PWRs), rated at 3,625.6 MWt, and their supporting structures. These structures include two natural-draft cooling towers (one per unit), associated pumping and discharge structures, water treatment building, switchyard, and training center. Plant Wilson, a six-unit oil-fueled combustion turbine facility, is also located on the VEGP site. Figure 1-3 shows the current VEGP site plan.

The new plant footprint selected for the ESP is adjacent to the west side of the VEGP Units 1 and 2, and is generally the area that was originally designated for VEGP Units 3 and 4 when the plant was first proposed for construction. The footprint is shown on Figure 1-4.

SNC has selected the Westinghouse AP1000 certified reactor design for the ESP application. SSAR Section 1.3 identifies the design parameters, site characteristics, and site interface values that form the permit basis for NRC's issuance of an ESP. The design parameters are based on the addition of two Westinghouse AP1000 units, to be designated Vogtle Units 3 and 4. Each unit represents a portion of the total generation capacity to be added and will consist of one reactor with a thermal power rating of 3,400 MWt and a net electrical output of 1,117 MWe **(Westinghouse 2005)**. The layout and arrangement of the proposed new units are shown in Figure 1-5.

1.3 Site Characteristics, Design Parameters, and Site Interface Values

The required contents of an ESP application are specified in 10 CFR 52.17. As detailed in 10 CFR 52.17(a)(1), the application is required to specify, among other things, the number, type, and thermal power level of the facilities; boundaries of the site and proposed general location of each facility; type of cooling systems, intakes, and outflows; anticipated maximum levels of radiological and thermal effluents; site seismic, meteorological, hydrologic, and geologic characteristics; and existing and projected future population profile of the area surrounding the site. The SNC approach to providing this information is presented in the following subsections.

1.3.1 Site Characteristic, Design Parameters, and Site Interface Value Approach

The list of plant parameters necessary to define the plant-site interface was developed in the early 1990s based on work sponsored by the US Department of Energy (DOE) and the nuclear industry, which included reactor vendors and utilities. The effort was intended to provide a comprehensive list of plant parameters to accurately characterize a plant at a site. Over time, this list evolved to encompass information needed to support development of an ESP application, including the SSAR and the Environmental Report.

During 2002, *Site Characteristic* and *Design Parameter* terminology was discussed in several public meetings involving the NRC and nuclear industry representatives as part of the resolution of Generic Topic ESP-6 (*Plant Parameters Envelope Approach for ESP*) and was the subject of associated correspondence between the NRC and the Nuclear Energy Institute (NEI). Definitions of these terms are now proposed in the NRC staff's draft amendment to 10 CFR 52. *Site Characteristics* are the actual physical, environmental, and demographic features of a site. These values are established through data collection and/or analysis and are reported in an ESP application. They are developed in accordance with NRC requirements and guidance and form the basis for comparison with the design characteristics of the selected plant to verify site suitability for that design. *Design Parameters* are the postulated features of a reactor or reactors that could be built at a proposed site. These features describe plant design information that is necessary to prepare and review an ESP application. The SNC approach evaluates the AP1000 reactor design and the VEGP site to identify the *Site Characteristics* and *Design Parameters*. In a COL application, the AP1000 site-specific engineering and design features will be compared with the ESP parameters to demonstrate they are bounded.

SNC has further defined *Site Interface Values* as those values that have been determined based on the specific interrelationships between select site characteristics and plant design parameters. Examples include (1) cooling system evaporation rate, which is dependent on both design heat rejection rate and the environmental characteristics of the heat sink, and (2) gaseous radioactive dose consequences, which are dependent on the plant design source terms and the site air dispersion characteristics. Similar to above, *Site Interface Values* will be evaluated at COL application to demonstrate they are bounded by the ESP analysis.

An overview of the AP1000 PWR design and a more detailed discussion of the implementation of the *Site Characteristic–Design Parameter* approach are presented below.

1.3.2 Overview of Reactor Type

The AP1000 PWR design, with a thermal power rating of 3,400 MWt, developed by Westinghouse, has been selected for evaluation in this ESP application.

In January 2006, the NRC issued the Westinghouse AP1000 Design Certification Final Rule under 10 CFR 52, Appendix D. The AP1000 is a two-loop, four-reactor-coolant-pump PWR that uses fuel, a reactor vessel, and internals similar to those in service today at South Texas Project. The reactor coolant pumps are canned pumps to reduce the probability of leakage and to improve reliability.

The AP1000 is designed to use passive features for accident mitigation. An externally cooled steel containment building, in-containment refueling water storage tank, rapid depressurizing capability, and other design features preclude the need for safety-related electrical alternating-current-powered equipment used by the current nuclear fleet. Electrical power generation is through the use of a standard steam turbine cycle.

The AP1000 is designed in a single-unit, stand-alone configuration.

1.3.3 Use of the Site Characteristics, Design Parameters, and Site Interface Values Table

The *Site Characteristics, Design Parameters, and Site Interface Values* table (Table 1-1) provides a summary list of the limiting site characteristic values that have been established by analyses presented throughout the SSAR. This list also provides a summary of important site characteristics necessary to establish the findings required by 10 CFR Parts 52 and 100 on the suitability of the proposed ESP site. This list is intended to support development of the *Site Characteristics and Plant Design Parameters for the Early Site Permit* table, as defined by the NRC **(NRC-NEI 2004)**. Table 1-1 further provides a list of limiting design parameters and assumptions involving the design of a nuclear power plant that may be constructed on the ESP site in the future, in order to assess site characteristics.

Table 1-1 is divided into three parts. Part I, Site Characteristics, includes the data that is specific to the ESP site. Part II, Design Parameters, includes information supplied by the reactor vendor, Westinghouse, for the AP1000 plant design. Part III, Site Interface Values, includes the values that have been determined based on the interrelationship of certain site characteristics and design parameters. The table includes a summary description of each item and a reference to the SSAR section(s) in which more detailed information can be found. Where two-unit values are different from one-unit values, the two-unit value is included in brackets [ ].

Since certain support system designs, such as cooling towers, have not yet been completed, the data in this table are based on design requirements and interface information from the reactor vendor, Westinghouse.

1.4 Identification of Agents and Contractors

SNC has selected Bechtel Power Corporation (Bechtel) as its principal contractor to assist with preparing the SSAR portion of the ESP application and Tetra Tech NUS, Inc. (TtNUS), to assist with preparing the Environmental Report portion. A Consortium composed of Westinghouse Electric Company, LLC and Shaw Stone & Webster Nuclear Services (Shaw) will act as the engineering and procurement construction contractor for proposed VEGP Units 3 and 4, with Shaw providing the bulk of the construction services for the LWA activities. Bechtel, Westinghouse, Shaw, and TtNUS have supplied personnel, systems, project management, and resources to work on an integrated team with SNC.

1.4.1 Bechtel Corporation

Bechtel is the nation's largest power contractor and is headquartered in San Francisco. Bechtel has a history of supporting the nuclear power industry, beginning with the construction in 1950 of the EBR-1 reactor. Since then, Bechtel has engineered and constructed more than 60,000 MWe of nuclear power capacity worldwide. Bechtel currently has approximately 40,000 employees working on 400 projects in 47 different countries around the globe.

1.4.2 Tetra Tech NUS, Inc.

TtNUS is an environmental and engineering consulting company with a history of service to the nuclear power industry since the inception of its predecessor company, Nuclear Utility Services (NUS) Corporation in 1960. TtNUS currently has 20 offices and approximately 700 employees throughout the country. TtNUS is a wholly owned subsidiary of Tetra Tech, Inc., which has approximately 9,000 employees worldwide.

1.4.3 Shaw Stone & Webster Nuclear Services (Shaw)

Shaw is a Fortune 500 company which has been an active participant in the nuclear industry for nearly 60 years, from providing engineering and design services for Shippingport, the nation's first commercial nuclear power plant, to the restart of Tennessee Valley Authority's Browns Ferry Unit 1, which at the time was the largest nuclear construction project in the western hemisphere. Shaw continues to prove its leadership role in the nuclear industry by being part of the AP1000 Consortium. Shaw is part of a vertically integrated company, Shaw Group, Inc., which has nearly 180 offices worldwide and over 21,000 employees, of which approximately 3,100 are nuclear professionals offering nuclear services on four continents.

1.4.4 Westinghouse Electric Company, LLC (Westinghouse)

Westinghouse offers a wide range of nuclear plant products and services to utilities throughout the world, including fuel, service and maintenance, instrumentation and control, and advanced nuclear plant designs, including the AP1000 certified reactor design. With headquarters in Monroeville, Pennsylvania, Westinghouse now has operations in twelve states and fourteen countries. After designing the world's first commercial pressurized water reactor nuclear power plant at Shippingport in 1957, Westinghouse and its licensees provided more than 40 percent of the world's 434 operating commercial nuclear plants. By the end of 2003, reactors based on Westinghouse technology had amassed over 2500 reactor-years of power generation.

1.4.5 Other Contractors

In addition to Bechtel, Westinghouse, Shaw, and TtNUS, contractual relationships were established with several specialized consultants to assist in developing the ESP application.

1.4.5.1 MACTEC Engineering and Consulting, Inc.

MACTEC Engineering and Consulting, Inc., performed geotechnical field investigations and laboratory testing in support of SSAR Section 2.5, Geology, Seismology, and Geotechnical Engineering. That effort included performing standard penetration tests; obtaining core samples and rock cores; performing cone penetrometer tests, downhole geophysical logging, and laboratory tests of soil and rock samples; installing groundwater observation wells; and preparing a data report.

1.4.5.2 William Lettis & Associates, Inc.

William Lettis & Associates, Inc., performed geologic mapping and characterized seismic sources in support of SSAR Section 2.5, including literature review, geologic field reconnaissance, review and evaluation of existing seismic source characterization models, identification and characterization of any new or different sources, and preparation of the related SSAR sections.

1.4.5.3 Risk Engineering, Inc.

Risk Engineering, Inc., performed probabilistic seismic hazard assessments and related sensitivity analyses in support of SSAR Section 2.5. These assignments included sensitivity analyses of seismic source parameters and updated ground motion attenuation relationships, development of updated Safe Shutdown Earthquake ground motion values, and preparation of the related SSAR sections.

1.5 Requirements for Further Technical Information

No technical information development programs remain to be performed to support this application.

1.6 Material Incorporated by Reference

The following materials are incorporated by reference in this application as they are related to the LWA activities:

- Westinghouse document APP-GW-GL-700, AP1000 Design Control Document (DCD), Revision 15 as modified by the following Technical Reports:
  - APP-GW-GLN-105, "Building and Structure Configuration, Layout, and General Arrangement Design Updates," (Technical Report 105)
  - APP-GW-GLR-005, "Containment Vessel Design Adjacent to Large Penetrations," (Technical Report 9)
  - APP-GW-GLR-021, "AP1000 As-Built COL Information Items," (Technical Report 6)
  - APP-GW-GLR-044, "Nuclear Island Basemat and Foundation," (Technical Report 85)
  - APP-GW-GLR-045, "Nuclear Island: Evaluation of Critical Sections," (Technical Report 57)
  - APP-GW-GLR-130, "Editorial Format Changes Related to "Combined License Applicant" and "Combined License Information Items," (Technical Report 130)
  - APP-GW-S2R-010, "Extension of Nuclear Island Seismic Analysis to Soil Sites," (Technical Report 03)

1.7 Drawings and Other Detailed Information

No such information has been submitted separately as part of this application.

1.8 Conformance to NRC Regulations and Regulatory Guidance

This section discusses the conformance of the ESP application SSAR with applicable NRC regulations and guidance. NRC regulations are contained in Title 10 of the Code of Federal Regulations. NRC guidance is contained in NRC Regulatory Guides (RGs) and in NRC Review Standard RS-002, Processing Applications for Early Site Permits.

Clarifications are identified when guidance is met, but additional information is needed to provide complete understanding of the method of conformance. In certain instances, regulations and regulatory guides do not apply due to design features not being applicable or due to process timing (i.e., applies at COL application versus ESP application).

Conformance with NRC regulations, Regulatory Guides, and Review Standard RS-002 is summarized in Table 1-2. A matrix of ESP sections confirms compliance with each regulatory requirement. The revision number and date are provided for applicable Regulatory Guides. Clarification explanations are provided in Table 1-3.

Table 1-1 Site Characteristics, Design Parameters, and Site Interface Values

Part I Site Characteristics		
Item	**Value**	**Description and Reference**
Precipitation		
Maximum Rainfall Rate	19.2 inches in 1 hr 6.2 inches in 5 min	PMP for 1-hr and 5-min duration of precipitation at the site. Refer to Table 2.4.2-3 and Figure 2.4.2-4
100-Year Snow Pack 48-Hour Winter Probable Maximum Precipitation (PMP)	10 lb/sq ft 28.3 in.	Weight, per unit area, of the 100-year return period snowpack at the site Maximum probable winter rainfall in 48-hour period. Refer to Section 2.3.1.3.4
Seismic		
Design Response Spectra	Site-specific GMRS values specified and illustrated in Section 2.5.2	Site-specific response spectra. Refer to Section 2.5.2 and Figures 2.5.2-44, 2.5.2-44a, and 2.5.2-44b.
Capable Tectonic Structures or Sources	No fault displacement potential within the investigative area	Conclusion on the presence of capable faults or earthquake sources in the vicinity of the plant site. Refer to Sections 2.5.1.1.4, 2.5.1.2.4, and 2.5.3; Table 2.5.3-1
Water		
Maximum Flood (or Tsunami)	178.10 ft msl	Water level at the site due to dam breach. Refer to Sections 2.4.2.2, 2.4.3.4, 2.4.4.3, and 2.4.10;
Maximum Groundwater	165 ft msl	Site basis for subsurface hydrostatic loading due to difference in elevation between the site grade elevation in the power block area and the maximum site groundwater level. Refer to Sections 2.4.12.4 and 2.5.4.6.1

Table 1-1 (cont.) Site Characteristics, Design Parameters, and Site Interface Values

Part I Site Characteristics		
Item	**Value**	**Description and Reference**
Subsurface Material Properties		
Liquefaction	None at site-specific SSE. Compacted structural fill will provide an adequate safety factor against liquefaction (min >1.1).	Liquefaction potential for subsurface material at the site. Refer to Section 2.5.4.8.4
Minimum Bearing Capacity (Static and Dynamic)	34,000 lb/sq ft (Static) 42,000 lb/sq ft (Dynamic)	Allowable load-bearing capacity of the layer supporting plant structures. Refer to Section 2.5.4.10.1
Minimum Shear Wave Velocity	Values in Tables 2.5.4-11 and 2.5.4-11a	Propagation velocity of shear waves through the foundation materials. Refer to Section 2.5.4.7.1; Tables 2.5.4-11, and 2.5.4-11a; Figures 2.5.4-6, 2.5.4-7, 2.5.4-7a, and 2.5.4-8
Tornado		
Maximum Pressure Drop	2.0 psi	Decrease in ambient pressure from normal atmospheric pressure at the site due to passage of a tornado having a probability of occurrence of 10^{-7} per year. Refer to Section 2.3.1.3.2
Maximum Rotational Speed	240 mph	Rotation component of maximum wind speed at the site due to passage of a tornado having a probability of occurrence of 10^{-7} per year. Refer to Section 2.3.1.3.2
Maximum Translational Speed	60 mph	Translation component of maximum wind speed at the site due to the movement across ground of a tornado having a probability of occurrence of 10^{-7} per year. Refer to Section 2.3.1.3.2

Table 1-1 (cont.) Site Characteristics, Design Parameters, and Site Interface Values

Part I Site Characteristics		
Item	**Value**	**Description and Reference**
Maximum Wind Speed	300 mph	Sum of the maximum rotational and maximum translational wind speed components at the site due to passage of a tornado having a probability of occurrence of 10^{-7} per year. Refer to Section 2.3.1.3.2
Radius of Maximum Rotational Speed	150 ft	Distance from the center of the tornado at which the maximum rotational wind speed occurs at the site due to passage of a tornado having a probability of occurrence of 10^{-7} per year. Refer to Section 2.3.1.3.2
Maximum Rate of Pressure Drop	1.2 psi/sec	Maximum rate of pressure drop at the site due to passage of a tornado having a probability of occurrence of 10^{-7} per year. Refer to Section 2.3.1.3.2
Wind		
Basic Wind Speed	104 mph	Three-second gust wind velocity, associated with a 100-year return period, at 33 ft (10 m) above ground level in the site area. Refer to Section 2.3.1.3.1
Selected Site Characteristic Ambient Air Temperatures		*(Site characteristic wet bulb and dry bulb temperatures associated with listed exceedance values and 100-year return period)*
Maximum Dry Bulb • 2% annual exceedance • 0.4% annual exceedance • 100-year return period	 92°F 97°F 115°F	Refer to Section 2.3.1.5

Table 1-1 (cont.) Site Characteristics, Design Parameters, and Site Interface Values

Part I Site Characteristics		
Item	**Value**	**Description and Reference**
Minimum Dry Bulb • 1% annual exceedance • 0.4% annual exceedance • 100-year return period	 25°F 21°F -8°	Refer to Section 2.3.1.5
Maximum Wet Bulb • 0.4% annual exceedance • 100-year return period	 79°F 88°F	Refer to Section 2.3.1.5
Site Temperature Basis for AP1000 • Maximum Safety Dry Bulb and Coincident Wet Bulb • Maximum Safety Wet Bulb (Non-coincident) • Maximum Normal Dry Bulb and Coincident Wet Bulb • Maximum Normal Wet Bulb (Non-coincident)	 115°F dry bulb/77.7°F wet bulb 83.9°F 94°F dry bulb/78°F wet bulb 78°F	Refer to Section 2.3.1.5
Airborne Effluent Release Point		
Atmospheric Dispersion (χ/Q) (Accident)		
0-2 hr @ Exclusion Area Boundary (EAB)	3.49E-04 sec/m3	The atmospheric dispersion coefficients used in the design safety analysis to estimate dose consequences of accident airborne releases. Refer to Section 2.3.4.2; Table 15-11.
0-8 hr @ Low Population Zone (LPZ)	7.04E-05 sec/m3	
8-24 hr @ LPZ	5.25E-05 sec/m3	
1-4 day @ LPZ	2.77E-05 sec/m3	
4-30 day @ LPZ	1.11E-05 sec/m^3	

Table 1-1 (cont.) Site Characteristics, Design Parameters, and Site Interface Values

Part I Site Characteristics		
Item	**Value**	**Description and Reference**
Atmospheric Dispersion (χ/Q) (Routine Release)		
Annual Average Undepleted/No Decay χ/Q Value @ EAB	5.5E-06 sec/m^3	The maximum annual average EAB undepleted/no decay atmospheric dispersion factor (χ/Q) value for use in determining gaseous pathway doses to the maximally exposed individual. Refer to Section 2.3.5.2; Table 2.3-17
Annual Average Undepleted/ 2.26-Day Decay χ/Q Value @ EAB	5.5E-06 sec/m^3	The maximum annual average EAB undepleted/2.26-day decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual. Refer to Table 2.3-17
Annual Average Depleted/ 8.00-Day Decay χ/Q Value @ EAB	5.0E-06 sec/m^3	The maximum annual average EAB depleted/8.00-day decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual. Refer to Table 2.3-17
Annual Average D/Q Value @ EAB	1.7E-08 1/m^2	The maximum annual average EAB relative deposition factor (D/Q) value for use in determining gaseous pathway doses to the maximally exposed individual. Refer to Table 2.3-17
Annual Average Undepleted/No Decay χ/Q Value @ Nearest Resident	3.4E-06 sec/m^3	The maximum annual average resident undepleted/no decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual. Refer to Section 2.3.5.2; Table 2.3-17

Table 1-1 (cont.) Site Characteristics, Design Parameters, and Site Interface Values

Part I Site Characteristics		
Item	**Value**	**Description and Reference**
Annual Average Undepleted/ 2.26-Day Decay χ/Q Value @ Nearest Resident	3.4E-06 sec/m^3	The maximum annual average resident undepleted/2.26-day decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual. Refer to Table 2.3-17
Annual Average Depleted/ 8.00-Day Decay χ/Q Value @ Nearest Resident	3.0E-06 sec/m^3	The maximum annual average resident depleted/8.00-day decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual. Refer to Table 2.3-17
Annual Average D/Q Value @ Nearest Resident	1.0E-08 1/m^2	The maximum annual average resident D/Q value for use in determining gaseous pathway doses to the maximally exposed individual. Refer to Table 2.3-17
Annual Average Undepleted/No Decay χ/Q Value @ Nearest Meat Animal	3.4E-06 sec/m^3	The maximum annual average meat animal undepleted/no decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual. Refer to Section 2.3.5.2; Table 2.3-17
Annual Average Undepleted/ 2.26-Day Decay χ/Q Value @ Nearest Meat Animal	3.4E-06 sec/m^3	The maximum annual average meat animal undepleted/2.26-day decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual. Refer to Table 2.3-17
Annual Average Depleted/ 8.00-Day Decay χ/Q Value @ Nearest Meat Animal	3.0E-06 sec/m^3	The maximum annual average meat animal depleted/8.00-day decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual. Refer to Table 2.3-17

Table 1-1 (cont.) Site Characteristics, Design Parameters, and Site Interface Values

Part I Site Characteristics		
Item	**Value**	**Description and Reference**
Annual Average D/Q Value @ Nearest Meat Animal	1.0E-08 1/m^2	The maximum annual average meat animal D/Q value for use in determining gaseous pathway doses to the maximally exposed individual. Refer to Table 2.3-17
Annual Average Undepleted/No Decay χ/Q Value @ Nearest Vegetable Garden	3.4E-06 sec/m^3	The maximum annual average vegetable garden undepleted/no decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual. Refer to Table 2.3-17
Annual Average Undepleted/ 2.26-Day Decay χ/Q Value @ Nearest Vegetable Garden	3.4E-06 sec/m^3	The maximum annual average vegetable garden undepleted/2.26-day decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual. Refer to Table 2.3-17
Annual Average Depleted/ 8.00-Day Decay χ/Q Value @ Nearest Vegetable Garden	3.0E-06 sec/m^3	The maximum annual average vegetable garden depleted/8.00-day decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual. Refer to Table 2.3-17
Annual Average D/Q Value @ Nearest Vegetable Garden	1.0E-08 1/m^2	The maximum annual average vegetable garden D/Q value for use in determining gaseous pathway doses to the maximally exposed individual. Refer to Table 2.3-17

Table 1-1 (cont.) Site Characteristics, Design Parameters, and Site Interface Values

Part I Site Characteristics		
Item	**Value**	**Description and Reference**
Population Density		
Population Center Distance	Approximately 26 mi (Augusta, GA)	The minimum allowable distance from the reactor(s) to the nearest boundary of a densely populated center containing more than about 25,000 residents (not less than one and one-third times the distance from the reactor(s) to the outer boundary of the LPZ) (i.e., 2-2/3 mi for VEGP). Refer to Sections 1.1, 1.2.1, 2.1.1, 2.1.3.2, and 2.1.3.5
Exclusion Area Boundary (EAB)	See Figure 1-4	The area surrounding the reactor(s), in which the reactor licensee has the authority to determine all activities, including exclusion or removal of personnel and property from the area. Refer to Sections 2.1.1, 2.1.2, and 2.3.4.1; Figure 1-4
Low Population Zone (LPZ)	A 2-mile-radius circle from the midpoint between the containment buildings of Units 1 and 2.	The area immediately surrounding the exclusion area that contains residents. Refer to Sections 2.1.3.4, 2.3.4.1, 2.3.4.2, and 2.3.5.1; Table 2.3-15
Dose Calculation EAB	See Figure 1-4	A circle extending ½ mi beyond the power block area circle (775-ft radius circle encompassing Units 3 and 4). Total radius is 3,415 ft from the centroid of the power block circle. Dose Calculation EAB is completely within the actual plant EAB and is used to conservatively determine χ/Q values and subsequent accident radiation doses. Refer to Sections 2.3.4.1, 2.3.4.2, and 2.3.5.1; Tables 2.3-14, 2.3-16, and 2.3-17; Figure 1-4

Table 1-1 (cont.) Site Characteristics, Design Parameters, and Site Interface Values

Part II Design Parameters		
Item	**Single Unit [Two Unit] Value**	**Description and Reference**
Structures		
Building Height	234 ft 0 in.	The height from finished grade to the top of the tallest power blocks structure, excluding cooling towers (i.e., Containment Building). Refer to Section 2.3.3.3
Building Foundation Embedment	39 ft 6 in. to bottom of basemat from plant grade	The depth from finished grade to the bottom of the basemat for the most deeply embedded power block structure (i.e., Containment/Auxiliary Building). Refer to Sections 2.4.12 and 2.5.4.10.1
Cooling Tower Height	600 ft	The height is from the finished grade to the top of the cooling tower Refer to Section 2.3.3.3
Cooling Tower Base Diameter	550 ft	The bottom of the cooling tower where it connects to the basin Refer to Section 2.3.3.3
Cooling Tower Diameter at the Top	330 ft	The cooling tower diameter at its highest elevation Refer to Section 2.3.3.3
Airborne Effluent Release Point		
Gaseous Source Term (Post-Accident)	See Chapter 15 Tables	The activity, by isotope, contained in post-accident airborne effluents. Refer to Section 15.3; Tables 15-2 through 15-10
Release Point Elevation (Post-Accident)	Ground level	The elevation above finished grade of the release point for accident sequence releases. Refer to Section 2.3.4.1, 2.3.5.1, and 15.2; Tables 2.3-14 and 2.3-15

Table 1-1 (cont.) Site Characteristics, Design Parameters, and Site Interface Values

Part II Design Parameters		
Item	**Single Unit [Two Unit] Value**	**Description and Reference**
Plant Characteristics		
Megawatts Thermal	3,400 MWt [6,800 MWt]	The thermal power generated by one unit. Refer to Sections 1.1, 1.2.2, and 1.3.2

Part III Site Interface Values		
Item	**Single Unit [Two Unit] Value**	**Description and Reference**
Normal Plant Heat Sink		
Cooling Tower Make-up Flow Rate	30,572 gpm [61,145 gpm]	The maximum rate of removal of water from the Savannah River to replace water losses from the circulating watersystem. The bounding Makeup Flow Rate is a calculated value based on the sum of the expected evaporation rate at design ambient conditions plus the bounding blowdown flow rate and drift. Refer to Sections 2.4.1.2.6, 2.4.8, and 2.4.11.5; Table 2.4.1-10
Airborne Effluent Release Point		
Post-Accident Dose Consequences	10 CFR 100 10 CFR 50.34(a)(1)	The estimated design radiological dose consequences due to gaseous releases from postulated accidents. Refer to Chapter 15; Tables 15-12 through 15-22
Minimum Distance to Site Boundary	3,420 ft	The minimum lateral distance from the release point (power block area circle) to the site boundary. Refer to Figure 1-4

Table 1-2 Regulatory Compliance Matrix

Legend:
X = Complies
C = Clarification Required, See Table 1-3

Regulatory Requirements Document Title	Rev.	Date	Chapter 1	2.1.1	2.1.2	2.1.3	2.2.1 - 2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	2.3.4	2.3.5	2.4.1	2.4.2	2.4.3	2.4.4	2.4.5	2.4.6	2.4.7	2.4.8	2.4.9	2.4.10	2.4.11	2.4.12	2.4.13	2.5.1	2.5.2	2.5.3	2.5.4	2.5.5	2.5.6	3.5.1.6	11.2.3	11.3.3	13.3	13.6	Chapter 15	Chapter 17
NRC Regulations																																							
10 CFR 20				X																																X			
10 CFR 20, Appendix B, Table 2																										X								X	X				
10 CFR 20.1301																																		X	X				
10 CFR 50.34(a)																																							
10 CFR 50.34(a)(1)					X	X																																X	
10 CFR 50.34(a)(10)																																				X			
10 CFR 50.34(a)(12)																												X											
10 CFR 50.34(b)(10)																												X											
10 CFR 50.47											X																												
10 CFR 50.47(b)(4)																																				X			
10 CFR 50, Appendix A, GDC 2									X	X				X	X	X	X	X	X	X	X	X	X	X			X	X	X	X	X								
10 CFR 50, Appendix A, GDC 4									X																														
10 CFR 50, Appendix B																																							X
10 CFR 50, Appendix E											X																									X			
10 CFR 50, Appendix I				X							X		X																					X	X				
10 CFR 50, Appendix S IV(a)																												X											
10 CFR 50, Appendix S IV(b)																													X										
10 CFR 50, Appendix S IV(c)															X		X	X																					
10 CFR 52.17(a)(1)			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X					X	
10 CFR 52.17(b)(1)						X																														X			
10 CFR 52.17(b)(2)																																				X			
10 CFR 52.17(b)(3)																																				X			
10 CFR 73.55																																					X		
10 CFR 100.3					X	X																																	
10 CFR 100.20				X		X	X					X	X																				X						
10 CFR 100.20 (b)								X																															
10 CFR 100.20(c)									X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
10 CFR 100.21(a)					X																																		
10 CFR 100.21(c)(1)										X			X																										
10 CFR 100.21(c)(2)						X				X		X																										X	
10 CFR 100.21(d)									X	X	X													X															
10 CFR 100.21(e)							X	X																															
10 CFR 100.21(f)																																					X		
10 CFR 100.23																								X		X	X	X	X	X									
10 CFR 100.23(c)																	X		X					X	X														
10 CFR 100.23(d)(4)																								X															
40 CFR 190																																		X	X				

Table 1-2 (cont.) Regulatory Compliance Matrix

Legend:
X = Complies
C = Clarification Required, See Table 1-3

NRC Regulatory Guides	Rev.	Date	Chapter 1	2.1.1	2.1.2	2.1.3	2.2.1 - 2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	2.3.4	2.3.5	2.4.1	2.4.2	2.4.3	2.4.4	2.4.5	2.4.6	2.4.7	2.4.8	2.4.9	2.4.10	2.4.11	2.4.12	2.4.13	2.5.1	2.5.2	2.5.3	2.5.4	2.5.5	2.5.6	3.5.1.6	11.2.3	11.3.3	13.3	13.6	Chapter 15	Chapter 17
NRC RG 1.23	Pr-1	Sep-80							X	X	C	X	X																										
NRC RG 1.26	4	Mar-07																																					C
NRC RG 1.29	3	Sep-78													X	X	X	X	X	X	X		X																
NRC RG 1.29	4	Mar-07																																					C
NRC RG 1.59	2	Aug-77													X	X	X	X	X	X	X		X																
NRC RG 1.60	1	Dec-73																										C											
NRC RG 1.70	3	Nov-78	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	C	X	X
NRC RG 1.76 (DG-1143)	Pr-1	Jan-06							X																														
NRC RG 1.78	1	Dec-01					X	X																															
NRC RG 1.91	1	Feb-78					X	X																															
NRC RG 1.101	4	Jul-03																																		X			
NRC RG 1.102	1	Sep-76													X	X	X	X	X		X		X																
NRC RG 1.109	1	Oct-77											X																					X	X				
NRC RG 1.111	1	Jul-77										X	X																						X				
NRC RG 1.112	0	Apr-76											X																										
NRC RG 1.113	1	Apr-77																								X													
NRC RG 1.125	1	Oct-78																X	X		X		X																
NRC RG 1.132	2	Oct-03																									X	X	X	X	X								
NRC RG 1.138	2	Dec-03																												X	X								
NRC RG 1.145	1	Nov-82										X																										X	
NRC RG 1.165	0	Mar-97																									X	C	X										
NRC RG 1.183	0	Jul-00										X																										X	
NRC RG 1.198	0	Nov-03																										X		X	X								
NRC RG 4.2 and Supplement 1	2 S-1	Jul-76 Sep-00									X																												
NRC RG 4.7	2	Apr-98				X						X															X	X	X	X							X		
NUREG-0800 / RS-002																																							
RS-002, Main Body Document, Section 4.4			X																																				
RS-002, Attachment 2, Section 2.1.1				X																																			
RS-002, Attachment 2, Section 2.1.2					X																																		
RS-002, Attachment 2, Section 2.1.3						X																																	
RS-002, Attachment 2, Section 2.2.1 - 2.2.2							X																																
RS-002, Attachment 2, Section 2.2.3								X																															

Table 1-2 (cont.) Regulatory Compliance Matrix

Legend:
X = Complies
C = Clarification Required, See Table 1-3

Regulatory Requirements Document Title	Rev.	Date	Chapter 1	2.1.1	2.1.2	2.1.3	2.2.1 - 2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	2.3.4	2.3.5	2.4.1	2.4.2	2.4.3	2.4.4	2.4.5	2.4.6	2.4.7	2.4.8	2.4.9	2.4.10	2.4.11	2.4.12	2.4.13	2.5.1	2.5.2	2.5.3	2.5.4	2.5.5	2.5.6	3.5.1.6	11.2.3	11.3.3	13.3	13.6	Chapter 15	Chapter 17
RS-002, Attachment 2, Section 2.3.1									X																														
RS-002, Attachment 2, Section 2.3.2										X																													
RS-002, Attachment 2, Section 2.3.3											X																												
RS-002, Attachment 2, Section 2.3.4												X																											
RS-002, Attachment 2, Section 2.3.5													X																										
RS-002, Attachment 2, Section 2.4.1														X																									
RS-002, Attachment 2, Section 2.4.2															X																								
RS-002, Attachment 2, Section 2.4.3																X																							
RS-002, Attachment 2, Section 2.4.4																	X																						
RS-002, Attachment 2, Section 2.4.5																		X																					
RS-002, Attachment 2, Section 2.4.6																			X																				
RS-002, Attachment 2, Section 2.4.7																				X																			
NUREG-0800, Section 2.4.8	2	Jul-81																				X																		
RS-002, Attachment 2, Section 2.4.9																						X																	
NUREG-0800, Section 2.4.10	2	Jul-81																						X																
RS-002, Attachment 2, Section 2.4.11																								X															
RS-002, Attachment 2, Section 2.4.12																									X														
RS-002, Attachment 2, Section 2.4.13																										X													
NUREG-0800, Section 2.5.1	3	Mar-97																										X												
NUREG-0800, Section 2.5.2	3	Mar-97																											X											
NUREG-0800, Section 2.5.3	3	Mar-97																												X										
RS-002, Attachment 2, Section 2.5.4																															X									
NUREG-0800, Section 3.7.2	Dr-3	Apr-96																													X									
RS-002, Attachment 2, Section 2.5.5																																X								
RS-002, Attachment 2, Section 3.5.1.6																																		X						
NUREG-0800, Section 3.5.1.6	2	Jul-81																																X						
RS-002, Attachment 2, Section 13.3.1																																					X			
RS-002, Attachment 2, Note 2																																						X		
RS-002, Attachment 2, Section 15.0																																							X	
NUREG-0800, Chapter 15	1&2	Jul-81																																					X	
RS-002, Attachment 2, Section 17.1.1																																								X

Table 1-3 Regulatory Compliance Clarifications

Regulatory Document	Affected ESP Application Section	Clarification
Reg Guide 1.23	2.3.3	System Accuracy for Wind Speed is ±0.5 mph (±0.22 m/sec) and for Differential Temperature is ±0.27°F (±0.15°C) per 50-m height.
Reg Guide 1.60	2.5.2	Site-specific response spectra is derived in accordance with 10 CFR Part 100 Subpart B 100.23. The standard spectral shape of Regulatory Guide is not used.
Reg Guide 1.165	2.5.2	Regulatory Guide 1.165 is used to (1) conduct geological, seismological, and geophysical investigations of the site and region around the site, (2) identify and characterize seismic sources, and (3) perform PSHA. The procedure to determine the SSE for the site departs from the Regulatory Guide 1.165 procedure. Site-specific SSE spectra following the procedures of ASCE 43-05 for defining the Design Response Spectra (DRS) using a Target Performance Goal (P_f) of a mean annual probability of exceedance of 1E- 05 is used to define the ESP SSE design ground motion.
Reg Guide 1.70	13.6	Regulatory Guide 1.70 requires the security plan to be submitted as a separate document. The security plan will be submitted with the COL. The ESP application follows the guidance described in RS-002, Attachment 2, Note 2.
Reg Guide 1.26	Ch 17	Refer to the Westinghouse AP1000 Design Control Document, Appendix 1A, for a discussion of Criteria C.1.C.1.a, C.1.b, and C.3 exceptions.
Reg Guide 1.29	Ch 17	Refer to the Westinghouse AP1000 Design Control Document, Appendix 1A, for a discussion of Criteria C.1.d, C.1.g, and C.1.n exceptions.

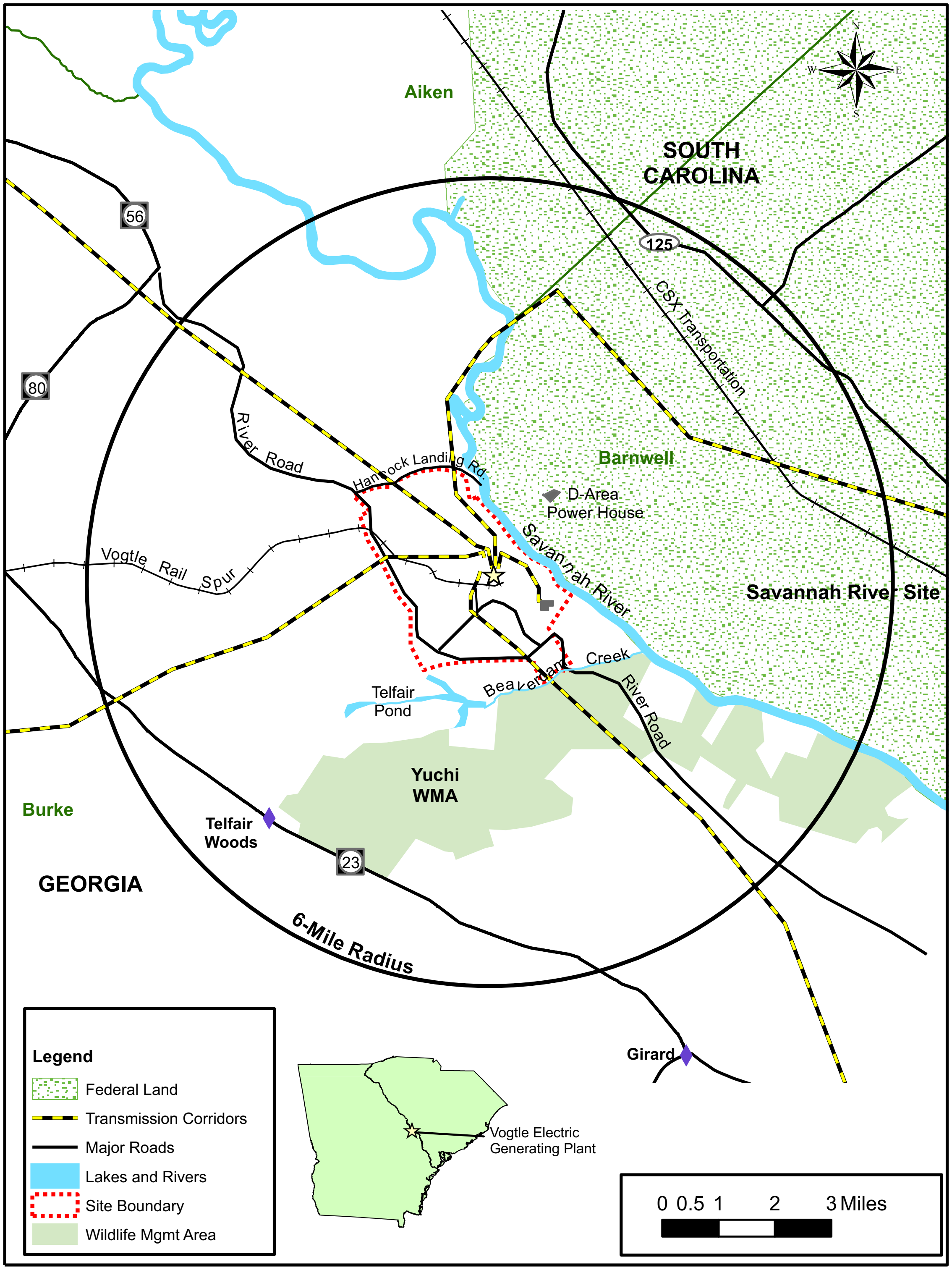

Figure 1-1 6-Mile Vicinity

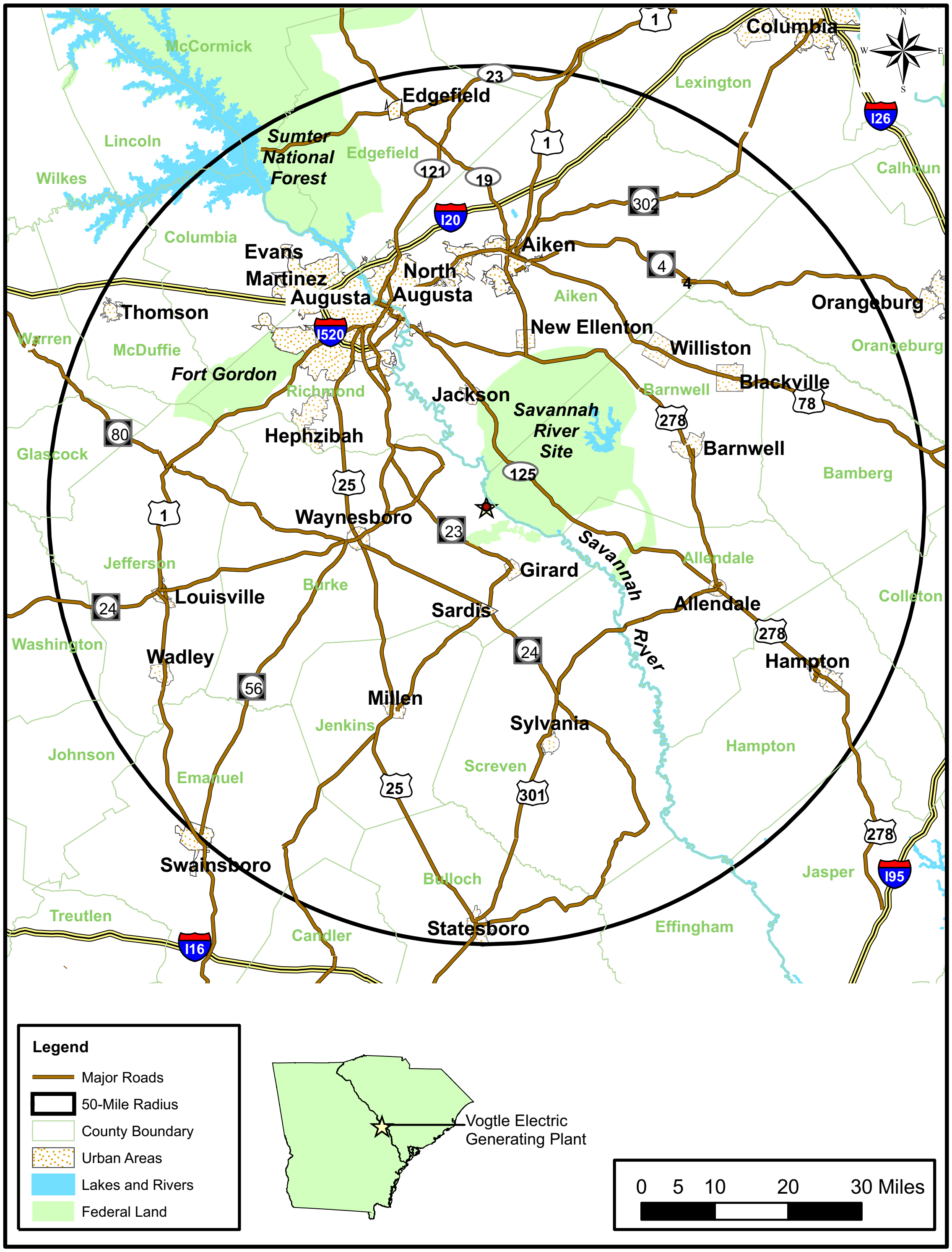

Figure 1-2 50-Mile Vicinity

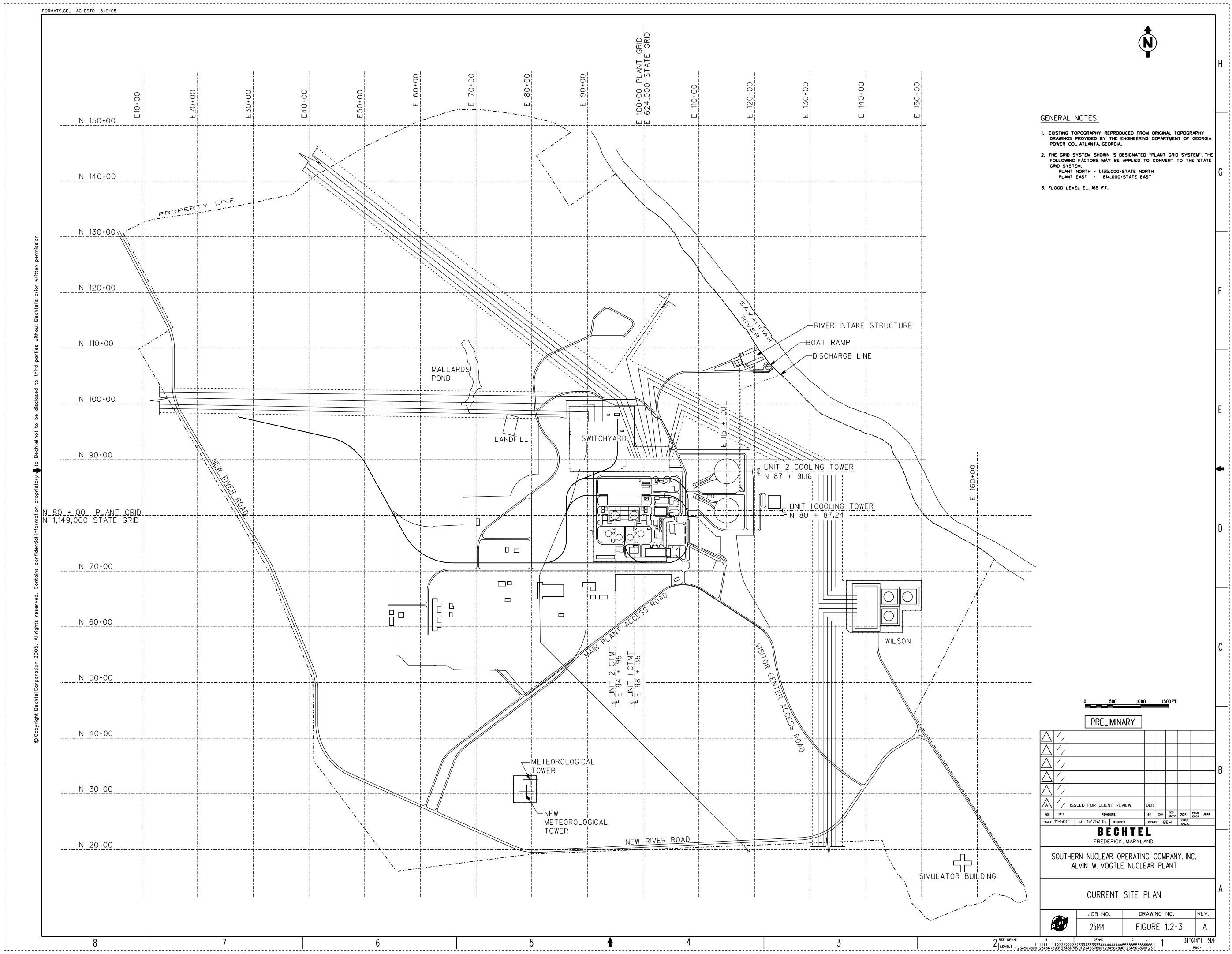

Figure 1-3 Site Layout – Current Development

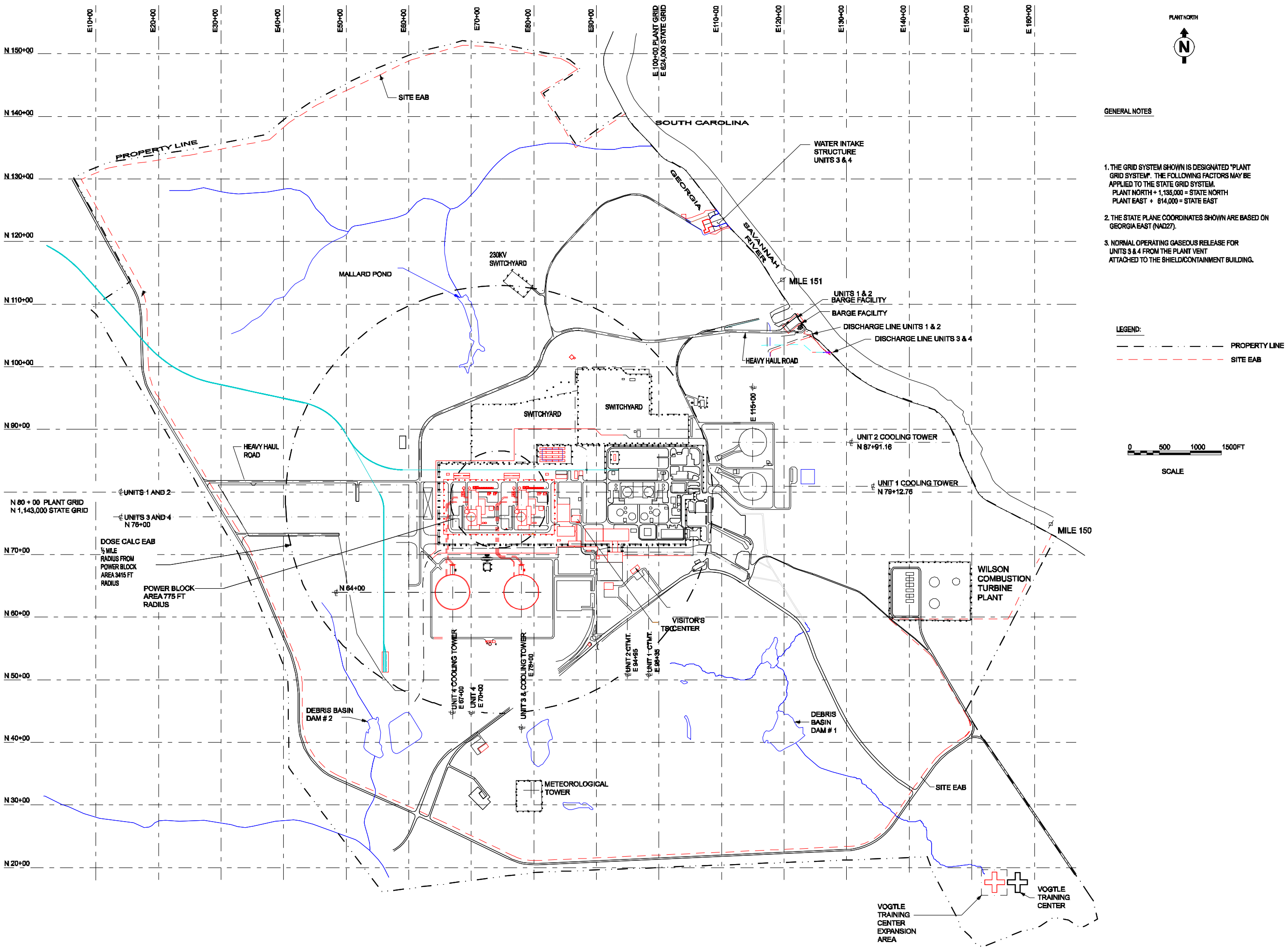

Figure 1-4 Site Layout – New Development

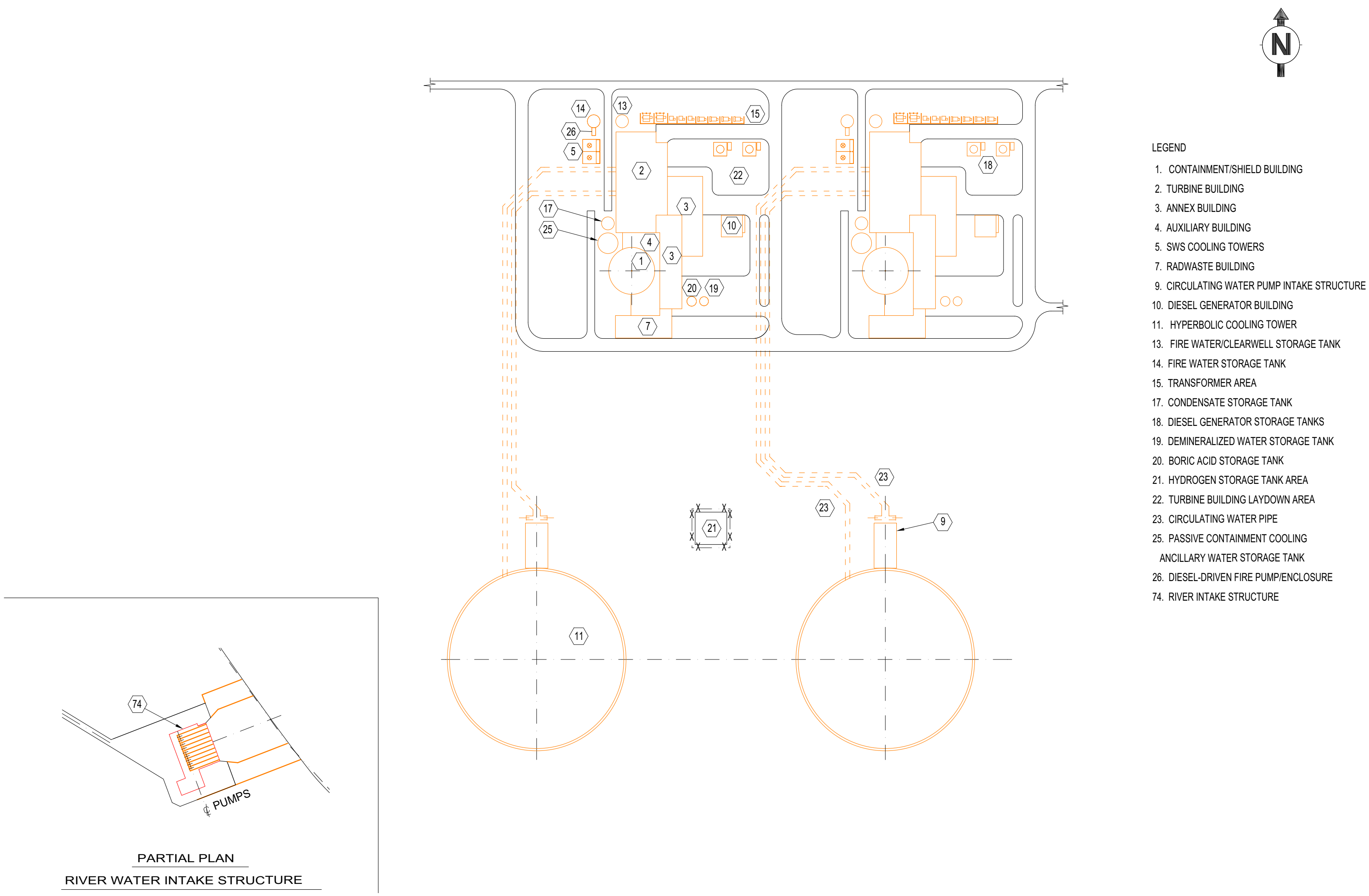

Figure 1-5 VEGP Units 3 and 4 Power Block Arrangement

Chapter 1 References

(NRC-NEI 2004) *Early Site Permit Template*, NRC letter to NEI, J.E. Lyons to A. Heymer, June 22, 2004.

(Westinghouse 2005) *AP1000 Design Control Document,* AP1000 Document No. APP-GW-GL-700, Revision 15, Westinghouse Electric Company, 2005.

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