CHAPTER 8
ELECTRIC POWER

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 8
ELECTRIC POWER

8.1 INTRODUCTION

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

8.1.1 UTILITY GRID DESCRIPTION

Supplement the information in DCD Subsection 8.1.1 with the following information.

VCS SUP 8.1-1 The VCSNS site consists of the existing VCSNS Unit 1 and the new VCSNS Units 2 and 3 reactors. VCSNS Unit 1 connects to the 115kV and 230kV SCE&G transmission systems via an existing 230kV switchyard and a 115kV transmission line. VCSNS Units 2 and 3 will connect to the 230kV SCE&G transmission system via a new 230kV switchyard. The SCE&G transmission system operator (TSO) is responsible for the safe and reliable operation of the electrical transmission system. The SCE&G transmission system consists of interconnected hydro plants, fossil-fueled plants, combustion turbine units and nuclear plants supplying energy to the service area at various voltages up to 230 kV. The transmission system is interconnected with neighboring utilities, and together, they form the Virginia-Carolina (VACAR) Sub region of the Southeastern Electric Reliability Council (SERC). As of January 2009, interconnected systems at 115kV and 230kV include Santee Cooper, Duke Energy, Progress Energy (East), Southeastern Power Administration (SEPA), and Southern Company.

The VCSNS Units 2 and 3 switchyard is tied to the following 230 kV transmission systems:

- SCE&G
- Santee Cooper
- Duke Energy

The switchyard is connected to each generating unit with two overhead tie-lines. One of these lines is connected to the plant main transformer circuit breaker and used for power export to the transmission system or for back feeding station loads when there is no generation. The second line is connected to the reserve auxiliary transformer circuit breaker and used when the unit auxiliary transformers are not available. Three overhead transmission lines connect the Units 2 and 3 switchyard to the Unit 1 switchyard. In addition, there are six overhead transmission lines connecting to the SCE&G transmission system, two overhead lines connecting to the Santee Cooper system, and one line connecting to the Duke Energy system.

Units 2 and 3 are served by a 230kV switchyard. The switchyard consists of ten bays, eight bays configured in a breaker-and-a-half arrangement and two bays configured in a double breaker arrangement. The Unit 2 and 3 main generator step-up transformer (GSU) and reserve auxiliary transformer (RAT) lines are connected to the east side of the switchyard and travel southeast to the plant. The three Unit 1 tie-lines, nine overhead transmission lines, and the two RAT lines are connected to both buses through the breaker-and-a-half arrangement. Two GSU lines are connected through a double breaker arrangement.

8.1.4.3 Design Criteria, Regulatory Guides, and IEEE Standards

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Add the following information between the second and third paragraphs of this subsection.

VCS SUP 8.1-2 Offsite and onsite ac power systems' conformance to Regulatory Guides and IEEE Standards identified by DCD Table 8.1-1 as site-specific is as indicated in Table 8.1-201.

VCS SUP 8.1-2

Table 8.1-201
Site-Specific Guidelines for Electric Power Systems

Criteria				Applicability (FSAR[a] Section/Subsection) 8.2	8.3.1	8.3.2	Remarks
1.	Regulatory Guides						
	a.	RG 1.129	Maintenance, Testing, and Replacement of Vented Lead—Acid Storage Batteries for Nuclear Power Plants			G	Battery Service tests are performed in accordance with the Regulatory Guide.
	b.	RG 1.155	Station Blackout				Not applicable[b]
	c.	RG 1.204	Guidelines for Lightning Protection of Nuclear Power Plants	G	G		Implemented via IEEE 665.
	d.	RG 1.206	Combined License Applications for Nuclear Power Plants (LWR Edition)	G	G	G	
2.	Branch Technical Positions						
	a.	BTP 8-3 (BTP ICSB-11 in DCD)	Stability of Offsite Power Systems	G			Stability Analysis of the Offsite Power System is performed in accordance with the BTP.

a) "G" denotes guidelines as defined in NUREG-0800, Rev. 3, Table 8-1 (SRP). No letter denotes "Not Applicable."
b) Station Blackout and the associated guidelines were addressed as a design issue in the DCD.

8.2 OFFSITE POWER SYSTEM

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

8.2.1 SYSTEM DESCRIPTION

Replace the first, second, and sixth paragraphs of DCD Subsection 8.2.1 with the following information. The new information is placed before the fifth paragraph of DCD Subsection 8.2.1.

VCS COL 8.2-1 VCSNS Units 2 and 3 are connected into a network supplying medium-sized load centers. The VCSNS Units 2 and 3 switchyard is tied to the following 230 kV transmission systems: SCE&G, Santee Cooper, and Duke Energy. The interconnection of Units 2 and 3, the switchyard, and the 230kV transmission lines are shown on Figure 8.2-201.

There are 12 overhead transmission lines connecting the new 230kV switchyard to other substations. (Eight lines, three new lines, and five reterminated lines are required for Unit 2, and four additional lines are required for Unit 3. These include the lines listed in the table below as well as three tie lines to VCSNS Unit 1.) Each line connected to the switchyard has the capacity to feed the design house loads for both units under all design conditions without relying on the other unit's generator. Three of these lines are short tie-lines, running in an easterly direction, connecting to the Unit 1 switchyard. (Two lines are required for Unit 2 and the third line is required for Unit 3.) Each is approximately one mile long with a thermal rating of 950MVA. The remaining nine 230kV lines originate at the Units 2 and 3 switchyard and connect to various substations as shown below.

230kV Line	Existing/New	Length (miles)	Line Owner
Denny Terrace	Existing	26	SCE&G
Lake Murray 1	Existing	23	SCE&G
Lake Murray 2	New	23	SCE&G
St. George 1	New	86	SCE&G
St. George 2	New	86	SCE&G
Ward	Existing	35	SCE&G
Varnville[(a)]	New	40	Santee Cooper
Newberry	Existing	17	Santee Cooper
Bush River	Existing	30	Duke Energy

a) Routed via Sandy Run

The layout of transmission lines to the new and existing substations minimizes the crossing of transmission lines to the extent possible. All structures for these transmission lines are designed to meet the National Electrical Safety Code clearance requirements and SCE&G and Santee Cooper engineering standards. Each phase is designed using a conductor bundle comprised of two aluminum conductor, steel reinforced conductors. All structures are grounded with either ground rods or a counterpoise system and have provisions for two overhead ground wires.

VCS CDI A transformer area containing the GSU, the unit auxiliary transformers (UATs), and the RATs is located next to each turbine building. An area containing the GSU and RAT circuit breakers and disconnects is located approximately 150 feet to the west of the transformer area.

8.2.1.1 Transmission Switchyard

Supplement the information in DCD Subsection 8.2.1.1 with the following.

VCS COL 8.2-1 A new 230kV switchyard is used to transmit electrical power output from Units 2 and 3 to the SCE&G, the Santee Cooper, and the Duke Energy 230kV transmission systems. The switchyard is also used as a power source for plant auxiliaries when the units are in the startup or shutdown modes, or when the units are not generating.

The 230kV switchyard is air-insulated and consists of ten bays, eight in a breaker-and-a-half arrangement and two in a double breaker arrangement, located about 2000 feet northwest of Units 2 and 3. The switchyard is connected to each generating unit with two overhead tie-lines. One line per unit is connected to the GSU circuit breaker and used for power export to the transmission system or for back feeding station loads when there is no generation. The second line is connected to the RAT circuit breaker and used when the UATs are not available. Information on the switchyard connections to the transmission system is provided in Subsection 8.2.1.

Failure Analysis

VCS SUP 8.2-1 The circuit breakers in the 230kV switchyard are sized with sufficient continuous current carrying capacity and fault interrupting capability to perform their intended function. The 230kV switchyard disconnect switches are rated on the same continuous current basis as the circuit breakers. The 230kV switchyard single-line diagram is shown on Figure 8.2-202.

The switchyard configuration provides for two main buses, both normally energized. The advantages of the breaker-and-a-half and double breaker schemes include:

- High reliability and operational flexibility
- Capability of isolating any circuit breaker or either main bus for maintenance without service interruption
- A bus fault does not interrupt service
- Double feed to each circuit
- All switching can be done with circuit breakers

The breaker-and-a-half configuration has multiple connections made between the buses. Each connection between the buses is made with three circuit breakers and two circuits (referred to as a bay). This arrangement allows for breaker maintenance without interruption of service. A fault on either bus will cause no circuit interruption. A breaker failure may result in the loss of two circuits (one bay) if a common breaker fails and only one circuit if an outside breaker fails. As described in Subsection 8.2.1.2.2, the protective relay schemes are designed to provide redundancy such that adequate protection is provided given a failure of any single component of the protective relaying system.

The connections for each RAT and each generator output are connected to different bays. A fault and a subsequent breaker failure will not isolate more than one bay. The double breaker configuration for the GSU connections further isolate the GSU from line faults by allowing the GSU to connect to the switchyard on a dedicated bay.

The features of the switchyard (i.e., breaker-and-a-half/double breaker switchyard, choice of termination points for GSU and RAT, line routing, protective relaying schemes, generator breaker, and fast bus transfer) ensure a highly reliable connection to the grid.

Transmission System Provider/Operator (TSP/TSO)

VCS SUP 8.2-2 The SCE&G transmission system operator (TSO) is responsible for the safe and reliable operation of the electrical transmission system. TSO and the Operations Departments for the VCSNS nuclear plants have formal agreements and protocols to provide safe and reliable operation of the transmission system and equipment at the nuclear plants in accordance with North American Electric Reliability Corporation (NERC) Standard NUC-001-01. Elements of this agreement are implemented in accordance with the procedures of both parties.

TSO continuously monitors and evaluates grid reliability and switchyard voltages, and informs the nuclear plant operators of any grid instability or voltage inadequacies. They also work to maintain local voltage requirements as required by the nuclear plant. The nuclear plant operators review the transmission system parameters and inform TSO immediately prior to initiating any plant activities that may affect grid reliability. In addition, the nuclear plant operators inform TSO of changes in generation ramp rates and notify them of any developing problems that may impact generation.

VCS SUP 8.2-3 As set forth in NERC Reliability Standard NUC-001-1, the formal agreement between Nuclear Plant Generator Operators (described here as VCSNS Operations Department) and Transmission Entities (described here as SCE&G TSO) establishes the Nuclear Plant Interface Requirements, such as transmission system studies and analyses. TSO performs short-term grid analyses to support VCSNS plant startup and normal shutdown. Long-term grid studies, done at a minimum of every 36 months, are performed and coordinated with the VCSNS Operations Departments. Studies of future load growth and new generation additions are performed yearly in accordance with NERC and Virginia-Carolinas Reliability Council standards.

New large generating units requesting to connect to the area bulk electric system are required to complete the Large Generator Interconnection Procedure. The studies performed by TSO as part of this procedure examine the generating unit (combined turbine-generator-exciter) and the main step-up transformer(s).

VCS SUP 8.2-4 The agreement between TSO and the VCSNS Operations Departments demonstrates protocols in place for the plant to remain cognizant of grid vulnerabilities to make informed decisions regarding maintenance activities critical to the electrical system. In the operations horizon, the TSO continuously monitors real-time power flows and assesses contingency impacts through use of a state-estimator tool. Operational planning studies are also performed using offline power flow study tools to assess near-term operating conditions under varying load, generation, and transmission topology patterns.

8.2.1.2 Transformer Area

Add the following paragraph and subsections at the end of the DCD Subsection 8.2.1.2.

VCS COL 8.2-1 The transformer area for each unit contains the GSU (three single-phase transformers plus one spare), three UATs, and two RATs. An area approximately

150 feet to the west of the transformer area contains the GSU and RAT circuit breakers and disconnects. The GSU circuit breaker is connected to the 230kV switchyard with an overhead tie-line. The two RATs are also connected to the 230kV switchyard via an overhead tie-line connected to the RAT circuit breaker.

8.2.1.2.1 Switchyard Transformer Ratings

The RATs do not have intermediate supply transformers since they are fed from the 230kV system.

8.2.1.2.2 Switchyard Protection Relay Scheme

VCS COL 8.2-2 The switchyard is designed to provide high-speed fault clearing while also maintaining high reliability and operational flexibility. The protective devices controlling the switchyard breakers are set with consideration given to preserving the plant grid connection following a turbine trip.

Under normal operating conditions, all 230kV breakers and disconnect switches are closed.

The protective relay schemes are designed to provide redundancy such that adequate protection is provided given a failure of any single component of the system. Primary protective relays are supplied with current transformer inputs, potential transformer inputs, and DC supplies that are independent of the same inputs to backup relays. The primary and backup relays trip 230kV circuit breakers via two independent trip coils supplied from two separate DC sources.

All 230kV circuit breakers are provided with a breaker failure scheme to rapidly clear faults due to a failed breaker.

Each 230kV transmission line is protected by two independent high-speed relaying schemes, each scheme using a different type of protection. The short 230kV tie-lines to Unit 1 and the tie-lines to the GSU and RAT circuit breakers also use two independent high-speed protection schemes, but each scheme may be of the same or similar type.

8.2.1.3 Switchyard Control Building

VCS COL 8.2-1 A control house is provided to serve the requirements of the switchyard. It contains the control and protective relay panels, redundant battery systems, and other panels and equipment required for switchyard operation.

All 230kV circuit breakers are controlled under the supervision of TSO.

8.2.1.4 Switchyard and Transmission Lines Testing and Inspection

An agreement between TSO and the VCSNS Operations Departments for development, maintenance, calibration, testing and modification of transmission lines, switchyards, transformer yards, and associated transmission equipment provides the procedure, policy, and organization to carry out maintenance, calibration, testing, and inspection of transmission lines and switchyards.

This agreement defines the interfaces and working relationship between TSO and VCSNS. TSO performs maintenance, calibration, and testing of transformer assets at VCSNS. TSO and the Operations Departments for the VCSNS nuclear plants are responsible for control of plant/grid interface activities. For reliability, TSO and the Operations Departments for the VCSNS nuclear plants coordinate maintenance and testing of offsite power systems. The nuclear plant operators establish communication and coordination protocols for restoration of external power supply to the nuclear plant on a priority basis.

For performance of maintenance, testing, calibration, and inspection, TSO follows its own field test manuals, vendor manuals and drawings, and industry's maintenance practices to comply with NERC reliability standards.

TSO verifies that these test results demonstrate compliance with design requirements and takes corrective actions as necessary. TSO plans and schedules maintenance activities and notifies the nuclear plant operators in advance. TSO also procures and stores necessary spare parts prior to the commencement of inspection, testing, and maintenance activities.

Transmission lines are currently inspected through an aerial inspection program twice a year. The inspection has a specific focus on right-of-way encroachments, vegetation management, conductor and line hardware condition assessment, and supporting structures. A vegetation management program is in effect to control vegetation within the boundaries of the transmission line rights-of-way. Where herbicides cannot be applied, vegetation is cut and removed. Vegetation management patrols are performed every one to three years.

The interconnecting switchyard, as well as other substation facilities, has multiple levels of inspection and maintenance. They include:

- Monthly walk-through and visual inspection including reading and recording of equipment counters and meters, site temperature and conditions, and equipment conditions.

- Quarterly oil sampling of power transformers at generating stations. Oil samples are tested for dissolved gas analysis and oil quality.

- Power circuit breakers are inspected and maintained according to the number of operations and length of time in service, in accordance with the breaker manufacturer's recommendations.

- Doble power testing on power transformers.
- Infrared and corona camera testing on bus and equipment to identify hot spots.
- Quarterly testing of battery systems including visual inspection, verification of battery voltage, and electrolyte level. Battery load testing is performed on a periodic basis not to exceed 6 years.
- Protective relay system testing including visual inspection, calibration, verification of current and potential inputs, functional trip testing, and correct operation of relay communication equipment.

8.2.2 GRID STABILITY

Add the following information at the end of DCD Subsection 8.2.2.

VCS COL 8.2-2 A transmission system study of the offsite power system is performed regularly. In order to maintain Reactor Coolant Pump (RCP) operation for three seconds following a turbine trip as specified in DCD Subsection 8.2.2, the grid voltage at the high side of the GSU and RATs must remain above the required AP1000 minimum grid voltage limit.

A forward-looking study was performed that analyzed cases for load flow, transient stability, and fault analysis. The following assumptions were made:

- Typical grid voltage is 232.3kV.
- GSU tap setting is 1.025.
- NERC Multiregional Modeling Working Group summer base cases were used for both the load flow and stability studies. The cases were modified to incorporate changes to the Southern Company and Duke Energy systems to reflect a 2015 case year as well as to incorporate changes to the SCE&G and Santee Cooper systems to reflect 2014 and 2019 case years to perform the analysis of the two Westinghouse AP1000 units.

The computer analysis was performed using the Siemens Power Technology International Software PSS/E, revision 30. The analysis examines five conditions:

- Normal running
- Normal shutdown
- Startup

- Turbine trip
- Not in service

The results of the study conclude that the transmission system remains stable preserving the grid connection, and supporting RCP operation for at least three seconds following a turbine trip under the modeled conditions.

Table 8.2-201 shows that the interface requirements for steady-state load, nominal voltage, allowable voltage regulation, nominal frequency, allowable frequency fluctuation, maximum frequency decay rate, and limiting under frequency value for the RCP have been satisfied.

The AP1000 generator 26kV terminal voltages met the requirement of 0.95 per unit – 1.05 per unit for steady-state conditions following transients caused by system contingencies. The results of the study conclude that the transmission system remains stable preserving the grid connection, and supporting RCP operation for at least three seconds following a turbine trip under the modeled conditions.

From 1987 to 2007, the 230kV transmission lines connecting the VCSNS site experienced 113 forced outages. The average frequency of forced line outages since 1987 is approximately 6 per year for the involved lines, with the majority being momentary outages due to lightning strikes or storm damage. The leading causes of forced outages of significant duration are equipment failures, logging and construction activities, and lightning or storm damage.

8.2.5 COMBINED LICENSE INFORMATION FOR OFFSITE ELECTRICAL POWER

VCS COL 8.2-1 This COL item 8.2-1 is addressed in Subsections 8.2.1, 8.2.1.1, 8.2.1.2, 8.2.1.3, and 8.2.1.4.

VCS COL 8.2-2 This COL item 8.2-2 is addressed in Subsections 8.2.1.2.2 and 8.2.2.

VCS COL 8.2-2

Table 8.2-201
Grid Stability Interface Evaluation

DCD Table 1.8-1 Item 8.2 Parameter	WEC AC Requirements	VCSNS 2 & 3 Value Assumed
Steady-state load	"normal running values provided as input to grid stability"	(90.00 + j58.6) MVA*
Inrush kVA for motors	56,712 kVA**	56,712 kVA**
Nominal Voltage	Not provided	1.01 pu (232.3 kV)
Allowable voltage regulation	0.95-1.05 pu steady state 0.15 pu transient dip***	0.95-1.05 pu steady state 0.15 pu transient dip***
Nominal Frequency	60 Hz	Assumed 60 Hz
Allowable frequency fluctuation	±1/2 Hz indefinite	±1/2 Hz indefinite
Maximum frequency decay rate	5 Hz/sec	5 Hz/sec

*Margin added to provide running values to account for site specific mechanical draft cooling tower loads.

**Based on the inrush of a single 10,000 HP feedwater pump assuming efficiency = 0.95, pf=0.9, and inrush =6.5x FLA.

***Applicable to Turbine Trip Only. The maximum allowable voltage dip from the pre-event steady state voltage value during the 3 second turbine trip event transient as measured at the point of connection to the high side of the generator step-up transformer and the reserve auxiliary transformer.

DCD Table 1.8-1 Item 8.2 Parameter	WEC Acceptance Criteria	VCSNS 2 & 3 Value Calculated
Limited under frequency value for RCP	≥57.7 Hz	≥57.7 Hz

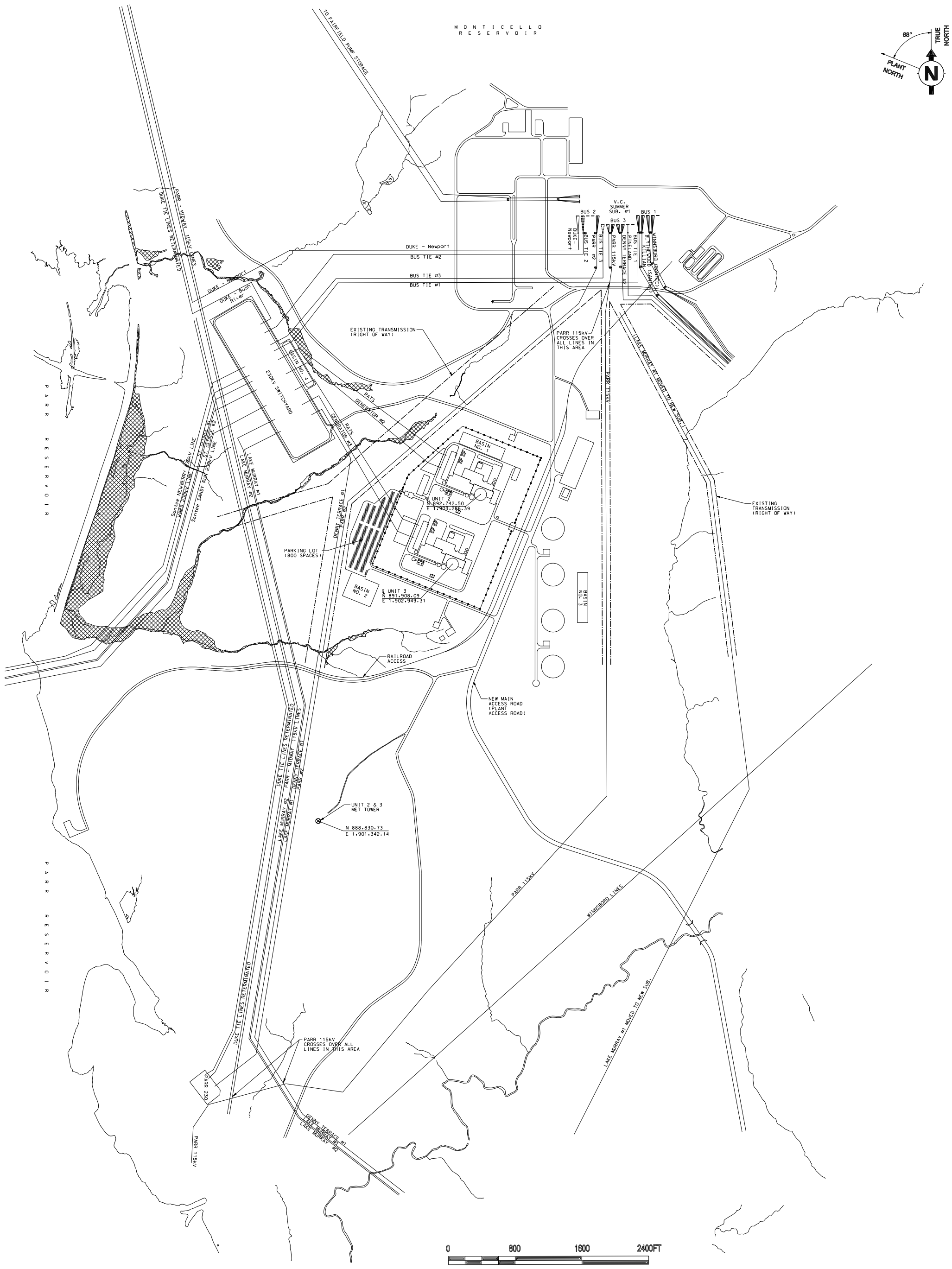

Figure 8.2-201
Site Transmission Line Map

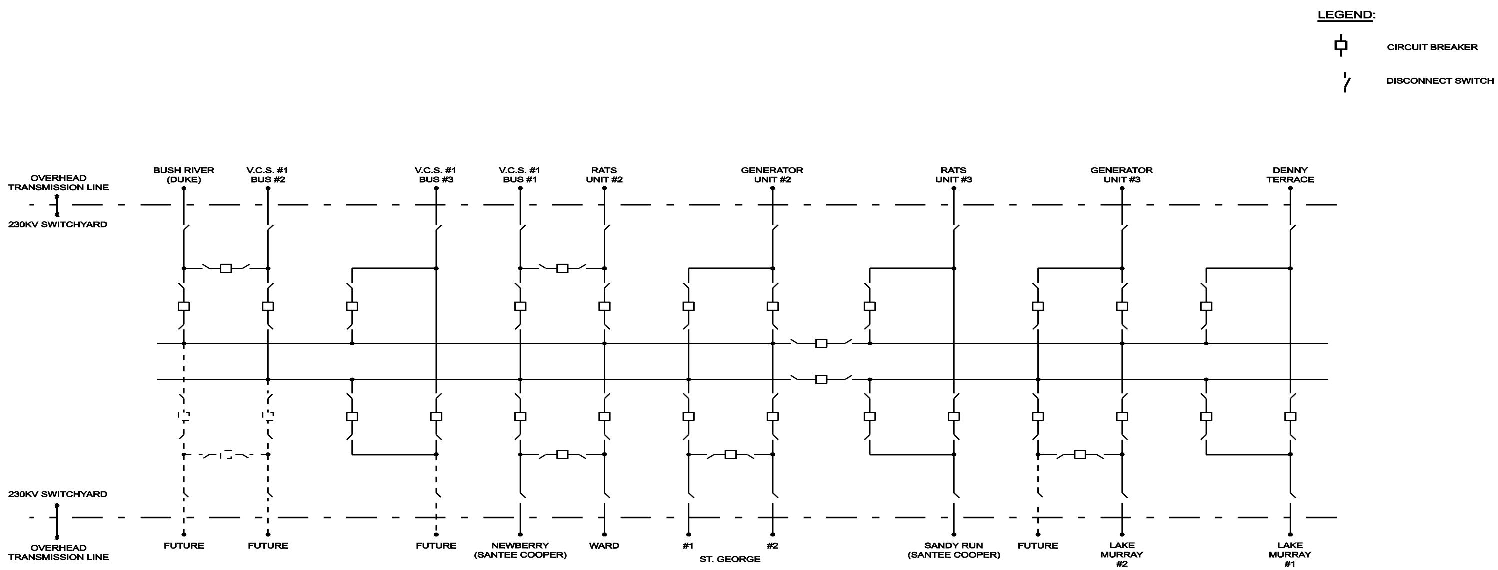

Figure 8.2-202
Switchyard Single-Line Diagram

8.3 ONSITE POWER SYSTEMS

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

8.3.1.1.1 Onsite AC Power System

Add the following to the end of the fourth paragraph of DCD Subsection 8.3.1.1.1.

VCS SUP 8.3-1 The site specific 230 kV switchyard is shown on Figure 8.2-201.

8.3.1.1.2.3 Onsite Standby Power System Performance

Add the following text between the second and third paragraphs of DCD Subsection 8.3.1.1.2.3.

VCS SUP 8.3-2 The VCSNS Units 2 and 3 site conditions provided in Table 2.0-201 and Section 2.3 are bounded by the standard site conditions used to rate both the diesel engine and the associated generator in DCD Subsection 8.3.1.1.2.3.

Add the following subsection after DCD Subsection 8.3.1.1.2.3.

8.3.1.1.2.4 Operation, Inspection, and Maintenance

STD COL 8.3-2 Operation, inspection and maintenance (including preventive, corrective, and predictive maintenance) procedures consider both the diesel generator manufacturer's recommendations and industry diesel working group recommendations.

8.3.1.1.6 Containment Building Electrical Penetrations

Add the following text at the end of DCD Subsection 8.3.1.1.6.

STD COL 8.3-2 Procedures implement periodic testing of protective devices that provide penetration overcurrent protection. A sample of each different type of overcurrent device is selected for periodic testing during refueling outages. Testing includes:

- Verification of thermal and instantaneous trip characteristics of molded case circuit breakers.
- Verification of long time, short time, and instantaneous trips of medium voltage vacuum circuit breakers.
- Verification of long time, short time, and instantaneous trips of low voltage air circuit breakers.
- Verification of Class 1E and non-Class 1E dc protective device characteristics (except fuses) per manufacturer recommendations, including testing for overcurrent interruption and/or fault current limiting.

Penetration protective devices are maintained and controlled under the plant configuration control program. A fuse control program, including a master fuse list, is established based on industry operating experience.

8.3.1.1.7 Grounding System

Replace the last paragraph of DCD Subsection 8.3.1.1.7 with the following information.

VCS COL 8.3-1 A Grounding Grid System within the Units 2 and 3 site boundary includes step and touch potentials near equipment that are within the acceptable limit for personnel safety. Actual resistivity measurements from soil samples taken at the Units 2 and 3 site were analyzed to create a soil model for the plant site. The ground grid conductor size was then determined using the methodology outlined in IEEE 80, "IEEE Guide for Safety in AC Substation Grounding" (Reference 201), and a grid configuration for the site was created. The grid configuration was modeled in conjunction with the soil model. The resulting step and touch potentials are within the acceptable limit.

8.3.1.1.8 Lightning Protection

Replace the last paragraph of DCD Subsection 8.3.1.1.8 with the following information.

VCS COL 8.3-1 In accordance with IEEE 665, "IEEE Standard for Generating Station Grounding" (DCD Section 8.3 Reference 18), a Lightning Protection Risk Assessment for the Units 2 and 3 buildings was performed based on the methodology in NFPA 780 (DCD Section 8.3 Reference 19). The tolerable lightning frequency for each of the buildings was determined to be less than the expected lightning frequency; therefore, lightning protection is required for the Units 2 and 3 buildings. The zone of protection is based on the elevations and geometry of the structures. It includes the space not intruded by a rolling sphere having a radius prescribed in Reference 19. The zone of protection method is based on the use of ground masts, air terminals, and shield wires. Either copper or aluminum is used for lightning protection. Lightning protection grounding is interconnected with the station or switchyard grounding system.

8.3.1.4 Inspection and Testing

STD SUP 8.3-4 Add the following text at the end of DCD Subsection 8.3.1.4

Procedures are established for periodic verification of proper operation of the Onsite AC Power System capability for automatic and manual transfer from the preferred power supply to the maintenance power supply and return from the maintenance power supply to the preferred power supply.

8.3.2.1.1.1 Class 1E DC Distribution

Add the following text at the end of DCD Subsection 8.3.2.1.1.1.

STD SUP 8.3-3 No site-specific non-Class 1E dc loads are connected to the Class 1E dc system.

8.3.2.1.4 Maintenance and Testing

Add the following text at the end of DCD Subsection 8.3.2.1.4.

STD COL 8.3-2 Procedures are established for inspection and maintenance of Class 1E and non-Class 1E batteries. Class 1E battery maintenance and service testing is performed in conformance with Regulatory Guide 1.129. Batteries are inspected periodically to verify proper electrolyte levels, specific gravity, cell temperature and battery float voltage. Cells are inspected in conformance with IEEE 450 and vendor recommendations.

The clearing of ground faults on the Class 1E dc system is also addressed by procedure. The battery testing procedures are written in conformance with IEEE 450 and the Technical Specifications.

8.3.3 COMBINED LICENSE INFORMATION FOR ONSITE ELECTRICAL POWER

VCS COL 8.3-1 This COL Item is addressed in Subsections 8.3.1.1.7 and 8.3.1.1.8.

STD COL 8.3-2 This COL Item is addressed in Subsections 8.3.1.1.2.4, 8.3.1.1.6 and 8.3.2.1.4.

8.3.4 REFERENCES

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201. Institute of Electrical and Electronics Engineers (IEEE), “IEEE Guide for Safety in AC Substation Grounding,” IEEE Std 80-2000, August 4, 2000.
