

**Final Safety Evaluation Report for Combined Licenses for  
Virgil C. Summer Nuclear Station Units 2 and 3**

U. S. Nuclear Regulatory Commission  
Office of New Reactors  
Washington, DC 20555-0001

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## ABSTRACT

This final safety evaluation report<sup>1</sup> (FSER) documents the U.S. Nuclear Regulatory Commission (NRC) staff's technical review of the combined license (COL) application submitted by South Carolina Electric and Gas Company (SCE&G or the applicant), for the Virgil C. Summer Nuclear Station (VCSNS) Units 2 and 3.

By letter dated March 27, 2008, the SCE&G, acting on behalf of itself and as agent for the South Carolina Public Service Authority (also referred to as Santee Cooper), submitted its application to the NRC for COLs for two AP1000 advanced passive pressurized-water reactors (PWRs) pursuant to the requirements of Sections 103 and 185(b) of the Atomic Energy Act of 1954, as amended; Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52, "Licenses, certifications and approvals for nuclear power plants," and the associated material licenses under 10 CFR Part 30, "Rules of general applicability to domestic licensing of byproduct material"; 10 CFR Part 40, "Domestic licensing of source material"; and 10 CFR Part 70, "Domestic licensing of special nuclear material." These reactors are identified as VCSNS Units 2 and 3, and will be located approximately 1 mile from the center of VCSNS Unit 1 in western Fairfield County, South Carolina.

The initial application incorporated by reference 10 CFR Part 52, Appendix D, "Design Certification Rule for the AP1000 Design," and the Westinghouse Electric Corporation's (Westinghouse's) application for amendment of the AP1000 design, as described in Revision 16 of the Design Control Document (DCD) (submitted May 26, 2010) as well as Westinghouse Technical Report (TR)-134, APP-GW-GLR-134, "AP1000 DCD Impacts to Support COLA Standardization," Revision 4, which was submitted on March 20, 2008. Subsequent to the initial application, in a letter dated June 28, 2011, SCE&G submitted Revision 5 of the application that incorporates by reference AP1000 DCD Revision 19. The results of the NRC staff's evaluation of the AP1000 DCD are documented in NUREG-1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design," and its supplements.

This FSER presents the results of the staff's review of information submitted in conjunction with the COL application, except those matters resolved as part of the referenced design certification rule. In Appendix A to this FSER, the staff has identified certain license conditions and inspections, tests, analyses and acceptance criteria (ITAAC) that the staff recommends the Commission impose, should COLs be issued to the applicant. Appendix A contains those proposed ITAAC that are discussed in this SER. In addition to the ITAAC in Appendix A, the ITAAC found in the AP1000 DCD Revision 19 Tier 1 material will also be incorporated into the COLs should COLs be issued to the applicant.

On the basis of the staff's review<sup>2</sup> of the application, as documented in this FSER, the staff recommends that the Commission find the following with respect to the safety aspects of the COL application: 1) the applicable standards and requirements of the Atomic Energy Act and

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<sup>1</sup> This FSER documents the NRC staff's position on all safety issues associated with the combined license application. The Advisory Committee on Reactor Safeguards (ACRS) independently reviewed those aspects of the application that concern safety, as well as the advanced safety evaluation report without open items (an earlier version of this document), and provided the results of its review to the Commission in a report dated February 17, 2011. This report is included as Appendix F to this FSER.

<sup>2</sup> An environmental review was also performed of the COL application and its evaluation and conclusions are documented in NUREG-1939, "Final Environmental Impact Statement for Combined Licenses for Virgil C. Summer Nuclear Station Units 2 and 3," dated April 2011.

Commission regulations have been met; 2) required notifications to other agencies or bodies have been duly made; 3) there is reasonable assurance that the facility will be constructed and will operate in conformity with the license, the provisions of the Atomic Energy Act, and the Commission's regulations; 4) the applicant is technically and financially qualified to engage in the activities authorized; and 5) issuance of the license will not be inimical to the common defense and security or to the health and safety of the public.

# CONTENTS

The chapter and section layout of this FSER is consistent with the format of (1) NUREG-0800, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)”; (2) Regulatory Guide (RG) 1.206, “Combined License Applications for Nuclear Power Plants”; and (3) the applicant’s final safety analysis report (FSAR). Where applicable, references to other regulatory actions (e.g., design certifications) are included in the text of the safety evaluation report (SER).

ABSTRACT .....	i
CONTENTS .....	iii
FIGURES .....	xvi
TABLES .....	xviii
APPENDICES .....	xix
EXECUTIVE SUMMARY .....	xx
ABBREVIATIONS .....	xxii
1.0 INTRODUCTION AND INTERFACES .....	1-1
1.1 Summary of Application .....	1-1
1.2 Regulatory Basis .....	1-5
1.2.1 Applicable Regulations .....	1-5
1.2.2 Finality of Referenced NRC Approvals .....	1-6
1.2.3 Overview of the Design-Centered Review Approach .....	1-8
1.3 Principal Review Matters .....	1-10
1.4 Staff Review of VCSNS COL FSAR Chapter 1 .....	1-14
1.5 Additional Regulatory Considerations .....	1-35
1.5.1 10 CFR 52.97(a)(1)(iv) Applicant Financial Qualifications and Evaluation of Financial Qualification in accordance with 10 CFR 50.33 .....	1-35
1.5.2 Nuclear Waste Policy Act .....	1-41
1.5.3 Consultation with Department of Homeland Security and Notifications .....	1-42
1.5.4 Evaluation of Departures and Exemption Associated with Numbering in the Application and Exemption Associated with Special Nuclear Material (SNM) Material Control and Accounting (MC&A) Program .....	1-42
1.5.5 Receipt, Possession, and Use of Source, Byproduct and Special Nuclear Material Authorized by 10 CFR Part 52 Combined Licenses .....	1-45
2.0 SITE CHARACTERISTICS .....	2-1
2.1 Geography and Demography .....	2-7
2.1.1 Site Location and Description .....	2-7
2.1.2 Exclusion Area Authority and Control .....	2-10
2.1.3 Population Distribution .....	2-13
2.2 Nearby Industrial, Transportation, and Military Facilities .....	2-17
2.2.1 Locations and Routes .....	2-17

2.2.2	Refer to 2.2.1 .....	2-26
2.2.3	Evaluation of Potential Accidents .....	2-26
2.3	Meteorology.....	2-35
2.3.1	Regional Climatology.....	2-36
2.3.2	Local Meteorology .....	2-50
2.3.3	Onsite Meteorological Measurements Program .....	2-57
2.3.4	Short-Term Diffusion Estimates (Related to RG 1.206, Section C.III.1, Chapter 2, C.I.2.3.4, “Short-Term Atmospheric Dispersion Estimates for Accident Releases”).....	2-66
2.3.5	Long-Term Diffusion Estimates (Related to RG 1.206, Section C.III.2, Chapter 2, C.I.2.3.5, “Long Term Atmospheric Dispersion Estimates for Routine Releases”).....	2-74
2.4	Hydrologic Engineering .....	2-80
2.4.1	Hydrologic Description.....	2-81
2.4.2	Floods.....	2-88
2.4.3	Probable Maximum Flood on Streams And Rivers.....	2-100
2.4.4	Potential Dam Failures .....	2-107
2.4.5	Probable Maximum Surge and Seiche Flooding .....	2-112
2.4.6	Probable Maximum Tsunami Hazards.....	2-115
2.4.7	Ice Effects .....	2-119
2.4.8	Cooling Water Canals and Reservoirs.....	2-122
2.4.9	Channel Diversions.....	2-124
2.4.10	Flooding Protection Requirements .....	2-127
2.4.11	Low Water Considerations.....	2-130
2.4.12	Groundwater .....	2-132
2.4.13	Accidental Release of Radioactive Liquid Effluent in Ground and Surface Waters .....	2-141
2.4.14	Technical Specification and Emergency Operation Requirements .....	2-150
2.5	Geology, Seismology, and Geotechnical Engineering .....	2-152
2.5.1	Basic Geologic and Seismic Information .....	2-153
2.5.2	Vibratory Ground Motion.....	2-196
2.5.3	Surface Faulting.....	2-230
2.5.4	Stability of Subsurface Materials and Foundations.....	2-246
2.5.5	Stability of Slopes .....	2-285
3.0	DESIGN OF STRUCTURES, COMPONENTS, EQUIPMENT AND SYSTEMS .....	3-1
3.1	Conformance with NRC General Design Criteria .....	3-1
3.2	Classification of Structures, Components, and Systems.....	3-1
3.2.1	Seismic Classification .....	3-1
3.2.2	AP1000 Classification Systems (Related to RG 1.206, Section C.III.1, Chapter 3, C.I.3.2.2, “System Quality Group Classification”) .....	3-5
3.3	Wind and Tornado Loadings .....	3-9
3.3.1	Wind Loadings .....	3-9
3.3.2	Tornado Loading.....	3-12
3.4	Water Level (Flood) Design.....	3-15
3.4.1	Flood Protection.....	3-15
3.4.2	Analytical and Test Procedures (Related to RG 1.206, Section C.III.1, Chapter 3, C.I.3.4.2, “Analysis Procedures”) .....	3-17
3.5	Missile Protection .....	3-17

3.5.1	Missile Selection and Description .....	3-18
3.5.2	Protection from Externally Generated Missiles .....	3-24
3.5.3	Barrier Design Procedures .....	3-25
3.6	Protection against Dynamic Effects Associated with the Postulated Rupture of Piping.....	3-25
3.7	Seismic Design.....	3-31
3.7.1	Seismic Design Parameters .....	3-32
3.7.2	Seismic System Analysis.....	3-34
3.7.3	Seismic Subsystem Analysis .....	3-38
3.7.4	Seismic Instrumentation .....	3-39
3.8	Design Of Category I Structures.....	3-47
3.8.1	Concrete Containment.....	3-47
3.8.2	Steel Containment .....	3-47
3.8.3	Concrete and Steel Internal Structures of Steel or Concrete Containment .....	3-47
3.8.4	Other Seismic Category I Structures .....	3-48
3.8.5	Foundations .....	3-48
3.9	Mechanical Systems and Components .....	3-54
3.9.1	Special Topics for Mechanical Components.....	3-54
3.9.2	Dynamic Testing and Analysis of Systems, Structures and Components .....	3-55
3.9.3	ASME Code Class 1, 2, and 3 Components, Component Supports, and Core Support Structures.....	3-55
3.9.4	Control Rod Drive System .....	3-61
3.9.5	Reactor Pressure Vessel Internals .....	3-61
3.9.6	Inservice Testing of Pumps and Valves (Related to RG 1.206, Section C.III.1, Chapter 3, C.I.3.9.6, "Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints") .....	3-62
3.9.7	Integrated Head Package .....	3-78
3.10	Seismic and Dynamic Qualification of Mechanical and Electrical Equipment .....	3-78
3.11	Environmental Qualification of Mechanical and Electrical Equipment.....	3-81
3.12	Piping Design (Related to RG 1.206, Section C.III.1, Chapter 3, C.I.3.12, "Piping Design Review") .....	3-89
4.0	REACTOR.....	4-1
4.1	Introduction.....	4-1
4.2	Summary of Application .....	4-1
4.3	Regulatory Basis .....	4-1
4.4	Technical Evaluation .....	4-2
4.5	Post Combined License Activities .....	4-5
4.6	Conclusion.....	4-6
5.0	REACTOR COOLANT SYSTEM AND CONNECTED SYSTEMS .....	5-1
5.1	Introduction.....	5-1
5.2	Integrity of Reactor Coolant Pressure Boundary .....	5-1
5.2.1.1	Compliance with 10 CFR 50.55a .....	5-1
5.2.1.2	Applicable Code Cases (Related to RG 1.206, Section C.III.1, Chapter 5, C.I.5.2.1.2, "Compliance with Applicable ASME Code Cases").....	5-8

5.2.1.3	Alternate Classification.....	5-12
5.2.2	Overpressure Protection.....	5-12
5.2.3	Reactor Coolant Pressure Boundary Materials .....	5-13
5.2.4	Inservice Inspection and Testing of Class 1 Components (Related to RG 1.206, Section C.III.1, Chapter 5, C.I.5.2.4, “Inservice Inspection and Testing of Reactor Coolant Pressure Boundary”).....	5-17
5.2.5	Detection of Leakage through Reactor Coolant Pressure Boundary (Related to RG 1.206, Section C.III.1, Chapter 5, C.I.5.2.5, Reactor Coolant Pressure Boundary Leakage Detection”) .....	5-34
5.3	Reactor Vessel.....	5-38
5.3.1	Reactor Vessel Design .....	5-38
5.3.2	Reactor Vessel Materials.....	5-39
5.3.3	Pressure Temperature Limits (Related to RG 1.206, Section C.III.1, Chapter 5, C.I.5.3.2, “Pressure-Temperature Limits, Pressurized Thermal Shock, and Charpy Upper-Shelf Energy Data and Analyses”).....	5-46
5.3.4	Reactor Vessel Integrity (Related to RG 1.206, Section C.III.1, Chapter 5, C.I.5.3.3 “Reactor Vessel Integrity”).....	5-50
5.3.5	Reactor Vessel Insulation .....	5-54
5.4	Component and Subsystem Design (Related to RG 1.206, Section C.III.1, Chapter 5, C.I.5.4, “Reactor Coolant System Component and Subsystem Design”) .....	5-54
6.0	ENGINEERED SAFETY FEATURES .....	6-1
6.0	Engineered Safety Features.....	6-1
6.1	Engineered Safety Features Materials .....	6-1
6.1.1	Metallic Materials .....	6-1
6.1.2	Organic Materials.....	6-4
6.2	Containment Systems .....	6-14
6.3	Passive Core Cooling System (Related to RG 1.206, Section C.III.1, Chapter 6, C.I.6.3, “Emergency Core Cooling System”) .....	6-19
6.4	Habitability Systems .....	6-24
6.5	Fission Product Removal and Control Systems .....	6-36
6.6	Inservice Inspection of Class 2, 3, and MC Components (Related to RG 1.206, Section C.III.1, Chapter 6, C.I.6.6, “Inservice Inspection of Class 2 and 3 Components”).....	6-36
7.0	INSTRUMENTATION AND CONTROLS .....	7-1
7.1	Introduction.....	7-1
7.2	Reactor Trip.....	7-4
7.3	Engineered Safety Features.....	7-4
7.4	Systems Required for Safe Shutdown.....	7-5
7.5	Safety-Related Display Information (Related to RG 1.206, Section C.III.1, Chapter 7, C.1.7.5, “Information Systems Important to Safety”) .....	7-5
7.6	Interlock Systems Important to Safety.....	7-8
7.7	Control and Instrumentation Systems (Related to RG 1.206, Section C.III.1, Chapter 7, C.I.7.7, “Control Systems Not Required for Safety”) .....	7-8

8.0	ELECTRIC POWER.....	8-1
8.1	Introduction.....	8-1
8.2	Offsite Power System.....	8-5
8.2.A	Site-Specific ITAAC for Offsite Power Systems.....	8-20
8.3	Onsite Power Systems.....	8-24
8.3.1	AC Power Systems.....	8-24
8.3.2	DC Power Systems.....	8-31
9.0	AUXILIARY SYSTEMS.....	9-1
9.1	Fuel Storage and Handling.....	9-1
9.1.1	New Fuel Storage (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.1.1, “Criticality Safety of Fresh and Spent Fuel Storage and Handling,” and C.I.9.1.2, “New and Spent Fuel Storage”).....	9-1
9.1.2	Spent Fuel Storage (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.1.1, “Criticality Safety of Fresh and Spent Fuel Storage and Handling,” and C.I.9.1.2, “New and Spent Fuel Storage”).....	9-1
9.1.3	Spent Fuel Pool Cooling System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.1.3, “Spent Fuel Pool Cooling and Cleanup System”).....	9-8
9.1.4	Light Load Handling System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.1.4, “Light Load Handling System (Related to Refueling)”).....	9-11
9.1.5	Overhead Heavy Load Handling Systems (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.1.5, “Overhead Load Handling System”).....	9-16
9.2	Water Systems.....	9-22
9.2.1	Service Water System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.2.1, “Station Service Water System (Open, Raw Water Cooling Systems)”).....	9-22
9.2.2	Component Cooling Water System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.2.2, “Cooling System for Reactor Auxiliaries (Closed Cooling Water Systems)”).....	9-25
9.2.3	Demineralized Water Treatment System.....	9-30
9.2.4	Demineralized Water Transfer and Storage System.....	9-31
9.2.5	Potable Water System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.2.4, “Potable and Sanitary Water Systems”).....	9-31
9.2.6	Sanitary Drains (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.2.4, “Potable and Sanitary Water Systems”).....	9-33
9.2.7	Central Chilled Water System (Related to RG 1.206 Section C.III.1, Chapter 9, C.I.9.2.2, “Cooling System for Reactor Auxiliaries (Closed Cooling Water Systems)”).....	9-35
9.2.8	Turbine Building Closed Cooling Water System.....	9-40
9.2.9	Waste Water System (Related to RG 1.206 Section C.III.1, Chapter 9, C.I.9.3.3, “Equipment and Floor Drainage System”).....	9-41
9.2.10	Hot Water Heating System.....	9-45
9.2.11	Raw Water System.....	9-45
9.3	Process Auxiliaries.....	9-55
9.3.1	Compressed and Instrument Air System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.3.1, “Compressed Air Systems”).....	9-55

9.3.2	Plant Gas System (Related to RG 1.206 Section C.III.1, Chapter 9, C.I.9.3.1, “Compressed Air Systems”) .....	9-58
9.3.3	Primary Sampling System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.3.2, “Process and Postaccident Sampling Systems”).....	9-58
9.3.4	Secondary Sampling System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.3.2, “Process and Postaccident Sampling Systems”).....	9-58
9.3.5	Equipment and Floor Drainage Systems (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.3.3, “Equipment and Floor Drainage System”).....	9-59
9.3.6	Chemical and Volume Control System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.3.4, “Chemical and Volume Control System (PWR) Including Boron Recovery System”).....	9-59
9.4	Air-Conditioning, Heating, Cooling, and Ventilation Systems.....	9-59
9.4.1	Nuclear Island Nonradioactive Ventilation System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.4.1, “Control Room Area Ventilation System”).....	9-59
9.4.2	Annex/Auxiliary Buildings Nonradioactive HVAC System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.4.3, “Auxiliary and Radwaste Area Ventilation System”) .....	9-63
9.4.3	Radiologically Controlled Area Ventilation System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.4.2, “Spent Fuel Pool Area Ventilation System,” and C.I.9.4.3, “Auxiliary and Radwaste Area Ventilation System”).....	9-63
9.4.4	Balance-of-Plant Interface .....	9-63
9.4.5	Engineered Safety Features Ventilation System .....	9-63
9.4.6	Containment Recirculation Cooling System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.4.5, “Engineered Safety Feature Ventilation System”).....	9-64
9.4.7	Containment Air Filtration System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.4.5, “Engineered Safety Feature Ventilation System”).....	9-64
9.4.8	Radwaste Building HVAC System .....	9-67
9.4.9	Turbine Building Ventilation System .....	9-67
9.4.10	Diesel Generator Building Heating and Ventilation System.....	9-67
9.4.11	Health Physics and Hot Machine Shop HVAC System .....	9-67
9.5	Other Auxiliary Systems .....	9-68
9.5.1	Fire Protection System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.5.1, Fire Protection Program).....	9-68
9.5.2	Communication System.....	9-80
9.5.3	Plant Lighting System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.5.3, “Lighting Systems”) .....	9-87
9.5.4	Diesel Generator Fuel Oil System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.5.4, “Diesel Generator Fuel Oil Storage and Transfer System).....	9-88
9.5.5	Standby Diesel Generator Cooling Water System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.5.5, “Diesel Generator Cooling Water System”) .....	9-92

9.5.6	Standby Diesel Generator Starting Air System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.5.6, "Diesel Generator Starting System").....	9-92
9.5.7	Standby Diesel Generator Lubrication System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.5.7, "Diesel Generator Lubrication System").....	9-92
9.5.8	Standby Diesel Generator Combustion Air Intake and Exhaust System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.5.8, "Diesel Generator Combustion Air Intake and Exhaust System") .....	9-93
10.0	STEAM AND POWER CONVERSION .....	10-1
10.1	Summary Description .....	10-1
10.2	Turbine-Generator .....	10-7
10.3	Main Steam Supply System .....	10-12
10.4	Other Features of Steam and Power Conversion System.....	10-17
10.4.1	Main Condensers.....	10-17
10.4.2	Main Condenser Evacuation System.....	10-18
10.4.3	Gland Sealing System (Related to RG 1.206, Section C.III.1, Chapter 10, C.I.10.4.3, "Turbine Gland Sealing System") .....	10-20
10.4.4	Turbine Bypass System.....	10-20
10.4.5	Circulating Water System .....	10-21
10.4.6	Condensate Polishing System (Related to RG 1.206, Section C.III.1, Chapter 10, C.I.10.4.6, "Condensate Cleanup System") .....	10-26
10.4.7	Condensate and Feedwater System .....	10-26
10.4.8	Steam Generator Blowdown System (Related to RG 1.206, Section C.III.1, Chapter 10, C.I.10.4.8, "Steam Generator Blowdown System (PWR)") .....	10-33
10.4.9	Startup Feedwater System .....	10-33
10.4.10	Auxiliary Steam System.....	10-33
10.4.11	Turbine Island Chemical Feed.....	10-34
10.4.12	Combined License Information .....	10-34
11.0	RADIOACTIVE WASTE MANAGEMENT .....	11-1
11.1	Source Terms.....	11-1
11.2	Liquid Waste Management Systems.....	11-1
11.3	Gaseous Waste Management System.....	11-14
11.4	Solid Waste Management (Related to RG 1.206, Section C.III.1, Chapter 11, C.I.11.4, "Solid Waste Management System") .....	11-24
11.5	Radiation Monitoring (Related to RG 1.206, Section C.III.1, Chapter 11, C.I.11.5, "Process and Effluent Radiological Monitoring and Sampling Systems") .....	11-31
12.0	RADIATION PROTECTION .....	12-1
12.1	Assuring That Occupational Radiation Exposures Are As-Low-As-Reasonably Achievable (ALARA) (Related to RG 1.206, Section C.III.1, Chapter 12, C.I.12.1, "Ensuring that Occupational Radiation Exposures are As Low As Is Reasonably Achievable") .....	12-1
12.2	Radiation Sources .....	12-8
12.3	Radiation Protection Design Features.....	12-11

12.4	Dose Assessment .....	12-24
12.5	Health Physics Facilities Design (Related to RG 1.206, Section C.III.1, Chapter 12, C.I.12.5, “Operational Radiation Protection Program”).....	12-32
13.0	CONDUCT OF OPERATIONS.....	13-1
13.1	Organizational Structure of Applicant.....	13-1
13.2	Training .....	13-7
13.3	Emergency Planning .....	13-13
	Attachment 13.3A – COL Information Items, Supplemental Information Items and Departures.....	13-22
	Attachment 13.3B – Emergency Planning Information in the Application .....	13-26
	Attachment 13.3C - Onsite Emergency Plan.....	13-32
13.4	Operational Programs (Related to RG 1.206, Section C.III.1, Chapter 13, C.I.13.4, “Operational Program Implementation”) .....	13-141
13.5	Plant Procedures .....	13-146
13.6	Physical Security .....	13-151
13.6.1	Introduction .....	13-151
13.6.2	Summary of Application.....	13-152
13.6.3	Regulatory Basis.....	13-153
13.6.4	Technical Evaluation.....	13-154
	13.6.4.1 Physical Security Plan.....	13-158
	13.6.4.2 Appendix B Training and Qualification Plan.....	13-183
	13.6.4.3 Appendix C Safeguards Contingency Plan .....	13-195
13.6.5	Post Combined License Activities.....	13-203
13.6.6	Conclusion.....	13-203
13.6.A	Site-Specific ITAAC for Physical Security.....	13-204
	13.6.A.1 Introduction .....	13-204
	13.6.A.2 Summary of Application .....	13-204
	13.6.A.3 Regulatory Basis .....	13-205
	13.6.A.4 Technical Evaluation .....	13-207
	13.6.A.4.1 Detection and Assessment Hardware .....	13-208
	13.6.A.4.2 Delay or Barrier Design .....	13-210
	13.6.A.4.3 Systems, Hardware, or Features Facilitating Security Response and Neutralization.....	13-210
	13.6.A.5 Post-Combined License Activities.....	13-211
	13.6.A.6 Conclusion .....	13-211
13.7	Fitness for Duty .....	13-212
13.8	Cyber Security .....	13-220
13.8.1	Introduction .....	13-220
13.8.2	Summary of Application.....	13-220
13.8.3	Regulatory Basis.....	13-221
13.8.4	Technical Evaluation.....	13-221
	13.8.4.1 Establishment of Cyber Security Program .....	13-223
	13.8.4.2 Security Assessment and Authorization (Section A.3.1.1 of Appendix A to RG 5.71).....	13-225
	13.8.4.3 Cyber Security Team (Section A.3.1.2 of Appendix A to RG 5.71) .....	13-225
	13.8.4.4 Identification of Critical Digital Assets (Section A.3.1.3 of Appendix A to RG 5.71).....	13-226

13.8.4.5	Reviews and Validation Testing (Section A.3.1.4 of Appendix A to RG 5.71) .....	13-227
13.8.4.6	Defense-In-Depth Protective Strategies (Section A.3.1.5 of Appendix A to RG 5.71).....	13-227
13.8.4.7	Application of Security Controls (Section A.3.1.6 of Appendix A to RG 5.71) .....	13-228
13.8.4.8	Incorporating the Cyber Security Program into the Physical Protection Program (Section A.3.2 of Appendix A to RG 5.71) .....	13-229
13.8.4.9	Policies and Implementing Procedures (Section A.3.3 of Appendix A to RG 5.71).....	13-229
13.8.4.10	Maintaining the Cyber Security Program (Section A.4 of Appendix A to RG 5.71).....	13-230
13.8.4.11	Continuous Monitoring and Assessment (Section A.4.1 of Appendix A to RG 5.71).....	13-230
13.8.4.12	Periodic Assessment of Security Controls (Section A.4.1.1 of Appendix A to RG 5.71).....	13-231
13.8.4.13	Effectiveness Analysis (Section A.4.1.2 of Appendix A to RG 5.71) .....	13-231
13.8.4.14	Vulnerability Assessments and Scans (Section A.4.1.3 of Appendix A to RG 5.71).....	13-232
13.8.4.15	Change Control (Section A.4.2 of Appendix A to RG 5.71).....	13-232
13.8.4.16	Configuration Management (Section A.4.2.1 of Appendix A to RG 5.71) .....	13-233
13.8.4.17	Security Impact Analysis of Changes and Environment (Section A.4.2.2 of Appendix A to RG 5.71).....	13-233
13.8.4.18	Security Reassessment and Authorization (Section A.4.2.3 of Appendix A to RG 5.71).....	13-234
13.8.4.19	Updating Cyber Security Practices (Section A.4.2.4 of Appendix A to RG 5.71).....	13-235
13.8.4.20	Review and Validation Testing of a Modification or Addition of a Critical Digital Asset (Section A.4.2.5 of Appendix A to RG 5.71).....	13-236
13.8.4.21	Application of Security Controls Associated with a Modification or Addition (Section A.4.2.6 of Appendix A to RG 5.71) .....	13-236
13.8.4.22	Cyber Security Program Review (Section A.4.3 of Appendix A to RG 5.71) .....	13-237
13.8.4.23	Document Control and Records Retention and Handling (Section A.5 of Appendix A to RG 5.71) ....	13-238
13.8.4.24	Deviations Taken to RG 5.71, Sections C.1 Through C.5 .....	13-239
13.8.5	Post Combined License Activities.....	13-265
13.8.6	Conclusion .....	13-265
14.0	INITIAL TEST PROGRAMS .....	14-1
14.1	Specific Information to be Included in Preliminary/Final Safety Analysis Reports (Related to RG 1.206, Section C.III.1, Chapter 14, C.I.14.1, "Specific Information To Be Addressed for the Initial Plant Test Program").....	14-1

14.2	Specific Information to be Included in Standard Safety Analysis Reports (Related to RG 1.206, Section C.III.1, Chapter 14, C.I.14.2, "Initial Plant Test Program") .....	14-2
14.2.1	Summary of Test Program and Objectives .....	14-2
14.2.2	Organization, Staffing, and Responsibilities (Related to RG 1.206, Section C.III.1, Chapter 14, C.I.14.2.2, "Organization and Staffing") .....	14-5
14.2.3	Test Specifications and Test Procedures (Related to RG 1.206, Section C.III.1, Chapter 14, C.I.14.2.3, "Test Procedures," C.I.14.2.4, "Conduct of Test Program," C.I.14.2.5, "Review, Evaluation, and Approval of Test Results," and C.I.14.2.6, "Test Records") .....	14-12
14.2.4	Compliance of Test Program with Regulatory Guides .....	14-28
14.2.5	Utilization of Operating Experience (Related to RG 1.206, Section C.III.1, Chapter 14, C.I.14.2.8, "Utilization of Reactor Operating and Testing Experiences in Development of Test Program") .....	14-28
14.2.6	Use of Plant Operating and Emergency Procedures (Related to RG 1.206, Section C.III.1, Chapter 14, C.I.14.2.9, "Trial Use of Plant Operating and Emergency Procedures") .....	14-34
14.2.7	Initial Fuel Loading and Initial Criticality .....	14-37
14.2.8	Test Program Schedule (Related to RG 1.206, Section C.III.1, Chapter 14, C.I.14.2.11, "Test Program Schedule") .....	14-37
14.2.9	Preoperational Test Descriptions (Related to RG 1.206, Section C.III.1, Chapter 14, C.I.14.2.12, "Individual Test Descriptions") .....	14-45
14.2.10	Startup Test Procedures (Related to RG 1.206, Section C.III.1, Chapter 14, C.I.14.2.12, "Individual Test Descriptions") .....	14-54
14.3	Certified Design Material (Related to RG 1.206, Section C.III.1, Chapter 14, C.I.14.3, "Inspections, Tests, Analyses, and Acceptance Criteria") .....	14-58
15.0	ACCIDENT ANALYSIS .....	15-1
15.0	Accident Analysis (Related to Regulatory Guide (RG) 1.206, Section C.III.1, Chapter 15, C.I.15.1, "Transient and Accident Classification," C.I.15.2, "Frequency of Occurrence," C.I.15.3, "Plant Characteristics Considered in the Safety Evaluation," C.I.15.4, "Assumed Protection System Actions," and C.I.15.5, "Evaluation of Individual Initiating Events") .....	15-1
15.1	Increase in Heat Removal from the Primary System (Related to RG 1.206, Section C.III.1, Chapter 15, C.I.15.6, "Event Evaluation") .....	15-11
15.2	Decrease in Heat Removal By the Secondary System .....	15-11
15.3	Decrease in Reactor Coolant System Flow Rate .....	15-12
15.4	Reactivity and Power Distribution Anomalies .....	15-12
15.5	Increase in Reactor Coolant Inventory .....	15-15
15.6	Decrease in Reactor Coolant Inventory .....	15-15
15.7	Radioactive Release From a Subsystem or Component .....	15-16
15.8	Anticipated Transients Without Scram .....	15-18
Appendix 15A	Evaluation Models and Parameters for Analysis of Radiological Consequences of Accidents .....	15-19

Appendix 15B Removal of Airborne Activity from the Containment Atmosphere Following a LOCA .....	15-24
16.0 TECHNICAL SPECIFICATIONS .....	16-1
16.1 Technical Specifications .....	16-1
16.2 Design Reliability Assurance Program (Related to RG 1.206, Section C.III.1, Chapter 17, C.I.17.4, “Reliability Assurance Program Guidance”).....	16-10
16.3 Investment Protection.....	16-10
17.0 QUALITY ASSURANCE (RELATED TO RG 1.206, SECTION C.III.1, CHAPTER 17, C.I.17, “QUALITY ASSURANCE AND RELIABILITY ASSURANCE”) .....	17-1
17.1 Quality Assurance During the Design and Construction Phases .....	17-1
17.2 Quality Assurance During the Operations Phase .....	17-6
17.3 Quality Assurance During Design, Procurement, Fabrication, Inspection, and/or Testing of Nuclear Power Plant Items (Related to RG 1.206, Section C.III.1, Chapter 17, C.I.17.3, “Quality Assurance Program Description”).....	17-6
17.4 Design Reliability Assurance Program (Related to RG 1.206, Section C.III.1, Chapter 17, C.I.17.4, “Reliability Assurance Program Guidance”).....	17-7
17.5 Quality Assurance Program Description – New License Applicants (Related to RG 1.206, Section C.III.1, Chapter 17, C.I.17.5, “Quality Assurance Program Guidance”).....	17-10
17.6 Maintenance Rule Program (Related to RG 1.206, Section C.III.1, Chapter 17, C.I.17.6, “Description of the Applicant’s Program for Implementation of 10 CFR 50.65, The Maintenance Rule”).....	17-37
18.0 HUMAN FACTORS ENGINEERING.....	18-1
18.1 Overview (No Corresponding Section in Regulatory Guide (RG) 1.206) .....	18-1
18.2 Human Factors Engineering Program Management (Related to RG 1.206, Section C.I.18.1, “HFE Program Management”) .....	18-1
18.3 Operating Experience Review (Related to RG 1.206, Section C.I.18.2, “Operating Experience Review”) .....	18-7
18.4 Functional Requirements Analysis and Allocation (Related to RG 1.206, Section C.I.18.3, “Functional Requirements Analysis and Function Allocation”) .....	18-7
18.5 AP1000 Task Analysis Implementation Plan (Related to RG 1.206, Section C.I.18.4, “Task Analysis”) .....	18-8
18.6 Staffing (Related to RG 1.206, Section C.I.18.5, “Staffing and Qualifications”) .....	18-8
18.7 Integration of Human Reliability Analysis with Human Factors Engineering (Related to RG 1.206, Section C.I.18.6, “Human Reliability Analysis”).....	18-14
18.8 Human-System Interface Design (Related to RG 1.206, Section C.I.18.7, “Human System Interface Design”) .....	18-14
18.9 Procedure Development (Related to RG 1.206, Section C.I.18.8, “Procedure Development”) .....	18-16
18.10 Training Program Development (Related to RG 1.206, Section C.I.18.9, “Training Program Development”).....	18-17

18.11	Human Factors Engineering Verification and Validation (Related to RG 1.206, Section C.I.18.10, "Verification and Validation") .....	18-20
18.12	Inventory (No Corresponding Section in RG 1.206) .....	18-20
18.13	Design Implementation (Related to RG 1.206, Section C.I.18.11, "Design Implementation") .....	18-21
18.14	Human Performance Monitoring (Related to RG 1.206, Section C.I.18.12, "Human Performance Monitoring") .....	18-21
19.0	Probabilistic risk assessment (RELATED TO RG 1.206, Section C.III.1, CHAPTER 19, C.I.19, "probabilistic risk assessment and severe accident evaluation") .....	19-1
	19.1–19.54, 19.56–19.57, and Appendices 19A–19F Probabilistic Risk Assessment .....	19-1
	19.55 Seismic Margin Analysis .....	19-3
	19.58 Winds, Floods, and Other External Events .....	19-6
	19.59 PRA Results and Insights .....	19-14
APPENDIX 19.A	LOSS OF LARGE AREAS OF THE PLANT DUE TO EXPLOSIONS OR FIRES .....	19.A-1
20.0	Conclusion .....	20-1

## FIGURES

Figure 2.4-1.	Peak Discharges Reported for Alston, South Carolina .....	2-293
Figure 2.4-2.	Peak Discharges Reported for Richtex, South Carolina .....	2-293
Figure 2.4-3.	Plant Site Drainage Basins and Flow Paths (FSAR Figure 2.4-261) .....	2-294
Figure 2.5.1-1.	Map of Physiographic Provinces and Mesozoic Rift Basins .....	2-295
Figure 2.5.1-2.	Potential Quaternary Features in the Site Region.....	2-296
Figure 2.5.1-3.	Local Charleston Tectonic Features .....	2-297
Figure 2.5.1-4.	Seismic Zones and Seismicity in CEUS .....	2-298
Figure 2.5.2-1.	Comparison of Events ( $m_b > 3$ ) from the EPRI Historical Catalog (Depicted by Yellow Circles) with Events from the Applicant's Updated Catalog (Depicted by Green Circles).....	2-299
Figure 2.5.2-2.	UCSS Model .....	2-300
Figure 2.5.2-3.	New Madrid Faults from the Clinton ESP Source Model .....	2-301
Figure 2.5.2-4.	Mean and Median Uniform Hazard Response Spectra.....	2-302
Figure 2.5.2-5.	High-frequency (5 to 10 Hz) 10-4 Hazard Deaggregation.....	2-303
Figure 2.5.2-6.	Low-frequency (1 to 2.5 Hz) 10-4 Hazard Deaggregation .....	2-304
Figure 2.5.2-7.	High-frequency (5 to 10 Hz) 10-5 Hazard Deaggregation.....	2-305
Figure 2.5.2-8.	Low-frequency (1 to 2.5 Hz) 10-5 Hazard Deaggregation .....	2-306
Figure 2.5.2-9.	10 <sup>-4</sup> Hard Rock UHRS (Depicted by Red Circles) and 10 <sup>-4</sup> High- and Low-Frequency Response Spectra (Depicted by Solid Blue and Dashed Green Curves, Respectively).....	2-307
Figure 2.5.2-10.	10 <sup>-5</sup> Hard Rock UHRS (Depicted by Red Circles) and 10 <sup>-5</sup> High- and Low-Frequency Response Spectra (Depicted by Solid Blue and Dashed Green Curves, Respectively).....	2-308
Figure 2.5.2-11.	S-wave Velocity Profile for the VCSNS Unit 2 (Left) and Unit 3 (Right) Site .....	2-309
Figure 2.5.2-12.	Horizontal (Solid Blue Curve) and Vertical (Dashed Red Curve) GMRS .....	2-310
Figure 2.5.2-13.	A Comparison of Events ( $m_b \geq 3$ ) from the VCSNS Site Updated Earthquake Catalog from 1985 to 2006 (Blue Circles), the USGS Earthquake Catalog from 1985 to 2006 (Red Circles), and the USGS Earthquake Catalog from 2006 to 2009 (Yellow Circles).....	2-311
Figure 2.5.2-14.	Comparison of ETSZ $M_{max}$ Distributions from the EPRI-SOG Study, the TIP Study, and the TVA Dam Safety Study (DSS).....	2-312
Figure 2.5.2-15.	EPRI SOG Source Geometries for the ETSZ .....	2-313
Figure 2.5.2-16.	1 Hz Spectral Accelerations Predicted for M 7.3 for the EPRI (2004) Models and for the Atkinson and Boore (2006) (Referred to as AB06) and Tavakoli and Pezeshk (2005) (Referred to as TP05) References, Using the 12 "Non-general Area Source" Equations from EPRI (2004) .....	2-314
Figure 2.5.2-17.	Results of the Applicant's Site Response Sensitivity Study Showing the Median and Mean Spectral Amplification Factors for 10-4 and 10-5 HF and LF Input Motions .....	2-315
Figure 2.5.3-1.	50-Mile Tectonic Features Map .....	2-316
Figure 2.5.4-1.	Example of Cross-Section of Structure Foundation for Unit 2 .....	2-317
Figure 2.5.4-2.	Example of Cross-Section of Structure Foundation for Unit 2 .....	2-318

Figure 2.5.4-3.	Shear Wave Velocity of Layer V with 5-Foot Vertical Distance Averaging .....	2-319
Figure 2.5.4-4.	At-Rest Lateral Earth Pressure Using ASCE 4-98 Method .....	2-320

## TABLES

Table 2.3.1-1.	Comparison of V.C. Summer Site Characteristics and AP1000 Site Parameters .....	2-321
Table 2.4-1.	Summary Results Showing the Impact of Sensitivity Tests on Flood Levels.....	2-322
Table 2.4-2.	Parameters Used by Applicant for Analysis of Accidental Release to Ground Water .....	2-322
Table 2.5.2-1.	Comparison of Maximum Magnitudes and Weights for the USGS and SCDOT Models with the Applicant’s UCSS Model .....	2-323
Table 2.5.2-2.	Mean Magnitudes and Distances used to Construct the UHRS (Based on Information Provided in VCSNS COL FSAR Table 2.5.2-218).....	2-323
Table 2.5.4-1.	Recovery and RQD Obtained from 30 Boring Logs .....	2-324
Table 2.5.4-2.	Shear Wave Velocity.....	2-324
Table 2.5.4-3.	Summary of Main Geotechnical Design Criteria .....	2-325
Table 3.6-1.	Pipe Rupture Hazards Analysis ITAAC.....	3-94
Table 3.12-1.	Piping Design ITAAC .....	3-94
Table 8.2A-1.	Offsite Power System .....	8-39
Table 11.2-1.	Adult Total Body Dose from Normal Effluent Releases for Each Pathway .....	11-41
Table 11.2-2.	Comparison of Important Modeling Assumptions .....	11-41
Table 11.2-3.	Modeling Parameter Values* .....	11-42
Table 11.2-4.	Comparison of Maximum Individual Doses (mrem/yr) .....	11-43
Table 11.2-5.	Comparison of Maximum Individual Doses to 40 CFR Part 190 (mrem/yr) .....	11-43
Table 11.3-1.	Comparison of Maximum Annual Individual Doses.....	11-43
Table 11.3-2.	Comparison of Population Doses (person-rem/yr).....	11-44
Table 13.3-1.	Emergency Plan ITAAC .....	13-266
Table 13.6A-1.	Site-Specific Physical Security Inspections, Tests, Analyses and Acceptance Criteria.....	13-279
Table 15.0-1.	Power Calorimetric Uncertainty Methodology.....	15-25
Table 19-A-1.	VCSNS RAIs that Correspond to VEGP RAI Responses .....	19-A-46
Table 19-A-2.	VEGP RAIs that are Endorsed by VCSNS .....	19-A-48

## APPENDICES

APPENDIX A. POST COMBINED LICENSE ACTIVITIES -- LICENSE CONDITIONS, INSPECTIONS, TESTS, ANALYSES, AND ACCEPTANCE CRITERIA, AND FINAL SAFETY ANALYSIS REPORT COMMITMENTS.....	A-1
APPENDIX B. CHRONOLOGY OF COMBINED LICENSE APPLICATION FOR VIRGIL C. SUMMER UNITS 2 AND 3 .....	B-1
APPENDIX C. ELECTRONIC REQUEST FOR ADDITIONAL INFORMATION DATABASE.....	C-1
APPENDIX D. REFERENCES.....	D-1
APPENDIX E. PRINCIPAL CONTRIBUTORS.....	E-1
APPENDIX F. REPORT BY THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS .....	F-1

## EXECUTIVE SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) regulations in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52 include requirements for licensing new nuclear power plants.<sup>3</sup> These regulations include the NRC's requirements for early site permits (ESP), design certification, and combined license (COL) applications. The ESP process (10 CFR Part 52, Subpart A, "Early Site Permits") is intended to address and resolve siting-related issues. The design certification process (10 CFR Part 52, Subpart B, "Standard Design Certifications") provides a means for a vendor to obtain NRC certification of a particular reactor design. Finally, the COL process (10 CFR Part 52, Subpart C, "Combined Licenses") allows an applicant to seek authorization to construct and operate a new nuclear power plant. A COL may reference an ESP, a certified design, both, or neither. As part of demonstrating that all applicable NRC requirements are met, a COL applicant referencing an ESP or certified design must demonstrate compliance with any requirements not already resolved as part of the referenced ESP or design certification proceeding before the NRC issues that COL.

This FSER describes the results of a review by the NRC staff of a COL application request submitted by South Carolina Electric and Gas (SCE&G or the applicant), acting on behalf of itself and as agent for the South Carolina Public Service Authority (also referred to as Santee Cooper) for two new reactors to be located at the Virgil C. Summer Nuclear Station (VCSNS) Units 2 and 3 site. The staff's review was to determine the applicant's compliance with the requirements of Subpart C of 10 CFR Part 52, as well as the applicable requirements under 10 CFR Parts 30, 40, and 70 governing the possession and use of applicable source, byproduct and special nuclear materials. This FSER identifies the staff's conclusions with respect to the COL safety review.

The NRC regulations also require an applicant to submit an environmental report pursuant to 10 CFR Part 51, "Environmental protection regulations for domestic licensing and related regulatory functions." The NRC reviews the environmental report as part of the Agency's responsibilities under the National Environmental Policy Act of 1969, as amended. The NRC presents the results of that review in a final environmental impact statement (FEIS), which is a report separate from this FSER. The staff's FEIS, NUREG-1939, "Final Environmental Impact Statement for Combined Licenses (COLs) for Virgil C. Summer Nuclear Station Units 2 and 3," was issued in April 2011, and can be accessed through the Agencywide Documents Access and Management System (ADAMS) at ML11098A044 and ML11098A057.<sup>4</sup>

By letter dated March 27, 2008, the SCE&G, acting on behalf of itself and as agent for the South Carolina Public Service Authority (also referred to as Santee Cooper), submitted its application

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<sup>3</sup> Applicants may also choose to seek a construction permit (CP) and operating license in accordance with 10 CFR Part 50, "Domestic licensing of production and utilization facilities," instead of using the 10 CFR Part 52 process.

<sup>4</sup> Agencywide Documents Access and Management System (ADAMS) is the NRC's information system that provides access to all image and text documents that the NRC has made public since November 1, 1999, as well as bibliographic records (some with abstracts and full text) that the NRC made public before November 1999. Documents available to the public may be accessed via the Internet at <http://www.nrc.gov/reading-rm/adams/web-based.html>. Documents may also be viewed by visiting the NRC's Public Document Room at One White Flint North, 11555 Rockville Pike, Rockville, Maryland. Telephone assistance for using web-based ADAMS is available at (800) 397-4209 between 8:30 a.m. and 4:15 p.m., Eastern Time, Monday through Friday, except Federal holidays. The staff is also making this FSER available on the NRC's new reactor licensing public web site at <http://www.nrc.gov/reactors/new-reactors/col/summer/documents/ser-final.html>

to the NRC for COLs for two AP1000 advanced passive pressurized-water reactors (PWRs) (ADAMS Accession No. ML081300460) to be located at the VCSNS site. SCE&G identified the two units as VCSNS Units 2 and 3. The VCSNS site is located in Fairfield County, South Carolina, approximately 15 miles west of the county seat of Winnsboro and 26 miles northwest of Columbia, the state capital. VCSNS Units 2 and 3 will be located approximately 1 mile from the center of VCSNS Unit 1.

The initial application incorporated by reference 10 CFR Part 52, Appendix D, "Design Certification Rule for the AP1000 Design," and the Westinghouse Electric Corporation's (Westinghouse's) application for amendment of the AP1000 design, as supported by Revision 16 of the Design Control Document (DCD). The initial application also incorporated by reference Westinghouse Technical Report (TR)-134, APP-GW-GLR-134, "AP1000 DCD Impacts to Support COLA Standardization," Revision 4, which was submitted on March 20, 2008. Subsequent to the initial application, in a letter dated June 28, 2011, SCE&G submitted Revision 5 of the application that incorporates by reference AP1000 DCD Revision 19. The results of the NRC staff's evaluation of the AP1000 DCD are documented in NUREG-1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design," and its supplements.

The staff has identified in Appendix A to this FSER, certain license conditions, and inspections, tests, analyses and acceptance criteria (ITAAC) that the staff recommends the Commission impose, should COLs be issued to the applicant. Appendix A includes those proposed ITAAC that are discussed in this FSER. In addition to the ITAAC in Appendix A, the ITAAC found in the AP1000 DCD Revision 19 Tier 1 material will also be incorporated into the COLs should COLs be issued to the applicant.

Inspections conducted by the NRC have verified, where appropriate, the conclusions in this FSER. The inspections focused on selected information in the COL application and its references. The FSER identifies applicable inspection reports as reference documents.

The NRC's Advisory Committee on Reactor Safeguards (ACRS) also reviewed the bases for the conclusions in this report. The ACRS independently reviewed those aspects of the application that concern safety, as well as the advanced safety evaluation report without open items (an earlier version of this document), and provided the results of its review to the Commission in a report dated February 17, 2011. Appendix F includes a copy of the report by the ACRS on the COL application, as required by 10 CFR 52.87, "Referral to the Advisory Committee on Reactor Safeguards (ACRS)."

## ABBREVIATIONS

$\chi/Q$	atmospheric dispersion
A2LA	American Association for Laboratory Accreditation
ac	alternating current
ACI	American Concrete Institute
ACP	access control point
ACRS	Advisory Committee on Reactor Safeguards
ADAMS	Agencywide Documents Access and Management System
ADS	automatic depressurization system
AE	architect-engineer
AEA	Atomic Energy Act of 1954
AEO	Annual Energy Outlook
AFB	Air Force Base
AFFF	aqueous film forming foam
ALARA	as low as is reasonable achievable
ALI	annual limit on intake
ALWR	advanced light-water reactor
ANI	American Nuclear Insurers
ANS	Alert and Notification Systems
ANS	American Nuclear Society
ANSI	American National Standards Institute
ANSS	Advanced National Seismic System
AOO	anticipated operational occurrence
AOV	air-operated valve
API	American Petroleum Institute
ASCE	American Society of Civil Engineers
ASE	advanced safety evaluation
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATE	advisory to evacuate
ATWS	anticipated transients without scram
AWWA	American Water Works Association
B&PV	Boiler and Pressure Vessel (ASME BPV Code)
BDBE	beyond-design basis event
BL	Bulletin
BLN	Bellefonte Nuclear Station
BLRA	Base Load Review Act
BOP	balance of plant
bpf	blows per foot
BTP	Branch Technical Position
BWR	boiling-water reactor
C	Celsius
C&C	command & control
CAE	Columbia Metropolitan Airport

CAS	central alarm station
CAV	cumulative absolute velocity
CCS	component cooling water system
CDA	critical digital asset
CDF	core damage frequency
CDI	conceptual design information
CDM	certified design material
CECC	Central Emergency Control Center
CEUS	Central and Eastern United States
CFR	<i>Code of Federal Regulations</i>
cfs	cubic feet per second
cGy	centiGray
cm	centimeters
CMT	core makeup tank
COL	combined license
CP	construction permit
CPSZ	Central Piedmont Shear Zone
CPT	cone penetration test
CR	control room
CRDM	control rod drive mechanism
CRDS	control rod drive system
CS	containment system
CS	core supports
CS	critical system
CSA	control support area
CSDRS	certified seismic design response spectra
CSP	Cyber Security Plan
CST	cyber security team
CTA	critical target area
CVCS	chemical and volume control system
CVS	portions of chemical and volume control system
CWIP	construction work in process
CWS	circulating water system
DAC	derived air concentration
DAS	Diverse Actuation System
DBA	design-basis accident
DBE	design-basis event
DBT	design-basis threat
dc	direct current
DC	design certification
DCA	design certification amendment
DCD	design control document
DCP	Design Change Package
DCRA	design-centered review approach
DECLG	double-ended cold leg guillotine
DECT	Digital Enhanced Cordless Telecommunication
DEIS	Draft Environmental Impact Statement
DEP	Departure
DEP	dose evaluation periphery
DG	diesel generator

DHEC	Department of Health and Environmental Control
DHS	Department of Homeland Security
DNBR	departure from nucleate boiling ratio
DOE	Department of Energy
DOT	Department of Transportation
D-RAP	Design Reliability Assurance Program
DTS	demineralized water treatment system
DWS	demineralized water system
EAB	exclusion area boundary
EAL	emergency action level
EAS	Emergency Alert System
ECCS	emergency core cooling system
ECFS	East Coast Fault System
ECMA	East Coast Magnetic Anomaly
ED	Emergency Director
EDMG	Extensive Damage Mitigation Guidelines
EIA	Energy Information Agency
EIS	Environmental Impact Statement
EI.	Elevation
ELS	plant lighting system
ENS	Emergency Notification System
EOC	emergency operation center
EOF	emergency operations facility
EOP	emergency operating procedure
EOP	emergency operating plan
EP	Emergency Plan
EP	emergency planning
EPA	Environmental Protection Agency
EPAct	Energy Policy Act of 2005
EPC	engineering, procurement, and construction
EPFZ	Eastern Piedmont fault zone
EPI	emergency public information
EPIO	Emergency Public Information Office
EPIP	emergency plan implementing procedure
EP-ITAAC	emergency planning-inspections, tests, analyses, and acceptance criteria
EPM	Emergency Plant Manager
EPOS	Emergency Plant Operations Supervisor
EPRI	Electric Power Research Institute
EPZ	emergency planning zone
EQ	environmental qualification
EQMEL	Environmental Qualification Master Equipment List
ER	Environmental Report
ERDS	emergency response data system
ERF	emergency response facility
ERO	emergency response officer
ERO	Emergency Response Organization
ESF	emergency support function
ESF	engineered safety feature
ESP	Early Site Permit
ESSX	Electric Switch System Exchange

EST	earth science team
ETE	evacuation time estimate
ETSZ	Eastern Tennessee Seismic Zone
F	Fahrenheit
FAA	Federal Aviation Administration
FAC	flow-accelerated corrosion
FBI	Federal Bureau of Investigation
FCEMS	Fairfield County Emergency Medical Services
FDT	fire dynamics tool
FDW	Fairfield County Airport
FEIS	final environmental impact statement
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FFD	fitness for duty
FIRS	foundation input response spectra
FIV	flow induced vibration
FMCRD	fine motion control rod drive
FMEA	failure mode and effects analysis
FP	fire protection
fps	feet per second
FPS	fire protection system
FPSF	Fairfield Pumped Storage Facility
FR	<i>Federal Register</i>
FRS	floor response spectra
FS	factory of safety
FSAR	final safety analysis report
FSER	final safety evaluation report
ft	feet
FTS	Federal Telecommunications System
GDC	General Design Criteria (Criterion)
GIS	geographical information system
GL	Generic Letter
GMRS	ground motion response spectra
gpm	gallons per minute
GSI	Generic Safety Issue
GSU	generator step-up
GTS	generic technical specification
GWMS	gaseous waste management system
HCCWS	high capacity chilled water subsystem
HCLPF	high confidence, low probability of failure
HCM	Highway Capacity Manual
HCU	hydraulic control unit
HDPE	high-density polyethylene
HEPA	high efficiency particulate air
HFE	human factors engineering
HMR	Hydro-meteorological Report
HP	health physics
HPN	Health Physics Network

HPS	Health Physics Society
HR	hard rock
HRA	human reliability analysis
HRHF	hard rock high frequency
HSI	human-system interface
HV	high voltage
HVAC	heating, ventilation, and air conditioning
Hz	Hertz
I&C	instrumentation and control
IBC	International Building Code
ICMO	interim compensatory order
IDLH	immediate danger to life and health
IED	Interim Emergency Director
IEEE	Institute of Electrical and Electronic Engineers
IFR	Interim Findings Report
IGSCC	intergranular stress corrosion cracking
IHP	integrated head package
IIS	incore instrumentation system
ILAC	International Laboratory Accreditation Cooperation
in	inch
INPO	Institute of Nuclear Power Operations
IPEEE	Individual Plant Examination of External Events
IPSAC	Investment Protection Short-Term Availability Control
IPZ	ingestion pathway emergency planning zone
IRWST	in-containment refueling water storage tank
ISA	independent safety assessment
ISA	Instrument Society of America
ISFSI	independent spent fuel storage installation
ISG	Interim Staff Guidance
ISI	inservice inspection
ISRS	in-structure response spectra
IST	inservice testing
ITAAC	inspections, tests, analyses, and acceptance criteria
ITP	Initial Test Program
JFD	joint frequency distribution
JIC	Joint Information Center
JOG	Joint Owners Group
JTWG	Joint Test Working Group
kg/m <sup>3</sup>	kilogram per cubic meter
KI	potassium iodide
km	kilometers
kPa	kilopascal
ksf	kips per square foot
ksi	kilopascal per square inch
kV	kilovolt
kVA	kilovolt amp
kWe	kilowatt electric

LAN	Local Area Network
lb/ft <sup>2</sup>	pounds per square foot
LBB	leak-before-break
LCCWS	low capacity chilled water subsystem
LCD	Local Climatological Data
LCEMS	Lexington County Emergency Medical Services
LCO	limiting condition for operation
LEFM	Leading Flow Edge Meter
LLEA	local law enforcement agency
LLHS	light load handling system
LLNL	Lawrence Livermore National Laboratory
LOA	letter of agreement
LOCA	loss-of-coolant accident
LOLA	loss of large area
LOOP	loss of offsite power
LPZ	low population zone
LRF	large release frequency
LSS	low strategic significance
LTOP	low-temperature overpressure protection
LWA	Limited Work Authorization
LWMS	liquid waste management system
LWR	light-water reactor

<b>M</b>	magnitude
m	meter
m/s	meters per second
m <sup>3</sup> /s	cubic meters per second
Ma	million years ago
m <sub>b</sub>	body-wave magnitude
Mbtu/hr	one million British thermal units/hour
MC	metal containment
MC&A	material control and accounting
MCL	Management Counterpart Link
MCR	main control room
M <sub>d</sub>	duration magnitude
MEI	maximally exposed individual
MERT	Medical Emergency Response Team
mGy	milliGray
mi	miles
MIT	Massachusetts Institute of Technology
M <sub>L</sub>	local magnitude
mm	millimeters
MMI	Modified Mercalli Intensity
M-O	Mononobe-Okabe
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MOV	motor-operated valve
MOX	mixed-oxide
MPA	methoxypropylamine
mph	miles per hour
MR	Maintenance Rule

MRA	Mutual Recognition Arrangement
mrad	millirad
mrem	millirem
MSD	Mitigative Strategies Description
msl	mean sea level
MSLB	main steam line break
MSSS	main steam supply system
MST	Mitigative Strategies Table
mSv	milliSievert
MT	magnetic particle
MUR	measurement uncertainty recapture
MVA	megavolt ampere
MVAR	mega volt amp reactive
MW	megawatts
MWe	megawatts electric
MWt	megawatts thermal
my	million years
N	North
NCDC	National Climatic Data Center
NDCT	natural draft cooling tower
NDL	nuclear data link
NEA	Nuclear Energy Agency
NEI	Nuclear Energy Institute
NERC	North American Electric Reliability Corporation
NFPA	National Fire Protection Association
NI	nuclear island
NIRMA	Nuclear Information and Records Management Association
NIST	National Institute of Standards and Technology
NMSZ	New Madrid Seismic Zone
NND	new nuclear deployment
NNS	non-nuclear safety
NOAA	National Oceanic and Atmospheric Administration
NOV	Notice of Violation
NPPENF	Nuclear Power Plant Emergency Notification Form
NRC	U.S. Nuclear Regulatory Commission
NRF	National Response Framework
NRO	Office of New Reactors
NS	nonseismic
NSSS	nuclear steam supply system
NSSS	nuclear steam system supplier
NUMARC	Nuclear Management and Resources Council
NVLAP	National Voluntary Laboratory Accreditation Program
NWS	National Weather Service
NYAL	New York-Alabama
OBE	operating basis earthquake
OCA	owner controlled area
ODCM	Offsite Dose Calculation Manual
OE	operating experience
OER	operating experience review

OHLHS	overhead heavy load handling system
OM	Operation and Maintenance (ASME OM Code)
OPRAA	operational phase reliability assurance activity
ORE	occupational radiation exposure
ORM	Onsite Radiation Manager
OSC	Operational Support Center
OSHA	Occupational Safety and Health Administration
PA	protected area
PAD	protective action decision
PAG	protective action guideline
PAP	primary access point
PAR	protective action recommendation
PAZ	protective action zone
PBA	power block area
PBAC	power block area circle
PBX	Private Branch Exchange
PCCAWST	passive containment cooling ancillary water storage tank
PCCWST	passive containment cooling water storage tank
pcf	pounds per cubic foot
PCP	Process Control Program
PCS	passive containment cooling system
PDP	procedure development program
PF	performance goal
PGA	peak ground acceleration
PGP	procedures generation package
PM	preventive maintenance
PMCL	Protective Measures Counterpart Link
PMF	probable maximum flood
PMH	probable maximum hurricane
PMP	probable maximum precipitation
PMS	protection and safety monitoring
PMT	probable maximum tsunami
PMWP	probable maximum winter precipitation
PMWS	probable maximum wind storm
PORV	power-operated relief valve
POV	power-operated valve
ppm	parts per million
PRA	probabilistic risk assessment
PRHR	passive residual heat removal
P-S	primary-shear velocity
psf	pounds per square foot
PSHA	probabilistic seismic hazard analysis
PSI	preservice inspection
psi	pounds per square inch
psig	pounds per square inch gauge
PS-ITAAC	physical security inspections, tests, analyses, and acceptance criteria
PSP	Physical Security Plan
P-T	pressure temperature
PT	liquid penetrant
PT&O	plant test and operations

PTLR	pressure-temperature limits report
PTS	pressurized thermal shock
PTS	plant-specific technical specifications
PVC	polyvinyl chloride
PWR	pressurized-water reactor
PWS	potable water system
PWSCC	primary water stress corrosion cracking
PXS	passive core cooling system
QA	quality assurance
QAPD	Quality Assurance Program description
QAPD	Quality Assurance Program Document
QC	quality control
QDF	queue discharge flow
QG	quality group
RAI	request for additional information
RAP	reliability assurance program
RAT	reserve auxiliary transformer
RCCA	rod cluster control assembly
RCL	reactor coolant loop
RCM	Response Coordination Manual
RCOL	reference combined license
RCP	reactor coolant pump
RCPB	reactor coolant pressure boundary
RCS	reactor coolant system
RCTS	resonant column torsional shear
REAC/TS	Radiation Emergency Assistance Center/Training Site
rem	roentgen equivalent man
REP	radiological emergency preparedness
RG	regulatory guide
RIS	Regulatory Issue Summary
RLE	review-level earthquake
RMS	radiation monitoring system
RNS	residual heat removal system
RO	reactor operator
RPP	Radiation Protection Program
RPV	reactor pressure vessel
RQD	rock quality designation
RRS	required response spectrum
RSCL	Reactor Safety Counterpart Link
RTDP	revised thermal design procedure
RTM	Response Technical Manual
RT <sub>NDT</sub>	nil-ductility reference transition temperature
RTNSS	regulatory treatment of nonsafety systems
RTP	rated thermal power
RT <sub>PTS</sub>	pressurized thermal shock reference temperature
RV	reactor vessel
RVSP	reactor vessel surveillance capsule program
RWS	raw water system
RXS	reactor system

S&PC	steam and power conversion
SACTI	Seasonal/Annual Cooling Tower Impact
SAMG	severe accident management guidance
SAR	safety analysis report
SAS	secondary alarm station
SAT	systematic approach to training
SBO	station blackout
SC	South Carolina
SCBA	self-contained breathing apparatus
SCDHEC	South Carolina Department of Health and Environmental Control
SCDNR	South Carolina Department of Natural Resources
SCDOT	South Carolina Department of Transportation
SCDPRT	South Carolina Department of Parks, Recreation, and Tourism
SCE&G	South Carolina Electric and Gas Company
SCEMD	South Carolina Emergency Management Division
SCFFMP	South Carolina Fire Fighter Mobilization Plan
SCOL	subsequent combined license
SCP	Safeguards Contingency Plan
SCPSC	South Carolina Public Service Commission
SCSCO	South Carolina State Climatology Office
SCSN	South Carolina State Network
SDS	sanitary drainage system
SDWIS	Safe Drinking Water Information System
SE	safety evaluation
SEC	Securities and Exchange Commission
SECY	Secretary of the Commission, Office of the Nuclear Regulatory Commission
SEI	Structural Engineering Institute
SEPA	Southeastern Power Administration
SER	safety evaluation report
SERC	Southeastern Electric Reliability Council
SEUSSN	South Eastern United States Seismic Network
SFP	spent fuel pool
SFS	spent fuel pool cooling system
SG	steam generator
SGI	safeguards information
SGTR	steam generator tube rupture
SMA	seismic margin analysis
SNC	Southern Nuclear Operating Company
SNM	special nuclear material
SNMPPP	Special Nuclear Material Physical Protection Program
SOG	Seismicity Owners Group
SOT	station orientation training
SP	Setpoint Program
SPDS	safety parameter display system
SPT	standard penetration test
sq mi	square mile
SR	surveillance requirement
SRM	Staff Requirements Memorandum
SRO	senior reactor operator
SRP	standard review plan

SSAR	Site Safety Analysis Report
SSCs	structures, systems, and components
SSE	safe shutdown earthquake
SSEP	safety, security and/or emergency preparedness
SSHAC	Senior Seismic Hazard Analysis Committee
SSI	soil-structure interaction
SS-ITAAC	site-specific inspections, tests, analyses and acceptance criteria
SSRS	square root sum of squares
STD	Standard
STS	standard technical specification
SUNSI	Sensitive Unclassified Non-Safeguards Information
SUP	Supplement
Sv	Sievert
SWMS	solid waste management system
SWS	service water system
T&QP	Training and Qualification Plan
TAG	Technical Advisory Group
TCP	traffic control point
TCS	turbine building closed cooling water system
TEDE	total effective dose equivalent
TG	turbine-generator
TGS	turbine generator system
TIP	Trial Implementation Project
TLD	thermoluminescent dosimeter
TMI	Three Mile Island
TR	technical report
TRS	test response spectrum
TS	technical specification
TSC	Technical Support Center
TSO	transmission system operator
TSTF	Technical Specification Task Force Traveler
TSTF	Technical Specification Task Force
TVA	Tennessee Valley Authority
U	unconfined compressive strength
UAT	unit auxiliary transformer
UBC	Uniform Building Code
UCSS	updated Charleston seismic source
UFM	ultrasonic flow meter
UFSAR	Updated Final Safety Analysis Report
UHRS	uniform hazard response spectra
UHS	ultimate heat sink
UPS	uninterruptible power supply
USACE	United States Army Corps of Engineers
USE	upper shelf energy
USGCRP	United States Global Change Research Program
USGS	United States Geological Survey
UT	ultrasonic
UTM	universal transverse Mercator

V&V	verification and validation
V/H	vertical-to-horizontal
VACAR	Virginia-Carolina
VAR	volt amp reactive
VBS	nuclear island nonradioactive ventilation system
VBS	vehicle barrier system
VCSNS	V.C. Summer Nuclear Station
Vdc	volts direct current
VEGP	Vogtle Electric Generating Plant
VES	main control room emergency habitability system
VFS	containment air filtration system
VHRA	very high radiation area
$V_p$	compression wave velocity
VPN	Virtual Private Network
$V_s$	shear wave velocity
VWS	chilled water system
W	West
WAC	waste acceptance criteria
WCAP	Westinghouse Commercial Atomic Power
WEC	Westinghouse Electric Company
WLS	liquid radwaste system
WWRB	waste water retention basin
WWS	waste water system
YFS	yard fire system
ZPA	zero period acceleration

## 1.0 INTRODUCTION AND INTERFACES

This chapter of the final safety evaluation report (FSER) is organized as follows:

- Section 1.1 provides an overview of the entire combined license (COL) application;
- Section 1.2 provides the regulatory basis for the COL licensing process;
- Section 1.3 provides an overview of the COL application principal review matters and where the staff's review of the 10 parts of the COL application is documented;
- Section 1.4 documents the staff's review of Chapter 1 of the final safety analysis report (FSAR); and
- Section 1.5 documents regulatory findings that are in addition to those directly related to the staff's review of the FSAR.

### 1.1 Summary of Application

In a letter dated March 27, 2008, as supplemented by several letters, the South Carolina Electric & Gas Company (SCE&G or the applicant), acting on behalf of itself and the South Carolina Public Service Authority (referred to as "Santee Cooper"), submitted its application to the U.S. Nuclear Regulatory Commission (NRC or the Commission) for a COL for two Westinghouse AP1000 advanced passive pressurized water reactors (PWRs) pursuant to the requirements of Sections 103 and 185(b) of the *Atomic Energy Act*, and Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52, "Licenses, certifications and approvals for nuclear power plants." These reactors would be identified as V.C. Summer Nuclear Station (VCSNS), Units 2 and 3, and would be located approximately 1 mile from the center of VCSNS Unit 1 in western Fairfield County, South Carolina.

Unless otherwise noted, this FSER (also referred to as the SER or Advanced SER in later sections of this document) is based on Revision 5 of VCSNS's COL application, which was submitted via letter dated June 28, 2011 (ADAMS accession number ML11187A127).

As indicated in the applicant's June 28, 2011, Revision 5 submission, the applicant incorporates by reference 10 CFR Part 52, Appendix D, "Design Certification Rule for the AP1000 Design," and the Westinghouse Electric Corporation's (Westinghouse's) application for amendment to portions of the Design Control Document (DCD) Revision 19.

The AP1000 nuclear reactor design is a PWR with a power rating of 3400 megawatts thermal (MWt) and an electrical output of at least 1000 megawatts electric (MWe). The AP1000 design uses safety systems that rely on passive means, such as gravity, natural circulation, condensation and evaporation, and stored energy, for accident prevention and mitigation.

In developing the FSER for VCSNS Units 2 and 3, the staff reviewed the AP1000 DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to a particular review topic. Because of its reliance on both the AP1000 DCD and the DCD FSER, the staff did not issue the VCSNS FSER until the AP1000 design certification amendment (DCA) FSER was issued. This allowed the staff to

review the AP1000 DCA FSER and identify any issues that could affect the review of the VCSNS COL application.

There is an AP1000 DCA FSER chapter that has been issued that does not have a corresponding VCSNS COL FSER chapter. Specifically, AP1000 DCA FSER Chapter 23, "Design Changes Proposed in Accordance with ISG-11," which has been issued, does not have a corresponding VCSNS COL SER chapter. Chapter 23 describes the staff's evaluation and findings for the information Westinghouse submitted after the submittal of DCD Revision 17, in order to address one or more of the criteria identified in Interim Staff Guidance (ISG), DC/COL-ISG-11, "Interim Staff Guidance Finalizing Licensing-basis Information." This information was subsequently incorporated into AP1000 DCD Revision 18. In the case where the information that is evaluated in AP1000 DCA FSER Chapter 23 affected the COL application, this issue was evaluated in the appropriate VCSNS COL FSER chapter. Specifically, STD COL 5.2-3 associated with unidentified reactor coolant system leakage inside containment was created as a result of changes evaluated in AP1000 DCA FSER Chapter 23. The staff's evaluation of the information in the VCSNS COL application that addresses this COL information item is found in Chapter 5 of this FSER.

The VCSNS COL application is organized as follows:

- **Part 1           General and Administrative Information**

Part 1 provides an introduction to the application and includes certain corporate information regarding SCE&G pursuant to 10 CFR 50.33(a) – (d).

- **Part 2           Final Safety Analysis Report**

Part 2 includes information pursuant to the requirements of 10 CFR 52.79 and, in general, adheres to the content and format guidance provided in Regulatory Guide (RG) 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)."

- **Part 3           Environmental Report**

Part 3 includes environmental information pursuant to the requirements of 10 CFR 52.80 and 10 CFR 51.50(c).

- **Part 4           Technical Specifications**

Part 4 addresses how the AP1000 Generic Technical Specifications (GTS) and Bases are incorporated by reference into the VCSNS Plant-Specific Technical Specifications (PTS) and Bases. Specifically, Section A addresses completion of bracketed information. Section B provides a complete copy of the VCSNS PTS and Bases.

- **Part 5           Emergency Plan**

Part 5 includes the VCSNS COL Emergency Plan, supporting information (e.g., evacuation time estimates (ETEs)), and applicable offsite State and local emergency plans.

- **Part 6           [Not Used - reserved for Limited Work Authorization/site redress information]**

- **Part 7 Departures Report**

Part 7 includes information regarding “departures” and “exemptions.” SCE&G identified four departures related to: (1) administrative departure for organization and numbering for the FSAR sections; (2) administrative departure for organization and numbering for FSAR Chapter 2; (3) maximum safety wet bulb (noncoincident) air temperature; and (4) the emergency response facility locations. SCE&G also identified two exemptions: (1) from 10 CFR Part 52, Appendix D, “Design Certification Rule for the AP1000 Design,” Section IV.A.2.a related to COL application organization and numbering; and (2) from 10 CFR Part 52, Appendix D, Section IV.A.2.d related to maximum safety wet bulb (noncoincident) air temperature. In a letter dated October 20, 2010, the applicant proposed to include a departure from AP1000 DCD Section 8.3.2.2 clarifying the current limiting feature of voltage regulating transformers. In a letter dated November 30, 2010, the applicant requested an exemption from the requirements of 10 CFR 70.22(b), 10 CFR 70.32(c) and in turn, 10 CFR 74.31, “Nuclear material control and accounting for special nuclear material of low strategic significance”; 10 CFR 74.41, “Nuclear material control and accounting for special nuclear material of moderate strategic significance”; and 10 CFR 74.51 “Nuclear material control and accounting for strategic special nuclear material.” The applicant requested the exemption so that the exceptions allowed in these regulations for nuclear reactors licensed under 10 CFR Part 50, “Domestic licensing of production and utilization facilities,” will also be applied to those licensed under 10 CFR Part 52.

- **Part 8 Security Plan**

Part 8 addresses the VCSNS Safeguards/Security Plan, which consists of the Physical Security Plan, the Training and Qualification Plan, and the Safeguards Contingency Plan. The Security Plan is submitted to the NRC as a separate licensing document in order to fulfill the requirements of 10 CFR 52.79(a)(35) and 10 CFR 52.79(a)(36). The Plan is categorized as Security Safeguards Information and is withheld from public disclosure pursuant to 10 CFR 73.21, “Protection of safeguards information: performance requirements.”

- **Part 9 Withheld Information**

Part 9 identifies sensitive information that is withheld from public disclosure under 10 CFR 2.390, “Public inspections, exemptions, requests for withholding.” The information in this part includes sensitive unclassified non-safeguards information, proprietary financial information, and figures from Part 2 of the application that meet the sensitive unclassified non-safeguards information (SUNSI) guidance for withholding from the public. In addition, this part of the application includes the following information:

- The withheld portion of the Mitigative Strategies Description and Plans for loss of large areas of the plant due to explosions or fire, as required by 10 CFR 52.80(d), and
- VCSNS Units 2 and 3 Cyber Security Plan, as required by 10 CFR 73.54, “Protection of Digital Computer and Communication Systems and Networks.”

- **Part 10 Proposed Combined License Conditions (Including ITAAC)**

Part 10 includes VCSNS proposed license conditions including inspections, tests, analyses, and acceptance criteria (ITAAC) information in accordance with 10 CFR 52.80. A table of the proposed license conditions is provided in Part 10 of Section 1.3 of this SER.

The contents of the environmental protection plan (and associated license conditions) are not evaluated in this SER. Part 10 of the application incorporates by reference the AP1000 DCD Tier 1 information including ITAAC. In addition, the application includes site-specific ITAAC (e.g., emergency planning, physical security, electrical, and piping).

- **Parts 11-18 Enclosures**

Parts 11-18 provide information submitted by the applicant in support of the VCSNS Units 2 and 3 application. Specifically, these sections include:

- Part 11 includes a subsurface report detailing the results of geotechnical exploration and testing at the proposed site for VCSNS Units 2 and 3.
- Part 12 includes a seismic technical advisory review letter detailing the background and conclusions reached by the Seismic Technical Advisory Group (TAG). The TAG was engaged by the applicant to perform a participatory peer review of the methods and procedures used to develop the VCSNS Units 2 and 3 application, as well as the conclusions and results presented in the FSAR.
- Part 13 describes the SCE&G new nuclear deployment Quality Assurance Program Description (QAPD). The QAPD is the top-level policy document that establishes the quality assurance (QA) policy and assigns major functional responsibilities for COL/construction/preoperation and operation activities conducted by or for SCE&G.
- Part 14 includes mitigative strategies description and plans for loss of large areas of the plant due to explosions or fire, as required by 10 CFR 52.80(d).
- Part 15 of the application includes the cyber security plan. The SUNSI version of the cyber security plan is provided in Part 9 of the application.
- Part 16 of the application includes VCSNS Special Nuclear Material Control and Accounting Program Description.
- Part 17 of the application includes the new fuel shipping plan.
- Part 18 of the application contains supplemental information in support of the 10 CFR Part 70 special nuclear material license application.

## **1.2 Regulatory Basis**

### **1.2.1 Applicable Regulations**

10 CFR Part 52, Subpart C, “Combined Licenses,” sets out the requirements and procedures applicable to Commission issuance of a COL for nuclear power facilities. The following are of particular significance:

- 10 CFR 52.79, “Contents of applications; technical information in final safety analysis report,” identifies the technical information for the FSAR.
- 10 CFR 52.79(d) provides additional requirements for a COL referencing a standard certified design.
- 10 CFR 52.80, “Contents of applications; additional technical information,” provides additional technical information outside of the FSAR (ITAAC and the environmental report).
- 10 CFR 52.81, “Standards for review of applications,” provides standards for reviewing the application.
- 10 CFR 52.83, “Finality of referenced NRC approvals; partial initial decision on site suitability,” provides for the finality of referenced NRC approvals (i.e., standard design certification (DC)).
- 10 CFR 52.85, “Administrative review of applications; hearings,” provides requirements for administrative reviews and hearing.
- 10 CFR 52.87, “Referral to the Advisory Committee on Reactor Safeguards (ACRS),” provides for referral to the ACRS.

The NRC staff reviewed this application according to the standards set out in

- 10 CFR Part 20, “Standards for Protection Against Radiation”
- 10 CFR Part 30
- 10 CFR Part 40
- 10 CFR Part 50
- 10 CFR Part 51, “Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions”
- 10 CFR Part 52
- 10 CFR Part 54, “Requirements for Renewal of Operating Licenses for Nuclear Power Plants”
- 10 CFR Part 55, “Operators’ Licenses”

- 10 CFR Part 70
- 10 CFR Part 73, “Physical Protection of Plants and Materials”
- 10 CFR Part 74, “Material Control and Accounting of Special Nuclear Material”
- 10 CFR Part 100, “Reactor Site Criteria”
- 10 CFR Part 140, “Financial Protection Requirements and Indemnity Agreements”

The staff evaluated the application against the acceptance criteria provided in the following:

- NUREG-0800, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)”
- NUREG-1555: “Standard Review Plans for Environmental Reviews for Nuclear Power Plants”
- NUREG-1577, “Standard Review Plan on Power Reactor Licensee Financial Qualifications and Decommissioning Funding Assurance”

In addition, the staff considered the format and content guidance in RG 1.206<sup>5</sup> for the COL application.

### **1.2.2 Finality of Referenced NRC Approvals**

In accordance with 10 CFR 52.83, if the application for a COL references a DC rule, the scope and nature of matters resolved in the DC for the application and any COL issued are governed by 10 CFR 52.63, “Finality of standard design certifications.”

Based on the finality afforded to referenced certified designs, the scope of this COL application review, as it relates to the referenced certified design, is limited to items that fall outside the scope of the certified design (e.g., COL information items, design information replacing conceptual design information, and programmatic elements that are the responsibility of the COL).

The certified AP1000 design currently incorporated by reference in 10 CFR Part 52, Appendix D, is based on the AP1000 DCD as amended through Amendment 15. This COL application also incorporates by reference the AP1000 DCA application. The results of the NRC staff’s technical evaluation of the AP1000 DCA application are documented in NUREG-1793, “Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design,” and its supplements. Since the AP1000 DCA is not yet certified, the applicant has not incorporated the

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<sup>5</sup> 10 CFR Part 52 Appendix D, Section IV.A.2.a requires the COL application to include a plant-specific DCD that describes the same type of information and uses the same organization and numbering as the generic DCD. The generic DCD used RG 1.70 “Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants (LWR Edition),” Revision 3 as a guide for the format and content. RG 1.206 was issued after the initial certification of the AP1000; thus, there are anticipated differences between the VCSNS Units 2 and 3 COL application and the guidance of RG 1.206.

10 CFR Part 52 - codified version of the DCA into its application. The incorporation of the AP1000 DCA into the VCSNS COL application is **Confirmatory Item 1-1**.

#### Resolution of Standard Content Confirmatory Item 1-1

Confirmatory Item 1-1 involves a commitment by the applicant to make changes to the VCSNS COL application to incorporate by reference the certified AP1000 design as documented in 10 CFR Part 52, Appendix D following the pending DCA. In a letter dated June 28, 2011, the applicant provided revision 5 to the VCSNS COL application. In this letter, the applicant noted that it was incorporating by reference AP1000 DCD, Revision 19. In a February 24, 2011, *Federal Register* (76 FR 10269), the NRC issued a notice of proposed rulemaking to codify the AP1000, as amended, in 10 CFR Part 52, Appendix D. As stated in the *Federal Register* notice the basis for the proposed rulemaking is AP1000 DCD, Revision 18, which was submitted by Westinghouse on December 1, 2010. Subsequent to the issuance of AP1000 DCD, Revision 18, on June 13, 2011, Westinghouse provided AP1000 DCD, Revision 19, to the NRC. The staff has evaluated whether any changes in AP1000 DCD, Revision 19 (relative to Revision 18), should be incorporated as part of the DCA, and the staff's safety evaluation associated with Revision 19 was issued on August 5, 2011. If the Commission incorporates any of these changes into the DCA, then the codified version of the AP1000 DCD would be based on Revision 19.

This FSER is based on VCSNS COL FSAR Revision 5, which incorporates by reference AP1000 DCD Revision 19. As noted in VCSNS COL FSAR Section 1.1, Appendix D to 10 CFR Part 52 is incorporated by reference into the VCSNS COL application. Prior to issuing the VCSNS COLs, the staff must verify that the certified version of the AP1000 DCD is incorporated by reference in the VCSNS COL application. Although FSAR Section 1.1 does not specify AP1000 DCD Revision 19 as the basis for 10 CFR Part 52 Appendix D, this FSER assumes that the changes in Revision 19 will be incorporated and approved in the rulemaking. In that event, if the VCSNS COLs are issued (assuming all other necessary findings can be made), AP1000 DCD Revision 19 will be incorporated into the COLs. However, the staff recognizes that if changes are required to either the AP1000 DCA FSER or to the VCSNS COL FSER as a result of the AP1000 DCA rulemaking, supplements to these FSERs, as appropriate, will be prepared and it may be necessary to re-verify that the certified design is properly incorporated. Based on this understanding, and based on the VCSNS application dated June 28, 2011, which incorporates by reference AP1000 DCD, Revision 19, Confirmatory Item 1-1 is now closed.

While the reference version of the AP1000 design has been docketed but not certified, 10 CFR 52.55(c) allows an applicant, at its own risk, to incorporate by reference a design that is not certified. If the DCA rulemaking results in certification of the amended design, that will demonstrate compliance with 10 CFR 52.81 for the information incorporated by reference from the AP1000 DCD into the COL application. However, until 10 CFR Part 52, Appendix D is revised by rulemaking to incorporate the AP1000 DCA application, the provisions of 10 CFR 52.63 do not apply to this supplemental information.

The contents of the AP1000 COL application are specified by 10 CFR 52.79(a), which requires the submission of information within the FSAR that describes the facility, presents the design bases and the limits on its operation, and presents a safety analysis of the structures, systems, and components (SSCs) of the facility as a whole. For a COL application that references a DC, 10 CFR 52.79(d) requires the DCD to be included or incorporated by reference into the FSAR. A COL application that references a certified design must also include the information and

analysis required to be submitted within the scope of the COL application, but which is outside the scope of the DCD. This set of information addresses plant- and site-specific information and includes all COL action or information items; design information replacing CDI; and programmatic information that was not reviewed and approved in connection with the DC rulemaking.

During its evaluation of the COL application, the staff confirmed that the complete set of information required to be addressed in the COL application was addressed in the DC, the DC as supplemented by the COL application, or completely in the COL application. Following this confirmation, the staff's review of the COL application is limited to the COL-specific review items.

### **1.2.3 Overview of the Design-Centered Review Approach**

The design-centered review approach (DCRA) is described in Regulatory Issue Summary (RIS) 2006-06, "New Reactor Standardization Needed to Support the Design-Centered Licensing Review Approach." The DCRA is endorsed by the Commission's Staff Requirements Memorandum (SRM) SECY-06-0187, "Semiannual Update of the Status of New Reactor Licensing Activities and Future Planning for New Reactors," dated November 16, 2006. The DCRA, which is the Commission's policy intended to promote standardization of COL applications, is beyond the scope of information included in the DC. This policy directs the staff to perform one technical review for each standard issue outside the scope of the DC, and use this decision to support decisions on multiple COL applications. In this context, "standard" refers to essentially identical information. In some cases the staff has expanded the use of this standard approach to other areas with essentially identical information for regulatory purposes. For example, the quality assurance plan for the AP1000 COL applicants is essentially identical with the exception of title names being different. Other areas where this approach was used include cyber security, technical specifications, and loss of large area fire reviews and may include information provided by the applicant(s) to resolve plant-specific issues.

The first COL application submitted for NRC staff review is designated in a design center as the reference COL (RCOL) application, and the subsequent applications in the design center are designated as subsequent COL (SCOL) applications. The VCSNS Units 2 and 3 COL application has been designated as an SCOL application in the AP1000 design center<sup>6</sup>.

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<sup>6</sup> In a letter dated April 28, 2009, the NuStart Energy Development, LLC, consortium informed the NRC that it had changed the RCOL designation for the AP1000 design center from Bellefonte Nuclear Plant (BLN) Units 3 and 4 to the Vogtle Electric Generating Plant (VEGP) Units 3 and 4. The transition of the RCOL from BLN Units 3 and 4 to VEGP Units 3 and 4 occurred after the issuance of the BLN Units 3 and 4 SER with open items. As part of the transition, the NRC staff concluded that the BLN evaluation material identified as Standard (STD COL, STD SUP, STD DEP and Interfaces for Standard Design) in the BLN SER was directly applicable to the VEGP review. As a result, standard content material from the SER for the RCOL (VEGP) application and referenced in the VCSNS SER includes evaluation material from the SER for the BLN COL application.

SCE&G, as an SCOL applicant in the AP1000 design center, organized and annotated its FSAR, Part 2 of the COL application, to clearly identify: a) sections that incorporate by reference the AP1000 DCD; b) sections that are standard for COL applicants in the AP1000 design center; and c) sections that are site-specific and thus only apply to VCSNS Units 2 and 3. The following notations have been used by the applicant for the departures from and/or supplements to the referenced DCD included in this COL application:

- STD – standard (STD) information that is identical in each COL referencing the AP1000.
- VCS – plant-specific information that is specific to this application.
- DEP – represents a departure (DEP) from the DCD.
- COL – represents a COL information item identified in the DCD.
- SUP – represents information that supplements (SUP) information in the DCD.
- CDI – represents design information replacing conceptual design information (CDI) included in the DCD but not addressed within the scope of the DCD review.

The following text is added to the Technical Evaluation sections in this SER whenever the staff uses standard content evaluation material to resolve departures and/or supplements to the referenced DCD:

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (Vogle Electric Generating Plant [VEGP] Units 3 and 4) were equally applicable to the VCSNS Units 2 and 3 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 2 to the VCSNS COL FSAR. In performing this comparison, the staff considered changes made to the VCSNS COL FSAR (and other parts of the COL application, as applicable) resulting from requests for additional information (RAIs).
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the VCSNS COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

To support the text added to the Technical Evaluation sections as described above, the staff evaluates any differences between the information provided by the VCSNS applicant and that provided by the VEGP applicant, regarding details in the application for the standard content material, to determine whether the standard content material of the VEGP SER is still applicable to the VCSNS application. These evaluations are in the SER sections that reference the standard content.

The staff compared the VEGP COL FSAR Revision 2 to the VCSNS COL FSAR at the time of the development of the advanced safety evaluation (ASE). The ASE included confirmatory items. Subsequent to the issuance of the ASE, SCE&G updated the standard portions of its application to be consistent with the VEGP COL application to close the standard content confirmatory items. A complete comparison between the subsequent VEGP COL FSAR revisions to the VCSNS COL FSAR revisions was not performed. However, the staff confirmed that responses to standard content confirmatory items were endorsed by SCE&G and that the changes discussed in the standard confirmatory items were made in the VCSNS COL FSAR.

### **1.3 Principal Review Matters**

The staff's evaluations related to the COL application review are addressed as follows:

- **Part 1 General and Administrative Information**

The staff's evaluation of the corporate information regarding SCE&G pursuant to 10 CFR 50.33, "Contents of applications; general information," is provided in Section 1.5.1 of this SER.

- **Part 2 Final Safety Analysis Report**

The staff's evaluation of information in the VCSNS COL FSAR is provided in the corresponding sections of this SER.

- **Part 3 Environmental Report**

The staff's evaluation of environmental information addressed in the Environmental Report pursuant to the requirements of 10 CFR 51.50(c) is provided in the Environmental Impact Statement.

- **Part 4 Technical Specifications**

Chapter 16 of this SER includes the staff's evaluation of the VCSNS Units 2 and 3 PTS and Bases (specifically completion of bracketed text).

- **Part 5 Emergency Plan**

Chapter 13 of this SER includes the staff's evaluation of the VCSNS Emergency Plan, including related ITAAC, supporting information such as ETEs, and the applicable offsite State and local emergency plans.

- **Part 7 Departures Report**

The staff's evaluation of the departures and exemptions in Part 7 is provided in the applicable chapter of this SER. The table below provides a description of the departure or exemption and where the evaluation is addressed in this SER.

Description of Departure or Exemption	Location of Evaluation in this Report
Departure for organization and numbering for the FSAR sections	1.5.4
Departure for organization and numbering for FSAR Chapter 2	2.0.4
Departure for the maximum safety wet bulb (noncoincident) air temperature	2.0, 2.3.1, 5.4, 6.2, 6.4, 9.1.3, 9.2.2, and 9.2.7
Departure for the emergency response facility locations	13.3
Departure for Class 1E voltage regulating transformer current limiting features	8.3.2
Exemption from 10 CFR Part 52, Appendix D, Section IV.A.2.a related to COL application organization and numbering	1.5.4, and 2.0.4
Exemption from 10 CFR 52.93(a)(1) <sup>7</sup>	1.5.4, and 2.0
Exemption from 10 CFR Part 52, Appendix D, Section IV.A.2.d related to maximum safety wet bulb (noncoincident) air temperature	2.0, 2.3.1, 5.4, 6.2, 6.4, 9.1.3, 9.2.2, and 9.2.7
Exemption from the requirements of 10 CFR 70.22(b), 10 CFR 70.32(c), 10 CFR 74.31, 10 CFR 74.41 and 10 CFR 74.51	1.5.4

- **Part 8 Security Plan**

The staff's evaluation of the Safeguards and Security Plans is documented separately from this SER and is withheld from the public in accordance with 10 CFR 73.21. A non-sensitive summary of the staff's evaluation of those plans is provided in Section 13.6 of this SER.

- **Part 9 Withheld Information**

The staff's evaluation of the withheld information occurs in the context of the specific subject being reviewed and is documented accordingly. A summary of the staff's evaluation of the Mitigative Strategies Description and Plans for loss of large areas of the plant due to explosions is provided in Appendix 19A of this SER. The staff's complete evaluation is documented separately from this SER and is withheld from the public in accordance with 10 CFR 2.390.

<sup>7</sup> Part 7 of the VCSNS COL application does not include an exemption request related to the requirements found in 10 CFR 52.93(a)(1). As discussed in Sections 1.5.4 and 2.0.4 of this report the staff determined that an exemption from this regulation is necessary.

The staff's evaluation of the VCSNS Units 2 and 3 Cyber Security Plan is provided in Section 13.8 of this SER.

• **Part 10 Proposed Combined License Conditions (Including ITAAC)**

The staff's evaluation of the proposed COL conditions (including ITAAC) is provided in the applicable chapter of this SER. The table below provides a description of the proposed license conditions and where the evaluation is addressed in this SER. The staff has identified certain license conditions and ITAAC that it will recommend the Commission impose if a COL is issued to the applicant. Appendix A.1 (of Appendix A) to this SER lists those license conditions. Each license condition is sequentially numbered in individual chapters of this SER. The staff has provided an explanation of each license condition in the applicable section of the SER. These license conditions are based on the provisions of 10 CFR 52.97, "Issuance of combined license." This SER highlights the applicant's proposed ITAAC and the staff's review and acceptance of them. Appendix A.2 (of Appendix A) lists those ITAAC.

<b>Proposed Combined License Condition</b>	<b>Location of Evaluation in this Report</b>
ITAAC	14.3 and throughout this SER
COL information items that cannot be resolved prior to issuance of a COL.	The proposed license conditions are evaluated throughout this SER.
Implementation requirements related to portions of operational programs identified in VCSNS COL FSAR Table 13.4-201 on or before the associated milestones in Table 13.4-201.	The operational programs are evaluated throughout this SER.
Requirements for a fully developed set of site-specific emergency action levels (EALs) to be submitted to the NRC.	13.3
Requirements associated with revisions to the physical security plan.	13.6
Requirements associated with submittal schedules to the NRC related to the operation programs listed in VCSNS COL FSAR Table 13.4-201.	The operational programs are evaluated throughout this SER
First-Plant-Only and first-Three-Plant-only Testing requirements.	14.2
Reporting requirements related to any changes made to the Initial Startup Test Program described in Chapter 14 of the VCSNS COL FSAR.	14.2
Power-ascension testing requirements.	14.2
License conditions associated with granting 10 CFR Part 30, 40, and 70 licenses governing the possession and use of applicable source, byproduct and special nuclear materials <sup>8</sup>	1.5.5

<sup>8</sup> Part 10 of the VCSNS COL application includes a proposed license condition associated with special nuclear material physical protection plan. The staff discusses this license condition as well as additional license conditions that are associated with granting of 10 CFR Parts 30, 40, and 70 licenses in Section 1.5.5 of this report.

Proposed Combined License Condition	Location of Evaluation in this Report
License condition associated with Special Nuclear Material Physical Protection Plan Change.	1.5.5
Geologic mapping <sup>9</sup>	2.5.1
License condition associated with implementation and maintenance of mitigative strategies for responding to a loss of large areas of the plant due to explosions or fires. <sup>10</sup>	Appendix 19A
Inclusion of the Environmental Protection Plan	Included as Appendix B of the COL to ensure compliance with the Endangered Species Act of 1973 and to ensure that the Commission is kept informed of other environmental matters as appropriate.

- **Parts 11-18 Information Incorporated by Reference**

Parts 11 and 12 of the application are evaluated as part of the staff’s review documented in Section 2.5, “Geology, Seismology, and Geotechnical Engineering,” of this SER. The staff’s review of Part 13 of the VCSNS COL application is documented in Chapter 17 of this SER. As discussed above, the staff’s review of Part 14 of the VCSNS COL application regarding mitigative strategies description and plans for loss of large areas of the plant due to explosions is provided in Appendix 19A of this SER. The staff’s complete evaluation is documented separately from this SER and is withheld as non-public in accordance with 10 CFR 2.390.

Part 15 of the application includes the cyber security plan and as discussed above, the staff’s evaluation of this plan is in Section 13.8 of this SER. Part 16 of the application includes the special nuclear material (SNM), material control and accounting (MC&A) program description. Part 17 of the application includes the new fuel shipping plan, and Part 18 of the application includes supplemental information in support of the 10 CFR Part 70 license. Parts 16, 17, and 18 of the application are evaluated in Section 1.5.5 of this SER.

Organization of SER

The staff’s SER is structured as follows:

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<sup>9</sup> VCSNS COL FSAR Section 2.5.1.2.4 includes an applicant commitment to perform geologic mapping during the excavation of Units 2 and 3. As discussed in Section 2.5.1 of this report the staff proposes a license condition associated with this mapping for Unit 3.

<sup>10</sup> Part 10 of the VCSNS COL application does not include a proposed license condition associated with implementation and maintenance of mitigative strategies for responding to a loss of large areas of the plant due to explosions or fires. As discussed in Chapter 19A of this report the staff believes a license condition in this area is warranted.

- The SER adheres to the “finality” afforded to COL applications that incorporate by reference a standard certified design. As such, this SER does not repeat any technical evaluation of material incorporated by reference; rather, it points to the corresponding review findings of NUREG-1793 and its supplements. However, the referenced DCD and the VCSNS COL FSAR are considered in the staff’s safety evaluation to the extent necessary to ensure that the expected scope of information to be included in a COL application is addressed adequately in either the DCD or COL FSAR or in both.
- For sections that were completely incorporated by reference without any supplements or departures, the SER simply points to the DCD and related NUREG-1793 and its supplements and confirms that all the relevant review items were addressed in the AP1000 DCD and the staff’s evaluation was documented in NUREG-1793 and its supplements.
- For subject matter within the scope of the COL application that supplements or departs from the DCD, this SER generally follows a six-section organization as follows:
  - “Introduction” section provides a brief overview of the specific subject matter
  - “Summary of Application” section identifies whether portions of the review have received finality and clearly identifies the scope of review for the COL
  - “Regulatory Basis” section identifies the regulatory criteria for the information addressed by the COL application
  - “Technical Evaluation” section focuses on the information addressed by the COL application
  - “Post Combined License Activities” section identifies the proposed license conditions, ITAAC or FSAR information commitments that are post-COL activities
  - “Conclusion” section summarizes how the technical evaluation resulted in a reasonable assurance determination by the staff that the relevant acceptance criteria have been met

## **1.4 Staff Review of VCSNS COL FSAR Chapter 1**

### **1.4.1 Introduction**

There are two types of information provided in Chapter 1 of the VCSNS COL FSAR:

- General information that enables the reviewer or reader to obtain a basic understanding of the overall facility without having to refer to the subsequent chapters. A review of the remainder of the application can then be completed with a better perspective and recognition of the relative safety significance of each individual item in the overall plant description.
- Specific information relating to qualifications of the applicant, construction impacts and regulatory considerations that applies throughout the balance of the application (e.g., conformance with the acceptance criteria in NUREG-0800).

This section of the SER will identify the information incorporated by reference, summarize all of the new information provided, and document the staff's evaluation of the sections addressing regulatory considerations.

#### **1.4.2 Summary of Application**

The information related to COL/SUP items included in Chapter 1 of the VCSNS COL FSAR encompasses the statements of fact or information recommended by RG 1.206. No staff technical evaluation was necessary where the statements were strictly background information. However, where technical evaluation of these COL/SUPs was necessary, the evaluation is not in this SER section, but in subsequent sections as referenced below.

##### Section 1.1 Introduction

Section 1.1 of the VCSNS COL FSAR, Revision 5, incorporates by reference Section 1.1, "Introduction," of the AP1000 DCD, Revision 19 with the following supplements. In a letter dated November 16, 2010, the applicant endorsed a VEGP letter dated November 11, 2010, that added a discussion of incorporation of the proprietary information and safeguards information referenced in the AP1000 DCD.

- STD SUP 1.1-1

The applicant specified the incorporation of Revision 19 of the Westinghouse AP1000 DCD in all sections of the VCSNS COL FSAR. Additionally, the applicant incorporated by reference Nuclear Energy Institute (NEI) technical reports as identified in Table 1.6-201 of the VCSNS COL FSAR.

- VCS SUP 1.1-2

The applicant clarified that the FSAR was being submitted to NRC by SCE&G under Section 103 of the *Atomic Energy Act* to construct and operate two nuclear power plants under the provisions of 10 CFR Part 52, Subpart C, "Combined Licenses."

- VCS COL 2.1-1

The applicant provided additional information in VCS COL 2.1-1 to address COL Information Item 2.1-1 (COL Action Item 2.1.1-1). Specifically, VCSNS Units 2 and 3 are to be located approximately 1 mile from the center of Unit 1 in western Fairfield County, South Carolina. This is a brief introductory summary of the plant location. An expanded discussion of VCS COL 2.1-1 is included in VCSNS COL FSAR Section 2.1.

- VCS COL 1.1-1

The applicant provided the anticipated schedule for construction and operation of VCSNS Units 2 and 3 in VCSNS COL FSAR Table 1.1-203. The applicant committed to provide a site-specific construction plan and startup schedule after issuance of the COL and after a positive decision had been made to construct the plant.

- STD SUP 1.1-6

The applicant identified that, while the VCSNS COL FSAR generally follows the AP1000 DCD organization and numbering, there were some organization and numbering differences that were adopted, where necessary, to include additional material, such as additional content identified in RG 1.206.

Related to this is STD DEP 1.1-1, “Administrative departure for organization and numbering of the FSAR sections,” in VCSNS COL FSAR Section 1.8 and Part 7 of the VCSNS COL application. The staff’s evaluation of this departure is included in Section 1.5.4 of this SER.

- STD SUP 1.1-3

The applicant provided additional information to describe annotations used in the left hand column of the VCSNS COL FSAR to identify departures, supplementary information, COL items, and CDI.

- STD SUP 1.1-4

The applicant provided additional information to indicate how proprietary, personal or sensitive information withheld from public disclosure pursuant to 10 CFR 2.390 and RIS 2005-026, “Control of Sensitive Unclassified Nonsafeguards Information Related to Nuclear Power Reactors,” is identified in the VCSNS COL FSAR. Proprietary material was provided in Part 9 of the COL application.

- VCS SUP 1.1-5

The applicant provided additional information to identify acronyms and system designations used in the VCSNS COL FSAR that are in addition to those identified in the AP1000 DCD.

### Section 1.2 General Plant Description

Section 1.2 of the VCSNS COL FSAR, Revision 5, incorporates by reference Section 1.2, “General Plant Description,” of the AP1000 DCD, Revision 19 with the following departures and supplements:

- VCS DEP 18.8-1

The applicant provided VCSNS COL FSAR Figure 1.2-201 to replace AP1000 DCD Figure 1.2-18 to reflect the proposed relocation of the Technical Support Center (TSC) and the Operations Support Center (OSC). The staff’s evaluation of the locations of the TSC and OSC is discussed in Section 13.3 of this SER.

- VCS COL 2.1-1; VCS COL 3.3-1; and VCS COL 3.5-1

The applicant provided additional information on the site plan for VCSNS Units 2 and 3 summarizing the principal structures and facilities, parking areas, roads, and transmission lines.

The location and orientation of the power block complex are also described. These COL information items are expanded in other sections of the VCSNS COL FSAR.<sup>11</sup>

### Section 1.3 Comparisons with Similar Facility Designs

Section 1.3 of the VCSNS COL FSAR, Revision 5, incorporates by reference Section 1.3, “Comparisons with Similar Facility Designs,” of the AP1000 DCD, Revision 19 with no supplements.

### Section 1.4 Identification of Agents and Contractors

Section 1.4 of the VCSNS COL FSAR, Revision 5, incorporates by reference Section 1.4, “Identification of Agents and Contractors,” of the AP1000 DCD, Revision 19 with the following supplements:

- VCS SUP 1.4-1

The applicant provided additional information to identify SCE&G as the agent acting on behalf of Santee Cooper for VCSNS Units 2 and 3. Additionally, the applicant identified SCE&G as the operator of VCSNS Units 2 and 3.

SCE&G is the principal subsidiary of SCANA Corporation. Santee Cooper is South Carolina’s state-owned electric and water utility. In a letter dated June 29, 2010, the applicant proposed changes to VCS SUP 1.4-1 to clarify the ownership role and that SCE&G retains sole responsibility for operations of VCSNS Units 2 and 3.

- VCS SUP 1.4-2

The applicant provided additional information related to specialized consulting firms that assisted in preparing the COL application for VCSNS.

SCE&G received support from the following contractors in preparing the COL:

- Bechtel Power Corporation
- MACTEC Engineering and Consulting, Inc.
- NuStart Energy, Inc.
- Risk Engineering, Inc.
- Tetra Tech NUS, Inc.
- William A. Lettis and Associates, Inc.
- Westinghouse Electric Company LLC

- VCS SUP 1.4-3

In a letter dated June 29, 2010, SCE&G provided a proposed revision to VCSNS COL FSAR Section 1.4.1 to add VCS SUP 1.4-3 to describe Westinghouse’s and Shaw’s roles in the construction of VCSNS Units 2 and 3.

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<sup>11</sup> Table 1.8-202 of the VCSNS COL FSAR provides a COL information item index of occurrences in the VCSNS COL FSAR.

### Section 1.5 Requirements for Further Technical Information

Section 1.5 of the VCSNS COL FSAR, Revision 5, incorporates by reference Section 1.5, "Requirements for Further Technical Information," of the AP1000 DCD, Revision 19 with no supplements. This section of the DCD provides information related to testing conducted during the AP600 conceptual design program to provide input into the plant design and to demonstrate the feasibility of unique design features. The DCD also describes the analyses performed to show that the AP600 and AP1000 exhibit a similar range of conditions such that the AP600 tests are sufficient to support the AP1000 safety analysis.

### Section 1.6 Material Referenced

Section 1.6 of the VCSNS COL FSAR, Revision 5, incorporates by reference Section 1.6, "Material Referenced," of the AP1000 DCD, Revision 19 with the following supplements:

- STD SUP 1.6-1

The applicant provided additional information to identify the technical documents incorporated by reference in the VCSNS COL FSAR in addition to those technical documents incorporated by reference in the AP1000 DCD.

### Section 1.7 Drawings and Other Detailed Information

Section 1.7 of the VCSNS COL FSAR, Revision 5, incorporates by reference Section 1.7, "Drawings and Other Detailed Information," of the AP1000 DCD, Revision 19, with the following supplements:

- VCS SUP 1.7-1

The applicant identified the site-specific system drawings. These are the circulating water system, raw water system, and switchyard single line diagram.

### Section 1.8 Interfaces for Standard Design

Section 1.8 of the VCSNS COL FSAR, Revision 5, incorporates by reference Section 1.8, "Interfaces for Standard Design," of the AP1000 DCD, Revision 19 with the following supplements:

- VCS SUP 1.8-1

The applicant identified four departures in VCS COL FSAR Table 1.8-201, "Summary of FSAR Departures from the DCD." The departures are:

- STD DEP 1.1-1 related to numbering and organization of the VCSNS COL FSAR sections to be consistent with RG 1.206 and NUREG-0800.
- VCS DEP 2.0-1 related to numbering and organization of the VCSNS COL FSAR Chapter 2 sections to be consistent with RG 1.206 and NUREG-0800, which differs from STD DEP 1.1-1.

- VCS DEP 2.0-2 related to the maximum safety wet bulb (noncoincident) air temperature.
- VCS DEP 18.8-1 related to the location of the TSC and the OSC.

In Revision 4 of the VCSNS COL application, the applicant added another Tier 2 departure related to a revision to AP1000 DCD Section 8.3.2.2 (Class 1E voltage regulating transformer current limiting features).

- VCS SUP 1.8-2

The applicant provided a list of the COL information items in the AP1000 DCD. In VCSNS COL FSAR Table 1.8-202, SCE&G provides the sections of the application addressing these issues. The table further identifies the AP1000 COL items as an “applicant” item, a “holder” item or both. An applicant item is completely addressed in the application. SCE&G’s definition of a COL holder item is an item that cannot be resolved prior to issuance of the COL. These items are regulatory commitments of the COL holder and will be completed as specified in the appropriate section of the referenced DCD and their completion is the subject of a COL license condition presented in Part 10 of this COL application.

- VCS SUP 1.8-3

The applicant provided in VCSNS COL FSAR Table 1.8-203 a list of interface items from the AP1000 DCD and the corresponding VCSNS COL FSAR section(s) that address those interface items.

### Section 1.9 Compliance With Regulatory Criteria

Section 1.9 of the VCSNS COL FSAR, Revision 5, incorporates by reference Section 1.9, “Compliance with Regulatory Criteria,” of the AP1000 DCD, Revision 19 with the following supplements:

- STD COL 1.9-1

The applicant provided additional information in STD COL 1.9-1 (corresponding to COL Information Item 1.9-1) related to NRC RGs cited in the VCSNS COL FSAR. Table 1.9-201 identifies the RG revision and provides VCSNS COL FSAR cross-references. In addition, Appendix 1AA, “Conformance with Regulatory Guides,” was developed by the applicant to supplement the detailed discussion presented in Appendix 1A, “Conformance with Regulatory Guides,” of the referenced AP1000 DCD. Specifically, Appendix 1AA delineates conformance of design aspects as stated in the DCD and conformance with programmatic and/or operational issues as presented in the VCSNS COL FSAR. In certain RGs design aspects were beyond the scope of the DCD and are also presented in the VCSNS COL FSAR.

- STD COL 1.9-2

The applicant provided additional information in STD COL 1.9-2 (corresponding to the first un-numbered COL information item identified at the end of AP1000 DCD Table 1.8-2) related to operational experience. VCSNS COL FSAR Table 1.9-204 provides a list of Bulletins and

Generic Letters (GLs), the appropriate VCSNS COL FSAR cross-references and whether the subject matter was addressed in the AP1000 DCD.

- STD COL 1.9-3

The applicant provided additional information in STD COL 1.9-3 (related to the second un-numbered COL information item identified at the end of AP1000 DCD Table 1.8-2) related to review of unresolved safety issues and generic safety issues (GSIs). Specifically, VCSNS COL FSAR Table 1.9-203 lists Three Mile Island (TMI) Action Plan items, Task Action Plan items, New Generic Issues, Human Factors issues, and Chernobyl Issues and states how they were considered in the AP1000 DCD and COL application. In addition, the applicant provided discussion on four new generic issues: Issue 186 related to heavy load drops; Issue 189 related to susceptibility of certain containments to early failure from hydrogen combustion; Issue 191 related to PWR sump performance; and Issue 196 related to the use of Boral in long-term dry storage casks for spent reactor fuel.

- STD SUP 1.9-1

The applicant provided additional information related to conformance with NUREG-0800. Specifically VCSNS COL FSAR Table 1.9-202 delineates conformance with NUREG-0800 for design aspects as stated in the AP1000 DCD and conformance for subjects beyond the scope of the DCD as presented in the VCSNS COL FSAR.

- STD SUP 1.9-2

The applicant clarified that the severe accident mitigation design alternatives evaluation for the AP1000 in Appendix 1B to the DCD is not incorporated into the VCSNS COL FSAR; but is addressed in the COL application Environmental Report.

- STD SUP 1.9-3

The applicant provided information related to station blackout (SBO) procedures and training for operators to include actions necessary to restore offsite power after 72 hours by addressing alternating current (ac) power restoration and severe weather guidance in accordance with NUMARC-87-00.

#### Section 1.10 Nuclear Power Plants to Be Operated On Multi-Unit Sites

The applicant provided an assessment of the potential impacts of construction of one unit on SSCs important to safety for an operating unit, in accordance with 10 CFR 52.79(a)(31). This section of the VCSNS COL FSAR provides an assessment of potential construction activity hazards, SSCs important to safety for the operating unit and related limiting conditions for operation (LCOs) for the operating unit, potentially impacted SSCs and LCOs and applicable managerial and administrative controls to be used to provide assurance that the LCOs for operating units are not exceeded as a result of construction activities at the multi-unit sites.

- STD SUP 1.10-1

The applicant identified this as a new section in the VCSNS COL application that was not part of the referenced DCD.

- VCS SUP 1.10-1

The applicant identified that the power blocks for VCSNS Units 2 and 3 have a minimum separation of at least 800 feet between plant centerlines. In the standard portion of the application there is a discussion that the primary consideration in setting this separation distance is the space needed to support plant construction via the use of a heavy-lift crane.

#### License Conditions

- Part 10, License Condition 1, ITAAC

The applicant proposed that the ITAAC identified in the tables in Appendix B of Part 10 of the VCSNS COL application be incorporated into the COL.

### **1.4.3 Regulatory Basis**

The regulatory basis of the information incorporated by reference is addressed in NUREG-1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the Commission regulations for the introductory information in VCSNS COL FSAR Chapter 1 are given in Section 1.0 of NUREG-0800.

The applicable regulatory requirements for the introductory information are as follows:

- 10 CFR 50.43(e) as it relates to requirements for approval of applications for a DC, COL, manufacturing license, or operating license that propose nuclear reactor designs that differ significantly from LWR designs that were licensed before 1997, or use simplified, inherent, passive, or other innovative means to accomplish their safety functions.
- 10 CFR 52.77 and 10 CFR 52.79, as they relate to general introductory matters.
- 10 CFR 52.79(a)(17), as it relates to compliance with technically relevant positions of the TMI requirements.
- 10 CFR 52.79(a)(20), as it relates to proposed technical resolutions of those unresolved safety issues and medium- and high priority GSIs that are identified in the version of NUREG-0933, "Resolution of Generic Safety Issues (Formerly entitled 'A Prioritization of Generic Safety Issues')," current on the date up to 6 months before the docket date of the application and, which are technically relevant to the design.
- 10 CFR 52.79(a)(31) regarding nuclear power plants to be operated on multi-unit sites, as it relates to an evaluation of the potential hazards to the SSCs important to safety of operating units resulting from construction activities, as well as a description of the managerial and administrative controls to be used to provide assurance that the LCOs are not exceeded as a result of construction activities at the multi-unit sites.

- 10 CFR 52.79(a)(37), as it relates to the information necessary to demonstrate how operating experience insights have been incorporated into the plant design.
- 10 CFR 52.79(a)(41), as it relates to an evaluation of the application against the applicable NRC review guidance in effect 6 months before the docket date of the application.
- 10 CFR 52.79(d)(2) requires that, for a COL referencing a standard DC, the FSAR demonstrate that the interface requirements established for the design under 10 CFR 52.47, “Contents of applications; technical information,” have been met.
- 10 CFR 52.97(a)(1)(iv) regarding technical and financial qualifications.

The related acceptance criteria from NUREG-0800, Chapter 1 are as follows:

- For regulatory considerations, acceptance is based on addressing the regulatory requirements as discussed in FSAR Chapter 1 or in the referenced FSAR section. The NUREG-0800 acceptance criteria associated with the referenced section will be reviewed in the context of that review.
- For performance of new safety features, the information is sufficient to provide reasonable assurance that: (1) these new safety features will perform as predicted in the applicant's FSAR; (2) the effects of system interactions are acceptable; and (3) the applicant provides sufficient data to validate analytical codes. The design qualification testing requirements may be met with either separate effects or integral system tests; prototype tests; or a combination of tests, analyses, and operating experience.

For conformance with regulatory criteria, RG 1.206 states an applicant should perform a similar evaluation for conformance with RGs that were in effect six months prior to the submittal of the COL application.

#### **1.4.4 Technical Evaluation**

The NRC staff reviewed Section 1 of the VCSNS COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.<sup>12</sup> The NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to this introduction. The results of the NRC staff's evaluation of the information incorporated by reference in the VCSNS COL application are documented in NUREG-1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the VCSNS Units 2 and 3 COL application, the staff undertook the following reviews:

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<sup>12</sup> See Section 1.2.2, “Finality of Referenced NRC Approvals” for a discussion of the staff's review related to verification of the scope of information to be included within a COL application that references a DC.

- The staff compared the VEGP COL FSAR, Revision 2 to the VCSNS COL FSAR. In performing this comparison, the staff considered changes made to the VCSNS COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the VCSNS COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the Bellefonte Nuclear Station (BLN) Units 3 and 4 COL application. Any confirmatory items in the standard content material retain the numbers assigned in the VEGP SER. Confirmatory items that are first identified in this SER section have a VCSNS designation (e.g., VCSNS Confirmatory Item 1.4-1).

The staff reviewed the information in the VCSNS COL FSAR:

VCSNS COL FSAR Sections 1.1, 1.2, 1.3, 1.6, and 1.7

There are no specific NUREG-0800 acceptance criteria related to the general information presented in Sections 1.1, 1.2, 1.3, 1.6, and 1.7, and no specific regulatory findings. The information provides the reader with a basic overview of the nuclear power plant and the construct of the VCSNS COL FSAR, itself.

In VCSNS COL FSAR Section 1.1, VCS COL 1.1-1 states that a site-specific construction plan and startup schedule will be provided after issuance of the COL and after a positive decision had been made to construct the plant. This is identified as **Commitment Number 1.4-1**.

The following portion of this technical evaluation section is reproduced from Section 1.4.4 of the VEGP SER:

*In a letter dated November 11, 2010, the applicant added a discussion of incorporation of the proprietary information and safeguards information referenced in the AP1000 DCD. This information is included to meet the requirements of 10 CFR Part 52, Appendix D, Section IV.A.3 which indicates the applicant must “include, in the plant specific DCD, the proprietary information and safeguards information referenced in the AP1000 DCD” and therefore, is acceptable. The incorporation of the above information into a future revision of the VEGP COL FSAR is **Confirmatory Item 1.4-1**.*

Resolution of Standard Content Confirmatory Item 1.4-1

*Confirmatory Item 1.4-1 is an applicant commitment to revise FSAR Section 1.1 to include a discussion of incorporation of the proprietary information and safeguards information referenced in the AP1000 DCD. The staff verified that the VEGP COL FSAR was appropriately revised. As a result, Confirmatory Item 1.4-1 is now closed.*

#### VCSNS COL FSAR Section 1.4

- VCS SUP 1.4-1, VCS SUP 1.4-2, and VCS SUP 1.4-3

This evaluation is limited to SCE&G's technical qualification to hold a 10 CFR Part 52 license in accordance with 10 CFR 52.97(a)(1)(iv). The financial qualifications that are also a requirement of 10 CFR 52.97(a)(1)(iv) are evaluated in Section 1.5.1 of this SER.

Based on Revision 2 of the VCSNS COL application, the staff determined that the ownership and operation of VCSNS Units 2 and 3, and the roles of Westinghouse and Shaw in designing and constructing the units was not clearly described. The issue was identified as RAI 1-4. In response to the question, SCE&G proposed changes to VCSNS COL FSAR Section 1.4 to clarify these issues as follows:

- SCE&G retains sole responsibility for operation of VCSNS Units 2 and 3 and ensuring that the requirements of 10 CFR 52.103(g), "Operation under a combined license," are met.
- SCE&G will jointly own the facility and share in the costs and output of the facility with SCE&G having a 55 percent share and Santee Cooper a 45 percent share.
- SCE&G has an Engineering, Procurement, and Construction (EPC) contract with a consortium comprised of Westinghouse Electric Company, LLC and Shaw. SCE&G notes that the consortium will act as the AP1000 provider, architect-engineer and constructor for VCSNS Units 2 and 3.

In addition, in VCSNS COL FSAR Section 1.4 of the application, SCE&G notes that it constructed and currently operates VCSNS Unit 1. Because SCE&G holds a 10 CFR Part 50 license for a nuclear power plant and has demonstrated its ability to build and operate a nuclear unit, the staff finds that SCE&G is qualified to hold a 10 CFR Part 52 license. The staff notes that Section 17.5 of the VCSNS COL FSAR discusses the QA program to be implemented at the receipt of the COL. This QA program includes requirements that will be implemented by SCE&G's EPC contractor, Westinghouse and Shaw. The staff's evaluation of Section 17.5 of the VCSNS COL FSAR is in Section 17.5 of this SER. Based on SCE&G's experience with building and operating a nuclear power plant and the staff's evaluation of SCE&G's QA program, the staff finds that SCE&G is technically qualified to hold a 10 CFR Part 52 license in accordance with 10 CFR 52.79(a)(1)(iv). Changes to VCSNS COL FSAR Section 1.4 described in SCE&G's response to RAI 1-4 is **VCSNS Confirmatory Item 1.4-1**.

#### Resolution of VCSNS Confirmatory Item 1.4-1

Confirmatory Item 1.4-1 is an applicant commitment to revise its FSAR Section 1.4 to better identify the roles and responsibilities of Santee Cooper, Westinghouse and Shaw in the VCSNS Units 2 and 3 project. The staff verified that the VCSNS COL FSAR was appropriately revised. As a result, VCSNS Confirmatory Item 1.4-1 is now closed.

### VCSNS COL FSAR Section 1.5

10 CFR 50.43(e) requires additional testing or analysis for applications for a DC or COL that propose nuclear reactor designs that differ significantly from LWR designs that were licensed before 1997, or use simplified, inherent, passive, or other innovative means to accomplish their safety functions. This requirement was addressed in the AP1000 DCD and evaluated by the staff in NUREG-1793 Chapter 21, "Testing and Computer Code Evaluation." The COL application does not include any additional design features that require additional testing.

### VCSNS COL FSAR Section 1.6

There are no specific NUREG-0800 acceptance criteria related to the information presented in Section 1.6 and no specific regulatory findings.

### VCSNS COL FSAR Section 1.8

- VCS SUP 1.8-1

As discussed in SER Section 1.4.2, the applicant identified four departures in VCSNS COL FSAR Table 1.8-201 from the referenced AP1000 DCD and proposed one additional departure. Section 1.3 of this SER provides a cross-reference to where these departures are discussed in this SER.

- VCS SUP 1.8-2

VCS SUP 1.8-2 includes the same type of information as VEGP SUP 1.8-2. Therefore, the following portion of this technical evaluation section is reproduced from Section 1.4.4 of the VEGP SER:

*In Sections 1.3 and 1.4.4 of the BLN SER, the staff identified a standard content **Open Item 1-2** related to the decision regarding which of the BLN COL FSAR commitments, if any, should become a license condition. On January 21, 2010, the NRC issued ISG-15, "Final Interim Staff Guidance on the Post-Combined License Commitments," ESP/DC/COL-ISG-15. This guidance discusses options regarding completion of COL items that cannot be completed until after issuance of the COL. The VEGP applicant identified that certain COL information items cannot be resolved prior to the issuance of a COL. The applicant has identified proposed License Condition 2 in Part 10 of the COL application to ensure these COL items will be completed by the identified implementation milestones through completion of the action identified. The determination that these COL information items cannot be resolved prior to issuance of a COL is discussed in the relevant SER section related to the topic. In addition, using the guidance of ISG-15, the staff has identified certain FSAR commitments in individual sections of this SER and these FSAR commitments are listed in Appendix A.3 of this SER. The staff considers **Open Item 1-2** is resolved.*

- VCS SUP 1.8-3

AP1000 DCD Table 1.8-1 presents interface items for the AP1000. This section of the DCD identifies certain interfaces with the standard design that have to be addressed in accordance

with 10 CFR 52.47(a)(1)(vii).<sup>13</sup> As required by 10 CFR 52.79(d)(2), the COL application must demonstrate how these interface items have been met. In the VCSNS COL FSAR, the applicant did not explicitly identify how these interface items have been met. In a letter dated September 4, 2009, the applicant provided VCSNS COL FSAR Table 1.8-203, which explicitly identifies the FSAR location of information addressing the interface items identified in Section 1.8 of the AP1000 DCD. The staff's review of the identified FSAR locations confirmed that interface items are adequately addressed in the VCSNS COL FSAR. The technical discussions related to specific interface requirements are addressed in related sections of this SER (e.g., SER Sections 8.2.4, and 11.3.2).

### VCSNS COL FSAR Section 1.9

In this section of the application, the applicant demonstrates conformance with RGs and NUREG-0800 and addresses unresolved safety issues, GSIs, TMI action items, and operating experience.

The following portion of this technical evaluation section is reproduced from Section 1.4.4 of the VEGP SER<sup>14</sup>:

#### AP1000 COL Information Item

- *STD COL 1.9-1*

*Regarding RGs, the applicant provides in BLN COL FSAR Table 1.9-201 a cross-reference between the RG and where it is discussed in the application, and Appendix 1AA, "Conformance with Regulatory Guides," to supplement the detailed discussion presented in Appendix 1A, "Conformance with Regulatory Guides," of the referenced DCD. The technical discussions related to this appendix are addressed in the related technical sections of the BLN COL FSAR. In addition, BLN COL FSAR Table 1.9-201 provides a listing of all RGs, the specific revision, and provides BLN COL FSAR and DCD cross-references.*

*The staff issued three RAIs associated with how the RG information in Table 1.9-201 and Appendix 1AA of the BLN COL FSAR is presented. In addition, there were two specific RAIs associated with how an individual RG is discussed in Table 1.9-201 and Appendix 1AA. A description of the RAIs and their responses follows.*

#### RAI 1-5

*In RAI 1-5, the staff noted that BLN COL FSAR Appendix 1AA lists the later version of the RG when compared with DCD Table 1.9-1 but in some cases does not discuss compliance with the later version. In other cases, exceptions to the RG were identified but not justified.*

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<sup>13</sup> Following the update to 10 CFR Part 52 (72 FR 49517), this provision has changed to 10 CFR 52.47(a)(25).

<sup>14</sup> The text reproduced from Section 1.4.4 of the VEGP is unaltered, but is presented in sequential order of the COL and SUP items.

### RAI 1-7

*In RAI 1-7, the staff noted that not all RGs listed in Appendix 1AA provided a cross-reference to where they were discussed in accordance with the guidance in Section 1 of NUREG-0800.*

### RAI 1-11

*In RAI 1-11, the staff noted that the information that TVA provided in response to RAIs 1-5 and 1-7 conflicted with information that TVA provided in response to another RAI. TVA was requested to reconcile these differences.*

### RAIs 1-1 and 1-10

*These RAIs are associated with specific RGs and RAI 1-1 and RAI 1-10 are evaluated in Chapters 13 and 12, of this SER, respectively.*

*In TVA's response to RAIs 1-5 and 1-7, TVA committed to make changes to BLN COL FSAR Table 1.9-201 and Appendix 1AA to:*

- Add an additional statement to Appendix 1AA that specifically addresses the later version of the RG.*
- Revise BLN COL FSAR Sections 1.9.1.1, 1.9.1.2, 1.9.1.3, and 1.9.1.4, to reflect that one method of identifying and justifying an alternative to an RG is the use of previous revisions of the RG for design aspects as stated in the DCD in order to preserve the finality of the certified design.*
- Revise BLN COL FSAR Table 1.9-201 to address the RG listed in Appendix 1AA, thereby providing a more complete cross reference of where each RG is discussed in the COL application.*

*In response to RAI 1-11, TVA committed to revising BLN COL FSAR Table 1.9-201 and Appendix 1AA to ensure that they are consistent with commitments made in other RAI responses.*

*The staff's evaluation of the RGs is addressed in Chapters 2 through 19 of this SER as needed. At a minimum the NRC staff's FSER sections will discuss any RG that involves an exception.*

*The staff finds TVA's responses to RAIs 1-5 and 1-7 acceptable. However, the staff notes that BLN COL FSAR Table 1.9-201 and Appendix 1AA will most likely need additional changes based on the staff's evaluation of the RGs in this SER and TVA's response to RAI 1-11. The NRC staff is still evaluating TVA's response to RAI 1-11 and has not yet made a determination of whether the response is acceptable. This is Open Item 1.4-2. The updating of BLN COL FSAR Table 1.9-201 to reflect changes committed to by TVA in response to RAI 1-11 and the updating of this information to reflect TVA's commitments in other RAI responses is Confirmatory Item 1.4-2.*

#### Resolution of Standard Content Confirmatory Item 1.4-2

The NRC staff verified that VEGP COL FSAR Table 1.9-201 was updated to provide an acceptable cross reference of where each RG is discussed in the COL application. As a result, Confirmatory Item 1.4-2 is resolved for VEGP.

#### Resolution of Standard Content Open Item 1.4-2

In a letter dated September 21, 2009, the VEGP applicant provided clarification to a previously submitted response dated January 27, 2009 from the BLN applicant. Specifically, the applicant proposed to revise the discussion in the "General comment" portion related to preserving the finality of the certified design in VEGP COL FSAR Sections 1.9.1.1, 1.9.1.2, 1.9.1.3, 1.9.1.4 and Appendix 1AA Note (b); to clarify in VEGP COL FSAR Section 17.5 the "DCD scope" and the "remaining scope" discussion for QA-related RGs (including RG 1.28; RG 1.30, "Quality Assurance Requirements for the Installation, Inspection, and Testing of Instrumentation and Electric Equipment (Safety Guide 30)"; RG 1.33, "Quality Assurance Program Requirements (Operation)," Revision 2; RG 1.38, "Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage, and Handling of Items for Water-Cooled Nuclear Power Plants," Revision 2; RG 1.39, "Housekeeping Requirements for Water-Cooled Nuclear Power Plants," Revision 2; RG 1.94, "Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants," Revision 1; and RG 1.116, "Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems"). In addition, the applicant proposed to revise the VEGP COL FSAR, Appendix 1AA Note (c) to clarify the purpose of a "General" entry under the column labeled "Section Criteria" discussion. It is stated that a "Criteria Section" entry of "General" indicates a scope for the conformance statement of "all regulatory guide positions related to programmatic and/or operational aspects." Thus an associated conformance statement of "Conforms" indicates that the applicant "complies with all regulatory guide positions related to programmatic and or/or operational aspects." The proposed clarifications clearly provide the scope of conformance to the RGs and, therefore, they are acceptable. The staff verified that the VEGP COL FSAR was updated to reflect the above. The staff considers Open Item 1.4-2 resolved for VEGP.

#### Evaluation of Site-Specific Information Related to Standard Content

In comparing VEGP COL FSAR Table 1.9-201 and Appendix 1AA to the respective tables in the VCSNS COL FSAR, the staff notes that there are several differences. These differences are associated with site-specific information and are reflected in the VCSNS COL FSAR by a "VCS COL 1.9-1" designation. The staff reviewed the site-specific differences in Table 1.9-201 and Appendix 1AA and has determined that the VCS COL 1.9-1 information in these tables was updated consistent with the update provided for the standard information; therefore, the staff considers the standard content open item as it relates to issues associated with the site-specific information resolved.

The following portion of this technical evaluation section is reproduced from Section 1.4.4 of the VEGP SER:

- *STD COL 1.9-2 (related to the first un-numbered COL information item identified at the end of DCD Table 1.8-2)*

*Regarding demonstration of operating experience from Bulletins and GLs, as required by 10 CFR 52.79(a)(37), BLN COL FSAR Table 1.9-204 provides a list of Bulletins and GLs, the appropriate BLN COL FSAR cross-references, and whether the subject matter was addressed in the DCD. The technical discussions related to the specific safety issues are addressed in the related sections of the BLN COL FSAR and are addressed in Chapters 2 through 19 of this SER as needed.*

*The evaluation of GSI 163, "Multiple Steam Generator Tube Leakage," is described below because otherwise its evaluation would be spread across several SER chapters.*

*GSI 163 identified a safety concern associated with the potential multiple steam generator (SG) tube leaks triggered by a main steam line break outside containment that cannot be isolated. The issue was evaluated as part of the AP1000 DCD review and was resolved for the AP1000 design. The evaluation was documented in NUREG-1793, Chapter 20. The evaluation states in part the following:*

*The staff agrees that the issue should be closed for the AP1000 design. Issue 163 concerns the possibility that a multiple steam generator tube rupture (SGTR), resulting from a main steam line break and degraded SG tubes, could result in core damage due to depletion of the reactor coolant and safety injection fluid in the refueling water storage tank. For the AP1000 design, an SGTR is mitigated using the passive core cooling system, initially through the passive residual heat removal heat exchanger, and the core makeup tanks (CMTs). After the CMTs drain to the low level to actuate the automatic depressurization system, the reactor coolant depressurization would result in gravity injection from the in containment refueling water storage tank (IRWST), and eventually from the containment recirculation. The scenario that the safety injection from the refueling water storage tank, which is outside the containment in the existing plants, will be depleted to result in core damage is not likely for the AP1000 design because the IRWST and containment recirculation will continue to provide core cooling.*

*Since the resolution of Issue 163 is an ongoing NRC effort, any future requirements for the resolution of this issue will be required of the COL applicant, if applicable to the AP1000 design.*

*Subsequent to the original issuance of NUREG-1793, GSI 163 was closed via a July 16, 2009, memorandum. In the safety evaluation accompanying the closure of the issue, the following is stated:*

*the staff concludes that the technical specification requirements relating to SG tube integrity provide reasonable assurance that all tubes will exhibit acceptable structural margins against burst or rupture during normal operation and DBAs (including MSLB [main steam line break]), and that leakage from one or multiple tubes under DBAs will be limited to very small amounts, consistent with the applicable regulations for offsite and control room dose.*

*Therefore, in addition to the unique design features of the AP1000 cited in NUREG-1793 and its supplements as a basis for closure of the issue, the staff notes that for PWR designs in general the issue is resolved based on the technical specification requirements. The staff discusses these technical specification requirements in Section 5.4, "Component and Subsystem Design," of this SER. Based on the evaluation in NUREG-1793 and its supplements, and based on the staff's evaluation of the SG tube surveillance program in Section 5.4 of this SER, the staff considers GSI 163 resolved for VEGP.*

- STD COL 1.9-3

*Regarding consideration of new and generic safety issues as required by 10 CFR 52.79(a)(17) and 10 CFR 52.79(a)(20), BLN COL FSAR Table 1.9-203, provides a listing of the TMI Action Plan items, Task Action Plan items, New Generic Issues, Human Factors issues, and Chernobyl Issues and states how they were considered in the DCD and COL application. The technical discussions related to the specific safety issues are addressed in the related sections of the BLN COL FSAR.*

*In addition, the applicant provided discussion of four new generic issues: Issue 186 related to heavy load drops; Issue 189 related to susceptibility of certain containments to early failure from hydrogen combustion; Issue 191 related to PWR sump performance; and Issue 196 related to the use of Boral in long-term dry storage casks for spent reactor fuel.*

*The applicant identified that neither Issue 189 nor Issue 196 is applicable to the design or application and that therefore neither is addressed in the BLN COL FSAR. Issue 186 states that there are not any planned heavy load lifts outside those described in the DCD; nonetheless, special procedures to address heavy loads are discussed in Subsection 9.1.5.3. Related to Issue 191, the applicant provided a reference to the protective coatings program and containment cleanliness program in Subsections 6.1.2.1.6 and 6.3.8.1 of the BLN COL FSAR, respectively.*

*Issue 186 and Issue 196 are evaluated in Chapter 9 of this SER. Issues 189 and 191 are evaluated in Chapter 6 of this SER.*

- STD SUP 1.9-1

*Regarding conformance with regulatory review criteria as required by 10 CFR 52.79(a)(41), BLN COL FSAR Table 1.9-202 provides the applicant's review of conformance with the acceptance criteria of NUREG-0800. The*

*technical discussions related to the specific acceptance criteria of NUREG-0800 are addressed in the related sections of the BLN COL FSAR and addressed in Chapters 2 through 19 of this SER as needed.*

- STD SUP 1.9-2

The applicant clarified that the severe accident mitigation design alternatives evaluation for the AP1000 in Appendix 1B to the DCD is not incorporated into the VCSNS COL FSAR; but is addressed in the VCSNS COL Environmental Report. The staff reviewed this information as part of its development of the Final Environmental Impact Statement. Therefore, no further evaluation is needed for STD SUP 1.9-2.

The following portion of this technical evaluation section is reproduced from of Section 1.4.4 of the VEGP SER:

- *STD SUP 1.9-3*

*This COL supplemental item is addressed as VEGP SUP 8.1-2 [VCS SUP 8.1-2] in SER Section 8.1.*

#### VCSNS COL FSAR Section 1.10

In this section of the application, the applicant provides an assessment of the potential hazards due to construction of one unit on SSCs important to safety for an operating unit, in accordance with 10 CFR 52.79(a)(31).

The following portion of this technical evaluation section is reproduced from Section 1.4.4 of the VEGP SER:

- *STD SUP 1.10-1*

*The NRC staff reviewed the information in BLN COL FSAR Table 1.10-201, identifying the potential hazards from construction activities, BLN COL FSAR Table 1.10-202 that cross-references the construction hazard with the impacted SSCs, and BLN COL FSAR Table 1.10-203, identifying the specific managerial and administrative controls to preclude or mitigate the construction hazard. There is the potential that review of other areas of the application could impact the hazards and management programs identified in the Bellefonte application. For example, site runoff from construction of Unit 4, if not properly controlled, could impact the operation of Unit 3. Site runoff is evaluated in Section 2.4 of this report. The staff has not yet completed its review of this application against the requirements of 10 CFR 52.79(a)(31). This is part of Open Item 1.4-3.*

*In the application, TVA stated that controls within Section 1.10 of the FSAR are not required unless there is an operating unit on the site. To clarify this FSAR commitment, the staff requests TVA to revise the application to positively state these programs will be in place when there is an operating unit on the site. This is Open Item 1.4-4.*

Resolution of Standard Content Open Item 1.4-4

*In a letter dated July 29, 2009, the applicant proposed to revise VEGP COL FSAR Section 1.10.3 to positively state that these programs will be in place when there is an operating unit on the site. The staff verified that the VEGP COL FSAR was appropriately updated to include the above. As a result, Open Item 1.4-4 is resolved.*

- VCS SUP 1.10-1

The supplemental information states that the power blocks for VCSNS Units 2 and 3 have a minimum separation of at least 800 feet between plant centerlines and notes that new units SSCs important to safety are described in VCSNS COL FSAR Chapter 3 and the LCOs for VCSNS Units 2 and 3 are identified in Part 4 of the COL application. VCSNS Unit 1 SSCs important to safety are described in Chapter 3 of the updated FSAR. In the standard portion of VCSNS COL FSAR Section 1.10, there is a discussion that the primary consideration in setting the 800-foot separation distance is the space needed to support plant construction via the use of a heavy-lift crane.

The site-specific supplemental information is provided to supplement the standard information above and provides with specificity the location of the SSCs and LCOs required by 10 CFR 52.79(a)(31). The staff's review of this SUP item is included in resolution of Open Item 1.4-3.

The following portion of this technical evaluation section is reproduced from of Section 1.4.4 of the VEGP SER:

Resolution of Standard Content Open Item 1.4-3

*A new draft ISG-22 has been issued to assist the staff with the evaluation of COL applicants' compliance with the requirements of 10 CFR 52.79(a)(31). The above draft ISG document was made available to the public including the applicant and was discussed at a public meeting on August 26, 2010.*

*The regulation at 10 CFR 52.79(a)(31) requires, in part, that applicants for a COL intending to construct and operate new nuclear power plants on multi-unit sites provide an evaluation of the potential hazards to the SSCs important to safety for operating units resulting from construction activities on the new units. The requirement in 10 CFR 52.79(a)(31) can be viewed as having two subparts:*

- 1. The COL applicant must evaluate the potential hazards from constructing new plants on SSCs important to safety for existing operating plants that are located at the site.*
- 2. The COL applicant must evaluate the potential hazards from constructing new plants on SSCs important to safety for newly constructed plants that begin operation at the site.*

*The interim guidance recommends that the applicant provide a construction impact evaluation plan that includes:*

- *A discussion of the construction activity identification process and the impact evaluation criteria used to identify and evaluate the construction activities that may pose potential hazards to the SSCs important to safety for operating unit(s).*
- *A table of those construction activities and the potential hazards that are identified using that construction impact evaluation plan, the SSCs important to safety for the operating unit potentially impacted by the construction activity, and expected mitigation method.*
- *Identification of the managerial and administrative controls, such as proposed license conditions that may involve construction schedule constraints or other restrictions on construction activities, that are credited to preclude and/or mitigate the impacts of potential construction hazards to the SSCs important to safety for the operating unit(s).*
- *A discussion of the process for communications and interactions planned and credited between the construction organization and the operations organization to ensure appropriate coordination and authorization of construction activities and implementation of the prevention or mitigation activities as necessary.*
- *A memorandum of understanding or agreement (MOU or MOA) between the COL applicant and the operating unit(s) licensee as a mechanism for communications, interactions, and coordination to manage the impact of the construction activities.*
- *An implementation schedule corresponding to construction tasks or milestones to ensure the plan is reviewed on a recurring basis and maintained current as construction progresses.*

*The staff reviewed the VEGP COL FSAR Section 1.10, which provides information to address compliance with 10 CFR 52.79(a)(31). In order to complete the staff's review, in RAI 1.5-2, the staff requested that the applicant provide a construction impact evaluation plan that includes:*

- *A discussion of the process for communications and interactions planned and credited between the construction organization and the operations organization to ensure appropriate coordination and authorization of construction activities and implementation of the prevention or mitigation activities as necessary.*
- *A memorandum of understanding or agreement (MOU or MOA) between the COL applicant and the operating unit(s) licensee as a mechanism for communications, interactions, and coordination to manage the impact of the construction activities.*

- *An implementation schedule corresponding to construction tasks or milestones to ensure the plan is reviewed on a recurring basis and maintained current as construction progresses.*

*In addition, the applicant was requested to identify the managerial and administrative controls (VEGP COL FSAR Table 1.10-203) that are credited to preclude and/or mitigate the impacts of potential construction hazards to the SSCs important to safety for the operating units (VEGP Units 1 and 2).*

*In a letter dated November 2, 2010, the applicant stated:*

- *VEGP COL FSAR Sections 1.10.2 and 13AA will be revised to include the discussion of the process for communications and interactions planned and credited between the construction organization and the operations organization.*
- *The COL applicant and the operating unit(s) licensee are the same entity, thus, no MOU or MOA is considered necessary.*
- *VEGP COL FSAR Sections 1.10.3 and 13AA will be revised to include the discussion of the implementation schedule corresponding to construction tasks or milestones.*
- *VEGP COL FSAR will be revised to indicate that managerial and administrative controls are developed and implemented as work progresses on site. These controls are intended to preclude and/or mitigate the impacts of potential construction hazards to the SSCs important to safety for the operating units.*

*The proposed changes to the VEGP COL FSAR meet the draft guidance of ISG-22 and, therefore, meet the requirements of 10 CFR 50.79(a)(31). The incorporation of the above proposed changes into a future revision of the VEGP COL FSAR is **Confirmatory Item 1.4-2**.*

*Resolution of Standard Content Confirmatory Item 1.4-2*

*Confirmatory Item 1.4-2 is an applicant commitment to revise FSAR Sections 1.10.2 and 1.10.3 and Appendix 13A to address guidance included in ISG-22. The staff verified that the VEGP COL FSAR was appropriately revised. As a result, Confirmatory Item 1.4-2 is now closed.*

*License Conditions*

- *Part 10, License Condition 1, ITAAC*

*The applicant proposed that the ITAAC identified in the tables in Appendix B of Part 10 of the VEGP COL application be incorporated into the COL. The proposed license condition also states that after the Commission has made the finding required by 10 CFR 52.103(g), "Operation under a combined license," the ITAAC do not constitute regulatory requirements; except for specific ITAAC,*

*which are subject to a hearing under 10 CFR 52.103(a), their expiration will occur upon final Commission action in such proceeding.*

*The ITAAC identified in tables in Appendix B of Part 10 of the VEGP COL application are evaluated throughout this SER. The remaining text of the proposed license condition is already covered by regulatory requirements of 10 CFR 52.103(h). Therefore, there is no need for a license condition.*

#### **1.4.5 Post Combined License Activities**

For the reasons discussed in the technical evaluation section above, the following FSAR commitment is identified as the responsibility of the licensee:

- Commitment (1.4-1) - A site-specific construction plan and startup schedule will be provided after issuance of the COL.

#### **1.4.6 Conclusion**

The NRC staff reviewed the application and checked the referenced DCD. The NRC staff's review confirmed that the applicant addressed the required information relating to principal review matters, and there is no outstanding information expected to be addressed in the VCSNS COL FSAR related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the VCSNS COL application are documented in NUREG-1793 and its supplements.

### **1.5 Additional Regulatory Considerations**

#### **1.5.1 10 CFR 52.97(a)(1)(iv) Applicant Financial Qualifications and Evaluation of Financial Qualification in accordance with 10 CFR 50.33**

#### **BACKGROUND:**

##### South Carolina Electric and Gas Company

According to the COL application, SCE&G is the principal subsidiary of SCANA Corporation, an energy-based holding company with headquarters in Columbia, South Carolina. SCE&G is an investor owned utility regulated by the South Carolina Public Service Commission (SCPSC). Historically, SCE&G and its parent company SCANA have had excellent access to the capital markets and continue to be highly rated by all credit rating agencies.

##### South Carolina Public Service Authority

According to the COL application, Santee Cooper, a body corporate and politic created under the laws of South Carolina, is South Carolina's state-owned electric and water utility, with corporate headquarters in Columbia, South Carolina.

#### **REGULATORY EVALUATION:**

The applicant's request for the NRC to issue two COLs pursuant to Section 103 of the Atomic Energy Act of 1954, as amended is subject to, among other things, the requirements of 10 CFR Part 52, Subpart C; 10 CFR Part 50; and 10 CFR Part 140. This SER reviews the

following issues: financial qualifications, decommissioning funding assurance, antitrust, foreign ownership, and nuclear insurance and indemnity.

### **FINANCIAL QUALIFICATIONS:**

Pursuant to 10 CFR 52.77, the application must include all of the information required by 10 CFR 50.33.

### **Construction Permit:**

Pursuant to 10 CFR 50.33(f)(1):

[T]he applicant[s] shall submit information that demonstrates that the applicant[s] possess or [have] reasonable assurance of obtaining the funds necessary to cover estimated construction costs and related fuel cycle costs. The applicant[s] shall submit estimates of the total construction costs of the facility and related fuel cycle costs, and shall indicate the source(s) of funds to cover these costs.

### **Construction Cost Estimate:**

Under 10 CFR Part 50, Appendix C, "A Guide for the Financial Data and Related Information Required To Establish Financial Qualifications for Construction Permits and Combined Licenses," Section I.A.1:

[E]ach applicant's estimate of the total cost of the proposed facility has been broken down as follows and be accompanied by a statement describing the bases from which the estimate is derived:

- (a) Total nuclear production plant costs; [and]
- (b) Transmission, distribution, and general plant costs; [and]
- (c) Nuclear fuel inventory cost for first core

If the fuel is to be acquired by lease or other arrangement than purchase, the application should so state. The items to be included in these categories should be the same as those defined in the applicable electric plant and nuclear fuel inventory accounts prescribed by the Federal Energy Regulatory Commission or an explanation given as to any departure therefrom.

As stated in the RAI response dated January 15, 2009, the projected overnight costs<sup>15</sup> for the construction of two AP1000 nuclear units at the VCSNS site are outlined below. This information was subsequently provided in a revision to the VCSNS COL application. Specifically, Part 1, "General and Financial Information," of the application provides the cost information in the January 15, 2009, letter. The proprietary portion of the cost estimates in the January 15, 2009, letter is in VCSNS COL application Part 9, "Withheld Information."

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<sup>15</sup> Overnight cost is the cost of a construction project if neither interest nor cost escalation was incurred during construction, as if the project was completed "overnight." An alternate definition is: the present value cost that would have to be paid as a lump sum up front to completely pay for a construction project. The overnight cost is frequently used when describing power plants.

**Projected Project Cost VCSNS Units 2 and 3  
SCE&G and Santee Cooper  
(in millions of 2008 \$)**

	<u>Total</u>
Total Nuclear Production Plant Costs	\$9,838.3
Transmission, Distribution and General Plant Costs	\$924.7

The RAI response and the VCSNS COL application also included a “nuclear fuel inventory cost for the first core.” The RAI response and application also provide a total estimated cost, which is the sum of the following: 1) total nuclear production plant costs; 2) transmission, distribution and general plant costs; and 3) nuclear fuel inventory for the first core. The applicant requested that both the nuclear fuel inventory cost for the first core and the total cost be considered proprietary information and that this information be withheld from the public. In a letter dated May 12, 2010, the staff found these two values to be proprietary and determined that these values would be withheld from the public.

The applicant described the bases for the foregoing cost estimate. According to the RAI response submitted June 24, 2009:

The cost basis provided [...] is obtained from the Engineering, Procurement and Construction (EPC) contract that has been developed between SCE&G, Westinghouse, and Stone and Webster. The contract was signed by all three parties on May 23, 2008. Transmission costs were developed based on expected system construction and upgrade that will be necessary to deliver the output of the new units to the customers. Nuclear fuel inventory costs are based on projected costs and are currently being negotiated with the associated vendors.

The estimated dates for completion are between April 1, 2016, and June 1, 2018, for Unit 2 and January 1, 2019, and June 1, 2021, for Unit 3. VCSNS is expected to operate at an estimated gross electrical power output of approximately 2234 MWe (1117 MWe per unit). Therefore, the total overnight cost in Part 9 of the VCSNS COL application can be converted to \$/kilowatt electric (kWe) installed. The NRC staff has been reviewing studies from independent sources<sup>16</sup> and collecting projected project cost estimates from all COL applications, as they are submitted, for comparison and reasonableness.<sup>17</sup> According to these studies, the cost of constructing a plant comparable to VCSNS is in the approximate range of \$3,222/kWe to \$5,072/kWe installed.

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<sup>16</sup> See, e.g., the 2009 the Massachusetts Institute of Technology (MIT) study entitled Update on the Cost of Nuclear Power; the 2003 the MIT interdisciplinary study entitled “The Future of Nuclear Power”; the U.S. Department of Energy’s (DOE’s) Energy Information Agency (EIA) 2004 Annual Energy Outlook (AEO); the Nuclear Energy Agency (NEA) of the Organization for Economic Cooperation and Development 2005 update on Projected Costs of Generating Electricity; and the Keystone Center 2007 report entitled “Nuclear Power Joint Fact-Finding.”

<sup>17</sup> The staff’s consideration of the cost information submitted by the applicant focuses on the estimated production plant cost and on the estimated cost of fuel, since the NRC has clear oversight of the plant and fuel, an unreasonably low plant construction and fuel cost estimates may have a nexus to a possible reduction in safety. The NRC does not have regulatory authority over transmission and distribution assets, which do not raise radiological safety issues. Thus, any such cost estimate provided is deemed to be true and accurate under 10 CFR 50.9, “Completeness and accuracy of information,” and no further assessment of that estimate is performed.

The applicant's overnight cost estimate is within the range derived from the studies developed from independent sources, and is also greater than construction cost estimates reviewed to date for comparable plants. Accordingly, the NRC staff finds the applicant's overnight cost estimate is reasonable.

### **Sources of Construction Funds:**

Pursuant to 10 CFR Part 50, Appendix C, Section I.A.2:

[t]he application should include a brief statement of the applicant's general financial plan for financing the cost of the facility, identifying the source or sources upon which the applicant relies for the necessary construction funds, e.g., internal sources such as undistributed earnings and depreciation accruals, or external sources such as borrowings.

According to the COL application, in May 2007, the South Carolina Legislature passed the Base Load Review Act (BLRA), which provides for the expedited recovery of prudently incurred capital and operating costs associated with new coal-fired or nuclear base load electric generating facilities larger than 350 megawatts. The legislation also provides for approval of initial prudence and annual recovery of cost of capital on construction work in process (CWIP).

According to the COL application, the BLRA allows for "expedited recovery of prudently incurred capital and operating costs" relating to VCSNS, including recovery of cost of capital on CWIP.

Also according to the COL application, initial capital requirements will be met through "accessing the capital markets for debt and equity as needed to balance the company's capital structure."

### Financial Statements

Pursuant to 10 CFR Part 50, Appendix C, Section I.A.3:

[t]he application should also include the applicant's latest published annual financial report, together with any current interim financial statements that are pertinent. If an annual financial report is not published, the balance sheet and operating statement covering the latest complete accounting year together with all pertinent notes thereto and certification by a public accountant should be furnished.

### South Carolina Electric and Gas Company

SCE&G has filed current financial statements with the Securities and Exchange Commission (SEC), which can be found at the following website:

<http://www.scanac.com/NR/ronlyres/AF99AF45-56B2-49BA-B742-B519490A723/0/201010K.pdf>

### South Carolina Public Service Authority

Santee Cooper has filed current financial statements with the SEC, which can be found at the following website:

<https://www.santeecooper.com/2010annualreport/>

The applicant submitted, pursuant to 10 CFR Part 50, Appendix C, Section I.A.3, annual financial statements. The NRC staff did not identify anything to indicate that the general financial plan of the applicant is unreasonable.

In consideration of the foregoing, the NRC staff finds that the applicants have demonstrated that they possess or have reasonable assurance of obtaining the funds necessary to cover estimated construction costs and related fuel cycle costs. Therefore, the NRC staff finds that the applicants are financially qualified to construct the facilities.

### Operating License

Pursuant to 10 CFR 50.33(f)(3),

If the application is for a combined license under subpart C of part 52 of this chapter, the applicant shall submit the information described in paragraphs (f)(1) and (f)(2) of this section.

10 CFR 50.33(f) provides that each application shall state:

[e]xcept for an electric utility applicant for a license to operate a utilization facility of the type described in 10 CFR 50.21(b) or 50.22, information sufficient to demonstrate to the Commission the financial qualification[s] of the applicant to carry out, in accordance with the regulations in this chapter, the activities for which the permit or license is sought.

10 CFR 50.2, "Definitions" states, in part, that an electric utility is:

[a]ny entity that generates or distributes electricity and which recovers the cost of this electricity, either directly or indirectly, through rates established by the entity itself or by a separate regulatory authority.

### South Carolina Electric and Gas Company

According to the COL application, the regulatory statutes provide for the recovery of costs prudently incurred on behalf of the retail customers. These costs include depreciation, taxes other than income, operations and maintenance expenses, fuel expenses, income taxes, and cost of capital.

### South Carolina Public Service Authority

According to the COL application, Santee Cooper's Board of Directors is empowered and required to set rates as necessary, except for wholesale transmission rates, to provide for expenses, including debt service, of Santee Cooper. There is no agency other than Santee

Cooper that has jurisdiction over the rates, except for wholesale transmission rates, of Santee Cooper.

In consideration of the foregoing, the NRC staff finds the applicants are electric utilities and not subject to financial qualifications pursuant to 10 CFR 50.33(f)(2).

## **DECOMMISSIONING FUNDING ASSURANCE:**

### **Regulatory Requirements:**

Pursuant to 10 CFR 50.33(k)(1):

[A]n application for [a ...] combined license for a production or utilization facility, information in the form of a report, as described in § 50.75, indicating how reasonable assurance will be available to decommission the facility.

Under 10 CFR 50.75, "Reporting and recordkeeping for decommissioning planning," the report must include a certification that the applicant will provide financial assurance for decommissioning using one or more of the methods allowed under the regulation at 10 CFR 50.75(e) no later than 30 days after the Commission publishes notice in the *Federal Register* under 10 CFR 52.103(a). In addition, the amount of the financial assurance may be more, but not less, than the amount stated in the table in 10 CFR 50.75(c)(1), as adjusted under 10 CFR 50.75(c)(2). Under 10 CFR 50.75(b)(4), a COL applicant need not obtain a financial instrument appropriate to the method to be used or submit a copy of the instrument to the Commission. (Once the COL is granted, the holder of a COL must submit an instrument as provided in 10 CFR 50.75(e)(3)).

### **Decommissioning Funding Estimate:**

VCSNS is a two-unit PWR (Units 2 and 3) that is being licensed in accordance with the Westinghouse AP1000 certified design, as documented in the referenced DCD including any supplemental material.

According to the COL application, the cost of decommissioning will be provided as follows: SCE&G will provide 55 percent of decommissioning; Santee Cooper will provide 45 percent of decommissioning funding.

The COL application acknowledged the requirements of 10 CFR 50.75 regarding the certification requirements, stating that the applicants will provide decommissioning funding assurance in an amount of \$365.61 million (2006 dollars) per unit. The NRC staff calculated the minimum funding amount required under 10 CFR 50.75(c) and found the applicants' amounts to be acceptable.

### **Decommissioning Funding Mechanism:**

The COL application stated that both the applicants will use an external sinking fund as the method to provide decommissioning funding assurance. Under 10 CFR 50.75(e)(1)(ii), an external sinking fund may be used as an exclusive method by a:

...licensee that recovers, either directly or indirectly, the estimated total cost of decommissioning through rates established by "cost of service" or similar

ratemaking regulation. Public utility districts, municipalities, rural electric cooperatives, and State and Federal agencies, including associations of any of the foregoing decommissioning, are assumed to meet this condition.

The NRC staff will make findings on the acceptability of the decommissioning funding mechanism and prospective financial instrument in the future consistent with the schedule, set forth in 10 CFR 50.75(e)(3), for the submission of reports by a holder of the COL.

Therefore, at this time, the NRC staff finds the applicants have complied with applicable decommissioning funding assurance requirements.

**ANTITRUST REVIEW:**

The Energy Policy Act of 2005 (EPA) removed the antitrust review authority in Section 105.c of the Atomic Energy Act of 1954, as amended (AEA), regarding license applications for production or utilization facilities submitted under Sections 103 or 104.b of the AEA after the date of enactment of the EPA. Accordingly, the NRC is not authorized to conduct an antitrust review in connection with this COL application.

**FOREIGN OWNERSHIP, CONTROL, or DOMINATION:**

Section 103 of the AEA prohibits the Commission from issuing a license for a nuclear power plant under Section 103 to:

an alien or any corporation or other entity if the Commission knows or has reason to believe it is owned, controlled, or dominated by an alien, a foreign corporation or a foreign government.

10 CFR 50.38, "Ineligibility of certain applicants," is the regulatory provision that implements this statutory prohibition.

SCE&G is an investor owned utility regulated by the SCPSC whose principal place of business is in South Carolina. The shares of common stock of SCE&G are publicly traded and widely held. Santee Cooper is a body corporate and politic created under the laws of South Carolina whose principal place of business is in South Carolina.

The COL application includes the names and addresses of the directors and officers of SCE&G and Santee Cooper and indicates that all are United States citizens. According to the COL application, neither SCE&G nor Santee Cooper is owned, controlled or dominated by any alien, foreign corporation or foreign government. The NRC staff does not know or have reason to believe otherwise.

**NUCLEAR INSURANCE and INDEMNITY:**

The provisions of the Price-Anderson Act (Section 170 of the AEA) and the Commission's regulations at 10 CFR Part 140 require that SCE&G and Santee Cooper provide satisfactory documentary evidence that they have obtained the maximum liability insurance coverage pursuant to 10 CFR 140.11(a)(4), "Amounts of financial protection for certain reactors," and not less than the amount required by 10 CFR 50.54(w), "Conditions of licenses," with respect to property insurance prior to fuel being brought on site.

## **CONCLUSION:**

Based on the foregoing, the NRC staff finds that there is reasonable assurance that SCE&G and Santee Cooper are financially qualified to engage in the proposed activities regarding VCSNS Units 2 and 3, as described in the application, and that there are no problematic decommissioning funding assurance issues, foreign ownership issues, or nuclear insurance and indemnity issues.

### **1.5.2 Nuclear Waste Policy Act**

Section 302(b) of the Nuclear Waste Policy Act of 1982, as amended, states, “The Commission, as it deems necessary or appropriate, may require as a precondition to the issuance or renewal of a license under Section 103 or 104 of the Atomic Energy Act of 1954 [42 U.S.C. 2133, 2134] that the applicant for such license shall have entered into an agreement with the Secretary for the disposal of high-level radioactive waste and spent nuclear fuel that may result from the use of such license.” In Table 1.2-1 of Part 3 of this application, the applicant provided verification that they have entered into contracts with the Department of Energy (DOE) for disposal of spent nuclear fuel and high-level radioactive waste generated at the proposed VCSNS Units 2 and 3 site. The referenced DOE contract numbers are DE-CR01-09RW09014 for VCSNS Unit 2 and DE-CR01-09RW09015 for VCSNS Unit 3.

Because SCE&G has entered into contracts with the DOE for the disposal of high-level radioactive waste and spent nuclear fuel for VCSNS Units 2 and 3, the staff considers the applicable requirements of Section 302(b) of the Nuclear Waste Policy Act of 1982 to be met.

### **1.5.3 Consultation with Department of Homeland Security and Notifications**

#### **1.5.3.1 Consultation with Department of Homeland Security**

In accordance with Section 657 of the *Energy Policy Act of 2005*, the NRC consulted with the Department of Homeland Security.

#### **1.5.3.2 Notifications**

As required by Section 182c of the Atomic Energy Act of 1954, as amended, and 10 CFR 50.43(a), on February 23, 2011, the NRC notified the Public Service Commission of South Carolina of the VCSNS COL application (ADAMS Accession No. ML110490240). In addition, in January 2009, the NRC published notices of the application in the *Winnsboro Herald Independent*, the *Newberry Observer*, the *Union Daily*, the *Blythewood Chronicle*, and *The State*. In accordance with Section 182c., the staff also published a notice of the application in the Federal Register on March 2, 9, 16, and 23, 2011 (76 FR 11522, 12998, 14436, and 16456).

Based on the staff’s completion of notifications to regulatory agencies and the public notices described above, the staff concludes that, for the purpose of issuing COLs for VCSNS Units 2 and 3, any required notifications to other agencies or bodies have been duly made.

#### **1.5.4 Evaluation of Departures and Exemption Associated with Numbering in the Application and Exemption Associated with Special Nuclear Material (SNM) Material Control and Accounting (MC&A) Program**

##### **Evaluation of Departures and Exemption Associated with Numbering in the Application**

In STD DEP 1.1-1 the applicant renumbered VCSNS COL FSAR Sections 9.2.11, 9.2.12, 9.2.13, 9.5.1.8, 9.5.1.9, 13.1, 13.1.4, 13.5, 13.5.3, 13.7, 17.5, 17.6, 17.7, 17.8 to include content consistent with RG 1.206 and NUREG-0800. The departure and the exemption associated with the numbering scheme of the FSAR are closely related. The applicant also requested that portions of Chapter 2 be renumbered in VCS DEP 2.0-1. The evaluation of VCS DEP 2.0-1 can be found in Section 2.0 of this SER.

Pursuant to 10 CFR 52.7, "Specific Exemptions," and 10 CFR 52.93, "Exemptions and Variances," the applicant requested an exemption from 10 CFR Part 52, Appendix D, Section IV.A.2.a, to include "a plant-specific DCD containing the same type of information and using the same organization and numbering as the generic DCD for the AP1000 design...." In Part 7, "Departures and Exemptions," of the VCSNS COL application, the applicant states that the exemption will not result in any significant departures from the expected organization and numbering of a typical FSAR, and the information is readily identifiable to facilitate an NRC review. The applicant states that the subject deviations are considered to be purely administrative to support a logical construction of the document. Further, the revised organization and numbering generally follows the guidance provided in RG 1.206 and NUREG-0800.

Pursuant to 10 CFR 52.7, the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of 10 CFR Part 52. 10 CFR 52.7 further states that the Commission's consideration will be governed by 10 CFR 50.12, "Specific exemptions," which states that an exemption may be granted when: (1) the exemptions are authorized by law, will not present an undue risk to public health or safety, and are consistent with the common defense and security; and (2) special circumstances are present. Special circumstances are present whenever, according to 10 CFR 50.12(a)(2)(ii), "Application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule."

Before considering whether this numbering exemption should be granted, the staff needed to address a threshold question regarding the review standard applicable to the request. Under 10 CFR 52.93(a)(1), if a request for an exemption is from any part of a design certification rule, then the Commission may grant the exemption if the exemption complies with the appropriate change provision in the referenced design certification rule, or if there is no applicable change provision, if the exemption complies with 10 CFR 52.63. Here, there is no applicable change provision in the referenced design certification rule, so according to 10 CFR 52.93(a)(1), the exemption must meet 10 CFR 52.63. However, the standards of the appropriate provision of 10 CFR 52.63 applicable to requests for exemptions from a design certification rule in 10 CFR 52.63(b)(1), by their terms, also do not apply to this change. Specifically, 10 CFR 52.63(b)(1) applies to changes to "certification information," and not administrative or procedural design certification rule provisions such as this one under consideration. In the Statements of Consideration for 10 CFR 52.63, the Commission stated that it used the "phrase 'certification information' in order to distinguish the rule language in the DCRs from the design certification information (e.g., Tier 1 and Tier 2) that is incorporated by reference in the DCRs." 72 Fed. Reg. 49,444. The exemption requested from the AP1000 DCD numbering scheme is

an exemption from rule language, not Tier 1 or Tier 2 information; therefore, 10 CFR 52.63 should not be used to analyze this exemption.

Because there is not an applicable change provision in the referenced design certification, and because 10 CFR 52.63(b)(1) does not apply to this exemption, the exemption cannot comply with the plain language of 10 CFR 52.93(a)(1). In this situation, the language of 10 CFR 52.93(a)(1) does not appear to serve the underlying purpose of the regulation as described by the Commission in the Statements of Consideration to the rule, in which the Commission stated that only changes to certification information must meet 10 CFR 52.63. Instead, this exemption should have fallen under 10 CFR 52.93(a)(2), and, thus, be analyzed under the requirements in 10 CFR 52.7. Therefore, the staff finds that, pursuant to 10 CFR 52.7, an exemption to 10 CFR 52.93(a)(1) should be granted. This exemption is warranted because it meets the requirements in 10 CFR 50.12. First, because this is an administrative change regarding what exemption regulation applies, the exemption to 10 CFR 52.93(a)(1) is authorized by law, will not present an undue risk to public health or safety, and is consistent with the common defense and security. Additionally, application of the regulation in this case is not necessary to achieve the underlying purpose of the rule. The underlying purpose of the rule is to maintain the safety benefits of standardization by requiring any exemption from certification information to meet the requirements in 10 CFR 52.63(b)(1). This underlying purpose does not apply to this exemption, because the form and organization of the application does not affect the safety benefits of standardization of the certification information. Therefore, for the purpose of determining the standards applicable to the exemption related to STD DEP 1.1-1, the staff finds an exemption to 10 CFR 52.93(a)(1) to be acceptable for the review of the exemption related to STD DEP 1.1-1.

Pursuant to the exemption described above, the NRC staff has reviewed the exemption related to STD DEP 1.1-1 to determine whether it meets the requirements in 10 CFR 52.7. This exemption would allow the applicant to provide an FSAR with numbering and topics more closely related to NUREG-0800 and RG 1.206., and the staff finds that this administrative change of minor renumbering will not present an undue risk to the public health and safety and is consistent with the common defense and security. In addition, this exemption is consistent with the Atomic Energy Act and is authorized by law. Further, the application of the regulation in these particular circumstances is not necessary to achieve the underlying purpose of the rule. Therefore, the staff finds that the exemption to 10 CFR Part 52, Appendix D, Section IV.A.2.a is justified. Finally for the same reasons the staff is granting the exemption request, the staff also finds the departure from the numbering scheme in the VCSNS COL FSAR to be acceptable.

### **Exemption Associated with Special Nuclear Material (SNM) Material Control and Accounting (MC&A) Program**

In a letter dated November 30, 2010, the applicant requested an exemption from the requirements of 10 CFR 70.22(b), 10 CFR 70.32(c) and, in turn, 10 CFR 74.31, 10 CFR 74.41, and 10 CFR 74.51. The provision of 10 CFR 70.22(b) requires an application for a license for SNM to include a full description of the applicant's program for MC&A of SNM under 10 CFR 74.31; 10 CFR 74.33, "Nuclear material control and accounting for uranium enrichment facilities authorized to produce special nuclear material of low strategic significance"; 10 CFR 74.41; and 10 CFR 74.51<sup>18</sup>. 10 CFR 70.32(c) requires a license authorizing the use of SNM to include and be subjected to a condition requiring the licensee to maintain and follow an

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<sup>18</sup> While not including an explicit exception for 10 CFR Part 50 reactors, 10 CFR 74.33 applies only to uranium enrichment facilities and thus is not directly implicated in this exemption request.

SNM MC&A program. However, 10 CFR 70.22(b), 10 CFR 70.32(c), 10 CFR 74.31, 10 CFR 74.41, and 10 CFR 74.51 include exceptions for nuclear reactors licensed under 10 CFR Part 50. The regulations applicable to the MC&A of SNM for nuclear reactors licensed under 10 CFR Part 50 are provided in 10 CFR Part 74, Subpart B, 10 CFR 74.11 through 10 CFR 74.19, excluding 10 CFR 74.17. The applicant stated that the purpose of this exemption request is to seek a similar exception for this COL under 10 CFR Part 52, such that the same regulations will be applied to the SNM MC&A program as nuclear reactors licensed under 10 CFR Part 50. In addition, the applicant stated that the exemption request is evaluated under 10 CFR 52.7, which incorporates the requirements of 10 CFR 50.12. As stated previously, that section allows the Commission to grant an exemption if: 1) the exemption is authorized by law; will not present an undue risk to the public health and safety; and is consistent with the common defense and security; and 2) special circumstances are present as specified in 10 CFR 50.12(a)(2). The criteria in 10 CFR 50.12 encompass the criteria for an exemption in 10 CFR 70.17(a) and 10 CFR 74.7, the specific exemption requirements for 10 CFR Part 70 and 10 CFR Part 74, respectively. Therefore, by demonstrating that the exemption criteria in 10 CFR 50.12 are satisfied, this request would also demonstrate that the exemption criteria in 10 CFR 52.7, 10 CFR 70.17(a), and 10 CFR 74.7 are satisfied.

The applicant stated that the subject exemption would allow nuclear reactors licensed under 10 CFR Part 52 to be explicitly excepted from the requirements of 10 CFR 70.22(b), 10 CFR 70.32(c), 10 CFR 74.31, 10 CFR 74.41, and 10 CFR 74.51. There is no technical or regulatory basis to treat nuclear reactors licensed under 10 CFR Part 52 differently than reactors licensed under 10 CFR Part 50 with respect to the MC&A provisions in 10 CFR Part 74. As indicated in the Statement of Considerations for 10 CFR 52.0(b) (72 Federal Register 49352, 49372, 49436 (August 28, 2007)), applicants and licensees under 10 CFR Part 52 are subject to all of the applicable requirements in 10 CFR Chapter I, whether or not those provisions explicitly mention a COL under 10 CFR Part 52. This regulation clearly indicates that plants licensed under 10 CFR Part 52 are to be treated no differently than plants licensed under 10 CFR Part 50 with respect to the substantive provisions in 10 CFR Chapter I (which includes 10 CFR Part 70 and 10 CFR Part 74). In particular, the exception for nuclear reactors licensed under 10 CFR Part 50, as in 10 CFR 70.22(b), 10 CFR 74.31, 10 CFR 74.41, or 10 CFR 74.51, should also be applied to reactors licensed under 10 CFR Part 52.

The staff agrees with the applicant's justification that nuclear reactors licensed under 10 CFR Part 52 should be treated the same as the reactors licensed under 10 CFR Part 50 regarding the MC&A for SNM.

Pursuant to 10 CFR 70.17(a), the Commission may, upon application of any interested person or upon its own initiative, grant such exemptions from the requirements of the regulations in this part as it determines are authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public interest.

In addition, pursuant to 10 CFR 74.7, the Commission may, upon application of any interested person or upon its own initiative, grant such exemptions from the requirements of the regulations in this part as it determines are authorized by law and will not endanger life or property or the common defense and security, and are otherwise in the public interest.

Pursuant to 10 CFR 52.7, the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of 10 CFR Part 52. 10 CFR 52.7 further states that the Commission's consideration will be governed by 10 CFR 50.12, "Specific exemptions," which states that an exemption may be granted when:

(1) the exemptions are authorized by law, will not present an undue risk to public health or safety, and are consistent with the common defense and security; and (2) when special circumstances are present. Special circumstances are present whenever, according to 10 CFR 50.12(a)(2)(ii), "Application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule."

The NRC staff reviewed the subject exemption, which will allow the applicant to have a similar exception for the COL under 10 CFR Part 52, such that the same regulations will be applied to the SNM MC&A program as nuclear reactors licensed under 10 CFR Part 50, and determined that this requested exemption will not present an undue risk to the public health and safety and is otherwise in the public interest. In addition, this exemption is consistent with the Atomic Energy Act and is authorized by law. Therefore, granting this exemption will not adversely affect the common defense and security. Further, the application of the regulation in these particular circumstances is not necessary to achieve the underlying purpose of the rule. Since the exemption criteria in 10 CFR 50.12 are satisfied, the staff considers that this request also demonstrates that the exemption criteria in 10 CFR 52.7, 10 CFR 70.17(a), and 10 CFR 74.7 are satisfied. Therefore, the staff finds that the exemption from 10 CFR 70.22(b), 10 CFR 70.32(c) and, in turn, 10 CFR 74.31, 10 CFR 74.41, and 10 CFR 74.51, is justified.

#### **1.5.5 Receipt, Possession, and Use of Source, Byproduct and Special Nuclear Material Authorized by 10 CFR Part 52 Combined Licenses**

In SCE&G's letter transmitting Revision 2 of the COL application, dated January 28, 2010, and in Part 1, "General and Financial Information," of the application SCE&G requested material licenses for receipt, possession and use of source, byproduct and SNM in accordance with Commission regulations in 10 CFR Parts 30, 40, and 70. The reviews conducted for compliance with the requirements of 10 CFR Part 52 to support the issuance of the COLs encompass those necessary to support granting 10 CFR Parts 30, 40, and 70 licenses. In this respect, the 10 CFR Part 52 COLs for VCSNS will be consistent with the approach to 10 CFR Parts 30, 40, and 70 licensing followed for operating licenses for nuclear power plants licensed in accordance with 10 CFR Part 50. The staff considered the following standard license provisions for the VCSNS COL as it relates to authorization pursuant to the regulations in 10 CFR Parts 30, 40, and 70<sup>19</sup>:

Subject to the conditions and requirements incorporated herein, the Commission hereby licenses SCE&G:

- (1) (i) pursuant to the Act and 10 CFR Part 70, to receive and possess at any time, special nuclear material as reactor fuel, in accordance with the limitations for storage and amounts required for reactor operation, described in the final safety analysis report (FSAR), as supplemented and amended;
- (ii) pursuant to the Act and 10 CFR Part 70, to use special nuclear material as reactor fuel, after the finding in Section 2.D(1) of this license has been made (note: 2D(1) is a reference to the 10 CFR 52.103(g) finding), in accordance with the limitations for

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<sup>19</sup> These proposed standard license conditions that the staff considered were based on similar license conditions found in SECY-00-0092, "Combined License Review Process," dated April 20, 2000.

storage and amounts required for reactor operation, and described in the FSAR, as supplemented and amended;

- (2) pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use, at any time, any byproduct, source, and special nuclear material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required;
- (3) pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use in amounts as required any byproduct, source, or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components; and
- (4) pursuant to the Act and 10 CFR Parts 30 and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility.

The staff notes that VCSNS COL FSAR Table 13.4-201 “Operational Programs Required by NRC Regulations,” provides milestones for the implementation of various operational programs. Important milestone dates for various operational programs that support issuance of the license and requirements relative to 10 CFR Parts 30, 40, and 70 include the following:

- Radiation Protection Program (including as low as is reasonably achievable [ALARA] principles) – prior to initial receipt of byproduct, source, or SNMs (excluding exempt quantities as described in 10 CFR 30.18, “Exempt quantities”)
- Fire Protection Program – prior to initial receipt of byproduct, source, or SNMs (excluding exempt quantities as described in 10 CFR 30.18, “Exempt quantities”)
- Security Program including physical security, safeguards contingency programs, training and qualification program – prior to receipt of fuel onsite (protected area)
- Non-licensed plant staff training program associated with receipt of the radioactive material – prior to initial receipt of byproduct, source, or SNMs (excluding exempt quantities as described in 10 CFR 30.18, “Exempt quantities”)

In a letter dated November 30, 2010, the applicant proposed to revise the VCSNS COL FSAR Table 13.4-201 to add information (milestones and requirements) related to the SNM MC&A program. In addition, as documented in the following table VCSNS endorsed VEGP standard content letters related to this subject.

<b>VEGP letter date</b>	<b>VEGP letter ADAMS accession number</b>	<b>VCSNS endorsement letter date</b>	<b>VCSNS letter ADAMS accession number</b>
July 29, 2009	ML092120064	January 20, 2010	ML100250429
July 9, 2010	ML101940025	August 25, 2010	ML102380466

<b>VEGP letter date</b>	<b>VEGP letter ADAMS accession number</b>	<b>VCSNS endorsement letter date</b>	<b>VCSNS letter ADAMS accession number</b>
October 15, 2010	ML102920120	November 18, 2010	ML103260238
November 23, 2010	ML103300034	November 30, 2010	ML103360073
March 16, 2011	ML110800088	March 30, 2011	ML110910544
March 3, 2011	ML110660153	April 6, 2011	ML110980382
March 16, 2011 <sup>20</sup>	ML110770137	April 6, 2011	ML110980403
May 6, 2011	ML111129A155	June 24, 2011	ML11180A063
June 22, 2011	ML11175A169	June 28, 2011	ML11181A009

These letters identified the portions of the VCSNS COL application that demonstrate compliance with the requirements of 10 CFR Parts 30, 40, 70, and 74. Also, in a letter dated November 30, 2010, the applicant requested an exemption from the requirements of 10 CFR 70.22(b), 10 CFR 70.32(c) and, in turn, 10 CFR 74.31, 10 CFR 74.41, and 10 CFR 74.51. This exemption request is addressed in Section 1.5.4 of this SER.

Section 1.2.3 of this SER provides a discussion of the strategy used by the NRC to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the VCSNS Units 2 and 3 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 2 to the VCSNS COL FSAR. In performing this comparison, the staff considered changes made to the VCSNS COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.
- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.
- The staff confirmed that the November 30, 2010, VCSNS submittal transmitting the SNM Material and Control Accounting Program Description is identical to the November 23, 2010, VEGP submittal transmitting its SNM Material Control and Accounting Program Description. The only exceptions are that the title of the units are different and the identification that VCSNS and not Southern Nuclear Operating Company is responsible for implementation of the program is different. The SNM Material and Control Accounting Program Description was subsequently placed in Part 11 Enclosure D of the VEGP COL application and Part 16 of the VCSNS COL application.
- The staff confirmed that the VEGP SNMPPP Description submitted in a letter dated March 16, 2011, and the VCSNS SNMPPP Description submitted in a letter April 6, 2011, are identical with the only exception being the organization titles.

<sup>20</sup> The March 16, 2011, letter from VEGP and the April 6, 2011, letter from VCSNS submit the Special Nuclear Material Physical Protection Program (SNMPPP) Description for VEGP and VCSNS, respectively. Although the cover letters are publicly available, the SNMPP is considered safeguards information and is withheld from public disclosure.

- The staff confirmed that the VEGP new fuel shipping plan and the supplemental information in support of 10 CFR Part 70 special nuclear material found in Part 11 Enclosure E and F, respectively, of the VEGP COL application are identical to the material found in Parts 17 and 18 of the VCSNS COL application.
- The staff verified that the site-specific differences were not relevant.

The staff has completed its review and found the evaluation performed for the standard content to be directly applicable to the VCSNS COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 1.5.5 of the VEGP SER:

*In addition to the evaluation of the implementation milestones noted above, the staff's evaluation of the radiation protection program that supports the issuance of the 10 CFR Parts 30, 40, and 70 licenses is addressed in Chapter 12 of this SER. Additional staff evaluations that support the issuance of the 10 CFR Part 70 license are addressed in Chapter 9 of this SER (i.e., new fuel storage, spent fuel storage, and fire protection programs) and in the staff's evaluation of TVA's security program. The staff finds that the information in the Bellefonte COL application to support granting of the 10 CFR Part 70 license mentioned as part of the license above is sufficient, pending resolution of the open items in this report related to new and spent fuel, fire protection program, security program, and the implementation of the fire protection and security programs. However, TVA needs to provide a discussion of which parts of its COL application other than the reference to the radiation protection program provide sufficient information to support compliance with the applicable portions of 10 CFR Part 30 and 40, prior to the 10 CFR 52.103(g) finding. This is Open Item 1.5-1.*

*Resolution of Standard Content Open Item 1.5-1*

*In letters dated July 29, 2009, July 9, 2010, and October 15, 2010, the applicant provided additional information related to source, byproduct and SNM and its purposes, radiation safety personnel, personnel training, facilities and equipment, waste management, and the radiation safety program in general.*

*Subsequent to the issuance of the SER with open items for the BLN application, the staff performed an additional review associated with granting the 10 CFR Parts 30, 40 and 70 licenses. For the 10 CFR Part 70 license, the staff considered SNM associated with the fuel (including security requirements) and SNM associated with non-fuel material (i.e., fission chambers). The staff also considered emergency plan requirements associated with SNM (fuel and non-fuel material). Based on these reviews, standard content Open Item 1.5-1 is resolved. These reviews are described below.*

### Review of Parts 30 and 40 Materials

*In a letter dated March 3, 2011, the applicant provided information regarding specific types of sources and byproduct material, the chemical or physical form, and the maximum amount at any time for the requested material licenses under 10 CFR Parts 30 and 40. The applicant also stated that SNM shall be in the form of reactor fuel, in accordance with the limitations for storage and amounts required for reactor operation, as described in the VEGP COL FSAR. Byproduct material and source material shall be in the form of sealed neutron sources for reactor startup and sealed sources for reactor instrumentation, radiation monitoring equipment, calibration, and fission detectors in amounts as required. The applicant also committed that no 10 CFR Part 40 specifically licensed source material, including natural uranium, depleted uranium and uranium hexafluoride will be received, possessed, or used during the period between issuance of the COL and the Commission's 10 CFR 52.103(g) finding for each of the VEGP Units 3 and 4. The applicant also stated that the quantity of any byproduct material with atomic numbers 1 through 93 would not exceed 100 millicuries for a single source and 5 Curies total. The maximum quantity for Americium 241 would not exceed 300 millicuries for single source and 500 millicuries total. Following the 10 CFR 52.103(g) finding for each of the VEGP Units 3 and 4, byproduct material, source material, and SNM in amounts as required, without restriction to chemical forms or physical form, would be used for the following:*

- *Sample analysis,*
- *Instrument and equipment calibration, and*
- *Associated with radioactive apparatus or components.*

*With respect to the requirements of 10 CFR Parts 30, 40, and 70 that are related to radiation protection (including administrative controls), the applicant provided information (in letters dated July 9, and November 23, 2010) on the purpose, storage and security of sources in VEGP COL FSAR Sections 12.2 and 12.5. Information related to the radiation protection program itself, including procedures for the use of these sources, is also described in VEGP COL FSAR Chapter 12. In addition, VEGP COL FSAR Section 13.4 states that the radiation protection program will be implemented according to the milestones listed in VEGP COL FSAR Table 13.4-201, Item 10. These milestones ensure that those portions of the program necessary to comply with the requirements of 10 CFR Parts 20, 30, 40, and 70, are implemented prior to the receipt of byproduct, source, SNM, or fuel, onsite.*

*The staff finds that the information provided by the applicant that describes the radiation protection measures (Chapter 12 of the VEGP COL FSAR) that will be implemented prior to receipt of byproduct, source or SNM, conforms to the applicable guidance in NUREG-1556, "Consolidated Guidance about Materials Licenses," and is, therefore, acceptable. The radiation protection program milestones included in the VEGP COL FSAR Table 13.4-201 are evaluated in Section 12.5 of this SER.*

*In a letter dated July 9, 2010, the applicant provided supplemental information relative to Item 14, Emergency Planning, in VEGP COL FSAR Table 13.4-201. In addition, the applicant proposed to revise the term 'portions applicable to SNM'*

to 'portions applicable to radioactive materials' for Item 14; Item 8, Fire Protection Program; Item 11, Non-Licensed Plant Staff Training Program; and Item 15, Physical Security Program. In addition, the applicant proposed to correct the references to regulatory citations of 10 CFR 30.32, "Application for specific licenses"; 10 CFR 40.31, "Application for specific licenses"; and 10 CFR 70.22, "Contents of applications." It also proposed to revise the "Requirements" column for Item 14 of the VEGP COL FSAR Table 13.4-201 to reference 10 CFR 30.32(i)(1), 10 CFR 40.31(j)(1), and 10 CFR 70.22(i)(1). It also proposed to revise Part 10 of the VEGP COL application, Proposed License Condition 3, "Operational Program Implementation," Section C, "Receipt of Materials," to include implementation of the portions of the emergency planning program applicable to SNM. In addition to the evaluation of the implementation milestones noted above, the staff's evaluation that supports the issuance of the 10 CFR Parts 30, and 40 licenses is addressed in Chapter 9 (the fire protection program).

The operational programs are specific programs that are required by regulations. VEGP COL FSAR Table 13.4-201 lists each operational program, the regulatory source for the program, the section of the FSAR in which the operational program is described, and the associated implementation milestone(s). The applicant proposed a license condition in Part 10, License Condition 3, Item C.3 of the VEGP COL application, which provides the milestones for implementing the portions of the non-licensed plant staff training program applicable to receipt of the radioactive material. However, Table 13.4-201 specifies implementation requirements (10 CFR 30.32(a), 10 CFR 40.31(a), and 10 CFR 70.22(a)) for the non-licensed plant staff training program associated with receipt of the radioactive material. Therefore, the staff determined that Item C.3 of proposed License Condition 3 is not needed because the implementation milestones for the non-licensed plant staff training program associated with receipt of radioactive material are governed by the applicable regulations.

The applicant proposed a license condition in Part 10 of the VEGP COL application to provide a schedule to support the NRC's inspection of operational programs, including the non-licensed plant staff training program applicable to receipt of the radioactive material. The proposed license condition is consistent with the policy established in SECY-05-0197, "Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria," for operational programs and is acceptable.

In response to RAI 1.5-1, the applicant stated, in a letter dated October 15, 2010, that no byproduct material will be received, possessed, or used at AP1000 units of a physical form that is in unsealed form, on foils or plated sources, or sealed in glass, that exceeds the quantities in Schedule C of 10 CFR 30.72. Since the quantities do not exceed Schedule C, an emergency plan that meets the requirements of 10 CFR 30.32(i)(3) is not required. As such, the implementation of the emergency plan prior to the receipt of byproduct material will be removed from VEGP COL FSAR Table 13.4-201 and from Part 10 proposed License Condition 3, Item C.4. The request for a 10 CFR Part 40 license does not involve authorization to receive, possess, or use uranium hexafluoride in excess of 50 kilograms in a single container or 1000 kilograms total. However, in a letter

dated March 3, 2011, the applicant revised the request for a 10 CFR Part 40 license to state that no 10 CFR Part 40 specifically-licensed source material, including natural uranium, depleted uranium and uranium hexafluoride (UF<sub>6</sub>), will be received, possessed, and used during the period between issuance of the COL and the Commission's 10 CFR 52.103(g) finding for each of the VEGP Units 3 and 4. Since the above quantities are not exceeded, an emergency plan for responding to the radiological hazards of an accidental release of source material and to any associated chemical hazards related to the material is not required. As such, the implementation of the emergency plan prior to the receipt of source material will be removed from VEGP COL FSAR Table 13.4-201. This applicant's proposal meets the requirements of 10 CFR 30.32 and 10 CFR 40.31 and is, therefore, acceptable. The incorporation of changes into a future revision of the VEGP COL FSAR is **Confirmatory Item 1.5-1**.

#### Resolution of Standard Content Confirmatory Item 1.5-1

Confirmatory Item 1.5-1 is an applicant commitment to revise FSAR Table 13.4-201. The staff verified that the VEGP COL FSAR Table 13.4-201 was appropriately revised. As a result, Confirmatory Item 1.5-1 is now closed.

The applicant also proposed an FSAR commitment to address the limitations during the period prior to the implementation of the emergency plan. In a letter dated March 16, 2011, the applicant stated that it has no plans to process UF<sub>6</sub> at the plant site at any time following the Commission's 10 CFR 52.103(g) finding, and consequently does not expect the requested 10 CFR Part 40 license to include receipt, storage, or use of UF<sub>6</sub> at the plant site. However, using the guidance of DC/COL-ISG-15, "Post-Combined License Commitments", the staff has determined that the commitment is not sufficient and instead the staff is proposing to add a restriction in the license condition related to 10 CFR Parts 30 and 40 (See License Condition 1-1.c(ii)).

#### Review of Part 70 Materials

The staff reviewed information related to nuclear fuel as SNM included in the VEGP COL application including the AP1000 DCD against 10 CFR Part 70 requirements. Specifically, the staff's review included:

- *General information—financial qualification, site description, hydrology, geology, meteorology, the nearby population, and potential effects of natural phenomena (Part 1 of the application, FSAR Section 1.1 and Chapter 2, Section 4.1 and Table 4.1-1 of the AP1000 DCD against the requirements of 10 CFR 70.22(a)(1) through (a)(4));*
- *Organization and Administration—the responsibilities and associated resources for the receipt, possession, inspection, and storage of the SNM in the form of fresh fuel assemblies (Part 1 of the application, Quality Assurance Program included in Part 11 (Enclosure 11A) of the application [Part 13 of the VCSNS COL application], VEGP COL FSAR Section 13.1 for organization against the requirements of 10 CFR 70.22(a)(6) and (a)(8));*

- *Radiation Protection—Radiation protection program implementation, organization and personnel qualification, written procedures, ALARA, radiation survey and monitoring (AP1000 DCD Section 9.1 and Chapter 12 of VEGP COL FSAR against the requirements of 10 CFR 70.22(a)(6) through (a)(8));*
- *Nuclear Criticality Safety—use of area radiation monitors in lieu of criticality accident alarms (AP1000 DCD Sections 9.1.1.3 and 11.5.6 against the requirements of 10 CFR 70.22(a)(6) through (a)(8) and 10 CFR 50.68(b));*
- *Fire safety—fire protection program (VEGP COL FSAR Section 9.5.1 and Table 13.4-201 against the requirements of 10 CFR 70.22(a)(6) through (a)(8));*
- *Emergency Preparedness—emergency preparedness program for the VEGP site (VEGP COL FSAR Section 13.3 and Table 13.4-201 and the Emergency Plan against the requirements of 10 CFR 70.22(i));*
- *Environmental Protection—organization, procedures and controls that ensures that the environment is protected during the conduct of activities (i.e., receipt, possession, inspection, and storage of SNM) (VEGP COL FSAR Section 11.5 and AP1000 DCD Sections 9.1.1 and 11.5 against the requirements of 10 CFR 70.22(a)(7) and (a)(8)); and*
- *MC&A Program and Security (MC&A program included in the application against requirements of 10 CFR 70.22(b) and 10 CFR Part 74, and the Physical Security Plan (PSP) against the requirements of 10 CFR 73.67, “Licensee fixed site and in-transit requirements for the physical protection of special nuclear material of moderate and low strategic significance”).*

*As indicated above, the applicant’s compliance with several applicable 10 CFR Part 70 requirements regarding radiation protection, nuclear criticality safety, and environmental protection is already encompassed by the design information incorporated by reference from the AP1000 DCD and evaluated by the staff as part of the design certification proceeding. As explained further below, with respect to other applicable 10 CFR Part 70 requirements to be addressed by the COL applicant, the staff finds that the information provided regarding general information, organization and administration, radiation protection, nuclear criticality safety, fire safety, emergency preparedness, and environmental protection to support receipt, storage, and possession of SNM, conforms to the applicable guidance in NUREG-1520 and NUREG-0800 and, therefore, is acceptable. First, however, the staff’s review of information regarding the MC&A program (10 CFR 70.22(b) and 10 CFR Part 74) and the PSP (10 CFR 73.67) is provided below.*

*MC&A Program for SNM (Fuel)*

*In RAI 1.5-3, the staff requested the applicant to review the requirements of 10 CFR 70.22(b) for the program addressing the control and accounting of SNM*

*and provide descriptions of how the applicable requirements for material accounting and controls under 10 CFR Part 74 will be met for the possession and storage of SNM during construction and prior to the operation of the nuclear power plant. In addition, the staff requested the applicant to provide a proposed license condition to clearly establish full implementation of the MC&A program meeting the applicable requirements of 10 CFR Part 74 prior to receipt of SNM, consistent and concurrent with the proposed license condition for implementing the applicable security (i.e., physical protection) requirements of 10 CFR Part 73.*

*In response to RAI 1.5-3, the applicant, in a letter dated November 23, 2010, stated that all non-irradiated SNM for the AP1000 units is identified as Category III, SNM of low strategic significance, as defined in 10 CFR 74.4, "Definitions." No SNM at an AP1000 nuclear facility will exceed an uranium-235 isotope enrichment of 10 percent. The quantity of SNM will be documented, controlled, and communicated to the NRC as required in 10 CFR 74.13, "Material status reports"; 10 CFR 74.15, "Nuclear material transaction reports"; and 10 CFR 74.19, "Recordkeeping."*

*In its response to RAI 1.5-3, the applicant also described the SNM MC&A program and stated that this program will be provided as an enclosure in the VEGP COL application, Part 11 [Part 16 of the VCSNS COL application]. The SNM MC&A program will be developed for control and accounting of SNM in accordance with the applicable requirements of 10 CFR Part 74, Subparts A and B. This program will be consistent with guidance of American National Standards Institute (ANSI) 15.8-2009, "Material Control Systems – Special Nuclear Material Control and Accounting Systems for Nuclear Power Plants." The SNM MC&A program will be implemented prior to receipt of SNM at the plant site and will remain in effect until the SNM is shipped from the plant site. The procedures constituting the SNM MC&A program will delineate the requirements, responsibilities, and methods of SNM control necessary to address the following programmatic elements:*

- 1. Establish, maintain, and follow written MC&A procedures to account for SNM.*
- 2. Maintain adequate records of the initial receipt or current inventory of SNM, including records of isotopic content, material received, material shipped, and material lost (material balance reports and physical inventory listing reports).*
- 3. Develop adequate inventory procedures and maintain adequate perpetual inventory records.*
- 4. Inventory SNM within the 12-month prescribed frequency.*
- 5. Report SNM inventories on the applicable forms.*
- 6. Establish an individual responsible for the control and accountability of SNM.*
- 7. Report the loss of or inability to find SNM items in a timely manner.*

8. Control access to SNM.
9. Control the shipping and transfer of SNM.

*The applicant proposed to add a new FSAR Section 13.5.2.2.9, which will summarize the use of plant procedures to address MC&A of SNM. The applicant also stated that VEGP COL FSAR Table 13.4-201 will be revised to provide information related to implementation of the SNM MC&A program.*

*In order to address the applicable 10 CFR Part 74 MC&A requirements prior to power operation, the applicant proposed a license condition that will require implementation of a MC&A program prior to receipt of SNM on site. Implementation of the SNM MC&A program prior to SNM receipt will also address the SNM possession and storage requirements during construction and prior to operation of the nuclear power plant.*

*The applicant's MC&A program for SNM is consistent with ANSI 15.8 and meets reporting and recordkeeping requirements of 10 CFR 74.11, "Reports of loss or theft or attempted theft or unauthorized production of special nuclear material"; 10 CFR 74.13; 10 CFR 74.15; and 10 CFR 74.19. The documentation, submitted by the applicant, for a program addressing the control and accounting of SNM provided descriptions of how the applicable requirements for material accounting and controls under 10 CFR Part 74 are met and, therefore, is acceptable, subject to the proposed revision to the VEGP COL application and the VEGP COL FSAR (this has been tracked as **Confirmatory Item 1.5-2**). In addition, the proposed license condition includes a provision to provide a schedule to support the NRC's inspection of the MC&A program for the SNM. This is consistent with the policy established in SECY-05-0197 and is thus acceptable.*

#### Resolution of Standard Content Confirmatory Item 1.5-2

*Confirmatory Item 1.5-2 is an applicant commitment to revise its FSAR Sections 13.4, 13.5 and Parts 7 and 11 (Enclosure 11D) [Part 16 of the VCSNS COL application contains analogous information as Part 11 (Enclosure 11D) of the VEGP COL application] of its application to address the SNM MC&A program. The staff verified that the VEGP COL FSAR and Parts 7 and 11 (Enclosure D) [Part 16 of the VCSNS COL application] of its application were appropriately revised. As a result, Confirmatory Item 1.5-2 is now closed.*

#### Security Review for 10 CFR Part 70 Materials

*In accordance with 10 CFR 73.55(a)(4), current applicants for an operating license under 10 CFR Part 50, or a COL under 10 CFR Part 52 who have submitted their applications to the Commission prior to the effective date of this rule must amend their applications to include security plans consistent with this section.*

*The Commission worded 10 CFR 73.55(a)(4) to require implementation of 10 CFR 73.55, "Requirements for physical protection of licensed activities in*

nuclear power reactors against radiological sabotage,” “before fuel is allowed onsite (protected area).” The Commission explained this provision as follows:

*This paragraph establishes when an applicant’s physical protection program must be implemented. The receipt of special nuclear material (SNM) in the form of fuel assemblies onsite, (i.e., within the licensee’s protected area) is the event that subjects a licensee or applicant to the requirements of this rule, and it is the responsibility of the applicant or licensee to complete the preliminary and preparatory actions required to implement an effective physical protection program at the time SNM is received onsite (within the protected area). 74 FR 13926, 13960 (Mar. 27, 2009)*

Further guidance is provided in the form of RGs to support implementation of this Rule. The following guidance is provided in RG 5.76, “Physical Protection Programs at Nuclear Power Reactors”:

*Except for mixed-oxide (MOX) fuel assemblies, the Commission requirements of 10 CFR 73.67, “Licensee Fixed Site and In-Transit Requirements for the Physical Protection of Special Nuclear Material of Moderate and Low Strategic Significance,” apply and must be met until fuel assemblies are received inside an operational protected area. Consistent with 10 CFR 73.55(a)(4), applicants for an operating license under the provisions of 10 CFR Part 50, or holders of a COL under the provisions of 10 CFR Part 52, shall implement the requirements of 10 CFR 73.55 before special nuclear material (SNM) in the form of fuel assemblies are allowed on site (in the protected area).*

*In a letter dated March 15, 2011, the NRC staff asked the applicant to provide its plan regarding the protection of new fuel as SNM at the VEGP Units 3 and 4 plant site prior to declaration of an operational protected area (PA) and implementation of the requirements of 10 CFR 73.55, as described in the SNM MC&A Program description. In addition, the staff also requested that the applicant consider the applicability of the substantive provisions of interim compensatory orders (ICMO) that were issued to Category III Fuel Cycle Facilities to ensure adequate protection when SNM is on site prior to the activation of the PA. In response to the staff’s questions, in a letter dated March 16, 2011, the applicant provided a physical protection plan in accordance with 10 CFR 73.67(f) and (g). This plan was included as an annex to the PSP. This plan includes transportation security provisions. The applicant also stated that once the PA is declared operational in accordance with 10 CFR 73.55(a)(4), the annex would no longer be required and could be removed in accordance with 10 CFR 50.54(p). Then, no separate transportation security provisions would be necessary for future new fuel shipments. The staff raised a question regarding the licensee’s ability to receive new fuel and return new fuel rods/assemblies to the fuel manufacturer. In a letter dated May 6, 2011, the applicant proposed to revise its FSAR Section 13.5.2.2.8 to include the New Fuel Shipping Plan that addresses the applicable 10 CFR 73.67 requirements in the event that unirradiated new fuel assemblies or components are returned to the supplying*

*fuel manufacturer(s) facility. The New Fuel Shipping Plan summarizes the procedures and the written agreement that the applicant will have in place prior to shipment of new fuel back to the fuel manufacturer and this plan will be included in Part 11, Enclosures of its application [Part 17 of the VCSNS COL application]. The staff finds this New Fuel Shipping Plan acceptable because it meets the applicable requirements of 10 CFR 73.67(g). The staff verified that the VEGP FSAR Section 13.5 and Part 11 (Enclosure E) [Part 17 of the VCSNS COL application] are appropriately updated.*

*In the RAI response dated March 16, 2011, the applicant addressed the Order imposing fingerprinting and criminal history records check requirements for unescorted access to radioactive material or other property dated April 30, 2007. In accordance with Section 5.4 of the PSP annex, the applicant committed to utilizing the access authorization program as outlined in Section 14.1 of the PSP. The access authorization program in Section 14.1 is in accordance with 10 CFR 73.56, "Personnel Access Authorization Requirements for Nuclear Power Plants," based on implementing guidance as provided by RG 5.66, "Access Authorization Program for Nuclear Power Plants," Revision 1 and Section 652 of the Energy Policy Act of 2005 (EP Act).*

*The applicant conducted a critical target area analysis (CTA), and determined that a CTA would not exist. Because there is no CTA at the facility, there is no need to address security issues related to CTAs. In addition, the applicant has adequately addressed security issues related to; security response procedures, coordination with local law enforcement for response support, storage of hazardous materials on-site, review of emergency shutdown/cool down procedures, supplementing of the Emergency Actions Levels, site accountability and evacuation strategies, emergency communications, evaluation of computer and communications networks for vulnerabilities, capabilities to provide fire suppression, evaluation of the need for offsite medical support, emergency support, and access to Federal support, and limiting public access to sensitive plant information. However, the staff has determined that the commitment included in the RAI responses is not sufficient and instead the staff is proposing to add a license condition to ensure adequate protection prior to implementation of the requirements of 10 CFR 73.55. This license condition (1-5) will preclude changes to the security plan provisions related to these issues without prior NRC approval until such matters fall under the new reactor security requirements of 10 CFR 73.55.*

*The staff's review of the applicant's PSP for the protection of SNM of low strategic significance (LSS) ) [Note: VCSNS refers to this plan as the SNMPPP] includes information that has been marked as "Safeguards Information" by the applicant, pursuant to ~~40 CFR 2.390~~[10 CFR 73.21 and 73.22]. The NRC staff reviewed the applicant's PSP for fixed site physical protection of SNM- LSS and chemicals of concern. The methods and procedures outlined in the PSP satisfy the performance objectives, systems capabilities, and reporting requirements specified in 10 CFR 73.67. The PSP for the facility is acceptable and provides reasonable assurance that the requirements for the physical protection of SNM- LSS and chemicals of concern will be met. The staff also verified that the PSP is appropriately updated.*

### Non-Fuel SNM

*In a letter dated, June 22, 2011, the applicant provided information regarding the name, amount, and specifications (including the chemical and physical form and, where applicable, isotopic content) of the non-fuel SNM (Fission Chambers) the applicant proposes to use (10 CFR 70.22(a)(4)). The letter also provided information to confirm that the applicable design and programmatic elements provided in the licensing basis will satisfy the requirements in 10 CFR 70.22(a)(6) through (8) prior to receipt of non-fuel SNM.*

### 10 CFR Part 70 Requirements - Other than MC&A (10 CFR 70.22(b) and 10 CFR Part 74) and Security (10 CFR 73.67) - for Fuel and Non-Fuel Material

*As noted above, in addition to MC&A and security, the staff also examined the applicant's compliance with 10 CFR Part 70 requirements regarding general information, organization and administration, radiation protection, nuclear criticality safety, fire safety, emergency preparedness, and environmental protection to support receipt, storage, and possession of SNM.*

*The staff's analysis follows with respect to those other requirements not already resolved via the applicant's incorporation of the AP1000 DCD. For the reasons described in Section 1.4.4 of this FSER the staff agrees that the applicant is technically qualified to engage in the proposed activities associated with this license, based on the applicant's ongoing experience in the safe operation of nuclear power plants, as presented in Section 1.4.1 of the VEGP COL FSAR. Likewise, the applicant's financial qualifications and ownership structure meet the requirements of 10 CFR 70.22 for the same reasons described above in Section 1.5.1.*

Note: VCSNS FSAR Section 1.4.1 has a similar discussion regarding SCE&G's operation of VCSNS Unit 1. The staff also concludes SCE&G is technically qualified to engage in the proposed activities associated with this license based on SCE&G's on-going experience with the safe operation of VCSNS Unit 1. In addition, Section 1.5.1 of this report finds that the financial qualifications and ownership structure for the VCSNS COL application acceptable.

The following portion of this technical evaluation section is reproduced from Section 1.5.5 of the VEGP SER:

*Similarly, the applicant has explained the anticipated amounts, types, and uses of 10 CFR Part 70 materials at the site are consistent with the provisions of 10 CFR 70.22. The VEGP COL FSAR and Part 1 of the application provide adequate description of the VEGP Units 3 and 4 facility and the proposed activities related to 10 CFR Parts 30, 40 and 70 material. In addition the VEGP COL FSAR provides information regarding regional hydrology, geology, meteorology, the nearby population, and potential effects of natural phenomena that could occur at the facility. The applicant has described the responsibilities and associated resources (see Part 1, "General and Administration Information," and Enclosure 11A, "Nuclear Development Quality Assurance Manual" [Part 13 of the VCSNS COL application] of the application) for the receipt, possession, inspection, and storage of the 10 CFR Part 70 material (fuel and non fuel).*

Therefore, it meets the requirements of 10 CFR 70.22(a)(1). Furthermore, as indicated in VEGP COL FSAR Table 13.4-201, applicable portions of the Radiation Protection Program will be implemented prior to initial receipt of byproduct, source, or SNMs. In accordance with VEGP COL FSAR Table 13.4-201, Item 10, Implementation Milestone #1, and the NRC-approved template, Nuclear Energy Institute (NEI) 07-03A, "Generic FSAR Template Guidance for Radiation Protection Program Description," which is incorporated by reference into VEGP COL FSAR Appendix 12AA (see SER Section 12.5), the appropriate radiation protection program elements associated with organization, facilities, instrumentation and equipment, procedures (e.g., procurement, receipt, inventory, labeling, leak testing, surveillance, control, transfer, disposal, storage, issuance, and use of radioactive sources), and training will be in place prior to initial receipt of byproduct, source, or special nuclear materials, thereby satisfying the requirements of 10 CFR 70.22(a)(4), (6), (7), and (8). VEGP COL FSAR Section 12.2 includes the requirements for written procedures that address leak-testing of radioactive sources. The leak-test will be consistent with 10 CFR 20.1501, "General," survey and monitoring requirements for evaluating the quantities of radioactive material and the potential radiological hazard of the radioactive source.

The fission chambers will be disposed of consistent with the operating procedures that specify the processes to be followed to ship waste that complies with the waste acceptance criteria (WAC) of the disposal site, the waste classification and characteristics requirements of 10 CFR 61.55, "Waste classification," and 10 CFR 61.56, "Waste characteristics," and the requirements of third party waste processors as applicable. This process is identified in VEGP COL FSAR Section 11.4.6.1.

With respect to fire safety, prior to installation, the new fission chambers (along with the new fuel) will be stored in the Auxiliary Building fuel handling area, which is an area protected by the fire protection program and fire protection system, as discussed in the AP1000 DCD Section 9A.3.1.3.1.2. Temporary storage of these non-combustible sealed sources is not specifically addressed in the AP1000 fire protection analysis in DCD Appendix 9A; however, the approach to extinguishing fires and containing material releases associated with the fission chambers would be similar to, and bounded by, the approach considered for the fuel handling area in general. The fuel handling area has been evaluated and determined acceptable for the storage of SNM in a full core load of new fuel. The hazards imposed by the relatively small quantity of SNM associated with the fission chambers (less than 100 grams), is not expected to be a challenge to the existing fire protection analysis for the new fuel storage (see Section 9.5.1 of this SER). The VEGP COL FSAR Section 12.2 includes the requirements for written procedures that address leak testing of radioactive sources (byproduct, source, and devices that contain SNM, as appropriate). Further, the fission chambers that contain the non-fuel SNM are sealed sources that are tested periodically to confirm their leak-tightness. Therefore, it is expected that the capabilities of the fire protection program and the fire protection equipment servicing this area are sufficient to meet the requirements of 10 CFR 70.22(a)(7) and 10 CFR 70.22(a)(8).

### Emergency Plan (SNM, Fuel and Non-Fuel)

*The applicant will be storing the new fuel in the new fuel rack (stored dry) or in the spent fuel racks prior to loading into the reactor. The safety analysis included in AP1000 DCD Sections 9.1.1.3 and 9.1.2.3 provides safety analysis that indicates that: (1) the design of new fuel rack is such that  $K_{eff}$  remains less than or equal to 0.95 with full density unborated water and less than equal to 0.98 with optimum moderation and full reflection conditions; and (2) the design of spent fuel rack is such that  $K_{eff}$  remains less than or equal to 0.95 under design basis conditions. This criticality evaluation meets the requirements of 10 CFR 50.68(b). Therefore, a criticality accident alarm system to meet the requirements of 10 CFR 70.24, "Criticality accident requirements," is not required. As a result, an emergency plan (to receive and possess) pursuant to 10 CFR 70.22(i) is also not required. In addition, an emergency plan for the fission chambers (to receive and possess) pursuant to 10 CFR 70.22(i) is not required due to the small quantity of SNM (less than 100 grams) associated with the fission chambers.*

### Conclusion

Based on the above, the staff finds that the information regarding general information, organization and administration, radiation protection, nuclear criticality safety, fire safety, emergency preparedness, and environmental protection to support receipt, storage, and possession of fuel and non-fuel SNM (Fission Chambers), conforms to the applicable guidance in NUREG-1520 and NUREG-0800 and, therefore, is acceptable.

For the reasons discussed above, the staff proposes to include the following license conditions for the VCSNS COL, as they relate to authorization pursuant to regulations in 10 CFR Parts 30, 40, and 70:

- License Condition (1-1) - Subject to the conditions and requirements incorporated herein, the Commission hereby licenses SCE&G:
  - (a) (i) Pursuant to the Act and 10 CFR Part 70, to receive and possess at any time, special nuclear material as reactor fuel, in accordance with the limitations for storage and amounts required for reactor operation, described in the final safety analysis report (FSAR), as supplemented and amended;
  - (ii) Pursuant to the Act and 10 CFR Part 70, to use special nuclear material as reactor fuel, after a Commission finding under 10 CFR 52.103(g) has been made in accordance with the limitations for storage and amounts required for reactor operation, and described in the FSAR, as supplemented and amended;
  - (b) (i) Pursuant to the Act and 10 CFR Parts 30, and 70, to receive, possess, and use, at any time, before a Commission finding under 10 CFR 52.103(g), such byproduct, and special nuclear material as: sealed neutron sources for reactor startup; sealed sources for reactor instrumentation and radiation monitoring equipment, calibration; and fission detectors in amounts as required;

(ii) Pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use after a Commission finding under 10 CFR 52.103(g), any byproduct, source, and special nuclear material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment, calibration, and as fission detectors in amounts as required;

(c) (i) Pursuant to the Act and 10 CFR Parts 30, and 70, to receive, possess, and use, before a Commission finding under 10 CFR 52.103(g), in amounts not exceeding those specified in 10 CFR 30.72, any byproduct, or special nuclear material that is (1) in unsealed form; (2) on foils or plated surfaces, or (3) sealed in glass, for sample analysis or instrument calibration or other activities associated with radioactive apparatus or components;

(ii) Pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use, after a Commission finding under 10 CFR 52.103(g), in amounts as required, any byproduct, source, or special nuclear material without restriction as to chemical or physical form, for sample analysis or instrument calibration or other activity associated with radioactive apparatus or components, but not uranium hexafluoride; and

(d) Pursuant to the Act and 10 CFR Parts 30 and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility.

- License Condition (1-2) - Prior to initial receipt of special nuclear materials (SNM) onsite, the licensee shall implement the SNM Material Control and Accounting (MC&A) program. No later than 12 months after issuance of the COL the licensee shall submit to the Director of Office of New Reactors (NRO) a schedule that supports planning for and conduct of NRC inspections of the SNM Material Control and Accounting program. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until the SNM Material Control and Accounting program has been fully implemented.
- License Condition (1-3) – No later than 12 months after issuance of the COL, the licensee shall submit to the Director of NRO a schedule that supports planning for and conduct of NRC inspection of the non-licensed plant staff training program. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until the non-licensed plant staff training program has been fully implemented.
- License Condition (1-4) – Prior to initial receipt of SNM on site, the licensee shall implement the SNM physical protection program. No later than 12 months after issuance of the COL, the licensee shall submit to the Director of NRO a schedule that supports planning for and conduct of NRC inspection of the SNM physical protection program. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until the SNM physical protection program has been fully implemented.

- License Condition (1-5) – The licensee shall not revise or modify the provisions of Sections 5.3, 5.4, 5.6, 5.9 and 5.10 of the Special Nuclear Material (SNM) Physical Protection Plan until the requirements of 10 CFR 73.55 are implemented.