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United States Nuclear Regulatory Commission

Protecting People and the Environment

Presentation to the Commission

Combined License Application Review Vogtle Units 3 and 4

SER Panel 1

September 27 – 28, 2011

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Vogtle Units 3 and 4

Chapter 1, Introduction and Interfaces

September 27 – 28, 2011

Vogtle COL Overview

Part Number	Description	Evaluation
1	General and Administration Information	Section 1.5.1
2	Final Safety Analysis Report	In appropriate SER Chapters
3	Environmental Report	Final Supplemental Environmental Impact Statement
4	Technical Specifications	Chapter 16
5	Emergency Plan	Chapter 13
6	Limited Work Authorization # 2	Section 3.8.5
7	Departure Reports	In appropriate SER Chapters
8	Security Plan	Section 13.6

Vogtle COL Overview (Cont'd)

Part Number	Description	Evaluation
9	Withheld Information	In appropriate SER Chapters
10	Proposed Combined License Conditions (Including ITAAC)	In appropriate SER Chapters
11	Information Incorporated by Reference (e.g., Quality Assurance Plan, Material Control and Accountability Program, Mitigative Strategies Document, Cyber Security Plan, SNM Material Control & Accounting Program, New Fuel Shipping Plan)	In appropriate SER Chapters

Overview of Vogtle COL FSAR Chapter 1

FSAR Section	Summary of Departures/Supplements
1.1 Introduction	Incorporated By Reference (IBR) with standard and site-specific supplements
1.2 General Plant Description	IBR with site-specific supplements
1.3 Comparisons with Similar Facility Designs	Completely IBR
1.4 Identification of Agents and Contactors	IBR with site-specific supplements
1.5 Requirements for Further Technical Information	Completely IBR

Overview of Vogtle COL FSAR Chapter 1 (Cont'd)

FSAR Section		Summary of Departures/Supplements
1.6	Material Referenced	IBR with standard and site-specific supplements
1.7	Drawings and Other Detailed Information	IBR with site-specific supplements
1.8	Interface for Standard Designs	IBR with site-specific supplements
1.9	Compliance with Regulatory Criteria	IBR with standard and site-specific supplements
1.10	Nuclear Power Plants to be Operated on Multi-Unit Sites	Standard and site-specific supplemental information

Vogtle COL Exemptions from Current Regulations

Description	Regulations	Location of Evaluation in FSER
COL application organization and numbering	10 CFR Part 52, Appendix D, Section IV.A.2.	Section 1.5.4
Exemption Criteria	10 CFR 52.93(a)(1)	Section 1.5.4
SNM MC&A Program	10 CFR 70.22(b), 70.32(c), 74.31, 74.41, 74.51	Section 1.5.4

Vogtle COL Departures from AP1000 Design Certification

Departure Numbers	Description	FSER Location
VEGP DEP 1.1-1	Administrative departure for organization and numbering of the FSAR sections	Section 1.5.4
VEGP DEP 2.5-1	Lower and Upper Mudmat	Section 2.5.4
VEGP DEP 3.4-1	Waterproofing Membrane Material	Sections 3.4.1 and 3.8.5
VEGP DEP 8.3-1	Class 1E voltage regulating transformer current limiting features	Section 8.3.2
VEGP DEP 9.2-1	PWS Filtration	Section 9.2.1
VEGP DEP 18.8-1	Emergency response facility locations	Sections 12.5, 13.3 and 18.8

Vogtle COL Variances from Vogtle Early Site Permit

ESP Variance Number	Description	FSER Location
VEGP ESP VAR 1.6-1	Overall reference to AP1000 DCD relating to LWA	Section 1.4.4
VEGP ESP VAR 1.6-2	Foundations	Section 3.8.5
VEGP ESP VAR 1.6-3	Accident analysis	Chapter 15
VEGP ESP VAR 1.2-1	Emergency planning – updated site layout including relocation of TSC	Section 13.3
VEGP ESP VAR 2.2-1	Updated information about hazardous chemicals in the vicinity of the site	Section 2.2
VEGP ESP VAR 2.3-1	Updated Climatological data	Section 2.3

Technical Topics of Interest

- Technical and Financial Qualifications
- Exemption related to SNM MC&A Program
- Licenses for Byproduct, Source, and SNM—10 CFR Part 30, 40 and 70, respectively

Technical Qualifications Review

- FSAR Section 1.4 and Chapter 17 provide information regarding applicant's experience with nuclear plants and its QA program, respectively

- Staff concludes that SNC is technically qualified to hold licenses for Vogtle Units 3 and 4 under 10 CFR 52 in accordance with 10 CFR 52.97(a)(1)(iv) (Section 1.4.4 of the FSER)

Financial Qualifications Review

- Part 1 of the Vogtle application provides reasonable assurance regarding:
  - Total cost of Vogtle Units 3 & 4
  - Funding sources for each of the Vogtle Owners
  - Decommissioning funding assurance
  - Foreign ownership
  - Nuclear insurance and indemnity

- Staff's review considered applicable regulations and guidance (10 CFR Part 140, 10 CFR 50.33, 10 CFR 52.97(a)(1)(iv), 10 CFR 50.75, Appendix C to 10 CFR 50 and NUREG-1577)

- Staff concludes that SNC provided reasonable assurance of qualifications to construct and operate Vogtle Units 3 and 4 and engage in the activities authorized by the licenses (Section 1.5.1 of the FSER)

SNM MC&A Program Exemption

Requirement

- The provisions of 10 CFR 70.22(b) require 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, 10 CFR 74.41, and 10 CFR 74.51
- 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 but not for reactor licensees under 10 CFR 52

Exemption Request

- The applicant requested an exemption from requirements of 10 CFR 70.22(b), 70.32(c), and 10 CFR 74.31, 74.41 and 74.51
- 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 requirements will be applied to the SNM MC&A program as for nuclear reactors licensed under 10 CFR Part 50

SNM MC&A Program Exemption

Staff's Evaluation

- The NRC staff reviewed the request for an exemption, which will allow the applicant to have a similar exception for the COL under 10 CFR Part 52, such that the same requirements will be applied to the SNM MC&A program as for nuclear reactors licensed under 10 CFR Part 50

- Staff found that granting this requested exemption:
  - will not present an undue risk to the public health and safety
  - is otherwise in the public interest
  - Is authorized by law, due to the Atomic Energy Act, et al.
  - will not adversely affect the common defense and security
  - in these particular circumstances is not necessary to achieve the underlying purpose of the rule

- Staff found 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.

10 CFR 30, 40 and 70 Licenses: Overview

- SNC requested materials licenses as part of its Part 52 Combined License Application (COL) for receipt, possession and use of Byproduct Material (Part 30), Source Material (Part 40), and Special Nuclear Material (Part 70).
- A first of a kind review for a COL application.
- Staff coordinated its review with other Offices: FSME and Region I (Parts 30 and 40), NMSS and NSIR (Parts 30, 40 and 70).
- Staff COL review for compliance with 10 CFR Part 52 also supports granting of 10 CFR Parts 30, 40, and 70 licenses.
- Major Areas of review:
  - Radiation Protection
  - Fire Protection
  - Non-Licensed Staff Training
  - Emergency Planning
  - Security

10 CFR 30, 40 and 70 Licenses: Parts 30 and 40 Reviews

- SNC provided Information regarding specific types of sources, chemical or physical form, and maximum amount.
- SNC committed not to exceed quantities in Schedule C of Part 30 material.
- SNC committed that Part 40 source material would not be received before the Commission finding under 52.103(g) and, in addition, uranium hexafluoride (UF_6) would not be received, possessed or used before or after the 52.103(g) findings.
- SNC provided sufficient details of the operational programs - radiation protection program, fire protection program, non-licensed staff training program – to support Parts 30 and 40 materials licenses.

10 CFR 30, 40 and 70 Licenses: Parts 30 and 40 Reviews (Cont'd)

- Staff reviews utilized guidance of NUREG-1556
- Major areas of review: Radiation Protection, Fire Protection, Non-Licensed staff training, emergency planning and security program (operational programs)
- These operational programs meet the policy established in SECY-05-0197 and, therefore, these operational programs are acceptable
- Emergency plan is not required for Byproduct Material and Source Material
- Staff proposed a license condition to restrict receipt, possession and use of Part 40 materials

10 CFR 30, 40 and 70 Licenses: Part 70 Review

- SNC provided information regarding Part 70 material (SNM in the form of nuclear fuel):
  - General information—financial, site description;
  - Organization and administration—responsibilities and associated resources and quality assurance program;
  - Radiation protection;
  - Nuclear criticality safety;
  - Fire safety;
  - Emergency preparedness;
  - Environmental protection—organization, procedures, and controls;
  - Material control and accounting (MC&A) program and physical security plan for nuclear fuel.

10 CFR 30, 40 and 70 Licenses: Part 70 Review (Cont'd)

- Staff review utilized guidance of NUREG-1520, and NUREG-0800, as applicable.
- Staff found that SNC is qualified to receive, possess and use SNM.
- Staff found that SNC complies with applicable Part 70 requirements regarding radiation protection, nuclear criticality safety, fire safety, and environmental protection encompassed by the design information incorporated by reference from AP1000 DCD and evaluated by staff as part of the review of COL application.
- Staff concluded that an emergency plan (to receive and possess nuclear fuel) pursuant to 10 CFR 70.22(i) is not required.

10 CFR 30, 40 and 70 Licenses: Part 70 Review (MC&A Program)

- SNC provided a program addressing the control and accounting of SNM appropriate for reactor operations and to meet the requirements stated in 10 CFR 74
  - This program will be an operational program
  - A proposed license condition will require implementation of this program prior to receipt of SNM on site
- Staff concluded
  - The MC&A program meets applicable requirements of 10 CFR 70.22(a) and 10 CFR 74
  - The MC&A program is an operational program consistent with the policy established in SECY-05-0197 and staff proposed a license condition covering implementation of the MC&A program

10 CFR 30, 40 and 70 Licenses: Part 70 Review (Security)

- Pursuant to 10 CFR 73.67(f) and (g), SNC provided
  - Its plan to protect new fuel as SNM at the Vogtle site prior to declaration of an operational PA and implementation of requirements of 10 CFR 73.55
  - Applicable provisions of ICMOs 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
  - The New Fuel Shipping Plan, which addresses applicable requirements of 10 CFR 73.67 in the event that unirradiated new fuel assemblies or components are returned to the supplying fuel manufacturer's facility
- Staff's review of the applicant's physical security plan for SNM and the new fuel shipping plan concludes that the security plan satisfies the performance objectives, system capabilities and reporting requirements specified in 10 CFR 73.67

10 CFR 30, 40 and 70 Licenses: Conclusions

- SNC satisfied applicable requirements of 10 CFR 30, 40 and 70 and staff proposes to include specific license conditions authorizing SNC to receive, possess and use Byproduct Material, Source Material and SNM pursuant to 10 CFR Parts 30, 40 and 70

- Staff determined that SNC's application is expected to be standard for the remaining AP1000 COL applicants
  - Design-centered review approach is appropriate
  - Staff evaluation is expected to constitute a standard review for the AP1000 COLs
  - Only plant-specific differences between RCOL (Vogtle) and SCOLs will be addressed separately

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Chapter 2, Site Characteristics

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Purpose

- Vogtle ESP and LWA-1 Site Safety Aspects
  - Vogtle ESP Safety Review Topics
  - Vogtle LWA-1 Review Topics
- FSAR Chapter 2, Site Characteristics
  - Background information
  - Overview of Vogtle COL FSAR Chapter 2
  - Topics of Interest

Vogtle ESP Safety Review Topics

- Population density and land use
- Physical characteristics of the site
  - Meteorology
  - Hydrology
  - Geology
  - Seismology
- Potential hazards of nearby facilities, including hazards at Vogtle Units 1 & 2
- Activities related to an NPP that might be constructed on the site
- Potential transportation accidents
- Capability of site to support construction of an NPP
- Suitability of site for development of adequate physical security plans
- Proposed complete and integrated Emergency Plans
- Quality Assurance
- Exclusion area boundary and LPZ

Vogtle LWA-1 Review Topics

- Acceptability of design properties related to the engineered backfill
- Acceptability of the mudmat and waterproof membrane
- Quality Assurance Requirements
- Fitness for duty program

Vogtle FSAR Chapter 2
Site Characteristics

- Background information regarding the AP1000 design and ESP as it relates to Chapter 2 of the application
  - Content IBR from DC or ESP without modification did not involve further technical review
  - Standard content for AP1000 design center reviewed for Vogtle as “Reference” COL application
  - Content specific to the Vogtle application

Overview of Vogtle COL FSAR Chapter 2

FSAR Section	Content	Topics of Interest
2.0 Site Characteristics	Incorporated by reference (IBR)/Plant-Specific	Vogtle site characteristics values versus AP1000 site parameter values
2.1 Geography and Demography	IBR/Plant-Specific	
2.2 Nearby Industrial, Transportation and Military Facilities	IBR/Standard/Plant-Specific	Potential chemical hazards (standard and plant-specific)
2.3 Meteorology	IBR/Plant-Specific	Air temperature site characteristic values
2.4 Hydrologic Engineering	IBR/Plant-Specific	
2.5 Geology, Seismology and Geotechnical Engineering	IBR/Plant-Specific	

Vogtle Site Characteristic Values vs. AP1000 Site Parameter Values

- Comparison of Vogtle site characteristic values with AP1000 site parameter values
- All site characteristic values fall within the AP1000 site parameter values, except for one
- Vogtle site's Ground Motion Response Spectra (GMRS) exceed the AP1000 DCD Certified Seismic Design Response Spectra (CSDRS)

Potential Chemical Hazards

- Evaluation of standard chemicals stored at an AP1000 site
  - Staff review and independent confirmatory analyses identified hydrazine and carbon dioxide exceeding IDLH concentrations outside the Vogtle Units 3 & 4 control rooms
- Evaluation of chemicals for Vogtle Units 3 & 4
  - Staff review and independent confirmatory analyses identified the onsite site-specific chemicals MPA and ammonium bisulfite as exceeding IDLH concentrations outside the Vogtle Units 3 & 4 control rooms
  - Potential accidental release of hydrazine stored at Vogtle Unit 1 does not threaten habitability of Vogtle Units 3 and 4 control rooms
- Those chemicals exceeding IDLH concentrations outside the Vogtle Units 3 & 4 control rooms were further evaluated for control room habitability in Section 6.4 of the SER

Air Temperature
Site Characteristic Values

- This variance is denoted as VEGP ESP VAR 2.3-1
- Changed the Vogtle ESP maximum and minimum normal air temperature site characteristic values
  - Vogtle ESP provided 1% annual exceedance values
  - AP1000 DCD specifies 1% seasonal exceedance values
  - 1% seasonal exceedance values are approximately equivalent to 0.4% annual exceedance values

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Chapter 3, Design of Structures, Systems, and Components

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Overview of Vogtle COL FSAR Chapter 3

Section	Content	Topics of Interest
3.1 Conformance with NRC General Design Criteria	Incorporated by Reference (IBR)/Standard	
3.2 Classification of Structures, Components, and Systems	Standard/Plant-Specific	
3.3 Wind and Tornado Loadings	Plant-Specific	
3.4 Water Level (Flood) Design	Standard/Plant-Specific	
3.5 Missile Protection	IBR/Standard/Plant-Specific	
3.6 Protection against Dynamic Effects Associated with the Postulated Rupture of Piping	Standard	

Overview of Vogtle COL FSAR Chapter 3

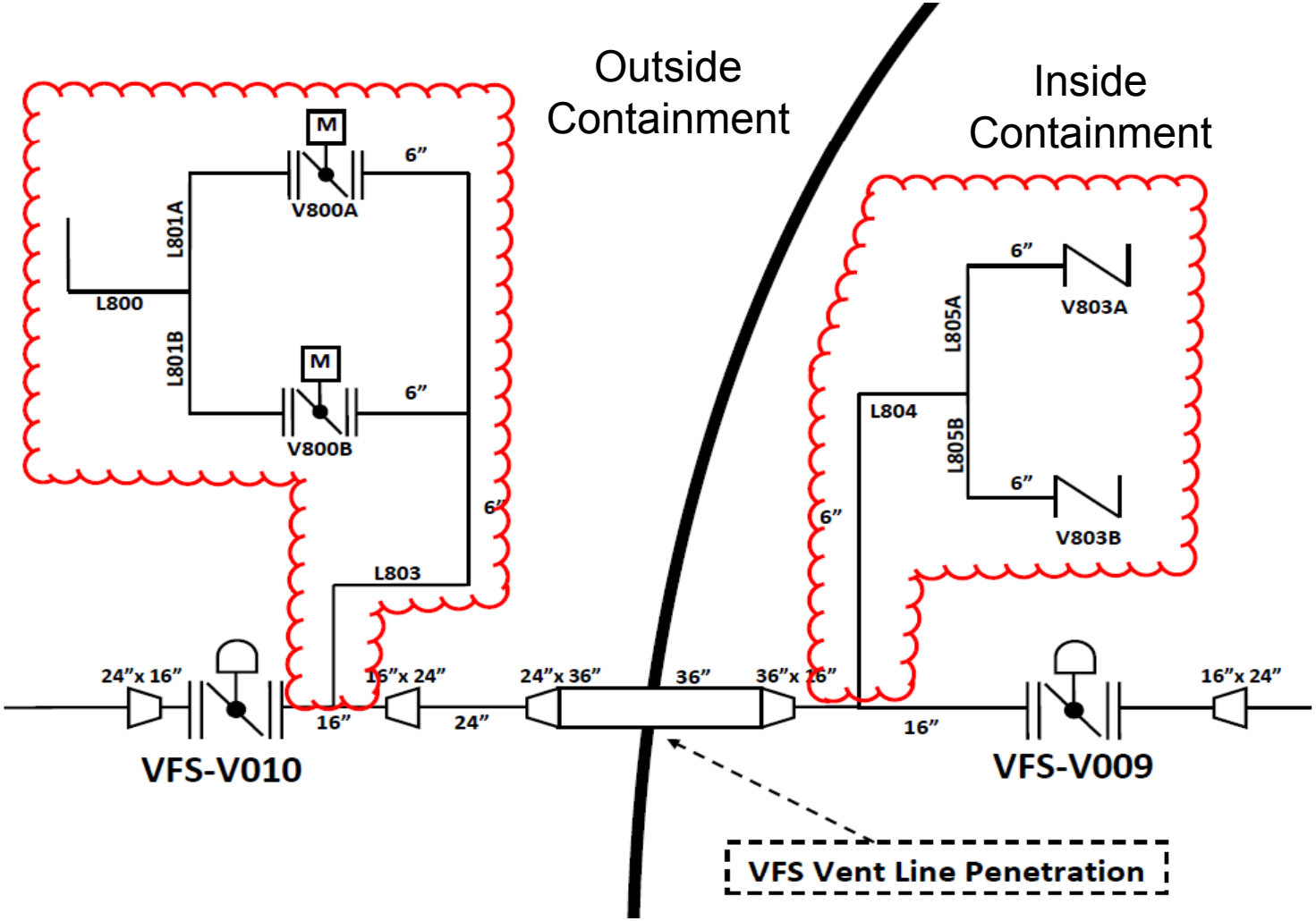
Section	Content	Topics of Interest
3.7 Seismic Design	Standard/Plant-Specific	Seismic Design and System Analysis
3.8 Design of Category I Structures	IBR/Standard/Plant-Specific	Waterproof Membrane Departure; LWA #2
3.9 Mechanical Systems and Components	IBR/Standard	Squib Valves
3.10 Seismic and Dynamic Qualification of Mechanical and Electrical Equipment	Standard	
3.11 Environmental Qualification of Mechanical and Electrical Equipment	Standard	
3.12 Piping Design	Standard	

AP1000 Shield Building Design

AP1000 Shield Building Design

- Revised design for improved aircraft impact resistance
- First of a kind use of modular construction
- Review for external events (e.g., seismic)
- Inspection of supporting information on aircraft impact performance
- Revision 19 additional topics

AP1000 Vacuum Relief System



AP1000 Vacuum Relief System

- Containment vacuum relief system prevents external differential pressure between containment and shield building from exceeding the design value of 1.7 psid.
- Each redundant vacuum relief device contains a check valve inside containment, a motor operated butterfly valve outside containment, and associated piping.
- Each relief flow path provides 100% of vacuum relief capacity.
- Each of these four valves also has containment isolation function.
- Following vacuum relief function, the vacuum relief MOVs will close automatically on a containment isolation signal, or a high radiation in containment signal.

Waterproof Membrane Departure

- AP1000 DCD (Revision 15) did not specify type of material to be used for the waterproofing membrane system for the nuclear island foundation
- In ESP review, staff found the elastomeric spray-on waterproofing membrane (methyl methacrylate resin) specified in the Vogtle ESP SSAR to be an acceptable foundation waterproofing system.
- AP1000 DCD (Revision 18) Section 3.4 stated that for applicants who choose to use the sprayed-on waterproofing membrane system, the waterproofing material will consist of 100 percent solid material (polymer-modified asphalt or polyurea)
- SNC proposed a Tier 2 departure, stating that Vogtle Units 3 and 4 will utilize methyl methacrylate resin as base material for the waterproofing membrane system for the nuclear island foundation.

Waterproof Membrane Departure

Resolution:

Staff found that the chosen material:

- Will limit the infiltration of subsurface water to seismic category structures below grade (foundations)
- Will provide for adequate transfer of horizontal seismic shear forces consistent with the DCD design
- Was reviewed and approved as part of ESP

Therefore, the staff found the departure acceptable.

Acronyms

COL – Combined License
CSDRS – Certified Seismic Design Response Spectra
DCD – Design Control Document
DEP – Departure
EP – Emergency Planning
ESP – Early Site Permit
FSAR – Final Safety Analysis Report
FSEIS – Final Supplemental Environmental Impact Statement
FSME – Office of Federal and State Materials & Environmental Management Programs
GMRS – Ground Motion Response Spectra
IBR – Incorporated by Reference
ICMO – Interim Compensatory Measures Orders
IDLH – Immediately Dangerous to Life or Health
ITAAC – Inspections, Tests, Analyses, and Acceptance Criteria
LPZ – Low Population Zone
LWA – Limited Work Authorization
MC&A – Material Control & Accounting
MOV – Motor Operated Valve
NMSS – Office of Nuclear Material Safety and Safeguards
NPP – Nuclear Power Plant
NSIR – Office of Nuclear Security and Incident Response
psid – unit of differential pressure measured in pounds per square inch.
PWS – Potable Water System
QA – Quality Assurance
RCOL – Reference Combined License
SCOL – Subsequent Combined License
SER – Safety Evaluation Report
SNC – Southern Nuclear Operating Company
SNM – Special Nuclear Material
VAR – Variance
VEGP – Vogtle Electric Generating Plant
10 CFR – Title 10 of the Code of Federal Regulations