

SAFETY EVALUATION BY THE OFFICE OF NEW REACTORS
RELATED TO EXEMPTION AND AMENDMENT NOS. 99 AND 98
TO THE COMBINED LICENSE NOS. NPF-91 AND NPF-92
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MEAG POWER SPVM, LLC
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CITY OF DALTON
VOGTLE ELECTRIC GENERATING PLANT UNITS 3 AND 4
DOCKET NOS. 52-025 AND 52-026

1.0 INTRODUCTION

By letter dated April 21, 2017 (Agencywide Document Access and Management System (ADAMS) Accession Number ML17111A958), Southern Nuclear Operating Company (SNC) requested U.S. Nuclear Regulatory Commission (NRC) approval of a License Amendment Request (LAR) 17-012, Combined License (COL) Numbers NPF-91 and NPF-92, for Vogtle Electric Generating Plant (VEGP) Units 3 and 4, respectively. The requested amendment proposes changes to plant-specific Tier 1 information and corresponding changes to Appendix C. Specifically, SNC proposes changes to plant-specific Tier 1, Table 2.2.4-1 and Figure 2.2.4-1 (Sheets 1 and 2) and corresponding changes to Appendix C to install two main feedwater thermal relief valves and two start-up feedwater thermal relief valves. SNC proposes to add the main feedwater thermal relief valves to the main feedwater line between the main feedwater isolation valves (MFIVs) and main feedwater control valves (MFCVs). In addition, SNC proposes to add the startup feedwater thermal relief valves between the startup feedwater isolation valves (SFIVs) and startup feedwater control valves (SFCVs). The proposed plant-specific (PS) design control document (DCD) Tier 1 information and corresponding changes to Appendix C require additional changes to corresponding Tier 2 information in Updated Final Safety Analysis Report (UFSAR), Chapter 3, "Design of Structures, Components, Equipment, and Systems," and Chapter 10, "Steam and Power Conversion."

SNC also requests exemptions, one for each unit, from the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52, Appendix D, "Design Certification Rule for the AP1000

Design,” Section III.B, “Scope and Contents.” The requested exemptions would allow a departure from the corresponding portions of the certified information in Tier 1 of the generic DCD.¹ The staff’s review of the exemption request, as well as the LAR, is included in section 3.0 of this safety evaluation.

In the revised application dated August 15, 2017, (ADAMS Accession No. ML17227A775) and supplemented by letter dated September 18, 2017, (ADAMS Accession No. ML17261B157), SNC provided additional information in support of the application. This information did not expand the scope of the application, and did not change the staff’s original proposed no significant hazards consideration determination as published in the *Federal Register* on September 12, 2017 (82 FR 42844). The staff’s review of the license amendment request is included in this safety evaluation.

2.0 REGULATORY BASIS

As stated in 10 CFR Part 52, Appendix D, Section VIII.B.5.a, a licensee who references this appendix may depart from Tier 2 information without prior NRC approval unless the proposed departure involves a change to or departure from Tier 1 information, Tier 2* information, or the technical specifications, or requires a license amendment under paragraphs B.5.b or B.5.c of this section.

As stated in 10 CFR Part 52, Appendix D, Section VIII.A.4, exemptions from Tier 1 information are governed by the requirements in 10 CFR 52.63(b)(1) and 10 CFR 52.98(f). Additionally, the Commission will deny a request for an exemption from Tier 1 if it finds that the design change will result in a significant decrease in the level of safety otherwise provided by the design.

According to 10 CFR 52.63(b)(1), a licensee who references a design certification rule may request NRC’s approval for an exemption from one or more elements of the certification information. The Commission may grant such a request only if it determines that the exemption will comply with the requirements of 10 CFR 52.7, which in turn points to the requirements listed in 10 CFR 50.12 for specific exemptions, and if the special circumstances present outweigh the decrease in safety due to reduction in standardization caused by the exemption. Therefore, any exemption from the Tier 1 information certified by Appendix D to 10 CFR Part 52 must meet the requirements of 10 CFR 50.12, 52.7 and 52.63(b)(1).

According to 10 CFR 52.98(f), any modification to, addition to, or deletion from the terms and conditions of a COL, including any modification to, addition to, or deletion from the inspections, tests, analyses and acceptance criteria (ITAAC) contained in the license is a proposed amendment to the license. Appendix C of COLs NPF-91 and NPF-92 contain information that SNC is proposing to modify. Therefore, the proposed changes require a license amendment.

10 CFR Part 50, “Domestic Licensing of Production and Utilization Facilities,” Appendix A, “General Design Criteria for Nuclear Power Plants,” General Design Criterion (GDC) 1, “Quality Standards and Records,” requires, in part, that structures, systems, and components (SSCs)

¹ While SNC describes the requested exemption as being from Section III.B of 10 CFR Part 52, Appendix D, the entirety of the exemption pertains to proposed departures from Tier 1 information in the generic DCD. In the remainder of this evaluation, the NRC will refer to the exemption as an exemption from Tier 1 information to match the language of Section VIII.A.4 of 10 CFR Part 52, Appendix D, which specifically governs the granting of exemptions from Tier 1 information.

important to safety shall be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed.

GDC 2, "Design bases for protection against natural phenomena," in 10 CFR Part 50, Appendix A, requires, in part, that SSCs important to safety be designed to withstand the effects of natural phenomena, such as earthquakes, tornadoes, hurricanes, floods, tsunamis, and seiches, without loss of capability to perform their safety functions.

GDC 4, "Environmental and dynamic effects design bases," requires, in part, that SSCs important to safety shall be appropriately protected against dynamic effects that may result from equipment failures and from events and conditions outside the nuclear power unit.

GDC 16, "Containment design," in 10 CFR Part 50, Appendix A, requires that containment and associated systems shall be provided to establish an essentially leak-tight barrier against the uncontrolled release of radioactivity to the environment and to assure that the containment design conditions important to safety are not exceeded for as long as postulated accident conditions require.

GDC 54, "Piping systems penetrating containment," in 10 CFR Part 50, Appendix A, requires that piping systems penetrating primary reactor containment shall be provided with leak detection, isolation, and containment capabilities having redundancy, reliability, and performance capabilities which reflect the importance to safety of isolating these piping systems. Such piping systems shall be designed with a capability to test periodically the operability of the isolation valves and associated apparatus and to determine if valve leakage is within acceptable limits.

GDC 57, "Closed system isolation valves," in 10 CFR Part 50, Appendix A, requires that each line that penetrates primary reactor containment and is neither part of the reactor coolant pressure boundary nor connected directly to the containment atmosphere shall have at least one containment isolation valve which shall be either automatic, or locked closed, or capable of remote manual operation. This valve shall be outside containment and located as close to the containment as practical. A simple check valve may not be used as the automatic isolation valve.

The NRC regulations in 10 CFR 50.55a, "Codes and standards," incorporate by reference the applicable editions and addenda of the American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code* (BPV Code), which addresses pressure integrity of components, and the ASME *Operation and Maintenance of Nuclear Power Plants*, Division 1, (OM Code) for the inservice testing (IST) of pumps, valves, and dynamic restraints.

3.0 TECHNICAL EVALUATION

3.1 EVALUATION OF EXEMPTION REQUEST

The regulations in Section III.B of Appendix D to 10 CFR Part 52 require a holder of a COL referencing Appendix D to 10 CFR Part 52 to incorporate by reference and comply with the requirements of Appendix D, including certified information in Tier 1 of the generic AP1000 DCD. Exemptions from Tier 1 information are governed by the change process in Section VIII.A.4 of Appendix D of 10 CFR Part 52.

The PS DCD is the document that is maintained by a licensee who references Appendix D to 10 CFR Part 52. It consists of the information in the generic DCD as modified and supplemented

by the PS departures and exemptions made under Section VIII of Appendix D. In LAR 17-012, the Tier 1 information in the PS DCD for which SNC requested a PS departure and exemption relates to the main feedwater and startup thermal relief valves. The proposed COL Appendix C (and plant-specific DCD Tier 1) changes require additional changes to corresponding Tier 2 information in UFSAR Chapters 3 and 10. Pursuant to the provisions of 10 CFR 52.63(b)(1), an exemption from elements of the design as certified in the 10 CFR Part 52, Appendix D, design certification rule is requested for the involved Tier 1 information described in LAR 17-012, as supplemented. The result of this exemption would be that the licensee could implement modifications to the Tier 1 information specified in the LAR if, and only if, the NRC approves the LAR. This exemption is a permanent exemption limited in scope to the particular Tier 1 information specified.

As stated in Section VIII.A.4 of Appendix D to 10 CFR Part 52, an exemption from Tier 1 information is governed by the requirements of 10 CFR 52.63(b)(1) and 52.98(f). Additionally, Section VIII.A.4 of Appendix D to 10 CFR Part 52 provides that the Commission will deny a request for an exemption from Tier 1 if it finds that the requested change will result in a significant decrease in the level of safety otherwise provided by the design. Pursuant to 10 CFR 52.63(b)(1), the Commission may grant exemptions from one or more elements of the certification information, so long as the criteria given in 10 CFR 52.7, which in turn references 10 CFR 50.12, is met and so long as the special circumstances defined in 10 CFR 50.12(a)(2) outweigh any potential decrease in safety due to reduced standardization.

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. As 10 CFR 52.7 further states, 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 the public health and safety, and are consistent with the common defense and security; and (2) special circumstances are present. Specifically, 10 CFR 50.12(a)(2) lists six circumstances for which an exemption may be granted. It is necessary for one of these bases to be present in order for the NRC to consider granting an exemption request. SNC stated that the requested exemption meets the special circumstances of 10 CFR 50.12(a)(2)(ii). That subparagraph defines special circumstances as when "[a]pplication 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 staff's analysis of the exemption request is presented below.

3.1.1 AUTHORIZED BY LAW

This exemption would allow SNC to implement changes to the PS DCD Tier 1 Table 2.2.4-1 and Figure 2.2.4.1 (Sheets 1 and 2) and corresponding changes to Appendix C. This exemption is a permanent exemption limited in scope to particular Tier 1 information. Subsequent changes to Tier 1 Table 2.2.4-1 and Figure 2.2.4-1 (Sheets 1 and 2) and corresponding changes to Appendix C or any other Tier 1 information would be subject to the exemption process specified in Section VIII.A.4 of Appendix D to 10 CFR Part 52 and the requirements of 10 CFR 52.63(b)(1). As stated above, 10 CFR Part 52, Appendix D, Section VIII.A.4 allows the NRC to grant exemptions from one or more elements of the Tier 1 information. Based on 10 CFR Part 52, Appendix D, Section VIII.A.4, the NRC staff has determined that granting of SNC's proposed exemption will not result in a violation of the Atomic Energy Act of 1954, as amended, or the Commission's regulations. Therefore, pursuant to 10 CFR 52.7 and 10 CFR 50.12(a)(1), the exemption is authorized by law.

3.1.2 NO UNDUE RISK TO PUBLIC HEALTH AND SAFETY

The underlying purpose of Appendix D to 10 CFR Part 52 is to ensure that a licensee will construct and operate the plant based on the approved information found in the DCD incorporated by reference into a licensee's licensing basis. The exemption proposed by SNC from the requirements of 10 CFR Part 52, Appendix D, Section III.B would allow changes to elements of the plant-specific Tier 1 DCD, resulting in a departure from the AP1000 certified (Tier 1) design information. Specifically, SNC proposes changes to plant-specific Tier 1, Table 2.2.4-1 and Figure 2.2.4-1 (Sheets 1 and 2) and corresponding changes to Appendix C to install two main feedwater thermal relief valves and two start-up feedwater thermal relief valves.

The changes proposed by SNC do not delete systems or equipment as described in Tier 1 of the AP1000 DCD. These changes will not impact the ability of the systems or equipment to perform their design function. Because they will not alter the operation of any plant equipment or systems, these changes do not present an undue risk from existing equipment or systems. The description changes do not introduce any new industrial, chemical, or radiological hazards that would represent a public health or safety risk, nor do they modify or remove any design or operational controls or safeguards intended to mitigate any existing on-site hazards. Furthermore, the proposed changes would not allow for a new fission product release path, result in a new fission product barrier failure mode, or create a new sequence of events that would result in significant fuel cladding failures. Accordingly, these changes do not present an undue risk from any new equipment or systems, because there remains no adverse impact to the design function of main feedwater and startup feedwater isolation and control valves or the systems, structures and components therein and will continue to protect the health and safety of the public in the same manner. Therefore, as required by 10 CFR 50.12(a)(1), the staff finds that there is no undue risk to public health and safety.

3.1.3 CONSISTENT WITH COMMON DEFENSE AND SECURITY

The proposed exemption would allow SNC's changes to PS DCD Tier 1 Table 2.2.4-1 and Figure 2.2.4.1 (Sheets 1 and 2) and corresponding changes to Appendix C. This proposed exemption would be a permanent exemption limited in scope to the particular information specified. Any changes to other Tier 1 information would be subject to the exemption process in Section VIII.A.4 of Appendix D to 10 CFR Part 52. The proposed changes do not alter or impede the design, function, or operation of any plant SSCs associated with the facility's physical or cyber security and, therefore, do not affect any plant equipment that is necessary to maintain a safe and secure plant status. In addition, the changes have no impact on plant security or safeguards. Therefore, as required by 10 CFR 50.12(a)(1), the staff finds that the common defense and security is not impacted by this exemption.

3.1.4 SPECIAL CIRCUMSTANCES

Special circumstances, in accordance with 10 CFR 50.12(a)(2)(ii), are present whenever 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. Special circumstances are present in the particular circumstances discussed in LAR 17-012, as supplemented, because the application of the specified Tier 1 information is not necessary to serve the underlying purpose of the rule. The underlying purpose of the Tier 1 information is to ensure that SNC will safely construct and operate a plant based on the certified information found in the AP1000 DCD, which was incorporated by reference into the VEGP's licensing

basis. The proposed changes to Tier 1 and Tier 2 will enable the licensee to safely construct and operate the AP1000 facility consistent with the design certified by the NRC.

The proposed exemption would revise plant-specific DCD Tier 1 information by incorporating SNC's changes to PS DCD Tier 1 Table 2.2.4-1 and Figure 2.2.4-1 (Sheets 1 and 2) and corresponding changes to Appendix C. The staff evaluated this exemption request and associated revisions to Tier 1 Table 2.2.4-1 and Figure 2.2.4-1 (Sheets 1 and 2) and corresponding changes to Appendix C in Section 3.2 of this safety evaluation, finding that the applicable regulatory requirements will continue to be met. These proposed changes, assessed in detail in Section 3.2 of this safety evaluation (SE), maintain the required design functions. The changes proposed do not adversely affect any function or feature used for the prevention and mitigation of accidents or their safety analyses. The proposed changes do not involve nor interface with any SSC accident initiator or initiating sequence of events related to the accidents evaluated and therefore do not have an adverse effect on any SSC's design function. The proposed design changes do not result in a reduction in the level of safety. Accordingly, this exemption from the certified information will enable the licensee to safely construct and operate the AP1000 facility consistent with the design certified by the NRC in 10 CFR 52, Appendix D. Therefore, the staff finds that the special circumstances required by 10 CFR 50.12(a)(2)(ii) for the granting of an exemption from the Tier 1 information exist.

3.1.5 SPECIAL CIRCUMSTANCES OUTWEIGH REDUCED STANDARDIZATION

Under 52.63(b)(1) "[i]n addition to the factors listed in § 52.7, the Commission shall consider whether the special circumstances that § 52.7 requires to be present outweigh any decrease in safety that may result from the reduction in standardization caused by the exemption." The proposed exemption would allow SNC to implement changes to PS DCD Tier 1 Table 2.2.4-1 and Figure 2.2.4.1 (Sheets 1 and 2) and corresponding changes to Appendix C. The design functions of the system associated with this request will continue to be maintained because the staff evaluated the associated changes to Table 2.2.4-1 and Figure 2.2.4-1 (Sheets 1 and 2) and concluded that the applicable regulatory requirements will continue to be met. Staff did not identify any decrease in safety as a result of the changes proposed in the LAR. Consequently, the safety impact that may result from any reduction in standardization is minimized, because the proposed design change does not result in a reduction in the level of safety. Therefore, the special circumstances continue to outweigh any decrease in safety from the reduction in standardization because the key design function of the main feedwater and the startup feedwater isolation and control system associated with this request continues to be maintained. Based on the foregoing reasons, as required by 10 CFR Part 52.63(b)(1), the staff finds that the special circumstances associated with this exemption request outweigh the effects the departure has on the standardization of the AP1000 design.

3.1.6 NO SIGNIFICANT REDUCTION IN SAFETY

This exemption revises PS DCD Tier 1 information by changing Table 2.2.4-1 and Figure 2.2.4-1 (Sheets 1 and 2) to add two main feedwater thermal relief valves and two startup feedwater thermal relief valves. The staff finds that these changes will not impact the functional capabilities of this system. The proposed changes will not adversely affect the ability of the main feedwater and the startup feedwater isolation and control valves to perform their design functions, and the level of safety provided by the current systems and equipment therein is unchanged. Therefore, based on the foregoing reasons and as required by 10 CFR Part 52, Appendix D, Section VIII.A.4, the staff finds that granting the exemption would not result in a significant decrease in the level of safety otherwise provided by the design.

3.2 EVALUATION OF PROPOSED CHANGES

3.2.1 Mechanical Engineering Evaluation

As discussed in LAR 17-012, the main feedwater and startup feedwater lines might exhibit an undesirable overpressure condition due to thermal expansion of trapped fluid volumes if ambient temperatures increase in the area. The potential overpressure condition can occur when both the isolation valve and control valve in either the main or startup feedwater lines are closed following actuation of engineered safety features signals for feedwater or containment isolation, and the fluid in the lines is initially below the maximum ambient temperature. In LAR 17-012, SNC stated that during the isolation of the main feedwater and startup feedwater lines, a significant ambient temperature increase might occur in the room in which the feedwater isolation and control valves are located (i.e., Main Steam Isolation Valve (MSIV) compartments, rooms 12404 and 12406). As a result, thermal expansion of the trapped volumes of fluid between the isolation and control valves might occur. This can occur for main feedwater during heatup, hot standby, and power operation up to 10 percent, and for startup feedwater during operation at greater than 5 percent power. Overpressure in these lines has the potential to impact the safety functions of containment isolation and steam generator isolation performed by the isolation and control valves. Significant room heatup can occur during a loss of offsite power event, loss of alternating current (ac) event, or other event involving loss of all heating, ventilation and cooling. Heatup can also occur during more severe events such as steam line or feed line breaks. SNC noted that the potential trapped volumes of fluid for the main feedwater lines are between the MFIVs (steam generator system (SGS)-PL-V057A/B) and MFCVs (SGS-PL-V250A/B), and between the SFIVs (SGS-PL-V067A/B) and SFCVs (SGS-PL-V255A/B) for the startup feedwater lines. Therefore, SNC proposed the installation of thermal relief valves in the main and startup feedwater lines to preclude these potential overpressure conditions.

The NRC staff reviewed the SNC's initial submittal in support of LAR 17-012, dated April 21, 2017. Based on its initial review, the NRC staff indicated during clarification calls and by an e-mail on June 6, 2017, (ADAMS Accession No. ML17157B567), that additional information would need to be submitted to support the proposed installation of the thermal relief valves. As a result of those discussions and the June 6, 2017, e-mail, SNC submitted a revision to LAR 17-012 by letter dated August 15, 2017, with additional information and a supporting enclosure. In this section of the safety evaluation, the NRC staff describes its review of the updated LAR 17-012 and the acceptability of the installation of the main and startup feedwater thermal relief valves.

In LAR 17-012, SNC proposes to install four 1"x1" thermal relief valves in the SGS main and startup feedwater lines. In particular, SNC states that the main feedwater thermal relief valves, SGS-PL-V257A/B, will be located in the main lines between the MFIVs and the MFCVs. The startup feedwater thermal relief valves, SGS-PL-V258A/B, will be located in the startup feedwater lines downstream of the SFCV's. The thermal relief valves will be constructed of stainless steel, and will not contain non-metallic parts such as soft seats. These thermal relief valves will be categorized as safety-related, Class C, and seismic Category I.

SNC states that the thermal relief valves will perform an active function of changing to an open position ("transfer open") in order to prevent overpressure in the line when both the isolation and control valves are closed. These thermal relief valves will normally be closed and will provide the safety function of remaining closed ("maintain closed") when isolation is required in the feedwater lines and ambient temperatures do not produce overpressure conditions caused by

trapped fluid in between the isolation and control valves. The valves will also have the safety function to re-close after they open to relieve pressure (“transfer closed”) in order to restore the isolation boundary.

According to LAR 17-012, the thermal relief valves will be designed and constructed in accordance with ASME BPV Code Section III requirements consistent with the design and construction of the lines to which they are added. Capacity certification of the valves will be performed by the supplier in accordance with ASME BPV Code, Section III, Subarticle ND-7700, “Certification,” under the National Board of Boiler and Pressure Vessel Inspectors (NBBI) certification program. In addition, the valve supplier will be required to qualify the functional capability of the valves in accordance with ASME Standard QME-1-2007, “Qualification of Active Mechanical Equipment Used in Nuclear Power Plants,” Subarticle QV-7600, “Qualification Requirements for Safety and Relief Valve Assemblies,” as accepted in NRC Regulatory Guide 1.100, Revision 3, “Seismic Qualification of Electrical and Active Mechanical Equipment and Functional Qualification of Active Mechanical Equipment for Nuclear Power Plants.” In accordance with ASME Standard QME-1-2007, the supplier will be responsible for preparing a Functional Qualification Report and an Application Report to document the valve qualification.

In LAR 17-012, SNC proposes to revise COL Appendix C (and PS Tier 1) UFSAR Table 2.2.4-1 to include main feedwater thermal relief valves SGS-PL-V257A/B and startup feedwater thermal relief valves SGS-PL-V258A/B, and indicate the applicability of ASME BPV Code, Section III and seismic Category I to these valves. Inspection, test, analysis, and acceptance criteria (ITAAC) 2.2.04.02a (220) specifies that components identified in UFSAR Table 2.2.4-1 as ASME Code Section III must be designed and constructed in accordance with ASME Code Section III requirements. In addition, ITAAC 2.2.04.03a (222) specifies that pressure boundary welds in components identified in UFSAR Table 2.2.4-1 as ASME Code Section III must meet ASME Code Section III requirements. Similarly, ITAACs 2.2.04.05a.i (226), 2.2.04.05a.ii (227), and 2.2.04.05a.iii (228) specify that seismic Category I equipment identified in UFSAR Table 2.2.4-1 must withstand seismic design basis loads without loss of safety function. As a result, the NRC staff finds that the requirements associated with the proposed revision to UFSAR Table 2.2.4-1 provide assurance that the main and startup feedwater thermal relief valves will be designed and constructed in accordance with ASME BPV Code, Section III requirements, and will satisfy the seismic Category I requirements. This satisfies the GDC 1 requirements for SSC quality standards, as the valves and piping will be designed and constructed to the standards of ASME BPV Code, Section III requirements and qualified in accordance with ASME QME-1 requirements; and it meets the requirements of GDC 2 to withstand the effects of natural phenomenon, including earthquakes, as the valves and piping will satisfy seismic Category I requirements.

In LAR 17-012, SNC proposes to revise UFSAR Table 3.11-1, “Environmentally Qualified Electrical and Mechanical Equipment,” to include the proposed main feedwater thermal relief valves and startup feedwater thermal relief valves. The table will specify that these valves will be qualified for a harsh environment, including the submergence and spray qualification program. SNC stated that equipment qualified to a harsh environment will have a qualified life of 60 years and will be designed to perform under harsh environmental conditions. These valves will be designed to not contain material that degrades under these conditions. Based on the requirements associated with qualification of the proposed main feedwater thermal relief valves and startup feedwater thermal relief valves for a harsh environment, including submergence and spray, the staff finds this specification to be acceptable.

As specified in LAR 17-012, the thermal relief valves will be included in the IST program for VEGP Units 3 and 4. In particular, the thermal relief valves will satisfy the provisions of the ASME OM Code as incorporated by reference in 10 CFR 50.55a, "Codes and standards." For example, UFSAR Table 3.9-16, "Valve Inservice Test Requirements," will be revised to include SGS-PL-V257A/B and SGS-PL-V258A/B as active valves with the inservice testing type and frequency listed as replacement every 10 years, consistent with ASME OM Code, Appendix I, "Inservice Testing of Pressure Relief Devices in Light-Water Reactor Nuclear Power Plants," paragraph I-1390, "Test Frequency, Classes 2 and 3 Pressure Relief Devices that are Used for Thermal Relief Application." The staff finds that conducting IST in accordance with the OM Code satisfies the applicable requirements as incorporated by reference in 10 CFR 50.55a.

In LAR 17-012, SNC specifies that the thermal relief valves will discharge away from sensitive equipment and the personnel walkway. SNC also notes that the volume of water relieved from the valves will be a very small amount, and will not exceed the ambient room temperature. In addition, the discharge from these thermal relief valves will not adversely affect any equipment in the area.

The staff finds that the installation of the thermal relief valves proposed in LAR 17-012 will not adversely affect any safety-related equipment, and will not add any new interfaces to safety-related SSCs that adversely affect the applicable safety functions. In addition, the changes do not result in a new failure mode, malfunction or sequence of events that could adversely affect a radioactive material barrier or safety-related equipment. Finally, the proposed changes will not allow a new fission product release path, result in a new fission product barrier failure mode, or create new sequence of events that would result in significant fuel cladding failures. The design functions of the system associated with this request will continue to be maintained because the staff evaluated the associated changes to Table 2.2.4-1 and Figure 2.2.4-1 (Sheets 1 and 2) and concluded that the applicable regulatory requirements will continue to be met.

3.2.2 Balance of Plant Evaluation

In LAR 17-012, SNC proposes changes to the plant condensate and feedwater and startup feedwater systems which supply feedwater to the secondary side of the steam generators via the SGS. The condensate and feedwater and startup feedwater systems are located within the turbine building, and the SGS is located within the auxiliary building and containment. The SGS contains the safety-related piping and valves that deliver feedwater to the steam generators.

SNC submitted LAR 17-012 to address concerns that, under certain conditions, portions of the main feedwater and startup feedwater systems, if isolated, may become vulnerable to thermally induced overpressurization. In LAR 17-012, SNC states that, during the isolation of the main feedwater and startup feedwater lines, a significant ambient temperature increase might occur in the room in which the feedwater isolation and control valves are located (i.e., MSIV compartments, rooms 12404 and 12406). As a result, thermal expansion of the trapped volumes of fluid between the isolation and control valves might occur. SNC concludes that overpressure in these lines has the potential to impact the safety functions of containment isolation and steam generator isolation performed by the isolation and control valves. To protect against this overpressurization vulnerability, SNC proposes adding thermal relief valves to the main feedwater and startup feedwater systems. In each train of the main feedwater system, SNC proposes that a relief valve be installed between the MFIV and the MFCV. In the startup feedwater system, SNC proposes to install relief valves between the check valve and isolation valve.

The staff reviewed SNC's LAR to determine if the modified system continues to comply with the applicable GDCs. The portion of the feedwater system from the steam generator inlet through the containment and up to the MFIV is safety-related and is required to remain functional after a design basis accident to provide containment and feedwater isolation. The safety-related functions performed by the SSCs in this portion of the system include (1) providing for a barrier against the release of containment atmosphere during a loss-of-coolant accident, and (2) serving as a boundary for ensuring that steam generator levels can be maintained when main feedwater pumps are not available. The MFCV provides backup isolation to the containment isolation valve, and the main feedwater check valve installed downstream of the isolation and control valve prevents reverse flow from the steam generators whenever feedwater pumps are tripped.

The condensate and feedwater system design and its capability to perform its design containment and feedwater isolation functions are discussed in Section 10.4.7 of the VEGP UFSAR. To ensure the isolation function is achieved, closure of both the primary MFIVs and the backup MFCVs and SFCVs must occur. SNC proposes to add thermal relief valves to a safety-related portion of the main feedwater system. SNC proposes to add four 1" by 1" seismic Category I valves with a relief setpoint of 1800 psig, as described in Section 2, "Detailed Description," of LAR 17-012. These valves will be maintained closed and transfer open which is consistent with their containment isolation safety function. These valves will be located in the MSIV compartment rooms 12404 and 12406, which provides them protection against natural phenomena. The seismic Category I classification of the valves complies with position C1 of Regulatory Guide 1.29, "Seismic Design Classification"; therefore, with the proposed modification, the feedwater and startup feedwater systems continue to be in compliance with GDC 2.

The staff reviewed the modified condensate and feedwater and startup feedwater systems for compliance with the requirements of GDC 4 as related to dynamic effects associated with possible fluid flow instabilities. The staff verified that the discharge from the thermal relief valves will not adversely affect any SSC important to safety. In LAR 17-012, Enclosure 7, dated August 15, 2017, "Response to NRC Comments," SNC states that the thermal relief valves discharge is aimed away from the walkway and away from sensitive equipment. SNC also states that the relieved water would be a very small amount: less than 0.25 ft³ (at a flow rate of less than 1 gallon per minute) for each main feedwater line and less than 0.03 ft³ for each startup feedwater line. Therefore, SNC states that the discharge of the relief valves does not adversely affect any equipment or its function. Based on the staff's evaluation of the information above, confirming that relief valve operation will not affect SSCs important to safety, and the staff's conclusion that the proposed modification of the systems did not affect system arrangement in any significant way, the staff finds that that the modified system will continue to be in compliance with GDC 4.

The staff also reviewed the modified system to determine if the proposed modifications had a significant impact on the system feedwater and containment isolation capabilities. The staff's review focused on the design compliance with the requirements of GDC 16, 54 and 57.

The staff reviewed the effect of the modification with respect to the condensate and feedwater and startup feedwater systems compliance with GDC 16, and found that the proposed modification will not impact containment isolation design or containment pressure. Additionally, as indicated in UFSAR Section 6.2.5, "Containment Leak Rate Test System," containment

isolation valves receive pre-operational and periodic Type C leak rate tests. Therefore the staff concludes that GDC 16 will be satisfied for the modified system.

The condensate and feedwater system design, as described in Section 10.4.7 of the VEGP Units 3 and 4 UFSAR, is in compliance with GDC 54 since redundant isolation valves for the main feedwater lines routed into containment are provided. The double valve isolation is provided via the MFCV and the MFIV. The proposed modification to the startup feedwater and the condensate and feedwater systems adds thermal relief valves to each line to prevent overpressure conditions from occurring when feedwater is isolated from the containment. The staff reviewed the effect of the proposed modification with respect to compliance with GDC 54. By virtue of the location of the proposed relief valves, the valves serve as outboard isolation for the containment penetration. Upon review of the information provided in SNC's initial submittal, the staff was unable to determine what impact, if any, the failure of the new thermal relief valves to reclose, following operation, would have on the system capability to perform its safety-related isolation function. In order to confirm that the modification would not adversely impact the system isolation capability and/or provide an additional radiological release pathway, the staff issued a Request for Additional (RAI) Information requesting that SNC discuss whether the possible failure of the thermal relief valves to reclose following operation and the potential consequences of such failure had been considered.

In the revision of LAR 17-012, SNC indicated that failure of one of the SGS main or startup feedwater thermal relief valves to maintain closed or to reclose after opening would not adversely affect a safety function unless there was a coincident failure of the corresponding main or startup feedwater isolation valve to close (in which case an overpressure condition due to trapped volume thermal expansion would not occur and cause the thermal relief valve to lift). SNC also stated that, if the corresponding isolation valve is closed, the safety function of steam generator isolation is performed satisfactorily even if the thermal relief valve is open. The staff found the added discussion in the revised LAR sufficiently addresses the concerns about failure of the relief valve to fully reclose. Based on the above discussion, the staff finds that the proposed design continues to be in compliance with GDC 54.

In regards to compliance with GDC 57, the staff found that proposed changes protect the main feedwater and startup feedwater against thermally induced overpressurization in the section of the system from the containment isolation valves to the MFCVs and SFCVs, and thus assure that the valves are not subject to overpressurization. Therefore, the staff finds that the proposed changes do not prevent isolation from occurring and does not adversely impact the function of the isolation and control valves. Based on the above discussion the staff finds that the design continues to be in compliance with GDC 57.

Based on review of LAR 17-012 and the supplemental information provided by SNC, the staff finds the proposed changes to COL Appendix C (and PS Tier 1) Table 2.2.4-1 and Figure 2.2.4-1 (Sheets 1 and 2) acceptable. The revised Tier 1 tables and figures provide necessary design information on the main and startup feedwater thermal relief valves that are to be verified by ITAAC provided in Tier 1 Section 2.2.4, "Steam Generator System," of the VEGP UFSAR.

3.3 TECHNICAL CONCLUSION ON THE PROPOSED CHANGES

The NRC staff reviewed the SNC's analysis and RAI responses provided by the August 15, 2017, revision and supplemental submittal dated September 18, 2017, in support of proposed LAR 17-012. The staff determined that the proposed changes to install thermal relief valves in the main feedwater and startup feedwater lines will not adversely impact the safety function of

those feedwater lines, will not introduce new failure mechanisms to those feedwater lines, and will not adversely impact other safety-related equipment. Based on its review, the NRC staff concludes that there is reasonable assurance that the requirements of GDC 1, 2, 4, 16, 54 and 57, and 10 CFR 50.55a will continue to be met with the implementation of LAR 17-012. Therefore, the staff concludes that the installation of main and startup feedwater thermal relief valves proposed in LAR 17-012 for VEGP Units 3 and 4 is acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations in 10 CFR 50.91(b)(2), the designated Georgia State official was notified of the proposed issuance of the amendment on October 4, 2017. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20, "*Standards for Protection Against Radiation.*" Based on the staff's evaluation and conclusions discussed above, the staff determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (82 FR 42844, published on September 12, 2017). Additional information provided by SNC on September 18, 2017, did not change the NRC staff's original proposed No Significant Hazard Consideration Determination. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

Because the exemption is necessary to allow the changes proposed in the license amendment, and because the exemption does not authorize any activities other than those proposed in the license amendment, the environmental consideration for the exemption is identical to that of the license amendment. Accordingly, the exemption meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment needs to be prepared in connection with the issuance of the exemption.

6.0 CONCLUSION

The staff has determined that pursuant to Section VIII.A.4 of Appendix D to 10 CFR Part 52, the exemption (1) is authorized by law, (2) presents no undue risk to the public health and safety, (3) is consistent with the common defense and security, (4) presents special circumstance that outweigh the potential decrease in safety due to reduced standardization, and (5) does not significantly reduce the level of safety at the licensee's facility. Therefore, the staff grants SNC an exemption from the Tier 1 information specified in LAR 17-012 and evaluated in Section 3.0 of this safety evaluation.

As discussed above, the staff determined that the proposed changes to install thermal relief valves in the main feedwater and startup feedwater lines will not adversely impact the safety function of those feedwater lines, will not introduce new failure mechanisms to those feedwater

lines, and will not adversely impact other safety-related equipment. Based on its review, the NRC staff concludes that there is reasonable assurance that the requirements of GDC 1, 2, 4, 16, 54 and 57, and 10 CFR 50.55a will continue to be met with the implementation of LAR 17-012. Therefore, the staff concludes that the installation of main and startup feedwater thermal relief valves proposed in LAR 17-012 for VEGP Units 3 and 4 is acceptable.

7.0 REFERENCES

1. SNC VEGP Units 3 and 4, "Request for License Amendment and Exemption: Addition of Steam Generator System (SGS) Thermal Relief Valves," dated April 21, 2017 (ADAMS Accession No. ML17111A958).
2. SNC VEGP Units 3 and 4, "LAR 17-012 R1: Revision to VEGP Units 3 and 4 Request for License Amendment and Exemption: Addition of Steam Generator System (SGS) Thermal Relief Valves," dated August 15, 2017 (ADAMS Accession No. ML17227A775).
3. SNC VEGP Units 3 and 4, "LAR 17-012 R1S: Supplement to Revised Request for License Amendment and Exemption: Addition of Steam Generator System (SGS) Thermal Relief Valves," dated September 18, 2017 (ADAMS Accession No. ML17261B157).
4. VEGP Units 3 and 4, Updated Final Safety Analysis Report, Revision 5 and Tier 1, dated May 5, 2012 (ADAMS Accession No. ML11180A100).
5. AP1000 Design Control Document, Revision 19, dated June 13, 2011 (ADAMS Accession No. ML11171A500).
6. COL NPF-91 for Vogtle Electric Generating Plant Unit 3, Southern Nuclear Operating Company (ADAMS Accession No. ML14100A106).
7. COL NPF-92 for Vogtle Electric Generating Plant Unit 4, Southern Nuclear Operating Company (ADAMS Accession No. ML14100A135).
8. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.100, Revision 3, "Seismic Qualification of Electrical and Active Mechanical Equipment and Functional Qualification of Active Mechanical Equipment for Nuclear Power Plants," September 2009 (ADAMS Accession No. ML091320468).
9. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.29, Revision 3, "Seismic Design Classification," September 1978 (ADAMS Accession No. ML003739983).
10. ASME Standard QME-1, "Qualification of Active Mechanical Equipment Used in Nuclear Power Plants," 2007.
11. ASME Boiler and Pressure Vessel Code, "Rules for Construction of Nuclear Facility Components," Section III, Subarticle ND-7700, Certification, July 2015.