

SAFETY EVALUATION BY THE OFFICE OF NEW REACTORS

RELATED TO AMENDMENT NO. 55

TO THE COMBINED LICENSE NOS. NPF-91 AND NPF-92

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VOGTLE ELECTRIC GENERATING PLANT UNITS 3 AND 4

DOCKET NOS. 52-025 AND 52-026

1.0 INTRODUCTION

By letter dated May 5, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16126A276), proposed license amendment request (LAR) 16-004, Southern Nuclear Operating Company (SNC/licensee) requested that the U.S. Nuclear Regulatory Commission (NRC) amend the combined licenses (COL) for Vogtle Electric Generating Plant (VEGP) Units 3 and 4, COL Numbers NPF-91 and NPF-92, respectively, regarding the Passive Core Cooling System (PXS) design changes to address potential gas intrusion.

The proposed amendment (LAR 16-004) would revise the Updated Final Safety Analysis Report (UFSAR) in the form of departures from the incorporated plant-specific Design Control Document Tier 2 information. The proposed amendment also involves related changes to plant-specific Tier 1 information, with corresponding changes to the associated COL Appendix C information for normal residual heat removal and containment air filtration system piping lines.

The licensee has also requested an exemption 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." This exemption request will allow a departure

from the corresponding portions of the certified information in Tier 1 of the generic Design Control Document (DCD).<sup>1</sup>

In order to modify the UFSAR (the plant-specific DCD) Tier 1 information, the NRC must find the licensee's exemption request included in its submittal for the LAR to be acceptable. The staff's review of the exemption request, as well as the LAR, is included in this safety evaluation.

The NRC staff's proposed no significant hazards consideration determination was published in the *Federal Register* on July 19, 2016 (81 FR 46958).

## 2.0 REGULATORY EVALUATION

10 CFR Part 50, Appendix A, General Design Criterion (GDC) 1 requires that structures, systems, and components important to safety shall be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed. Where generally recognized codes and standards are used, they shall be identified and evaluated to determine their applicability, adequacy, and sufficiency and shall be supplemented or modified as necessary to assure a quality product in keeping with the required safety function. A quality assurance program shall be established and implemented in order to provide adequate assurance that these structures, systems, and components will satisfactorily perform their safety functions. Appropriate records of the design, fabrication, erection, and testing of structures, systems, and components important to safety shall be maintained by or under the control of the nuclear power unit licensee throughout the life of the unit.

GDC 2 requires that structures, systems, and components important to safety shall 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. The design bases for these structures, systems, and components shall reflect: (1) Appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area, with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated, (2) appropriate combinations of the effects of normal and accident conditions with the effects of the natural phenomena, and (3) the importance of the safety functions to be performed.

GDC 4 requires that structures, systems, and components important to safety shall be designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including loss-of-coolant accidents. These structures, systems, and components shall be appropriately protected against dynamic effects, including the effects of missiles, pipe whipping, and discharging fluids, that may result from equipment failures and from events and conditions outside the nuclear power unit. However, dynamic effects associated with postulated pipe ruptures in nuclear power units may be excluded from the design basis when analyses reviewed and approved by the Commission demonstrate that the probability of fluid system piping rupture is extremely low under conditions consistent with the design basis for the piping.

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<sup>1</sup> While the licensee 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.

GDC 16 requires that reactor 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 35 requires that a system to provide abundant emergency core cooling shall be provided. The system safety function shall be to transfer heat from the reactor core following any loss of reactor coolant at a rate such that (1) fuel and clad damage that could interfere with continued effective core cooling is prevented and (2) clad metal-water reaction is limited to negligible amounts.

GDC 36 requires that the emergency core cooling system shall be designed to permit appropriate periodic inspection of important components, such as spray rings in the reactor pressure vessel, water injection nozzles, and piping, to assure the integrity and capability of the system.

GDC 37 requires that the emergency core cooling system shall be designed to permit appropriate periodic pressure and functional testing to assure (1) the structural and leaktight integrity of its components, (2) the operability and performance of the active components of the system, and (3) the operability of the system as a whole and, under conditions as close to design as practical, the performance of the full operational sequence that brings the system into operation, including operation of applicable portions of the protection system, the transfer between normal and emergency power sources, and the operation of the associated cooling water system.

GDC 50 requires that the reactor containment structure, including access openings, penetrations, and the containment heat removal system shall be designed so that the containment structure and its internal compartments can accommodate, without exceeding the design leakage rate and with sufficient margin, the calculated pressure and temperature conditions resulting from any loss-of-coolant accident. This margin shall reflect consideration of (1) the effects of potential energy sources which have not been included in the determination of the peak conditions, such as energy in steam generators and as required by § 50.44 energy from metal-water and other chemical reactions that may result from degradation but not total failure of emergency core cooling functioning, (2) the limited experience and experimental data available for defining accident phenomena and containment responses, and (3) the conservatism of the calculational model and input parameters.

GDC 54 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.

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

Appendix D, Section VIII.B.5.a to 10 CFR 52 requires, among other things, that an applicant or licensee who references 10 CFR Part 52, Appendix D 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 Technical Specifications, or requires a license amendment under paragraphs B.5.b or B.5.c of 10 CFR Part 52, Appendix D, Section VIII.

10 CFR 52.63(b)(1) allows the licensee who references a design certification rule to request NRC approval for an exemption from one or more elements of the certification information. The Commission may only grant such a request 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 the special circumstances present outweigh any decrease in safety that may result from the 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).

10 CFR 52.98(f) states that 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, or related 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 the licensee is proposing to modify. Therefore, the proposed changes require a license amendment.

### 3.0 TECHNICAL EVALUATION

#### 3.1 EVALUATION OF EXEMPTION

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. Because the Licensee has identified changes to plant-specific Tier 1 information, with corresponding changes to the associated COL Appendix C information during design finalization of the PXS, resulting in the need for a departure, an exemption from the certified design information within plant-specific Tier 1 material is required under 10 CFR 52.63(b)(1) to implement the LAR. Also, the exemption is needed because Section VIII.A.4 of Appendix D to 10 CFR Part 52 requires a licensee to obtain an exemption to depart from the Tier 1 information of the generic AP1000 DCD.

The Tier 1 information for which a plant-specific departure and exemption was requested includes corresponding changes to COL Appendix C information during reconfiguration of the PXS. The result of this exemption would be that the licensee could implement modifications to Tier 1 information described and justified in LAR 16-004 if, and only if, the NRC approves LAR 16-004. 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 that the special circumstances, which is defined by 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 special circumstances for which an exemption may be considered. It is necessary for one of these special circumstances to be present in order for the NRC to consider granting an exemption request. The licensee 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 each of these findings is presented below.

### 3.1.1 AUTHORIZED BY LAW

This exemption would allow the licensee to implement a revision to Tier 1, Table 2.2.1-2, Table 2.2.3-2 and Table 2.3.6-2 in the plant-specific DCD. This exemption is a permanent exemption limited in scope to particular Tier 1 information. Subsequent changes to Tier 1, Table 2.2.1-2, Table 2.2.3-2 and Table 2.3.6-2 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 the licensee's proposed exemption will not result in a violation of the Atomic Energy Act of 1954, as amended, or the Commission's regulations. Therefore, as required by 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 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 changes proposed by the Licensee do not add or 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. These changes do not add any new equipment or system interfaces to the current plant design. 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. 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 changes to elements of the PXS, as presented in the system and non-system based ITAAC tables in the plant-specific DCD Tier 1, thereby departing from the AP1000 certified (Tier 1) design information. This proposed exemption would be a permanent exemption limited in scope to particular Tier 1, Table 2.2.1-2, Table 2.2.3-2 and Table 2.3.6-2 information. Any changes to Tier 1, Table 2.2.1-2, Table 2.2.3-2 and Table 2.3.6-2 or any 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 change does not alter or impede the design, function, or operation of any plant structures, systems, or components associated with the facility's physical or cyber security and, therefore, does 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 exemption is consistent with the common defense and security.

### 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. The underlying purpose of the Tier 1 information is to ensure that a licensee will safely construct and operate a plant based on the certified information found in the AP1000 DCD, which was incorporated by reference into the SNC's licensing basis. The proposed changes would reconfigure the PXS, as presented in Tier 1 ITAAC tables. These changes will enable the licensee to safely construct and operate the AP1000 facility consistent with the design certified by the NRC by clarifying the information mentioned above found in Tier 1, Table 2.2.1-2, Table 2.2.3-2 and Table 2.3.6-2 of the DCD.

Special circumstances are present in the particular circumstances discussed in LAR 16-004 because the application of the specified Tier 1 information does not serve the underlying purpose of the rule. The proposed change implements changes to reconfigure the PXS, as presented in Tier 1 ITAAC tables. This exemption request and associated revisions to Tier 1 Table 2.2.1-2, Table 2.2.3-2 and Table 2.3.6-2 demonstrate that the applicable regulatory requirements will continue to be met. 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 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

This exemption would allow the implementation of changes to Tier 1, Table 2.2.1-2, Table 2.2.3-2 and Table 2.3.6-2 in the DCD proposed in the LAR. The design functions of the system associated with this request are consistent with the current design of the plant in supporting the actual system functions. The design functions of these systems will continue to be maintained because the associated revisions to Table 2.2.1-2, Table 2.2.3-2 and Table 2.3.6-2 demonstrate that the applicable regulatory requirements will continue to be met. 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. Based on the foregoing reasons, as required by 10 CFR Part 52.63(b)(1), the staff finds

that the special circumstances outweigh the effects the departure has on the standardization of the AP1000 design.

### 3.1.6 NO SIGNIFICANT REDUCTION IN SAFETY

This exemption would allow the implementation of changes to Tier 1, Table 2.2.1-2, Table 2.2.3-2 and Table 2.3.6-2 in the DCD proposed in the LAR. The exemption request proposes to depart from the certified design by reconfiguring the PXS. The changes for consistency will not impact the functional capabilities of this system. The proposed changes will not adversely affect the ability of the PXS to perform its 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 TECHNICAL EVALUATION OF PROPOSED CHANGES

### 3.2.1 Passive Core Cooling System

As stated in LAR 16-004 and further described in the Vogtle COL Appendix C and plant-specific DCD Tier 1 Subsection 2.2.3, the safety-related PXS provides emergency core cooling during design basis events. The PXS provides the following safety-related design functions:

1. The PXS provides containment isolation of the PXS piping lines penetrating the containment.
2. The passive residual heat removal heat exchanger provides core decay heat removal during design basis events.
3. The core makeup tanks, accumulators, in-containment refueling water storage tank (IRWST), and containment recirculation provide reactor coolant system (RCS) makeup, boration, and safety injection during design basis events.
4. The PXS provides pH adjustment of water flooding the containment following design basis accidents.

#### 3.2.1.1 Piping Classification Evaluation for PXS

COL Appendix C Table 2.2.3-2 and the corresponding plant-specific DCD Tier 1 Table 2.2.3-2 identify the PXS piping lines that are required to be 1) designed and constructed in accordance with American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code Section III requirements; 2) evaluated to meet the leak before break (LBB) design criteria described in UFSAR Subsection 3.6.3.2; and 3) designed to withstand combined normal and seismic design basis loads without a loss of functional capability.

As stated in the LAR 16-004 submittal, changes were made to UFSAR Figure 3E-4 Sheet 2 and Table 2.2.3-2 of COL Appendix C and plant-specific DCD Tier 1, as summarized below:

1. PXS piping line PXS-L123A is moved to the line numbers evaluated for LBB under line name IRWST injection line A to direct vessel injection (DVI) line A.

2. PXS piping line PXS-L123B is moved to the line numbers evaluated for LBB under line name IRWST injection line B to DVI line B.
3. PXS piping lines PXS-L133A and PXS-L134A are added under the line name IRWST injection line A to DVI line A as ASME B&PV Code Section III, evaluated for LBB and not requiring functional capability.
4. PXS piping lines PXS-L133B and PXS-L134B are added under the line name IRWST injection line B to DVI line B as ASME B&PV Code Section III, evaluated for LBB and not requiring functional capability.

As stated in LAR 16-004 Section 2.1 and the corresponding revised figure to UFSAR Figure 3E-4 (Sheet 2 of 2) "High Energy Piping – Passive Core System" in Enclosure 3, branch tees and 8-inch nominal vertical vent lines PXS-L133A, PXS-L134A, PXS-L133B, and PXS-L134B containing redundant nonsafety-related void sensing instrumentation were added to the 8-inch nominal PXS piping lines PXS-L123A, PXS-L125A, PXS-L123B, and PXS-L125B at the outlets of each of the IRWST passive injection squib valves PXS-PL-V123A, PXS-PL-V125A, PXS-PL-V123B, and PXS-PL-V125B.

LAR 16-004 Section 2.1 also stated that the PXS piping lines PXS-L123A, PXS-L125A, PXS-L123B, and PXS-L125B are required during IRWST injection as the primary PXS flowpath during low pressure IRWST injection, therefore, these piping lines are required to maintain function capability during normal and safe shutdown earthquake (SSE) loads. However, the vertical vent lines PXS-L133A, PXS-L134A, PXS-L133B, and PXS-L134B are not required during IRWST injection as their design function is to provide adequate venting of the system prior to IRWST injection being initiated, therefore, these piping lines are not required to maintain functional capability during normal and SSE loads.

According to the revised Figure 3E-4 in Enclosure 3 of LAR 16-004, the added vertical vent lines PXS-L133A, PXS-L134A, PXS-L133B, and PXS-L134B have the same classification as the main PXS piping lines PXS-L123A, PXS-L125A, PXS-L123B, and PXS-L125B, which has the designation of "BTA". According to Figure 1.7-2 "Piping and Instrumentation Diagram Legend" of the UFSAR, "BTA is austenitic stainless steel designed to ASME B&PV Code Section III Class 1, NRC Quality Group A. Section 50.55(a)(c)(1) of 10 CFR Part 50 states that components that are part of the reactor coolant pressure boundary must meet the requirements for Class 1 components in Section III of the ASME B&PV Code. According to USFAR Figure 3E-4, both the A and B trains of the PXS-L123 and PXS-L125 main PXS piping lines and their added branch vertical vent lines PXS-L133 and PXS-L134 are connected with the IRWST downstream of the squib valves that inject directly into the reactor vessel through the DVI lines during IRWST injection, therefore, they are part of the reactor coolant pressure boundary. Based on their classification as ASME B&PV Code Section III Class 1 and the fact that that added branch vertical vent lines have the same classification as the main PXS injection lines, the NRC staff finds the classification and the design code of these PXS piping lines acceptable.

In addition, these piping lines are classified as qualified for LBB requirement and without functional capability requirement. These piping lines are the 8-inch pipe stubs equipped with instrumentation to detect gas buildup during plant operations and to alert the main control room operator that PXS needs to be vented. The staff agrees with the classification of these piping lines because, while they do perform a function during PXS operation, they are not required to be functional during normal and SSE load.

LAR 16-004 Section 2.2 stated, as a result of the design finalization, that PXS piping lines PXS-L019A and PXS-L019B are deleted from their current rows in COL Appendix C Table 2.2.3-2 and the corresponding DCD Tier 1 Table 2.2.3-2. Two new rows with line names “Normal Residual Heat Removal System (RNS) A discharge line to PXS from RNS check valve RNS-PL-V017A to DVI line A” and “RNS B discharge line to PXS from RNS check valve RNS PL-V017B to DVI line B” are added to represent the piping lines PXS-L019A and PXS-L019B, respectively. The licensee also eliminated these two piping lines from COL Appendix C and the corresponding plant-specific DCD Tier 1 Table 2.3.6-2, which indicated a discrepancy with Table 2.2.3-2. In making these changes, the licensee eliminated a discrepancy between the two tables. In addition, these two piping lines are used during long-term core cooling as the flow path for long-term, post-accident makeup to the reactor coolant boundary through the PXS. Therefore, these piping lines are required to be identified as requiring functional capability during normal and SSE loads.

Upon review of UFSAR Figure 3E-4 Sheet 1 of 2 and COL Appendix C Figure 2.3.6-1 “Normal Residual Heat Removal System,” the NRC staff finds the regrouping of PXS-L019A and PXS-L019B acceptable because these two lines are discharge lines from the RNS and tee into the main PXS piping injection lines downstream of the core makeup tanks. In addition, because these piping lines are used for long-term, post-accident core cooling, requiring these piping lines to be functional during normal and SSE loads is appropriate. Therefore, the NRC staff finds the change with regard to the grouping and renaming of piping lines PXS-L019A and PXS-L019B acceptable.

### 3.2.1.2 LBB Evaluation for PXS

COL Appendix C Table 2.2.3-2 and the corresponding plant-specific DCD Tier 1 Table 2.2.3-2 included a change to PXS piping lines PXS-L123A and PXS-L123B, which reclassifies the pipes to include LBB evaluation. Because these piping lines are required during IRWST injection as the primary PXS flow path during low pressure IRWST injection, these piping lines are required to maintain functional capability during normal and SSE loads.

The staff reviewed the information for the piping lines that were evaluated for LBB in a previous License Amendment Request (LAR 13-031). In a response to a request for additional information (RAI 7438-8661 dated July 14, 2016 (ADAMS Accession No. ML16195A468), the applicant verified that the piping lines were qualified for LBB and are bounded by the Bounding Analysis Curve (BAC) methodology for the AP1000 DCD. The applicant provided the BAC for the piping systems in LAR 16-004. Based on the information provided by the applicant, the revisions to the tables and figures identified do not change any technical information to the updated UFSAR. Therefore, the NRC staff finds the changes in LBB requirement for the PXS acceptable.

### 3.2.2 Change in Normal Residual Heat Removal System

As stated in LAR 16-004 and further described in COL Appendix C and DCD Tier 1 Subsection 2.3.6, the nonsafety-related normal RNS removes heat from the core and RCS and provides RCS low temperature over-pressure protection at reduced RCS pressure and temperature conditions after shutdown. The RNS also provides a means for cooling the IRWST during normal plant operation. The RNS provides the following safety-related design functions:

1. The RNS preserves containment integrity by isolation of the RNS piping lines penetrating the containment.

2. The RNS provides a flow path for long-term, post-accident makeup to the RCS through the PXS.

DCD Tier 2 Section 5.4.7.1.1 also lists the following safety-related function for the RNS:

1. The RNS preserves the reactor coolant pressure boundary.

### 3.2.2.1 Piping Classification Evaluation for RNS

COL Appendix C and DCD Tier 1 Table 2.3.6-2 identify the RNS piping lines required to be 1) designed and constructed in accordance with ASME B&PV Code Section III requirements; 2) evaluated to meet the LBB design criteria described in UFSAR Subsection 3.6.3.2; and 3) designed to withstand combined normal and seismic design basis loads without a loss of functional capability.

As stated in LAR 16-004, changes were made to COL Appendix C Table 2.3.6-2 and the corresponding plant-specific DCD Tier 1 Table 2.3.6-2 to clarify the boundary of the piping system included in those piping lines by changing the line names from “RNS Discharge Lines, from RCS Pressure Boundary Isolation Valves RNS-PL-V015A and RNS-PL-V015B to Reactor Vessel DVI Nozzles” to “RNS Discharge Lines, from RCS Pressure Boundary Isolation Valves RNS-PL-V015A and RNS-PL-V015B to RCS Pressure Boundary Isolation Valves RNS-PL-V017A and RNS-PL-V017B.” The piping lines PXS-L019A and PXS-L019B were relocated within COL Appendix C Table 2.2.3-2 and the corresponding plant-specific DCD Tier 1 Table 2.2.3-2 in order to designate the lines as requiring functional capability. Additionally, piping lines PXS-L019A and PXS-L019B were deleted from COL Appendix C Table 2.3.6-2 and corresponding plant-specific DCD Tier 1 Table 2.3.6-2.

The licensee also stated that lines RNS-L019A and RNS-L019B are piping lines located between the outboard reactor coolant pressure boundary valves RNS-PL-V015A and RNS-PL-V015B and inboard reactor coolant pressure boundary valves RNS-PL-V017A and RNS-PL-V017B, respectively. These piping lines are used as the flow path for long-term, post-accident makeup to the RCS through the PXS. The change in the description of the RNS piping lines reflects that the piping lines do not continue beyond valves RNS-PL-V017A and RNS-PL-V017B. There is also no change to the LBB evaluation and functional capability requirements for these two piping lines. This change was done so that lines PXS-L019A and PXS-L019B could be removed and appear only in COL Appendix C Table 2.2.3-2 and corresponding plant-specific DCD Tier 1 Table 2.2.3-2.

Upon review of COL Appendix C Figure 2.3.6-1, “Normal Residual Heat Removal System,” the NRC staff finds the renaming of piping lines RNS-L019A and RNS-L019B acceptable because there is no physical change to the design of the RNS and the classification and design code of standard, as well as LBB and functional capability requirements, remain the same. In addition, both the upstream (RNS-L019A and RNS-L019B) and downstream (PXS-L019A and PXS-L019B) piping lines of the reactor coolant pressure boundary valves RNS-PL-V017A and RNS-PL-V017B are designed to ASME B&PV Code Section III Class 1. Renaming the piping lines RNS-L019A and RNS-L019B does not change the design code of standard. Therefore, the NRC staff finds this change to be acceptable.

### 3.2.2.2 LBB Evaluation for RNS

No physical changes were made to the piping lines RNS-L019A and RNS-L019B. These lines were not designated for LBB evaluation under the AP1000 certified design, which is still acceptable as it has not changed. The LBB evaluation for piping lines PXS-L019A and PXS-L019B is evaluated in Section 3.2.1.2 above.

### 3.2.3 Change in Containment Air Filtration System

As stated in LAR 16-004 and further described in COL Appendix C and plant-specific DCD Tier 1 Subsection 2.7.6, the nonsafety-related containment air filtration system (VFS) provides intermittent flow of outdoor air to purge and filter the containment atmosphere of airborne radioactivity during normal plant operation and continuous flow during hot or cold plant shutdown conditions to reduce airborne radioactivity levels for personnel access. The VFS also provides filtered exhaust for the radiologically controlled area ventilation system during abnormal conditions.

The VFS provides the safety-related design functions of preserving containment integrity by isolation of the VFS piping lines penetrating containment and providing vacuum relief for the containment vessel. The containment system (CNS) is the collection of boundaries that separates the containment atmosphere from the outside environment during design basis accidents. The VFS piping lines penetrating containment between the containment isolation valves both inside and outside containment are included in the CNS penetration boundary.

#### 3.2.3.1 Piping Classification Evaluation for VFS

COL Appendix C and plant-specific DCD Tier 1 Table 2.2.1-2 identify the VFS piping lines that are part of the CNS required to be designed and constructed in accordance with ASME B&PV Code Section III requirements.

As stated in LAR 16-004, changes were made to COL Appendix C and the corresponding plant-specific Tier 1 Table 2.2.1-2 to add VFS piping line VFS-L832 under line name "Containment Purge Discharge from Containment." This piping is also identified to have ASME B&PV Code Section III as the design code standard as it is part of the CNS penetration boundary.

UFSAR Figure 9.4.7-1 "Simplified Containment Air Filtration System Piping and Instrumentation Diagram (REF) VFS 001" provides a simplified diagram of the VFS. LAR 16-004 Section 2.4 further stated that the piping line VFS-L832 is a piping line located between the containment purge exhaust containment penetration and the parallel outside containment isolation valve VFS-PL-V010 and the outside containment vacuum relief valves VFS-PL-V800A and VFS-PL-V800B. It was unclear to the NRC staff which piping line is VFS-L832. In request for additional information (RAI) 7438-8661, Question 03.02.02-1 dated July 14, 2016 (ADAMS Accession No. ML16195A468), the licensee was requested to provide a markup to UFSAR Figure 9.4.7-1 to indicate the piping line VFS-L832 and to provide its quality group classification.

In a letter dated July 27, 2016 (ADAMS Accession No. ML16209A435), the licensee provided a response to RAI 7438-8661, Question 03.02.02-1, clarified the piping line VFS-L832, and provided a markup to UFSAR Figure 9.4.7-1. VFS-L832 is part of the CNS containment boundary design, is the piping line outside of the containment purge exhaust containment penetration, and ends prior to valve VFS-PL-V010 due to a reducer not shown in the simplified

diagram. The continuation of the physical piping from the reducer to valve VFS-PL-V010 is line VFS-L205. The licensee also stated that the piping line VFS-L832 is classified as ASME B&PV Code Section III Class 2.

The NRC staff finds the response to RAI 7438-8661, Question 03.02.02-1 acceptable because the licensee clarified the piping line VFS-L832, which is not a new added piping line to the VFS. The NRC staff also finds the classification of VFS-L832 as ASME B&PV Code Section III Class 2 to be acceptable because it is the piping line immediately outside of the containment penetration and has the same classification as the piping line downstream of containment vacuum relief valves VFS-PL-800A and VFS-PL-800B and the piping line upstream of the containment isolation valve VFS-PL-V010, all three of which are directly connected to VFS-L832.

In addition, by virtue of penetrating the containment, the piping has a safety-related function to maintain containment integrity; the VFS system also has the safety related function of vacuum relief of the containment. The licensee stated that, in completing detailed design of piping and routing, piping line VFS-L832 was identified as penetrating the containment. The VFS system is already identified in COL Appendix C and the corresponding plant-specific Table 2.2.1-2 as one of the containment penetrations that conforms to ASME B&PV Code Section III, as such, piping line VFS-L832 would also need to conform to ASME B&PV Code Section III. In order to provide reasonable assurance that VFS-L832 will be constructed to that standard, ITAAC Item 2.b in COL Appendix C and the corresponding plant-specific Table 2.2.1-3 specifies that inspections will be conducted of the as-built piping in Table 2.2.1-2. The proposed change maintains all containment penetrations conformance with ASME B&PV Code Section III, including piping line VFS-L832.

Therefore, based on the reasoning above, the NRC staff finds the response to RAI 7438-8661, Question 03.02.02-1, as well as the change to COL Appendix C and the corresponding plant-specific Tier 1 Table 2.2.1-2 acceptable.

### 3.2.3.2 LBB Evaluation for VFS

The VFS piping was not evaluated for LBB in the AP1000 certified design. Therefore, line segment VFS-L832 is not required to be evaluated for LBB.

## 3.3 SUMMARY

In LAR 16-004, the licensee proposed to make changes that would affect the COL Appendix C, the corresponding plant-specific Tier 1 information, as well as the UFSAR. The changes were reviewed in Section 3.2 of this safety evaluation. The changes affect the PXS, RNS, and VFS as summarized below:

For the PXS, branch tees and four 8-inch nominal vertical vent lines PXS-L133A, PXS-L134A, PXS-L133B and PXS-L134B containing redundant nonsafety-related void sensing instrumentation were added to the 8-inch nominal PXS piping lines PXS-L123A, PXS-L125A, PXS-L123B, and PXS-L125B at the outlets of each of the IRWST passive injection squib valves PXS-PL-V123A, PXS-PL-V125A, PXS-PL-V123B, and PXS-PL-V125B. The four 8-inch nominal PXS piping lines PXS-L123A, PXS-L125A, PXS-L123B and PXS-L125B were relocated to qualify for LBB requirements. Two piping lines, PXS-L019A and PXS-L019B, were relocated from Table 2.3.6-2 to Table 2.2.3-2 of COL Appendix C and the corresponding plant-specific DCD Tier 1 to appropriately reflect their locations and, because these two piping lines are used

during long-term core cooling as the flow path for long-term, post-accident makeup to the RCS, these two piping lines were changed to require functional capability during normal and SSE loads. These changes are reflected in COL Appendix C and the corresponding plant-specific DCD Tier 1 Table 2.2.3-2 and Table 2.3.6-2 as well as in UFSAR Figure 3E-4.

For the RNS, the line names were changed in COL Appendix C and the corresponding plant-specific DCD Tier 1 Table 2.3.6-2 to clarify the boundary of the piping system for piping lines RNS-L019A and RNS-L019B.

For the VFS, piping line VFS-L832 was added to COL Appendix C and the corresponding plant-specific DCD Tier 1 Table 2.2.1-2 to appropriately identify this piping line as part of the CNS penetration boundary. There is no change to UFSAR Figure 9.4.7-1 since VFS-L832 is an already existing piping line as indicated in the licensee's response to RAI 7438-8661, Question 03.02.02-1.

The NRC reviewed the above changes in Section 3.2 of this safety evaluation and finds the changes to the PXS, RNS, VFS and the affected sections in COL Appendix C, its corresponding plant-specific DCD Tier 1 and the UFSAR acceptable in accordance with 10 CFR 50, Appendix A, GDC 1 and the guidance provided in SRP Section 3.2.2, "System Quality Group Classification" and Regulatory Guide (RG) 1.26, "Quality Group Classifications and Standards For Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants."

#### 4.0 STATE CONSULTATION

In accordance with the Commission's regulations in 10 CFR 50.91(b)(2), the Georgia State official was notified of the proposed issuance of the amendment. 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. The NRC staff has 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 has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (81 FR 46958 (July 19, 2016)). 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 nor 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 nor 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 circumstances, (5) the special circumstances outweigh the potential decrease in safety due to reduced standardization, and (6) does not reduce the level of safety at the licensee's facility. Therefore, the staff grants the licensee an exemption from the Tier 1 information requested by the licensee.

The staff has concluded, based on the considerations discussed in Section 3.2 and confirming that these changes do not change an analysis methodology, assumptions, or the design itself, that there is reasonable assurance that: (1) the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public. Therefore, the staff finds the changes proposed in this license amendment acceptable.

## 7.0 REFERENCES

1. Southern Nuclear Operating Company, Vogtle Electric Generating Plant Units 3 and 4, "Request for License Amendment and Exemption: Passive Core Cooling System (PXS) Design Changes to Address Potential Gas Intrusion (LAR-16-004)," dated May 5, 2016 (ADAMS Accession No. ML16126A276).
2. Vogtle Units 3 and 4 Updated Final Safety Analysis Report, Revision 4 and Tier 1, Revision 3 dated July 13, 2015 (ADAMS Accession No. ML15194A443).
3. AP1000 Design Control Document, Revision 19, dated June 13, 2011 (ADAMS Accession No. ML11171A500).
4. Combined License NPF-91 for Vogtle Electric Generating Plant Unit 3, Southern Nuclear Operating Company (ADAMS Accession No. ML14100A106).
5. Combined License NPF-92 for Vogtle Electric Generating Plant Unit 4, Southern Nuclear Operating Company (ADAMS Accession No. ML14100A135).
6. Southern Nuclear Operating Company, Vogtle Electric Generating Plant Units 3 and 4, "Request for License Amendment and Exemption: Piping Line Number Additions, Deletions and Functional Capability Re-Designation (LAR-13-031)," dated October 16, 2014 (ADAMS Accession No. ML14290A139).