

SAFETY EVALUATION BY THE OFFICE OF NEW REACTORS

RELATED TO EXEMPTION AND AMENDMENT NO. 8

TO THE COMBINED LICENSE NO. NPF-93

AND LICENSE NO. NPF-94

SOUTH CAROLINA ELECTRIC AND GAS COMPANY

SOUTH CAROLINA PUBLIC SERVICE AUTHORITY

VIRGIL C. SUMMER NUCLEAR STATION UNITS 2 AND 3

DOCKET NOS.: 52-027 AND 52-028

## **1.0 INTRODUCTION**

By letter dated February 7, 2013, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13042A004) and revised by letter dated July 11, 2013 (ML13197A431), South Carolina Electric & Gas (SCE&G/licensee) requested that the U.S. Nuclear Regulatory Commission (NRC) amend the combined licenses (COLs) for Virgil C. Summer Nuclear Station (VCSNS) Units 2 and 3, COL Numbers NPF-93 and NPF-94, respectively.

The proposed changes would depart from the Updated Final Safety Analysis Report (UFSAR) Tier 1 material by revising the design of steel containment vessel (SCV) penetrations. The proposed departures consist of changes to Tier 1 (and COL Appendix C) and UFSAR text, tables, and figures to:

1. Replace the Primary Sampling System (PSS) containment air return check valve with a solenoid-operated valve (SOV), and
2. Redesign the PSS inside-containment header and a PSS containment penetration

SCE&G also requested an exemption from the provisions of Title 10 of *Code of Federal Regulations* (10 CFR) Part 52, "*Licenses, Certifications, and Approvals for Nuclear Power Plants*," Appendix D, *Design Certification Rule for the AP1000 Design*, Section III.B, to allow a departure from the elements of the certification information in Tier 1 of the generic design control document (DCD). This request for exemption will apply the requirements of 10 CFR 52, Appendix D, Section VIII.A.4 to allow departures from generic Tier 1 information due to the following proposed changes to Section 2.3.13, Tables 2.2.1-2, 2.3.13-1, and 2.3.13-3, and Figures 2.2.1-1 and 2.3.13-1.

In a letter dated July 11, 2013 (ADAMS Accession No. ML13197A431), the licensee provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the NRC staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on March 4, 2013 (78 FR 14126).

## **2.0 REGULATORY EVALUATION**

Tier 1 Information is defined in 10 CFR Part 52, Appendix D Section II.D. 10 CFR Part 52, Appendix D Section II.D.3 lists inspections, tests, analyses, and acceptance criteria (ITAAC) as part of the definition for Tier 1 information. The information that SCE&G is requesting to change is referenced in Section 2.3.13, Tables 2.2.1-2, 2.3.13-1, and 2.3.13-3, and Figures 2.2.1-1 and 2.3.13-1 of the Tier 1 information that is part of the ITAAC.

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

10 CFR 52.63(b)(1) allows the licensee 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 complies 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 potential decrease in safety due to reduced standardization. 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 ITAAC contained in the license is a proposed amendment to the license. Appendix C, which contains the ITAAC, of COLs NPF-91 and NPF-92 contain Section 2.3.13, Tables 2.2.1-2, 2.3.13-1, and 2.3.13-3, and Figures 2.2.1-1 and 2.3.13-1. SCE&G is proposing to modify the section, tables and figures. Therefore, the proposed changes constitute a license amendment.

10 CFR Part 52, Appendix D, VIII.A.4 indicates that a design change requiring a Tier 1 change shall not result in a significant decrease in the level of safety otherwise provided by the design.

10 CFR Part 52, Appendix D, Section VIII.B.5.a requires prior NRC approval for Tier 1 changes, and Tier 2 departures that involves changes to Tier 1 information. The proposed changes affect Tier 1 Section 2.3.13, Tables 2.2.1-2, 2.3.13-1, and 2.3.13-3, and Figures 2.2.1-1 and 2.3.13-1.

The AP1000 SCV, including penetrations, is required to comply with ASME Code, Section III, Division 1–Subsection NE, “Metal Containment,” including the 2002 Addenda and supplementary requirements(per 10 CFR 50.55a) in the UFSAR Section 3.8.2. The proposed addition of one new PSS containment penetration is required to meet the following requirements:

- 10 CFR 50.55a, “Codes and Standards,”
- 10 CFR Part 50, “Domestic Licensing of Production and Utilization Facilities,” Appendix A, General Design Criterion (GDC) 1, “Quality Standards and Records,” as it relates to designing, fabricating, erecting, testing, and inspecting steel containments to quality standards commensurate with the importance of the safety function to be performed.
- 10 CFR Part 50, Appendix A, GDC 2, “Design Bases for Projection Against Natural Phenomena,” as it relates to designing steel containments to be capable of withstanding the most severe natural phenomena, such as winds, tornados, floods, earthquakes, and the appropriate combination of all loads.
- 10 CFR Part 50, Appendix A, GDC 4, “Environmental and Dynamic Effects Design Bases,” as it relates to the capability of steel containments to withstand the dynamic effects of equipment failures, including missiles, pipe whipping, and blowdown loads associated with loss-of-coolant accidents.
- 10 CFR Part 50, Appendix A, GDC 16, “Containment Design,” as it relates to the capability of the steel containment to act as a leaktight membrane to prevent the uncontrolled release of radioactive effluents in the environment.
- 10 CFR Part 50, Appendix A, GDC 50, “Containment Design Basis,” as it relates to designing steel containments with sufficient margin of safety to accommodate appropriate design loads.
- 10 CFR Part 50, Appendix A, GDC 52, “Capability for Containment Leakage Rate Testing,” requires that the reactor containment and other equipment which may be subjected to containment test conditions shall be designed so that periodic integrated leakage rate testing can be conducted at containment design pressure.
- 10 CFR Part 50, Appendix A, GDC 53, “Provisions for Containment Testing and Inspection,” requires that the reactor containment shall be designed to permit (1) appropriate periodic inspection of all important areas, such as penetrations, (2) an appropriate surveillance program, and (3) periodic testing at containment design pressure of the leaktightness of penetrations which have resilient seals and expansion bellows.
- 10 CFR Part 50, Appendix A, GDC 54, “Systems Penetrating Containment,” 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.
- 10 CFR Part 50, Appendix J, “Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors,” specifies the containment leakage test requirements to confirm

the leak-tight integrity of the primary reactor containment and systems and components that penetrate containment and establishment of acceptance criteria for these tests.

- 10 CFR 50.34(f), as it relates to the capability of the steel containment of specific identified plants to resist (1) those loads that are generated by pressure and dead loads during an accident that releases hydrogen generated from 100-percent fuel clad metal-water reaction and accompanied by either hydrogen burning or added pressure from post-accident inerting, and (2) those loads that are generated as a result of an inadvertent full actuation of a post-accident inerting hydrogen control system, excluding seismic or design-basis-accident (DBA) loadings.
- 10 CFR 50.44, “Combustible Gas Control for Nuclear Power Reactors,” as it relates to the capability of the steel containment of existing plants and new plants to resist those loads associated with combustible gas generation from a metal-water reaction of the fuel cladding.
- 10 CFR 52.80(a), which requires that a COL application contain the proposed inspections, tests, and analyses, including those applicable to emergency planning, that the licensee shall perform. It also requires that the acceptance criteria that are necessary and sufficient to provide reasonable assurance that if the inspections, tests, and analyses are performed and the acceptance criteria met, the facility has been constructed and will operate in conformity with the COL, the provisions of the Atomic Energy Act, and the NRC’s requirements.

### **3.0 TECHNICAL EVALUATION**

#### **3.1 EVALUATION OF EXEMPTION**

##### **INTRODUCTION**

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.

As defined in Section II of Appendix D to 10 CFR Part 52, Tier 1 information includes ITAAC. Therefore, a licensee referencing Appendix D incorporates by reference all the ITAAC contained in the generic DCD. These ITAAC, along with the plant-specific ITAAC, were enumerated in Appendix C of the COL at its issuance. During the detailed design phase of the PSS, departures from AP1000 generic DCD Tier 2 information were determined necessary to improve the reliability of a containment isolation valve and improve the sampling capability of the system. This activity requests exemption from the generic DCD Tier 1 tables and figures that support the COL Appendix C ITAAC to allow an accurate reflection of the proposed departures from the involved Tier 2 material.

An exemption is needed because Section III.B of Appendix D to 10 CFR Part 52 requires a licensee to comply with the Tier 1 information of the generic AP1000 DCD.

In summary, the end result of this exemption would be that the licensee can implement modifications to Tier 1 information described and justified in licensing amendment request (LAR)

13-06 to Section 2.3.13, Tables 2.2.1-2, 2.3.13-1, and 2.3.13-3, and Figures 2.2.1-1 and 2.3.13-1, if and only if, the NRC approves the LAR. This is a permanent exemption limited in scope to particular Tier 1 information.

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, the Commission will deny an exemption request if it finds that the requested change to Tier 1 information will result in a significant decrease in safety. Pursuant to 10 CFR 52.63(b) (1), the Commission may, upon application by an applicant or licensee referencing a certified design, grant exemptions from one or more elements of the certification information, so long as the criteria given in 10 CFR 50.12 are met, and that the special circumstances as defined by 10 CFR 50.12 outweigh any potential decrease in safety due to reduced standardization.

10 CFR 50.12(a)(2) lists six special circumstances for which an exemption may be granted. It is necessary for one of these special circumstances to be present in order for 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 subsection 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 approved changes to Tier 1 Section 2.3.13, Tables 2.2.1-2, 2.3.13-1, and 2.3.13-3, and Figures 2.2.1-1 and 2.3.13-1. This is a permanent exemption limited in scope to particular Tier 1 information, and subsequent changes to Section 2.3.13, Tables 2.2.1-2, 2.3.13-1, and 2.3.13-3, and Figures 2.2.1-1 and 2.3.13-1 or any other Tier 1 information, would be subject to full compliance by the licensee as specified in Section III.B of Appendix D to 10 CFR Part 52. As stated above, 10 CFR 52.63(b)(1) allows the NRC to grant exemptions from one or more elements of the certification information, namely, the requirements of Section III.B of Appendix D to 10 CFR Part 52. The NRC staff has determined that granting of the licensee 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 Section III.B of Appendix D to 10 CFR Part 52 is to ensure that the licensee will construct and operate the plant based on the approved information found in the DCD incorporated by reference into the licensee’s licensing basis. The plant-specific Tier 1 DCD will continue to reflect the approved licensing basis for VCSNS Units 2 and 3 and will maintain a consistent level of detail with that which is currently provided elsewhere in Tier 1 of the plant-specific DCD. Because the changes to the PSS design do not represent any adverse impact to the containment design function, the containment 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 the licensee to implement modifications to Tier 1 Section 2.3.13, Tables 2.2.1-2, 2.3.13-1, and 2.3.13-3, and Figures 2.2.1-1 and 2.3.13-1 requested in the LAR. This is a permanent exemption limited in scope to particular Tier 1 information. Subsequent changes to Section 2.3.13, Tables 2.2.1-2, 2.3.13-1, and 2.3.13-3, and Figures 2.2.1-1 and 2.3.13 or any other Tier 1 information would be subject to full compliance by the licensee as specified in Section III.B of Appendix D to 10 CFR Part 52. This change is not related to security issues. 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. The underlying purposes of Section III.B of Appendix D to 10 CFR Part 52 is to ensure that the licensee will construct and operate the plant based on the approved information found in the DCD incorporated by reference into the licensee's licensing basis. The licensee achieves this purpose in part when it provides ITAAC that accurately reflect the plant design, such that the ITAAC are adequate to verify the construction of the approved design. The requested exemption asks for the licensee to be allowed to implement the changes proposed in the LAR to Tier 1 Section 2.3.13, Tables 2.2.1-2, 2.3.13-1, and 2.3.13-3, and Figures 2.2.1-1 and 2.3.13-1. The proposed changes to the PSS facilitate operation by improving operability, reliability, and maintainability of the nonsafety-related functions while maintaining safety-related functions. Accordingly, this exemption from the certification information will enable the licensee to safely construct, maintain, and operate the AP1000 facility consistent with the design certified by the NRC in 10 CFR Part 52, Appendix D. Therefore, special circumstances are present, because application of the current generic certified design information in Tier 1 as required by 10 CFR Part 52, Appendix D, Section III.B, in the particular circumstances discussed in this request would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule. Therefore, because the application of Section III.B of Appendix D to 10 CFR Part 52 in this circumstance does not serve the underlying purpose of the rule, the staff finds the special circumstances required by 10 CFR 50.12(a)(2)(ii) for the granting of an exemption from Section III.B of Appendix D to 10 CFR Part 52 exist.

### 3.1.5 SPECIAL CIRCUMSTANCES OUTWEIGH REDUCED STANDARDIZATION

This exemption would allow the implementation of changes to Tier 1 Section 2.3.13, Tables 2.2.1-2, 2.3.13-1, and 2.3.13-3, and Figures 2.2.1-1 and 2.3.13-1 proposed in the LAR. Based on the nature of the proposed changes to the generic Tier 1 information and the understanding that these changes were identified during the design finalization process for the AP1000, it is expected that this exemption will be requested by other AP1000 licensees and applicants. However, a review of the reduction in standardization resulting from the departure from the standard DCD determined that even if other AP1000 licensees and applicants do not request this same departure, the special circumstances will continue to outweigh any decrease in safety from the reduction in standardization because the key design functions the key design functions of the Containment System (CNS) and the PSS associated with this request will continue to be maintained. This exemption request and the associated changes to Section 2.3.13, Tables 2.2.1-2, 2.3.13-1, and 2.3.13-3, and Figures 2.2.1-1 and 2.3.13-1 that

there is a minimal change from the standard information provided in the generic AP1000 DCD, which is offset by the special circumstances identified above. The changes have no effect on any systems, structures or components meeting their design function. Based on this, as required by 10 CFR 52.63(b)(1), the staff finds that the special circumstances outweigh the potential decrease in safety due to reduced standardization of the AP1000 design.

### 3.1.6 NO SIGNIFICANT REDUCTION IN SAFETY

The proposed exemption would allow changes to the PSS as presented in Tier 1 Section 2.3.13, Tables 2.2.1-2, 2.3.13-1, and 2.3.13-3, and Figures 2.2.1-1 and 2.3.13-1. The level of safety presented by plant structures is defined by the ability of the structures to protect the SSCs contained within these structures from hazards and to minimize the propagation of damage resulting from postulated events to the degree practical.

The proposed changes to the containment penetration and associated piping and valves are consistent in design and application with containment penetrations already approved as part of the DCD as documented in NUREG-1793 Section 6.2.4. A review of these design changes has determined that they will not have an adverse impact on the design functions associated with the CNS or PSS. Therefore, 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

The staff conducted multiple technical reviews to evaluate the proposed changes. The following sections provide technical safety evaluations related to the structural engineering and containment systems aspects of the proposed changes.

### 3.2.1 STRUCTURAL ENGINEERING EVALUATION

To perform the technical evaluation related to the PSS containment penetration, the NRC staff considered Section 3.8.2, "Steel Containment," of the UFSAR. The staff also examined portions of NUREG-1793, Supplement 2, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Plant Design," ADAMS Accession No. ML112061231) and, "Updated Final Safety Evaluation Report for the Virgil C. Summer Nuclear Station (VCSNS) Units 2 and 3," (ADAMS Accession No. ML12201A130). The staff reviewed the LAR to evaluate the impact of the requested UFSAR changes on the integrity of the SCV.

In the LAR, the licensee proposed to depart from the UFSAR Tier 1 information by requesting to perform a redesign of the PSS inside containment header and adding one new containment penetration to the SCV. The safety-related design function of the PSS is containment integrity under DBA conditions, including pressure and temperature. The 2.134-centimeter (0.84-inch) diameter containment penetration would allow the passage of a 0.635-centimeter (0.25-inch) liquid sampling tube line. The as-built SCV, along with the new PSS containment penetration, will conform to Section III of the ASME Code and will be classified as seismic Category I. The containment isolation components attached to this penetration are subject to the ITAAC in the Tier 1, Table 2.3.13-3. The LAR states that the proposed changes to the PSS would not affect the containment vessel's ability to withstand the loads and load combinations described in UFSAR Table 3.8.2-1.

During the review, the staff applied the guidance of Standard Review Plan Section 3.8, as well as relevant regulatory guides, with references to related industry standards. For determining the adequacy of the proposed UFSAR changes, the staff considered the effect of adding one new PSS containment penetration on (1) compliance with ASME Code Section III, and (2) DCD Tier 1 ITAAC commitments. Below is the staff's technical evaluation.

#### *ASME Code Requirements*

The design of mechanical penetrations is described in UFSAR Section 3.8.2.1.5, "Mechanical Penetrations." Containment mechanical penetrations are designed to maintain containment integrity under DBA conditions, including pressure and temperature. The design and construction of the mechanical penetration assemblies are in accordance with ASME Code, Section III, Division 1, Subsection NE. The penetration sleeves, including the welds to the tubing couplings, follow ASME Code, Section III, Division 1, Subsection NE. The capillary tubing is designed and fabricated in accordance with ASME Code B31.1.

The staff evaluation of the AP1000 containment penetrations is described in Chapter 3.8.2 of the "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Plant Design," NUREG-1793, Supplement 2, dated August 5, 2011.

The NRC staff review of the LAR finds that, while the licensee is proposing to add a small diameter containment penetration [2.134-centimeter (0.84-inch) diameter], the licensee is not departing from the method of design referenced in UFSAR Subsection 3.8.2, namely Section III, Subsection NE, of the ASME Code.

Based on the licensee's continued commitment to design and construct the PSS containment penetration to Section III of the ASME Code, the NRC staff concludes that the proposed design change is consistent with the UFSAR and therefore acceptable.

#### *ITAAC Commitments to Containment Penetrations*

The UFSAR Tier 1 ITAAC Table 2.3.13-3 describes the ITAAC which confirm that the PSS containment penetration will be designed and constructed in accordance with ASME Code Section III.

The NRC staff review of the LAR finds that the proposed additional containment penetration will fall within the purview of the ITAAC commitments mentioned above. The licensee is not requesting departures from ITAAC commitments or acceptance criteria.

Based on the licensee's continued commitment to AP1000 containment ITAAC, the NRC staff concludes that the design change will have acceptable design and construction verification and that the proposed design change is consistent with the certified design.

#### Conclusion

The NRC staff has reviewed the licensee's analysis provided in the LAR. Based on its technical evaluation, the staff concludes the following:



- (1) The proposed PSS containment penetration will be designed in accordance with the requirements of Section III of the ASME Code and the AP1000 DCD, Subsection 3.8.2. The LAR identifies no departures from these requirements.
- (2) The proposed PSS containment penetration will not affect the design function of the containment.
- (3) The proposed PSS containment penetration will be subject to design and construction verification through relevant ITAAC.

For the reasons specified above, the staff finds that the proposed UFSAR changes to add one new PSS containment penetration will not affect analysis results and related conclusions presented in the UFSAR related to the SCV and penetration design. Consequently, the NRC staff concludes that there is reasonable assurance that the requirements of Appendix A (GDC 1, 2, 4, and 16) to 10 CFR Part 50, 10 CFR 50.34(f), 10 CFR 52.80(a), and 10 CFR 50.44 are satisfied. Therefore, the staff finds the proposed changes acceptable.

### 3.2.2 CONTAINMENT SYSTEMS EVALUATION

#### *Change to the PSS Containment Air Return Valve PSS-PL-V024*

In the LAR the licensee proposes to replace the PSS containment air return check valve (PSS-PL-V024) with a normally open and fail close SOV. The reason for the proposed change is to avoid potential premature failure of the valve due to constant valve cycle (chatter) during normal operating condition. The PSS return line has insufficient air flow during normal containment atmosphere sampling to maintain the check valve in the fully open position. Table 2.1-1 of the submittal lists all the affected sections, figures, and tables in Tier 1 and COL Appendix C, and UFSAR.

The PSS provides the non-safety-related function of obtaining reactor coolant and containment atmosphere samples. The air return valve, PSS-PL-V024, provides safety-related containment isolation function. The staff review is to verify the new SOV can maintain the safety function that is provided by the existing check valve.

As described in Section 2.1 of the submittal, the PSS containment air return check valve is located inside containment and functions to prevent any containment sump backflow from entering the PSS sample return line. The valve also functions as a containment isolation valve, independent of any operator action. The SOV is proposed to be installed so that the flow will be in the preferred flow direction (flow over the seat) during postulated accident condition to maintain its containment isolation function. This valve will be in the non-preferred direction (flow under seat) for normal containment air sampling and post-accident liquid sampling. The SOV will be a Class 1E SOV, with Class 1E open/close position indication switches and containment isolation control signals powered from Class 1E Division B. The outside-containment atmosphere sample return isolation valve (PSS-PL-V023) continues to be a normally open, air-operated globe valve.

The failure mode of both valves will be in the closed position to isolate containment. The proposed SOV would conform to ASME Code Section III, would be seismic Category I, and qualified for harsh environment. Environmental qualification is in accordance with AP1000 plant equipment qualification methodology. The ITAAC of Tier 1 Table 2.2.13-1 would be applied to

verify that the installed valve satisfies the approved design. The remotely operated valves receive a containment isolation signal generated by the protection and safety monitoring system (PMS) and are powered by a Class 1E power source. PSS-PL-V024 valve will be designed and installed consistent with existing PSS containment isolation valves in similar applications. In addition, the proposed change will permit periodic inspection and testing of the affected containment penetrations. In the event of a containment isolation signal, the sample line would be automatically isolated, but provisions are available in PMS to manually bypass the containment isolation signal so that control is handed back to the sampling operator to take a sample.

The staff confirmed the above information using Table 2.1-1 of the submittal, which contains a list of figures, tables in Tier 1, COL Appendix C, and UFSAR description being affected by the proposed change. Based on the above information and staff's verification, the staff has determined that the new SOV will continue to provide the safety-related function of containment isolation, and the valve will be designed and installed using same code and standards for similar containment isolation valves of the PSS. Therefore, the staff finds the proposed change acceptable.

#### *Redesigning the PSS Inside-Containment Header and Adding an Additional Containment Penetration*

The proposed change on the redesigning of the PSS inside-containment header and adding an additional containment penetration would provide redundancy in the event of a sample isolation solenoid failure, and acquisition of RCS grab random samples from either hot leg. The current design of the PSS uses one containment penetration to grab random samples for monitoring from eleven different locations through one common header. Due to the use of a common header, fluid of different chemical compositions will be purged through common tubing. This will affect the deposit/accumulated zinc layer and remove any chemical equilibrium achieved. Sampling of dissolved hydrogen and zinc are significant requirements because the AP1000 uses a constant, direct injection system for each of these chemistry parameters. Also, zinc absorption is affected by thermal gradient. If samples are taken intermittently (grab samples) then the oxide layers and their zinc constituents will be affected by thermal transients. Consequently, the AP1000 PSS hot leg sample lines would have to be purged for greater than eight hours per sample to provide confidence in the sample results. An appropriate alternative would be the provision of long-term sampling flow from one of the RCS hot legs to maintain equalization of the PSS tubing. The proposed alternative would be to install a new flow path (including a new containment penetration and isolation valve) to the PSS sampling equipment consistent with the existing flow path, which would allow for a continuous flow of RCS coolant from the hot legs. The redesign of the PSS would involve:

- a. New containment penetration PSS-PY-C04 (similar to PSS-PY-C01) and new outside containment isolation valve PSS-PL-V011A (similar to PSS-PL-V011 renamed V011B)
- b. Revised PSS-PL-V012A from a check valve to a solenoid-operated valve (similar to PSS-PL-V004A/B)
- c. Rerouting of tube lines inside containment
- d. Rerouting of the RCS Hot Leg sample tubing into the PSS sample header

Table 2.2-1 of the submittal lists all the affected sections, figures, and tables in Tier 1 and COL Appendix C, and UFSAR.

As described in Section 2.2 of the submittal, the additional containment penetration and attached containment isolation components would be designed, constructed, and tested using the same requirements of similarly functioning PSS containment penetration and isolation components. The containment penetration would conform to ASME Code Section III, and would be seismic Category I. The containment isolation components would be subject to the applicable ITAAC Table 2.3.13-3. The additional containment penetration (PSS-PY-C04) would be identical in form, fit and function to existing PSS sampling containment penetration (PSS-PY-C01) and would be compliant with UFSAR Subsection 3.8.2.1.5, which states that penetrations are designed to maintain containment integrity under design basis accident conditions, including pressure, temperature and radiation.

A new outside-reactor containment (ORC) isolation valve PSS-PL-V011A would be located near the existing ORC isolation valve (renamed PSS-PL-V011B). PSS-PL-V011A would be a normally open, air-operated, globe valve and would fail in the closed position to isolate containment. All PSS containment isolation valves would be classified as AP1000 Safety Class B (ASME III, Class 2).

The addition of a new PSS containment penetration will not change the maximum leakage rate allowed by Technical Specification and verified periodically in accordance with regulations. The containment leak rate test program identifies the containment testing requirements, as specified, for the containment, its penetrations and their isolation barriers. These are designed to permit periodic leak rate testing, in accordance with 10 CFR 50 Appendix A, (GDC 52, 53 and 54). These tests will be completed as required by the ITAAC and based on set intervals established by 10 CFR 50, Appendix J requirements and ANS 56.8 guidelines.

The staff confirmed the above information using Table 2.2-1 of the submittal, which contains a list of figures, tables in Tier 1, COL Appendix C, and UFSAR description being affected by the proposed change. Based on the above information and staff's verification, the staff has determined that the redesigning the PSS inside-header and adding an additional containment penetration and containment isolation valve will continue to provide the safety-related function of containment isolation, and will be designed and installed using same code and standards of similar functioning PSS containment penetration and isolation components requirements. Therefore, the staff finds the proposed change acceptable.

### Conclusion

For the reasons specified above, the NRC Staff finds that the proposed changes to the PSS and supporting evaluation provided in the LAR meet relevant design provisions and do not alter relevant conclusions made for the AP1000 standard design. Based on these findings, the staff concludes that there is reasonable assurance that the requirements of 10 CFR 50, GDC 52, 53 and 54 and Appendix J will continue to be met. Therefore, the staff finds the proposed changes to be acceptable.

#### **4.0 STATE CONSULTATION**

In accordance with the Commission's regulations in 10 CFR 50.91(b)(2), the South Carolina State official was notified of the proposed issuance of the amendment. The 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." 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. Also, 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 (*Federal Register* (FR) notice 78 FR 14126, published on March 4, 2013). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Under 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 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) is a special circumstances, (5) that outweighs the reduction in standardization, and (6) does not significantly reduce the level of safety at the licensee's facility. Therefore, the staff grants the licensee an exemption from the requirements of 10 CFR Part 52, Appendix D, Section III.B.

Based on the considerations discussed above, the staff has concluded that there is reasonable assurance that (1) the proposed operation will not endanger public health and safety, (2) 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 public health and safety. Therefore the staff finds the changes proposed in this license amendment acceptable.

## 7.0 REFERENCES

1. Request for License Amendment and Exemption– Changes to the Primary Sampling System (LAR 13-06), letter from South Carolina Electric & Gas dated February 7, 2013 (ADAMS Accession No. ML13042A004).and revised by the letter dated July 11, 2013 (ADAMS Accession No.ML13197A431).
2. Virgil C. Summer Nuclear Station (VCSNS) Updated Final Safety Analysis Report (UFSAR), Revision 0, dated July 3, 2012 (ADAMS Accession No. ML12201A130)
3. AP1000 Design Control Document, Revision 19, June 13, 2012 (ADAMS Accession No. ML11171A500).
4. U.S. Nuclear Regulatory Commission, “Final Safety Evaluation Report for Virgil C. Summer Nuclear Station, Units 2 & 3 Combined License Application,” August 17, 2011 (ADAMS Accession No. ML110450305).
5. U.S. Nuclear Regulatory Commission, “Final Safety Evaluation Report Related to Certification of the AP1000 Standard Plant Design,” Supplement 2, NUREG-1793, August 5, 2011 (ADAMS Accession No. ML112061231).
6. U.S. Nuclear Regulatory Commission, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition,” NUREG-0800, May 1980.
7. ASME, *Boiler and Pressure Vessel Code*, Section III, Division I, Subsection NE, “Metal Containment,” July 1 2001, New York, NY.