

SAFETY EVALUATION BY THE OFFICE OF NEW REACTORS
RELATED TO EXEMPTION AND AMENDMENT NO. 10
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 August 30, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13246A228) and revised by letter dated October 15, 2013 (ADAMS Accession No. ML13290A517), South Carolina Electric & Gas (SCE&G/licensee) requested that the U.S. Nuclear Regulatory Commission (NRC/Commission) 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 amendment and exemption provide for departure from the Updated Final Safety Analysis Report (UFSAR) Tier 1 material included in Appendix C of each of the VCSNS Units 2 and 3 COLs. The proposed amendment also provides for departure from Tier 2 material which involves a departure to the associated certified Tier 1 material. SCE&G has also requested an exemption from the provisions of Title 10 of the *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 elements of the certification information in Tier 1 of the generic design control document (DCD).

The proposed departure consists of changes to VCSNS Tier 1 (COL Appendix C) Figure 2.3.10-1, Liquid Radwaste System (WLS), and UFSAR Tier 2 tables, text and figures to align Tier 1 with Tier 2 information provided in the UFSAR and to achieve consistency within Tier 1 material by (1) Changing the safety classification of the Passive Core Cooling System (PXS) and Chemical and Volume Control System (CVS) compartment drain hubs, (2) Changing the connection type from the PXS Compartments drains A and B to a header to match the design description, (3) Changing the valve types for three valves in the Tier 1 figure to conform to the design description and (4) Changing depiction of Tier 1 WLS components to conform to Tier 1 Figure Conventions.

In order to modify the VCSNS Units 2 and 3, Tier 1 information the NRC must find the licensee's exemption request included in its submittal for the LAR acceptable. The staff's review of the exemption request as well as the LAR is included in this safety evaluation.

In a letter dated October 15, 2013 (ADAMS Accession No. ML13290A517), 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 September 17, 2013 (78 FR 57180).

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 the licensee is requesting to change is referenced in Figure 2.3.10-1 of the Tier 1 information that is part of the ITAAC. The proposed changes to the WLS are required to meet the following requirements:

- 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) 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 combined license 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-93 and NPF-94 contains Figure 2.3.10-1. The licensee is proposing to modify Figure 2.3.10-1. 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 2 departures that involve changes to Tier 1 information. The proposed changes affect COL Appendix C, Tier 1, Figure 2.3.10-1 and associated Tier 2 Tables, text and figures.
- The regulations in 10 CFR Part 50, Appendix A, General Design Criterion (GDC) 56, primary containment isolation, and 10 CFR 50.55a require that each line that connects directly to the containment atmosphere and penetrates primary reactor containment shall

be provided with containment isolation valves with various requirements and that isolation valves outside containment be located as close to the containment as practical. The proposed change to the Tier 1 information includes a change in valve type whose function is containment isolation.

- Regulations in 10 CFR Part 50, Appendix A, General Design Criterion 1, "Quality Standards and Records," requires "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." The proposed changes to VCSNS Units 2 and 3, and COL Appendix C, Tier 1, Figure 2.3.10-1 include changing the safety classification of the WLS PXS and CVS compartment drain hubs.
- Regulations in 10 CFR Part 50, Appendix I, "Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion "As Low as is Reasonably Achievable" for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents," requires, in part, for liquid effluent releases and doses to members of the public meet design objectives and "As low as reasonably achievable" provisions.

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.

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 WLS departures from AP1000 generic DCD Tier 2 and Tier 1 information were determined necessary to clarify the safety classification of WLS drain hubs and to identify the type of valves and location of equipment consistently in WLS figures.

Therefore, the licensee proposed an exemption from the elements of the AP1000 certified (Tier 1) design information to allow a departure from the WLS as shown in the design description figures. The proposed departure would clarify that the Passive Core Cooling (PXS) and CVS compartment drain hubs and the associated WLS drain function are nonsafety-related, change the connection type from the PXS compartments to a header, change certain types of valves and location of equipment consistent with Tier 2 information and revise VCSNS Units 2 and 3 Tier 1, and COL Appendix C, Figure 2.3.10-1 to use symbols consistent with Tier 1 figure conventions.

In summary, the end result of this exemption and amendment would be that the licensee can implement modifications to Tier 1 information, namely, Appendix C to License Nos. NPF-91 and NPF-92, Section 2.3.10, "Liquid Radwaste System" as described in the application, as supplemented, if and only if the NRC approves the license amendment request. 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.

The requirements of 10 CFR 50.12(a)(2) list 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 2.3.10. This is a permanent exemption limited in scope to particular Tier 1 information, and subsequent changes to Section 2.3.10 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'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 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. The change would allow the licensee to implement modifications to Tier 1 information described and justified in LAR 13-015 to AP1000 DCD, Tier 1 Section 2.3.10, "Liquid Radwaste System." These proposed changes are evaluated and found to be acceptable in Section 3.2 of this Safety Evaluation. 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 2.3.10 requested in the LAR. This is a permanent exemption limited in scope to particular Tier 1 information. Subsequent changes to Section 2.3.10 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 purposes of the rule or is not necessary to achieve the underlying purpose of the rule. 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 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 VCSNS Units 2 and 3, Tier 1 Section 2.3.10. The requested change will facilitate plant construction and maintain or enhance future safe plant operation and maintenance, while supporting the ability of the WLS to perform its design functions. Accordingly, this change to the certified 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 VCSNS Units 2 and 3, Tier 1, Section 2.3.10 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, this exemption may 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 of the WLS design associated with this request will continue to be maintained. This exemption request and the associated changes to VCSNS Units 2 and 3, Tier 1, Section 2.3.10 demonstrate 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 WLS design as presented in VCSNS Units 2 and 3, Tier 1 Section 2.3.10. The proposed changes to the WLS design will not adversely affect the ability of the WLS functions and the level of safety provided by the systems and equipment contained therein is unchanged. 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 NRC staff has evaluated various aspects of the proposed changes to the WLS; the evaluations are contained in the following sections.

3.2.1 Liquid Radwaste System Valve Types

3.2.1.1 Introduction

VCSNS Units 2 and 3 Tier 1 and COL Appendix C, Figure 2.3.10-1, "Liquid Radwaste System," depicts valves WLS-PL-V055, WLS-PL-V057 and WLS-PL-V223 as diaphragm valves. Also, UFSAR Tier 2, Figure 11.2-1, "Liquid Radwaste System – Simplified Piping and Instrumentation Diagram," depicts the two diaphragm valves located between the containment sump and the waste holdup tank. Although not identified with tag numbers, these two valves are WLS-PL-V055 and WLS-PL-V057. However, valves WLS-PL-V055, WLS-PL-V057, and WLS-PL-V223 are identified as plug valves in other portions of the licensing and design basis. To resolve this inconsistency, SCE&G proposed to change valves WLS-PL-V055, WLS-PL-V057, and WLS-PL-V223 from diaphragm valves to plug valves and to revise applicable figures to depict the valves as plug valves.

3.2.1.2 Technical Evaluation

WLS-PL-V055, WLS-PL-V057, and WLS-PL-V223 are depicted as plug valves in the following UFSAR figures and tables:

- UFSAR Tier 2, Figure 11.2-2 (Sheets 1 through 8), "Liquid Radwaste System – Piping and Instrumentation Diagram," provides a detailed piping and instrumentation diagram. Sheet 1 of Figure 11.2-2, does not identify valves WLS-PL-V055 and WLS-PL-V057 by tag number but identifies them as the two containment isolation plug valves located between the containment sump and the waste holdup tanks.
- UFSAR Tier 2, Figure 11.2-2 Sheet 8 identifies WLS-PL-V223 as a plug valve.

UFSAR Tier 2, Table 3.9-16, "Valve Inservice Test Requirements," identifies valves WLS-PL-V055 and WLS-PL-V057 as "Remote AO Plug" type valves. However, Tier 1 and COL Appendix C, Figure 2.3.10-1, "Liquid Radwaste System," depicts valves WLS-PL-V055, WLS-PL-V057, and WLS-PL-V223 as diaphragm valves. Also, Tier 2, Figure 11.2-1, "Liquid Radwaste System – Simplified Piping and Instrumentation Diagram," depicts valves WLS-PL-V055 and WLS-PL-V057 as diaphragm valves.

To resolve this inconsistency with the identification of valves WLS-PL-V055, WLS-PL-V057, and WLS-PL-V223, SCE&G proposed to change valves WLS-PL-V055, WLS-PL-V057, and WLS-PL-V223 from diaphragm valves to plug valves and proposed to revise VCSNS Units 2 and 3, Tier 1 (and COL Appendix C) Figure 2.3.10-1 and UFSAR Tier 2, Figure 11.2-1 to depict the valves as plug valves.

The NRC staff verified that valves WLS-PL-V055, WLS-PL-V057, and WLS-PL-V223 are designed, constructed, and tested in accordance with the codes and standards identified in UFSAR Tier 2, Table 3.2-3, "AP1000 Classification of Mechanical and Fluid Systems, Components, and Equipment." Valves WLS-PL-V055 and WLS-PL-V057 are safety-related, Class B, containment isolation valves. These safety-related valves are designed and constructed in accordance with ASME Code Section III requirements, functionally qualified in accordance with ASME QME-1-2007, and inservice testing is performed in accordance with the ASME Operations and Maintenance (OM) Code and applicable addenda, as required by 10 CFR 50.55a(f). Valve WLS-PL-V223 is a nonsafety-related, Class D valve that is designed and constructed in accordance with ANSI 16.34.

The NRC staff verified that the existing valve inservice test methods in UFSAR Tier 2, Table 3.9-16 are the appropriate test requirements for safety-related valves WLS-PL-V055 and WLS-PL-V057. Valve WLS-PL-V223 is not listed in Table 3.9-16 because it does not perform a safety-related function.

3.2.1.3 Conclusion

Changing the applicable figures as described above will make the VCSNS Units 2 and 3, Tier 1 (and COL Appendix C) and Tier 2 sections of the UFSAR consistent with regards to the identification of valves WLS-PL-V055, WLS-PL-V057, and WLS-PL-V223 as plug valves.

The regulations in 10 CFR Part 50, Appendix A, GDC 56, primary containment isolation, and 10 CFR 50.55a require that each line that connects directly to the containment atmosphere and penetrates primary reactor containment shall be provided with containment isolation valves with various requirements and that isolation valves outside containment be located as close to the containment as practical. These regulations have been satisfied by the proposed changes to the Tier 1 information which includes a change in valve type whose function is containment isolation.

Plug valves will perform the design function described in the UFSAR, and the valves will be designed, constructed, and tested in accordance with applicable codes and standards. Based on the above information and the staff's review, the staff has determined that the licensee's proposal to change valves WLS-PL-V055, WLS-PL-V057, and WLS-PL-V223 from diaphragm valves to plug valves and to update applicable figures to reflect this change is acceptable.

3.2.2 Liquid Radwaste System Figure Consistency

3.2.2.1 Introduction

The proposed change will make the VCSNS Units 2 and 3, Tier 1 (and COL Appendix C) Figure 2.3.10-1 consistent with the Figure Legend in Tier 1, Section 1.3. Valves CVS-PL-V045 and CVS-PL-V047 identified in Tier 1, Figure 2.3.10-1 are depicted using symbols that are different from the generic valve symbols identified in Figure Legend in Tier 1, Section 1.3. SCE&G proposed to change VCSNS Units 2 and 3, Tier 1 and COL Appendix C, Figure 2.3.10-1 valve symbols to be consistent with the Figure Legend in Tier 1, Section 1.3. SCE&G also proposed to change the symbols for valves WLS-PL-V055, WLS-PL-V057, and WLS-PL-V223 to the generic valve symbol, consistent with Tier 1, Figure Legend. In addition, SCE&G proposed to add the valve tag (identification) numbers to Tier 1, Figure 2.3.10-1.

AP1000 DCD, Tier 1, Section 1.3, Figure Legend, states that components that are part of the system functional arrangement shown on Tier 1 figures, but not included in the system design commitments, should be shown with dashed lines. Consistent with this approach, the licensee proposed that components (i.e., valves and filters) not discussed in the design commitment portion of VCSNS Units 2 and 3, Tier 1, and COL Appendix C, Table 2.3.10-4, be depicted with dashed lines.

3.2.2.2 Technical Evaluation

With regard to the change in valve symbols and the addition of valve tag numbers, Tier 1, Section 1.3, Figure Legend, uses generic symbols to designate components such as valves, valve operators, mechanical equipment, dampers and electrical equipment in Tier 1 figures. The staff notes that the symbols in Tier 1, Section 1.3, are generic and not as detailed as the symbols identified in Tier 2, Section 1.7, "Drawings and Other Detailed Information," for piping and instrumentation diagrams (P&ID) that are contained in Tier 2 figures. Therefore, the piping diagrams in Tier 1 and Tier 2 will not use the exact same symbols to designate components. For example, Tier 1 only uses three generic symbols for valves (i.e., valve, check valve, and relief valve) while Tier 2 uses approximately 30 different symbols to identify specific types of valves. For plug and globe valves, Tier 1 uses a generic valve symbol while Tier 2 uses specific symbols for each valve type.

In order to make the valve symbols in VCSNS Units 2 and 3, Tier 1 and COL Appendix C, Figure 2.3.10-1 consistent with the valve symbols in Tier 1, Section 1.3, the following changes were proposed to Tier 1 and COL Appendix C, Figure 2.3.10-1:

1. Change the symbols for globe valves CVS-PL-V045 and CVS-PL-V047 to conform to the valve and valve operator symbols in Tier 1, Section 1.3.
2. Change the symbols for plug valves WLS-PL-V055, WLS-PL-V057, and WLS-PL-V223 to conform to the valve and valve operator symbols in Tier 1, Section 1.3.
3. Add the valve tag numbers for CVS-PL-V045, CVS-PL-V047, WLS-PL-V055, WLS-PL-V057, and WLS-PL-V223.

Based on the above information and the staff's review, the staff has determined that it is appropriate to change the valve symbols for valves CVS-PL-V045, CVS-PL-V047, WLS-PL-V055, WLS-PL-V057, and WLS-PL-V223 in VCSNS Units 2 and 3, Tier 1 and COL Appendix C, Figure 2.3.10-1 consistent with the Tier 1, Section 1.3, and to add tag numbers to the valves because these changes will make Figure 2.3.10-1 consistent with the figure legend in Tier 1, Section 1.3, and do not change any technical information in the UFSAR.

With regard to the change in solid lines to dashed lines in VCSNS Units 2 and 3, Tier 1, Figure 2.3.10-1, Tier 1, Section 1.3, Figure Legend, states that components that are part of the system functional arrangement shown on Tier 1 figures, but not included in the system design commitments, should be shown with dashed lines. Consistent with this approach, it was proposed that components (valves and filters) not discussed in the design commitment portion of VCSNS Units 2 and 3, Tier 1, and COL Appendix C, Table 2.3.10-4 be depicted with dashed lines. SCE&G proposed that the following components (valves and filters) not discussed in the design commitment portion of VCSNS Units 2 and 3, Tier 1, and COL Appendix C, Table 2.3.10-4 be changed from solid lines to dashed lines:

1. Valves CVS-PL-V045 and CVS-PL-V047
2. Valves WLS-PL-V055 and WLS-PL-V057 (valve WLS-PL-V223 has not changed)
3. Filters WLS-MV-06 and WLS-MV-07
4. Various unidentified check valves in the WLS

The staff notes that safety-related containment isolation valves CVS-PL-V045, CVS-PL-V047, WLS-PL-V055 and WLS-PL-V057 were changed from solid lines to dashed lines indicating that these valves are not discussed in the design commitment portion of VCSNS Units 2 and 3, Tier 1, and COL Appendix C, Table 2.3.10-4. In that these are safety-related containment isolation valves, the staff verified that CVS-PL-V045 and CVS-PL-V047 contain design commitments in VCSNS Units 2 and 3, Tier 1, Section 2.3.2-1, "Chemical Volume and Control System," Table 2.2.1-3, and WLS-PL-V055 and WLS-PL-V057 contain design commitments in VCSNS Units 2 and 3, Tier 1, Section 2.2.1, "Containment Systems," Table 2.2.1-3. Therefore, the staff finds it acceptable to depict valves CVS-PL-V045, CVS-PL-V047, WLS-PL-V055 and WLS-PL-V057 with dashed lines indicating that these valves are not discussed in the design commitment portion of VCSNS Units 2 and 3, Tier 1, and COL Appendix C, Table 2.3.10-4. However, these valves do have design commitments as containment isolation valves in applicable Tier 1 sections as discussed above.

Filters WLS-MV-06 and WLS-MV-07, and various unidentified check valves in the WLS, were changed from solid lines to dashed lines because these components are not discussed in the design commitment portion of VCSNS Units 2 and 3, Tier 1, and COL Appendix C, Table 2.3.10-4. As verified with SCE&G during a Public Meeting on September 5, 2013 (ADAMS Accession No, ML13262A296), these check valves and filters are nonsafety-related, Class D components that do not have Tier 1 design commitments. Therefore, the staff finds it acceptable to depict these check valves and filters with dashed lines because these components do not have any Tier 1 design commitments.

3.2.2.3 Conclusion

Based on the above information and the staff's review, the staff has determined that it is acceptable to change the valve symbols and add valve tag numbers for the subject valves in VCSNS Units 2 and 3, Tier 1 and COL Appendix C, Figure 2.3.10-1, because these changes will make Figure 2.3.10-1 consistent with the figure legend in Tier 1, Section 1.3, and do not change any technical information in the UFSAR.

With regard to the solid versus dashed lines, the staff has determined that it is acceptable for the subject components to be represented with dashed lines in VCSNS Units 2 and 3, Tier 1 and COL Appendix C, Figure 2.3.10-1 because the components are not discussed in the Design Commitment portion of VCSNS Units 2 and 3, Tier 1, and COL Appendix C, Table 2.3.10-4.

3.2.3 Change in Safety Classification

3.2.3.1 Introduction

VCSNS Units 2 and 3, Tier 1 and COL Appendix C, Figure 2.3.10-1, "Liquid Radwaste System," and UFSAR Figure 11.2-2 (Sheet 1 of 8) "Liquid Radwaste System Piping and Instrumentation Diagram (REF) WLS-01," depict the PXS and CVS compartment drain hubs as safety-related, having the same safety classification as the drain piping and check valves. This designation is not consistent with the intended design in that the compartment drain hubs perform no safety-related function. To resolve this inconsistency, SCE&G proposed revisions to applicable figures, sections, and tables.

The licensee states that the AP1000 assignment of safety-related classifications, which is described in UFSAR Tier 2 Subsection 3.2.2, "AP1000 Classification System," conforms to the requirements of 10 CFR 50.55a. This classification system provides an easily recognizable means of identifying the extent to which structures, systems, and components are related to industry and regulatory quality groups. UFSAR Tier 2 Table 3.2-1, "Comparison of Safety Classification Requirements," provides a comparison of the AP1000 code classification letters and other safety classifications.

The proposed change will clarify the safety classification of the drain hubs that are connected to the drain lines of the CVS compartment (Room 11209) and the PXS A and B compartments (Rooms 11206 and 11207, respectively) inside containment. This change also requires a change to the WLS description to remove the safety function of compartment draining.

The safety classification break (change in safety classification at a particular point) is specifically identified on UFSAR Tier 2, Figure 11.2-2 (Sheet 1 of 8) "Liquid Radwaste System Piping and Instrumentation Diagram (REF) WLS-01" at the downstream side of the second of two WLS check valves from each of the three compartment drains. The compartment drain hubs are located on the upstream side of the first of the two check valves. Since there is no identification of the safety classification break between the drain hubs and the first check valve, the drain hubs could be interpreted as having the same safety classification as the drain piping and check valves.

To resolve the inconsistency in designation, SCE&G proposed the following revisions:

- Add a safety class break from AP1000 Class C to Non-Nuclear Safety (NNS) between the CVS and PXS compartment drain hubs and the drain lines by adding the drawing symbol “N/3” to indicate the drain hubs are nonsafety-related while the drain piping to the downstream side of the second check valve remains ASME Section III, Class 3 in Tier 1 and Units 2 and 3 COL Appendix C, Figure 2.3.10-1 “Liquid Radwaste System.”
- Indicate a safety class break from NNS (AP1000 Class D) to AP1000 Class C (ASME Section III, Class 3) between the CVS and PXS compartment drain hubs and drain lines along with a corresponding note in UFSAR Tier 2 Figure 11.2-2 (Sheet 1 of 8) “Liquid Radwaste System Piping and Instrumentation Diagram (REF) WLS-01.”
- Add an entry for the WLS floor drain hubs to indicate safety class in UFSAR Tier 2, Section 3.2, Table 3.2-3 “AP1000 Classification of Mechanical and Fluid Systems, Components, and Equipment,” by adding a new line item for Floor Drain Hubs.
- Delete the bullet describing draining the PXS compartments as a safety-related function in UFSAR Tier 2, Section 11.2 “Liquid Waste Management System, Subsection 11.2.1.1, Safety Design Basis.”
- Delete the bullet describing draining the PXS compartments as a safety-related function in UFSAR Tier 2, Subsection 14.2.9.3.1 “Liquid Waste System Testing.”

3.2.3.2 Technical Evaluation

The WLS contains drain lines from the PXS and CVS compartments within containment. These drain lines serve the function of draining the PXS compartments during operation to assist in overall floor drain collection, and for leakage detection of the Reactor Coolant Pressure Boundary (RCPB). Within each drain line are two safety-related check valves and piping, which perform the safety-related function of preventing cross flooding of the PXS and CVS compartments as described in VCSNS Units 2 and 3 Tier 2 FSAR Section 11.2 and VCSNS Units 2 and 3, Tier 1, Section 2.3.10.

While the WLS does perform the safety function of preventing cross flooding of compartments, the prevention of PXS compartment flooding is incorrectly categorized as a safety-related function. The safe shutdown components of the PXS located in these two compartments are redundant and essentially identical. One set of the redundant equipment is located in each of the two separate compartments. The redundant passive core cooling system components located in these two compartments provide coolant to the reactor vessel from the two core makeup tanks, the two accumulators, and the in-containment refueling water storage tank via two independent and redundant direct vessel injection lines.

The maximum flooding rate to either of these PXS compartments would occur on a postulated loss-of-coolant accident (LOCA) of one of the eight inch direct vessel injection lines at a location inside one of the two compartments. This postulated rupture would result in direct blowdown

from the reactor coolant system to the compartment as well as blowdown of the associated core makeup tank and accumulator. The resulting flooding in one of the two PXS compartments would not prevent the passive core cooling system from performing its safe shutdown function. The PXS-A and the PXS-B compartments are physically separated and isolated from each other by a structural wall so that flooding in one compartment cannot cause flooding in the other compartment.

The staff verified that Tier 1, Subsection 2.3.10, Item 6 does not identify the prevention of PXS compartment flooding as a safety-related function. Also, analyses performed for these systems for Revision 19 of the AP1000 DCD support the determination that this is not a safety-related function. The staff also verified UFSAR, Tier 2, Subsection 3.4.1.2.2.1, which states that “the total flood-up of either the PXS-A or PXS-B compartments from any source of water is acceptable and does not prevent the passive core cooling system from performing its required safe shutdown function.”

The same discussion goes on to state that when the flooding rate exceeds the ability of the floor drain lines to drain the water from the compartment, or in the event that the floor drain line is blocked, the water level in that compartment increases to the entrance curb elevation. Should the flooding continue, the water overflows from that compartment to the maintenance floor at elevation 107'-2". The water overflowing to this level would immediately drain to the reactor coolant system compartment via the vertical access tunnel. There is no curb at the entrance to the vertical access tunnel; therefore, water on the maintenance floor (elevation 107'-2") flows freely into the reactor coolant system compartment. For LOCA events, flooding via this path continues to a level above the reactor coolant system cold legs. This is further acknowledged by the containment flood-up level calculation which does not take into account any draining of the PXS compartments.

With the function of prevention of PXS compartment flooding considered not safety-related, ANS 51.1 (1983 Edition) provides criteria for class breaks between Safety Class 2 or 3 components and nonsafety-related components. In accordance with the ANS 51.1 criteria, the class breaks between the drain hubs and drain piping do not impact the drain lines' safety function to prevent back flow to the PXS and CVS compartments.

The staff concludes that the proposed change will clarify that the drain hubs are nonsafety-related (Class D/NNS) and that the drain hubs are also the interface with the safety-related drain line (Class C/ASME III Class 3). The class break from non-nuclear safety (Class D/NNS) equipment to ASME III, Class 3 (Class C) piping is consistent with ANS 51.1 (1983 Edition), Section 3.3.2.1, Case 6, Subpart d, includes the following guidance:

From SC [Safety Class]-2 or SC-3 piping totally inside or outside the primary containment and not connected to the RCPB [reactor coolant pressure boundary] to any less stringent class, the interface is at: the connection of the less stringent class equipment to the more stringent class equipment if failure of the less stringent class does not result in the loss of nuclear safety or an accident.

For the CVS and PXS compartments, connecting the nonsafety-related drain hubs to safety class piping is acceptable because a postulated failure of the drain hubs would not impact the safety function of the Class 3/Class C piping. The two check valves would remain functional and would maintain the backflow prevention capability in each line. In addition, failure of these drain hubs would not directly cause an accident.

Furthermore, the removal of this safety function does not impact the condensate return analysis performed since the drain hubs were not credited in the analysis. Leak before break (LBB) capabilities are not impacted by this change as well. As stated within Section 5.2.5 of the UFSAR, the leak before break system is “nonsafety.” If a seismic event were to occur and the drain hubs were to fail, fluid will still be able to trickle down the drain hubs and into the safety-related piping. The leakage would then drain into the lower room below the compartments. This is possible because of the safety piping that exists up to the end of the check valves which exist on each of these lines. Thus, the leakages will still be able to be detected through the use of the seismic Category I level instruments.

3.2.3.3 Conclusion

Based on the above information and the staff’s review, the staff has determined that changing the safety designation of the drain hubs to nonsafety-related would not have an adverse impact on the safety-related functions of the WLS. This change will not cause any decrease in safety or affect any safety-related equipment or function, radioactive material barrier, or safety analysis.

The staff concludes that, with regard to the change in safety classification of the WLS, PXS and CVS compartment drain hubs shown in VCSNS Units 2 and 3, and COL Appendix C, Tier 1, Figure 2.3.10-1, the regulations in 10 CFR Part 50, Appendix A, General Design Criterion (GDC) 1, “Quality Standards and Records,” that requires “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,” have been satisfied. Accordingly, the proposed revisions in Section 3.2.3.1 of this Safety Evaluation are, therefore, acceptable.

3.2.4 PXS Compartment Drain Piping Connection

3.2.4.1 Introduction

VCSNS Units 2 and 3 Tier 1 and COL Appendix C, Figure 2.3.10-1, “Liquid Radwaste System,” depicts a piping separation between the drain lines from PXS Compartments A and B to the WLS sump.

This separation is not consistent with the design described in UFSAR Tier 2, Figure 11.2-2 (Sheet 1 of 8) “Liquid Radwaste System Piping and Instrumentation Diagram (REF) WLS-01” and in the design documentation that was in effect when the AP1000 design was certified (i.e., AP1000 DCD Revision 19), in which the lines from the PXS compartment drains are hard-piped to the containment sump. The licensee proposed a revision to Units 2 and 3 COL Appendix C, Figure 2.3.10-1 to change the connection between PXS Compartments A and B to indicate a hard piped connection into the containment sump.

3.2.4.2 Technical Evaluation

Having a hard-piped connection instead of an open funnel maintains the function of providing a drainage pathway from the PXS compartments. The piping downstream of the check valves is designated NNS as depicted in the above referenced Tier 1 and Tier 2 figures. The same codes and standards are maintained for the piping. Therefore, the change is acceptable because all functions are still maintained by the piping change.

3.2.4.3 Conclusion

The staff concludes that providing a hard-piped connection instead of an open funnel in VCSNS Units 2 and 3, COL Appendix C, Figure 2.3.10-1 is consistent with UFSAR Tier 2, Figure 11.2-2 (Sheet 1 of 8) and the design documentation. This change will not cause any decrease in safety or affect any safety-related equipment or function, radioactive material barrier, or safety analysis and is acceptable.

3.2.5 Use of Optional Mobile Radwaste Processing and Radiological Dose Assessment

3.2.5.1 Introduction

A review of the August 30, 2013 application, Enclosure 1, Section 2.4, "WLS Figure Consistency, Detailed Description," Table 4, and Enclosure 3 figures revealed an inconsistency with the placement of components. Specifically, the placement of pre-filter WLS-MV-06 on the proposed revision of VCSNS Units 2 and 3, Tier 1 and Appendix C to the COLs, Figure 2.3.10-1 is different than that shown in UFSAR Tier 2, Figure 11.2-1. In Appendix C to the COL, Figure 2.3.10-1, the placement is between both connections to the optional mobile filtration equipment, while in UFSAR Tier 2, Figure 11.2-1 the placement of pre-filter WLS-MV-06 is downstream of the last connection to the line for the mobile equipment. In addition, a review of the August 30, 2013 application, Enclosure 1, Section 2.4, WLS Figure Consistency, Technical Evaluation, indicates that the proposed changes do not affect containment, control, processing or releases of radioactive materials. While the conclusion states that radioactive effluents would not be affected by the proposed change, the conclusion does not confirm that releases of liquid effluents in unrestricted areas and associated doses to members of the public would be maintained, as characterized in UFSAR, Revision 2, Tier 2, Tables 11.2-202 to 11.2-206 for routine liquid effluent releases and anticipated operational occurrences (AOOs).

3.2.5.2 Technical Evaluation

With regard to the placement of pre-filter WLS-MV-06, in an October 15, 2013 supplement to the application (ADAMS Accession No. ML13290A517), the licensee made three revisions to VCSNS Units 2 and 3, Tier 1 and Appendix C to the COLs, Figure 2.3.10-1. One change relocates the pre-filter downstream of the last connection to the line used for mobile equipment. In the second and third changes, the branch lines to both the "ALT. FILTER/MOBILE EQUIPMENT" (in the upper right quadrant of Figure 2.3.10-1) and the "MOBILE EQUIPMENT" (in the lower right quadrant of Figure 2.3.10-1) were modified to depict dashed lines instead of solid lines. As a result of these changes, there is now a consistent depiction of these connections among the Appendix C to the COLs, Figure 2.3.10-1 and UFSAR Tier 2, Figure 11.2-1 flow diagrams.

With regard to any effects on the containment, control, and processing or releases of radioactive materials, described in the October 15, 2013 supplement, SCE&G made specific revisions to the portion of the amendment request describing the details and technical evaluation of the proposed changes. In addition to stating that the types and amounts of radioactive effluents will not change, the licensee confirmed that the expected radioactive releases and doses to members of the public will be consistent with those results presented in UFSAR Tier 2, Tables 11.2-202 to 11.2-206.

3.2.5.3 Conclusion

With regard to the placement of pre-filter WLS-MV-06 the staff concludes that the three revisions, as proposed in the October 15, 2013 supplement to the application, are acceptable since they clarify and maintain the licensing basis of the COL for the use of mobile radwaste processing equipment.

The staff concludes that the application, as supplemented, is acceptable with regard to radiological effects since it maintains the licensing basis of the COL in complying with the requirements of 10 CFR Part 20 for liquid effluent releases and doses to members of the public and 10 CFR Part 50, Appendix I design objectives and “As low as reasonably achievable” provisions.

4.0 **STATE CONSULTATION**

In accordance with the Commission’s regulations 10 CFR 50.91(b)(2), the South Carolina 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, “*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, 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 (*Federal Register*, 78 FR 57180 dated September 17, 2013). 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 issuing 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) has special circumstances 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 the licensee an exemption from the requirements of 10 CFR Part 52, Appendix D, Section III.B, to allow a departure from elements of the certification information in Tier 1 of the generic DCD

associated with the VCSNS Units 2 and 3, "Liquid Radwaste System," Figure 2.3.10-1.

The staff has concluded, based on the considerations discussed above, 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) 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 the health and safety of the public. Therefore, the staff finds the changes proposed in this license amendment, consisting of changes to VCSNS Tier 1 (COL Appendix C) Figure 2.3.10-1, "Liquid Radwaste System," and UFSAR Tier 2 tables, text and figures, acceptable.

7.0 REFERENCES

1. Request for License Amendment and Exemption – Liquid Radwaste System Consistency Changes (LAR-13-32), letter from SCE&G dated August 30, 2013 (ADAMS Accession No. ML13246A228) and supplemented by letter dated October 15, 2013 (ADAMS Accession No. ML13290A517).
2. Virgil C. Summer Nuclear Station (VCSNS) Updated Final Safety Analysis Report (UFSAR), Revision 1, dated July 11, 2013 (ADAMS Accession No. ML13217A253).
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 Combined Licenses for Virgil C. Summer Nuclear Station, Units 2 and 3," Volume 1, NUREG-2153, September 30, 2013 (ADAMS Accession No. ML13275A125).
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).