

SAFETY EVALUATION BY THE OFFICE OF NEW REACTORS

RELATED TO EXEMPTION AND AMENDMENT NO. 70

TO THE COMBINED LICENSE NOS. NPF-93 AND NPF-94

SOUTH CAROLINA ELECTRIC & 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 September 22, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16270A582), South Carolina Electric & Gas Company (SCE&G) on behalf of itself and the South Carolina Public Service Authority (hereafter called the licensee) submitted license amendment request (LAR) 16-14 and requested that the U.S. Nuclear Regulatory Commission (NRC/Commission) amend the combined licenses (COL) for Virgil C. Summer Nuclear Station (VCSNS), Units 2 and 3, COL Numbers NPF-93 and NPF-94, respectively.

The LAR would revise the Updated Final Safety Analysis Report (UFSAR) in the form of departures from the incorporated plant-specific Design Control Document (DCD) Tier 2 information. Specifically, the LAR revises the Design Reliability Assurance Program (D-RAP) to identify the covers for the in-containment refueling water storage tank (IRWST) vents and overflow weirs as the risk-significant components included in the D-RAP and to identify that the field control relays of each rod drive motor-generator (MG) set are a part of the rod drive power supply control cabinets in which the relays are located.

The proposed amendment also involves related changes to plant-specific Tier 1 information, with corresponding changes to the associated COL Appendix C information. The licensee has 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 DCD.¹ In order to modify the plant-specific DCD Tier 1 information, the NRC staff must find the included exemption request acceptable. The NRC staff's review of the exemption request as well as the LAR is included in this safety evaluation.

¹ 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.

The NRC staff issued an initial *Federal Register* notice of opportunity to request a hearing and a proposed No Significant Hazards Determination on November 8, 2016 (81 FR 78652).

2.0 REGULATORY EVALUATION

Tier 1 information is defined in 10 CFR Part 52, Appendix D, Section II.D, "Definitions." Information in 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 ITAAC Tables. Therefore, the information is considered Tier 1 information.

In accordance with 10 CFR Part 52, Appendix D, Section VIII.A.4, 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 will deny such a request if the design change causes a significant reduction in the level of plant safety otherwise provided by the design.

Paragraph 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. In addition, the Commission must consider whether special circumstances, as required by 10 CFR 52.7 and 50.12, outweigh any decrease in safety that may result from the reduction in standardization cause 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).

Regulations in 10 CFR 52.98(f) state 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 of COLs NPF-93 and NPF-94 contain tables that the licensee is proposing to modify. Therefore, the proposed change requires 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 licensee referencing Appendix D to 10 CFR Part 52 to incorporate by reference and comply with the requirements of Appendix D, including all Tier 1 information contained in the generic AP1000 DCD. As defined in Section II of Appendix D to 10 CFR Part 52, Tier 1 information includes ITAAC and design descriptions, among other things. Therefore, a licensee referencing Appendix D incorporates by reference all Tier 1 information contained in the generic AP1000 DCD. The Tier 2 ITAAC and the design descriptions, along with plant-specific ITAAC, were included in Appendix C of the COL at its issuance. Because the changes to plant-specific Tier 1 information and corresponding changes to associated COL Appendix C information, as identified by the licensee, result in the need for a departure from the generic AP1000 DCD, an exemption from the certified design information is required.

The Tier 1 information for which a plant-specific departure and exemption was requested includes corresponding changes to COL Appendix C information. The result of this exemption would be that the licensee could implement modifications to Tier 1 information described and

justified in LAR 16-14 if, and only if, the NRC approves LAR 16-14. 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, Tables 2.5.1-4 and 3.7-1. This exemption is a permanent exemption limited in scope to particular Tier 1 information. Subsequent changes to Tier 1, Tables 2.5.1-4 and 3.7-1 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 proposed changes would modify the covers for the IRWST vents and overflow weirs as the risk-significant components included in the D-RAP and identify that the rod drive MG set's field control relays are a part of the rod drive power supply control cabinets, as presented in the Tier 1 tables. The purpose of the proposed changes are to clarify and provide additional details in COL Appendix C of the IRWST vents and

overflow weirs, the field control relays of each rod drive MG set, and the rod drive power supply control cabinets. 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 NRC staff concludes that there is no undue risk to public health and safety.

3.1.3 Consistent with the Common Defense and Security

The proposed exemption would allow changes to elements of the D-RAP, as presented in the ITAAC tables in the plant-specific DCD Tier 1, thereby departing from the AP1000 certified (Tier 1) design information. This proposed exemption would be permanent and limited to Tables 2.5.1-4 and 3.7-1. Any changes to Tier 1, Tables 2.5.1-4 and 3.7-1 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 concludes 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 licensee's licensing basis. The proposed changes would modify the covers for the IRWST vents and overflow weirs as the risk-significant components included in the D-RAP and identify that the rod drive MG set's field control relays are a part of the rod drive power supply control cabinets, as presented in the Tier 1 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, Tables 2.5.1-4 and 3.7-1 of the DCD.

Special circumstances are present in the particular circumstances discussed in LAR 16-14 because the application of the specified Tier 1 information does not serve the underlying purpose of the rule. This exemption request and associated revisions to Tier 1 Tables 2.5.1-4 and 3.7-1 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 concludes 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

The proposed changes identify the covers for the IRWST vents and overflow weirs as the risk-significant components included in the D-RAP and identify that the rod drive MG set's field control relays are a part of the rod drive power supply control cabinets in which the relays are located. This exemption would allow the implementation of changes to Tier 1, Tables 2.5.1-4 and 3.7-1 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 Tier 1, Tables 2.5.1-4 and 3.7-1 demonstrate that the applicable regulatory requirements will continue to be met and are consistent with the current design of the plant in supporting the actual system functions. There is no safety impact and the benefits of properly identifying the IRWST vents and overflow weirs, and differentiating between the field control relays and the rod drive power supply control cabinets, outweigh any reduction in standardization. Based on the foregoing reasons, as required by 10 CFR Part 52.63(b)(1), the NRC staff concludes 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, Tables 2.5.1-4 and 3.7-1 proposed in the LAR. The exemption request proposed to depart from the certified design by modifying the covers for the IRWST vents and overflow weirs as the risk-significant components included in the D-RAP and by clarifying that the rod drive MG set's field control relays are a part of the rod drive power supply control cabinets. The changes for consistency will not impact the functional capabilities of this system. The proposed changes will not adversely affect the ability of the IRWST or rod drive MG set's field control relays 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 NRC staff concludes that granting the exemption would not result in a significant decrease in the level of safety otherwise provided by the design.

3.2 EVALUATION OF PROPOSED CHANGES

3.2.1 IRWST Vents and Overflow Weir Covers

The safety significance of the dimensions associated with the vent and overflow weir covers of the IRWST is related to the ability to maintain the functionality of the IRWST by preventing debris from entering the tank, accommodating volume and mass increases in the tank, and preventing overpressurization through venting. The IRWST inventory supports long-term cooling in the event of a postulated accident.

The licensee proposed the following changes to the VCSNS, Units 2 and 3, COL Appendix C Table 3.7-1:

- Include individual equipment tags for IRWST hood vent covers, IRWST steam generator wall vent covers, and IRWST overflow weir covers. Remove the line for IRWST vents (PXS-MT-03).

The licensee proposed the following changes to the VCSNS, Units 2 and 3, UFSAR:

- Include the IRWST vents and overflow weir covers explicitly in UFSAR Table 3.2-3, “AP1000 Classification of Mechanical and Fluid Systems, Components, and Equipment,” as components in the passive core cooling system.
- Clarify the descriptions in UFSAR Section 6.3.2.2, “In-Containment Refueling Water Storage Tank,” and Section 6.3.2.2.7.2, “IRWST Screens.”
- Change UFSAR Table 17.4-1, “Risk-Significant SSCs Within the Scope of D-RAP,” to specifically identify the covers and include them in the scope of the D-RAP.

In the LAR, the licensee described the distinctions associated with the covers on the IRWST vents and overflow weirs. Currently, the UFSAR does not distinctly identify the covers as components separate from the IRWST. The vent covers are designed to prevent overpressurization while preventing debris from entering the tank. The overflow weir cover is designed to accommodate volume and mass discharges into the IRWST while preventing debris from entering the tank. The licensee states that the UFSAR only describes “vents” and “overflows”, and that the use of a cover was implied. This LAR corrects that omission in the licensing basis.

The NRC staff reviewed the impacts of the proposed changes of the covers on the functions of the IRWST. With respect to the changes proposed in UFSAR Table 3.2-3 and UFSAR Section 6.3.2.2, the NRC staff compared the IRWST functions as described in the DCD to those proposed in the LAR. The vent covers described in the LAR have a design function to prevent overpressurization, while the overflow weir cover opens on a suitable increase in inventory of the IRWST (i.e., from actuation of the automatic depressurization system stage 1/2/3 valves). Both types of covers prevent debris from entering the IRWST.

The licensee stated that the vent and overflow weir covers are not specifically identified in the IRWST description. The NRC staff identified the locations where the IRWST vent covers are described in the UFSAR. In UFSAR Section 6.3.2.2.7.2, the vents and overflows are described as normally closed by louvers. The vents covering the IRWST are further detailed in UFSAR Section 6.3.2.2.3. These louvers are the vent and overflow weir covers detailed in the LAR. Additionally, although the information is not discussed in the LAR, the vents and overflow weir covers are identified in UFSAR Figure 6.3-2 (DCD Figure 6.3-2), notes 2 and 4 respectively (notes 5 and 11 in the DCD), which state that each vent or overflow has an airtight cover that opens with a low differential pressure. Because the covers are specifically mentioned in the UFSAR, they are considered part of the plant design in the DCD. As such, the proposed LAR does not represent a physical change to the system from a functional design perspective. The proposed changes to detail the covers specifically in UFSAR Table 3.2-3, and clarify UFSAR Sections 6.3.2.2.3 and 6.3.2.2.7.2 to add the word covers to the description and the word weirs when discussing the overflow, do not constitute a difference in the design functions associated with the IRWST. The proposed changes to COL Appendix C Table 3.7-1, “Risk-Significant Components,” reflect the corrected and more specific nomenclature to be applied. The proposed changes to UFSAR Table 17.4-1 clarify the insights and assumptions related to assignment of these components to the D-RAP, but do not alter them.

Because no functional changes are proposed to the vent and overflow weir covers, and the components continue to perform their function as described in the UFSAR, the NRC staff concludes there is no reduction in safety as a result of the change. The NRC staff concludes there is reasonable assurance that the covers will perform the design function set forth as

described in the UFSAR and, therefore, the proposed changes regarding the vent and overflow weir covers are acceptable.

3.2.2 Control Rod Drive MG Sets

As described in Subsection 7.1.3.7 of UFSAR, the control rod drive MG sets provide the power to the control rod drive mechanisms through the reactor trip switchgear. Each of the two MG sets consists of a skid-mounted, motor-driven flywheel/generator. Two control cabinets house the rod drive supply control relays, which function to allow the reactor control rods to drop following a reactor trip signal from the non-safety-related diverse actuation system (DAS).

The licensee proposed the following changes to the VCSNS, Units 2 and 3, COL Appendix C:

- In Table 2.5.4-1, revise ITAAC Nos. 2.501.02a and 2.5.01.02c.i to identify that the generator field control relays are a part of the control cabinets for the rod drive MG sets.
- In Table 3-7-1, revise equipment name from "Rod Drive MG Sets (generator field control relays)" to "Control Cabinets for the Rod Drive MG Sets (generator field control relays)." Revise equipment tags from PLS-MG-01A/B to PLS-JD-RDM001, PLS-JD-RDM002.

The licensee proposed the following changes to the VCSNS, Units 2 and 3, UFSAR:

- Change UFSAR Table 17.4-1, "Risk-Significant SSCs Within the Scope of D-RAP [design reliability assurance program]," to specifically Revise "Rod Drive MG Sets (Generator Field Control Relays) (PLS-MG-01A/B)" to "Control Cabinets for the Rod Drive MG Sets (Generator Field Control Relays) (PLS-JDRDM001, PLS-JD-RDM002)."

In VCSNS Amendment No. 27 (ADAMS Accession No. ML15135A140), the licensee received approval to use latching control relays, instead of the breakers, to open the control rod drive mechanism MG-set generator field on a DAS signal. However, in VCSNS Amendment No. 27, the licensee did not take into account the separate tag numbers of the two portions of the control rod drive system (MG sets and control cabinets). Also, the control relays are located in the control cabinets, not with the MG sets. Hence, equipment tag and component description are not accurately reflected in the UFSAR.

Therefore, the licensee proposed changes to Table 2.5.1-4, "Inspections, Tests, Analyses, and Acceptance Criteria," Items 2.a and 2.c in COL Appendix C (and plant-specific DCD Tier 1). These changes identify that the control relays are contained in the control cabinets for the rod drive MG sets. The licensee also proposed to change the equipment tag numbers for the related control cabinets. The proposed changes in component description in the above two ITAAC items and equipment tag numbers are made to associate the control relays to the control cabinets, as opposed to the rod drive MG sets themselves. The proposed changes reflect a corrected and more specific nomenclature for Items 2.a and 2.c in Table 2.5.1-4. Additionally, the proposed changes to UFSAR Table 17.4-1 clarify the insights and assumptions related to assignment of these structures, systems, and components to the D-RAP, but do not alter them. These corrections and clarifications to the nomenclature of Table 2.5.1-4 Items 2.a and 2.c in COL Appendix C will support proper plant operation and maintenance, and thus will increase plant safety. Therefore, the benefits of the proposed changes outweigh the loss of standardization.

The NRC staff concludes that the required function of the control relay to open upon receipt of a DAS reactor trip signal is not affected by the proposed changes. Also, the NRC staff concludes

that the intent of ITAAC for DAS functions is not changed or adversely affected. Overall, the NRC staff concludes that the proposed changes to component description and equipment tag numbers do not adversely affect any safety-related functions or the function of the DAS. Because no functional changes are proposed in the LAR and the components continue to perform their function as described in the UFSAR, the NRC staff concludes there is no reduction in safety as a result of the change. The NRC staff concludes there is reasonable assurance that the relays will perform the design function set forth as described in the UFSAR and, therefore, the proposed changes regarding the control rod drive MG sets are acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations in 10 CFR 50.91(b) (2), the designated South Carolina State official was notified of the proposed issuance of the amendment. The State of South Carolina official had no comment.

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 (81 FR 78652; published on November 8, 2016) and the discussion in Section 4.0 above continues to support that proposed finding. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

Because the exemption is necessary to allow the changes proposed in the license amendment and because the exemption does not authorize any activities other than those proposed in the license amendment, the environmental consideration for the exemption is identical to that of the license amendment. Accordingly, the exemption meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 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 Commission 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 circumstance; (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 Tier 1 information specified by the licensee.

The Commission has concluded, based on the considerations discussed above that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by construction activities 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 concludes the changes proposed in this license amendment acceptable.