

SAFETY EVALUATION RELATED TO AMENDMENT NO. 41  
TO THE COMBINED LICENSES NOS. NPF-93 AND NPF-94  
SOUTH CAROLINA ELECTRIC & GAS COMPANY  
VIRGIL C. SUMMER NUCLEAR STATION UNITS 2 AND 3  
DOCKET NOS. 52-027 AND 52-028

1.0 INTRODUCTION

By letter dated May 18, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession Number ML15138A458 (Reference 1)), South Carolina Electric & Gas (SCE&G, the licensee) submitted a license amendment request (LAR) for U.S. Nuclear Regulatory Commission (NRC or Commission) review and approval for specific changes to the Virgil C. Summer Nuclear Station (VCSNS) Units 2 and 3 combined licenses (COLs) NPF-93 and NPF-94, respectively. The proposed changes would modify the VCSNS Units 2 and 3 Radiation Emergency Plan (REP) to expand the plume exposure pathway emergency planning zone (EPZ) boundary. The Evacuation Time Estimates (ETE) Study and Alert and Notification System (ANS) Design Report have also been revised to encompass the expanded EPZ boundary. The proposed changes to the plume exposure pathway EPZ for VCSNS Units 2 and 3 have been reviewed and approved by the State of South Carolina and Lexington County. The proposed changes to the plume exposure pathway EPZ for VCSNS Units 2 and 3, and the ANS Design Report have been reviewed and approved by the Federal Emergency Management Agency (FEMA). The proposed expansion of the plume exposure pathway EPZ for VCSNS Unit 1 was previously approved by the NRC in letter dated August 18, 2015 (ADAMS Accession Number ML15170A087).

2.0 REGULATORY EVALUATION

The regulatory requirements and guidance on which the NRC staff based its acceptance are as follows:

2.1 Regulatory Requirements

Section 47(b)(5) of 10 CFR Part 50 states:

Procedures have been established for notification, by the licensee, of State and local response organizations and for notification of emergency personnel by all organizations; the content of initial and followup messages to response organizations and the public has been established; and means to provide early notification and clear instructions to the populace within the plume exposure pathway Emergency Planning Zone have been established.

Section 47(b)(10) of 10 CFR Part 50 states, in part:

A range of protective actions has been developed for the plume exposure pathway EPZ for emergency workers and the public. In developing this range of actions, consideration has been given to evacuation, sheltering, and, as a supplement to these, the prophylactic use of potassium iodide (KI), as appropriate. Evacuation time estimates have been developed by applicants and licensees. Licensees shall update the ETEs on a periodic basis. Guidelines for the choice of protective actions during an emergency, consistent with Federal guidance, are developed and in place, and protective actions for the ingestion exposure pathway EPZ appropriate to the locale have been developed.

Section 47(c)(2) of 10 CFR Part 50 states, in part:

Generally, the plume exposure pathway EPZ for nuclear power plants shall consist of an area about 10 miles (16 km) in radius and the ingestion pathway EPZ shall consist of an area about 50 miles (80 km) in radius. The exact size and configuration of the EPZs surrounding a particular nuclear power reactor shall be determined in relation to local emergency response needs and capabilities as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries.

Section IV.3 of Appendix E to 10 CFR Part 50 states, in part:

Nuclear power reactor licensees shall use NRC approved evacuation time estimates (ETEs) and updates to the ETEs in the formulation of protective action recommendations...

Section IV.D.3 of Appendix E to 10 CFR Part 50 states, in part:

The licensee shall demonstrate that the appropriate governmental authorities have the capability to make a public alerting and notification decision promptly on being informed by the licensee of an emergency condition... The design objective of the prompt public alert and notification system shall be to have the capability to essentially complete the initial alerting and initiate notification of the public within the plume exposure pathway EPZ within about 15 minutes.

## 2.2 Guidance

Revision 2 of Regulatory Guide 1.101, "Emergency Response Planning and Preparedness for Nuclear Power Reactors" (Reference 2), provides guidance on methods acceptable to the NRC staff for implementing specific parts of the NRC's regulations.

Revision 1 of NUREG-0654/FEMA-REP-1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in support of Nuclear Power Plants" (Reference 3), provides a planning basis and specific acceptance criteria, including those addressing the plume exposure pathway and EPZ, to meet the requirements of 10 CFR 50.47(b) and Appendix E to 10 CFR Part 50.

Section I.D.2 of Reference 3, states, in part:

The choice of the size of the Emergency Planning Zones represents a judgment on the extent of detailed planning which must be performed to assure an adequate response base...Although the radius for the EPZ implies a circular area, the actual shape would depend upon the characteristics of a particular site.

Table 1 in Section I.D of Reference 3 further states:

Judgment should be used in adopting this distance [the ten mile radius for the plume exposure pathway] based upon considerations of local conditions such as demography, topography, land characteristics, access routes, and local jurisdictional boundaries.

Section III, "Recommended Planning Basis," of NUREG-0396, "Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear power Plants" (Reference 4), states:

It is expected that judgment of the planner will be used in determining the precise size and shape of the EPZs considering local conditions such as demography, topography and land use characteristics, access routes, jurisdictional boundaries, and arrangements with the nuclear facility operator for notification and response assistance.

NUREG/CR-7002, "Criteria for Development of Evacuation Time Estimate Studies" (Reference 5), provides detailed information and guidance for the developing or updating an ETE study.

### 3.0 TECHNICAL EVALUATION

The NRC staff has reviewed the licensee's technical analysis in support of the proposed VSCNS Units 2 and 3 REP changes. The staff's technical evaluation is detailed below.

#### 3.1 Background

The licensee states that the EPZ expansion for VSCNS Units 2 and 3 is being done at the request of Lexington County, South Carolina. On July 24, 2012, Lexington County Council passed a resolution to expand the existing Protective Action Zone (PAZ) D-2 in support of emergency planning efforts related to the continued operation of VCSNS Unit 1 and future operation of Units 2 and 3 currently under construction (Refer to Item 1 of Enclosure 6 to Reference 1). This change was requested because the construction of Units 2 and 3 will cause a shift in the geographic center of the VCSNS site, and as a result of this shift, the EPZ is being expanded for Lexington County only. This change was identified by the licensee as a reduction in effectiveness to the VCSNS Units 2 and 3 REP, and therefore, submitted to the NRC for prior approval.

The following documents were submitted by the licensee to support the staff's evaluation of the proposed change to the plume exposure pathway EPZ:

- An updated ANS Design Report, "Alert and Notification System Design Report," dated January 15, 2014 (Reference 6), to include the installation of two new sirens in PAZ D-2; and
- An updated ETE Study, "Development of Evacuation Time Estimates Expanded EPZ Boundary," dated April 2012 (Reference 7), to include the population of the expanded EPZ area.

The proposed changes to the plume exposure pathway EPZ for VCSNS Units 2 and 3 are supported by the State of South Carolina, as documented by letter dated November 6, 2014. The proposed change to the plume exposure pathway EPZ for VCSNS, Units 2 and 3 was reviewed and approved by the Federal Emergency Management Agency (FEMA) by letters dated August 6, 2013 (refer to Item 5 of Enclosure 6 to Reference 1) and July 10, 2014 (refer to Item 6 of Enclosure 6 to Reference 1). The proposed expansion of the plume exposure EPZ for VCSNS Units 2 and 3 is consistent with the proposed expansion for VCSNS Unit 1 that was previously approved by the NRC in letter dated August 18, 2015 (Reference 8).

### 3.2 Evaluation

In considering the proposed changes to the dimensions of the plume exposure pathway EPZ described in the VCSNS Units 2 and 3 REP, the staff also considered:

- The impact on the ability of the licensee to perform the protective actions recommendation functions required by 10 CFR 50.47(b)(10);
- The revised evacuation time estimates required by 10 CFR 50.47(b)(10) and Appendix E to 10 CFR Part 50; and
- The public notification requirements of Appendix E to 10 CFR Part 50.

#### Change 1 – Revised ANS Design Report

Section II.4 of the Memorandum of Understanding between the NRC and FEMA, contained in Appendix A to 44 CFR 353, states that FEMA is responsible, “to take the lead in offsite emergency planning and to review and assess offsite emergency plans and preparedness for adequacy.” 44 CFR Part 351.20(g) states that FEMA’s responsibility is to, “review and approve State radiological emergency plans and preparedness in accordance with FEMA procedures in 44 CFR Part 350.” Section V.A.2 of FEMA P-1028, “Program Manual: Radiological Emergency Preparedness,” (Reference 9), states that, “approval of the ANS is contained within FEMA’s approval of the State’s Radiological Emergency Response Plan in accordance with 44 CFR Part 350.5-350.7.”

The NRC staff verified that FEMA has reviewed and approved the updated ANS Design Report (Reference 6), as evidenced by a letter to the licensee dated July 10, 2014 (Enclosure 6 to Reference 1). In its evaluation, FEMA determined that the installation of two new sirens in PAZ D-2 provide reasonable assurance that the requirements of Section 47(b)(5) to 10 CFR Part 50, and Section IV.D.3 of Appendix E to 10 CFR Part 50, continue to be met for providing appropriate governmental authorities the capability to provide early notification and clear instructions to the populace within the expanded plume exposure pathway EPZ promptly on being informed by the licensee of an emergency condition. The proposed expansion of the plume exposure EPZ for VCSNS Units 2 and 3 is consistent with the proposed expansion for VCSNS Unit 1 that was previously approved by the NRC in letter dated August 18, 2015 (Reference 8).

#### Change 2 – Revised ETE Study

The expanded plume exposure pathway EPZ added approximately 1,187 people to the population of the EPZ on the outer boundary of PAZ D-2, including the area south and west of Chapin, South Carolina in Lexington County. In support of the expansion of the plume exposure pathway EPZ for VCSNS Units 2 and 3, the licensee provided an updated ETE Study (Reference 7), to include the additional areas within the expanded PAZ D-2.

Section IV.3.3 of the Statements of Consideration to the 2011 Emergency Preparedness Final Rule, “Enhancements to Emergency Preparedness Regulations (10 CFR Parts 50 and 52)” (Reference 10), states, in part:

The NRC will review the ETE analyses for completeness using NUREG/CR-7002, “Criteria for Development of Evacuation Time Estimate Studies,” the NRC guidance on ETE development issued with the final rule...The NRC will not approve ETE updates but will review them for completeness.

The NRC staff reviewed the updated ETE Study (Reference 7), incorporating the changes based on the expanded EPZ, against the guidance provided in NUREG/CR-7002 (Reference 5). The updated ETE Study was found to have been developed consistent with the guidance in NUREG/CR-7002, in support of the expansion of PAZ D-2 and provides the basis for protective action recommendations consistent with Section IV.3 of Appendix E to 10 CFR Part 50. The updated ETE report remains subject to future NRC inspection in its entirety. The proposed expansion of the plume exposure EPZ for VCSNS Units 2 and 3 is consistent with the proposed expansion for VCSNS Unit 1 that was previously approved by the NRC in letter dated August 18, 2015 (Reference 8).

Change 3 – Expansion of PAZ D-2 to include an area south and west of Chapin, SC (Lexington County)

The NRC staff reviewed the proposed changes and determined that they are consistent with the guidance provided in References 3 and 4, in that the expanded EPZ continues to meet the following criteria:

- While encompassing approximately a 10 mile radius from the VCSNS site, the precise size and shape of the expanded plume exposure EPZ also considers local conditions, such as demography, topography and land use characteristics, access routes, and jurisdictional boundaries.
- The choice of the size of the plume exposure EPZ represents a judgment on the extent of detailed planning which must be performed to assure an adequate response base. Detailed planning within the 10 miles would provide a substantial base for expansion of response efforts in the event that this proved necessary.

Based the criteria above and the current support of the implementing governmental authorities in the State of South Carolina and Lexington County for the proposed EPZ boundary expansion, as well as FEMA’s evaluation that offsite REP plans will continue to provide reasonable assurance of public health and safety, the proposed change to the plume exposure pathway EPZ for VCSNS Units 2 and 3 continues to meet the requirements of Section 47(c)(2) of 10 CFR Part 50. Additionally, the NRC staff finds that the proposed expansion of PAZ D-2 does not impact the protective action strategy or protective action guide thresholds as described in the VCSNS Units 2 and 3 REP. Therefore, the requirements of 10 CFR 50.47(b)(10) dealing with a range of protective actions for the plume exposure pathway EPZ for VCSNS Units 2 and 3 continue to be met and provide continued reasonable assurance of public health and safety.

Based on the licensee’s continued ability to meet the protective actions functions required by 10 CFR 50.47(b)(10), as described in Change 3 above, the revised ETE required by 10 CFR 50.47(b)(10) and Appendix E to 10 CFR Part 50, as described in Change 2 above, and the public notification requirements of Appendix E to 10 CFR Part 50, as described in Change 1 above, the NRC staff finds the proposed changes to the EPZ boundary to PAZ D-2 for VCSNS

Units 2 and 3 are acceptable. The proposed expansion of the plume exposure EPZ for VCSNS Units 2 and 3 is consistent with the proposed expansion for VCSNS Unit 1 that was previously approved by the NRC in letter dated August 18, 2015 (Reference 8).

#### 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 State 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, and there has been no public comment on such finding (*Federal Register*, 80 FR 585120, dated September 29, 2015). 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.

#### 6.0 CONCLUSION

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 operation in the proposed manner; (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations; and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

#### 7.0 REFERENCES

1. SCE&G Letter, "V.C. Summer, Units 2 and 3-LAR 13-39 Request for NRC Approval of Radiation Emergency Plan Change" dated May 18, 2015 (ADAMS Accession No. ML15138A458).
2. Regulatory Guide 1.101, Revision 2, "Emergency Planning and Preparedness for Nuclear Power Reactors," dated October 31, 1981 (ADAMS Accession No. ML090440294).
3. NUREG-0654/FEMA REP-1, Revision 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," dated November 30, 1980 (ADAMS Accession No. ML040420012).
4. NUREG-0396, "Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plants," dated December 1978 (ADAMS Accession No. ML051390356).

5. NUREG/CR-7002, "Criteria for Development of Evacuation Time Estimate Studies," dated November 2011 (ADAMS Accession No. ML113010515).
6. Alert and Notification System Design Report," Revision 1, dated January 15, 2014 (ADAMS Accession No. ML14363A376).
7. "Development of Evacuation Time Estimates Expanded EPZ Boundary, Revision 5," dated April 2012 (ADAMS Accession No. ML14363A373).
8. U.S. Nuclear Regulatory Letter, "Virgil C. Summer Nuclear Station, Unit 1 – Issuance of Amendment to Revise the Radiation Emergency Plan," (ADAMS Accession No. ML15170A087).
9. FEMA P-1028, "Program Manual: Radiological Emergency Preparedness," dated January 2015 (Available at <http://www.fema.gov/>).
10. Final Rule, "Enhancements to Emergency Preparedness Regulations," published in the *Federal Register* (76 FR 72560) and associated Statements of Consideration (76 FR 72589) dated November 23, 2011.