



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

August 13, 2013

Mr. Thomas D. Gatlin
Vice President, Nuclear Operations
South Carolina Electric & Gas Company
Virgil C. Summer Nuclear Station
Post Office Box 88, Mail Code 800
Jenkinsville, SC 29065


SUBJECT: VIRGIL C. SUMMER NUCLEAR STATION, UNIT NO. 1 (VCSNS) – REQUEST
FOR ADDITIONAL INFORMATION (TAC NO. ME7586)

Dear Mr. Gatlin:

By letters dated November 15, 2011, January 26 and October 10, 2012, the South Carolina Electric & Gas Company (SCE&G, the licensee) submitted a license amendment request (LAR) to revise Facility Operating License Number NPF-12 for the Virgil C. Summer Nuclear Station, Unit No. 1. The LAR would permit transition of the fire protection licensing basis from Title 10 of the *Code of Federal Regulations (10 CFR)*, Section 50.48(b), to 10 CFR 50.48(c), "National Fire Protection Association Standard NFPA 805" (NFPA 805).

The staff has determined that additional information is needed to continue the review as discussed in the Enclosure. We request that SCE&G respond to these RAIs within sixty (60) calendar days from the date of this letter. Please note that the staff's review is continuing and further RAIs may be developed.

Sincerely,


Robert E. Martin, Senior Project Manager
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-395

Enclosure: Request for Additional Information

cc w/encl: Distribution via Listserv

REQUESTS FOR ADDITIONAL INFORMATION
LICENSE AMENDMENT REQUEST TO ADOPT
PERFORMANCE-BASED NATIONAL FIRE PROTECTION ASSOCIATION
STANDARD 805 FOR FIRE PROTECTION
FOR VIRGIL C. SUMMER NUCLEAR STATION, UNIT NO. 1
DOCKET NO. 50-395

By letters dated November 15, 2011, January 26 and October 10, 2012, the South Carolina Electric & Gas Company (SCE&G, the licensee) submitted a license amendment request (LAR) to revise Facility Operating License Number NPF-12 for the Virgil C. Summer Nuclear Station, Unit No. 1 (VCSNS). The LAR would permit transition of the fire protection licensing basis from Title 10 of the *Code of Federal Regulations (10 CFR)*, Section 50.48(b), to 10 CFR 50.48(c), "National Fire Protection Association Standard NFPA 805" (NFPA 805).

The staff has determined that additional information is needed to complete the review as discussed below. The abbreviations in the following RAIs stand for the following: MP [Monitoring Program], SSD [Safe Shutdown], FPE [Fire Protection Engineering], FM [Fire Modeling], PRA [Probabilistic Risk Assessment], and RR [Radioactive Release].

Fire Modeling (FM) RAI 01.01

In the October 10, 2012 letter (ADAMS Accession No. ML12297A218), SCE&G provided additional information pertaining to the use of detector actuation – quasi steady (DETECT-QS) to estimate detector activation (Fire Modeling RAI 01.n). The response stated: "The smoke detection model in NUREG 1805 was used so there is no consideration for obstructions in smoke detection calculations. When suppression was credited, there are two approaches: 1) detailed DETECT calculations are available to justify activation...."

Please provide justification for using DETECT-QS in cases where the underlying modeling assumptions do not reflect actual plant conditions (e.g., no flat ceiling is present, numerous obstructions within the geometry, etc.).

FM RAI 01.02

In the October 10, 2012 letter, SCE&G described how fire location effects are accounted for in the zone of influence (ZOI) and in severity factor calculations (Fire Modeling RAI 01.p).

- a. Please provide further explicit discussion of fire location effects in the consolidated model of fire and smoke transport (CFAST) hot gas layer (HGL) calculations.
- b. Explain how and where (specific areas and scenarios) wall and corner effects were accounted for in the HGL calculations.

FM RAI 01.03

The SCE&G October 10, 2012 letter provided additional information pertaining to wall and

corner effects for fire modeling in areas where Section 4.2.4.1 of National Fire Protection Association Standard 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants", 2001 Edition, (NFPA 805) was used (Fire Modeling RAI 01.s). The response states "The offset distance between a fire and a wall or a corner boundary at which the boundary influences the entrainment likely varies with the fire size. It has been observed to range from as little as a few inches to several feet (Williamson et al., 1991, Nuclear Regulatory Commission (NRC), 2005)."

Please provide the following:

- a. Justification as to why the Williamson reference is applicable to fire sizes exceeding 150 kilowatt (kW) and ignition source fire areas greater than one square foot (1 ft²). Address the wall (or corner) effects when a fire is within 2 feet of a wall (or both walls in a corner).
- b. Justification for why for Fire Areas CB10, CB12, and CB18, for the wall or corner scenario are only used for the sensitivity case instead of as the base fire modeling case.
- c. An updated analysis, in which the maximum expected fire scenario (MEFS) is increased as described in this RAI and an assessment of the revised safety margins in light of this change.
- d. Justification for the acceptability of the updated analysis in terms of meeting the requirements of Section 4.2.4.1 of NFPA 805.

FM RAI 01.04

The SCE&G October 10, 2012 letter provided additional information pertaining to the pipe insulation in area CB10 and how it could affect the consideration of intervening combustibles in the fire modeling analysis (Fire Modeling RAI 01.u). The response stated: "The insulation is fiberglass, per ASTM C547, having a thermal conductivity less than or equal to 0.3 Btu per inch per hour per square foot per degree Fahrenheit, (Btu-in/hr-ft²- °F) (0.043 W/m-K) at 200 °F (93 °C). The insulation is jacketed with a vapor barrier laminate of aluminum foil and glass cloth, with lap adhesive. Due to the non-combustible nature of the material, the insulation is not considered an intervening combustible for modeling purposes."

In terms of material flammability, ASTM C547, "Standard Specification for Mineral Fiber Pipe Insulation," makes reference to a fire testing standard, ASTM E84, "Standard Test Method for Surface Burning Characteristics of Building Materials." ASTM C547 specifies that pipe insulation should have minimum performance, when testing in accordance with ASTM E84, of 25 for the flame spread index (FSI) and 50 for the smoke developed index (SDI), respectively.

Provide the FSI and SDI of the pipe insulation located in CB10.

FM RAI 09.01

In a letter dated October 10, 2012, SCE&G provided additional information pertaining to administrative controls to ensure that model assumptions will not be violated during post-transition (Fire Modeling RAI 09). The response was limited in its details about technical assumptions, procedures for maintaining the transient staging areas, and defense-in-depth (DID) considerations.

Please provide the following:

- a. A description of how the technical results of the fire modeling studies will be translated into administrative controls (procedures) that will be used in the plant.
- b. A description of the training to be provided to operations and maintenance personnel (method of training, frequency, testing, etc.) regarding the new administrative controls.
- c. A description of the process being proposed to verify compliance with the administrative controls.
- d. A description of how the proposed approach meets the NEI 04-02, "Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program under 10 CFR 50.48(c)," Revision 2, (ADAMS Accession No. ML081130188) guidance that "over-reliance on performing programmatic activities" is avoided.

FM RAI 09.02

The performance-based fire modeling approach in fire areas C1310, C1312, CB18 and IB11, is crediting the use of a detailed administrative controls methodology in the performance-based fire modeling analyses.

Please provide the following:

- a. Justification for implementing an administrative controls program that deviates from the standard of practice used throughout the nuclear industry (typically, floor sections are marked indicating those areas where transient combustibles are not allowed).
- b. Description of those actions to be taken to ensure acceptable personnel performance with respect to these administrative controls.
- c. Justification for how the fire modeling analyses accounts for violations of location of transient combustibles (in three dimensional space), type of transient combustibles, and quantity of transient combustibles, such that the plant can still meet the nuclear safety and radioactive release performance criteria, goals, and objectives.
- d. Justification that fire area IB11 has sufficient defense-in-depth to account for not having automatic or manual fixed fire suppression installed.

Fire Protection Engineering (FPE) RAI 14.01

In the October 10, 2012 letter, SCE&G provided a table depicting items from LAR Attachment A, Table B-1, that have been identified as "Complies by Alternative (CA)" or "Complies with Fire Protection Engineering Equivalency Evaluation (CE)" for which NRC approval is being sought (FPE RAI 14). Since the compliance strategies in the LAR are defined differently than in NEI 04-02, additional information is still required. The following requests are made with regard to those elements in LAR Attachment A, Table B-1, and the responses provided to FPE RAI 14:

Please provide the following:

- a. Attachment L Approval Request in accordance with 10 CFR 50.48 (c)(2)(vii), for the use of a performance based method to manage a surveillance program as proposed in the first row, last column, of the table for Table B-1, Section 3.2.3(1) Inspection, Testing, and Maintenance Procedures, (EPRI Technical Report 1006756 Fire Protection Surveillance Optimization and Maintenance Guide).
- b. A summary of the related engineering evaluation that supports the CE compliance strategy provided in Table B-1, Section 3.3.5.3, for electric cable construction flame propagation testing. The summary should include:
 - i. A description of the Fire Protection Engineering Evaluation performed and how it relates to FAQ 06-0022, "Acceptable Cable Flame Propagation Tests," (ADAMS Accession No. ML091240278).
 - ii. A description of what type of flame propagation testing was performed for existing cables.
 - iii. Justification for the use of the alternatives provided in FAQ 06-0022 regarding flame propagation testing of new cables.
- c. A detailed description of how metal roof construction, identified in Table B-1, Section 3.3.6, meets the requirements of Section 3.3.6 of NFPA 805.

FPE RAI 14.02

Attachment L, "NFPA 805 Chapter 3 Requirements for Approval (10 CFR 50.48 (c)(2)(vii)" of the LAR includes 11 approval requests (L1 through L11). In each of the requests under "Acceptance Criteria Evaluation, Safety Margin and Defense-in-Depth", the following statement is provided: "The margin of safety that is inherent within the NFPA 805 Fire PRA and performance based review and is acceptable to ensure that no conditions are inadvertently produced that would challenge the ability of the fire protection features individually and or combined as defense-in-depth."

Please provide more details that explicitly describe how safety margin and DID are specifically maintained for each approval request. In addition, if any new approval requests are submitted, ensure that the safety margin and DID discussion is specific to each approval request.

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Robert E. Martin, Senior Project Manager
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ADAMS Accession No.: ML13218A195

* By email

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