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

July 11, 2014

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 – REQUEST FOR ADDITIONAL INFORMATION REGARDING LICENSE AMENDMENT REQUEST TO ADOPT NATIONAL FIRE PROTECTION ASSOCIATION STANDARD 805 (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 NRC 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 30 days of the date of this letter. Please note that the NRC staff's review is continuing and further requests for information may be developed.

Sincerely,

Shawn Williams

Shawn Williams, 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

Probabilistic Risk Assessment RAI 64.01

In a letter dated October 10, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession Number ML12297A218), the licensee responded to PRA RAI 64 and provided the results of a sensitivity analysis from applying a variance method that incorporates component failure rate error factors in developing the mean interfacing system loss of coolant accident (ISLOCA) frequency. The results showed an increase by a factor of 3.7 in internal events core damage frequency (CDF) to 5.0E-05 per year and an increase by a factor of 145 in internal events large early release frequency (LERF) to 3.7E-05 per year. The licensee stated that these increases are dominated by the variance in the rupture failure rate for motor-operated valves (MOVs). The NRC staff notes that while the ISLOCA frequency calculation method utilized in the internal events probabilistic risk assessment (IEPRA) has no impact on the Fire PRA (FPRA), the large increase in CDF and LERF shown in this sensitivity analysis results in the total CDF (including internal events, fire events, and seismic events) and LERF exceeding the Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," Revision 2, May 2011 (ADAMS Accession No. ML100910006) risk guidelines for Region II so that only very small risk increases are allowed. Assess the relevance of more recent data on rupture failure rate of MOVs to the analysis, including updating the contribution to total CDF and LERF from this issue.

Alternately, additional analysis or modifications may be necessary to meet RG 1.174 guidelines. Provide a discussion of the potential changes to the overall analysis, including any plant changes needed to meet RG 1.174 guidelines as developed in response to PRA RAI 98, as well as the updated risk measures, CDF and LERF.

PRA RAI 66.03

In a letter dated May 2, 2014, (ADAMS Accession No. ML14125A274) the licensee responded to PRA RAI 66.02 and stated that "additional cable protection modifications were added to protect the CREP panels in CB04, CB06, CB15, and CB17" and "additional cable protection modifications were added to the latest fire PRA model to protect several additional functions including prevention of spurious ESFAS, prevention of RWST draindown, isolation of spray suction, and EDG loading." It does not appear, however, that these modifications are included in the updated LAR Attachment C provided in the letter dated February 25, 2014 (ADAMS Accession No. ML14063A455), nor are they described in the updated LAR Attachment S, Table

S-1, provided in the letter dated October 14, 2013 (ADAMS Accession No. ML13289A194). Identify which of the ECR modification(s) in LAR Attachment S, Table S-1 includes these "additional cable protection modifications." In addition, describe all of the individual modifications included under this ECR modification(s), and describe where each of these individual modifications is specifically identified in the LAR to either make a VFDR (DROID) deterministically compliant or to only reduce risk.

PRA RAI 68.01

In a letter dated April 1, 2013 (ADAMS Accession Number ML13092A333), the licensee responded to PRA RAI 68 and explained that for grouped transient zones, (defined as zones in which all the fixed and transient ignition sources are failed completely at time zero), 120 new scenarios were identified for which walk downs showed that cable trays extend across transient zone boundaries. The NRC staff noted that these new scenarios do not appear to have been specifically included in the FPRA model, however, the results of an evaluation showed the scenarios increase the fire CDF by 1.4E-06 per year. While not significant to transition, the NRC staff notes that the self-approval acceptance guidelines are much smaller than the transition acceptance guidelines and therefore addition of these 120 new scenarios could affect post-transition plant change evaluations. Discuss how these scenarios will be included in post-transition plant change evaluations if they are not specifically modeled in the FPRA.

PRA RAI 85.02

In a letter dated November 26, 2013 (ADAMS Accession No. ML13333A280), the licensee responded to PRA RAI 85.01 and stated that the FPRA is currently being updated based on changes due to RAI responses and that the model has been converted to use the most recent version of the FRANX software that will allow uncertainties for CDF and LERF to be provided. Furthermore, in a letter dated May 2, 2014, (ADAMS Accession No. ML14125A274) the licensee responded to PRA RAI 98 and stated that the updated uncertainty analysis utilizing this capability supports the conclusion that the estimated CDF and LERF are not significantly affected by state-of-knowledge correlations (SOKC). Clarify if delta (Δ) CDF and ΔLERF are significantly affected by SOKC (i.e., RG 1.174 risk guidelines are exceeded). If significantly affected, discuss the results and any changes made to the PRA model to meet the RG 1.174 risk guidelines.

PRA RAI 97.01

In a letter dated January 9, 2014 (ADAMS Accession No. ML14013A074), the licensee responded to PRA RAI 97 and stated that the seal package modeled in the PRA supporting the LAR is based on the FlowServe N9000 seals and that the Flowserve N9000 seal package will be installed. The response also states that LAR Attachment S, Table S-2, item 22 also requires update of the PRA to reflect the as-built modifications.

a) Provide technical design and testing evaluations that support the RCP seal PRA model.

b) Summarize the differences and similarities between the FlowServe RCP PRA model in the PRA and the PRA models in "Model for Failure of RCP Seals Given

Loss of Seal Cooling in CE NSSS Plants," WCAP-16175-P-A, Rev. 0, March 2007 (ADAMS Accession No. ML071130391). In addition, discuss the seal logic model and the basic events values assumed in the FPRA.

c) Summarize whether any testing will be required to confirm the projected reliability of the seals and how such testing will be reflected in the FlowServe RCP PRA.

d) Implementation Item 22 does not discuss the actions that will be taken should the change in risk for the updated Fire PRA model following installation of the as-built modifications not meet the RG 1.174 risk guidelines. Identify when a confirmatory evaluation of the achieved NFPA-805 transition change in risk that includes the installed and tested seals will be completed, and what action(s) will be taken should the RG 1.174 risk guidelines not be met.

PRA RAI 100

In letters dated October 10, 2012 (ADAMS Accession No. ML12297A218), April 1, 2013 (ADAMS Accession No. ML13092A333), November 26, 2013 (ADAMS Accession No. ML1333A280), January 9, 2014 (ADAMS Accession No. ML14013A074), and May 2, 2014 (ADAMS Accession No. ML14125A274), the licensee responded to PRA RAIs 08, 66, 95, 10.02, and 10.03 and described the methodology to evaluate the risk of main control room (MCR) abandonment scenarios, including the fault tree that is used to model accident scenarios with MCR evacuation followed by a failure to control the reactor remotely from the Control Room Evacuation Panel (CREP) and associated recovery actions. The NRC staff noted that the MCR evacuation logic includes basic events for 1) evacuation due to the loss of habitability in the MCR, 2) evacuation due to loss of control (inability to successfully shutdown from the MCR), 3) pre-mature evacuation when control from the MCR is still available, 4) failure to evacuate when control from the MCR is lost, and 5) failure to successfully shutdown following abandonment (with and without station blackout [SBO]). In addition to abandonment on loss of habitability in the MCR, abandonment on loss of control scenarios are evaluated in Fire Areas CB04, CB06, CB15, and CB17 (MCR).

Furthermore, regarding loss of MCR habitability scenarios, the licensee stated that because the MCR abandonment logic acts by Boolean reduction in combination with the rest of the model, it cannot be used to develop a CCDP or CLERP for a given scenario. The licensee further stated that it is not independent of the rest of the model, and cannot be quantified independently for the scenarios to yield an abandonment-only CCDP or CLERP at the scenario level. As a result, the licensee provided the entire range of CCDPs for each of the four abandonment areas, which included the CCDPs for both abandonment and non-abandonment scenarios. However, the updated LAR Attachment G (submitted in a letter dated February 25, 2014, ADAMS Accession No. ML14063A455) describes two human error probabilities (HEPs) representing failure to successfully implement the new MCR abandonment procedure: 1) 6.2E-02 for non-SBO scenarios and 2) 9.97E-02 for SBO scenarios. In addition, in a letter dated October 10, 2012 (ADAMS Accession No. ML12297A218), the licensee responded to Fire Modeling RAI 01.c and indicated that the probability of having to abandon the MCR due to habitability is about 9E-02 which suggests that the CCDP for MCR abandonment scenarios due to loss of habitability is less than 1E-02. Provide the following:

a) The results (i.e., CDF, LERF, ΔCDF and ΔLERF) of a sensitivity study that removes credit for MCR abandonment on loss of control (i.e., only credits remote shutdown due to loss of habitability in the MCR due to a fire). As a part of the response, you may also present additional information that supports the analysis for loss of control abandonment. This additional information should include detailed discussion of the MCR evacuation fault tree logic, justification for each basic event probability, description and justification for the criteria used to make the abandonment on loss of control decision, and a characterization of the types of scenarios and range of CCDPs for MCR abandonment scenarios due to loss of control only.

b) Characterize the types of scenarios and range of CCDPs for MCR abandonment scenarios due to loss of habitability only. If fire-induced failures of MCR functions are not considered in abandonment scenarios, provide justification for their exclusion. Describe how credited abandonment actions from the abandonment procedure address loss of function or spurious actions that may occur as a result of a fire leading to abandonment. If abandonment actions do not account for these effects, then provide an updated response to PRA RAI 98, that incorporates fire-induced failures in the modeling of abandonment scenarios. In the response, address MCR abandonment scenarios due to loss of habitability and loss of control separately.

PRA RAI 101

In a letter dated October 10, 2013 (ADAMS Accession No. ML12297A218) the licensee responded to PRA RAI 13. In a letter dated November 26, 2013 (ADAMS Accession No. ML13333A280) the licensee provided an updated LAR Attachment S, Table S-2 and provided a new Implementation Item (Item 22) to validate/update the FPRA model to reflect the as-built modifications and to verify that the reported change-in-risk is either less than that estimated in the LAR Attachment W, or is within the guidance of RG 1.174. However, the implementation item does not discuss the actions to be taken if RG 1.174 guidelines are not met.

Describe the process that will ensure appropriate actions are taken if RG 1.174 guidelines are not met that will ensure that additional analysis and/or additional plant modifications will be made to meet RG 1.174 guidelines. Also, discuss the process for updating the FPRA to reflect completion of other implementation items in addition to as-built modifications.

July 11, 2014

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Sincerely,

/RA/
Shawn Williams, Senior Project Manager
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

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Enclosure:
Request for Additional Information

cc w/encl: Distribution via Listserv

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ADAMS Accession No.: ML14182A473 * by email

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