



Ronald A. Jones
Vice President
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February 16, 2017
NND-17-0105
10 CFR 50.90
10 CFR 52.63

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
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Washington, DC 20555

Virgil C. Summer Nuclear Station (VCSNS) Units 2 and 3
Combined License Nos. NPF-93 and NPF-94
Docket Nos. 52-027 & 52-028

Subject: LAR 16-05 S01 Supplement to License Amendment and Exemption Request:
Slab Thickness Changes between Column Lines I to J-1 and 2 to 4 at Elevation
153'-0"

- References:
1. NND-16-0236 South Carolina Electric & Gas Company (SCE&G) LAR 16-05 License Amendment and Exemption Request: Slab Thickness Changes between Column Lines I to J-1 and 2 to 4 at Elevation 153'-0" – July 5, 2016 [ML16187A392]
 2. 2016/12/06 Summer RAI for SER - FW: Summer RAI LAR 16-05 – December 06, 2016 [ML16341B437]

In accordance with the provisions of 10 CFR 50.90, South Carolina Electric & Gas Company (SCE&G), acting on behalf of itself and the South Carolina Public Service Authority (Santee Cooper), requests an amendment to the Virgil C. Summer Nuclear Station (VCSNS) Units 2 and 3 combined licenses (COLs) numbers NPF-93 and NPF-94, respectively. The requested amendment proposes to change thickness of one floor in the auxiliary building located between Column Lines I to J-1 and 2 to 4 at Elevation 153'-0". The requested amendment proposes to depart from plant-specific Design Control Document (DCD) Tier 1 information with corresponding changes to the associated COL Appendix C information and Tier 2* information in the Updated Final Safety Analysis Report (UFSAR). This activity has been determined to require prior NRC approval.

This letter supplements LAR 16-05 (Reference 1) via Enclosure 5 to address a Request for Additional Information (RAI) from the NRC Staff, which was transmitted by electronic mail (email) to SCANA via Reference 2, to support review of Reference 1.

This letter contains no regulatory commitments.

In accordance with 10 CFR 50.91, SCE&G is notifying the State of South Carolina of this LAR by transmitting a copy of this letter and enclosures to the designated State Official.

Should you have any questions, please contact Mrs. April Rice by telephone at (803) 941-9858, or by email at arice@scana.com.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on this 16th day of February, 2017.

Sincerely,



Ronald A. Jones
Vice President
New Nuclear Operations

MMD/RAJ/mmd

- Enclosure 1-4: Previously submitted with the original LAR 16-05 via letter NND-16-0236
- Enclosure 5: Virgil C. Summer Nuclear Station Units 2 and 3 – Response to NRC Request for Additional Information (LAR 16-05 S01)

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South Carolina Electric and Gas Company
Virgil C. Summer Nuclear Station (VCSNS) Units 2 and 3

NND-17-0105

Enclosure 5

Response to NRC Request for Additional Information
(LAR 16-05 S01)

(This Enclosure consists of 4 pages, including this cover page)

The following is RAI Question 03.08.04-1 provided via reference 2 by the NRC Staff regarding the review of Virgil C. Summer Nuclear Station (VCSNS) Units 2 and 3 License Amendment Request (LAR) 16-05, which was submitted via reference 1. The information below provides the SCANA responses to the RAI.

RAI Question 03.08.04-1:

Pursuant to 10 CFR 52.98(c) and in accordance with 10 CFR 50.90, South Carolina Electric and Gas Company (SCE&G) in a letter dated July 5, 2016 requested a license amendment (LAR 16-05) to change thickness of one floor in the auxiliary building above the Component Cooling Water System (CCS) room located between Column Lines I to J-1 and Column Lines 2 to 4 at Elevation 153'-0". The proposed change will depart from plant-specific AP1000 Design Control Document (DCD) Tier 1 information with corresponding changes to the associated COL Appendix C information and Tier 2* information in the Updated Final Safety Analysis Report (UFSAR).

The proposed change revises the thickness of the floor of the reinforced concrete composite slab (RCCS) from 0'-9" to 1'- 3". The licensee in Enclosure 1, Section 2.0 in paragraph 2 of the LAR 16-05, justifies the change in slab thickness by stating:

The proposed changes to the design of the subject floor as described in the UFSAR are needed because of a discrepancy between the detailed design and licensing basis that was identified after design finalization was reached.

The licensee further in the same paragraph indicates:

The proposed change to increase the floor thickness at the location indicated above does not change the design requirements and evaluation methods for composite floors in the auxiliary building incorporated in UFSAR Subsection 3.8.4 including conformance with American Institute of Steel Construction (AISC) N690 and American Concrete Institute (ACI) 349.

Consistent with SRP Section 3.8.4, the applicant has committed to use American Institute of Steel Construction (AISC) N690 and American Concrete Institute (ACI) 349 for the design and analysis of reinforced concrete composite elements of category I safety-related structures and components. The licensee indicates that the slab thickness changes is in conformance with ACI 349 and has no significant effect on margin of safety. Since the RCCS thickness change leads to increased dead load (DL) by approximately 67%, the staff in order to complete its safety review and conclusions requests the following additional information:

- a) Describe the *discrepancy between the detailed design and licensing basis that was identified after design finalization was reached*, as mentioned in the above paragraph, to justify why the 9" thick slab does not serve the desired function and causes to change the thickness to 15".
- b) Explain the effect of the increase in load from the thickened slab on the margin of safety, and
- c) Address how the increase in mass of the slab was accounted for in the dynamic and static analysis of the structure.

SCANA Response to RAI Question 03.08.04-1:

- a) After issuance of the AP1000 Standard Design Certification, licensing basis compliance reviews were conducted to verify that the design documentation met licensing basis commitments. During the compliance review, it was identified that the licensing basis showed a floor thickness of 9" whereas the design drawings and analysis was performed using a 15" thickness. After extended review of the relevant design drawings and analysis, it is confirmed that the design and analysis qualify this 15" floor to meet its function. The 9" dimension shown in the licensing basis is an editorial inconsistency from the thickness used in the design drawings and calculations.

The floor design utilizing the 15" slab meets the applicable design requirements of AISC N690 and ACI 349 for the applied loads. The 15" thick slab provides sufficient safety margins in the structural design. Please refer to the Response to NRC Comment b) for the summarized interaction ratios of the 15" slab design.

- b) The interaction ratios of the 15" slab design for key structural characteristics of the floor are summarized in the table below:

Table 1: Interaction Ratio of 15" Slab Design

Structural Element	Load Combination	Item	Interaction Ratio 15" Slab (Note 1)
Steel Beams Supporting the Ceiling of Room 12561	Construction	Bending Stress	0.42
		Shear Stress	0.21
		Displacement (Note 2)	0.19
	Normal	Bending Stress	0.27
		Shear Stress	0.29
		Displacement (Note 2)	0.01
	Extreme	Bending Stress	0.30
		Shear Stress	0.51
Concrete Slab in the Ceiling of Room 12561	Normal	Flexure	0.11
		Shear	0.22
	Extreme	Flexure	0.51
		Shear	0.54

Notes:

- Maximum allowable interaction ratio is 1.0.
- Actual maximum vertical displacement in inches is provided as opposed to an interaction value to provide a better understanding of the displacement behavior of the beam.

The structural design codes AISC N690 and ACI 349 are endorsed by the AP1000 licensing basis. The criteria and requirements of AISC N690 and ACI 349 provide a margin of safety to structural failure. Overall it is noted from the table above that the interaction values for the 15" slab are considerably lower than the 1.0 limit. The design of the ceiling of room 12561 conforms to criteria and requirements in ACI 349 and AISC N690 and therefore maintains the margin of safety.

- c) As noted in the Response to NRC Comment a), both the global seismic analysis and the local floor slab design are currently performed based on a 15" slab thickness. With regard to the local slab design, Table 1 shown in the Response to NRC Comment b) demonstrates that the 15" slab serves the structural functions in flexure, shear and deflection under the construction/normal/extreme loading conditions.

With regard to the global seismic analysis, it is worth noting that dynamic analysis is performed in the global model with the auxiliary building and shield building modeled; the mass of the ceiling of room 12561 is less than 0.1% of the total mass of the global model. This insignificant mass has negligible impact on the seismic behavior of the nuclear island (shield building and auxiliary building).