Southern Nuclear

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10 CFR 50.90
10 CFR 52.63

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Southern Nuclear Operating Company
Vogtle Electric Generating Plant Units 3 and 4
Supplement to Request for License Amendment and Exemption:
Addition of In-Containment Refueling Water Storage Tank
to Radiation Analyses (LAR-19-003S1)

Ladies and Gentlemen:

On July 16, 2019 [ADAMS Accession Number ML19197A278], pursuant to 10 CFR 52.98(c) and in accordance with 10 CFR 50.90, Southern Nuclear Operating Company (SNC), submitted a request for an amendment to the combined licenses (COLs) for Vogtle Electric Generating Plant (VEGP) Units 3 and 4 (License Numbers NPF-91 and NPF-92, respectively). The license amendment request (LAR)-19-003 proposed to depart from Updated Final Safety Analysis Report (UFSAR) Tier 2 information (which includes the plant-specific Design Control Document (DCD) Tier 2 information) and involved related changes to plant-specific Tier 1 information, with corresponding changes to the associated COL Appendix C information. Pursuant to the provisions of 10 CFR 52.63(b)(1), an exemption from elements of the design as certified in the 10 CFR Part 52, Appendix D, Design Certification Rule was also requested for the plant-specific DCD Tier 1 material departures.

The LAR-19-003 submittal built upon discussions held with NRC Staff on March 26, 2019 [ML19091A294] and May 23, 2019 [ML19154A558] and proposed changes to incorporate the contribution of design basis passive residual heat removal (PRHR) heat exchanger (HX) leakage to the in-containment refueling water storage tank (IRWST) into normal operating doses. The change to normal operating doses involves crediting the north-east wall and west wall of the IRWST as radiation shielding walls in plant-specific Tier 1 (and associated COL Appendix C) Table 3.3-1.

On August 26, 2019, NRC Staff provided, via email [ML19240A976], four questions regarding SNC's LAR-19-003 submittal. SNC and NRC Staff discussed the questions during the September 5, 2019 weekly public meeting [ML19253A079]. This supplement provides written responses to those questions.

This supplement does not impact the scope, technical content, or conclusions of the Technical Evaluation, Significant Hazards Consideration Determination, or Environmental Considerations of LAR-19-003 provided in SNC letter dated July 16, 2019 [ML19197A278].

Enclosures 1 through 4 were provided with the original LAR submittal [ML19197A278].

Enclosure 5 provides written responses to the NRC Staff's questions provided via email August 26, 2019.

Enclosure 6 provides revisions to portions of the markups previously provided in Enclosure 3. Revision bars in the right-hand margin are provided as a reviewer's aid. Portions of Enclosure 3 not addressed in Enclosure 6 are unaffected by this supplement.

This letter contains no regulatory commitments. This letter has been reviewed and determined not to contain security-related information.

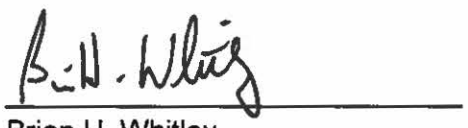
SNC's request for NRC staff approval of the license amendment by January 13, 2020, to support completion of Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) activities associated with the north-east and west walls of the IRWST, is not changed by this supplement. SNC expects to implement this proposed amendment within 30 days of approval of the requested change.

In accordance with 10 CFR 50.91, SNC is notifying the State of Georgia of this LAR supplement by transmitting a copy of this letter and its enclosures to the designated State Official.

Should you have any questions, please contact Mr. Adam Quarles at (205) 992-7031.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 3rd of October 2019.

Respectfully submitted,



Brian H. Whitley
Director, Regulatory Affairs
Southern Nuclear Operating Company

Enclosures
1) through 4) previously provided in original submittal of LAR-19-003 dated July 16, 2019 [ML19197A278]
5) Supplement to Request for License Amendment: Addition of In-Containment Refueling Water Storage Tank to Radiation Analyses (LAR-19-003S1)
6) Revisions to Proposed Changes to Licensing Basis Documents (LAR-19-003S1)

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Southern Nuclear Operating Company

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Enclosure 5

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

Supplement to Request for License Amendment:

Addition of In-Containment Refueling Water Storage Tank to Radiation Analyses

(LAR-19-003S1)

(This Enclosure consists of 3 pages, including this cover page.)

On August 26, 2019, NRC Staff provided, via email, four questions regarding Southern Nuclear Operating Company's (SNC's) license amendment request (LAR)-19-003. The NRC Staff's questions and SNC's responses are below.

NRC Staff Questions

1. The UFSAR indicates that the minimum IRWST water volume is 73,100 ft^3. However, the volume of the IRWST vapor space source term is unclear. Please clarify the volume of the IRWST vapor space.

2. The IRWST vapor space source term is provided in the proposed updated DCD Table 12.2-30 (Sheet 1 of 6), the source term only includes noble gases. Please specify your assumptions and why halogens or other radionuclides are not in the vapor space source term.

3. Table 12.2-30 provides the radionuclide concentrations in the liquid and vapor space in units of µCi/gram. Please clarify if the vapor space activity should be assumed to have the density of air and the liquid space activity should have the density of water?

4. UFSAR Table 12.2-24 appears to indicate that the decontamination factor for the spent fuel pool purification demineralizer for Cs and Rb is 2. However, based on the staff's confirmatory analysis, it appears a higher decontamination factor than 2 may have been used for Cs and Rb, in calculating the IRWST liquid source term. Please clarify the decontamination factor assumed for Cs and Rb for the spent fuel pool purification filter and demineralizer in calculating the IRWST liquid source term. If the value used is different than what is specified in the FSAR, the difference and basis for the difference should be documented.

SNC Responses to NRC Staff Questions

1. The IRWST air volume (i.e., "vapor space") in which gases and volatile compounds accumulates is approximately 4,400 ft^3 based on IRWST nominal water depth, bottom area, and tank height.
2. The IRWST is maintained as an acidic (i.e., reducing) environment which chemically converts a portion of the halogens (i.e., iodine and bromine) from the reduced form (e.g., I^-) to an oxidized (elemental) form (e.g., I_2). The elemental halogens are volatile and will partition across the surface of the liquid in the IRWST, with a portion becoming airborne and the remainder staying in the liquid. A negligible amount of the iodine in the IRWST liquid converts to elemental I_2. Additionally, partitioning across the surface of the water is minimal. With the negligible conversion of iodine to elemental I_2, and the high degree of retention of iodine in the IRWST liquid, the contribution of iodine in the IRWST vapor space does not need to be considered. This conclusion is also applied to bromine.
3. The header rows for Table 12.2-30 (Sheets 1 and 3) and Table 12.2-31 (Sheets 1 and 3) should denote units of µCi/cm^3. Please note that the values in these tables originally reported in LAR-19-003 (with the exception of Cs as described in the response to

Question 4) are not changed as they were calculated in units of $\mu Ci/cm^3$ and intended to be reported in units of $\mu Ci/cm^3$.

4. The Staff's confirmatory analysis is correct in that a higher decontamination factor (DF) than 2 was used for Cs and Rb. Analyses were rerun using a DF of 2 for Cs and Rb.

   Using a DF of 2 for Cs increased concentrations of Cs-134, Cs-136, and Cs-137. The effects of the lower DF have been updated as shown in the markups of Table 12.2-30 (Sheet 3) provided in Enclosure 6.

   The Rb nuclide concentrations reported in Table 12.2-30 (Sheet 3) are dominated by radioactive decay. Therefore, a change in purification (i.e., changing the DF from 10 to 2) did not result in a change to the nuclide concentrations reported in Table 12.2-30 (Sheet 3).

   In addition to the changes identified above, additional changes are made to Table 12.2-30 (Sheet 3) and Table 12.2-31 (Sheet 2). Ba-137m changed in Table 12.2-30 (Sheet 3); and Fe-55, Fe-59, Co-58, Co-60, and Zn-65 changed in Table 12.2-31 (Sheet 2). Each change is necessary to address a row misalignment between the nuclide concentrations reported in the calculation note (the source for the nuclide concentration tables provided in the LAR-19-003 submittal) and nuclide concentrations calculated in the spreadsheet (the source for the nuclide concentration tables in the calculation note).

Southern Nuclear Operating Company

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Enclosure 6

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

Revisions to Proposed Changes to Licensing Basis Documents

(LAR-19-003S1)

Note:

Revision bars indicate changes between Enclosure 3 and Enclosure 6. The table insertions provided in Enclosure 6 replace the corresponding table insertions provided in Enclosure 3. All other table insertions provided in Enclosure 3 are not affected by this LAR supplement.

Inserted material is indicated by blue underline

*** * *** Denotes omitted material

(This Enclosure consists of 6 pages, including this cover page.)

Insert new UFSAR Table 12.2-30 (Sheet 1 of 6) titled "IRWST Design Basis Source Strengths and Specific Activity" after Table 12.2-29 as shown below (Note: a corresponding update to the Chapter 12 Table of Contents is also made to reflect this new table):

Table 12.2-29
Core Melt Accident Integrated Source Strengths from MCR HVAC Filters

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* * *	* * *	* * *

Notes:

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Table 12.2-30 (Sheet 1 of 6) IRWST Design Basis Source Strengths and Specific Activity

Vapor Specific Activity	
Nuclide	**Concentration (μCi/cm^3)**
Kr-83m	3.0E-04
Kr-85m	3.5E-03
Kr-85	2.4E+01
Kr-87	5.5E-04
Kr-88	3.9E-03
Kr-89	1.7E-06
Xe-131m	3.4E-01
Xe-133m	8.1E-02
Xe-133	1.4E+01
Xe-135m	4.1E-05
Xe-135	2.9E-02
Xe-137	3.9E-06
Xe-138	5.4E-05

Insert new UFSAR Table 12.2-30 (Sheet 3 of 6) titled "IRWST Design Basis Source Strengths and Specific Activity" after newly inserted Table 12.2-30 (Sheet 2 of 6) as shown below (Note: a corresponding update to the Chapter 12 Table of Contents is also made to reflect this new table):

Table 12.2-30 (Sheet 3 of 6) IRWST Design Basis Source Strengths and Specific Activity

Liquid Specific Activity			
Nuclide	**Concentration (μCi/cm^3)**	**Nuclide**	**Concentration (μCi/cm^3)**
Br-83	4.1E-06	Te-134	4.2E-07
Br-84	5.0E-07	I-129	5.8E-11
Br-85	5.3E-09	I-130	6.4E-06
Rb-88	2.5E-05	I-131	2.1E-03
Rb-89	9.6E-07	I-132	1.2E-04
Sr-89	4.0E-06	I-133	1.2E-03
Sr-90	1.9E-07	I-134	1.1E-05
Sr-91	7.9E-07	I-135	2.6E-04
Sr-92	5.9E-08	Cs-134	4.8E-03
Y-90	1.9E-07	Cs-136	5.0E-03
Y-91m	4.2E-08	Cs-137	3.5E-03
Y-91	5.2E-07	Cs-138	1.1E-05
Y-92	6.4E-08	Ba-137m	3.5E-03
Y-93	5.5E-08	Ba-140	3.2E-06
Zr-95	1.8E-07	La-140	4.4E-07
Nb-95	5.7E-07	Ce-141	1.8E-07
Mo-99	4.0E-04	Ce-143	1.8E-07
Tc-99m	6.1E-05	Ce-144	1.4E-07
Ru-103	1.6E-07	Pr-143	4.8E-07
Rh-103m	7.2E-09	Pr-144	1.9E-09
Rh-106	2.1E-11	N-16	2.8E-05
Ag-110m	1.6E-06	Cr-51	8.5E-06
Sb-124	3.3E-06	Mn-54	4.4E-06
Te-127m	2.9E-06	Mn-56	2.2E-05
Te-129m	9.2E-06	Fe-55	3.4E-06
Te-129	2.4E-07	Fe-59	8.2E-07
Te-131m	7.8E-06	Co-58	1.6E-04
Te-131	9.8E-08	Co-60	1.5E-06
Te-132	1.7E-04	-	-

Insert new UFSAR Table 12.2-31 (Sheet 1 of 6) titled "IRWST Expected Source Strengths and Specific Activity" after newly inserted Table 12.2-30 (Sheet 6 of 6) as shown below (Note: a corresponding update to the Chapter 12 Table of Contents is also made to reflect this new table):

Table 12.2-31 (Sheet 1 of 6) IRWST Expected Source Strengths and Specific Activity

Vapor Specific Activity	
Nuclide	**Concentration (μCi/cm^3)**
Kr-85m	7.7E-06
Kr-85	9.9E-02
Kr-87	2.0E-06
Kr-88	8.4E-06
Xe-131m	2.6E-03
Xe-133m	4.0E-05
Xe-133	3.8E-03
Xe-135m	3.7E-07
Xe-135	8.2E-05
Xe-137	2.3E-08
Xe-138	2.9E-07

Insert new UFSAR Table 12.2-31 (Sheet 2 of 6) titled "IRWST Expected Source Strengths and Specific Activity" after newly inserted Table 12.2-31 (Sheet 1 of 6) as shown below (Note: a corresponding update to the Chapter 12 Table of Contents is also made to reflect this new table):

Table 12.2-31 (Sheet 2 of 6) IRWST Expected Source Strengths and Specific Activity

Plateout Specific Activity	
Nuclide	**Concentration ($\mu Ci/cm^2$)**
Zr-95	6.0E-03
Ru-103	6.1E-03
Ce-141	3.6E-04
Ce-144	1.2E-03
Cr-51	3.4E-05
Mn-54	1.7E-02
Fe-55	9.1E-04
Fe-59	6.0E-03
Co-58	1.3E-01
Co-60	7.4E-02
Zn-65	1.2E-01

Insert new UFSAR Table 12.2-31 (Sheet 3 of 6) titled "IRWST Expected Source Strengths and Specific Activity" after newly inserted Table 12.2-31 (Sheet 2 of 6) as shown below (Note: a corresponding update to the Chapter 12 Table of Contents is also made to reflect this new table):

Table 12.2-31 (Sheet 3 of 6) IRWST Expected Source Strengths and Specific Activity

Liquid Specific Activity			
Nuclide	Concentration (μCi/cm^3)	Nuclide	Concentration (μCi/cm^3)
Br-84	5.3E-09	I-133	1.4E-06
Rb-88	3.6E-08	I-134	1.9E-07
Sr-89	2.5E-08	I-135	9.1E-07
Sr-90	3.2E-09	Cs-134	1.9E-06
Sr-91	4.6E-09	Cs-136	7.8E-08
Y-90	3.2E-09	Cs-137	2.6E-06
Y-91m	2.4E-10	Ba-137m	2.6E-06
Y-91	9.6E-10	Ba-140	1.2E-06
Y-93	2.2E-08	La-140	4.4E-07
Zr-95	4.4E-09	Ce-141	1.7E-09
Nb-95	4.4E-08	Ce-143	4.1E-08
Mo-99	1.7E-07	Ce-144	4.6E-08
Tc-99m	1.6E-08	Pr-143	3.3E-07
Ru-103	8.3E-08	Pr-144	4.9E-10
Ru-106	3.1E-10	W-187	5.1E-07
Rh-103m	3.0E-09	Np-239	5.4E-07
Rh-106	3.1E-10	N-16	4.0E-08
Ag-110m	3.2E-07	Na-24	8.5E-06
Sb-124	6.6E-08	Cr-51	3.4E-08
Te-129m	2.9E-08	Mn-54	1.8E-08
Te-129	1.7E-08	Fe-55	1.4E-08
Te-131m	2.0E-08	Fe-59	3.3E-09
Te-131	2.0E-09	Co-58	6.1E-07
Te-132	5.2E-08	Co-60	6.0E-09
I-131	3.0E-06	Zn-65	5.8E-09
I-132	2.9E-07	-	-