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Southern Nuclear Operating Company
Vogtle Electric Generating Plant Units 3 and 4
Supplement to Request for License Amendment and Exemption:
Central Chilled Water System (VWS) Optimization Changes (LAR-17-015S1)

Ladies and Gentlemen:

Pursuant to 10 CFR 52.98(c), and in accordance with 10 CFR 50.90, Southern Nuclear Operating Company (SNC) requested 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) by SNC letter ND-17-0704, dated April 27, 2017 [ADAMS Accession Number ML17118A049]. The requested amendment proposed changes to revise the minimum chilled water flow rates to the supply air handling units serving the Main Control Room (MCR) and the Class 1E electrical rooms, and the unit coolers serving the normal residual heat removal system (RNS) and chemical and volume control system (CVS) makeup pump rooms in the VEGP Units 3 and 4 Updated Final Safety Analysis Report (UFSAR) and plant-specific Tier 1 (and 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 Design Control Document (DCD) Tier 1 material departures.

This letter supplements LAR-17-015 in Enclosure 4 to address a Request for Additional Information (RAI) from the NRC Staff, which was transmitted by electronic mail (email) on July 5, 2017 [ADAMS Accession Number ML17186A381], to support review of LAR-17-015. In addition, this supplement also contains a revised UFSAR markup in Enclosure 5 to reflect the changes described in the response to NRC Question 09.02.02-02.

The supplemental information provided in this LAR supplement does not impact the scope, technical content, or conclusions of the Technical Evaluation, Significant Hazards Consideration Determination, or Environmental Considerations of the original LAR, LAR-17-015, provided in Enclosure 1 of SNC letter ND-17-0704.

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

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 enclosures to the designated State Official.

Should you have any questions, please contact Paige Ridgway at (205) 992-7516.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 3rd of August 2017.

Respectfully submitted,



Brian H. Whitley
Regulatory Affairs Director
Southern Nuclear Operating Company

- Enclosures: 1 – 3) (Previously submitted with the original LAR, LAR-17-015, in SNC letter ND-17-0704)
- 4) Vogtle Electric Generating Plant (VEGP) Units 3 and 4 – Response to NRC Request for Additional Information Regarding the LAR-17-015 Review (LAR-17-015S1)
 - 5) Vogtle Electric Generating Plant (VEGP) Units 3 and 4 – Revised Proposed Changes to the Licensing Basis Documents (LAR-17-015S1)

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Southern Nuclear Operating Company

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Enclosure 4

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

**Response to NRC Request for Additional Information Regarding
the LAR-17-015 Review**

(LAR-17-015S1)

(This enclosure contains 7 pages, including this cover page.)

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Enclosure 4

Response to NRC Request for Additional Information Regarding the LAR-17-015 Review (LAR-17-015S1)

This Enclosure provides responses to questions from the NRC Staff regarding the review of Southern Nuclear Operating Company (SNC) License Amendment Request (LAR) 17-015, which was submitted by SNC letter ND-17-0704 on April 27, 2017.

NRC Question 09.02.02-01:

10 CFR 52.98(c) delineates the change process for information on a certified design that was referenced by a combined license, and 10 CFR 50.90 delineates the process for amending a combined license.

Pursuant to 10 CFR 52.98(c) and in accordance with 10 CFR 50.90, Southern Nuclear Operating Company (SNC) in a letter dated April 27, 2017 requested a license amendment (LAR 17-015) to change cooling load requirements for the low-capacity (air-cooled) chillers of the central chilled water system in the AP1000 design. The proposed change would 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).

LAR Table 2-1 presents the proposed change to USFAR Table 9.2.7-1, "Component Data - Central Chilled Water System," regarding flow rates through cooling coils in various plant HVAC subsystems served by the low-capacity (air-cooled) chillers. This table also contains a Note which states "[Heat loads used to determine cooling coil flow rates include 15% margin." In addition, the capacity of the chillers is changed from "300 tons" to "230 tons" to reflect the reduced HVAC heat loads during their final detail design phase.

LAR Table 2-2 presents the proposed change to COL Appendix C (and plant-specific Tier 1) Table 2.7.2-2, "Inspections, Tests, Analyses and Acceptance Criteria," Item 3.a, regarding flow rates through the above-mentioned cooling coils. This table also contains a Note which states "[T]he 15% margin is not included in the heat loads used to calculate the flow rate identified in the ITAAC acceptance criteria" to account for the lower proposed flow rates as compared to those in USFAR Table 9.2.7-1.

The staff noted that Tier 1 Table 2.7.2-2 also includes ITAAC Item 3.b, which states, in part, "[A] report exists and concludes that the heat transfer rate of each air-cooled chiller is greater than or equal to 230 tons, "and has not been changed under LAR 17-015.

The licensee is requested to explain why the total capacity of the air-cooled chiller in ITAAC Item 3.b is not changed as part of LAR 17-015, given the differences in the proposed flow rates through the cooling coils, as discussed above. In addition, since the specified chiller capacity in ITAAC Item 3.b should be derived from the detailed design information provided in the FSAR, the licensee is requested to revise USFAR Table 9.2.7-1 to clearly indicate the basis for such difference.

The licensee is also requested to provide reference to all detailed calculations used to support the proposed changes in LAR 17-015.

SNC Response to NRC Question 09.02.02-01:

When the AP1000 Design Certification was approved [AP1000 Design Control Document (DCD) Revision 19], the Low Capacity (LC) chiller cooling load was calculated to be 183 tons based on the normal maximum room cooling loads. However, the AP1000 Standard Plant design specified a nominal 300 ton rated air-cooled water chiller. The chiller sizing criteria at that time used the chilled water flow demand identified in DCD Rev. 19 Tier 1 ITAAC Table 2.7.2-2 to estimate the required chiller capacity. For example, COL Appendix C ITAAC Table 2.7.2-2 required a chilled water flowrate of 138 gpm for VBS MY C01A/B cooling coils (inside the VBS MS 02A/B air handling units). Therefore, the cooling coil load would equate to approximately 92 tons of chiller load assuming a 16°F temperature drop across the cooling coil per design. Table 1 summarizes the original LC chiller sizing criteria.

Table 1

Coil Tag Numbers	ITAAC Chilled Water Flow		Cooling Load		Remarks
	Per Unit (gpm)	Total (gpm)	ITAAC ⁽¹⁾ (Tons)	Calculated ⁽²⁾ Maximum (Tons)	
MCR & CSA (Coils MY C01 A/B)	138	138	92	63	Only A or B operates at any time
Class 1E Division A/C Electrical Room (Coils MY C02 A/C)	108	108	72	66	Only A or C operates at any time
Class 1E Division B/D Electrical Room (Coils MY C02 B/D)	84	84	56	38	Only B or D operates at any time
CVS Make-up Pump Room Coolers (Coils MY C07 A/B)	12	24	16	10	Only A or B operates at any time
RNS Pump Room Coolers (Coils MY C06 A/B) (Coils MY C12 A/B)	15	15	10	6	RNS Pump Room A & B Coolers each contain two 100% capacity cooling coils. A and B operate simultaneously to support concurrent RNS pump (RNS-MP-01A/B) operation
Total	N/A	369 gpm	246 Tons	183 Tons	Minimum chilled water flow required to meet normal maximum cooling load - 278 gpm

Note 1: ITAAC Cooling load is based on a 16°F delta temperature across the cooling coil.

Note 2: Cooling load is based on the design maximum summer outside air temperature plus room equipment loads during normal plant operation.

The acceptance criteria for COL Appendix C Table 2.7.2-2, ITAAC 2.7.02.03b, is that the “Heat transfer rate of each air-cooled chiller is greater than or equal to 230 tons.” The total capacity of

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the air-cooled chiller in is not changed because the ITACC acceptance criteria of “greater than or equal to 230 tons” is satisfied. Thus, a 300-ton chiller rating was reflected in UFSAR Table 9.2.7-1.

Changes to UFSAR Table 9.2.7-1 are requested as part of LAR-17-015 to reflect the as-purchased LC chiller cooling capacity. As the chilled water design matured following design certification, the required LC air-cooled chiller capacity was reduced from 300 nominal tons to 230 nominal tons. The reduction in chiller capacity reflects a change in the sizing criteria for the LC chillers whereby the chiller capacity was specified to meet or exceed the ITAAC 2.7.02.03b requirement of 230 tons. This change in sizing criteria permitted a chiller sizing commensurate with the calculated chiller cooling demand whereas chiller sizing based on the ITAAC specified chilled water flowrates resulted in an extremely oversized chiller. ITAAC Closure Notification on completion of ITAAC 2.7.02.03b [ITAAC Index Number 704] verified the heat transfer rate of LC air-cooled chillers to be greater than or equal to 230 tons [ADAMS Accession No. ML17093A305]. The vendor's performance datasheet also confirmed each LC chiller heat transfer rate to be 240 tons, which satisfies the ITAAC acceptance criteria. Since the as-purchased equipment satisfies the ITAAC 2.7.02.03b required chiller capacity, no changes COL Appendix C (and associated plant-specific Tier 1) Table 2.7.2-2, ITAAC 2.7.02.03b are deemed necessary.

Additional information in the associated calculations used to support this LAR is available for audit, if needed.

NRC Question 09.02.02-02:

10 CFR 52.98(c) delineates the change process for information on a certified design that is referenced by a combined license, and 10 CFR 50.90 delineates the process for amending a combined license.

Pursuant to 10 CFR 52.98(c) and in accordance with 10 CFR 50.90, Southern Nuclear Operating Company (SNC) in a letter dated April 27, 2017 requested a license amendment (LAR 17-015) to change cooling load requirements for the low-capacity (air-cooled) chillers of the central chilled water system in the AP1000 design. The proposed change would 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).

LAR Table 2-6 presents the proposed change to USFAR Table 9.4.3-1 regarding cooling coil capacity for the normal residual Heat Removal (RNS) Pump Room Unit Coolers. The staff noted that in UFSAR Figure 9.4.3-1, unlike other room unit coolers, each RNS Pump Room Unit Cooler includes two cooling coils (VAS MY 06A/B and VAS MY 12A/B).

The licensee is requested to clarify if the proposed value of 75250 Btu/hr is applied to one or both coils in the RNS Pump Room Unit Cooler, and to revise UFSAR Table 9.4.3-1 accordingly to reflect the total heat load requirement for this cooler.

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SNC Response to NRC Question 09.02.02-02:

Each normal Residual Heat Removal (RNS) Pump Room Unit Coolers contains two 100% capacity cooling coils to support simultaneous RNS pump (RNS-MP-01A/B) operation. Either LC Central Chilled Water System (VWS) train can deliver chilled water to the A or B RNS pump room unit coolers. Therefore, the USFAR Table 9.4.3-1 cooling coil capacity for the RNS Pump Room Coolers is per coil.

UFSAR Table 9.4.3-1 is revised, as shown in Enclosure 5 of this letter, to describe the cooling coil capacity for the RNS Pump Room Coolers as being per coil.

NRC Question 09.02.02-03:

10 CFR 52.98(c) delineates the change process for information on a certified design that was referenced by a combined license, and 10 CFR 50.90 delineates the process for amending a combined license.

Pursuant to 10 CFR 52.98(c) and in accordance with 10 CFR 50.90, Southern Nuclear Operating Company (SNC) in a letter dated April 27, 2017 requested a license amendment (LAR 17-015) to change cooling load requirements for the low-capacity (air-cooled) chillers of the central chilled water system. The proposed change would 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).

LAR Tables 2-4, 2-5, 2-6 and 2-7 present the proposed changes to the required heat loads for selected HVAC components served by the low-capacity chillers, and LAR Table 2-1 presents the proposed changes to the corresponding design cooling loads by the chiller.

The staff noted that, although each design cooling coil flow rate in UFSAR Table 9.2.7-1 is properly allocated to cover the required heat load in the respective UFSAR Table 9.4.1-1 or Table 9.4.3-1, and the chiller capacity of "230 tons" appears to be consistent with the total sum of required heat loads of "198 tons" (i.e., 15% higher for value in UFSAR Table 9.2.7-1), the cooling coil flow rates specified in ITAAC No. 2.7.02.03a (i.e., Tier 1 Table 2.7.2-2, Item 3.a) are inconsistent with the respective required heat load.

The licensee is requested to address the cited inconsistency between ITAAC Item 3.a and the UFSAR design information. The LAR should be modified accordingly.

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Response to NRC Request for Additional Information Regarding the LAR-17-015 Review
(LAR-17-015S1)

SNC Response to NRC Question 09.02.02-03:

The AP1000 design basis employs recommendations from the Utility Requirements Document (URD). In the case of HVAC system, a commercial margin of 15% is applied to HVAC heat loads and fan static pressure requirements to account for future load growth and/or system degradation.

With regards to the design cooling coil flow rates as stated in UFSAR Table 9.2.7-1, HVAC calculations were performed to determine the cooling requirements for the MCR/CSA Rooms (MY C01 A/B), Class 1E Division A/C Electrical Rooms (MY C02 A/C), Class 1E Division B/D Electrical Rooms (MY C02 B/D), and the RNS (MY C06 A/B, MY C12 A/B) and CVS (MY C07 A/B) pump rooms. The 15% margin was added to room cooling loads in the supporting heat load calculations and incorporated into the chiller demand calculation. However, no additional margin was placed on the chiller system flow rates, as the room heat loads and required cooling water flowrates are directly proportional. Therefore, UFSAR Table 9.2.7-1 markup and associated UFSAR Table 9.4.1-1 and UFSAR Table 9.4.3-1 markups reflect the 15% margin imposed on HVAC heat load per the URD.

The cooling coil flow rates specified in ITAAC No. 2.7.02.03a (i.e., Tier 1 Table 2.7.2-2, Item 3.a) markup are consistent with the maximum chiller load based on the design heat load demand without the additional 15% commercial margin. These flowrates represent the maximum required flows to meet the calculated maximum design cooling demand without consideration future load growth and/or system degradation at system startup. In addition, the system will be balanced to the flow requirements as shown in the markup of UFSAR Table 9.2.7-1 to account for measurement uncertainty, and to provide assurance that the VWS testing will be able to fulfill the ITAAC requirement to meet or exceed the specified flow rates. Table 2 compares the chilled water flows needed to meet the cooling demand with a 15% commercial margin added to the required flows needed to meet maximum system design cooling loads presented in ITAAC Table 2.7.2-2, Item 3.a).

Table 2

Coil Tag Numbers	System Demand Loads (15% Margin Added)		ITAAC Loads (15% Margin Not Added)	
	Heat Load (Tons)	Flow Rate (gpm)	Heat Load (Tons)	Flow Rate (gpm)
MCR & CSA (Coils MY C01 A/B)	67	101	64	96
Class 1E Elect. Room (Coils MY C02 A/C)	71	106	64	97
Class 1E Elect. Room (Coils MY C02 B/D)	38	56	34	52
CVS Make-up Pump Comp. Coolers (Coils MY C07 A/B)	9	14	8	12
RNS Pump Room Coolers (Coils MY C06 A/B) (Coils MY C12 A/B)	13	20	11	16
Total	198 Tons	297 gpm	181 Tons	273 gpm

Southern Nuclear Operating Company

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Enclosure 5

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

Revised Proposed Changes to the Licensing Basis Documents

(LAR-17-015S1)

Note:

Added text is shown as bold Blue Underline
Deleted text is shown as bold ~~Red Strikethrough~~
*** Indicates omitted exiting text

(This enclosure contains 2 pages, including this cover page.)

The Normal Residual Heat Removal Pump Room Unit Coolers portion of UFSAR Table 9.4.3-1 is revised, as seen below, to describe the cooling coil capacity for the RNS Pump Room Coolers as being per coil.

UFSAR Table 9.4.3-1 “Component Data – Radiologically Controlled Area Ventilation System Auxiliary/Annex Building Ventilation Subsystem (Nominal Values)”

Normal Residual Heat Removal Pump Room Unit Coolers	
* * *	
Cooling Coil Requirements	
Type	Chilled Water
Capacity <u>per coil</u> (Btu/hr)	87,000 <u>75,250</u>
Water flow (gpm)	See Table 9.2.7-1
* * *	