

September 20, 2023

NL-23-0742
10 CFR 50.90U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555-0001Vogtle Electric Generating Plant – Units 3&4
Docket Nos.: 52-025 52-026Subject: Supplement 3 to Non-Voluntary License Amendment Request: Technical Specification
Revision to Adopt WCAP-17661-P-A, Improved RAOC and CAOC For Surveillance
Technical Specifications

Ladies and Gentlemen:

On October 14, 2022, Southern Nuclear Operating Company (SNC) requested a license amendment [ML22287A174] to Vogtle Electric Generating Plant (VEGP) Units 1 and 2 renewed facility operating licenses NPF-68 and NPF-81, respectively, Joseph M. Farley Nuclear Plant (FNP), Units 1 and 2 renewed facility operating licenses NPF-2 and NPF-8, respectively, and VEGP Units 3 and 4 combined licenses NPF-91 and NPF-92, respectively. On December 9, 2022, SNC supplemented the request for a license amendment [ML22343A255] in response to a Nuclear Regulatory Commission (NRC) request for additional information (RAI) [ML22308A204] dated November 18, 2022. On July 5, 2023, SNC supplemented the request for a license amendment [ML23186A134] to resolve an inconsistency in the request.

SNC herein supplements the request to provide additional information addressing the methodology used for the VEGP Units 3 and 4 analyses. Supplemental information is provided in the Enclosure. This information supplements but does not replace any pages of the previous submittals.

The conclusions of the No Significant Hazards Consideration Determination Analysis and Environmental Consideration contained in the original application have been reviewed and are unaffected by this supplement.

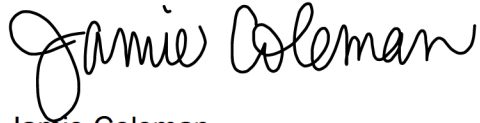
This letter contains no regulatory commitments. This letter has been reviewed and determined not to contain security-related information.

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

If you have any questions, please contact Amy C. Chamberlain at 205.992.6361.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 20th day of September 2023.

Respectfully submitted,

A handwritten signature in black ink that reads "Jamie Coleman". The signature is written in a cursive, flowing style.

Jamie Coleman
Director, Regulatory Affairs
Southern Nuclear Operating Company

Enclosure: CAOC/RAOC Supplemental Information

cc: Regional Administrator, Region II
NRR Project Manager – Vogtle 3 & 4
Senior Resident Inspector – Vogtle 3 & 4
State of Georgia Environmental Protection Division
RType: CFA04.054, CVC7000

Vogtle Electric Generating Plant – Units 3 and 4

**Enclosure to NL-23-0742
Supplement 3 to NL-20-0170**

CAOC/RAOC Supplemental Information

Supplement 3 Information for NL-20-0170

In the License Amendment Request (LAR) provided by Southern Nuclear Operating Company (SNC) letter NL-20-0170 dated October 14, 2022, and supplemented by SNC letter NL-22-0897 dated December 9, 2022, and SNC letter NL-23-0506 dated July 5, 2023, SNC proposed revisions to the Technical Specifications related to the heat flux hot channel factor.

In the request, SNC provided references to both the Constant Axial Offset Control (CAOC) and the Relaxed Axial Offset Control (RAOC) surveillance formulations for Vogtle Units 3 and 4 discussions. SNC acknowledges that the discussions of the applicability of each of these could be clearer in the licensing basis.

The existing VEGP Units 3 and 4 Technical Specification (TS) 3.2.1, Heat Flux Hot Channel Factor, or F_Q , is based on the CAOC surveillance formulation, as identified in the TS 3.2.1 Bases. WCAP-8385 which supports the CAOC surveillance formulation is identified in the VEGP Units 3 and 4 Final Safety Analysis Report (FSAR), Subsection 4.3.2.2.6, in the following statement.

A discussion of precalculated power distribution control in Westinghouse pressurized water reactors (PWRs) is included in WCAP-7811 (Reference 11). Detailed background information on the design constraints on local power density in a Westinghouse PWR, on the defined operating procedures, and on the measures taken to preclude exceeding design limits is presented in the Westinghouse topical report on power distribution control and load following procedures WCAP-8385 (Reference 12).

The existing VEGP Units 3 and 4 TS 3.2.3, Axial Flux Difference, or AFD, is also based on the CAOC surveillance formulation, as identified in the TS 3.2.3 Bases.

The allowed range of the AFD is used in the nuclear design process to confirm that operation within these limits produces core peaking factors and axial power distributions that meet safety analysis requirements.

The CAOC methodology (Refs. 1, 2, and 3) entails:

- a. Establishing an envelope of allowed power shapes and power densities,
- b. Devising an operating strategy for the cycle that maximizes unit flexibility (maneuvering) and minimizes axial power shape changes,
- c. Demonstrating that this strategy does not result in core conditions that violate the envelope of permissible core power characteristics, and
- d. Demonstrating that this power distribution control scheme can be effectively supervised with excore detectors.

Reference 1 for the TS 3.2.3 Bases is WCAP-8385, "Power Distribution Control and Load Following Procedures," (September 1974) which supports the CAOC surveillance formulation.

However, as noted in the License Amendment Request (LAR), the VEGP Units 3 and 4 Final Safety Analysis Report (FSAR), Subsection 4.3.2.2.6, indicates that the F_Q is calculated using the RAOC methodology defined in WCAP-10216-P-A, Revision 1A, "Relaxation of Constant Axial Offset Control, FQ Surveillance Technical Specification," dated February 1994.

While both references are correct, SNC agrees that clarification of FSAR Subsection 4.3.2.2.6, near the current RAOC discussion, should occur following LAR approval. The following information succinctly summarizes how CAOC and RAOC are used in the power distribution.

The constant axial offset control (CAOC) procedures described in WCAP-8385 were developed to allow the use of a low upper bound on F_Q during normal operation (hence maximizing the margin to core safety limits) while permitting the maintenance of necessary load follow flexibility. The CAOC procedures require control of the AO at all power levels within a permissible operating band about a target value corresponding to the equilibrium full power value. Control to a target AO minimizes transient xenon effects on the axial power distributions.

The F_Q Surveillance Technical Specification responsible for providing assurance that F_Q will remain within the limits assumed in the plant safety analyses when the core is operated within its allowed operating space is based on the CAOC methodology presented in WCAP-8385. The key operating space limits include RTP, control bank rod insertion limits (RI Ls), and the axial flux difference (AFD) limits. Together, these operating space limits restrict the range of potential non-equilibrium core power shapes during normal operation, thereby limiting the maximum non-equilibrium $F_Q(Z)$ and the maximum local power density.

The F_Q Surveillance formulation relies on a combination of analytical factors and periodic measurements to provide assurance that core operation within the allowed operating space will be acceptable. When an F_a surveillance is performed, the equilibrium $F_Q(Z)$ is measured at or near steady-state conditions. This is then multiplied by an analytical factor, $W(Z)$, which characterizes the increase in $F_Q(Z)$ for non-equilibrium operation. The result, when uncertainties are included, is the maximum postulated transient $F_Q(Z)$, which is then compared to the $F_Q(Z)$ limit.

WCAP-17661-P-A improves upon the CAOC F_Q Surveillance formulation by permitting adjustment of the surveillance to the target AO core conditions. Also, the improved CAOC F_a Surveillance formulation incorporates the concept of operating spaces by providing the option of implementing a more restrictive CAOC operating space, which is defined as a unique combination of AFD band and control bank RI Ls, if the F_a limit is exceeded rather than having to reduce power.

In summary, both CAOC and RAOC are used in the power distribution analyses. The TSs are based on the CAOC surveillance formulation.

Both WCAP-8385 and WCAP-17661-P-A are shown in the corresponding TS Bases changes (Attachment 9 to NL-20-0170) as being added to the References for the Bases of TS 3.2.1, in addition to the existing WCAP-10216-P-A.

WCAP-10216-P-A supporting the RAOC surveillance formulation, and WCAP-8385 supporting the CAOC-based operating spaces surveillance formulation, are both currently identified in TS 5.6.3, Core Operating Limits Report (COLR), and WCAP-17667-P-A, Revision 1, supporting the proposed TS surveillance formulation is proposed to be added to TS 5.6.3 in the LAR.