



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

SAFETY EVALUATION BY THE OFFICE OF NEW REACTORS

RELATED TO AMENDMENT NOS. 124 AND 123

TO COMBINED OPERATING LICENSE

NOS. NPF-91 AND NPF-92, RESPECTIVELY

SOUTHERN NUCLEAR OPERATING COMPANY, INC.

GEORGIA POWER COMPANY

OGLETHORPE POWER CORPORATION

MEAG POWER SPVM, LLC

MEAG POWER SPVJ, LLC

MEAG POWER SPVP, LLC

CITY OF DALTON, GEORGIA

VOGTLE ELECTRIC GENERATING PLANT, UNITS 3 AND 4

DOCKET NOS. 52-025 AND 52-026

1.0 INTRODUCTION

By letter dated February 2, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18037B114), the Southern Nuclear Operating Company (SNC) requested that the U.S. Nuclear Regulatory Commission (NRC) amend Vogtle Electric Generating Plant (VEGP) Units 3 and 4, Combined License (COL) Numbers NPF-91 and NPF-92, respectively.

The letter contained License Amendment Request (LAR) 18-006 and requested changes to the approved COL Appendix A, Technical Specifications (TS) by proposing modifications to the Administrative Controls section in TS 5.6.3 for the core operating limits report (COLR) which requires documentation including analytical methods which are used elsewhere in the TS and described in the Updated Final Safety Analysis Report (UFSAR). In addition, LAR-18-006 includes an editorial change to TS 5.7.2 on high radiation areas, correcting a typographical error.

2.0 REGULATORY EVALUATION

This LAR proposed changes to the approved COL Appendix A by proposing modifications to TS information, and associated UFSAR information, concerning the analytical methods for

maintaining core operating limits and reactor trip setpoints within limits. The proposed modifications are to the TS Administrative Controls and are consistent with the requirements as described elsewhere in the TS and in the UFSAR.

The NRC staff considered the following regulatory requirements in reviewing the proposed LAR:

Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52, Appendix D, Section VIII.B.5.a allows an applicant or licensee who references this appendix to depart from Tier 2 information, without prior NRC approval, unless the proposed departure involves a change to or departure from Tier 1 information, Tier 2* information, or the TS, or requires a license amendment under paragraphs B.5.b or B.5.c of the section.

10 CFR Part 52, Appendix D, VIII.C.6 states that after issuance of a license, “Changes to the plant-specific TS will be treated as license amendments under 10 CFR 50.90.” 10 CFR 50.90 addresses the application for amendment of license, construction permit, or early site permit. The proposed LAR requires changes in the TS, and therefore an LAR is required to be submitted for NRC approval.

10 CFR 50.36, TS impose limits, operating conditions, and other requirements upon reactor facility operation for the public health and safety. The TS are derived from the analyses and evaluations in the safety analysis report. In general, TS must contain: (1) safety limits and limiting safety system settings; (2) limiting conditions for operation; (3) surveillance requirements (SR); (4) design features; and (5) administrative controls.

10 CFR 50.36(c)(2)(ii) requires that a TS limiting condition for operation (LCO) of a nuclear reactor must be established for items that meet one of the four listed criteria, including as Criterion 1, instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary.

10 CFR 50.36(c)(3) requires that the TS include surveillance requirements (SR) to test, calibrate or inspect necessary systems and components to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the LCO will be met.

3.0 TECHNICAL EVALUATION

3.1 PROPOSED CHANGES TO TS 5.6.3, “CORE OPERATING LIMITS REPORT (COLR)”

TS 5.6.3.a currently states:

Core operating limits shall be established prior to each reload cycle, or prior to any remaining portion of a reload cycle, and shall be documented in the COLR for the following:

(Note: TS 5.6.3.a lists several functions for which COLR limits need to be established. They are not reproduced here. Function 3.3.1 is specifically affected by the proposed change as stated below).

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3.3.1, “Reactor Trip System (RTS) Instrumentation”;

TS 5.6.3.a is proposed to be revised to delete TS 3.3.1 entirely.

With regard to the deletion of TS 3.3.1, SNC stated:

TS 5.6.3.a identifies TS 3.3.1, Reactor Trip System (RTS) Instrumentation, as one of the core operating limits which must be established prior to each reload cycle and which must be documented in the COLR. The Overpower Delta-T (OPΔT) and Overtemperature Delta-T (OTΔT) reactor trip setpoints and time constants were previously planned to be included in the COLR to support TS 3.3.1. However, the OPΔT and OTΔT reactor trip setpoints and time constants have since been included in the TS 5.5.14 Setpoint Program (SP). This impact to TS 5.6.3 was not recognized at the time of the change.

SNC further stated:

Additionally, as required by TS 5.5.14.b, each TS required automatic protection instrumentation setpoint and tolerance shall be calculated in conformance with WCAP-16361-P-A and WCAP-16361-NP-A (Reference 6.1). The time constants and equations used for the OPΔT and OTΔT reactor trips are discussed in both WCAP-16361-P-A/WCAP-16361-NP-A and APP-GW-GLR-137 (Reference 6.2). APP-GW-GLR-137 contains discussion regarding the basis for the OPΔT and OTΔT reactor trip algorithms, and both WCAP-16361-P-A and TS Bases 3.3.1 describe APP-GW-GLR-137 as the appropriate analytical method for the revised OPΔT and OTΔT reactor trips.

TS 5.6.3.b currently states:

The analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC, specifically those described in the following documents:

1. WCAP-9272-P-A, "Westinghouse Reload Safety Evaluation Methodology," July 1985 (Westinghouse Electric Company (Westinghouse) Proprietary) and WCAP-9273-NP-A (Non-Proprietary).

(Methodology for Specifications 3.1.3 - Moderator Temperature Coefficient, 3.1.5 - Shutdown Bank Insertion Limits, 3.1.6 - Control Bank Insertion Limits, 3.2.1 - Heat Flux Hot Channel Factor, 3.2.2 - Nuclear Enthalpy Rise Hot Channel Factor, 3.2.3 - AXIAL FLUX DIFFERENCE, and 3.9.1 - Boron Concentration.)

(Note: There are no changes proposed to TS 5.6.3.b.2 and 5.6.3.b.3)

4. WCAP-12945-P-A, Volumes 1-5, "Westinghouse Code Qualification Document for Best Estimate Loss of Coolant Accident Analysis," Revision 2, March 1998 (Westinghouse Proprietary) and WCAP-14747 (Non-Proprietary)

(Methodology for Specification 3.2.1 – Heat Flux Hot Channel Factor)

5. WCAP-12472-P-A, "BEACON Core Monitoring and Operations Support System," August 1994, Addendum 1, May 1996 (Westinghouse Proprietary), and Addendum 2, March 2001, (Westinghouse Proprietary), and WCAP-12473-A (Non-Proprietary)

(Methodology for Specification 3.2.5 - OPDMS - Monitored Parameters.)

6. APP-GW-GLR-137, Revision 1, "Bases of Digital Overpower and Overtemperature Delta-T (OPΔT/OTΔT) Reactor Trips," Westinghouse Electric Company LLC.

(Methodology for Specification 2.1.1 - Reactor Core Safety Limits, and 3.3.1 – Reactor Trip System (RTS) Instrumentation.)

The proposed change would revise TS 5.6.3.b as follows:

The analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC, specifically those described in the following documents:

1. WCAP-9272-P-A, "Westinghouse Reload Safety Evaluation Methodology," July 1985 (Westinghouse Proprietary) and WCAP-9273-NP-A (Non-Proprietary).

(Methodology for Specifications 3.1.1 - Shutdown Margin (SDM), 3.1.3 - Moderator Temperature Coefficient, 3.1.5 - Shutdown Bank Insertion Limits, 3.1.6 - Control Bank Insertion Limits, 3.2.1 - Heat Flux Hot Channel Factor, 3.2.2 - Nuclear Enthalpy Rise Hot Channel Factor, 3.2.3 - AXIAL FLUX DIFFERENCE, 3.4.1 - RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits, and 3.9.1 - Boron Concentration.)

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- 4a. WCAP-16009-P-A, "Realistic Large-Break LOCA Evaluation Methodology Using the Automated Statistical Treatment of Uncertainty Method (ASTRUM)," Revision 0, January 2005 (Westinghouse Proprietary) and WCAP-16009-NP-A (Non-Proprietary).

(Methodology for Specification 3.2.1 - Heat Flux Hot Channel Factor, and Specification 3.2.2 - Nuclear Enthalpy Rise Hot Channel Factor.)

- 4b. APP-GW-GLE-026, "Application of ASTRUM Methodology for Best-Estimate Large-Break Loss-of-Coolant Accident Analysis for AP1000", Revision 1, February 2009 (Westinghouse Proprietary) and APP-GW-GLE-026-NP (Non-Proprietary).

(Methodology for Specification 3.2.1 - Heat Flux Hot Channel Factor, and Specification 3.2.2 - Nuclear Enthalpy Rise Hot Channel Factor.)

5. WCAP-12472-P-A (Westinghouse Proprietary) and WCAP-12473-A (Non-Proprietary), "BEACON Core Monitoring and Operations Support System," August 1994, Addendum 1, May 1996, and Addendum 2, March 2001; and WCAP-12472-P-A (Westinghouse Proprietary) and WCAP-12472-NP-A (Non-Proprietary) Addendum 4, September 2012.

(Methodology for Specification 3.2.5 - OPDMS - Monitored Parameters.)

6. APP-GW-GLR-137, Revision 1, "Bases of Digital Overpower and Overtemperature Delta-T (OPΔT/OTΔT) Reactor Trips," Westinghouse Electric Company LLC.

(Methodology for Specification 2.1.1 - Reactor Core Safety Limits.)

Regarding WCAP-9272-P-A and WCAP-9273-NP-A Analytical Method TS Applicability, SNC stated:

TS 3.1.1, Shutdown Margin (SDM), and TS 3.4.1, Reactor Coolant System (RCS) Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits, are listed as core operating limits which must be established and documented in the COLR in TS 5.6.3.a. However, neither core operating limit is tied to an analytical method discussed in TS 5.6.3.b. Therefore, the TS do not identify the appropriate analytical method used in the COLR to determine SDM and RCS pressure, temperature, and flow DNB limits.

Regarding WCAP-16009-P-A and APP-GW-GLE-026 Analytical Method TS Applicability, SNC stated:

WCAP-16009-P-A and WCAP-16009-NP-A (Reference 6.4) describe the Automated Statistical Treatment of Uncertainty Method (ASTRUM) analytical method used to perform the best-estimate [large-break loss-of-coolant accident (LBLOCA)] analysis as described in the current UFSAR Chapter 15 safety analysis. These changes were incorporated generically for the AP1000 design in the NRC-approved AP1000 core reference report WCAP-17524-P-A, Revision 1 (Reference 6.5), and incorporated into the VEGP Units 3 and 4 licensing basis as Amendments 52 and 52, respectively (ADAMS Accession No. ML16201A435). Therefore, these analytical methods have been approved by the NRC and have replaced the previous Westinghouse proprietary WCAP-12945-P-A and non-proprietary WCAP-14747 (Reference 6.6) analytical method for best-estimate LBLOCA safety analysis applications.

TS 5.6.3.b Item 4 still lists WCAP-12945-P-A and WCAP-14747 as the analytical method for TS 3.2.1. However, WCAP-16009-P-A and WCAP-16009-NP-A analytical methods have been approved by the NRC and incorporated into the AP1000 design, and the application of these analytical methods is discussed in topical report APP-GW-GLE-026 and APP-GW-GLE-026-NP (Reference 6.7). Therefore, TS 5.6.3.b Item 4 is proposed to be revised to replace WCAP-12945-P-A and WCAP-14747 with WCAP-16009-P-A and WCAP-16009-NP-A as new Item 4a, and with topical reports APP-GW-GLE-026 and APP-GW-GLE-026-NP as new Item 4b, as the analytical methods for TS 3.2.1 to incorporate the NRC-approved analytical methods accepted for use in LBLOCA analyses into the TS.

In addition, TS 3.2.2 is proposed to be added to the list of supported TS for both new Item 4a and Item 4b to incorporate the NRC-approved analytical methods accepted for use in LBLOCA analyses into the TS. The COLR determines this core operating limit in accordance with the WCAP-16009-P-A, WCAP-16009-NP-A, APP-GW-GLE-026, and APP-GW-GLE-026-NP ASTRUM analytical method as described in UFSAR Section 4.3.

Regarding WCAP-12472-P-A Analytical Method TS Applicability, SNC stated:

The Best Estimate Analyzer for Core Operations – Nuclear (BEACON) system is a core monitoring and support package that uses Westinghouse standard instrumentation in conjunction with an analytical method for online generation of three-dimensional power

distributions. The system provides core monitoring, core measurement data reduction, core analysis, and core predictions. WCAP-12472-P-A and WCAP-12473-A, including Addendum 1 and Addendum 2 (Reference 6.8) describe the application of the BEACON system for core monitoring and support. These analytical methods are described in UFSAR Subsection 4.3.2 as used to support core monitoring instrumentation and the experimental verification of power distribution limits, and are also listed in TS 5.6.3.b Item 5 as the appropriate methodologies for TS 3.2.5, On-Line Power Distribution Monitoring System (OPDMS) - Monitored Parameters.

WCAP-12472-P-A Addendum 4 and WCAP-12472-NP-A Addendum 4 (Reference 6.11) have two purposes related to the AP1000 design:

1. To affirm the continued use of the NRC-approved Westinghouse design model methodology, including PHOENIX-P/ANC, PARAGON/ANC, and NEXUS/ANC, in the BEACON system.
2. To affirm that uncertainties applied to power distribution monitoring using fixed in-core detectors are valid using higher order polynomial fits of the detector variability and fraction of inoperable detectors than provided in WCAP-12472-P-A and WCAP-12473-A Addendum 1.

The NRC staff has reviewed and approved Revision 0 of WCAP-12472-P-A Addendum 4 and WCAP-12472-NP-A Addendum 4 for referencing in licensing applications using the updated BEACON system, with no restrictions for usage. In the Final safety evaluation for WCAP-12472-P-A Addendum 4 (ADAMS Accession No. ML12158A263), no conditions and limitations were required by the NRC staff for using the analytical methods described in WCAP-12472-P-A Addendum 4.

As SNC stated in its application, TS 5.6.3.b Item 5 is proposed to be revised to add WCAP-12472-P-A Addendum 4 and WCAP-12472-NP-A Addendum 4 to the list of analytical methods to incorporate the NRC-approved analytical methods accepted for use in monitoring of core operating limits into the TS. The only changes required to the UFSAR are to add these topical reports to VEGP UFSAR Table 1.6-1, "Material Referenced," for "DCD Section Number 4.3" and for "DCD Section Number 16.1," and to UFSAR Subsection 4.3.5, "References," Reference 4, for consistency with the TS changes described above. The staff has reviewed this change and has concluded that these proposed changes are acceptable for monitoring the power distribution core operating limits.

NRC Staff Conclusion

Regarding SNC's proposed change for the removal of TS 3.3.1 from TS 5.6.3.a and from item 6 of TS 5.6.3.b, described above, the staff reviewed SNC's request to modify the analytical methods for the COLRs in the TSs and determined that this is an administrative change because the requirements are now located in the approved TS 5.5.14. The staff notes that the subject changes do not adversely affect any LCO, Action, or SR as specified in the TSs. Therefore, the staff finds the changes acceptable.

Regarding SNC's proposed listing of specific WCAPs in TS 5.6.3.b, items 1, 4.a, 4.b, 5 and 6, the staff notes that TS 5.6.3.b requires that the analytical methods used to determine the core

operating limits be methods previously reviewed and approved by the NRC. Since the referenced WCAPs in the listing have already been reviewed and approved by the NRC, the proposed listing is acceptable. Further, since the methodology for specific LCOs listed in TS 5.6.3.b. is based on the NRC approved WCAPs, LCO, Action, or SR as specified in the TSs are not adversely affected. Therefore, the staff finds the proposed changes acceptable.

3.2 PROPOSED CHANGES TO TS 5.7, "HIGH RADIATION AREA"

TS 5.7.2(d)(4) currently states:

In those cases where options (2) and (3), above, are impractical or determined to be inconsistent with the "As Low As is Reasonably Achievable" principle, a radiation monitoring device that continuously displaces radiation dose rates in the area.

TS 5.7.2(d)(4) is proposed to be revised to correct the word "displaces" as follows:

In those cases where options (2) and (3), above, are impractical or determined to be inconsistent with the "As Low As is Reasonably Achievable" principle, a radiation monitoring device that continuously displays radiation dose rates in the area.

With regard to this proposed change SNC stated:

TS 5.7 identifies controls which must be applied to high radiation areas in compliance with 10 CFR Part 20. A typographical error is identified in TS 5.7.2, High Radiation Areas with Dose Rates Greater than 1.0 rem/hour at 30 Centimeters from the Radiation Source or from any Surface Penetrated by the Radiation, but less than 500 rads/hour at 1 Meter from the Radiation Source or from any Surface Penetrated by the Radiation. TS 5.7.2(d)(1), 5.7.2(d)(2), and 5.7.2(d)(3) states that each individual group entering such an area shall possess either one of two different specific radiation devices or a self-reading dosimeter, along with the specific requirements for each. TS 5.7.2(d)(4) states that if the options of TS 5.7.2(d)(1) and 5.7.2(d)(3) "are impractical or determined to be inconsistent with the "As Low As is Reasonably Achievable" principle, a radiation monitoring device that continuously *displaces [emphasis added]* radiation dose rates in the area" may be used. The word "displaces" is clearly a typographical error in this sentence. Therefore, it is proposed to change TS 5.7.2(d)(4) to reference "a radiation monitoring device that continuously *displays [emphasis added]* radiation dose rates in the area" as an editorial change to correct this typographical error.

NRC Staff Conclusion

Regarding the proposed typographical error in TS 5.7.2.d(4), the staff agrees that proposed use of word "displays," instead of the currently used word "displaces," is appropriate since the change correctly reflects the function of a radiation monitoring device that continuously displays. Therefore, the staff finds that this editorial correction is acceptable.

3.3 SUMMARY

In LAR-18-006, SNC proposed to make changes that would affect the COL Appendix A, TS 5.6.3 and TS 5.7.2. The proposed changes identify analytical methods previously reviewed and approved by the NRC used to determine the core operating limits, and are consistent with the

requirements which are described in the TS and in the UFSAR, including the NRC-approved analytical methods used in core design for VEGP. In addition, the proposed changes correct a typographical error. Further, the changes do not adversely affect any LCO, Action, or SR as discussed in the TSs. The staff documented its review of the above changes in Section 3.0 of this safety evaluation and finds the proposed changes in LAR-18-006 for VEGP Units 3 and 4 acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations in 10 CFR 50.91(b)(2), the Georgia State official was notified of the proposed issuance of the amendment on April 11, 2018. The State official had no comment.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20, "*Standards for Protection Against Radiation*," on April 11, 2018. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (83 FR 10911, published on March 13, 2018). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

6.0 CONCLUSION

The staff has concluded, based on the considerations discussed in Section 3.0 that there is reasonable assurance that: (1) the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public. Therefore, the staff finds the changes proposed in this license amendment acceptable.

7.0 REFERENCES

1. Southern Nuclear Operating Company, Vogtle Electric Generating Plant Units 3 and 4, "Analytical Methods for Core Operating Limits Report and Consistency Changes (LAR-18-006)," February 2, 2018 (ADAMS Accession No. ML18037B114).
2. Vogtle Units 3 and 4 Updated Final Safety Analysis Report, Revision 6, March 12, 2017, and Tier 1, Revision 5, June 15, 2017 (ADAMS Package Accession No. ML17172A218).
3. AP1000 Design Control Document, Revision 19, June 13, 2011 (ADAMS Accession No. ML11171A500).

4. Combined License NPF-91 for Vogtle Electric Generating Plant Unit 3, Southern Nuclear Operating Company (ADAMS Accession No. ML14100A106).
5. Combined License NPF-92 for Vogtle Electric Generating Plant Unit 4, Southern Nuclear Operating Company (ADAMS Accession No. ML14100A135).
6. WCAP-16361-P-A (Westinghouse Proprietary) and WCAP-16361-NP-A (Non-Proprietary), "Westinghouse Setpoint Methodology for Protection Systems – AP1000," Revision 1, February 2011 (ADAMS Accession No. ML110601158).
7. APP-GW-GLR-137, "Bases of Digital Overpower and Overtemperature Delta-T (OPΔT/OTΔT) Reactor Trips," Revision 1, February 24, 2011 (ADAMS Accession No. ML110620129).
8. NRC Final Safety Evaluation Report on WCAP-9272-P-A (Westinghouse Proprietary) and WCAP-9273-NP-A (Non-Proprietary), "Westinghouse Reload Safety Evaluation Methodology," May 31, 1985 (ADAMS Accession No. ML051390150).
9. WCAP-16009-P-A (Westinghouse Proprietary) and WCAP-16009-NP-A (Non-Proprietary), "Realistic Large-Break LOCA Evaluation Methodology Using Automated Statistical Treatment of Uncertainty Method (ASTRUM)," Revision 0, March 11, 2005 (ADAMS Accession No. ML050910157).
10. APP-GW-GLE-026 (Westinghouse Proprietary), "Application of ASTRUM Methodology for Best-Estimate Large-Break Loss-of-Coolant Accident Analysis for AP1000", Revision 1, February 3, 2009 (ADAMS Accession No. ML090410367).
11. NRC Final Safety Evaluation Report on NUREG-1793 of APP-GW-GLE-026 (Westinghouse Proprietary), "Application of ASTRUM Methodology for Best-Estimate Large-Break Loss-of-Coolant Accident Analysis for AP1000, Revision 1," Volume 2, Supplement 2, Pages 15-28 through 15-43, September 30, 2011.
12. WCAP-12472-P-A (Westinghouse Proprietary)/WCAP-12473-A (Non-Proprietary), Addendum 1-A, January 2000, (non-proprietary approved version, with NRC acceptance and NRC Safety Evaluation Report) (ADAMS Accession No. ML003678190).
13. WCAP-12472-P-A (Westinghouse Proprietary)/WCAP-12473-A (Non-Proprietary), Addendum 2, May 1, 2002 (ADAMS Accession No. ML021270086).
14. WCAP-12472-P-A (Westinghouse Proprietary)/WCAP-12472-NP (Non-Proprietary), Addendum 4, Revision 0, September 18, 2012 (ADAMS Accession No. ML12270A385).