



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

SAFETY EVALUATION BY THE OFFICE OF NEW REACTORS  
RELATED TO AMENDMENT NOS. 117 AND 116  
TO THE COMBINED 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 September 22, 2017 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17265A822), Southern Nuclear Operating Company, Inc. (SNC) requested that the U.S. Nuclear Regulatory Commission (NRC) amend Vogtle Electric Generating Plant (VEGP) Units 3 and 4, Combined License (COL) Nos. NPF-91 and NPF-92, respectively. The License Amendment Request (LAR) 17-034 seeks changes to COL Appendix A, Technical Specifications (TS). The proposed changes add new TS 3.1.10, Rod Withdrawal Test Exception – MODE 5, and modify TS Limiting Condition of Operation (LCO) 3.0.7, to allow rod movement and rod drop time testing under cold conditions (MODE 5). Additionally, the proposed changes would revise LCO Applicability of TS 3.4.8, Minimum Reactor Coolant System (RCS) Flow, to reflect its safety analysis basis.

2.0 REGULATORY EVALUATION

The staff reviewed the changes requested in this LAR. The proposed TS changes add a rod withdrawal test exception in MODE 5 to permit rod testing in reduced flow condition (new TS 3.1.10 and revised LCO 3.0.7), and amend the Applicability of TS 3.4.8, Minimum RCS Flow, accordingly.

The application states:

“New TS 3.1.10 provides the necessary exception to TS 3.4.4, “RCS Loops,” which otherwise requires full RCS flow in MODE 5 whenever the Plant Control System is capable of rod withdrawal or one or more rods are not fully inserted. A reference to TS 3.1.10 is added to TS LCO 3.0.7 to include the new test exception. The LCO Applicability of TS 3.4.8, “Minimum RCS Flow,” is revised to align with the purpose of that TS with respect to the initial conditions credited for the analysis of an inadvertent boron dilution event.”

The application proposes the following specific TS changes:

- TS LCO 3.0.7 is revised to add a reference to new test exception TS 3.1.10.
- TS 3.1.10 is added to require the following LCO:

“During the performance of rod movement and rod drop time testing, the requirements of LCO 3.4.4, “RCS Loops,” may be suspended provided boron concentration of the reactor coolant system is greater than the all rods out (ARO) boron concentration that provides  $k_{eff} < 0.99$ .”

TS 3.1.10 has the following LCO Applicability:

“MODE 5 with LCO 3.4.4 not met.”

TS 3.1.10 has one Condition. Condition A states:

“Requirements of the LCO not met.”

Required Action A.1 reads:

“Initiate action to fully insert all rods.”

The Required Action A.1 Completion Time is immediately.

Required Action A.2 reads:

“Place the Plant Control System in a condition incapable of rod withdrawal.”

The Required Action A.2 Completion Time is 1 hour.

Surveillance Requirement (SR) 3.1.10.1, with a Frequency of 12 hours, is added for TS 3.1.10. SR 3.1.10.1 reads:

“Verify boron concentration of the reactor coolant system is greater than the ARO boron concentration providing  $k_{eff} < 0.99$ .”

- The LCO Applicability for TS 3.4.8 currently reads:

“MODES 3, 4, and 5 with Plant Control System incapable of rod withdrawal, all rods fully inserted, and unborated water sources not isolated from the RCS.”

The LCO Applicability for TS 3.4.8 is revised to read:

“MODES 3, 4, and 5 with unborated water sources not isolated from the RCS.”

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

Title 10 of the *Code of Federal Regulations* (10 CFR) 52.98(f) states that any modification to, addition to, or deletion from the terms and conditions of a COL is a proposed amendment to the license. This activity involves a change to COL Appendix A, TS; therefore, this activity requires an amendment to the license.

10 CFR 52, Appendix D, VIII.C.6 states that after issuance of a license, “[c]hanges to the plant-specific TS will be treated as license amendments under 10 CFR 50.90.” 10 CFR 50.90 addresses the applications for amendments of licenses, construction permits, and early site permits. 10 CFR 50.90, in part, states that if a COL holder seeks to amend the license, an “application for an amendment must be filed with the Commission.” As discussed above, a change to COL Appendix A is requested, and thus an LAR is required.

10 CFR 50.36, “Technical specifications,” imposes limits, operating conditions, and other requirements upon reactor facility operation for the public health and safety. In accordance with 10 CFR 50.36(b), the TS are derived from the analyses and evaluations in the safety analysis report. Consistent with 10 CFR 50.36(c), these TS contain items in the following categories, among others: (1) safety limits and limiting safety system settings; (2) limiting conditions for operation; (3) surveillance requirements; (4) design features; and (5) administrative controls.

10 CFR 50, Appendix A, General Design Criterion (GDC) 10 requires that “[t]he reactor core and associated coolant, control, and protection systems shall be designed with appropriate margin to assure that specified acceptable fuel design limits are not exceeded during any condition of normal operation, including the effects of anticipated operational occurrences.”

10 CFR 50, Appendix A, GDC 25 requires that “[t]he protection system shall be designed to assure that specified acceptable fuel design limits are not exceeded for any single malfunction of the reactivity control systems, such as accidental withdrawal (not ejection or dropout) of the control rods.”

10 CFR 50, Appendix A, GDC 26 requires that “[t]wo independent reactivity control systems of different design principles shall be provided. One of the systems shall use control rods, preferably including a positive means for inserting the rods, and shall be capable of reliably controlling reactivity changes to assure that under conditions of normal operation, including anticipated operational occurrences, and with appropriate margin for malfunctions such as stuck rods, specified acceptable fuel design limits are not exceeded. The second reactivity control system shall be capable of reliably controlling the rate of reactivity changes resulting from planned, normal power changes (including xenon burnout) to assure that the acceptable fuel design limits are not exceeded. One of the systems shall be capable of holding the reactor core subcritical under cold conditions.”

10 CFR 50, Appendix A, GDC 27 requires that “[t]he reactivity control systems shall be designed to have a combined capability, in conjunction with poison addition by the emergency core cooling system, of reliably controlling reactivity changes to assure that under postulated accident conditions and with appropriate margin for stuck rods the capability to cool the core is maintained.”

10 CFR 50, Appendix A, GDC 28 requires that “[t]he reactivity control systems shall be designed with appropriate limits on the potential amount and rate of reactivity increase to assure that the effects of postulated reactivity accidents can neither (1) result in damage to the reactor coolant pressure boundary greater than limited local yielding nor (2) sufficiently disturb the core, its support structures, or other reactor pressure vessel internals to impair significantly the capability to cool the core. These postulated reactivity accidents shall include consideration of rod ejection (unless prevented by positive means), rod dropout, steam line rupture, changes in reactor coolant temperature and pressure, and cold water addition.”

10 CFR 50, Appendix A, GDC 29 requires that “[t]he protection and reactivity control systems shall be designed to assure an extremely high probability of accomplishing their safety functions in the event of anticipated operational occurrences.”

### 3.0 TECHNICAL EVALUATION OF PROPOSED CHANGES

SNC proposes to add new TS 3.1.10 and revise LCOs 3.0.7 and 3.4.8 as described above. Proposed TS 3.1.10 allows a test exception from the requirements of TS 3.4.4, “RCS Loops,” for rod movement and rod drop time testing under cold (MODE 5) conditions. TS 3.4.4 would otherwise require full RCS flow in MODE 5 whenever the Plant Control System is capable of rod withdrawal or one or more rods are not fully inserted. The typical tests that require rod withdrawal and movement in MODE 5 are:

- a. Cold Rod Drop Time Testing
- b. Digital Rod Position Indication System and Bank Demand Position Indication System Surveillance Testing
- c. Rod Control System Testing
- d. Control Rod Drive Mechanism Testing

These tests require operating the plant with less than the RCS flow required by LCO 3.4.4, “RCS Loops.” The proposed changes would allow performance of tests, like those noted above, that require rod movement and rod drop testing in MODE 5. In LAR 17-034, SNC states that LCO Note 3 in TS 3.4.4 currently allows an exception for 1 hour (per 8-hour period) to perform necessary testing, both with and without flow, but it is estimated that it will take 24 hours to complete the rod movement and rod drop time testing at MODE 5 conditions. New LCO 3.1.10 proposes to allow an exception to TS 3.4.4 with respect to the full RCS flow required by LCO 3.4.4 to provide sufficient time to perform the rod movement and rod drop time testing.

The staff evaluated the proposed changes and determined that the subcritical boron concentration limitations in the proposed TS 3.1.10 will assure that the core remains subcritical at all times during any planned rod withdrawals or any inadvertent rod withdrawal errors. With boron concentration required to be maintained at  $k_{\text{eff}} < 0.99$ , there is no conflict with fuel acceptance criteria, such as departure from nucleate boiling. Furthermore, as described in LCO 3.0.7, and as stated in the Standard Technical Specifications (ADAMS Accession No. ML16110A277), compliance with test exception LCOs is optional, and therefore no criteria of 10 CFR 50.36(c)(2)(ii) apply since Test Exception LCOs provide flexibility to perform certain operations by temporarily modifying requirements of other LCOs. The proposed LCO 3.1.10 assures that the subcritical boron concentrations must be met assuming all control, shutdown, and gray rods are fully withdrawn and these boration requirements provide sufficient reactivity

margin to assure that the reactor core remains subcritical and acceptable fuel design limits will not be exceeded for normal shutdown and anticipated operational occurrences. The staff has determined the proposed revisions are acceptable because they will continue to satisfy the applicable criteria of 10 CFR 50.36(c)(2).

The subcritical boron concentrations for the RCS during the control rod testing is set to ensure the reactor core remains subcritical assuming all control, shutdown, and gray rods are fully withdrawn. Since the control rod testing does not involve extensive control rod movements, the boration requirements ensure sufficient margin is provided to maintain the reactor core in a subcritical state during this operation. Additional protection during control rod testing is provided by administrative controls and the Source Range Neutron Flux – High Setpoint Reactor Trip Function (TS 3.3.2) and the Manual Reactor Trip Function (TS 3.3.5). Because LAR 17-034 does not involve a design change to any plant system, the combination of boration requirements and the available reactor trip functions ensure the requirements of GDC 10, 25, 26, 27, and 29 continue to be met, in accordance with the discussion provided in Updated Final Safety Analysis Report (UFSAR) Subsections 3.1.2 and 3.1.3, to control reactivity, maintain the fuel within operating limits, and operate the plant within TS limits. Through the boration requirements and by limiting the testing to the performance of rod movement and rod drop time testing, the requirements of GDC 28 continue to be met in accordance with the discussion provided in UFSAR Subsection 3.1.3.

The staff finds that the proposed changes would not affect any function or feature used for the prevention and mitigation of accidents or their safety analyses. The proposed changes would not affect the radiological source terms (i.e., amounts and types of radioactive materials released, their release rates and release durations) used in the accident analyses. The changes would not result in a new failure mode, malfunction, or sequence of events that could adversely affect a radioactive material barrier or safety-related equipment. The proposed changes would not allow for a new fission product release path, result in a new fission product barrier failure mode, or create a new sequence of events that could result in significant fuel cladding failures. The proposed changes would not adversely affect any fuel design limits, design analysis, nor would they adversely affect any safety analysis input or result, or design/safety margin. For these reasons, the safety analysis of record in UFSAR Section 15.4.6, “Chemical and Volume Control System Malfunction that Results in a Decrease in the Boron Concentration in the Reactor Coolant,” remains bounding.

Based on the staff’s review of LAR 17-034, the staff concludes the amendment would not create the possibility of a new or different accident from any of the safety analysis presented in UFSAR Chapter 15 and the existing safety analysis remains applicable. Based on the analysis above, the staff finds the proposed TS revisions acceptable. In addition, the staff finds the proposed Bases changes are consistent with the TS. Therefore, the staff concludes that the changes presented in LAR 17-034 are acceptable.

#### 4.0 STATE CONSULTATION

In accordance with the Commission's regulations in 10 CFR 50.91(b)(2), on March 9, 2018, the Georgia State official was consulted regarding the amendment. The State official had no comments.

#### 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." The 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. Also, 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 (*Federal Register*, 82 FR 49240, dated October 24, 2017). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Under 10 CFR 51.22(b), no environmental impact statement or environmental assessment needs to be prepared in connection with the issuance of the amendment.

#### 6.0 CONCLUSION

Based on the technical evaluation discussed in Section 3.0, the staff concludes that the changes to (1) add new TS 3.1.10, (2) modify TS LCO 3.0.7 to allow rod movement and rod drop time testing under cold conditions (MODE 5), and (3) revise the LCO Applicability of TS 3.4.8 to reflect its safety analysis basis do not change any analysis methodology, assumptions, or the design itself. Therefore, there is reasonable assurance that: (1) the health and safety of the public will not be endangered by construction and 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 to be acceptable.

#### 7.0 REFERENCES

1. Southern Nuclear Operating Company, Vogtle Electric Generating Plant Units 3 and 4, "Request for License Amendment: Technical Specification Changes to Support Control Rod Testing in Cold Shutdown with Reactor Coolant Pumps Not in Operation (LAR 17-034)," dated September 22, 2017 (ADAMS Accession No. ML17265A822).
2. Vogtle Units 3 and 4 Updated Final Safety Analysis Report, Revision 6 and Tier 1, Revision 5 dated June 15, 2017 (ADAMS Accession No. ML17172A218).
3. AP1000 Design Control Document, Revision 19, dated June 13, 2011 (ADAMS Accession No. ML11171A500).

4. NUREG-2194, Vol. 1, Standard Technical Specifications Westinghouse Advanced Passive 1000 (AP1000) Plants (ADAMS Accession No. ML16110A277).
5. Combined License NPF-91 for Vogtle Electric Generating Plant Unit 3, Southern Nuclear Operating Company (ADAMS Accession No. ML14100A106).
6. Combined License NPF-92 for Vogtle Electric Generating Plant Unit 4, Southern Nuclear Operating Company (ADAMS Accession No. ML14100A135).