

SAFETY EVALUATION BY THE OFFICE OF NEW REACTORS
RELATED TO AMENDMENT NOS. 105 AND 104
TO THE COMBINED LICENSE NOS. NPF-91 AND NPF-92
SOUTHERN NUCLEAR OPERATING COMPANY, INC.
GEORGIA POWER COMPANY
OGLETHORPE POWER COMPANY
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 May 31, 2017 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17151A296), and supplemented by letter dated November 16, 2017 (ADAMS Accession No. ML17321A010), Southern Nuclear Operating Company (SNC) submitted license amendment request (LAR) 17-019 and requested that the U.S. Nuclear Regulatory Commission (NRC) amend the combined licenses (COL) for Vogtle Electric Generating Plant (VEGP) Units 3 and 4, COL Numbers NPF-91 and NPF-92, respectively. LAR 17-019 consists of changes to the Updated Final Safety Analysis Report (UFSAR) in the form of departures from the incorporated plant-specific Design Control Document (DCD) Tier 2 information and involves changes to the VEGP Units 3 and 4 COL Appendix A, Technical Specifications (TS). The proposed changes revise the plant specific Tier 2 information addressing the administrative controls for unborated water flow paths to the reactor coolant system (RCS) that are required to support chemical additions during periods when the reactor coolant pumps (RCPs) are not in operation.

In letter dated November 16, 2017, SNC provided additional information that supplemented the application. This information did not expand the scope of the application, and did not change the NRC's original proposed no significant hazards consideration determination as published in the *Federal Register* on September 12, 2017 (82 FR 42853).

2.0 REGULATORY EVALUATION

The NRC staff considered the following regulatory requirements in reviewing the licensee's proposed UFSAR changes.

10 CFR 50.90 states, in part, that whenever a licensee desires to amend their license, the must file an application for an amendment, fully describe the requested changes, and follow as far as applicable, the form prescribed for the original application.

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.

Appendix D, Section VIII.C.6 states that after issuance of a license, "Changes to the Technical Specifications will be treated as license amendments under 10 CFR 50.90." As such, when changes to COL Appendix A are requested, an LAR is required.

10 CFR 50.36, Technical specifications (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; (4) design features; and (5) administrative controls.

10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants," General Design Criterion (GDC) 10, "Reactor design," requires that the 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.

GDC 13, "Instrumentation and control," requires that instrumentation shall be provided to monitor and control variables and systems over their anticipated ranges for normal operation, for anticipated operational occurrences, and for accident conditions as appropriate to ensure adequate safety. Appropriate controls shall be provided to maintain these variables and systems within prescribed operating ranges.

GDC 15, "Reactor Coolant System Design," requires that the RCS and associated auxiliary, control, and protection systems shall be designed with sufficient margin to assure that the design conditions of the reactor coolant pressure boundary are not exceeded during any condition of normal operation, including anticipated operational occurrences.

GDC 28, "Reactivity limits," requires that the reactivity control systems shall be designed with appropriate limits on the potential amount and rate of reactivity 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.

GDC 31, "Fracture prevention of reactor coolant pressure boundary," requires that the reactor coolant pressure boundary shall be designed with sufficient margin to assure that when stressed under operating, maintenance, testing, and postulated accident conditions (1) the boundary behaves in a nonbrittle manner and (2) the probability of rapidly propagating fracture is minimized. The design shall reflect consideration of service temperatures and other conditions of the boundary material under operating, maintenance, testing, and postulated accident conditions and the uncertainties in determining (1) material properties, (2) the effects of irradiation on material properties, (3) residual, steady state and transient stresses, and (4) size of flaws.

3.0 TECHNICAL EVALUATION

To perform the technical evaluation, the staff considered VEGP Units 3 and 4 UFSAR Section 5.2.3.2.1, "Chemistry of Reactor Coolant," and DCD Table 5.2-2, "Reactor Coolant Water Chemistry Specifications." The staff reviewed the licensee's proposed actions to evaluate the impact of the requested VEGP Units 3 and 4 UFSAR changes on the chemistry of the reactor coolant. The staff also examined portions of NUREG-1793, Supplement 2, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Plant Design" (NUREG-1793) (ADAMS Accession No. ML112061231), and the "Final Safety Evaluation Report for the Vogtle Electric Generating Plant Units 3 and 4 Combined License Application," (ADAMS Accession No. ML110450302) documenting the staff's technical evaluation of those aspects of the AP1000 DCD and VEGP Units 3 and 4 COL application, respectively and the overall safety of the plant.

The proposed changes do not modify the RCS design. Rather the changes modify processes and procedures to allow unborated water sources to be unisolated under administrative controls for the purpose of chemical addition to the pressurizer when RCPs are not in operation.

3.1 PROPOSED CHANGES

The following changes to COL Appendix A, TS are proposed:

Revise Limiting Condition for Operation (LCO) 3.4.8 Note 1 to add an additional condition as follows:

With no RCPs in operation, an unborated water source through the chemical mixing tank may be unisolated under administrative controls for less than or equal to (\leq) 1 hour for the purpose of chemical addition to the pressurizer.

Additionally, text is added to clarify that the first portion of existing Note 1 is applicable "for the purpose of testing."

Add "OR" to separate the two portions of Note 1 for clarity.

The following changes to UFSAR information are proposed.

UFSAR Subsection 15.4.6.1 revised to include the following paragraph:

The TS contain exceptions which allow all RCPs to be removed from operation in Modes 3, 4, and 5 for a limited duration while performing required tests or while an unborated water source flow path through the chemical mixing tank to the pressurizer is unisolated under administrative controls. This is acceptable provided no operations are permitted that would add coolant to the RCS that has an insufficient boron concentration to meet the required shutdown margin (SDM), and the core outlet temperature remains sufficiently subcooled. With respect to chemical additions, the system design includes a flow orifice which limits flow from the chemical mixing tank to 2 gallons per minute and allows combining the chemical addition solution with flow from the boric acid storage tank to the suction of the chemical and volume control system makeup pumps. Administrative controls include dedicated control room and local operators to secure the unborated water source flow path after completion of the chemical addition or if flow rates indicate the potential for inadequately borated blended flow. Procedural controls also require the chemical addition flow path to be directed to the pressurizer for the short duration allowed for this exception. This limits the flow rate and duration of an unisolated, unborated water flow path during this evolution.

UFSAR Subsection 15.4.6.2.2 is revised to include reference to the exception for chemical addition: "(subject to the limited exception discussed in UFSAR Subsection 15.4.6.1)"

UFSAR Subsection 15.4.6.2.3 is revised to include reference to the exception for chemical addition: "(subject to the limited exception discussed in UFSAR Subsection 15.4.6.1)"

UFSAR Subsection 15.4.6.2.4 is revised to include reference to the exception for chemical addition: "(subject to the limited exception discussed in UFSAR Subsection 15.4.6.1)"

3.2 STAFF EVALUATION OF PROPOSED CHANGES

The staff reviewed the changes to the UFSAR presented in LAR 17-019 with respect to the addition of chemicals necessary to achieve proper RCS water quality by allowing an unborated water source through the chemical mixing tank to be unisolated for 1 hour or less for chemical addition to the pressurizer to be performed with RCPs not in operation. In order to perform chemical addition to the pressurizer without the mixing provided by forced RCS flow, administrative controls are established such that coolant introduced into the RCS is at a boron concentration greater than or equal to that required to meet the SDM boron concentration.

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. When RCPs are not in operation, chemical additions must be mixed with flow from the boric acid storage tank as a chemical and volume control system blended flow makeup operation, which provides natural mixing of the two sources (unborated water with borated water). Requiring the resulting RCS makeup boron concentration to be greater than or equal to SDM concentration safeguards against chemical additions that would dilute the RCS boron concentration, thereby maintaining the margin to criticality. RCS additions, with coolant at boron concentrations less than necessary to maintain the required SDM, are prohibited by procedures or controlled by the

operating procedures because a uniform concentration distribution throughout the RCS cannot be assured without RCP operation. This provides acceptable margin to maintaining subcritical operation.

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. No system or design function or equipment qualification would be adversely affected by the proposed changes. 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 design code limit allowable value, design analysis, nor would they adversely affect any safety analysis input or result, or design/safety margin. Based on the staff's review of LAR 17-019, the staff concludes the safety analysis presented in UFSAR Chapter 15 remains applicable as no alteration is made to the input by the accident analysis of Chapter 15 as a consequence of this change to the license amendment.

SNC's proposed changes support the addition of chemicals necessary to achieve proper RCS water quality. The proposed changes allow an unborated water source through the chemical mixing tank to be unisolated for 1 hour or less for chemical addition to the pressurizer while the RCPs are not in operation. The staff has confirmed that the SNC proposed procedures and administrative controls to monitor the coolant will ensure that the coolant is at boron concentration greater than or equal to that required to meet the SDM boron concentration.

The licensee is adding a note with this proposed change to the existing TS to allow no RCP to be running for 1 hour or less in order to add nonborated chemicals to the RCS. The technical aspects of this change have been evaluated and found acceptable above.

The proposed change does not adversely impact the reactor design. Design margins are not changed. Fuel design limits are not exceeded during any condition of operation regarding this change. Therefore, compliance with GDC-10 is not changed.

The proposed change does not adversely affect any instrumentation or control systems. Existing monitoring is not changed and instrumentation will continue to monitor dilution paths and chemical and volume control system flow paths. Alarm indications to alert operators of a potential event are not changed. Therefore, compliance with GDC-13 is not changed.

The proposed change does not adversely impact the RCS design, but allows unborated water sources to be unisolated under administrative controls for the purpose of chemical addition to the pressurizer when RCPs are not in operation. Design conditions of the reactor coolant pressure boundary are not exceeded. Therefore, compliance with GDC-15 is not changed.

The proposed change does not adversely impact reactivity limits. Boron concentrations of coolant being injected to the RCS are monitored during chemical addition to the pressurizer to maintain the required SDM. Therefore, compliance with GDC-28 is not changed.

These changes do not adversely impact the reactor coolant pressure boundary or the fracture prevention of the reactor coolant pressure boundary. The probability of fracture is not increased by this change. Therefore, compliance with GDC-31 is not changed.

Based on the proposed information, the staff concludes that the proposed UFSAR changes do not impact the licensee's compliance with the requirements in 10 CFR Part 50, Appendix A, GDC 10, 13, 15, 28, and 31. Therefore, the staff finds the proposed changes to be acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations in 10 CFR 50.91(b), the Georgia State official was notified on November 20, 2017 of the proposed issuance of 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 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. 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 (82 FR 42853 published on September 12, 2017). 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 of this safety evaluation and confirming that these changes do not change an analysis methodology, assumptions, or the design itself, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by the proposed activities, (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 LAR 17-019 to be acceptable.

7.0 REFERENCES

1. Vogtle Electric Generating Plant, Units 3 and 4 - Request for License Amendment: Chemical Addition with Reactor Coolant Pumps Not in Operation (LAR-17-019), dated May 31, 2017 (ADAMS Accession No. ML17151A296).
2. Vogtle Electric Generating Plant, Units 3 and 4 – Supplement to Request for License Amendment: Chemical Addition with Reactor Coolant Pumps Not in Operation (LAR-17-019), dated November 16, 2017 (ADAMS Accession No. ML17321A010).
3. Final Safety Evaluation Report for Vogtle Electric Generating Plant Units 3 and 4 Combined License Application, dated August 5, 2011 (ADAMS Accession No. ML110450302).
4. Final Safety Evaluation Report Related to Certification of the AP1000 Standard Plant Design, NUREG-1793, Supplement 2, dated August 5, 2011 (ADAMS Accession No. ML112061231).

5. NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)," dated March 2007 (ADAMS Accession No. ML070660036).
6. Vogtle Electric Generating Plant Updated Final Safety Analysis Report (UFSAR), Revision 5, dated April 6, 2016 (ADAMS Accession No. ML16174A168).