

SAFETY EVALUATION BY THE OFFICE OF NEW REACTORS

RELATED TO AMENDMENT NOS. 83 AND 82

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

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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 August 31, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16244A253) Southern Nuclear Operating Company (SNC/licensee), submitted for the U.S. Nuclear Regulatory Commission (NRC) staff's review, a license amendment request (LAR) 16-011 to Combined License (COL) Nos. NPF-91 and NPF-92, for Vogtle Electric Generating Plant (VEGP), Units 3 and 4, respectively, in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 52.98(c) and 10 CFR 50.90. In this amendment, the licensee proposed changes to the updated final safety analysis report (UFSAR) to eliminate pressurizer spray line monitoring during pressurizer surge line first plant only testing. These proposed changes correct inconsistencies in testing purpose, testing duration, and the ability to leave equipment in place following the data collection period. These changes involve information which is specifically referenced in Section 2.D.(2) of the COLs.

2.0 REGULATORY EVALUATION

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

10 CFR Section 50.90 states that whenever a holder of a license, including a construction permit and operating license under this part, and an early site permit, combined license, and manufacturing license under Part 52 of this chapter, desires to amend the license or permit, application for an amendment must be filed with the Commission, as specified in Section 50.4 or

52.3 of this chapter, as applicable, fully describing the changes desired, and following as far as applicable, the form prescribed for original applications.

10 CFR 52.79(a)(28) requires plans for preoperational testing and initial operations.

10 CFR 52.98(c)(1) states that if a COL references a certified design, then changes to, or departures from, the information within the scope of the referenced design certification rule are subject to the applicable change procedures in that rule.

10 CFR 52.98(f) requires NRC approval for any modification to, addition to, or deletion from the terms and conditions of a COL, including any modification to, addition to, or deletion from the inspections, tests, analyses, or related acceptance criteria contained in the license.

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 Technical Specifications, or requires a license amendment under Paragraphs B.5.b or B.5.c of the section.”

10 CFR Part 50, Appendix A, general design criteria (GDC) 2, “Design Bases for Protection Against Natural Phenomena,” requires that structures, systems, and components important to safety shall be designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunamis, and seiches without loss of capability to perform their safety functions.

10 CFR Part 50, Appendix A, GDC 4, “Environmental and Dynamic Effects Design Bases,” requires that structures, systems, and components important to safety be designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing and postulated accidents, including loss-of-coolant accidents.

10 CFR Part 50, Appendix A, GDC 14, “Reactor Coolant Pressure Boundary,” requires that the reactor coolant pressure boundary shall be designed, fabricated, erected, and tested so as to have an extremely low probability of abnormal leakage, of rapidly propagating failure, and of gross rupture.

10 CFR Part 50, Appendix A, GDC 15, “Reactor Coolant System Design,” requires that the reactor coolant system 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.

NRC Bulletin 88-08, “Thermal Stresses in Piping Connected to Reactor Coolant Systems” dated June 22, 1988. This was issued following the discovery of cracks in unisolable piping connected to the reactor coolant system (RCS) at several nuclear power plants. NRC Bulletin 88-08 was reviewed as part of the VEGP licensing basis to ensure GDC 4 requirements were met.

NRC Bulletin 88-11, “Pressurizer Surge Line Thermal Stratification” dated December 20, 1988. This was issued following the observance of unexpected movement of the pressurizer surge line during a refueling outage where there were difficulties in setting whip restraint gap sizes. NRC

Bulletin 88-11 was reviewed as part of the VEGP licensing basis to ensure GDC 4 requirements were met.

The proposed change involves a revision to COL License Condition 2.D.(2)(a)2, "Pressurizer Surge Line Stratification Evaluation (first plant test as identified in AP1000 Design Control Document (DCD), Revision 19, Section 14.2.9.1.7 Item (d))." 10 CFR 52.98(f) requires NRC's approval for any modification to the terms and conditions of a COL. Therefore, in accordance with 10 CFR 52.98(f), NRC's approval is required for the COL License Condition change as well as the proposed changes to the UFSAR, Subsection 14.2.9.1.7, "Expansion, Vibration and Dynamic Effects Testing," Item (d), "Pressurizer Surge Line Stratification Evaluation," referenced in the COL License Condition and related changes to Subsection 14.2.9.2.22, "Pressurizer Surge Line (First Plant Only)."

3.0 TECHNICAL EVALUATION

In the LAR, the licensee proposes to remove from the UFSAR the requirement to install, monitor, and verify operation of temperature sensors on the pressurizer spray line from the pressurizer surge line testing suite for monitoring thermal stratification and thermal cycling for the first plant as described in UFSAR Subsection 14.2.9.1.7 Item (d), and required by COL License Condition 2.D.(2)(a)2. These modifications are to address inconsistencies in regards to testing purpose, testing duration, and ability to leave equipment in place following the data collection period and commitments related to NRC Bulletin 88-11 for pressurizer surge line monitoring. Modifications are proposed for the descriptions of pressurizer spray line testing, which are included in UFSAR Subsections 14.2.9.1.7 and 14.2.9.2.22.

3.1 PROPOSED CHANGES

UFSAR Subsection 14.2.9.1.7 describes testing performed to verify that the safety-related, high energy piping and components are properly installed and supported such that expected movement due to thermal expansion during normal heatup and cooldown, and as a result of transients; thermal stratification and thermal cycling; as well as vibrations caused by steady-state or dynamic effects do not result in excessive stress or fatigue to safety-related plant systems and equipment. The licensee proposes to delete "and pressurizer spray line" from UFSAR Subsection 14.2.9.1.7 Item (d) which described temperature sensors installed to monitor thermal stratification and thermal cycling during power operation for the first plant.

UFSAR Subsection 14.2.9.2.22 states that the purpose of the pressurizer surge line testing is to obtain data to verify the proper operation of temperature sensors installed on the pressurizer surge line and pressurizer spray line, and to obtain RCS piping displacement measurements for baseline data. The licensee proposes to modify the purpose section to state that the purpose of the pressurizer surge line testing is to obtain data to verify the proper operation of temperature sensors installed on the pressurizer surge line, and to obtain pressurizer surge line piping displacement and thermal stratification measurements.

The licensee stated that replacing RCS with pressurizer surge line was to clarify that the pressurizer surge line thermal monitoring first plant only test was applicable only to the pressurizer surge line. Monitoring of the RCS for thermal effects, dynamic effects and vibration and for thermal stratification is discussed in UFSAR Subsections 3.9.3, "ASME Code Classes 1, 2, and 3 Components, Component Supports, and Core Support Structures," and 14.2.9.1.7. Thermal stratification was added to clarify the purpose of the pressurizer surge line thermal

stratification monitoring first plant only test as discussed in UFSAR Subsections 3.9.3, 14.2.5, and 14.2.9.1.7.

The term “for baseline data” was deleted to clarify that the data obtained is evaluated during hot functional testing, power ascension testing and during the first fuel cycle. The pressurizer surge line thermal stratification monitoring first plant only test was not intended to extend past the first fuel cycle. The data would not be considered “baseline” as it would not be used in comparison to any future data obtained, as the data would be evaluated based on acceptable American Society of Mechanical Engineers (ASME) Code requirements and piping stress limits to develop plant operating strategies to limit developed piping stresses in the first and subsequent AP1000 plants, as applicable.

UFSAR Subsection 14.2.9.2.22 Item c) also describes the plant parameters required to be recorded in support of the pressurizer surge line thermal stratification monitoring first plant only test. The licensee proposed revisions to the plant parameters required to be recorded by adding pressurizer surge line temperatures, RCS charging flow rate, charging line to auxiliary spray flow, and deleting passive core cooling system – passive residual heat removal flow rate.

The licensee also proposes revisions to remove UFSAR 14.2.9.2.22 Item d), which requires monitoring of the pressurizer surge line and spray line for valve leakage, revise Item e) to clarify that the transducers and associated hardware may be removed after the completion of testing, but not required to be removed after completion of hot functional testing as implied by the current wording, and remove Item f) as it is redundant to Item a). The licensee stated the added parameters identified above to UFSAR Subsection 14.2.9.2.22 Item c) permit detection of thermal stratification in the surge line, allow calculation of the net RCS inventory and permit identification of spray source and status for transient monitoring, respectively. The deleted parameter was intended to provide net RCS inventory information, and is no longer required with the addition of the RCS charging flow rate parameter.

The licensee has also proposed a revision to COL License Condition 2.D.(2)(a)2 to implement above changes.

3.2 STAFF EVALUATION OF PROPOSED CHANGES

The NRC issued Bulletin 88-08 following the discovery of cracks in unisolable piping connected to the RCS at several nuclear power plants. AP1000 DCD Tier 2, Section 3.9.3.1.2, “Loads for Class 1 Components, Core Support, and Component Supports,” which has been incorporated by reference in the UFSAR Section 3.9.3.1.2, “Loads for Class 1 Components, Core Support, and Component Supports,” for VEGP, addressed NRC Bulletin 88-08 concerns related to thermal stratification and determined that the pressurizer spray line is not susceptible to thermal stratification concerns of NRC Bulletin 88-08. The staff, in its safety evaluation report (NUREG-1793, “Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design”), Section 3.12.5.9, “Thermal Oscillations in Piping Connected to the Reactor Coolant System,” found that the AP1000 design has adequately addressed the staff’s concerns identified in NRC Bulletin 88-08. Therefore, the staff finds the removal of the requirement to install temporary temperature sensors to monitor the pressurizer spray line for thermal stratification acceptable.

The staff finds the deletion of the requirement to install temperature sensors on the pressurizer spray line in the purpose section, and to verify operation of the temporary temperature sensor in

Item a) in the general test methods and acceptance criteria of UFSAR Subsection 14.2.9.2.22 is consistent with the change for UFSAR Subsection 14.2.9.1.7, and therefore acceptable.

The staff finds the changes to the purpose section of UFSAR Subsection 14.2.9.2.22 acceptable as the changes would not adversely affect the design functions of the RCS and the pressurizer surge and spray lines and the licensee would continue to meet acceptable piping stress limits and ASME Code requirements. In addition, the proposed changes do not adversely affect the licensee's commitments to monitor pressurizer surge line thermal stratification to address NRC Bulletin 88-11.

The staff finds the deletion of the passive core cooling system – passive residual heat removal flow rate parameter acceptable as the licensee added the RCS charging flow rate parameter for RCS net inventory information. The staff finds that the changes to UFSAR Subsection 14.2.9.2.22 Items d) and e) acceptable because the pressurizer surge line does not have valves, and the pressurizer spray valves each have, in parallel, a manual throttle valve that permits a small continuous flow through both spray lines to reduce thermal stresses and thermal shock as mentioned in the AP1000 DCD UFSAR Subsection 5.4.5.3.4, "Pressurizer Spray." The deletion of Item f) is acceptable as it was redundant to Item a).

The staff finds that the changes do not change the existing design and testing requirements described in other areas of the UFSAR necessary to monitor temperatures using permanent instrumentation and to verify the continued integrity of the pressurizer surge lines. The proposed changes are acceptable as described above because they do not adversely affect the design functions of the RCS and the pressurizer surge lines. In addition, the proposed changes do not adversely affect the licensee's commitments to monitor pressurizer surge line thermal stratification to address NRC Bulletin 88-11.

The staff also finds that the changes do not involve physical modifications or addition of systems, structures, and components, and do not impact the existing seismic design requirements, do not affect the capability of the RCS to withstand dynamic effects associated with missiles, pipe whipping and discharging fluids, and do not impact the capability of the pressurizer surge line and pressurizer spray lines to perform the required reactor coolant pressure boundary functions. The NRC staff finds the RCS design margins have not been altered and still assure that the design conditions of the reactor coolant pressure boundary are not exceeded during any condition of normal operation, including anticipated operational occurrences.

The proposed revision to the COL License Condition 2.D.(2)(a)2 is acceptable to the staff because it simply reflects the implementation of the above changes.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations in 10 CFR 50.91(b)(2), the George State official was notified 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 (81 FR 92863 and 82 FR 10590, published on December 20, 2016 and February 14, 2017, respectively). 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 reviewed the licensee's proposed changes in the LAR, concerning the details of the RCS, specifically to eliminate pressurizer spray line monitoring during pressurizer surge line thermal stratification testing of the first plant and to correct inconsistencies in testing purpose, testing duration, and the ability to leave equipment in place following the data collection period.

Based on the staff's evaluation, the staff has concluded that the proposed changes are acceptable because they do not adversely affect the design functions of the RCS and the pressurizer surge line and pressurizer spray lines and the licensee will continue to meet ASME Code requirements. Additionally, the staff concludes that there is reasonable assurance that the requirements of GDCs 2, 4, 14, and 15 of 10 CFR Part 50, Appendix A continue to be met.

The staff further concludes, based on the considerations discussed above, that there is reasonable assurance that: (1) the health and safety of the public will not be endangered by construction activities or operation in the proposed manner; (2) 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 16-011 to be acceptable.

7.0 REFERENCES

1. Request for LAR 16-011: Pressurizer Surge Line Testing, letter from SNC, dated August 31, 2016 (ADAMS Accession No. ML16244A253).
2. Vogtle Electric Generating Plant, Units 3 and 4 COLA (Final Safety Analysis Report), Revision 5, dated June 24, 2011 (ADAMS Accession No. ML11180A100).
3. AP1000 Design Control Document, Revision 19, dated June 13, 2011 (ADAMS Accession No. ML11171A500).
4. NUREG-1793, Supplement 2, Final Safety Evaluation Report Related to Certification of the AP1000 Standard Plant Design, dated August 5, 2011 (ADAMS Accession No. ML112061231).
5. NUREG-2124, Volume 1, Final Safety Evaluation Report, Related to the Combined Licenses for Vogtle Electric Generating Plant, Units 3 and 4, dated September 30, 2012 (ADAMS Accession No. ML12271A045).