



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NOS. 171 AND 169

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 July 26, 2019 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML19207A727), as supplemented by letter dated November 1, 2019 (ADAMS Accession No. ML19305D559), Southern Nuclear Operating Company (SNC) requested that the 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 License Amendment Request (LAR) 19-013 requested changes to the Updated Final Safety Analysis Report (UFSAR) Tier 2 information and related changes to the VEGP Units 3 and 4 COL, associated with the Pressurizer Surge Line Stratification Evaluation.

In LAR 19-013, SNC seeks approval to use and evaluate the results of the Pressurizer Surge Line Stratification monitoring test performed in China on the AP1000 power reactor facility at Sanmen Unit 1 as part of the Initial Test Program (ITP) for VEGP Units 3 and 4. This test is used to establish a unique phenomenological performance parameter of the AP1000 design features beyond testing performed for Design Certification of the AP600. Because of the standardization of the AP1000 design, this test is not required for subsequently built plants. The Pressurizer Surge Line monitoring requirement is listed as one of the first plant only tests according to the UFSAR (Section 14.2.5). The requested amendment involves changes to

eliminate the performance of the Pressurizer Surge Line Stratification Evaluation first plant only test during the hot functional testing and during the first operating cycle at VEGP Units 3 and 4 by revising COL Condition 2.D.(2)(a)1 and UFSAR Subsections 14.2.5, 14.2.9.1.7 and 14.2.9.2.22.

The supplement dated November 1, 2019, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the NRC staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on September 24, 2019 (84 FR 50083).

## 2.0 REGULATORY EVALUATION

SNC requested approval to use and evaluate the results of the first plant only startup testing performed in China at Sanmen Unit 1 as part of the ITP for SNC's VEGP Units 3 and 4. The requested amendment credits this test by proposing changes to the COL and UFSAR Tier 2 information. Specifically, the proposed changes would revise the COL License Condition 2.D.(2)(a)1 and UFSAR Subsections 14.2.5 and 14.2.9.1.7 item (d) by removing the requirement to perform the Pressurizer Surge Line Stratification Evaluation first plant only test.

The staff considered the following regulatory requirements in reviewing the LAR that included the proposed changes.

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

10 CFR 52.98(f) requires NRC approval for any modification to, addition to, or deletion from the terms and conditions of a COL. These changes involve a change to COL License Condition 2.D.(2)(a) and changes to the UFSAR. Therefore, NRC approval is required prior to making the plant specific proposed changes in this LAR.

10 CFR Part 50, Appendix B requires that licensees apply a quality assurance (QA) program to the design, fabrication, construction, and testing of structures, systems, and components.

The specific technical requirements applicable to LAR 19-013 include 10 CFR 50.55a and General Design Criterion 1, as they relate to piping systems, pipe supports, and components being designed, fabricated, erected, constructed, tested, and inspected to quality standards commensurate with the importance of the safety function to be performed.

## 3.0 TECHNICAL EVALUATION

In LAR 19-013, SNC proposes to remove COL Condition 2.D.(2)(a)1, which requires SNC to perform the Pressurizer Surge Line Stratification Evaluation testing described in VEGP Units 3 and 4 UFSAR Subsections 3.9.8.5, 3.9.3.1.2, 14.2.9.2.22 and 14.2.9.1.7 as a first plant only test. The reason is that the Pressurizer Surge Line Stratification first plant only test has been completed in China at the first AP1000 plant, Sanmen Unit 1.

The NRC staff reviewed the AP1000 Design Control Document Revision 19 and VEGP Units 3 and 4 UFSAR, regarding the AP1000 surge line stratification testing. During inspections in 2016, and 2018, for closure of the Inspections, Tests, Analyses, and Acceptance Criteria for piping Design Acceptance Criteria, the staff reviewed the as-designed surge line design piping stress analysis, which included design inputs for thermal stratification. The AP1000 surge line piping is designed to American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (B&PV), Section III Class 1 piping requirements. ASME B&PV Code, Section III, is incorporated by reference in 10 CFR 50.55a. ASME B&PV Section III requires that Class 1 piping be evaluated for stresses and fatigue due to various applicable loadings. Loadings due to thermal stratifications affect pipe stresses and add to piping fatigue usage.

NRC Bulletin 88-11 and Standard Review Plan Section 3.12 discuss the potential for stresses and fatigue induced by thermal stratification in the pressurizer surge line. In particular, Bulletin 88-11 requested that licensees establish a program that would monitor the surge line for the effects of thermal stratification beginning with hot functional testing. VEGP Units 3 and 4 UFSAR Subsection 3.9.3.1.2 provides detailed information of the AP1000 surge line conformance to NRC Bulletin 88-11. According to the UFSAR, a monitoring program will be implemented by the COL applicant for the first AP1000 plant to record temperature distributions and thermal displacements of the surge line piping during hot functional testing and during the first fuel cycle. As mentioned above, the AP1000 surge line design piping analysis contains design inputs due to thermal stratification. The first plant testing for thermal stratification will provide test data, which will be used to validate these design inputs. These stratification design inputs are required bounding acceptance criteria for the surge line first plant testing.

COL Section 2.D.(2)(a)1 requires that a "Pressurizer Surge Line Stratification Evaluation (first plant test as identified in UFSAR Section 14.2.9.1.7 item (d))" be performed by SNC. UFSAR Section 14.2.9.1.7 item (d) states that a monitoring program will be implemented by the COL applicant for the first AP1000 plant to record temperature distributions and thermal displacements of the surge line piping during hot functional testing and during the first fuel cycle. The "Pressurizer Surge Line Stratification Evaluation (14.2.9.1.7 Item (d))" is included in UFSAR Subsection 14.2.5, "Utilization of Reactor Operating and Testing Experience in the Development of Initial Test Program." The surge line monitoring program is discussed in UFSAR Subsection 3.9.8.5 and is outlined in UFSAR Subsection 3.9.3.1.2 under "NRC Bulletin 88-11" Request 3. The testing is to be performed in accordance with UFSAR Subsection 14.2.9.2.22, "Pressurizer Surge Line Testing (First Plant Only)." In addition to permanent plant temperature instrumentation consisting of three strap-on resistance temperature detectors (RTDs), additional temporary instrumentation is installed on the pressurizer surge line at critical locations to measure piping displacements and thermal stratification during hot functional testing and during the first fuel cycle of the first AP1000 plant. For the test to be applicable to subsequent plants, they need to confirm that their heatup and cooldown procedures are consistent with the pertinent attributes of the first AP1000 plant surge line monitoring.

According to UFSAR Subsection 14.4.6, "First-Plant-Only and Three-Plant-Only Tests," the first-plant-only tests either are performed in accordance with Subsection 14.2.5 or a justification is provided that the results of the first-plant-only tests are applicable to a subsequent plant. SNC seeks to use the Sanmen Unit 1 thermal stratification testing, which recorded temperature distributions and thermal displacements of the surge line piping during hot functional testing and during the first fuel cycle, as the first-plant-test for the surge line stratification testing for VEGP Units 3 and 4. In its submittals dated July 26 and November 1, 2019, SNC provided justification

to show that the results of the Sanmen Unit 1 first plant testing for surge line stratification monitoring are applicable to VEGP Units 3 and 4, as subsequent AP1000 plants.

SNC noted that the hot functional testing procedure used by Sanmen 1 will be used by VEGP Units 3 and 4. SNC compared the Sanmen Unit 1 heatup and cooldown procedures with the VEGP Units 3 and 4 heatup and cooldown procedures, and confirmed that the operational transients remain unchanged. SNC also reviewed design documents and operating procedures specific to the Sanmen Unit 1 surge line testing and confirmed that there were no significant site-specific differences in either the as-built configurations or operating parameters that would preclude the testing results from being applied to VEGP Units 3 and 4.

According to SNC's submittals, the first AP1000 plant, Sanmen Unit 1, monitored the temperature in the pressurizer surge line using temporary RTDs and displacement sensors, as well as the three permanent plant RTDs during the period of hot functional testing and during the first fuel cycle. Displacement and temperature measurements taken during these periods met acceptance criteria. The evaluation of the data from the first AP1000 operating plant (Sanmen Unit 1) will be included as a part of the as-built reconciliation of the Reactor Coolant System ASME B&PV Section III piping system, as described in VEGP Units 3 and 4 UFSAR Subsection 3.9. The data recorded at Sanmen 1 is contained within a test report that will be used to reconcile the VEGP Units 3 and 4 as-built fatigue and piping stress analyses.

Based on its review, as shown above, the NRC staff finds that the Pressurizer Surge Line Stratification testing of the first AP1000 plant, Sanmen Unit 1, is applicable to VEGP Units 3 and 4, which are subsequent plants. The NRC staff based this on SNC's confirmation that the Sanmen Unit 1 surge line, which was designed, procured, and tested using the standard AP1000 design requirements, has the same heat up and cooldown procedures as VEGP Units 3 and 4. In addition, the surge line thermal stratification first AP1000 plant testing has met acceptance criteria. Therefore, it provides reasonable assurance that the VEGP Units 3 and 4 surge line compliance to ASME B&PV Section III stress and fatigue criteria is not adversely impacted.

In letter dated January 13, 2012 (ADAMS Accession No. ML120040121), the staff communicated six topics that SNC should consider for requests to credit previously conducted first plant only or first three plant only tests performed in China. SNC provided responses to the six topics in LAR 18-019 dated August 3, 2018 (ADAMS Accession No. ML18215A383). The staff considered the six topics in its review of LAR 18-019. The staff documented its results in the safety evaluation (SE) dated January 22, 2019 (ADAMS Accession No. ML18351A342). In the SE, the staff evaluated applicable QA attributes related to audits, QA program documents, test control program procedures, test specifications, post-test analysis results, QA documents for instrument calibration, adequacy of administrative controls governing the ITP, and verified the QA documents and procedures were available in English.

In LAR 19-013, SNC identified that Westinghouse Electric Company has an Appendix B to 10 CFR Part 50 program. SNC noted that Westinghouse Electric Company developed test procedures with the Sanmen owners for the Evaluation of the Pressurizer Surge Line Stratification test. SNC observations and reviews concluded that Sanmen Unit 1 conducted the first plant only startup testing in accordance with the test procedures. The NRC staff concluded that the test results are sufficient for crediting the first plant only test completed at Sanmen Unit 1 for VEGP Units 3 and 4.

Based on the staff's review of the the quality controls applied to testing activities as documented in LAR 18-019, and the staff's SE for LAR 18-019, the staff found that the evaluation and conclusions related to QA addressed in LAR 18-019 are applicable to LAR 19-013. The staff determined that QA controls for the first plant only start-up tests were consistent with Appendix B to 10 CFR Part 50. The staff found that the QA requirements for the first plant only test performed at Sanmen Unit 1 were relevant and adequate for deleting conditions requiring SNC to meet the ITP requirements of COL for Condition 2.D(2)(a)1 to Evaluate Pressurizer Surge Line Stratification.

In summary, the NRC staff concluded that the testing performed at Sanmen Unit 1 is relevant and adequate to delete the VEGP Units 3 and 4 COL Condition 2.D(2)(a)1 requiring SNC to perform the Pressurizer Surge Line Stratification first plant only test.

#### 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Georgia State official was notified of the proposed issuance of the amendment on December 6, 2019. 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. 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, 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 (*Federal Register*, 84 FR 50083, dated September 24, 2019). 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, Request for License Amendment: Elimination of License Condition to Evaluate Pressurizer Surge Line Stratification (LAR 19-013), July 26, 2019 (ADAMS Accession No. ML ML19207A727).
2. Southern Nuclear Operating Company, Vogtle Electric Generating Plant Units 3 and 4,

Revised Request for License Amendment: Elimination of License Condition to Evaluate Pressurizer Surge Line Stratification (LAR 19-013R1), November 1, 2019 (ADAMS Accession No. ML19305D559).

3. Vogtle Electric Generating Plant Unit 3, Current Facility Combined License NPF-91, Revised June 25, 2019 (ADAMS Accession No. ML14100A106).
4. Vogtle Electric Generating Plant Unit 4, Current Facility Combined License NPF-92, Revised June 25, 2019 (ADAMS Accession No. ML14100A135).
5. Vogtle Electric Generating Plant, Units 3 and 4, Updated Final Safety Analysis Report, Revision 7, June 15, 2018 (ADAMS Accession No. ML18179A227).
6. Response to Southern Nuclear Operating Company's Letter on first-plant-only-tests and first-three-plant-only-tests for the Vogtle Electric Generating Plant Units 3 and 4, January 13, 2012 (ADAMS Accession No. ML120040121).
6. Safety Evaluation – Vogtle Electric Generating Plant Units 3 and 4 (LAR 18-019), January 22, 2019 (ADAMS Accession No. ML18351A342).
7. Southern Nuclear Operating Company, Vogtle Electric Generating Plant Units 3 and 4, Request for License Amendment and Exemption: Crediting Previously Completed First Plant and First Three Plant Tests (LAR 18-019), August 3, 2018 (ADAMS Accession No. ML18215A383).
8. Westinghouse Electric Company's AP1000 Design Control Document, Revision 19 (ADAMS Accession No. ML11171A500).