



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

March 12, 2018

MEMORANDUM TO: Jennifer Dixon-Herrity, Chief  
Licensing Branch 4  
Division of New Reactor Licensing  
Office of New Reactors

FROM: Paul Kallan, Senior Project Manager */RA/*  
Licensing Branch 4  
Division of New Reactor Licensing  
Office of New Reactors

SUBJECT: AUDIT REPORT FOR VOGTLE ELECTRIC GENERATING  
PLANT UNITS 3 AND 4, REQUEST FOR LICENSE  
AMENDMENT AND EXEMPTION: PASSIVE RESIDUAL HEAT  
REMOVAL HEAT TRANSFER AND IN-CONTAINMENT  
REFUELING WATER STORAGE TANK HEAT UP TEST  
ACCEPTANCE CRITERIA CHANGE (LAR 17-033)

By letter dated October 6, 2017 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17279B017), Southern Nuclear Operating Company (the licensee) requested an amendment to Combined License (COL) Numbers NPF-91 and NPF-92, for Vogtle Electric Generating Plant (VEGP) Units 3 and 4.

The requested amendment proposes changes to the Updated Final Safety Analysis Report (UFSAR) in the form of departures from the incorporated plant-specific Design Control Document Tier 2 information and a COL License Condition which references a UFSAR Section impacted by one of the proposed changes.

The requested amendment proposes changes to revise the licensing basis documents to change the methodology and acceptance criteria for the in-containment refueling water storage tank heatup preoperational test described in UFSAR Subsection 14.2.9.1.3, Item h and the passive residual heat removal heat exchanger preoperational test described in UFSAR Subsection 14.2.9.1.3, Item g. These changes involve material which is specifically referenced in Section 2.D.(2) of the COLs for VEGP Units 3 and 4.

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The Containment and Ventilation Branch staff conducted an audit on February 15 – 16, 2018, to gain better understanding of proposed changes to reach reasonable findings and review related documentation and non-docketed information to evaluate conformance with the Standard Review Plan or technical guidance.

Docket Nos.: 52-025 and 52-026

Enclosure:  
Regulatory Audit Plan

cc: See next page

U.S. NUCLEAR REGULATORY COMMISSION AUDIT PLAN FOR VOGTLE ELECTRIC  
GENERATING PLANT UNITS 3 AND 4 REQUEST FOR LICENSE AMENDMENT AND  
EXEMPTION: PASSIVE RESIDUAL HEAT REMOVAL HEAT TRANSFER AND  
IN-CONTAINMENT REFUELING WATER STORAGE TANK HEAT UP TEST ACCEPTANCE  
CRITERIA CHANGE (LAR 17-033) DATED: MARCH 12, 2018

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**ADAMS Accession No.: ML18059A755****NRO-008**

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**OFFICIAL RECORD COPY**

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(Revised 01/29/2018)

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**REPORT OF REGULATORY AUDIT  
LICENSE AMENDMENT (LAR 17-033) RELATED TO  
PASSIVE RESIDUAL HEAT REMOVAL HEAT TRANSFER AND IN-CONTAINMENT  
REFUELING WATER STORAGE TANK HEAT UP TEST ACCEPTANCE CRITERIA CHANGE  
VOGTLE ELECTRIC GENERATING PLANT, UNITS 3 AND 4**

**A.     Background**

By letter dated October 6, 2017, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17279B017), Southern Nuclear Operating Company (SNC), the licensee for Vogtle Electric Generating Plant (VEGP) Units 3 and 4, requested the U.S. Nuclear Regulatory Commission (NRC) approval of an amendment of the combined licenses (COL) for VEGP Units 3 and 4, nuclear power facility (NPF) COL Numbers NPF-91 and NPF-92, respectively. As part of the license amendment request (LAR), the applicant proposes changes to the Updated Final Safety Analysis Report (UFSAR) in the form of departures from the incorporated plant-specific Design Control Document Tier 2 information and a COL License Condition which references a UFSAR section impacted by one of the proposed changes. Specifically, the requested amendment proposes changes to revise the licensing basis documents to change the methodology and acceptance criteria for the in-containment refueling water storage tank heatup preoperational test described in UFSAR Subsection 14.2.9.1.3, Item h and the passive residual heat removal (PRHR) heat exchanger preoperational test described in UFSAR Subsection 14.2.9.1.3, Item g. These changes involve material which is specifically referenced in Section 2.D.(2) of the COLs for VEGP Units 3 and 4. The NRC staff determined that an audit of the reports and calculations supporting this LAR is the appropriate method to verify this proposed change rather than by issuing multiple rounds of requests for additional information (RAIs).

**B.     Bases**

This regulatory audit is based on the following:

- 10 CFR Part 50, Appendix A, General Design Criterion (GDC) 35—Emergency core cooling, which requires in part, that nuclear power plants provide a system to provide abundant emergency core cooling. For the AP1000, the PRHR heat exchanger (HX) performs this function for a subset of accidents.
- 10 CFR Part 50, Appendix A, GDC 37—Testing of emergency core cooling system, which requires in part that the emergency core cooling system shall be designed to permit appropriate periodic pressure and functional testing to assure (1) the structural and leaktight integrity of its components, (2) the operability and performance of the active components of the system, and (3) the operability of the system as a whole under conditions as close to design as practical.
- The NRC staff followed NRO Office Instruction NRO-REG-108 (Revision 0), “Regulatory Audits,” (ADAMS Accession No. ML081910260) in performing the audit of the reports and calculations cited below.

The audit plan is available in ADAMS under Accession No. ML18038B115.

C. Audit Location and Dates

Location: The audit was conducted at Westinghouse Electric Company's (the vendor's) the reading room.

Date: February 15-16, 2017.

D. Audit Team Members

The following NRC staff members participated in substantive discussions during the audit:

Paul Kallan, Senior Project Manager (Office of New Reactors/Division of New Reactor Licensing/Licensing Branch 4)  
Boyce Travis, Reactor Systems Engineer (Office of New Reactors/Division of Safety Systems, Risk Assessment and Advanced Reactors/Containment and Ventilation Branch)

E. Applicant and Industry Staff Participants

Stephanie Agee (via telephone)

F. Documents Audited

- "AP1000 Plant Hot Functional Tests of PRHR Performance," APP-PXS-M3C-516, Revision 1

G. Description of Audit Activities and Summary of Observations

Staff audited Westinghouse Electric Company's calculation APP-PXS-M3C-516, "AP1000 Plant Hot Functional Tests of PRHR Performance," Revision 1. This calculation provides the basis for the acceptance criteria for both the forced circulation and natural circulation PRHR cooldown tests. The licensee used a LOFTRAN model with inputs corresponding to expected test conditions to calculate a predicted heat transfer rate for various system configurations. These configurations included maximum and minimum safeguards heat transfer conditions as well as conditions corresponding to expected nominal values for minimum and maximum safeguards configurations. Values were evaluated for a single reactor coolant system (RCS) temperature for forced flow and two RCS temperatures (effectively corresponding to the initial phase of the transient and the successful end state of the transient) for natural circulation. These calculated values each yield a calculated PRHR heat transfer value for the configuration, which allows the licensee to have an expectation for the maximum, minimum, and "nominal" heat transfer values for both forced and natural circulation RCS conditions.

These calculated values can then be used as acceptance criteria for test configurations. The previous acceptance criterion left the possibility that a test could be successful and not meet the minimum calculated safeguards performance requirements. The changes proposed in the LAR rectify that, as the minimum safeguards performance requirement heat transfer now corresponds to the test acceptance criterion.



H. Exit Briefing

The NRC staff's audit exit was conducted on the morning of February 20, 2018. The vendor and NRC staff discussed the staff's takeaways from the audit, and the staff indicated the necessary information within the scope of the audit was provided to assist the staff in their review.

I. RAIs Resulting from Audit

No RAIs were asked as a result of this audit.

J. Open Items and Proposed Closure Paths

No open items were identified as a result of the audit.

K. Deviations from the Audit Plan

No deviations from the audit plan were identified or required.

L. References

1. Request for License Amendment and Exemption 17-033: Passive Residual Heat Removal Heat Transfer and In-containment Refueling Water Storage Tank Heat Up Test Acceptance Criteria Change, October 6, 2017 (ADAMS Accession No. ML17279B017).
2. Regulatory Audit Plan for the Review of Request for License Amendment and Exemption (LAR 17-033) De Passive Residual Heat Removal Heat Transfer and In-containment Refueling Water Storage Tank Heat Up Test Acceptance Criteria Change Debris Screen Related Dimensions for the Vogtle Electric Generating Plant Units 3 and 4 February 13, 2018 (ADAMS Accession No. ML18038B115).
3. NRO-REG-108, "Regulatory Audits," April 2, 2009 (ADAMS Accession No. ML081910260).