



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

May 31, 2018

MEMORANDUM TO: Jennifer Dixon-Herrity, Chief
Licensing Branch 4
Division of Licensing, Siting, and
Environmental Analysis
Office of New Reactors

FROM: Peter Hearn, Senior Project Manager /RA/
Licensing Branch 4
Division of Licensing, Siting, and
Environmental Analysis
Division of New Reactor Licensing
Office of New Reactors

SUBJECT: AUDIT SUMMARY FOR VOGTLE ELECTRIC GENERATING PLANT UNITS 3
AND 4, REQUEST FOR LICENSE AMENDMENT AND EXEMPTION:
CHANGES TO CONTAINMENT COOLING AND SPENT FUEL POOL MAKEUP
STRATEGIES (LAR-17-021)

The U.S. Nuclear Regulatory Commission staff conducted an audit of documents related to the Vogtle Electric Generating Plant (VEGP) Units 3 and 4, combined licenses, specifically documents related to VEGP Units 3 and 4 License Amendment Request (LAR) 17-021, "Changes to Containment Cooling and Spent Fuel Pool Makeup Strategies" (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17198A596). The audit was conducted using the VEGP Electronic Reading Room.

The plan for this audit is available in ADAMS under Accession No. ML18010B038. A summary of the audit is enclosed.

Docket Nos.: 52-025 and 52-026

Enclosure:
As stated

CONTACT: Peter Hearn, NRO/DNRL/LB4
301-415-1189

SUBJECT: AUDIT SUMMARY FOR VOGTLE ELECTRIC GENERATING PLANT UNITS 3 AND 4, REQUEST FOR LICENSE AMENDMENT AND EXEMPTION: CHANGES TO CONTAINMENT COOLING AND SPENT FUEL POOL MAKEUP STRATEGIES (LAR-17-021)
DATED: MAY 31, 2018

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***via email**

NRO-008

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**UNITED STATES NUCLEAR REGULATORY COMMISSION
AUDIT SUMMARY FOR THE REGULATORY AUDIT OF
SOUTHERN NUCLEAR OPERATING COMPANY
VOGTLE ELECTRIC GENERATING PLANT UNITS 3 AND 4
REQUEST FOR LICENSE AMENDMENT AND EXEMPTION:
CHANGES TO CONTAINMENT COOLING AND SPENT FUEL
POOL MAKEUP STRATEGIES (LAR-17-021)**

LICENSEE: Southern Nuclear Operating Company
LICENSEE CONTACT: Ryan Henderson
DURATION: February 12, 2018 to March 14, 2018
LOCATIONS: VEGP-designated electronic reading room

I. BACKGROUND

Southern Nuclear Operating Company submitted by a letter dated July 14, 2017, to the U.S. Nuclear Regulatory Commission (NRC) a request for license amendment and exemption (LAR) 17-021 “Changes to Containment Cooling and Spent Fuel Pool Makeup Strategies.”

The licensee is proposing to enable the passive containment cooling water storage tank (PCCWST) to be available to support spent fuel pool (SFP) cooling as required in TS 3.7.9 earlier in a refueling outage and, consequently, enhance refueling outage efficiency.

In order to justify these changes the licensee has revised the containment cooling thermal analysis and the spent fuel pool heatup and boiloff analysis.

To facilitate the NRC staff’s evaluation of information supporting the LAR-017-021, and to complete its safety review of the proposed license changes, the NRC staff performed an audit to evaluate the revised thermal calculations as stated in the staff’s regulatory audit plan, dated January 17, 2018 (NRC Agencywide Documents Access and Management System (ADAMS) Accession No. ML18010B038).

II. REGULATORY AUDIT BASIS

This regulatory audit is based on the following regulations:

- Title 10 of the Code of Federal Regulations (10 CFR) Part 50, Appendix A, General Design Criterion (GDC) 38, “Containment heat removal,” which requires that a system to remove heat from the reactor containment shall be provided. The system safety function shall be to reduce rapidly, consistent with the functioning of other associated systems, the containment pressure and temperature following any loss-of-coolant accident and maintain them at acceptably low levels.
- GDC 61 “Fuel storage and handling and radioactivity control,” which requires that

the fuel storage and handling, radioactive waste, and other systems which may contain radioactivity shall be designed to assure adequate safety under normal and postulated accident conditions. These systems shall be designed with a residual heat removal capability having reliability and testability that reflects the importance to safety of decay heat and other residual heat removal, and to prevent significant reduction in fuel storage coolant inventory under accident conditions.

The staff used the guidance provided in NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," Section 6.2.2, "Containment Heat Removal Systems" and Section 9.1.3, "Spent Fuel Pool Cooling and Cleanup System," for this audit.

III. AUDIT MEMBERS

AUDIT TEAM: Raul Hernandez (NRO, Audit Lead)
Harry Wagage, NRO
Peter Hearn, NRO, Project Manager

IV. DOCUMENTS AUDITED

The documents audited are listed below:

- APP-SFS-M3C-012 "AP1000 Spent Fuel Pool Heatup, Boiloff, and Emergency Makeup on Loss of Cooling," Revision 4.
- APP-SFS-M3C-012 "AP1000 Spent Fuel Pool Heatup, Boiloff, and Emergency Makeup on Loss of Cooling," Revision 6.
- DCP_DCP_008777, "Determination of the Impact of DCP 4441 on the AP1000 WGOthic Air Only Cooling Analysis of Record to Support LAR-107," June 16, 2017
- APP-SSAR-GSC-193, Revision 2, "Scaling Calculation for Time To Steady State PCS Film Coverage for the AP1000 Containment Pressure and Temperature Response Analysis," June 2011
- APP-SSAR-GSC-749, Revision 0, "AP1000 Dry PCS Heat Removal Capability," July 2010

V. DESCRIPTION OF AUDIT ACTIVITIES AND SUMMARY OF OBSERVATIONS

NRC staff examined APP-SFS-M3C-012 Revision 4 and APP-SFS-M3C-012 Revision 6. During this examination NRC staff noted:

- the licensee has not changed the thermal analyses methodology used in APP-SFS-M3C-012 Revision 4;
- all the volumes of the credited safety-related makeup water sources have been modified to account for construction tolerances on the wall dimensions;
- the initial pool water temperature (APP-SFS-M3C-012 Revision 6) has been raised for all cases evaluated in APP-SFS-M3C-012 Revision 4;
- APP-SFS-M3C-012 Revision 6 assumes limited leakage from the gate between the SFP

- and the CLP;
- the most limiting event saturation time decreased from 2.33 hours to 2.0 hours;
 - the calculated minimum time to take operator action has decreased to 18.4 hours; and
 - changes in pool heatload resulted in changes in makeup water requirements from the passive containment cooling ancillary water storage tank (PCCAWST).

The staff's examination of APP-SFS-M3C-012 Revision 6 did not identify any issue or generate any RAI.

The applicant has prepared DCP_DCP_008777 to support LAR 17-021 and APP-SSAR-GSC-193 and APP-SSAR-GSC-749 provide the current licensing basis. As stated in DCP_DCP_008777, the applicant first performed a re-run of the design basis containment peak pressure analysis for air-only PCS cooling (i.e., for over 7 days with an initial core decay heat of 6 MWt) with updated WGOthic code, which corrected the identified code errors. This resulted in lowering the containment peak pressure from design basis peak pressure which is below the containment design pressure. The applicant then used the updated WGOthic code to run a case with an initial core decay heat of 7 MWt and air-only PCS cooling for the first 72 hours following a loss of normal shutdown cooling. This involved increasing the initial core decay heat from 6 MWt in the current design basis analysis to 7 MWt and reducing the analysis time from 7 days to 3 days to determine the peak pressure before PCS water is applied, which turns the transient around. The applicant did not model the 50 gpm cooling water supplied via PCCAWST for the remainder of the 7-day period. The results showed that the containment peak pressure in 3 days remained well below the containment design pressure.

During the audit the staff reviewed the current licensing basis analysis for air-only PCS cooling provided in APP-SSAR-GSC-749. Figure 5-1 of this report provides containment pressure transients for air-only PCS cooling for four cases with different initial decay heat levels that were run for over 7 days. The staff interpolated these results to estimate the containment pressure at 3 days for an air-only PCS cooling with initial decay heat of 7 MWt. The interpolated value of containment pressure at 3 days was well below the containment design pressure of 59 psig and was comparable to the applicant's revised analysis results provided in DCP_DCP_008777. The staff expects that, with initiation of 50 gpm PCS water cooling starting at 3 days, the containment pressure would start dropping and, thus, the containment pressure predicted at 3 days will remain the peak containment pressure for 7 days period following a loss of normal shutdown cooling.

After auditing DCP_DCP_008777, APP-SSAR-GSC-193, and APP-SSAR-GSC-749 the staff did not identify any issues or a need to request the applicant for additional information.

VI. EXIT BRIEFING

The NRC staff conducted an audit closeout meeting on March 14, 2018. At the exit briefing the NRC staff reiterated the purpose of the audit and discussed their activities. The NRC staff stated that it had not identified areas where additional information is needed.

VII. REFERENCES

1. Vogtle, Units 3 and 4 - Request for License Amendment and Exemption: Changes to Containment Cooling and Spent Fuel Pool Makeup Strategies (LAR-17-021), July 14, 2017, (ADAMS Accession No. ML17198A596).
2. Audit Plan for Vogtle Electric Generating Plant Units 3 and 4, Request for License Amendment and Exemption: Changes to Containment Cooling and Spent Fuel Pool Makeup Strategies (LAR 17-021), January 17, 2018 (ADAMS Accession No. ML18010B038).
3. U.S. Nuclear Regulatory Commission, NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," March 2007.