



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

December 9, 2020

Mr. James Barstow
Vice President, Nuclear Regulatory
Affairs and Support Services
Tennessee Valley Authority
1101 Market Street, LP 4A-C
Chattanooga, TN 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT, UNITS 1 AND 2 – REGULATORY AUDIT
SUMMARY RELATED TO REQUEST TO IMPLEMENT FULL SPECTRUM™
LOCA METHODOLOGY FOR LOSS-OF-COOLANT ANALYSIS TPBAR
STRESS ANALYSIS (EPID L-2019-LLA-0005)

Dear Mr. Barstow:

By letter to the U.S. Nuclear Regulatory Commission (NRC) dated January 17, 2020, Tennessee Valley Authority (TVA) submitted a license amendment request that would replace the loss-of-coolant accident (LOCA) analysis evaluation model references with reference to the FULL SPECTRUM™ Loss-of-Coolant Accident (FSLOCA™) Evaluation Model analysis applicable to Watts Bar Nuclear Plant, Units 1 and 2, with replacement steam generators.

To enhance the review of TVA's request, the NRC staff conducted an audit of supporting documents from April 27, 2020, to June 26, 2020. The staff audited the requested documents to confirm certain information relied upon in the license amendment request. A summary of the regulatory audit is enclosed.

The NRC staff did not identify any significant issues during the audit. However, the staff did identify the need for additional information related to the topic of the audit. Separate correspondence containing a request for additional information was transmitted to Mr. Russ Wells on July 14, 2020.

Sincerely,

/RA/

Kimberly J. Green, Senior Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-390 and 50-391

Enclosure:
Regulatory Audit Summary

cc: Listserv



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REGULATORY AUDIT SUMMARY RELATED TO LICENSE AMENDMENT REQUEST
REGARDING IMPLEMENTATION OF FULL SPECTRUM™ LOCA METHODOLOGY
FOR LOSS-OF-COOLANT ANALYSIS TPBAR STRESS ANALYSIS

TENNESSEE VALLEY AUTHORITY

WATTS BAR NUCLEAR PLANT, UNITS 1 AND 2

DOCKET NOS. 50-390 AND 50-391

1.0 BACKGROUND

A regulatory audit is a planned license or regulation-related activity that includes the examination and evaluation of docketed and non-docketed information. The audit was conducted with the intent to gain understanding, to verify information, and to identify information that will require docketing to support the basis of a licensing or regulatory decision.

By letter dated January 17, 2020 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20017A338), the Tennessee Valley Authority (TVA, the licensee) submitted a license amendment request (LAR) to the U.S. Nuclear Regulatory Commission (NRC) for Watts Bar Nuclear Plant (Watts Bar), Units 1 and 2, "Application to Implement the FULL SPECTRUM™¹ LOCA (FSLOCA™¹) Methodology for Loss-of-Coolant Accident (LOCA) Analysis and New LOCA-specific Tritium Producing Burnable Absorber Rod Stress Analysis Methodology (WBN-TS-19-04)." The proposed changes would revise Watts Bar, Units 1 and 2, Technical Specification 5.9.5, "Core Operating Limits Report," to replace the LOCA analysis evaluation model references with reference to the FULL SPECTRUM™ Loss-of-Coolant Accident (FSLOCA™) Evaluation Model analysis applicable to Watts Bar, Units 1 and 2, with replacement steam generators; revise the Watts Bar, Unit 2, Operating License Condition 2.C(4), to reflect the implementation of the FSLOCA Evaluation Model methodology; and revise Watts Bar, Unit 1, Technical Specification 4.2.1, "Fuel Assemblies," to delete discussion of Zircaloy fuel rods. TVA also requested approval of the new LOCA-specific Tritium Producing Burnable Absorber Rod (TPBAR) stress analysis methodology to evaluate the integrity of the TPBARs for conditions expected during a large-break LOCA.

The NRC staff performed a preliminary review of the LAR and determined that a regulatory audit would assist in the timely completion of the review. The regulatory audit was performed consistent with NRC Office of Nuclear Reactor Regulation Office Instruction LIC-111, Revision 1, "Regulatory Audits," dated October 31, 2019 (ADAMS Accession No. ML19226A274).

2.0 AUDIT ACTIVITIES AND RESULTS

The NRC staff conducted a regulatory audit that consisted of a remote audit from April 27, 2020, to June 26, 2020. The audit plan was provided to TVA on April 27, 2020, and was revised on

June 2, 2020 (ADAMS Accession Nos. ML20120A021 and ML20155K766, respectively). The list of documents uploaded by the licensee in response to the NRC staff's request and examined by the audit team is provided in Section 4.0 below.

The remote audit was conducted using an online portal and teleconferencing capabilities. The purpose of the audit was to (1) examine several analyses or documents referenced in the LAR but not provided as part of the LAR, and (2) identify any information that would be required from the licensee to be provided on the docket for the NRC to render a staff finding to support the safety evaluation.

The NRC staff examined the documents identified in Section 4.0 below and held an audit entrance call with members of TVA on April 30, 2020, regarding the LAR under review. The collective results of the regulatory audit were used by the NRC staff to finalize requests for additional information (RAIs).

At the conclusion of the audit, the NRC staff determined that additional information would be needed in order for the staff to complete the review of the LAR. An RAI was issued on July 14, 2020 (ADAMS Accession No. ML20196L862), for the following issues:

- Details of the TPBAR cladding stress analysis methodology using the WCOBRA/TRAC-TF2 code
- Details of the thermal creep rupture and cladding burst failure mode analyses
- Details of the statistical approach similar to that used in the FSLOCA evaluation model to demonstrate compliance with Title 10 of the *Code of Federal Regulations* Section 50.46 acceptance criteria is used for the LOCA-specific TPBAR stress analysis, including inputs and stress intensities
- Acceptance criteria that ensure TPBAR structural integrity as listed in Table 4.3.2-1 of the LAR
- Details of Monte Carlo style statistical analysis where tolerance limits are constructed for the figures of merit related to the TPBAR structural integrity

A sixth request was issued; however, the nature of the request is proprietary.

TVA provided a response to the RAI by letter dated August 27, 2020 (ADAMS Accession No. ML20240A324), which addressed the NRC staff's request.

3.0 AUDIT PARTICIPANTS

NRC

M. Panicker
D. Woodyatt
K. Green

TVA

R. Wells
C. Borelli
M. Burzynski

Pacific Northwest National Laboratory

R. Montgomery
D. Paxton

Westinghouse

M. Shockling
M. Rudakewiz
J. Laird

4.0 DOCUMENTS PROVIDED IN ELECTRONIC READING ROOM

WCAP-18429-P, Revision 0, "Watts Bar Units 1 and 2 TPBAR [Tritium Producing Burnable Absorber Rod] Structural Integrity Analysis for the Large Break Loss-of-Coolant Accident (LBLOCA)," Westinghouse, March 2019

TTP-1-31101, Revision 1, "Development of a Metric for Evaluation of TPBAR Structural Integrity During LBLOCA Event," Westinghouse/TVA/PNNL [Pacific Northwest National Laboratory], April 2018

PNNL-TTP-1-3123, Revision 1, Tritium Technology Program, "Stainless Steel Burst Stress Curve Evaluation," PNNL/TVA, March 2020

PNNL TTP-3-721, Revision 1, "High Temperature Fracture Models for Assessment of TPBAR Cladding Survivability During LOCA," PNNL/TVA, April 2020

PNNL TTP-3-714 Revision 0, "Thermal Creep Rupture Model Development for Loc Behavior of TPBARs," PNNL/TVA, March 2020

Watts Bar, Units 1 and 2 (WAT/WBT), Input File Finalization for Phase 2 of the FULL SPECTRUM LOCA (FSLOCA) EM Analysis (CN-LIS-17-83)

Region I Final Break Spectrum and Uncertainty Analysis Input File Finalization for Watts Bar, Units 1 and 2 (WAT/WBT), with the FULL SPECTRUM LOCA (FSLOCA) Evaluation Model (CN-LIS-18-33)

Watts Bar, Units 1 and 2 (WAT/WBT), Input File Finalization for Phase 2 of the FULL SPECTRUM LOCA (FSLOCA) EM [Evaluation Model] Analysis (CN-LIS-17-83)

Region I Final Break Spectrum and Uncertainty Analysis Input File Finalization for Watts Bar, Units 1 and 2 (WAT/WBT), with the FULL SPECTRUM LOCA (FSLOCA) Evaluation Model (CN-LIS-18-33)

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MPanicker, NRR

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ADAMS Accession No. ML20322A023

***by e-mail**

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DATE	11/20/2020	11/20/2020	09/08/2020
OFFICE	NRR/DORL/LPL2-2/BC*	NRR/DORL/LPL2-2/PM*	
NAME	UShoop	KGreen	
DATE	12/07/2020	12/09/2020	

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