



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

January 11, 2023

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: BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2 AND 3 – REGULATORY
AUDIT SUMMARY REGARDING LICENSE AMENDMENT REQUEST TO
ADOPT RISK-INFORMED COMPLETION TIMES IN ACCORDANCE WITH
TSTF-505, REVISION 2, “PROVIDE RISK-INFORMED EXTENDED
COMPLETION TIMES – RITSTF INITIATIVE 4B” (EPID L-2022-LLA-0049)

Dear Mr. Barstow:

By letter dated March 31, 2022, the Tennessee Valley Authority (TVA) submitted a license amendment request (LAR) for Renewed Facility Operating License Nos. DPR-33, DPR-52, and DPR-68 for Browns Ferry Nuclear Plant, Units 1, 2, and 3 (Browns Ferry). The proposed amendments would revise certain technical specifications to permit the use of a risk-informed completion time (RICT) for actions to be taken when a limiting condition for operation is not met. The proposed changes to implement RICT are based on a Technical Specifications Task Force (TSTF) Traveler, TSTF-505, Revision 2, “Provide Risk-Informed Extended Completion Times – RITSTF Initiative 4b.” The LAR also proposed to implement TSTF-439, Revision 2, “Eliminate Second Completion Times Limiting Time from Discovery of Failure to Meet an LCO.”

The Nuclear Regulatory Commission (NRC) staff reviewed TVA’s LAR and determined that a regulatory audit would assist in the timely completion of the LAR review. The NRC staff conducted a regulatory audit that consisted of a remote audit from June 21 to September 16, 2022. The audit plan was provided to Mr. Rymer of your staff by letter dated June 14, 2022. The audit plan included a list of items to be provided on an electronic portal. The staff reviewed these documents and held discussions with members of TVA on the LAR relevant to the NRC staff’s review. The results of the regulatory audit were used by the NRC staff to finalize requests

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for additional information, which were issued by email dated October 19, 2022. The audit summary for the audit is enclosed.

Sincerely,

/RA/

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

Docket Nos. 50-259, 50-260, and 50-296

Enclosure:
Audit Summary

cc: Listserv

REGULATORY AUDIT SUMMARY
RELATED TO LICENSE AMENDMENT REQUEST TO ADOPT RISK-INFORMED
COMPLETION TIMES IN ACCORDANCE WITH TSTF-505, REVISION 2, "PROVIDE
RISK-INFORMED EXTENDED COMPLETION TIMES – RITSTF INITIATIVE 4B"
TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2, AND 3
DOCKET NOS. 50-259, 50-260, AND 50-296

1.0 BACKGROUND

The regulatory audit is a planned license or regulation-related activity that includes the examination and evaluation of primarily non-docketed information. The regulatory audit is conducted with the intent to gain understanding, to verify information, and/or to identify information that will require docketing to support the basis of a licensing or regulatory decision. Performing a regulatory audit of a licensee's information is expected to assist the NRC staff in efficiently conducting its review or gain insights on the licensee's processes or procedures. Information that the U.S. Nuclear Regulatory Commission (NRC) staff relies upon to make the safety determination must be submitted on the docket. However, the NRC staff may review supporting information retained as records under Title 10 of the *Code of Federal Regulations* (10 CFR) 50.71, "Maintenance of records," and/or 10 CFR 54.37, which, although not required to be submitted as part of the licensing action, would help the staff better understand the licensee's submitted information.

By letter dated March 31, 2022 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML22090A287), the Tennessee Valley Authority (TVA) submitted a license amendment request (LAR) for Renewed Facility Operating License Nos. DPR-33, DPR-52, and DPR-68 for Browns Ferry Nuclear Plant, Units 1, 2, and 3 (Browns Ferry). The proposed amendments would revise certain technical specifications to permit the use of a risk-informed completion time (RICT) for actions to be taken when a limiting condition for operation is not met. The proposed changes to implement a RICT are based on a Technical Specifications Task Force (TSTF) Traveler, TSTF-505, Revision 2, "Provide Risk-Informed Extended Completion Times – RITSTF Initiative 4b" (ML18183A493). The LAR also proposed to implement TSTF-439, Revision 2, "Eliminate Second Completion Times Limiting Time from Discovery of Failure to Meet an LCO," which has been incorporated in the Standard Technical Specifications (NUREG-1433, "Standard Technical Specifications - General Electric Plants (BWR/4)," Revision 5 (ML21272A357)).

An audit team consisting of NRC staff and a contractor from the Pacific Northwest National Laboratory (PNNL) conducted a remote regulatory audit to support the review of the LAR from June 21 to September 15, 2022. The purpose of the audit was to gain an understanding of the information needed to support the NRC staff's licensing decision regarding the LAR and to develop requests for additional information (RAIs).

The information submitted in support of the LAR is under final review, and any additional information needed to support the LAR review will be formally requested by the NRC staff using the RAI process in accordance with the Office of Nuclear Reactor Regulation Office Instruction LIC-101, Revision 6, "License Amendment Review Procedures" (ML19248C539).

2.0 AUDIT ACTIVITIES AND OBSERVATIONS

The NRC audit team consisted of NRC staff and an NRC contractor from PNNL. The list of attendees from the NRC, PNNL, TVA, and TVA's contractors is provided in section 4.0.

During the remote regulatory audit, the NRC audit team held an entrance meeting with TVA on Monday, September 12, 2022. During the remainder of the remote audit, the NRC audit team participated in technical discussions with TVA according to the audit plan dated June 14, 2022 (ML22147A137). These technical discussions were focused on previously submitted NRC staff audit questions (ML22238A065, ML22238A067, ML22259A037, ML22259A038, and ML22259A039). The NRC audit team held an exit meeting with TVA on Thursday, September 15, 2022, where the NRC staff provided a brief conclusion of the team's goals, objectives, and technical discussions. Section 5.0 contains a list of the documents audited by the NRC audit team.

3.0 RESULTS OF THE AUDIT

As a result of the remote regulatory audit, RAIs were issued to TVA on October 19, 2022 (ML22292A272). TVA provided a response to the RAIs in a supplement dated December 1, 2022 (ML22335A468).

4.0 AUDIT PARTICIPANTS

NRC	TVA
Kimberly Green	Beau Eckermann
Malcolm Patterson	Bill Victor
Robert Pascarelli	Gordon Williams
Jigar Patel	Dan Kearnaghan
Todd Hilsmeier	Eric Browne
Sunwoo Park	Gerry Kindred
Keith Tetter	Jacob Johnson
Vijay Goel	Mark Nicholson
Edmund Kleeh	Jeff Barker
Joseph Ashcraft	Monica Chlastosz
Khadijah West	Nick Lovelace, G. D. Barri and Associates
Chang Li	Pierre Macheret, Kleinsorg Group Risk Services
Nan Chien	Raymond Newmaster, Jensen-Hughes
Santosh Bhatt	
Mark Wilk (Contractor from Pacific Northwest National Laboratory)	

5.0 LIST OF DOCUMENTS PROVIDED ON THE ELECTRONIC PORTAL

TVA provided the following supporting documents (e.g., analyses, calculations, reports, drawings, and procedures) on the Browns Ferry Nuclear Plant document electronic portal during the audit.

PRA Acceptability

- Jensen Hughes, Report No. 06076-RPT-01, Revision 0, “Browns Ferry FPIE, Internal Flood, and Fire PRA Finding Level Fact and Observation Closure by Independent Assessment”
- Jensen Hughes, Report No. 006069-RPT-01, Revision 0, “Browns Ferry Seismic PRA Fact and Observation Closure Independent Assessment,” November 7, 2019
- Jensen Hughes, Report No. 06064-RPT-01, Revision 0, “BFN Fire PRA Focused Scope Peer Review Report: Obstructed Plume,” March 15, 2019 (TVA Document No. BFN-0-19-021, March 20, 2019)
- BWR Owners Group, “Browns Ferry Nuclear Plant, Fire PRA Peer Review Report Using ASME/ANS PRA Standard Requirements,” May 2012 (TVA Document No. B45 130430 002)
- GE Hitachi Nuclear Energy, “Browns Ferry Nuclear Plant, Fire PRA Follow-On Peer Review Report Using ASME/ANS PRA Standard Requirements,” October 2012 (TVA Document No. B45 130430 003)
- BFN-FPRA-FSPR-RPT-01, Revision 0, “Browns Ferry Nuclear Plant, Fire PRA Focused-Scope Peer Review Report,” June 15, 2015 (TVA Document No. BFN-0-20-012, B45 200129 004, January 29, 2020)
- Letter from Sloane B. D., ERIN Engineering and Research, Inc., to Kearnaghan, D. P., Tennessee Valley Authority, “Browns Ferry Nuclear Units 1, 2, 3, PRA Focused Scope Peer Review Final Report Transmittal – P00132150002-5175,” August 31, 2015
- BWR Owners Group, “Browns Ferry Units 1, 2, 3, PRA Peer Review Report Using ASME PRA Standard Requirements,” August 2009 (TVA Document No. B45 150820 001)
- ABS Consulting, Report R-2205685-1797, “Internal Flood PRA Peer Review for Browns Ferry Nuclear Plant,” Final, October 2009
- Engineering Planning and Management, Inc., Report P3146-0001-02, Revision 0, “Focused Scope Peer Review of the Browns Ferry Nuclear Power Plant Internal Flood PRA Model Against the ASME PRA Standard Requirements,” October 2018
- BWR Owners Group, “Browns Ferry Nuclear Plant, Seismic PRA Peer Review Report Using ASME/ANS PRA Standard Requirements,” Revision 0, June 2019 (TVA Document No. BFN-0-20-014, B45 200129 006, January 29, 2020)

PRA Assumptions and Sources of Uncertainty

- Tennessee Valley Authority, Calculation NDN0009992012000016, Revision 2, “TVA Fire PRA – Task 7.15 Uncertainty and Sensitivity Analysis,” March 11, 2020
- Jensen Hughes, Report 006085-RPT-01, “Browns Ferry Nuclear: Review of Sources of Uncertainty for RICT and 10 CFR 50.69 PRA Applications,” Revision 0, April 2021 (TVA Document No. BFN-0-21-060, B45 210430 001, April 30, 2021)
- Tennessee Valley Authority, Calculation MDN0009992019000268, Revision 1, “BFN Seismic PRA Quantification, Sensitivity and Uncertainty Notebook,” November 6, 2019

- Tennessee Valley Authority, Calculation NDN000999201000001, Revision 10, “BFN Probabilistic Risk Assessment – Summary Document,” April 10, 2021

PRA Modeling of Shared or Cross-tied Systems

- Tennessee Valley Authority, Calculation NDN-000-999-2007-0006, Revision 2, “SY. 24 – BFN Probabilistic Risk Assessment – 120V AC System,” December 31, 2014
- Tennessee Valley Authority, Calculation NDN-000-075-2007-0010, Revision 5, “SY.04 – BFN Probabilistic Risk Assessment – Core Spray System,” March 21, 2016
- Tennessee Valley Authority, Calculation NDN-000-032-2007-0016, Revision 7, “SY.02 – BFN Probabilistic Risk Assessment – Plant Control Air and Nitrogen System,” February 27, 2018
- Tennessee Valley Authority, Calculation NDN-000-023-2007-0026, Revision 5, “SY.20 – BFN Probabilistic Risk Assessment – Residual Heat Removal Service Water System,” March 22, 2016
- Tennessee Valley Authority, Calculation NDN-000-085-2007-0009, Revision 4, “SY.03 – BFN Probabilistic Risk Assessment – Control Rod Drive Hydraulic System,” March 21, 2016
- Tennessee Valley Authority, Calculation NDN-000-067-2007-0013, Revision 5, “SY.06 – BFN Probabilistic Risk Assessment – Emergency Equipment Cooling Water System,” March 17, 2016
- Tennessee Valley Authority, Calculation NDN-000-999-2007-0007, Revision 5, “SY.26 – BFN Probabilistic Risk Assessment – 480V and Higher AC Electric Power System,” March 22, 2016
- Tennessee Valley Authority, Calculation NDN-000-024-2007-0019, Revision 4, “SY.13 – BFN Probabilistic Risk Assessment – Raw Cooling Water System,” April 10, 2021
- Tennessee Valley Authority, Calculation NDN-000-999-2007-0011, Revision 4, “SY.25 – BFN Probabilistic Risk Assessment – 250V DC System,” April 10, 2021
- Tennessee Valley Authority, Calculation NDN-000-074-2007-0025, Revision 6, “SY.19 – BFN Probabilistic Risk Assessment – Residual Heat Removal System,” April 10, 2021

Real-Time Risk Tool

- Jensen Hughes, Report 06084-RPT-01, Revision 1, “Browns Ferry Nuclear Plant All-Hazards (One-Top) Integrated Model Development,” August 27, 2021 (TVA Document No. BFN-0-21-094 R1, B45 210901 001)

RICT Calculations

- Jensen Hughes, Report 06086-PRA-01, Revision 0, “Browns Ferry Nuclear Power Plant, Units 1, 2, and 3 PRA Application Notebook, RICT Estimates for TSTF-505 (RICT) Program LAR Submittal,” September 1, 2021 (TVA Document No. BFN-0-21-114, Revision 1, B45 220209 001, February 9, 2022)

PRA Configuration Control Procedures

- Tennessee Valley Authority, NPG Standard Programs and Processes, NPG-SPP-09.11, Revision 0004, “Probabilistic Risk Assessment Program,” August 28, 2018

- Tennessee Valley Authority, NPG Standard Department Procedure, NEDP-26, Revision 0013, "Probabilistic Risk Assessment," June 10, 2021

RICT Program Procedures

- Tennessee Valley Authority, NPG Standard Programs and Processes, NPG-SPP-09.11.4 (Draft), Revision 0000, "Risk Informed Completion Time Program," April 28, 2022

Electrical Power Distribution Single-Line Diagrams

- Tennessee Valley Authority, Browns Ferry Nuclear Plant, Units 1, 2, and 3, Updated Final Safety Analysis Report, "Table of Contents, Chapter 8.0, 'Electrical Power Systems,'" Amendment 29

Design Details of Shared or Cross-tied Systems

- Tennessee Valley Authority, General Design Criteria Document BFN-50-7023, Revision 16, "Residual Heat Removal Service Water System," July 20, 2010 (R06 100720 664)
- Tennessee Valley Authority, General Design Criteria Document BFN-50-7200E, Revision 16, "4KV AC Auxiliary Power System," March 4, 2019 (R14 190304 101)
- Tennessee Valley Authority, General Design Criteria Document BFN-50-7200A, Revision 7, "Auxiliary DC Power and Distribution System"
- Tennessee Valley Authority, General Design Criteria Document BFN-50-7200C, Revision 8, "250 V DC Power Distribution System," June 24, 2016 (R14 160624 106)
- Tennessee Valley Authority, General Design Criteria Document BFN-50-7200F, Revision 9, "Plant Offsite Power Distribution System"
- Tennessee Valley Authority, General Design Criteria Document BFN-50-7200B, Revision 13, "120 VAC Power Supply and Distribution System," June 6, 2017 (R14 170612 101)
- Tennessee Valley Authority, General Design Criteria Document BFN-50-7032, Revision 17, "Control Air System," June 21, 2017 (R14 170622 102)
- Tennessee Valley Authority, General Design Criteria Document BFN-50-7200D, Revision 12, "480V AC Auxiliary Power System" (R14 160614 112)
- Tennessee Valley Authority, General Design Criteria Document BFN-50-7024, Revision 21, "Raw Cooling Water System," May 3, 2018 (R14 180504 104)
- Tennessee Valley Authority, General Design Criteria Document BFN-50-7075, Revision 13, "Core Spray Cooling System," November 24, 2015 (R14 151124 108)
- Tennessee Valley Authority, General Design Criteria Document BFN-50-7067, Revision 25, "Emergency Equipment Cooling Water System," May 8, 2018 (R14 180508 109)
- Tennessee Valley Authority, General Design Criteria Document BFN-50-7074, Revision 30, "Residual Heat Removal System," May 17, 2018 (R14 180518 101)
- Tennessee Valley Authority, General Design Criteria Document BFN-50-7085, Revision 14, "Control Rod Drive System," December 18, 2015 (R14 151218 107)
- Tennessee Valley Authority, General Design Criteria Document BFN-50-7082, Revision 29, "Standby Diesel Generator," March 31, 2017 (R14 170417 101)

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