



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

February 25, 2016

Mr. Joseph W. Shea
Vice President, Nuclear Licensing
Tennessee Valley Authority
1101 Market Street, LP 3R-C
Chattanooga, TN 37402-2801

SUBJECT: BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2, AND 3 - REQUEST FOR
ADDITIONAL INFORMATION RELATED TO LICENSE AMENDMENT
REQUEST REGARDING EXTENDED POWER UPRATE (CAC NOS. MF6741,
MF6742, AND MF6743)

Dear Mr. Shea:

By letter dated September 21, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15282A152), as supplemented by letters dated November 13, December 15, and December 18, 2015 (ADAMS Accession Nos. ML15317A361, ML15351A113, and ML15355A413, respectively), Tennessee Valley Authority (TVA or the licensee) submitted a license amendment request (LAR) for the Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3. The proposed amendment would increase the authorized maximum steady-state reactor core power level for each unit from 3,458 megawatts thermal (MWt) to 3,952 MWt. This LAR represents an increase of approximately 20 percent above the original licensed thermal power level of 3,293 MWt, and an increase of approximately 14.3 percent above the current licensed thermal power level of 3,458 MWt.

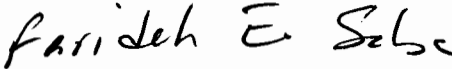
The U.S. Nuclear Regulatory Commission (NRC) staff reviewed the licensee's submittals and determined that additional information is needed. On February 2, 2016, the NRC staff forwarded, by electronic mail, a draft of the staff's request for additional information (RAI) to TVA. On February 9, 2015, TVA informed the NRC staff that no clarification call is needed. The official questions are found in the enclosed RAI. This request was discussed with Mr. Daniel Green of your staff, and it was agreed that TVA would respond by March 25, 2016.

J. Shea

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If you have any questions, please contact me at 301-415-1447 or Farideh.Saba@nrc.gov.

Sincerely,

A handwritten signature in black ink that reads "Farideh E. Saba". The signature is written in a cursive style with a large, prominent "F" and "S".

Farideh E. Saba, Senior 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:
Request for Additional Information

cc w/enclosure: Distribution via Listserv

REQUEST FOR ADDITIONAL INFORMATION

LICENSE AMENDMENT REQUEST REGARDING EXTENDED POWER UPRATE

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2, AND 3

DOCKET NOS. 50-259, 50-260, AND 50-296

By letter dated September 21, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15282A152), as supplemented by letters dated November 13, December 15, and December 18, 2015 (ADAMS Accession Nos. ML15317A361, ML15351A113, and ML15355A413, respectively), Tennessee Valley Authority (TVA, the licensee) submitted a license amendment request (LAR) for the Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3. The proposed amendment would increase the authorized maximum steady-state reactor core power level for each unit from 3,458 megawatt thermal (MWt) to 3,952 MWt. This LAR represents an increase of approximately 20 percent above the original licensed thermal power level of 3,293 MWt, and an increase of approximately 14.3 percent above the current licensed thermal power level of 3,458 MWt.

The U.S. Nuclear Regulatory Commission (NRC) staff from the Office of Nuclear Reactor Regulation (NRR), Division of Risk Assessment, Fire Protection Branch (AFPB), reviewed the LAR and its supplements. The NRC staff determined that the following information is needed to complete their review.

AFPB-Request for Additional Information (RAI) 1

The NRC staff notes that LAR Attachment 6 to the Safety Analysis Report (SAR) for BFN, Units 1, 2, and 3, Extended Power Uprate (EPU), NEDC-33860P,¹ Revision 0, September 2015, Section 2.5.1.4, "Fire Protection," states that, "The transition to NFPA 805 is currently under NRC staff review, and TVA anticipates its approval prior to implementation [of] EPU operation. Accordingly, the fire protection analysis described in this section is based on the NFPA 805 implementation..."

On October 10, 2015, the NRC issued a license amendment for BFN, Units 1, 2, and 3, to incorporate National Fire Protection Association (NFPA) 805 fire protection licensing basis in accordance with Title 10 of *Code of Federal Regulations* (10 CFR), Section 50.48(c). The amendment approved the transition of the licensee's fire protection program to a risk-informed, performance-based program based on the 2001 Edition of NFPA 805. The staff requests that the licensee provide a supplement to LAR Attachment 6 to the SAR for BFN Units 1, 2, and 3,

¹ This document is marked "Proprietary" (non-publicly available information) in TVA letter dated September 21, 2015. All contents of this document should be handled in accordance with the NRC guidance of handling Sensitive Unclassified Non-Safeguards Information (SUNSI).

Enclosure

EPU, NEDC-33860P, Revision 0, September 2015, Section 2.5.1.4, "Fire Protection," consistent with the approved NFPA 805 licensing basis.

AFPB-RAI 2

Attachment 1 to Matrix 5, "Supplemental Fire Protection Review Criteria, Plant Systems," of NRR RS-001, Revision 0, "Review Standard for Extended Power Uprates" (ADAMS Accession No. ML033640024) states:

Power uprates typically result in increases in decay heat generation following plant trips. These increases in decay heat usually do not affect the elements of a fire protection program related to (1) administrative controls, (2) fire suppression and detection systems, (3) fire barriers, (4) fire protection responsibilities of plant personnel, and (5) procedures and resources necessary for the repair of systems required to achieve and maintain cold shutdown. In addition, an increase in decay heat will usually not result in an increase in the potential for a radiological release resulting from a fire. However, the licensee's application should confirm that these elements are not impacted by the extended power uprate.

The NRC staff notes that LAR Attachment 6 to SAR for BFN, Units 1, 2, and 3, EPU, NEDC-33860P, Revision 0, September 2015, Section 2.5.1.4.1, "Fire Protection Program," specifically addresses items (1) through (4) above. The staff requests that the licensee provide statements to address item (5) and a statement confirming no increase in the potential for a radiological release resulting from a fire.

AFPB-RAI 3

The NRC staff notes that LAR Attachment 6 to the SAR for BFN, Units 1, 2, and 3, EPU, NEDC-33860P, Revision 0, September 2015, Section 2.5.1.4.1, "Fire Protection Program," states:

The higher decay heat associated with EPU results in higher heat input into the suppression pool which, without mitigation, will result in higher suppression pool temperatures. The higher decay heat may also result in lower vessel water levels or higher Peak Cladding Temperatures (PCTs), depending on the plant-specific analysis basis. As a result of these effects, fire suppression and detection systems, operator response time, peak clad temperature (PCT), and suppression pool temperature need to be addressed.

The staff requests the licensee verify that additional heat in the plant environment from the EPU will not:

- a. Impact any required operator manual actions (referred to as recovery actions per NFPA 805 licensing basis) being performed at their designated time (including, e.g., verifying that under EPU conditions, recovery actions and repairs required to demonstrate the availability of a success path to achieve the nuclear safety

performance criteria are feasible and have been evaluated for the additional risk due to their use), or

- b. Require any new recovery actions due to additional heat in the plant environment to maintain the plant in safe and stable conditions.

AFPB-RAI 4

The staff notes that LAR Attachment 6 to the SAR for BFN, Units 1, 2, and 3, EPU, NEDC-33860P, Revision 0, September 2015, Section 2.5.1.4.1, "Fire Protection Program," states that, "...Other EPU modifications will be assessed and assured not to adversely affect the ability to achieve and maintain the fuel in a safe and stable condition in the event of a fire..." Further, Section 2.11.1.2.2, "Fire Safe Shutdown (FSS) Events," states:

Attachment 47 of the EPU LAR provides a listing and discussion of the modifications planned for EPU. The effect of these modifications on the Browns Ferry Fire Protection Program will be evaluated, in accordance with TVA's configuration change process, prior to EPU implementation. Per the process, these modifications will be evaluated to assure the changes do not affect the approved Fire Protection Program and will not adversely affect the ability to achieve and maintain safe shutdown in accordance with the current Browns Ferry license conditions and procedures...

The NRC staff notes that modifications associated with the EPU have not yet been completed to address the impact on the fire protection program. The staff requests that the licensee discuss how the results of plant modifications would impact the fire protection program and the plant's compliance with the fire protection program licensing basis (10 CFR 50.48(c)).

AFPB-RAI 5

The NRC staff notes that LAR Attachment 6 to the SAR for BFN, Units 1, 2, and 3, EPU, NEDC-33860P, Revision 0, September 2015, Section 2.5.1.4.1, "Fire Protection Program," states:

Original NFP 805 analyses were performed at EPU conditions and therefore operator action times cannot be compared to CLTP [current licensed thermal power] conditions. To ensure that PCT remains less than the acceptance criterion in the most limiting scenario, one LPCI pump must be manually aligned for injection within 20 minutes...

The staff requests the licensee provide a technical justification for the 20-minute time for the operator to perform the actions to align LPCI pump injection. Include discussion of the original time margin without CLTP conditions (i.e., what was assumed for the NFPA 805 analyses) and why the 20-minute assumption is deemed adequate.

AFPB-RAI 6

The NRC staff notes that LAR Attachment 6 to the SAR for BFN, Units 1, 2, and 3, EPU, NEDC-33860P, Revision 0, September 2015, Section 2.5.1.4.2, "Fire Event," states:

The results of Case 4, and the evaluations in Section 2.6.5.2, FUSAR [Fuel Uprate Safety Analysis Report] Section 2.5.1.4, and LAR Attachment 39, demonstrate that the peak fuel cladding temperature, vessel water level, and suppression pool temperature meet the acceptance criteria and the time available for the operators to perform the necessary actions is sufficient. Therefore, EPU has no adverse effect on the ability of the systems and personnel to mitigate the effects of a fire event and satisfies the requirement of achieving and maintaining the fuel in a safe and stable condition in the event of a fire.

The staff requests the licensee confirm that the above analysis cases at EPU conditions meet the NFPA 805 licensing basis to achieve and maintain the fuel in a safe and stable condition in the event of a fire.

AFPB-RAI 7

Some plants credit aspects of their fire protection system for other than fire protection activities (e.g., utilizing the fire water pumps and water supply as backup cooling or inventory for non-primary reactor systems). If BFN, Units 1, 2, and 3, credits its fire protection system in this way, identify the specific situations and discuss to what extent, if any, the EPU affects these "non-fire-protection" aspects of the plant fire protection system.

J. Shea

- 2 -

If you have any questions, please contact me at 301-415-1447 or Farideh.Saba@nrc.gov.

Sincerely,

/RA/

Farideh E. Saba, Senior Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
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ADAMS Accession No.: ML16041A022

*by memo

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DATE	2/24/2016	2/25/2016	

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