

November 18, 2004

Mr. Karl W. Singer
Chief Nuclear Officer and
Executive Vice President
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: BROWNS FERRY NUCLEAR PLANT, UNITS 2 AND 3 — RESULTS
OF ACCEPTANCE REVIEW FOR EXTENDED POWER UPRATE
(TAC NOS. MC3743 AND MC3744) (TS-418)

Dear Mr. Singer:

By letter to the U. S. Nuclear Regulatory Commission (NRC) dated June 25, 2004, Tennessee Valley Authority (TVA, the licensee) submitted an amendment request for Browns Ferry Nuclear Plant (BFN), Units 2 and 3. The proposed amendment would change the BFN, Units 2 and 3, operating licenses to increase the maximum authorized power level from 3458 megawatts thermal (MWt) to 3952 MWt. This change represents an increase of approximately 15 percent above the current maximum authorized power level. The proposed amendment would also change the BFN Units 2 and 3 licensing bases to revise the credit for overpressure from 3 pounds for short-term and 1 pound for long-term, to 3 pounds for the duration of a loss-of-coolant accident, and revise the maximum ultimate heat sink temperature. The purpose of this letter is to provide the results of the NRC staff's acceptance review of the extended power uprate (EPU) application for BFN, Units 2 and 3. The acceptance review determines whether or not there is sufficient detail to allow the NRC staff to proceed with its detailed technical review. The review also ensures that the application adequately characterizes the regulatory requirements and licensing basis of the plant.

Consistent with Title 10 to the *Code of Federal Regulations* (10 CFR), Section 50.90, an amendment to the license (including the Technical Specifications) must fully describe the changes requested, consistent with the form prescribed, to the extent applicable, for original applications. Section 50.34 of 10 CFR addresses the content of technical information required. This section stipulates that the submittal address the design and operating characteristics, unusual or novel design features, and principal safety considerations.

The NRC staff has reviewed your request and concluded that it does not provide technical information in sufficient detail to enable the staff to make an independent assessment regarding the acceptability of the proposed in terms of regulatory requirements and the protection of public health and safety. Specific examples of areas which require additional information to be submitted are included in the enclosure.

Based on the examples provided, the NRC staff does not consider your applications to be complete and requests that TVA revise the EPU submittal to address the concerns contained in

the enclosure. This request was discussed with Mr. Tim Abney of your staff on November 16, 2004, and it was agreed that a response would be provided within 90 days of the issuance of this letter. Upon receipt of information that adequately addresses these deficiencies, the NRC staff will consider your applications complete, such that the detailed technical review could be initiated and a schedule for completing our review could be established. If the response cannot be provided by the agreed upon date, TVA should notify the NRC staff in writing. Upon written notification, a new date may be established with agreement from the NRC staff. If the response is not provided within 90 days, the NRC staff may proceed on your request consistent with 10 CFR 2.108, Denial of application for failure to supply information.

If you have any questions, please contact the BFN, Units 2 and 3, Project Manager, Ms. Eva Brown, at (301) 415-2315.

Sincerely,

/RA/

Edwin M. Hackett, Director
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-260 and 50-296

Enclosure: List of NRC Staff Completeness
and Quality Items

cc w/encl: See next page

K. Singer

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*w/comments

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NRR-106

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NAME	EBrown	BClayton	LRaghavan*	MMarshall	EHackett
DATE	11/17/04	11/17/04	10/26/04	11/17/04	11/18/04

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SUBJECT: BROWNS FERRY NUCLEAR PLANT, UNITS 2 AND 3 — RESULTS OF
ACCEPTANCE REVIEW FOR EXTENDED POWER UPRATE (TAC NOS.
MC3743, AND MC3744)

Dated: November 18, 2004

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EXTENDED POWER UPRATE
TENNESSEE VALLEY AUTHORITY
LIST OF COMPLETENESS AND QUALITY ITEMS
BROWNS FERRY PLANT, UNITS 2 AND 3
DOCKET NOS. 50-260 AND 50-296

The U.S. Nuclear Regulatory Commission (NRC) staff has identified the following areas that lack the information needed to allow the staff to start its review. The Tennessee Valley Authority (TVA) can use RS-001, Review Standard for Extended Power Upgrades [EPUs], Rev. 0, and the EPU Licensing Topical Report (ELTR)-1 and ELTR-2, for guidance regarding the information needed to complete the application. The safety evaluation (SE) template provides a draft regulatory evaluations and conclusions for each review area.

1. In general, several areas are identified as being bounded by analyses performed as part of the ELTR-1 and ELTR-2 assessments. However, the application does not provide sufficient information to allow the NRC staff to determine the applicability of the ELTR-1 and ELTR-2 analyses to Browns Ferry Plant (BFN), Units 2 and 3. Specifically, information relating proposed operation to the assumptions, evaluations, reviews, and assessments used in the ELTR analyses were not provided. Examples of these include:
 - a. In Enclosure 4, the EPU Safety Analysis Report (SAR) items are stated to be dispositioned based on confirmation of consistency between BFN and the generic description provided in ELTR-1 and ELTR-2. However, no details are provided to allow the NRC staff to verify how this BFN to ELTR confirmation was performed. Specifically, what criteria, key parameters, etc., were examined to confirm the consistency? Also, identify and justify all the areas where BFN Units 2 and 3 do not satisfy the ELTR criteria.
 - b. TVA has referred exclusively to ELTR-1 and ELTR-2, as the applicable licensing basis for BFN Units 2 and 3. Since the ELTRs do not provide the plant-specific licensing and design criteria, provide a revised enclosure to reflect the appropriate plant-specific licensing and design criteria.
 - c. Enclosure 4, Section 7.4.1, indicates that the feedwater heater analysis has not been completed. Please provide the completed analysis in the EPU submittal.
2. Items (e.g., in Section 2) of the EPU SAR are dispositioned based on experience and are stated to be confirmed because they will be evaluated for the uprated core prior to EPU implementation. However, these evaluations will be performed close to the reload outage and will only be available in the Supplemental Reload Licensing Report and the Core Operating Limits Report. There is no discussion as to how these confirmations, prior to EPU implementation, will be verified in accordance with the ELTR Safety Evaluation Report, licensee expectations or restrictions, and applicable Title 10, *Code of Federal Regulations* (10 CFR) Part 50, Appendix B requirements.

Enclosure

3. In an attached document to Enclosure 5, Framatome Updated Safety Analyses Report (FUSAR), entitled, Licensing Approach for Use of Framatome Fuels, it is stated that:

. . . the remaining GE14 fuel in the Unit 2 core will be a relatively small batch of twice-burnt fuel (at BOC [beginning of cycle]) located primarily on or near the periphery.

There is insufficient information to establish whether GE14 fuel will be put in critical positions or will be limiting. Since, BFN Unit 2 will be operating with a mixed core, additional information will be needed, such as a mixed core analyses report and a fuel transition report. Also, as BFN Unit 3, will be the first uprated unit using a full core of ATRIUM-10 fuel, additional information, such as the assumptions, limitations, restrictions in the models, and the applications of the models, will be required to establish whether the evaluation models given in Table 1-3 of FUSAR are valid for EPU application. Further, the TVA has not established that the use of the reference equilibrium core will be bounding for the first cycle of EPU operation. Consistent with the guidance provided in Mr. Ledyard B. Marsh's letter to GE dated June 25, 2003, specific operating cycle information must be submitted, prior to any approval, to show compliance with all regulations for the proposed transition core design.

4. Enclosure 8 takes exception to performing any large scale transient testing. The staff does not review the computer codes that are used for balance-of-plant performance and must rely on the startup test program to confirm that the required modifications and EPU analyses have been completed properly and in particular, large scale transient testing is relied upon to demonstrate that the integrated plant performance is properly bounded by the analyses that have been completed. Consequently, the EPU submittal must be revised to identify and describe tests that will be performed that are sufficiently comprehensive to confirm that: a) all plant modifications have been evaluated and implemented properly, and b) integrated plant performance and transient operation is consistent with the analyses that have been completed. Any exceptions based on plant or industry operating experience must describe the experience in sufficient detail to establish the relevance and applicability to the BFN Units 2 and 3 proposed uprate conditions.
5. The NRC staff noted that in several review areas there was insufficient information provided to arrive at an adequate safety conclusion, as described in the template.
 - a. The following issues were identified with TVA's analysis provided in Enclosure 9 (GE-NE-0000-0023-1250-1) of the submittal supporting the structural integrity of the BFN steam dryer under EPU conditions.
 - (1) The excitation source for flow-induced vibration effects and, thus, the actual applied forcing function on the BFN steam dryer has not been adequately determined.
 - (2) Many uncertainties exist in the load definition that attempts to bound the complex nature of the fluid excitation forces acting on the dryer at EPU conditions. Also, the ability to construct a dynamic response spectrum to bound the dryer response is questionable, because its frequency content

and magnitude are extrapolated from other reactors pressure measurements in stagnant regions located significantly away from the critical dryer hood surfaces.

- (3) The maximum calculated stress for the unmodified steam dryer at current licensed thermal power (CLTP) conditions is too high and reflects large uncertainty in simplifying the complex nature of loads experienced at EPU conditions.
 - (4) Scaling down the results from the dynamic analysis by a presumed factor on stresses at all locations may be not conservative since the true stress at some locations is undetermined.
 - (5) The pressure on the faces of the dryer extrapolated from CLTP to EPU has not been validated. No information on pressures above CLTP is available.
 - (6) The formulation used to define the plant-specific load at BFN has not been benchmarked against test data.
- b. Enclosure 4, Section 10.3.2 discusses Mechanical Environmental Qualification. Specifically identify what equipment will be affected, what non-metallic components are being referred to mechanical equipment, and the basis for acceptance.
- c. Enclosure 7 indicates that further evaluations may identify the need for additional modifications or obviate the need for modifications that are currently planned for implementing the proposed EPU. All evaluations in support of the proposed EPU must be completed and any modifications that are necessary for implementing the proposed EPU must be identified and evaluated pursuant to 10 CFR 50.59 requirements such that modifications that require NRC review and approval are properly identified, specifically recognized, and evaluated, if necessary, in the amendment request.
- d. Enclosure 4, Section 4.2.5, should be expanded to address protective coatings. The following information was found to be missing or incomplete:
- (1) Discuss the effect of EPU on qualified coatings and analyses including failures of delamination of qualified and unqualified coatings (pressure, temperature, integrated dose).
 - (2) Discuss whether original qualification standards for Service Level 1 coatings are still bounding under EPU conditions.
 - (3) Discuss the effect of EPU on “zone of influence” during a postulated design-basis accident. Discuss whether EPU will result in an increase in the failure of qualified coatings.

- e. Enclosure 4, Section 6.4, Water Systems, does not address nonsafety-related loads in the service water system.
- f. Enclosure 4, Section 6.1, Electrical Power and Auxiliary Systems, Section 9.3.2, Station Blackout, and Section 10.3.1, Environmental Qualification for Electrical Equipment should be expanded to address the physical modifications that will need to be made to address the uprated capacity as well as unique and multi-unit features. Additionally, a discussion on the effects for Unit 2 should be included.
- g. Enclosure 4, Section 3.4, should be expanded to address the potential for recirculation pump seizure and/or a recirculation pump shaft break.
- h. Enclosure 4 should be expanded to address uncontrolled control rod assembly withdrawal from a subcritical or low power startup condition.
- i. Enclosure 4 should be expanded to address the inadvertent opening of a boiling-water reactor pressure relief valve.

Mr. Karl W. Singer
Tennessee Valley Authority

BROWNS FERRY NUCLEAR PLANT

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