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, UNIT 1 — RESULTS OF ACCEPTANCE REVIEW FOR EXTENDED POWER UPRATE (TAC NO. MC3812) (TS-431)

Dear Mr. Singer:

By letter to the U.S. Nuclear Regulatory Commission (NRC) dated June 28, 2004, the Tennessee Valley Authority (TVA, the licensee) submitted an amendment request for Browns Ferry Nuclear Plant (BFN), Unit 1. The proposed amendment would change the BFN Unit 1 operating license to increase the maximum authorized power level from 3293 megawatts thermal (MWt) to 3952 MWt. This change represents an increase of approximately 20 percent above the current maximum authorized power level. The proposed amendment would also change the BFN Unit 1 licensing basis and associated Technical Specifications (TS) to credit 3 psig for containment overpressure following a loss-of-coolant accident, and increase the reactor steam dome pressure by 30 psig. 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 Unit 1. 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, *Code of Federal Regulations* (10 CFR), Section 50.90, an amendment to the license (including TS changes) must fully describe the changes requested, consistent with the form prescribed, to the extent applicable, for original applications. The content of the technical information required is addressed in 10 CFR Section 50.34. This section stipulates that the submittal address the design and operating characteristics, unusual or novel design features, and principal safety considerations.

As you are aware, BFN Unit 1 is in a unique situation. Since its shutdown in 1985, the reactor has been defueled, and systems have not operated. With TVA’s decision to restart Unit 1, a large number of modifications are underway to replace missing components and address almost 20 years of regulatory issues. In parallel, TVA has been submitting amendments to update the current licensing basis of the plant, adopt full-scale implementation of the alternative source term methodology, increase the authorized thermal power level, address other restart concerns, and renew the license for another 20 years. As a result, there are outstanding plant modifications, technical analyses and evaluations, licensing actions, and regulatory

requirements that have not been fully evaluated and incorporated into the design and licensing basis of BFN Unit 1.

The staff intends to use RS-001, "Review Standards for Extended Power Uprates," Rev. 0 for its review. The RS states that the staff will review plants against their design bases. The Unit 1 configuration, as it existed at the time of the application, does not reflect the design basis of the plant for the reasons mentioned above. Operation at any power level has to meet the Agency's required level of assurance that all the systems will operate as designed and analyzed. The safe operation of Unit 1 for a certain period of time at power levels not exceeding the original power level, and its conformance to its design basis will provide, among other things, a reference basis for our evaluation to allow the plant to operate at a higher power level.

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 amendment in terms of regulatory requirements and the protection of public health and safety. Specific examples of the areas that require additional information to complete the application are included in the enclosure.

Based on the examples provided in the enclosure, the NRC staff does not consider your application 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 the information that adequately addresses these deficiencies, the NRC staff will consider your application complete, such that the detailed technical review could be initiated, and a schedule for completing our review 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 act 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 Unit 1 Project Manager, Margaret H. Chernoff, at (301) 415-4041.

Sincerely,

/RA/

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

Docket No. 50-259

Enclosure: List of NRC Staff Completeness Items

cc w/encl: See next page

The staff intends to use RS-001, "Review Standards for Extended Power Uprates," Rev. 0 for its review. The RS states that the staff will review plants against their design bases. The Unit 1 configuration, as it existed at the time of the application, does not reflect the design basis of the plant for the reasons mentioned above. Operation at any power level has to meet the Agency's required level of assurance that all the systems will operate as designed and analyzed. The safe operation of Unit 1 for a certain period of time at power levels not exceeding the original power level, and its conformance to its design basis will provide, among other things, a reference basis for our evaluation to allow the plant to operate at a higher power level.

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 amendment in terms of regulatory requirements and the protection of public health and safety. Specific examples of the areas that require additional information to complete the application are included in the enclosure.

Based on the examples provided in the enclosure, the NRC staff does not consider your application 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 the information that adequately addresses these deficiencies, the NRC staff will consider your application complete, such that the detailed technical review could be initiated, and a schedule for completing our review 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 act 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 Unit 1 Project Manager, Margaret H. Chernoff, at (301) 415-4041.

Sincerely,

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

Docket No. 50-259

Enclosure: List of NRC Staff Completeness Items

cc w/encl: See next page

DISTRIBUTION: See next page

ADAMS Accession No. ML043100476 NRR-106

OFFICE	PDII-2/PM	PDII-2/LA	PDIII-1/SC	PDII-2/SC(A)	PD-II/D
NAME	MChernoff	BClayton	LRaghavan	MMarshall	EHackett

DATE	11/17/04	11/17/04	10/22/04	11/17/04	11/18/04

OFFICIAL RECORD COPY

DISTRIBUTION FOR: BROWNS FERRY NUCLEAR PLANT, UNIT 1 — RESULTS OF ACCEPTANCE REVIEW FOR EXTENDED POWER UPRATE (TAC NO. MC3812) (TS-431)

Dated: November 18, 2004

Distribution

PUBLIC
PDII-2 R/F
OGC
ACRS
EBrown
KJabbour
BClayton (hard copy)
MMarshall
EHackett
JLyons
LMarsh
TChan
DTrimble
RDennig
DRoberts
LLund
MYoder
GGeorgiev
JBongarra
EThrom
JTappert
FAkstulewicz
MMasnik
GThomas
KManoly
JDixon-Herrity
CWu
JTatum
EMarinos
DThatcher
SWeerakkody
LMarsh
HLi
RPettis
NIqbal
BSheron
RJenkins
SKlementowiz
MRubin
JStang
NTrehan
AHayes
RPederson
MStutzke
SLaur
RMatthew
SCoffin
MKhanna
EImbro
JUhle
AAttard
EWeis, NSIR
KWilliams, NSIR
SCahill, RII
LRaghavan
MChernoff

EXTENDED POWER UPRATE

TENNESSEE VALLEY AUTHORITY

LIST OF COMPLETENESS AND QUALITY ITEMS

BROWNS FERRY PLANT, UNIT 1

DOCKET NO. 50-259

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 or the licensee) can use RS-001, "Review Standard for Extended Power Uprates [EPUs]," Rev. 0, for guidance regarding the information needed to complete the application. The Safety Evaluation (SE) template provides a draft regulatory evaluation and conclusion for each review area.

1. In general, several areas are identified as being bounded by analyses performed as part of the Extended Power Uprate (EPU) Licensing Topical Report (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), Unit 1. Specifically, information which relates the proposed EPU operation to the assumptions, evaluations, reviews, and assessments used in the ELTR analyses were not provided. Examples are provided below.

   a. In Enclosure 4 of the EPU Safety Analysis Report (SAR), items are stated to be dispositioned based on comparison of ELTR-1 and ELTR-2 to the BFN Unit 1. However, no details are provided to allow the NRC staff to verify how this BFN to ELTR comparison was performed. Specifically, what criteria, key parameters, etc., were examined to confirm the consistency? Also, please identify and justify all the areas where BFN Unit 1 does not satisfy the ELTR criteria.

   b. TVA has referred exclusively to ELTR-1 as the applicable licensing basis for BFN Unit 1. ELTR-1 does not provide the plant-specific licensing and design criteria for BFN Unit 1. Please 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. 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. TVA has not established that the use of equilibrium core will be bounding for the first cycle of EPU operation. However, the NRC staff must confirm that the plant will meet the applicable regulations for the operating cycles for both equilibrium and transition. There is no discussion as to how these confirmations, prior to EPU implementation, will be verified in accordance with the ELTR SE Report.

Therefore, specific operating cycle information must be submitted in a timely manner to enable the staff to complete its review and show compliance with the regulations for both equilibrium and transition core designs. Also, please discuss whether TVA intends to operate a blended low enrichment uranium core for Unit 1.

3. 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 Unit 1 proposed uprate conditions.

4. The following issues were identified with respect to 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.

   a. 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.

   b. 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.

   c. 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.

   d. 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.

   e. 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.

   f. The formulation used to define the plant-specific load at BFN has not been benchmarked against test data.

5. The NRC staff finds that several review areas lack the information necessary to arrive at an adequate safety conclusion as described in the template.

a. Enclosure 4, Section 10.3.2, discusses Mechanical Environmental Qualification. Specifically identify what equipment is affected, what non-metallic components are being referred to for each, and the basis for acceptance. In addition, please provide a listing, along with the appropriate justification, of any differences between BFN Unit 1 and Units 2 and 3.

b. 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 Title 10, *Code of Federal Regulations* (10 CFR), Section 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.

c. 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).

   (3) Discuss whether original qualification standards for Service Level 1 coatings are still bounding under EPU conditions.

   (4) 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.

j.

Mr. Karl W. Singer
Tennessee Valley Authority

BROWNS FERRY NUCLEAR PLANT

cc:

Mr. Ashok S. Bhatnagar, Senior Vice President
Nuclear Operations
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Michael J. Lorek, General Manager
Nuclear Engineering
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Michael D. Skaggs
Site Vice President
Browns Ferry Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Decatur, AL 35609

General Counsel
Tennessee Valley Authority
ET 11A
400 West Summit Hill Drive
Knoxville, TN 37902

Mr. John C. Fornicola, Manager
Nuclear Assurance and Licensing
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Kurt L. Krueger, Plant Manager
Browns Ferry Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Decatur, AL 35609

Mr. Jon R. Rupert, Vice President
Browns Ferry Unit 1 Restart
Browns Ferry Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Decatur, AL 35609

Mr. Robert G. Jones
Browns Ferry Unit 1 Plant Restart Manager
Browns Ferry Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Decatur, AL 35609

Mr. Fredrick C. Mashburn
Senior Program Manager
Nuclear Licensing
Tennessee Valley Authority
4X Blue Ridge
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Timothy E. Abney, Manager
Licensing and Industry Affairs
Browns Ferry Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Decatur, AL 35609

Senior Resident Inspector
U.S. Nuclear Regulatory Commission
Browns Ferry Nuclear Plant
10833 Shaw Road
Athens, AL 35611-6970

State Health Officer
Alabama Dept. of Public Health
RSA Tower - Administration
Suite 1552
P.O. Box 303017
Montgomery, AL 36130-3017

Chairman
Limestone County Commission
310 West Washington Street
Athens, AL 35611