

June 28, 2006

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 — EXTENDED POWER  
UPRATE LARGE TRANSIENT TESTING (TAC NOS. MC3812 AND MC7208)  
(TS-431)

Dear Mr. Singer:

By letter dated June 28, 2004, 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, and is commonly referred to as an extended power uprate (EPU).

The NRC staff issued Requests for Additional Information regarding planned testing of Unit 1 in letters dated November 18 and December 29, 2004, June 15, October 3, and December 22, 2005. Additionally, this topic was specifically discussed in a public meeting on April 20, 2006. In letters dated April 25 and August 15, 2005, and May 16, 2006, TVA provided a discussion of the main steam isolation valve (MSIV) closure and generator load reject tests. In the letters, TVA provided discussions of these tests in the context of initial plant startup and provided discussions regarding the similarity of the testing proposed for Unit 1 with the recovery testing performed in 1991 and 1995 for Units 2 and 3, respectively. The NRC staff notes that the recovery testing for Units 2 and 3 occurred prior to approval of the 5-percent uprate for Units 2 and 3, which was approved in September 1998. To the extent practical, the NRC staff has considered the experience from BFN Units 2 and 3 and other plants of the same design.

Since its shutdown in 1985, Unit 1 has been defueled, systems have not operated and have generally been maintained in a layup condition. As part of the Unit 1 recovery, TVA has indicated that upgrades and significant modifications will be implemented including the replacement of some large- and small-bore piping; installation of cable trays, conduits, supports, and pipe hangers; refurbishment of various large pumps and motors (including the main feedwater, condensate, condensate booster and recirculation pumps); rewind of the turbine-generator; installation of main bank transformers; and modification of various control room indicators. Upon completion of the recovery, Unit 1 would include a combination of new and refurbished components and new and old piping, supports, cable trays, cables, etc.

Additionally, many components are being modified to support operation at extended power. Thus, the response of this unit to anticipated operational occurrences may be different from its response when it was tested and started-up in late 1973 and early 1974.

The EPU review conducted by the U.S. Nuclear Regulatory Commission (NRC) staff is structured as a "delta" review, meaning that there is a basic assumption that the analyses and evaluations under review are extrapolations from verified plant-specific data. The subsequent routine surveillance testing performed for systems and components is based, in part, on the baseline established after successful large transient tests conducted at initial startup. As Unit 1 has been shut down for a lengthy period and will undergo significant modifications to support restart and operation at EPU conditions (including a higher dome pressure), the years of plant-specific operating experience normally relied upon at the higher power level and higher reactor dome pressure are absent. Section 14.2.1 of NUREG-0800, Standard Review Plan (SRP) for the Review of Safety Analysis Reports for Nuclear Power Plants and Appendix L of General Electric [GE] Licensing Topical Report, NEDC-32424P-A, Generic Guidelines for General Electric Boiling Water Reactor [BWR] Extended Power Uprate, or ELTR-1, and NEDC-32523P-A, Generic Guidelines for GE BWR EPU, February 2000 (ELTR-2), contain guidance regarding testing of Large Transient Disturbances. Your application states that the technical bases for your request follows the guidelines of ELTR-1 and ELTR-2.

The NRC-approved licensing topical reports (ELTR-1 and ELTR-2) specify the analyses and testing required for EPU involving an increase in the dome pressure. Section 5.11.9, Power Uprate Testing, of ELTR-1 states:

A Main Steam Isolation Valve closure test, equivalent to that conducted in the initial [sic] startup testing, will be performed if the power uprate is more than 10 % above any previously recorded MSIV closure transient data.

For uprates of more than 15 %, a Generator Load Rejection test, equivalent to that conducted in the initial startup testing, will be performed if the power uprate is more than 15 % above any previously recorded Generator Load Rejection transient data.

Appendix L of ELTR-1 provides guidelines for uprate testing. The justification provided for the inclusion of a MSIV test and a generator load rejection test is as follows:

For larger uprates [greater than 15 %], two of the large disturbance tests of the initial startup test program are repeated, to verify that the plant performance is as predicted and projected from previous test data.

For uprates of more than 15 %, a Generator Load Rejection test, equivalent to that conducted in the initial [sic] startup testing, will be performed if the power uprate is more than 15 % above any previously recorded Generator Load Rejection transient data.

Chapter 14.2.1, Generic Guidelines for Extended Power Uprate Testing Programs, of NUREG-0800, provides guidelines for reviewing EPU testing programs. The technical rationale states that the review of a proposed EPU testing program provides assurance that

(1) any power uprate related modifications to the facility have been adequately constructed and implemented, and

(2) the facility can be operated at the proposed EPU conditions in accordance with design requirements and in a manner that will not endanger the health and safety of the public.

A key assumption in SRP Section 14.2.1 is that the unit has been adequately tested up to its currently licensed maximum thermal power and has relevant operating experience data. The guidance was developed assuming that the power ascension to the new EPU power level could be viewed as an extension of the plant's initial test program power ascension to the maximum full power (i.e., delta review).

TVA's letters focus on the use of Technical Specification surveillance testing as a substitute for more integrated system testing. While component testing will demonstrate component performance and surveillance testing can be used to partially confirm continued proper performance, this testing is insufficient to demonstrate satisfactory integrated plant performance at EPU conditions. An integrated test is necessary to effectively confirm plant response and analyses at the uprated conditions.

Any discussion of the relevance of operating experience should be supported by a detailed discussion of the similarities and differences among the units being compared. The NRC staff has requested TVA to address the similarities and differences among the units, however the information provided did not demonstrate that the operating experience for the operating units bound operation of Unit 1 at EPU conditions, particularly given the extent of the secondary components replaced or refurbished for Unit 1.

Adequate comparisons, in which the differences among units are specified and justified in terms of large transient performance, bounding the extent of modifications to Unit 1 at uprated conditions, were not provided. The NRC staff has determined that an MSIV closure test and a generator load rejection test are necessary to demonstrate appropriate plant response.

The NRC staff has decided that a license condition will be necessary to address the staff's concerns. This condition, proposed by the NRC staff, pertains to transient testing:

During the extended power uprate (EPU) power ascension test program and prior to exceeding 60 days of plant operation above a nominal 3293 Megawatts thermal power level (100 percent original licensed thermal power) or within 30 days of satisfactory completion of steam dryer monitoring and testing (whichever is longer), with plant conditions stabilized at approximately the EPU full power level, TVA shall perform a main steam isolation valve closure test and a generator load reject test. Following each test, TVA shall confirm that plant response to the transient is as expected in accordance with previously established acceptance criteria. The evaluation of the test results for each test shall be completed, and all discrepancies resolved, prior to resumption of power operation.

K. Singer

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In order to support the EPU review schedule, TVA is requested to submit a supplement to the EPU application by July 31, 2006, accepting the license condition proposed in this letter. It should be noted, however, that your acceptance does not constitute completion of the staff's review of the EPU application.

If you have any comments, please contact Margaret Chernoff, BFN Unit 1 Project Manager, at 301-415-4041.

Sincerely,

***/RA by CHaney for/***

Cornelius F. Holden, Deputy Director  
Division of Reactor Operating Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-259

cc: See next page

K. Singer

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DATE	06/28/06	06/28/06	06/26/06	06/19/06	06/20/06
OFFICE	DSS/D	SBWB/BC	LPL2-2/BC	OGC	DORL/DD
NAME	TMartin with comments	GCranston with comments	MMarshall	JMoore	CHaney for CHolden
DATE	06/27/06	06/20/06	06/28/06	06/27/06	06/28/06

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UPRATE LARGE TRANSIENT TESTING (TAC NO. MC3812) (TS-431)

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