



Tennessee Valley Authority, Post Office Box 2000, Decatur, Alabama 35609-2000

February 24, 2009

TVA-BFN-TS-431

10 CFR 50.90

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Stop OWFN, P1-35
Washington, D. C. 20555-0001

In the Matter of)
Tennessee Valley Authority)

Docket Nos. 50-259

BROWNS FERRY NUCLEAR PLANT (BFN) - UNIT 1 - TECHNICAL SPECIFICATIONS (TS) CHANGE TS-431 - EXTENDED POWER UPRATE (EPU) - RESPONSE TO ROUND 23 REQUEST FOR ADDITIONAL INFORMATION (RAI) - UNIT 1 LARGE TRANSIENT TESTING (LTT) - (TAC NO. MD5262)

By letter dated June 28, 2004 (ADAMS Accession No. ML041840109), TVA submitted a license amendment application to NRC for EPU operation of BFN Unit 1. The proposed amendment would change the operating license to increase the maximum authorized core thermal power level of Unit 1 by approximately 14 percent to 3952 megawatts.

In a submittal dated October 22, 2007 (ML072960311), TVA provided supplemental justification for not performing a main turbine trip/generator load reject large transient test on Units 2 and 3 at EPU conditions. At that time, due to the limited operating experience on Unit 1 following its restart in May 2007 from the extended outage, a regulatory commitment was made to perform a main turbine trip/main generator load reject large transient test from EPU rated power conditions within 60 days of operation at EPU power. On October 3, 2008, after a year of accumulating operating experience with the EPU-modified feedwater/condensate system installed on Unit 1, TVA made another submittal (ML082810470) that summarized the Unit 1 restart testing and the operating experience gained during Unit 1 Cycle 7, and requested NRC approval to withdraw the Unit 1 LTT commitment.

On November 12, 2008, NRC sent a Round 22 RAI (ML083120045), which included two RAI questions (SRXB-75 and SRXB-76), on TVA's request to withdraw the LTT commitment. A response to these two RAI questions was submitted on December 15, 2008 (ML083530619). On January 29, 2009, an additional RAI (SRXB-77) was received by e-mail concerning TVA's December 15, 2008, response to SRXB-76. This new RAI is being added to the draft Round 23 RAI. A response to RAI SRXB-77 is provided in the enclosure to this letter.

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TVA notes that the last several EPU-approved BWR plants (Brunswick, Vermont Yankee, Susquehanna, and Hope Creek) were not required to perform a main turbine trip/main generator load reject transient test from EPU conditions. In the above referenced BFN submittals, TVA provided an operating experience basis justification similar to that provided by these plants. Unit 1 currently has over a full cycle of operations with the EPU-modified hardware and control systems installed, which have responded well to planned and unplanned major transients. Accordingly, TVA believes that performance of main turbine trip/main generator load reject LTT on Unit 1 should not be required.

TVA has determined that the additional information provided by this letter does not affect the no significant hazards considerations associated with the proposed TS change. The proposed TS change still qualifies for a categorical exclusion from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9).

No new regulatory commitments are made in this submittal. If you have any questions regarding this letter, please contact me at (256)729-2636.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 24th day of February, 2009.

Sincerely,



F. R. Godwin
Manager of Licensing
and Industry Affairs

Enclosure:

Response to Round 23 Request For Additional Information (RAI) - Unit 1 Large Transient Testing (LTT)

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Enclosure
cc (Enclosure):

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

Ms. Eva Brown, Project Manager
U.S. Nuclear Regulatory Commission
(MS 08G9)
One White Flint, North
11555 Rockville Pike
Rockville, Maryland 20852-2739

Ms. Heather J. Gepford, Acting Branch Chief
U.S. Nuclear Regulatory Commission
Region II
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW, Suite 23T85
Atlanta, Georgia 30303-8931

NRC Resident Inspector
Browns Ferry Nuclear Plant
10833 Shaw Road
Athens, Alabama 35611-6970

ENCLOSURE

TENNESSEE VALLEY AUTHORITY BROWNS FERRY NUCLEAR PLANT (BFN) UNIT 1

TECHNICAL SPECIFICATIONS (TS) CHANGE TS-431 EXTENDED POWER UPRATE (EPU)

RESPONSE TO ROUND 23 REQUEST FOR ADDITIONAL INFORMATION (RAI) - UNIT 1 LARGE TRANSIENT TESTING (LTT)

NRC RAI SRXB-77 (Unit 1 only)

In a letter dated December 15, 2008, TVA provided information regarding expected plant response to a load reject event from extended power uprate (EPU) power level at Browns Ferry Nuclear Unit 1. TVA also stated that the potential for the high pressure coolant injection (HPCI) system to automatically start on low reactor water level following a load rejection from EPU power level would be entered in the plant corrective action program.

The Level 2 acceptance criteria for the turbine trip and generator load rejection test performed as part of the startup test program included the following:

The feedwater controller must prevent a low-level initiation of the HPCI and MSIV's [main steam isolation valves] as long as feedwater remains available.

After the startup test program, TVA had lowered the setpoint for main steam line isolation to the reactor vessel water level L1 setpoint. However, HPCI and reactor core isolation cooling (RCIC) continue to startup at the reactor vessel water level L2 setpoint, which may be reached following a load rejection from EPU power level. As TVA described, if HPCI is not secured by operators, HPCI would shutdown automatically on high reactor vessel level. The high level isolation would also shutdown the main feed pumps, resulting in a complete loss of feedwater flow.

Clarify the criteria to be employed in the corrective action program to ensure that a load rejection from EPU power level would not routinely progress to a HPCI start and potential high reactor water level event necessitating operator action. Also, describe how the reactor water level margin to an automatic HPCI start and subsequent potential high level isolation would be evaluated, and explain why the margin is sufficient to preclude the need for load rejection testing from the EPU power level.

TVA Response to SRXB-77

A scram on a Boiling Water Reactor results in a characteristic large prompt drop in sensed reactor water level immediately after the scram. If the scram is the result of a reactor pressurization transient such as a main turbine trip or main generator load reject, the magnitude of this short-term water level drop will be larger. The reactor feedwater system will respond to the lowered water level and will restore reactor water level to normal range within about a minute. A review of a number of previous main turbine trips/load rejects from full power on all three BFN units shows this initial water level drop typically comes within a few inches of the reactor vessel water Level 2 trip setpoint. Additionally, there is a variance of several inches in the observed minimum water levels in the reviewed transient events. A turbine trip/load reject

from EPU conditions may cause this prompt water level drop to be slightly larger, which could encroach on or exceed the Level 2 setpoint for a brief period of time and initiate HPCI.

The feedwater system will satisfactorily restore reactor water level following a turbine trip/load reject without the assistance of HPCI. Therefore, if HPCI did initiate, the operator would normally remove HPCI from operation and allow the feedwater control system to control reactor water level. In the event that the operators did not secure HPCI, reactor water level would continue to increase and HPCI would subsequently trip on high vessel water level (Level 8) along with the feedpumps. The high water level feedpump trip is a system design function which prevents overfills of the reactor vessel. Following a high water level feedpump trip, extra water inventory would be present in the reactor vessel. After reactor water level decreases to normal range, operators would return one of three feedpumps to operation to control water level. Returning a feedpump to operation is a routine, simple task. Therefore, a HPCI initiation, should it occur, is not a significant event.

In the original startup test program (circa 1974), Level 2 test criteria were system performance expectations criteria - in this case, for a non-safety system (feedwater controls) to be able maintain water level above Level 2 in order to avoid a HPCI initiation and a MSIV isolation following a turbine trip/load reject. As discussed in the RAI, the MSIV isolation element of the test criteria is no longer applicable since the MSIV isolation trip function on water level has since been lowered from Level 2 to Level 1. The remaining element from the original startup test program Level 2 criteria (avoidance of HPCI starts following a turbine trip/load reject) is not a safety significant criterion.

A turbine trip/load reject from high power is a major plant transient, which challenges plant systems and, thus, has a small, but inherent safety risk. Also, there is risk due to random support system equipment failures, which could potentially cause harm to major power generating equipment such as the main generator and main turbine. Accordingly, TVA does not believe the performance of a planned main turbine trip/load reject transient from EPU power to ascertain if this particular Level 2 test criterion is met/not met is warranted. Furthermore, considering that the prompt minimum reactor water level varies several inches between events, it is quite possible that a HPCI initiation would not be observed during a planned transient test yet be later experienced following an unplanned turbine trip/load reject.

For these reasons, TVA believes that performance of main turbine trip/main generator load reject LTT on Unit 1 should not be required. Rather, it is more appropriate that the issue (the possibility of HPCI initiation), be tracked in accordance with the BFN corrective action program. Under the existing corrective action document, one EPU modification has already been designed and implemented on Units 1 and 2, which immediately initiates a recirculation pump runback to 75% flow on a scram signal. Reducing recirculation flow tends to reduce the magnitude of the prompt water level decrease. If EPU operating experience subsequently does show that turbine trips/load rejects routinely result in HPCI initiations, then the actual plant transient response and feedwater system response will be evaluated, and adjustments made to the feedwater system control system to optimize response to avoid HPCI starts.