

September 30, 2005

TVA-BFN-TS-433

10 CFR 50.90

U.S. Nuclear Regulatory Commission  
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Washington, D.C. 20555-0001

Gentlemen:

In the Matter of	)	Docket No. 50-259
Tennessee Valley Authority	)	

**BROWNS FERRY NUCLEAR PLANT (BFN) - UNIT 1 - TECHNICAL  
SPECIFICATIONS (TS) CHANGE 433 - RESPONSE TO REQUEST FOR  
ADDITIONAL INFORMATION REGARDING 24-MONTH FUEL CYCLE (TAC NO.  
MC4161)**

This letter provides TVA's responses to the NRC request for additional information (Reference 1) regarding proposed Technical Specification (TS) 433.

On August 16, 2004 (Reference 2), TVA requested a TS change (TS 433) to allow Unit 1 to adopt a 24-month refueling cycle. NRC requested additional information to support the review of the submittal. The NRC requests and TVA's responses are enclosed.

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

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If you have any questions about this submittal, please contact me at (256) 729-2636. I declare under penalty of perjury that the foregoing is true and correct. Executed on September 30, 2005.

Sincerely,

Original signed by:

William D. Crouch  
Manager of Licensing  
and Industry Affairs

References:

1. NRC letter to TVA, dated September 2, 2005, Browns Ferry Nuclear Plant, Unit 1 - Request for Additional Information Regarding 24 Moth Fuel Cycle (TAC No, MC4161) (TS-433)."
2. TVA letter to NRC, dated August 16, 2004, "Browns Ferry Nuclear Plant (BFN) Unit 1 - Technical Specification Change (TS) TS 433 - 24 Month Fuel Cycle."

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Enclosure

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s:lic/submit/TechSpec/TS 426 RAI

**TENNESSEE VALLEY AUTHORITY (TVA)**  
**BROWNS FERRY NUCLEAR PLANT UNIT 1**  
**RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION**  
**REGARDING PROPOSED TECHNICAL SPECIFICATION (TS) TS 433**  
**24-MONTH FUEL CYCLE**

**BACKGROUND**

On August 16, 2004, TVA submitted<sup>(1)</sup> a request for an amendment to license DPR-33 for BFN Unit 1. The proposed amendment extends the frequency of "once-per-cycle" from 18 months to 24 months in the affected TS Surveillance Requirements. The proposed changes will allow Unit 1 to adopt a 24-month refueling cycle, and will result in a maximum surveillance interval of 30 months when employing the 25% grace period allowed by Surveillance Requirement 3.0.2.

On September 2, 2005, NRC requested<sup>(2)</sup> additional information to support their review of the proposed change. Each specific NRC request and TVA's response is provided below.

**NRC Question:**

1. On August 16, 2004, General Electric Nuclear Energy Company issued a Part 21 Notification MFN 04-080, "Part 21 60-day Interim Notification: Narrow Range Water Level Instrument Level-3 Trip." This notification concerns a potential issue with the Level-3 trip from the narrow range water level instruments that initiate reactor scram. Does this condition apply to Browns Ferry Nuclear Plant (BFN), Unit 1? Please explain the basis for the determination of applicability. Specifically:
  - Show that the dryer skirt will remain submerged with no steam bypass during all anticipated transients for which

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<sup>1</sup> TVA letter to NRC, dated August 16, 2004, "Browns Ferry Nuclear Plant (BFN) Unit 1 – Technical Specification Change (TS) TS 433 – 24 Month Fuel Cycle."

<sup>2</sup> NRC letter to TVA, dated September 2, 2005, Browns Ferry Nuclear Plant, Unit 1 - Request for Additional Information Regarding 24 Moth Fuel Cycle (TAC No, MC4161)(TS-433)."

the reactor vessel water level instrument system (RVWLIS) is needed.

- Show that the error in the water level measurement will remain within the limits assured in the selection of the normal setpoints during all anticipated transients for which the RVWLIS is needed.

#### **TVA Response:**

The August 16, 2004, General Electric Nuclear Energy Company Part 21 Notification was applicable to BFN Unit 1. During a loss of feedwater (LOFW) transient event, the dryer skirt will be exposed. However, the Reactor Pressure Vessel Instrumentation Level 3 trip will perform its safety function because there is sufficient margin between the existing trip setpoint for L3 trip and the analytical limit. The existing trip setting is 530" above vessel zero (AVZ). The analytical limit of 518" is used in the transient analyses for a LOFW event. The error due to this steam dryer bypass condition alone at extended power uprate conditions is 4.91 inches. The calculated instrument process errors are 3.2 inches. This results in a combined error of 8.11 inches. The new potential low setting for LOFW event (this part 21 condition) and the combined existing calculation errors are  $530 - 8.11 = 521.89$  inches. Based on this review, the SCRAM would occur before the Analytical limit and before the instrument tap.

--- 530"	(AVZ) Setpoint
--- 528"	(AVZ) Technical Specification Allowable Value <sup>(3)</sup>
---527-1/2"	(AVZ) Bottom of Dryer Skirt
--- 521.89"	(AVZ) LOFW event & existing process errors
--- 518"	(AVZ) Analytical Limit
--- 517"	(AVZ) Instrument Tap

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<sup>3</sup> This Technical Specification allowable value was proposed for Unit 1 restart by letter from TVA to NRC, dated March 9, 2004, "Browns Ferry Nuclear Plant (BFN) UNIT 1 - Technical Specification 434 - Lowering the Allowable Value for Reactor Vessel Water Level - Low Level 3."

As stated in the Technical Specification bases, the Level 3 Allowable Value is selected to ensure that for transients involving loss of all normal feedwater flow, initiation of the low pressure ECCS subsystems at Reactor Vessel Water - Low Low Low, Level 1 will not be required.

Therefore the instrument would continue to function with sufficient margin from the analytical limit and the trip setting, without affecting safety margin. The level 1 trip setting 406" AVZ, would never be challenged by this condition and likewise the Top of Active fuel elevation of 360" AVZ would not be affected.

**NRC Question:**

2. In Enclosure 1 of Tennessee Valley Authority's (TVA's) submittal, on page E1-14, TVA response to Generic Letter 91-04, Item 1, states that "A review of BFN data indicated that two occasions . . . the as-found surveillance value was outside of AVs [allowable values]. An evaluation concluded that the 24-month calibration frequency for these instruments was still acceptable." Please provide the criteria for your evaluation and the basis for the conclusion that the 24-month calibration frequency was still acceptable.

**TVA Response:**

The evaluations of the two failures consisted of reviewing the circumstances regarding the failed surveillance tests as well as the results of other surveillances for the failed instruments and other instruments of the same type. The first instrument that failed its surveillance test was a primary containment isolation temperature switch. The main steam tunnel is monitored by 16 temperature sensors. These sensors are arranged in four trip logic circuits with four temperature sensors in each circuit. A single sensor failure does not prevent completion of the essential isolation logic. The switch that failed its surveillance was located above the main steam lines in the Reactor Building steam vault area. The switch failed to actuate at or before the maximum setpoint of 200 degrees F. The as-found setpoint was 223 degrees F.

The failure of the primary containment isolation temperature switch was evaluated under the Corrective Action Program. The switch is a simple bi-metallic switch encased in a sealed metal housing. The evaluation determined that the setpoint drift could have been caused by physical handling during installation and removal and/or in-service factors. Due to the switches simple operational characteristics, it was not possible to determine the exact failure mode. In the surveillance data population which was reviewed to support this proposed Technical Specification change, there were 32 total calibrations performed on similar temperature switches. This past operational experience indicated that this type of switch normally has minimal drift characteristics.



Immediately after the failure, the primary containment isolation temperature switches were replaced by using signals from Analog Trip Units under the provisions of 10 CFR 50.59. This design change was planned and scheduled for implementation prior to the switch failing its surveillance test.

The second instrument that failed its surveillance test was a scram discharge volume level switch. The scram discharge system receives the water displaced by the motion of the control rod drives during a reactor scram. The system contains two separate scram discharge volumes serving the East and West rod banks, each of which drains to its own adjacent instrumented drain tank (namely, the Scram Discharge Instrument Volume [SDIVs]). SDIV scram water level is measured by two diverse methods. The scram level in each SDIV is measured by two thermal probes (RTD devices) and two Magnetrol float switches. A single sensor failure does not prevent completion of the logic. The failed RTD switch had an as-found value of 50.7 gallons as compared to a maximum value of 49.7 gallons.

The failure of the scram discharge level switch was evaluated under the Corrective Action Program. The apparent cause for the failed surveillance was a random failure of the associated circuit card. The circuit card was replaced with a new card and the as-left setpoint was in tolerance. In the surveillance data population which was reviewed to support this proposed Technical Specification change, there were a total of 16 total calibrations performed on similar level switches. No other surveillance failures were identified and the switch successfully passed its next surveillance.

Based on these reviews, it was concluded that the two failures were random instances and not systematic in nature. Therefore, if the failures are random it does not introduce a time dependent failure mechanism that will invalidate the 24 month calibration interval.

**NRC Question:**

3. In Enclosure 1, on page E1-58, Section 4.2, "Validation Items from Conversion to Improved Technical Specification" Item A "Calibration Frequencies" lists some of the instruments that need to be validated to satisfy License Condition 2.C(4). The U.S. Nuclear Regulatory Commission staff compared the information in Section 4.2 of this submittal and the information in your letters dated June 16, 2004, "Browns Ferry Unit 1 - Plan for Satisfying License Condition 2.C(4)," and October 12, 2004, "Browns Ferry Unit 1 - Completion of License Condition 2.C(4)," and found that some clarification is needed. For example, on page E1-59, Section A.1 of the TS-433 submittal discusses only the Reactor Vessel Steam Dome Pressure. However, page E1-4 of the June 16 letter and page E1-3 of the October 12 letter discuss the High Reactor Pressure, High Drywell Pressure and Reactor Low Water Level, and state that the validation of the calibration frequency for two of these functions is no longer required. Please explain this statement. Also, please verify that instruments described in Section 4.2 of this submittal represent all the instruments that need to be validated under License Condition 2.C(4) with respect to 24-month calibration frequency.

**TVA Response:**

The purposes of Unit 1 License Condition 2.C.4 were to:

1. Ensure the changes to the Unit 1 TS, identified in the application for conversion to ITS as lacking the required analysis, were supported and reflected by the plant's design basis prior to returning the associated equipment to service; and
2. Allow future TS changes to be made to all three units, during the period that Unit 1 was in a long-term lay-up condition, without requiring Unit 1 supporting analyses be performed prior to submittal or requiring additional license conditions be added for each amendment.

The first purpose of the 2.C.4 License Condition applied primarily to instrument calibration frequencies. The affected instrument can be discussed in two groups. The first group is those that no longer need to be validated and the second group is those that still required validation.

The High Drywell Pressure and Reactor Low Water Level instruments belong to the first group and no longer require validation. Just before the conversion to Improved Technical Specifications (ITS) for Units 1, 2 and 3, the calibration frequency for the instruments was every three months for Unit 1 and 18 months for Units 2 and 3. The ITS conversion submittal proposed an 18 month calibration frequency for all three units. The 18 month value was based on the licensed length of the Units 1, 2 and 3 operation cycle at the time of the ITS submittal. When the ITS conversion amendment was submitted, Units 2 and 3 scaling and setpoint calculations supported the 18 month calibration frequency. Since Unit 1 was shutdown, with no approved plan to return the unit to service, scaling and setpoint calculations were not performed to support the 18 month calibration frequency specified in the Unit 1 ITS application. Hence, License Condition 2.C.4 ensured that the supporting calculations for the Unit 1 High Drywell Pressure and Reactor Low Water Level instrumentation 18 month calibration frequency would be performed before TVA restarted Unit 1.

TVA subsequently requested and NRC approved <sup>(4)</sup> a Technical Specification amendment that specified 24 month calibration frequencies for the High Drywell Pressure and Reactor Low Water Level instrumentation for Units 2 and 3. The application that requests 24 month calibration frequencies to support a 24 month fuel cycle for Unit 1 is the subject of this letter and the current staff review. The NRC review of TS 433 will complete the requirement to validate the calibration frequency for the Unit 1 High Drywell Pressure and Reactor Low Water Level instrumentation and thus no further validation is required.

In other words, when TVA stated that validation of the 18 month calibration frequency for High Drywell Pressure and Reactor Low Water Level instrumentation is no longer required, it meant that TVA does not intend to operate Unit 1 on an 18 month refueling

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<sup>4</sup> NRC letter to TVA, dated November 30, 1998, "Issuance of Amendments - Browns Ferry Nuclear Plant Units 1, 2, and 3 (TAC Nos. MA2081, MA2082, and MA2083)."

cycle and that TVA will not perform Unit 1 setpoint and scaling calculations for instrumentation assuming an 18 month refueling cycle. The underlying purpose of the License Condition, to ensure that the supporting analysis for the High Drywell Pressure and Reactor Low Water Level instrumentation would be performed before TVA operated Unit 1 on an 18 month refueling cycle, has been superseded by the request to go to a 24 month refueling cycle. Validation of the 18 month calibration frequency is no longer required since TVA does not intend to operate Unit 1 on an 18 month refueling cycle. Supporting setpoint and scaling calculations have been prepared to support 24 month calibration frequencies for the High Drywell Pressure and Reactor Low Water Level instrumentation, as well as the other instrumentation that supported a 24 month refueling outage for Unit 1, as discussed in Section 4.1 of TS 433.

The second group of instruments are those whose calibration frequencies that still required validation. The High Reactor Pressure is an example of an instrument in this group. Just before the conversion to ITS for Units 1, 2 and 3, the calibration frequency was every three months for Unit 1 and every six months (184 days) for Units 2 and 3. The ITS conversion submittal proposed a 184 day calibration frequency for all three units for the High Reactor Pressure instrumentation. At the time of TVA's ITS submittal, Units 2 and 3 scaling and setpoint calculations supported the 184 day calibration frequency. Since Unit 1 was shutdown, with no approved plan to return the unit to service, scaling and setpoint calculations were not performed at the time of ITS conversion to support the 184 day calibration frequency specified in the Unit 1 ITS application. Prior to the submission of TS 433, a setpoint and scaling calculation was prepared to support the 184 day calibration frequency for the Unit 1 High Reactor Pressure instrumentation. Even though this instrument is not on a 24 month surveillance frequency, a statement validating the current Unit 1 TS 184 day instrument calibration frequency was included on Page E1-59 of TS 433 in order to satisfy License Condition 2.C.4. The NRC review of TS 433 will complete the requirement to validate the calibration frequency for the Unit 1 High Reactor Pressure instrumentation.

Section 4.2 of the August 16, 2004 submittal (TS 433) and TVA's August 16, 2004 TS 447 application <sup>(5)</sup> contain all the instruments whose calibration frequencies needed to be validated under License Condition 2.C(4).

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<sup>5</sup> TVA letter to NRC, dated August 16, 2004, "Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 - Technical Specifications (TS) Change TS-447 - Extension of Channel Calibration Surveillance Requirement Performance Frequency and Allowable Value Revision."

**NRC Question:**

4. On page E1-16 of Enclosure 1, the application states that drift studies were performed for a 30-month cycle for each instrument type. Please provide a sample drift study.

**TVA Response:**

The following summarizes the methodology used to determine Real Life Drift (RLD) at the Browns Ferry Nuclear Plant.

To ensure the collection of quality data that will meet 10CFR50, Appendix B Standards, plant procedures which fall under the plant's existing Appendix B program are utilized. Additional procedures may be needed to supplement the data collection process. The plant's Surveillance Instructions (SI) utilized to implement the plant's Technical Specification surveillance requirements are the main source of plant data since these SI and their results (data) already fall under the plant's Appendix B program.

When data for a specific device is needed, the person performing the analysis starts by identifying all the different applications of that specific device within the plant. Once the different applications have been identified by a unique tag number or function, a search for the associated SI(s) is performed. When the associated SI's are identified, the data documented from the periodic performance of these specific SI's is retrieved (QA Record for Appendix B requirements) for review and analysis.

The general data analysis compares the as-found data of one calibration to the as-left data from the previous instrument's adjustment which may or may not be its last calibration. The results of the calibration must be noted to determine if a device has been recalibrated or only checked, replaced due to damage, or any other unusual circumstance that could bias the results. The other part of the data analysis is to note the duration from the previous calibration and the date of the calibration. Plots of the deviation versus duration and the deviation versus date are used to determine if there is a time relationship or a seasonal fluctuation indicative of a temperature effect. Trends in the drift data with relation to

time or temperature are quantified first, then the uncertainty about the trend statistically evaluated. After qualitatively determining that there is or is not a time/seasonal variation, the data is statistically analyzed by calculating the mean, standard deviation, and distribution. The distribution is used to evaluate how close the data is to a normal distribution. As long as the data approximates a normal distribution, the analyzed data's mean and standard deviation can be used to predict future behavior utilizing tolerance and confidence tables.

As part of the review of another Unit 1 Technical Specification change, TVA recently submitted <sup>(6)</sup> information regarding TVA's setpoint methodology. TVA provided excerpts of setpoint and scaling calculations, which included drift analysis. TVA also included Electrical Engineering Branch Technical Instruction EEB-TI-28, *Setpoint Calculations*, which is the primary procedure for calculating instrument setpoints. The calculations which determine the 24 month drift values for each specific instrument are also available for review at the plant.

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<sup>6</sup> TVA letter to NRC, dated March 11, 2005, "Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 - Technical Specifications (TS) Change TS-447, Request for Additional Information (RAI) - Extension of Channel Calibration Surveillance Requirement Performance Frequency and Allowable Value Revision."