TVA-BFN-TS-453

August 1, 2006

10 CFR 50.90

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

Gentlemen:

In the Matter of	)	Docket Nos. 50-259
Tennessee Valley Authority	)	50-260
		50-296

BROWNS FERRY NUCLEAR PLANT (BFN) – UNITS 1, 2, AND 3 – RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION (RAI) RELATED TO TECHNICAL SPECIFICATIONS (TS) CHANGE NO. TS-453 - INSTRUMENT SETPOINT PROGRAM (TAC NOS. MC9518, MC9519, AND MC9520)

In a letter dated April 19, 2005, (ADAMS Accession No. ML050900421) NRC indicated that the Unit 1 Extended Power Uprate (EPU) license amendment and several TS changes needed for Unit 1 restart were being constrained by the resolution of instrument setpoint Method 3 issues. In response, on January 10, 2006, TVA submitted license amendment request TS-453 (ML060180452). TS-453 adds provisions into the TS specifying the methodology used for determining, setting, and evaluating as-found setpoints for instruments necessary to ensure compliance with a Safety Limit and for selected instruments which are critical in ensuring the fuel peak cladding temperature acceptance criterion of 10 CFR 50.46 is met.

On June 16, 2006, NRC informed TVA via letter (ML061660004) that additional information was required in support of the

review of TS-453. The enclosure to this letter provides TVA's response to the Staff's June 16, 2006, request for additional information.

The TS changes listed as being constrained in the April 19, 2005, NRC letter are repeated below for ready reference. Except for TS-431 (Unit 1 EPU), NRC has previously reviewed and approved the same TS changes for Units 2 and 3.

- TS-430, Unit 1 - Power Range Neutron Monitor Upgrade
- TS-431, Unit 1 EPU
- TS-433, Unit 1 - 24-Month Fuel Cycle
- TS-434, Unit 1 - Allowable Value for Reactor Vessel Water Level - Low Level 3
- TS-437, Unit 1 - Scram Discharge Instrument Volume Setpoint Change

TVA has determined this response does not change the determination in the January 10, 2006, TS-453 submittal that there are no significant hazards considerations associated with the proposed change and that the TS change qualifies for a categorical exclusion from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9).

There are no new regulatory commitments associated with this submittal. If you have any questions concerning 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 1st day of August, 2006.

Sincerely,
Original signed by:

William D. Crouch
Manager of Licensing
and Industry Affairs

cc: See page 3

Enclosure: Response to June 16, 2006, Request for Additional Information

Enclosure

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S:lic/submit/subs/TS/ TS-453 RAI Response to June 16, 2006

ENCLOSURE

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 1, 2, AND 3

RESPONSE TO JUNE 16, 2006, NRC REQUEST FOR ADDITIONAL INFORMATION RELATED TO TECHNICAL SPECIFICATIONS (TS) CHANGE NO. TS-453 INSTRUMENT SETPOINT PROGRAM

NRC RAI Part (a)

Concerning TS Table 3.3.1.1-1, Function 2, Average Power Range Monitors, a. Neutron Flux - High (Setdown) and b. Flow Biased Simulated Thermal Power - High, please provide:

(a) An overview description of the testing and calibration of the instrumentation that supports these functions. This description should include self-testing and input signal conversion calibration in the digital system. The description should also address all manual testing and calibration. Include schedule constraints and considerations for each test. Show how this testing, including the associated schedule considerations, is accommodated in the setpoint calculations.

TVA Response to (a)

In TS-453, provisions are added into the TS specifying the methodology used for determining, setting, and evaluating as-found setpoints for instruments necessary to ensure compliance with a Safety Limit and for selected instruments which are critical in ensuring the fuel peak cladding temperature acceptance criterion of 10 CFR 50.46 is met. Since credit is not taken in the BFN transient and accident analyses for TS instrument Table 3.3.1.1-1, Function 2.a, Average Power Range Monitors (APRM), Neutron Flux - High (Setdown) or Function 2.b, Flow Biased Simulated Thermal Power - High, in ensuring a Safety Limit is met or that the temperature acceptance criterion of 10 CFR 50.46 is met, these two TS instrument functions are not in the scope of TS-453.

The TS 3.3.1.1-1 APRM instrument functions are part of the Power Range Neutron Monitoring (PRNM) system. For Unit 1 restart, the same PRNM system currently installed and in-service on Units 2 and 3 is being installed on Unit 1. A license amendment in support of this modification was submitted on November 10, 2003 (ML033300129) as TS change TS-430, which is under NRC review.

The PRNM system, which includes four APRM subsystems, is described in detail in General Electric Topical Report NEDC-32410P, Nuclear Measurement Analysis and Control Power Range Neutron Monitor (NUMAC PRNM) Retrofit Plus Option Stability Functions, March 1995. NEDC-32410P, as subsequently supplemented, was accepted for use in licensing applications as documented in an NRC Safety Evaluation Report (SER) dated September 5, 1995. NEDC-32410P (later issued as NEDC-32410P-A) provides a description of the PRNM system design, qualification, system operation, self-checking functions, and testing requirements including the basis for the surveillance intervals for the APRM system.

TS changes required for the installation of PRNM systems on Units 2 and 3 were approved by NRC in SERs dated September 11, 1997, for Unit 2 and on September 3, 1998 (ML020110054), for Unit 3. As noted in the NRC approvals, the PRNM system installations on Units 2 and 3 meet the conditions and stipulations in the NEDC-32410P SER. Additionally, TVA adopted the baseline surveillance tests and corresponding test frequencies from the model TS in NEDC-32410P into BFN TS via these two license amendments. Through several years of operating service, the PRNM system has shown itself to be a reliable system. As noted above, the same system is being installed for Unit 1.

NRC RAI Part (b)

(b) The setpoint calculations including Limiting Trip Setpoint value that is the least conservative acceptable target value for the as-left setting, the as-left tolerance (value), the as-found tolerance (value), and the allowable value;

TVA Response to (b)

As noted in the response to (a), APRM Functions 2.a, Neutron Flux - High (Setdown) and 2.b, Flow Biased Simulated Thermal Power - High, are not in the scope of TS-453. However, to respond to NRC's inquiry, a synopsis of the setpoints and uncertainties for the subject APRM functions is provided below.

TVA calculation ED-Q2092-900118, Revision 16 documents the setpoints and allowable values (AVs) for the APRM, Neutron Flux - High (Setdown) and APRM Flow Biased Simulated Thermal Power - High, at Extended Power Uprate (EPU) conditions. The AVs in this calculation are for those proposed in TS-431, Unit 1 EPU, which was submitted to NRC on June 28, 2004. The values were determined using General Electric setpoint methodology.

Error Terms:

APRM/Trip/LPRM Accuracy (A) = ± 1.21% power fixed
(A) = ± 1.48% power flow biased

Channel Calibration Accuracy (C) = ± 0.94% power

Channel Instrument Drift (D) = ± 0.63% power fixed
(D) = ± 0.86% power flow biased

Primary Element Accuracy (DPEA) = 0.82% power bias
(APEA) = ± 0.23% power random

Process Measurement Accuracy (PMA) = ± 1.11% power fixed
(PMA) = ± 1.15% power flow biased

APRM Flow Biased Neutron Flux - Upscale

Analytical Limit (AL) = 0.55W + 67.5% power

Where W = recirculation pump drive flow, percent of rated

The Nominal Trip Setpoint (NTSP) is:

NTSP = AL - [1.645/2] * [SQRT(A^2+C^2+PMA^2+APEA^2+D^2)+DPEA]
NTSP = 0.55W + 67.5-[1.645/2]*[SQRT(1.48^2 + 0.94^2 + 1.15^2 + 0.23^2 + 0.86^2) + 0.82]
= 0.55W + 67.5 - 2.548
= 0.55W + 64.95
= 0.55W + 64.68 (for margin to chosen AV)

let NTSP = 0.55W + 64.5% power

AV = AL - [1.645/2] * [SQRT(A^2+C^2+PMA^2+APEA^2)]
AV = 0.55W + 67.5 - [1.645/2] * [SQRT(1.48^2 + 0.94^2 + 1.15^2 + 0.23^2)]
= 0.55W + 67.5 - 1.735
= 0.55W + 65.77

let AV = 0.55W + 65.5% power

APRM Neutron Flux Upscale Trip - Setdown

AL = 23% power

NTSP = AL - [1.645/2] * [SQRT(A^2+C^2+PMA^2+APEA^2+D^2)+DPEA]

NTSP = 23 - [1.645/2]*[SQRT(1.21^2 + 0.94^2 + 1.11^2 + 0.23^2 + 0.63^2) + 0.82]
= 23 -2.326
= 20.67% power
= 12.33% power (for margin to chosen AV)

let NTSP= 12 % power

AV = AL - [1.645/2] * [SQRT(A^2+C^2+PMA^2+APEA^2)]
AV = 23 - [1.645/2] * [SQRT(1.21^2 + 0.94^2 + 1.11^2 + 0.23^2)]
= 23 - 1.568
= 21.43% power

let AV = 13% power

Since margin exists between AL and NTSP and there are no measurable errors during calibration of the APRMs, the setpoints are acceptable. The setpoints associated with these APRM functions, which are verified during the calibration surveillance test, are stored in computer memory as fixed digital values and hence should never change. Accordingly, there should not be a difference in the as-found values and as-left setpoint values. The PRNM software also continuously checks for faults or failures as described in detail in NEDC-32410P-A.

NRC RAI Part (c)

(c) Describe the procedure for operability determination of the instruments, and the schedule upon which the procedure is based and executed.

TVA Response to (c)

The PRNM system and APRM subsystems are routinely tested in accordance in accordance with the Surveillance Requirements (SRs) referenced in TS Table 3.3.1.1-1 at the frequencies prescribed by the individual TS SRs. Channel Functional Tests (CFTs) are performed every 184 days (TS SR 3.3.1.1.16), a comparison to the calculated core thermal power is conducted weekly (TS SR 3.3.1.1.2), and a Channel Check (CC) is performed daily. The CFT verifies trip logic. The weekly core power comparison SR compares the APRM output signals against calculated thermal power and adjusts the APRM output signal if not within the TS SR 3.3.1.1.2 criteria. The daily CC compares the APRM outputs among the four APRM subsystems. The APRM digital setpoints are verified in the calibration SR procedure

in accordance with TS SR 3.3.1.1.13, which is performed every 24 months.

The calibration, CFT, weekly power comparison, and CC surveillance tests each have acceptance criteria based on the specific instrument functions being tested by the surveillance test. Each of these SR procedures require an operability evaluation if acceptance criteria is not met. Regarding the calibration surveillance test, since PRNM is a digital system, the as-left APRM setpoint values will always be verified to be equal to the NTSP.

If an instrument function setpoint is found not to meet a TS AV, the SR procedures require immediate notification of the Unit Supervisor, who will evaluate TS operability and ensure corrective actions are initiated. A failure to meet the surveillance criteria is documented in the surveillance test data package or chronological test log and will be remedied prior to declaring the instrument operable. In no case is an instrument returned to service with an as-left setpoint outside the acceptable range.

Additionally, BFN site procedure SPP-6.7, "Instrumentation Setpoint, Scaling, and Calibration Program," requires that TS instruments which exceed TS AVs be documented as adverse conditions in the corrective action program. Evaluation in the corrective action program includes extent of condition and adverse trend considerations.

The above process description is typical of existing BFN instrument surveillance procedures for instruments that directly protect safety limits as well as for other TS instruments.

Supplemental Information Regarding Instrument Functions

In a teleconference on July 18, 2006, NRC staff asked if TS 3.3.1.1, Instrument Function 7.b, Scram Discharge Volume Water Level - High, should be in the scope of TS-453. As stated in the TS 3.3.1.1, Instrument Function 7.b, TS Bases, no credit is taken for a scram initiated from Function 7.b in any the transients analyzed in the Final Safety Analysis Report. The function of this instrument is to protect the capability of the scram discharge system. The function does not ensure a Safety Limit is met or that the temperature acceptance criterion of 10 CFR 50.46 is met; therefore, this instrument function was not included in TS-453.