May 6, 2004

TVA-BFN-TS-437

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 No. 50-259
Tennessee Valley Authority)

BROWNS FERRY NUCLEAR PLANT (BFN) - UNIT 1 – TECHNICAL SPECIFICATIONS (TS) CHANGE 437 – RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING SCRAM DISCHARGE VOLUME WATER LEVEL SETPOINT (TAC NOS. MC1427)

This letter provides TVA's responses to the NRC request for additional information regarding proposed Technical Specification 437 (Reference 1).

On November 3, 2003 (Reference 2), TVA requested a Technical Specification changes to lower the Allowable Value for Technical Specification Table 3.3.1.1-1, Reactor Protection System Instrumentation, Function 7.b, Scram Discharge Volume Water Level - High Float Switches. NRC has requested additional information to support the review of the submittal. The NRC requests and TVA's responses are enclosed.

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

If you have any questions about this submittal, please contact me at (256) 729-2636.

Sincerely,

Original signed by:

T. E. Abney
Manager of Licensing
and Industry Affairs

References:

1. NRC letter, K.N. Jabbour to J.A. Scalice, dated April 16, 2004, "Browns Ferry Nuclear Plant, Unit 1 – Request for Additional Information Regarding the Scram Discharge Volume Water Level Setpoint (TAC No. MC1427)."

2. TVA letter, T.E. Abney to NRC, dated November 3, 2003, "Browns Ferry Nuclear Plant (BFN) Unit 1 – Technical Specifications (TS) Change 437 – Scram Discharge Volume Water Level Setpoint."

Enclosure
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S:lic/submit/Techspecs/TS 437.doc

ENCLOSURE 1
TECHNICAL SPECIFICATION 437
SCRAM DISCHARGE VOLUME WATER LEVEL SETPOINT
RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION

NRC REQUEST

(1) Please discuss the instrument setpoint methodology used to calculate the allowable values of the float switches to monitor the scram discharge volume water level. Please identify the method discussed in the Instrument Society of America Standard 67.04.02, which has been used to determine the allowable values for this function. If your methodology has not been previously reviewed by the U.S. Nuclear Regulatory Commission staff, then please submit a copy of plant instrument setpoint methodology for review and approval.

TVA RESPONSE

The primary instrument setpoint methodology used at TVA is based on Method 3 of ISA S67.04.02. As evidenced below, TVA's method for performing setpoint calculations has been reviewed and approved by NRC.

- Prior to Unit 2 restart, NRC (including NRR personnel) performed an inspection[1] to assess the adequacy of the testing, calibration, maintenance and configuration control of safety-related instrumentation. Section 5 of Inspection Report 89-06 states:

  > "The latest procedure used by the licensee for setpoint calculations is the Division of Nuclear Engineering (DNE), Electrical Engineering Branch (EEB), instruction EEB-TI-28, Revision 1, dated October 24, 1988. … Procedure EEB-TI-28 incorporates the guidance found in RG 1.105 and ISA Standard 67.04 and is acceptable for assuring that setpoints are established and held within specified limits for nuclear safety-related instruments used in nuclear power plants. The guidance provided by this procedure

1 NRC letter, B.A. Wilson to O.D. Kingsley, dated May 8, 1989, "Notice of Violation (NRC Inspection Report Nos. 50-259/89-06, 50-260/89-06 and 50-296/89-06).

was reflected in the setpoint calculations which were reviewed during this inspection and are identified in the scope paragraph. The methodology of determining instrument loop errors and using them in the accuracy calculation reviewed is acceptable."

- In order to support the restart of BFN Unit 2, TVA submitted[2] a request to revise the TS low water level setpoint. On January 2, 1991, NRC approved[3] the requested amendment.

  "The amendment changes the Technical Specifications (TS) to incorporate a revised trip setpoint for the Level 1 low reactor pressure vessel (RPV) water level based on new calculation methodology."

  As stated in the Safety Evaluation:

  "TVA performed a Setpoint and Scaling Calculation to determine the accuracy of the instruments and loops. This accuracy was compared to the required accuracies to assure that there is sufficient margin between the setpoints and the operating limits, and the safety limits. The calculations reviewed by the staff at TVA's Rockville offices were as follows *(several calculations listed)*. The staff's review of the calculations verified that TVA addressed instrument and loop errors for normal operation and accident conditions … The methodology for determination of instrument setpoints used by TVA was in accordance with Regulatory Guide (RG) 1.105 that endorses Instrument Society of America (ISA) Standard ISA-S67.04 – 1982 "Setpoint for Nuclear Safety Related Instrumentation Used in Nuclear Power Plants". … The proposed changes to the LSSS *(limiting safety system setting)* and SL *(safety limit)* settings are acceptable because they are based on a value derived by approved calculational means. This change ensures that trips occur within the

2 TVA letter, E.G. Wallace to NRC, dated August 6, 1990, "Browns Ferry Nuclear Plant (BFN) - Unit 2 - TVA BFN Technical Specification (TS) No. 291 - Revision to Level 1 Low Reactor Pressure Vessel (RPV) Water Level."

3 NRC letter, T.M. Ross to O.D. Kingsley, dated January 2, 1991, "Issuance of Amendment (TAC No. 77279) (TS 291).

analytical limit used to confirm the design bases of the plant."

This NRC approved setpoint methodology continues to be used and has formed the basis for subsequent NRC approval of Technical Specification changes. For example, the NRC approved[4] a change in the reactor vessel water level safety limit and limiting safety system setting for BFN Units 1 and 3 by Amendments 222 and 196, respectively. The Safety Evaluation states:

> "The methodology used by the licensee to determine the LSSS is in accordance with the Instrument Society of America Standard ISA-S67.04 – 1982 "Setpoints for Nuclear Safety Related Instrumentation Used in Nuclear Power Plants." This methodology is consistent with the guidance of Regulatory Guide 1.105. Therefore, the proposed LSSS is acceptable."

4 NRC letter, J.F. Williams to O.D. Kingsley, dated July 17, 1995, "Issuance of Technical Specification Amendments for the Browns Ferry Nuclear Plant Units 1, 2, and 3 (TAC NOS. M89248, M89249 and M89250) (TS 318)."

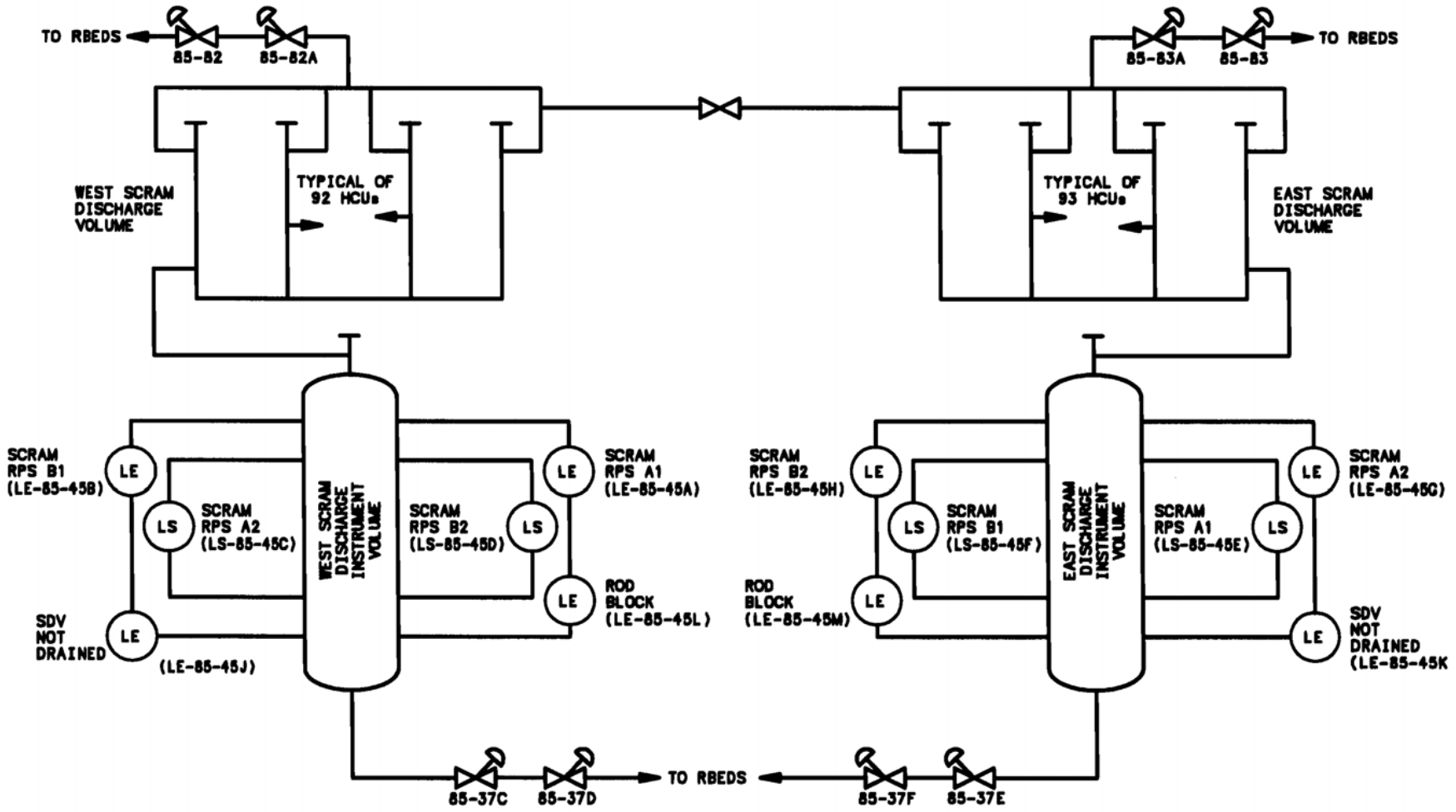
NRC REQUEST

(2) Please provide simplified drawings showing the configuration of the scram discharge volume, the instrument volume, and the location of all level switches.

TVA RESPONSE

The requested sketch is provided on the next page.

SCRAM DISCHARGE INSTRUMENT VOLUME



ACRONYMS:
HCU: HYDRAULIC CONTROL UNITS FOR CONTROL ROD DRIVERS
LE: LEVEL ELEMENT
LS: LEVEL SWITCH
RPS: REACTOR PROTECTION SYSTEM
RBEDS: REACTOR BUILDING EQUIPMENT DRAIN SYSTEM
SDV: SCRAM DISCHARGE VOLUME

NRC REQUEST

(3) It appears that there is a slight discrepancy between the Updated Final Safety Analysis Report, Section 3.4.5.3, and the November 3, 2003, submittal regarding the number of switches. Please address this discrepancy.

TVA RESPONSE

The apparent discrepancy exists because the Updated Final Safety Analysis Report describes all six of the level switches in a single Scram Discharge Instrument Volume (SDIV) as opposed to the eight scram switches on the two SDIVs. The six switches on a single SDIV are:

- 4 switches (two float switches and two thermal probes per SDIV) that initiate a scram (Note: currently at 50 gallons)
- 1 switch (one thermal probe per SDIV) that initiates a rod withdrawal block (Note: currently at 25 gallons)
- 1 switch (one thermal probe per SDIV) that initiates an alarm in the control room (Note: currently at 4 gallons)

There are two SDIVs in each reactor unit. The TS 437 submittal discusses just the switches that initiate a scram (i.e., 4 switches (two float switches and two thermal probes) for each of the two SDIVs or 8 total switches).

NRC REQUEST

(4) Please discuss, in detail, the function and the allowable setpoint values of the resistance temperature devices that are provided for the scram discharge volume level monitoring.

TVA RESPONSE

The Scram Discharge Instrument Volume (SDIV) water level is measured by two diverse methods. The level in each SDIV is measured by:

- Two float switches; and

- Two thermal probes (resistance temperature devices, RTDs).

The level in each of the SDIVs is monitored to ensure that adequate free volume exists in the scram discharge system to accept the reactor coolant discharged during a scram. At the allowable value, there is sufficient free volume to ensure a successful scram. The setpoint values are determined using the methods discussed in Item 1 above to ensure the switches actuate at or before the allowable value is reached.

The outputs of the float switches and the thermal probes are arranged so that there is a signal from a float switch and a thermal probe provided to each reactor protection system (RPS) trip logic channel. The trip logic is one-out-of-two taken twice for a scram, so actuation of either a float switch or a thermal probe will trip a channel. Tripping of both channels in either SDIV will initiate a high water level reactor scram. Tripping of one channel in each of the two SDIVs will not initiate a scram.

For BFN Unit 1, the high water level trip Technical Specification Allowable Value is currently 50 gallons for both the float switches and the thermal probes. The float switches are primarily mechanical devices and there is a measurable time delay associated with filling the interior volume of the switch. Accounting for this time delay in the supporting calculations is the reason for the proposed lowering of the Technical Specification allowable value from 50 gallons to 46 gallons for these float switches.

Each of the thermal probes employs two RTDs and a low power heater. The heater heats only one of the two RTDs. In the absence of liquid, a resistance imbalance is created between the two RTDs in the monitoring circuit. When liquid contacts the thermal probe, both RTDs are caused to become near equal in temperature and the monitoring circuit imbalance is greatly reduced. The change in the monitoring circuit imbalance actuates the output relay. For this water level detection application, the thermal probe is independent of the liquid temperature and the setpoint is based on the physical elevation of the thermal probe relative to the SDIV. Since there is virtually no time delay associated with the RTDs, the existing allowable value of 50 gallons (setpoint 49 gallons) for the thermal probe is consistent with the supporting analysis. Therefore, TVA is not proposing a change to the Technical Specification allowable value of 50 gallons for the thermal probes.