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

MAR 31 1994

TVA-BFN-TS-319 10 CFR 50.90

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

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

BROWNS FERRY NUCLEAR PLANT (BFN) - UNITS 1 and 3 - TECHNICAL SPECIFICATION (TS) NO. 319 - HIGH PRESSURE COOLANT INJECTION (HPCI)/REACTOR CORE ISOLATION COOLING (RCIC) STEAM LINE SPACE HIGH TEMPERATURE ISOLATIONS

In accordance with the provisions of 10 CFR 50.4 and 50.90, TVA is submitting a request for an amendment (TS-319) to licenses DPR-33 and DPR-68 to change the Technical Specifications for Units 1 and 3. As part of TVAs environmental qualification program, the environmental responses of the reactor building to high energy line breaks (HELBs) were analyzed. TVA used computer modeling techniques to predict the temperature response of various reactor building zones to HELBs. The results indicate that the setpoints for the HPCI and RCIC high temperature isolations should be lowered. The proposed change will lower (i.e., more conservative) the trip level settings for the HPCI and RCIC steam line space isolation instrument channels. In addition, this change defines the specific areas where steam line space temperatures are monitored. The proposed TS changes for Units 1 and 3 are based on similar changes implemented on Unit 2.

TVA has determined that there are no significant hazards considerations associated with the proposed change and that the change is exempt from environmental review pursuant to

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10 CFR 51.22(c)(9). The BFN Plant Operations Review Committee and the BFN Nuclear Safety Review Board have reviewed this proposed change and determined that operation of BFN Units 1 and 3 in accordance with the proposed change will not endanger the health and safety of the public. Additionally, in accordance with 10 CFR 50.91(b)(1), TVA is sending a copy of this letter and enclosures to the Alabama State Department of Public Health.

Enclosure 1 to this letter provides the description and evaluation of the proposed change. This includes TVA's evaluation that the proposed change does not involve a significant hazards consideration, and is exempt from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9). Enclosure 2 contains copies of the appropriate TS pages from Units 1 and 3 marked-up to show the proposed change. Enclosure 3 forwards the revised TS pages for Units 1 and 3 which incorporate the proposed change. Enclosure 4 contains a summary of the commitment associated with the proposed TS change.

This amendment is needed to support restart of BFN Unit 3. By letter dated December 23, 1993, TVA submitted the current schedule showing TS amendment need dates for support of Unit 3 restart. In order to support the restart schedule, TVA requests approval of the enclosed amendment by May 29, 1995. Any significant changes to this need date will be communicated through the NRC Project Manager. TVA requests that the amendment be made effective within 30 days following approval to allow for orderly implementation.

If you have any questions about this change, please telephone me at (205) 729-2636.

Sincerely,

Pedro Salas
Manager of Site Licensing

Enclosures
cc: See page 3

Subscribed and sworn to before me
on this 31ST day of MARCH 1994.

Barbara A. Blanton
Notary Public

My Commission Expires 10-30-94

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ENCLOSURE 1

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 1 and 3

PROPOSED TECHNICAL SPECIFICATION (TS) CHANGE TS-319
DESCRIPTION AND EVALUATION OF THE PROPOSED CHANGE

I. DESCRIPTION OF THE PROPOSED CHANGE

The proposed Technical Specifications will revise the temperature trip level settings for the high pressure coolant injection (HPCI) and reactor core isolation cooling (RCIC) steam line space isolation instrument channels. In addition, the proposed change defines the specific areas where steam line space temperatures are monitored. The trip level settings ensure that for a postulated HPCI or RCIC steam line break, the system's primary containment isolation valves (PCIVs) will close.

The HPCI and RCIC turbines use steam supplied from the reactor. Excessive steam flow and local area high temperature measuring instruments are used to detect a steam line break and ensure automatic closure of each system's PCIVs. The PCIVs closure prevent excessive loss of reactor coolant and the release of significant amounts of radioactive material from the nuclear system process barrier.

The proposed Units 1 and 3 changes are similar to the changes approved for Unit 2. The BFN Unit 2 TS change was submitted by TVA letter dated July 13, 1990, and supplemented by letter dated September 17, 1990. The BFN Unit 2 TS change was approved by NRC. Refer to NRC's safety evaluation report dated January 10, 1991.

The following are the specific proposed TS changes:

1. Delete the following from Table 3.2.B (with associated entries on line).

   "Instrument Channel - RCIC Steam Line Space High Temperature" on page 3.2/4.2-18 for Units 1 and 3.

   "Instrument Channel - HPCI Steam Line Space High Temperature" on page 3.2/4.2-19 for Units 1 and 3.

2. Add the following to Table 3.2.B, page 3.2/4.2-22 for Unit 1 and page 3.2/4.2-21 for Unit 3.

Minimum No. Operable Per Trip Sys. (1)	Function	Trip Level Setting	Action	Remarks
2	RCIC Steam Line Space Torus Area High Temperature	≤155°F	E	1. Above trip setting isolates RCIC system and trips RCIC turbine.
2	RCIC Steam Line Space RCIC Pump Room Area High Temperature	≤180°F	E	1. Above trip setting isolates RCIC system and trips RCIC turbine.
2	HPCI Steam Line Space Torus Area High Temperature	≤180°F	E	1. Above trip setting isolates HPCI system and trips HPCI turbine.
2	HPCI Steam Line Space HPCI Pump Room Area High Temperature	≤200°F	E	1. Above trip setting isolates HPCI system and trips HPCI turbine.

3. Add a note 1.E to the notes For Table 3.2.B on page 3.2/4.2-23 for Unit 1 and page 3.2/4.2-22 for Unit 3.

E. Within 24 hours restore the inoperable channel(s) to OPERABLE status or place the inoperable channel(s) in the tripped condition.

4. Delete note 4 of the notes For Table 3.2.B on page 3.2/4.2-23 for Unit 1 and 3.2/4.2-22 for Unit 3.

Existing note 4 reads:

"4. Requires one channel from each physical location (there are 4 locations) in the steam line space."

Revised note 4 would read:

Deleted.

5. Delete the following from Table 4.2.B on page 3.2/4.2-46 for Unit 1 and 3.2/4.2-45 for Unit 3 (with associated entries on line).

> "Instrument Channel - RCIC Steam Line Space High Temperature"
>
> "Instrument Channel - HPCI Steam Line Space High Temperature"

6. Add the following to Table 4.2.B on page 3.2/4.2-46 for Unit 1 and 3.2/4.2-45 for Unit 3

Function	Functional Test	Calibration	Instrument Check
RCIC Steam Line Space Torus Area High Temperature	(1)	Once/3 months	None
RCIC Steam Line Space RCIC Pump Room Area High Temperature	(1)	Once/3 months	None
HPCI Steam Line Space Torus Area High Temperature	(1)	Once/3 months	None
HPCI Steam Line Space HPCI Pump Room Area High Temperature	(1)	Once/3 months	None

7. Revise the bases section 3.2 on page 3.2/4.2-67 for Unit 1 and 3.2/4.2-66 for Unit 3.

The existing bases section 3.2 reads:

> "...The HPCI trip settings of 90 psi for high flow and 200°F for high temperature are such that core uncovery is prevented and fission product release is within limits.
>
> The RCIC high flow and temperature instrumentation are arranged the same as that for the HPCI. The trip setting of 450" water for high flow and 200°F for temperature are based on the same criteria as the HPCI...."

Revised bases section 3.2 would read in part :

> "...Each trip system consists of two channels. Each channel contains one temperature switch located in the pump room

and three temperature switches located in the torus area. The RCIC high flow and high area temperature sensing instrument channels are arranged in the same manner as the HPCI system.

The HPCI high steam flow trip setting of 90 psid and the RCIC high steam flow trip setting of 450" H_2O have been selected such that the trip setting is high enough to prevent spurious tripping during pump startup but low enough to prevent core uncovery and maintain fission product releases within 10 CFR 100 limits.

The HPCI and RCIC steam line space temperature switch trip settings are high enough to prevent spurious isolation due to normal temperature excursions in the vicinity of the steam supply piping. Additionally, these trip settings ensure that the primary containment isolation steam supply valves close and isolate a break within an acceptable time period to prevent core uncovery and maintain fission product releases within 10 CFR 100 limits...."

8. Editorial change to the bases on page 3.2/4.2-67 for Unit 1 and page 3.2/4.2-66 for Unit 3. The word "operable" is changed from lower case to capital letters. The bases will read as follows.

"The HPCI high flow and temperature instrumentation ... OPERABLE."

II. REASON FOR THE PROPOSED CHANGE

In response to TVA's environmental qualification program, the environmental responses of the reactor building to high energy line breaks (HELBs) were analyzed. TVA used computer modeling techniques to predict the temperature response of various reactor building zones to HELBs. The results indicate that the setpoints for the HPCI and RCIC temperature switches should be lowered in order to limit the maximum room temperature as a result of a HPCI or RCIC steam supply line break. The temperature trip level settings are revised (i.e., more conservative) to ensure timely initiation of a closure signal to the primary containment isolation valves. The capitalization of the term "operable" on the affected Units 1 and 3 bases pages denotes that it is defined in the TS definition section 1.0.

This amendment is needed to support restart of BFN Unit 3. By letter dated December 23, 1993, TVA submitted the current schedule showing TS amendment need dates for support of Unit 3 restart. In order to support the restart schedule, TVA requests approval of the enclosed amendment by May 29, 1995. Any significant changes to this need date will be communicated through the NRC Project Manager. TVA requests that the amendment be made effective 30 days following approval to allow for orderly implementation.

III. SAFETY ANALYSIS

The HPCI system is provided to limit fuel cladding temperature and loss of inventory in the event of a small break in the nuclear system which does not result in rapid depressurization of the reactor vessel. The HPCI system permits the reactor to be shutdown while maintaining sufficient reactor vessel water inventory until the reactor vessel is depressurized. The HPCI system continues to operate until reactor vessel pressure is below the pressure at which Low Pressure Coolant Injection (LPCI) or Core Spray System operation maintains core cooling and inventory. The RCIC system provides makeup water to the reactor vessel during hot shutdown, abnormal operational transients, and isolation from the main heat sink. During the above conditions the RCIC system supplements or replaces the normal makeup water systems.

A pipe break in the HPCI or RCIC steam supply piping results in a loss of reactor coolant inventory and a breach of the reactor coolant pressure boundary, with a subsequent release path for fission products. A high temperature in the vicinity of the break will occur due to the release of energy from the reactor coolant pressure boundary in the form of steam. The HPCI and RCIC systems have four sets of four bimetallic temperature switches located in areas along the path of the steam supply piping (see Figure). The sixteen temperature switches are arranged into two divisional trip systems with eight temperature switches per division. The trip logic scheme for the temperature switches is arranged in a one-out-of-two taken twice logic configuration for any of the four reactor building areas being monitored (pump room and three areas in the torus) see Figure.

The minimum number of channels operable per trip system is revised to conform with the system design (see Figure). The HPCI and RCIC instrument channels are similarly configured. Each consists of two trip systems which contain two channels apiece. A channel consists of one temperature switch located in the pump room and three temperature switches in the torus area.

The HPCI and RCIC steam line space temperature switch trip

setting are high enough to prevent spurious isolation due to temperature excursions other than the HPCI or RCIC steam line break in the vicinity of the steam supply piping. Additionally, these trip setting ensure that the primary containment isolation steam supply valves receive a signal to close and isolate a break within an acceptable time period to prevent core uncovery and maintain fission product releases within 10 CFR 100 limits.

TVA utilized computer modeling techniques to predict the temperature response of various reactor building zones to high energy line breaks (HELBs). The results for Unit 3 indicate that temperatures below the present 200°F TS value may be present for various HPCI and RCIC line break scenarios. In addition, the computer modeling determined the analytical limits. The analytical limit is a value established by the Reactor Building Environmental Analysis for a postulated HELB in the HPCI and RCIC system to meet the requirements of 10 CFR 50.49. The temperature switches setpoint was selected to provide sufficient margin between the setpoint and the analytical limit to account for all inaccuracies inherent in the instrument loop.

The current calculation methodology is based on Regulatory Guide 1.105, Instrument Setpoints for Safety Related Systems. Regulatory Guide 1.105 endorses Instrument Society of America (ISA) Standard ISA-S67.04 - 1982, Setpoints for Nuclear Safety Related Instrumentation Used in Nuclear Power Plants, as an acceptable method for ensuring that setpoints stay within technical specification limits. No physical change to plant equipment was involved.

The HPCI and RCIC temperature trip setting have been selected high enough to prevent spurious isolation due to maximum temperatures in the vicinity of the steam supply piping.

The maximum temperature expected could occur due to temperature excursions greater than the design heat loads or a degrading of the environmental control systems. In either case a substantial margin (greater than 35 degrees F) exist between the maximum temperature expected in each area and the minimum actuation temperature for each temperature switch. In addition, for a HELB in a system other than HPCI and RCIC, a margin greater than 20 degrees F exist between the maximum temperature expected in each area and the minimum actuation temperature for each switch.

With the substantial margin between maximum temperatures for the areas and the minimum actuation temperatures of the switches, the maximum temperatures cannot result in actuation of the switches.

The trip settings have been selected high enough to prevent spurious isolation due to maximum temperatures in the vicinity of the steam supply piping. The changes are justified because they are conservative.

The computer modeling techniques for Unit 1 will be confirmed prior to Unit 1 restart.

The proposed Units 1 and 3 change to Note 1.E for Table 3.2.B revises the action to be taken for an inoperable instrument/channel. The proposed Note 1.E requires an inoperable channel to be repaired within 24 hours or placed in the tripped position. If the inoperable channel cannot be repaired in the allowable out-of-service time, the channel must be placed in the tripped condition which performs the intended function of the channel. The change to the action statement is proposed to provide a compensatory measure which is consistent with the functional design of the isolation instrumentation and logic. The existing action statement in the TS requires the function to be repaired in 24 hours or the system or component is declared inoperable. The proposed action statement requires the function(s) to be repaired within 24 hours or place the inoperable channel in the tripped condition. It is unnecessary to declare the system or component inoperable since placing the inoperable channel(s) in the tripped condition, restores single failure tolerance to the isolation function.

The deletion of the existing Note 4 is proposed since it does not accurately describe the design of the HPCI/RCIC high temperature isolation instrumentation. The existing Note 4 describes each sensor as a channel. This is incorrect since the design of the system provides four channels, with each channel made up of four sensors.

Application of the definition of OPERABLE to the HPCI/RCIC temperature switches determines the number of sensors required for the channel to be OPERABLE. The TS definition of OPERABLE combined with the description of a channel in the proposed bases provides adequate guidance and controls the OPERABILITY of the involved temperature switches.

The proposed Units 1 and 3 change does not limit the time that an inoperable channel may be placed in the tripped position. Placing a channel in the tripped position restores the isolation function to a single failure tolerant condition. Tripping a channel does result in a condition where a spurious actuation in another channel could prevent the function of the associated system. However, this condition is consistent with the design of the HPCI and RCIC systems, since neither the HPCI or RCIC systems are single failure proof. The proposed change is consistent with the General Electric Standard Technical

Specification for Boiling Water Reactors (BWR/4) and provides for reliable isolation.

IV. NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

TVA has concluded that operation of Browns Ferry Nuclear Plant (BFN) Units 1 and 3 in accordance with the proposed change to the technical specifications does not involve a significant hazards consideration. TVA's conclusion is based on its evaluation in accordance with 10 CFR 50.91(a)(1), of the three standards set forth in 10 CFR 50.92(c). TVA's conclusion is based on the following:

1. **The proposed amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated.**

   The proposed changes to the HPCI and RCIC steam line space isolation setpoints do not affect any precursor for any design basis events or operational transients analyzed in the Browns Ferry Final Safety Analysis Report. Therefore, the probability of an accident previously evaluated is not increased.

   The HPCI and RCIC steam line space high temperature isolations are provided to ensure automatic closure of each system's primary containment isolation valves for a HPCI or RCIC steam line break. The isolation occurs when a very small leak has occurred. If the small leak is allowed to continue without isolation, offsite dose limits may be reached. As a result of the environmental qualification program, the environmental responses of the reactor building to high energy line breaks were analyzed. TVA used computer modeling techniques to predict the temperature response of various reactor building zones to high energy line breaks. The results indicate that the setpoints for the HPCI and RCIC temperatures switches should be lowered. The lower setpoints assure the timely initiation of a closure signal to the primary containment isolation valves. Therefore, assuring the maximum allowable temperatures are not exceeded.

   The proposed change to the HPCI and RCIC steam line space isolation setpoints are in the conservative direction and provides the same or earlier detection and isolation of HPCI and RCIC steam line breaks.

   The proposed trip level settings are high enough to ensure that spurious trips do not occur from normal or transient system operation and low enough to ensure that line breaks are detected and isolated before design conditions are exceeded. Therefore, the proposed changes will not significantly increase the

consequences of an accident previously evaluated.

2. **The proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated.**

The proposed change to the HPCI/RCIC steam line space high temperature isolations does not involve any modification to plant equipment or changes in operating procedures. No new failure modes are introduced. There is no effect on the function or operation of any other plant system. No new system interactions have been introduced by the change. The results of a break in the HPCI or RCIC steam lines remain as before. The HPCI or RCIC steam line area temperature switches will still detect a break due to an increase in area temperature and provide an initiation signal to close the system primary containment isolation valves to prevent reactor coolant loss. The proposed change will conservatively serve to detect and mitigate HPCI and RCIC line breaks more expeditiously. Therefore, the proposed changes do not create the possibility of a new or different kind of accident.

3. **The proposed amendment does not involve a significant reduction in a margin of safety.**

The proposed change will not reduce the margin of safety. The proposed change ensure that HPCI and RCIC steam line breaks are isolated at the same or lower steam line area temperatures. Computer modeling techniques were utilized to predict the temperature response in various areas through which the HPCI and RCIC steam lines pass. The revised setpoints are established above the maximum expected normal room temperatures to avoid spurious actions due to ambient conditions and below the analytical limits to ensure timely pipe break detection and isolation. Substantial margin exist between the maximum temperature expected in each area and the minimum actuation temperature determined for each temperature switch. With the substantial margin between maximum temperatures for the areas and the minimum actuation temperature of the switches, the maximum temperatures cannot result in actuation of the switches. The design and function of the affected components has not been changed. Therefore, the proposed change does not involve a significant reduction in a margin of safety.

V. ENVIRONMENTAL IMPACT CONSIDERATION

The proposed change does not involve a significant hazards consideration, a significant change in the types of or significant increase in the amounts of any effluents that may be released offsite, or a significant increase in individual or cumulative occupational radiation exposure. Therefore, the proposed change meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), an environmental assessment of the proposed change is not required.

FIGURE

HPCI/RCIC TEMPERATURE SWITCH LAYOUT

Typical for HPCI or RCIC System