



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

JAN 21 1994

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)	50-260
		50-296

BROWNS FERRY NUCLEAR PLANT (BFN) - ADDITIONAL INFORMATION REGARDING TECHNICAL SPECIFICATION (TS) 328, LOW PRESSURE COOLANT INJECTION (LPCI) OPERABILITY WITH THE RESIDUAL HEAT REMOVAL (RHR) SYSTEM ALIGNED FOR SHUTDOWN COOLING (SDC) (TAC NOS. M85255, M85256, and M85257)

TVA submitted a proposed technical specification change (TS 328) on December 23, 1992, that would allow LPCI to be considered operable when the RHR system is aligned in the SDC mode with the reactor shut down. TVA provided additional information on August 12, 1993, in response to an NRC request for additional information, dated June 9, 1993. Per telephone conversations with BFN's Project Manager during the week of January 3, 1994, NRC requested additional information to support the proposed technical specification change. Enclosure 1 provides the requested information.

A summary of the commitment contained in this letter is provided in Enclosure 2. If you have any questions, please contact me at (205) 729-2636.

Sincerely,

Pedro Salas
Manager of Site Licensing

Enclosures
cc: See page 2

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Enclosures

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ENCLOSURE 1

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

ADDITIONAL INFORMATION - LOW PRESSURE COOLANT INJECTION OPERABILITY

BACKGROUND

TVA submitted Technical Specification (TS) 328 on December 23, 1992 (Reference 1). This proposed TS change would allow the low pressure coolant injection (LPCI) mode of the Residual Heat Removal (RHR) system to be considered operable when capable of manual realignment from the shutdown cooling (SDC) mode. The proposed change only applies when the plant is in hot shutdown condition with the primary system at less than 105 psig or when the plant is in the cold shutdown condition with the primary system at atmospheric pressure.

On June 9, 1993, NRC requested TVA describe the "limiting accident" for each operating mode affected by the proposed technical specifications and the analysis of the postulated sequence of events, including time to core uncover if mitigating actions were not taken (Reference 2). TVA provided the requested additional information (RAI) on August 12, 1993 (Reference 3).

TVA demonstrated that the "limiting accident" for each operating mode affected by the proposed technical specifications would be bounded by BFN loss of coolant accident (LOCA) analyses. TVA also postulated a "worst case accident" for both operating modes affected by the proposed TS change. For the cold shutdown condition, TVA postulated that the most severe accident was an inadvertent draindown of the reactor vessel due to a break in SDC piping or a leak in the reactor coolant pressure boundary caused by maintenance or valve mispositioning. TVA explained that any draindown of the reactor vessel would be terminated by isolation of the SDC isolation valves due to a primary containment isolation system (PCIS) signal on low water level (538" above vessel zero). TVA later clarified that BFN Technical Specifications do not require the PCIS to be operable in the cold shutdown condition with the reactor at atmospheric pressure. However, BFN operating practice is to maintain that portion of the PCIS (i.e., reactor vessel low water level instrumentation) that initiates an SDC isolation operable when RHR is in the SDC mode.

REQUEST FOR ADDITIONAL INFORMATION (RAI)

On January 7, 1994, BFN's Project Manager advised TVA that additional information was needed to support the proposed technical specification for the cold shutdown case. The NRC requested TVA provide a time to core uncover for a "postulated event" in cold shutdown and additional information concerning RHR System valve interlocks that would prevent reactor draindown to the suppression pool.

BFN's Project Manager also advised TVA that no further information was needed to support the safety evaluation for the proposed technical specification for the hot shutdown case.

TVA RESPONSE

TVA cannot postulate any credible events that would uncover the core during cold shutdown. In the initial RAI response, TVA postulated a pipe break or a reactor draindown due to maintenance or valve mispositioning errors as a "worst case accident" for the purpose of showing that the event would be terminated by a SDC isolation due to a PCIS signal on low water level. However, TVA never considered them credible events while in cold shutdown with the reactor at atmospheric pressure. Per BFN Final Safety Analysis Report (FSAR) Section 14.4.3, a pipe break is only assumed if the component to rupture is subjected to significant pressure.

Reactor draindown due to maintenance or valve mispositioning errors is not considered credible since RHR system valves that would allow a significant draindown path are equipped with interlocks that prevent inadvertent draindown. The interlocks that provide protection against valve positioning errors that could cause an inadvertent reactor vessel draindown are as follows:

1. When an RHR SDC pump suction valve (FCV-74-2, 13, 25, or 36) is open, the corresponding suppression pool pump suction valve (FCV-74-1, 12, 24, or 35) cannot be opened or vice versa (see attached figure).
2. When an RHR SDC pump suction valve is open, the corresponding RHR suppression pool return line valve (2-FCV-74-57 or 71) cannot be opened or vice versa. (Interlock will be installed on Units 1 & 3 prior to restart.)
3. The RHR minimum flow valve (FCV-74-7 or 30) is designed to automatically open on low flow. Prior to placing the RHR into the SDC mode, the operating procedure requires the operator to bypass the minimum flow valve logic, using a handswitch, to keep the minimum flow valve closed (precludes

draining of the reactor vessel to suppression pool). The RHR minimum flow valve is also designed to automatically close if a SDC suction valve is not fully closed and neither pump on the corresponding loop is operating.

In addition, BFN's RHR system operating procedure contains precautions that address potential drain paths from the vessel to the suppression pool.

There are no other paths in which a valve misalignment error could cause the reactor vessel to drain rapidly enough to allow core uncover. There are one-inch lines off the RHR SDC piping that could drain the vessel, however, these are too small to be considered capable of draining the reactor vessel prior to operators manually realigning RHR to the LPCI mode.

TVA calculated approximate times to core uncover for various sized pipe openings. This calculation assumed the reactor is in cold shutdown at atmospheric pressure, the draindown starts at 538" above vessel zero (low water level), and core uncover is at the top of the active fuel. The calculated draindown times are listed in the table below:

DRAINDOWN TIME (MINUTES)	OPENING	
	(SQUARE INCHES)	(NOMINAL PIPE DIAMETER - IN.)
3.3	113.04	12
4.8	78.5	10
7.5	50.24	8
13.3	28.26	6
29.9	12.56	4

As stated in TVA's initial RAI response, the operator would be prompted to manually realign RHR from the SDC mode to the LPCI mode upon receipt of reactor vessel low water level scram/isolation indication and alarms (at 538" above vessel zero). The actions required for manual realignment can be completed in approximately 3.5 minutes from the receipt of the scram/isolation indication and alarms. Therefore, sufficient time is available to manually realign RHR to the LPCI mode.

REFERENCES

1. Letter from TVA to NRC, dated December 23, 1992, Technical Specification (TS) No. 328 - Low Pressure Coolant Injection (LPCI) Operability When Residual Heat Removal System (RHRS) is Aligned to Shutdown Cooling (SDC) Mode - Units 1, 2, and 3
2. Letter from NRC to TVA, dated June 9, 1993, Request for Additional Information - Proposed Technical Specification Amendment Regarding Low Pressure Coolant Injection Operability With Residual Heat Removal Aligned for Shutdown Cooling (TAC Nos. M85255, M85256, and M85257)
3. Letter from TVA to NRC, dated August 12, 1993, Response to Request for Additional Information - Proposed Technical Specification Amendment Regarding Low Pressure Coolant Injection Operability With Residual Heat Removal Aligned for Shutdown Cooling (TAC Nos. M85255, M85256, and M85257)

ENCLOSURE 2

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

SUMMARY OF COMMITMENT

Electrical interlocks will be installed between the Residual Heat Removal shutdown cooling pump suction valves (FCV-74-2, 13, 25, & 36) and the corresponding suppression pool return line valves (FCV-74-57 & 71) prior to the restart of Units 1 and 3.