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John T. Herron
Vice President, Browns Ferry Nuclear Plant

August 23, 2000

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

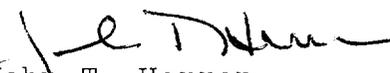
10 CFR 50.73

Dear Sir:

**BROWNS FERRY NUCLEAR PLANT (BFN) - UNITS 2 AND 3 - DOCKET NOS.
50-260 AND 296 - FACILITY OPERATING LICENSES DPR-52 AND DPR-68 -
LICENSEE EVENT REPORT (LER) 50-260/2000-002-00**

The enclosed report provides details concerning a failure to meet 10CFR50 Appendix R criteria. This report is submitted in accordance with 10 CFR 50.73 (a)(2)(ii)(C) as a condition during operation that results in the nuclear power plant in a condition not covered by the plant's operating and emergency procedures.

Sincerely,


John T. Herron

cc: See page 2

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Enclosure

cc (Enclosure):

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LICENSEE EVENT REPORT (LER)

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Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0104), Office of Management and Budget, Washington, DC 20503. If an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information

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TITLE (4)
Failure to Meet Appendix R Criteria Resulting in a Condition Not Covered by Plant Operating Procedures.

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
07	24	2000	2000	-- 002	-- 00	08	23	00	Unit 3	0500296
									NA	05000

OPERATING MODE (9) 1	POWER LEVEL (10) 100	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)								
		20.2201(b)	20.2203(a)(2)(v)	50.73(a)(2)(i)(B)	50.73(a)(2)(viii)					
		20.2203(a)(1)	20.2203(a)(3)(I)	<input checked="" type="checkbox"/> 50.73(a)(2)(ii)	50.73(a)(2)(x)					
		20.2203(a)(2)(i)	20.2203(a)(3)(ii)	50.73(a)(2)(iii)	73.71					
		20.2203(a)(2)(ii)	20.2203(a)(4)	50.73(a)(2)(iv)	OTHER					
		20.2203(a)(2)(iii)	50.36(c)(1)	50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A					
	20.2203(a)(2)(iv)	50.36(c)(2)	50.73(a)(2)(vii)							

LICENSEE CONTACT FOR THIS LER (12)

NAME Steve Austin, Senior Licensing Project Manager	TELEPHONE NUMBER (Include Area Code) (256) 729-2070
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

SUPPLEMENTAL REPORT EXPECTED (14)				EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE).	<input checked="" type="checkbox"/>	NO						

Abstract (Limit to 1400 paces, i.e., approximately 15 single-spaced typewritten lines) (16)

On July 24, 2000, at approximately 1322 hours Central Daylight Time (CDT), TVA concluded that a condition involving noncompliance with 10 CFR Part 50 Appendix R, Criterion III.L.2.b existed for BFN Units 2 and 3. Specifically, during a postulated Appendix R event requiring Low Pressure Coolant Injection, the Safe Shutdown Instructions (SSI) require that the operator start one Residual Heat Removal (RHR) pump at time (T) = 10 minutes. At T = 20 minutes, the SSI require the operator open three main steam relief valves and depressurize the reactor to less than the shutoff head of the RHR pump. RHR injection would begin when reactor pressure less than the shutoff head of the RHR pump is attained, approximately 5 minutes after initiation of reactor depressurization. Pump startup at T=10 minutes and reactor depressurization delay until T=20 minutes could result in a dead-head of the RHR pump for up to 16 minutes if a spurious closure of the RHR pump minimum flow valve occurs. The root cause of this event is an inadequate GE Appendix R Analysis regarding the operation of the minimum flow valves. TVA discussed the issue in the analysis with GE and they are currently working to a resolution to the discrepancy. TVA reviewed the Appendix R Analysis provided by GE for potential similar instances of inadequate or unclear analysis. None were identified. Significant improvements have been instituted in the Engineering Design process since the 1985 time frame. These improvements effectively address the requirement to question design information provided by vendors. In order to address the power/control cables for the RHR minimum flow valves, TVA will issue an evaluation, or a design modification, as appropriate, to provide a permanent resolution to this condition. This condition is reportable in accordance with 10 CFR 50.73(a)(2)(ii)(C), as a condition during operation that results in the nuclear power plant in a condition not covered by the plant's operating and emergency procedures.

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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

I. PLANT CONDITION(S)

At the time of the discovery of this condition, Units 2 and 3 were at 100 percent power. Unit 1 was shutdown and defueled.

II. DESCRIPTION OF EVENT

A. Event:

On July 24, 2000, at approximately 1322 hours Central Daylight Time (CDT), TVA concluded that a condition involving noncompliance with 10 CFR Part 50 Appendix R, Criterion III.L.2.b existed for BFN Units 2 and 3.

For a postulated Appendix R fire event requiring the use of Low Pressure Coolant Injection (LPCI) [BO], the current BFN Safe Shutdown Instructions (SSI) require that the operator start one Residual Heat Removal (RHR) [BO] pump at time (T) = 10 minutes. At T = 20 minutes, the SSI require the operator open three main steam relief valves and depressurize the reactor to less than the shutoff head of the RHR pump. RHR injection would begin when reactor pressure drops to less than the shutoff head of the RHR pumps, approximately 5 minutes after initiation of reactor depressurization. Pump startup at T=10 minutes and reactor depressurization delay until T=20 minutes could result in a dead-head of the RHR pump for up to 16 minutes if a spurious closure of the RHR pump minimum flow valve occurs.

During a scheduled NRC Triennial Fire Protection Inspection that took place from June 26 through June 29, 2000, NRC questioned the adequacy of the technical basis for TVA Appendix R SSI. The power cables for the RHR minimum flow valve [FCV] were not protected as part of TVA's Appendix R Analysis and could be subject to spurious operation in certain fire scenarios. If the minimum flow valve spuriously closed between the time the pump was started until the reactor pressure decreased to less than the pump shutoff head, the pump may operate in a dead-head condition.

The SSI that allowed operating the RHR pumps with the minimum flow valve subject to a possible spurious closure, were based on a letter from General Electric (GE) dated September 5, 1985. The following is an excerpt from the September 5, 1985 letter:

"During this fire event, the pump will start either on manual action or an automatic initiation on low water level. Both of these signals will occur at approximately 20 minutes into the event. At that time, the operator would have gained sufficient control of the system that the dead-head pump start would only last for several minutes. This limited time of dead-head would not cause pump failure. This assessment is based on observations from several other plants which experienced running the RHR pump without the minimum flow line. The most notable event is an RHR pump at Fermi-2 which ran without the minimum flow line for up to 1½ hours. Post event inspection

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showed that no pump damage was attributed to the loss of the minimum flow line. Therefore, the spurious operation of the RHR minimum flow valve is not detrimental to the RHR pumps at Browns Ferry.

Based on the above evaluations, the RHR minimum flow valve is not required for safe shutdown during an Appendix R fire event at the Browns Ferry Nuclear Plant."

NRC questioned the adequacy of the evaluation provided by GE which concluded that spurious operation of the RHR pump minimum flow valve is not detrimental to the RHR pump operation at BFN. The evaluation appeared to be based on the experience of other plants.

As a result of NRC's question, TVA requested that GE provide additional justification for the technical basis of RHR pump dead-head discussion provided by the September 5, 1985, letter. During a July 24, 2000, teleconference with GE it was determined that adequate justification supporting dead-head operation of the pump could not be provided. Subsequently, at 1420 hours CDT, TVA placed a one hour non-emergency report to the NRC.

At approximately 1632 hours CDT, TVA entered the appropriate Appendix R Limiting Condition For Operation which established compensatory measures in accordance with the Fire Protection Report.

On July 27, 2000, at approximately 0149 hours CDT, TVA implemented a temporary modification to ensure that the Units 2 and 3 RHR minimum flow valves would remain open during an Appendix R fire event. Subsequently, TVA exited the Appendix R Limiting Condition for Operation.

This condition has existed on Unit 2 since May 1991 and Unit 3 since November 1995.

TVA is reporting this event pursuant to 10 CFR 50.73(a)(2)(ii)(C), as a condition not covered by the plant's operating and emergency procedures.

B. Inoperable Structures, Components, or Systems that Contributed to the Event:

None.

C. Dates and Approximate Times of Major Occurrences:

June 29, 2000

NRC questioned the technical basis of TVA procedures which allowed RHR pump operation without minimum flow path available during a postulated Appendix R fire.

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July 24, 2000, at 1420 CDT

TVA concluded that adequate justification for RHR pump operation with the minimum flow valve closed was not available and made a one hour non-emergency notification to the NRC in accordance with 10 CFR 50.72(b)(1)(ii)(C).

D. Other Systems or Secondary Functions Affected:

None.

E. Method of Discovery:

NRC questioned the technical basis for TVA SSI which allowed RHR pump operation without minimum flow path available during a postulated Appendix R Fire event. TVA and GE evaluated the condition and concluded that adequate technical basis could not be provided.

F. Operator Actions

None.

G. Safety System Responses:

None.

III. CAUSE OF THE EVENT

A. Immediate Cause:

Noncompliance with applicable requirements of 10 CFR 50 Appendix R.

B. Root Cause:

The root cause of this event is an inadequate GE analysis regarding the operation of the minimum flow valves. The analysis was subsequently used to develop the SSI. In the September 5, 1985, letter, GE provided discussions on the operation of the BFN RHR pump minimum valves based on knowledge of occurrences at other plants. However, GE could not subsequently provide adequate technical justification for the conclusions of the letter.

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C. Contributing Factors

TVA did not employ a sufficient questioning attitude in 1985 upon receipt of the letter from GE. The letter was not specific in defining the allowable time for pump operation without minimum flow protection, nor was there adequate discussion of the basis for the conclusion (e.g., similarity of the BFN pumps to those at other plants).

IV. ANALYSIS OF THE EVENT

The BFN Safe Shutdown Analysis is based on GE NEDC-31119, 10 CFR 50 Appendix R Submittal Fire Protection and Safe Shutdown Systems Analysis Report, dated January, 1986. This report was developed by GE for TVA. The analysis provides general time frames necessary to achieve the objectives required to meet shut down requirements.

The GE analysis assumes both manual depressurization and RHR pump start occur at approximately 20 minutes after an event initiation. However, there is no explicit time sequence for starting a pump versus initiating reactor depressurization. Additionally, based on the language provided by GE in the September 5, 1985, letter, it was determined that operation of a RHR pump without minimum flow protection was also acceptable.

The combination of the GE analysis not specifying an explicit time or constraint requirement for starting a RHR pump, and the September 5, 1985, letter, which implied RHR pump operation without minimum flow protection for up to 1½ hours was acceptable, led to procedures that started a RHR pump prior to initiating reactodepressurization.

V. ASSESSMENT OF SAFETY CONSEQUENCES

A highly unlikely chain of events would have to occur in order to have a fire of the magnitude that would disable the minimum flow control valves for the RHR pumps. The fire would have to occur in an area of the plant that contains power and control circuits for the RHR pump minimum flow valves. Furthermore, the postulated fire would have to be severe enough that despite detection, automatic and manual suppression activities, the fire progresses to the point of burning the RHR minimum flow control/power cables. The minimum flow valves for the RHR pumps are normally in the open position when the pumps are in standby. Therefore, at the onset of the event, the RHR pump minimum flow valve would have to spuriously close for the event to occur.

Administrative controls in place during plant operation limit the amount of transient combustible materials in the plant and there are insufficient fixed combustible sources that could cause a significant exposure to fire. Considering the available automatic detection and suppression systems in the affected areas, and a dedicated on-site fire brigade, it is highly unlikely that a fire of the magnitude that would disable or spuriously operate the RHR minimum flow valves would occur.

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This event involved the reactor safety cornerstone described in NRC's Significance Determination Process (SDP). Accordingly, TVA analyzed the issue using the Fire Protection Risk Significance Screening Methodology. A Phase II analysis (Appendix F of the SDP) was used to evaluate the risk associated with the failure to protect the RHR minimum flow valve cables.

In performing the Phase II SDP analysis, TVA assumed that a fire barrier or 20 ft. separation does not exist between the redundant trains of the RHR minimum flow valves and circuits. The degradation has lasted for more than 30 days. Several fire scenarios were evaluated to assess the potential for damage to Safe Shutdown System (SSDS) components including the RHR minimum flow valve circuits. The fuel sources and their damage potential was derived from the BFN Individual Plant Examination of External Events (IPEEE) analysis. It was assumed that the RHR minimum flow valve circuits will be damaged if they traverse the zone of influence of the various fire sources in the reactor building. Other plant systems were also considered impacted if their circuits were in the fire zone of influence. All locations in the plant which contain a significant fire source were evaluated. The ignition frequency was derived from the BFN IPEEE analysis. The automatic fire suppression and manual fire fighting effectiveness were in the normal state.

Through performance of the Phase II SDP analysis, it was determined the postulated fire could produce the plant transient condition. As a result, the transient work sheet (reactor trip) for BFN (draft) was utilized to determine the remaining available mitigation capacity (available systems to shutdown the plant). For every case, significant plant systems remain available to safely shutdown the plant. TVA evaluated the impact of the failure to protect the RHR minimum flow valves and determined that this condition had very little risk to safety. Therefore, the safety of the plant, its personnel, and the public were not compromised by this event.

VI. CORRECTIVE ACTIONS

A. Immediate Corrective Actions:

TVA established compensatory actions in accordance with the BFN Fire Protection Report.

TVA implemented a temporary modification that ensures that the RHR minimum flow valves would remain open during a postulated Appendix R fire.

B. Corrective Actions to Prevent Recurrence:

TVA discussed the issue in the analysis with GE and they are currently working to a resolution to the discrepancy¹.

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In order to address the power/control cables for the RHR minimum flow valves, TVA will issue an evaluation, or a design modification, as appropriate, to provide a permanent resolution to this condition¹.

TVA reviewed the Appendix R Analysis provided by GE for other potential similar instances of inadequate or unclear analysis. None were identified.

Significant improvements have been instituted in the Engineering Design process since the 1985 time frame. These improvements effectively address the requirement to question design information provided by vendors.

VII. ADDITIONAL INFORMATION

A. Failed Components:

None.

B. Previous LERs on Similar Events:

There have been three previous events involving noncompliance with Appendix R (LER260/96002, LER 620/94002 and LER 260/94007). These LERs resulted from individuals failing to correctly interpret or implement the applicable requirements of the calculation and/or design criteria used during the original development of the Appendix R program. The corrective actions identified by these LERs would not have prevented this event.

C. Additional Information:

None.

D. Safety System Functional Failure:

This event did not result in a safety system functional failure in accordance with NEI 99-02, Revision 0.

VIII. COMMITMENTS

None.

¹ TVA does not consider this corrective action a regulatory commitment. TVA's Corrective action Program will track completion of this item.