

January 24, 2005

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

10 CFR 50.73

Dear Sir:

**TENNESSEE VALLEY AUTHORITY - BROWNS FERRY NUCLEAR PLANT (BFN) -
UNIT 2 - DOCKET 50-260 - FACILITY OPERATING LICENSE DPR - 52 -
LICENSEE EVENT REPORT (LER) 50-260/2004-003-00**

The enclosed report provides details of a failure to meet the requirements of a Technical Specifications Limiting Condition for Operation due to inoperability of the main turbine control valve fast closure pressure switch inputs to the reactor protection system beyond the allowable outage time.

In accordance with 10 CFR 50.73(a)(2)(i)(B), TVA is reporting this event as any operation or condition prohibited by the plant's Technical Specifications. There are no commitments contained in this letter.

Sincerely,

Original Signed by:

Mike D. Skaggs

cc: See page 2

U.S. Nuclear Regulatory Commission
Page 2
January 24, 2005

Enclosure

cc (Enclosure):

(Via NRC Electronic Distribution)

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U.S. Nuclear Regulatory Commission

Page 3

January 24, 2005

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Enclosure

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NRC FORM 366 (6-2004)		U.S. NUCLEAR REGULATORY COMMISSION			APPROVED BY OMB NO. 3150-0104		EXPIRES 06/30/2007												
<h2 style="margin: 0;">LICENSEE EVENT REPORT (LER)</h2> <p style="margin: 5px 0 0 100px;">(See reverse for required number of digits/characters for each block)</p>										Estimated burden per response to comply with this mandatory collection request:: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose 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 collection.									
1. FACILITY NAME Browns Ferry Unit 2					2. DOCKET NUMBER 05000260			3. PAGE 1 OF 5											
4. TITLE Inoperability of Turbine Control Valve Fast Closure Pressure Switches Beyond TS Allowable Outage Time																			
5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED										
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME		DOCKET NUMBER								
07	12	2004	2004-003-00			01	24	2005	none		N/A								
9. OPERATING MODE			11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)																
1			20.2201(b)		20.2203(a)(3)(i)		50.73(a)(2)(i)(C)		50.73(a)(2)(vii)										
10. POWER LEVEL 43%			20.2201(d)		20.2203(a)(3)(ii)		50.73(a)(2)(ii)(A)		50.73(a)(2)(viii)(A)										
			20.2203(a)(1)		20.2203(a)(4)		50.73(a)(2)(ii)(B)		50.73(a)(2)(viii)(B)										
			20.2203(a)(2)(i)		50.36(c)(1)(i)(A)		50.73(a)(2)(iii)		50.73(a)(2)(ix)(A)										
			20.2203(a)(2)(ii)		50.36(c)(1)(ii)(A)		50.73(a)(2)(iv)(A)		50.73(a)(2)(x)										
			20.2203(a)(2)(iii)		50.36(c)(2)		50.73(a)(2)(v)(A)		73.71(a)(4)										
			20.2203(a)(2)(iv)		50.46(a)(3)(ii)		50.73(a)(2)(v)(B)		73.71(a)(5)										
			20.2203(a)(2)(v)		50.73(a)(2)(i)(A)		50.73(a)(2)(v)(C)		OTHER										
20.2203(a)(2)(vi)		<input checked="" type="checkbox"/>	50.73(a)(2)(i)(B)		50.73(a)(2)(v)(D)		specify in Abstract below or in NRC Form 366A												
12. LICENSEE CONTACT FOR THIS LER																			
NAME Paul S. Heck, Nuclear Engineer, Licensing and Industry Affairs					TELEPHONE NUMBER (Include Area Code) 256-729-3624														
13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT																			
CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX										
14. SUPPLEMENTAL REPORT EXPECTED						15. EXPECTED SUBMISSION DATE													
<input type="checkbox"/> YES (if yes, complete 15. EXPECTED SUBMISSION DATE)						<input checked="" type="checkbox"/> NO													
ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) On Monday, July 12, 2004, Unit 2 was in power ascension following start-up from a scram which had occurred on July 8, 2004. The scram had occurred when the power-load unbalance (PLU) circuit of the main turbine electro-hydraulic control (EHC) system unexpectedly actuated during in-plant electrical switching. Engineering and 10 CFR 50.59 evaluations were completed to determine if reactor operation was acceptable with the PLU function disabled. The initial evaluations determined such operation was acceptable, and prior to reactor start-up the EHC PLU function was disabled via temporary modification. This modification was performed to eliminate the scram potential from the PLU circuit. Subsequently, the conclusions of the initial evaluations were found to be in error. After further consideration and discussions with General Electric, it was determined the temporary modification would be removed. On August 10, 2004, the temporary modification was removed to restore the EHC PLU function. The period of approximately 30 days between the Unit 2 reactor exceeding 30% power and the removal of the temporary modification exceeded the 4-hour out-of-service time allowed by the TS Table 3.3.1.1-1 for the turbine control valve fast closure pressure switch function. The root cause was that the BFN FSAR failed to include a description of the PLU function or its relationship to the transient analyses. The FSAR has been revised and personnel involved in 50.59 evaluations briefed.						MONTH		DAY		YEAR									

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
Browns Ferry Nuclear Plant Unit 2	05000260	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 5
		2004	-- 003	-- 00	

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

I. PLANT CONDITION(S)

At the time of the event, Unit 2 was operating at approximately 43 percent reactor power (approximately 1490 megawatts thermal) during power ascension following start-up from a scram which had occurred on July 8, 2004. Unit 3 was in Mode 1 at 100 percent reactor power (approximately 3458 megawatts thermal), and it was not affected by this event. Unit 1 was shutdown and defueled, and it also was not affected by this event.

II. DESCRIPTION OF EVENT

A. Event:

On Monday, July 12, 2004, Unit 2 was in power ascension following start-up from a scram which had occurred on July 8, 2004. The scram had occurred when the power-load unbalance (PLU) circuit of the main turbine [TA] electro-hydraulic control (EHC) system unexpectedly actuated during in-plant electrical switching. See Licensee Event Report 260/2004-001 for the details of this event. Engineering and 10 CFR 50.59 evaluations were completed to determine if reactor operation was acceptable with the PLU function disabled. The initial evaluations determined such operation was acceptable, and prior to reactor start-up the EHC PLU function was disabled via temporary modification. This modification was performed to eliminate the scram potential from the PLU circuit. The reactor restart was commenced, and at approximately 2240 hours CDT on July 11, 2004, the reactor achieved a power level greater than 30% of rated. At this power, Technical Specification (TS) Table 3.3.1.1-1 requires operability of the turbine control valve (TCV) fast closure pressure switch scram function. On July 26th, 2004, after approximately 2 weeks of additional power operation, the conclusions of the initial evaluations were found to be in error. After further consideration and discussions with General Electric, it was determined the temporary modification would be removed. On August 10, 2004, at 2152 hours CDT, the temporary modification was removed to restore the EHC PLU function.

The period of approximately 30 days between the Unit 2 reactor exceeding 30% power and the removal of the temporary modification exceeded the 4-hour out-of-service time allowed by the TS. In summary, a violation of the TS requirements commenced at approximately 0240 hours CDT on July 12, 2004, when the allowable 4-hour interval elapsed. TS compliance was restored at 2152 hours on August 10, 2004.

In accordance with 10 CFR 50.73(a)(2)(i)(B), TVA is reporting this event as any operation or condition prohibited by the plant's Technical Specifications

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

None

C. Dates and Approximate Times of Major Occurrences:

July 8, 2004	2232 hours CDT	Unit 2 turbine tripped and reactor scrammed during in-plant electrical switching activity which resulted in a sensed PLU condition
July 10, 2004		Temporary modification installed to disable the PLU function prior to Unit 2 restart from the scram
July 11, 2004	2240 hours CDT	Unit 2 reactor power achieved 30% power following start-up
July 12, 2004	0240 hours CDT	TS Limiting Condition for Operation (LCO) 3.3.1.1 Condition E completion time of 4 hours was exceeded

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
Browns Ferry Nuclear Plant Unit 2	05000260	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	3 OF 5
		2004	-- 003	-- 00	

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

August 10, 2004 2152 hours CDT The temporary modification was removed to re-enable the EHC PLU function, thus returning Unit 2 to compliance with TS 3.3.1.1

D. Other Systems or Secondary Functions Affected

None

E. Method of Discovery

The question of turbine control valve fast closure pressure switch TS operability when the PLU function is disabled was raised by the Nuclear Regulatory Commission (NRC) resident inspectors. After much discussion between TVA and NRC as well as internal to NRC, the NRC concluded that the switches were not operable in accordance with TS requirements and documented this condition as a non-cited violation in NRC Integrated Inspection Report 2004-04 (ADAMS accession number ML0430000050), dated October 25, 2004.

F. Operator Actions

N/A. This event involved engineering analyses, and no operator actions were required.

G. Safety System Responses

No equipment actuation occurred, nor was any actuation required, at any time during this condition.

III. CAUSE OF THE EVENT

A. Immediate Cause

Reactor operation above 30% power continued after the TCV fast closure pressure switches were made inoperable for a period exceeding the TS LCO allowable outage time of 4 hours.

B. Root Cause

The BFN FSAR failed to include a description of the PLU function or its relationship to the transient analyses. The FSAR information was insufficient to identify a correlation between the PLU function and the TS operability of the turbine control valve fast closure scram function required in TS Table 3.3.1.1-1.

IV. ANALYSIS OF THE EVENT

Event investigation after the July 8, 2004, Unit 2 reactor scram conclusively determined that a spurious operation of the EHC PLU function had occurred in conjunction with in-plant electrical switching which had temporarily de-energized a power supply affecting one channel of PLU instrumentation. It was not immediately apparent, however, how this single event had caused the PLU to be actuated. The digital EHC system installed on Unit 2 has been in service since April 2000, it has performed in a very reliable manner, and the entire system, including the PLU function, was designed to be well-protected against single point failures. It was known that the switching event had induced the circuit response, and that the circuit had operated with no similar problems for the preceding 4 ½ years. The operational impacts were evaluated of disabling the PLU function to avoid the potential of another spurious actuation of the PLU.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
Browns Ferry Nuclear Plant Unit 2	05000260	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	4 OF 5
		2004	-- 003	-- 00	

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

This evaluation concluded that the EHC PLU function existed solely for the purpose of protecting the turbine-generator against overspeed during generator load reject events, that neither the design nor licensing bases took credit for the function, and that no TS requirements would be impacted. A temporary modification was therefore performed to disable the EHC PLU function, and reactor operations were resumed.

Fast closure of the turbine control valves will occur if, for any reason, intended or unintended, their actuating oil pressure is relieved. Four pressure switches are installed to monitor the turbine control valve actuating oil pressure and initiate a reactor scram if the loss of actuating oil pressure is sensed. These switches are included in the TS for their reactor protection system function. The temporary modification was accomplished by software changes inside the EHC logic, and the pressure switches were not impacted in any way, directly or indirectly, by the temporary modification. The pressure switches met their TS required function to initiate a reactor scram on sensed low actuating oil pressure, and reactor operations were resumed.

Subsequent to resumed reactor operations, during the continued evaluation of the July 8 scram event, a system engineer realized that some transient analyses provided by General Electric (GE) did credit operation of the PLU function in determining response time for a reactor scram upon a generator load reject. At this time it was realized that BFN Unit 2 could be operating in an unanalyzed condition, and GE was contracted to perform the relevant analyses taking no credit for the PLU operation. During the time that GE was working on these analyses, given that the results of the July 8th event investigation had restored confidence in the PLU circuit reliability, the temporary modification to the EHC logic was removed and the PLU function was restored. The new GE analyses determined that for some power levels the reactor scram might be slightly delayed relative to the previous analyses, and an operating limit minimum critical power ratio (OLM CPR) penalty was required for reactor operations at those power levels with the PLU disabled. BFN reviewed the analyses results against the actual OLM CPR values which had existed during the interval where the PLU had been disabled. The BFN Unit 2 OLM CPR had been more conservative than that specified in the new analyses at all times during the interval, so the operation with the PLU function disabled had no impact on reactor safety.

The PLU logic monitors the difference in the percentage magnitude of the generator electrical output and steam pressure supplied to the low pressure turbines. When the steam pressure magnitude exceeds the generator electrical output by an established difference, a generator load reject condition is apparent. Without immediate control system response, such a condition would cause a rapid acceleration in turbine speed. To reduce the turbine speed increase effects, the PLU initiates a fast closure of the turbine control valves. This is accomplished by energizing a solenoid valve in the actuating oil supply line physically near each of the four control valves to immediately dump the actuating pressure to drain. These solenoid valves energize only if the PLU function operates, though the actuating oil pressure could be quickly lost also via a full turbine trip signal or through a supply line pipe break. Neither these solenoid valves which dump the control valve actuating oil pressure nor the PLU logic are included in the TS.

The NRC concluded that even though the TS pressure switches monitoring the actuating oil pressure were capable of sensing a pressure loss, they were not operable for the purpose of initiating a reactor scram in an actual load-reject event since the oil pressure itself would not be lost in the same manner as assumed by the transient analysis.

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		2004	-- 003	-- 00	

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

V. ASSESSMENT OF SAFETY CONSEQUENCES

As stated in Section IV above, the reactor never operated with an OLMCPR value less conservative than those specified in the analyses. In the event of an actual generator load-reject event during the interval with the PLU function disabled, with the additional conservatism assumed of no turbine bypass valve operation, the reactor MCPR limit would not have been exceeded. There were no consequences to the health and safety of the public caused by this condition.

VI. CORRECTIVE ACTIONS

A. Immediate Corrective Actions

The temporary modification that disabled the PLU function was removed.

B. Corrective Actions to Prevent Recurrence⁽¹⁾

- BFN FSAR has been revised to clarify the PLU feature and its transient analysis significance.
- Site personnel involved in 10 CFR 50.59 reviews have been briefed on this event.

VII. ADDITIONAL INFORMATION

A. Failed Components

None

B. Previous LERs on Similar Events

None

C. Additional Information

Browns Ferry Corrective Action document PER 65268

D. Safety System Functional Failure Consideration:

This event does not involve a safety system functional failure which would be reported in accordance with NEI 99-02. During the period of Unit 2 reactor operation with the PLU function disabled, the OLMCPR value remained greater (more conservative) than the limiting value OLMCPR determined by analysis. No transient event occurred, and had one occurred, no reactor fuel thermal limits would have been exceeded.

E. Loss of Normal Heat Removal Consideration:

The event being reported does not involve a reactor scram.

VIII. COMMITMENTS

None

⁽¹⁾ TVA does not consider this corrective action a regulatory commitment. The completion of this action will be tracked in TVA's Corrective Action Program.