



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

August 7, 2009

10 CFR 50.73

U.S. Nuclear Regulatory Commission  
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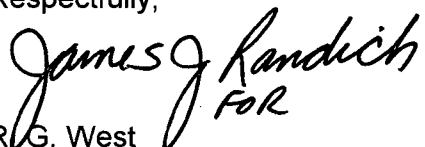
Browns Ferry Nuclear Plant Unit 2  
Facility Operating License No. DPR-52  
NRC Docket No. 50-260

**Subject: LICENSEE EVENT REPORT (LER) 50-260/2009-003**

The enclosed report provides details of a failure to meet the requirements of the Technical Specifications (TSs) Limiting Condition for Operation (LCO) 3.4.3 concerning the main steam relief valve operability.

TVA is reporting this in accordance with 10 CFR 50.73(a)(2)(i)(B) as an operation or condition prohibited by the plant's TSs. There are no commitments contained in this letter. Should you have any questions concerning this submittal, please contact F. R. Godwin, Site Licensing and Industry Affairs Manager, at (256) 729-2636.

Respectfully,

  
FOR  
R.G. West  
Vice President

cc: See page 2

JE22  
NRR

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Enclosure

cc (Enclosure):

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**LICENSEE EVENT REPORT (LER)**

(See reverse for required number of digits/characters for each block)

Estimated burden per response to comply with this mandatory collection request: 80 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.

<b>1. FACILITY NAME</b> Browns Ferry Unit 2	<b>2. DOCKET NUMBER</b> 05000260	<b>3. PAGE</b> 1 of 5
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**4. TITLE:** Main Steam Relief Valve As Found Setpoint Exceeded Technical Specification Lift Pressure

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
06	09	2009	2009	003	00	08	07	2009	None	N/A
									FACILITY NAME	DOCKET NUMBER
									None	N/A

<b>9. OPERATING MODE</b>  4	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §:</b> (Check all that apply)			
<b>10. POWER LEVEL</b>  0	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)
<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER	
<input type="checkbox"/> 20.2203(a)(2)(vi)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	<small>Specify in Abstract below or in NRC Form 368A</small>	

**12. LICENSEE CONTACT FOR THIS LER**

<b>NAME</b> Steve Austin, Licensing Engineer	<b>TELEPHONE NUMBER (Include Area Code)</b> 256-729-2070
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**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
B	SB	RV	T020	Y					

**14. SUPPLEMENTAL REPORT EXPECTED**

**15. EXPECTED SUBMISSION DATE**

<input type="checkbox"/> YES (if yes, complete 15. EXPECTED SUBMISSION DATE)	<input checked="" type="checkbox"/> NO		MONTH	DAY	YEAR
			N/A	N/A	N/A

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On June 8, 2009, TVA determined that 7 of the 13 Main Steam Relief Valves (MSRVs) removed from Unit 2 following Cycle 15 operation mechanically actuated at pressures greater than 3 percent above their Technical Specifications (TSs) setpoint, and thus were inoperable. Unit 2 TS limiting condition for operation (LCO) 3.4.3 requires that twelve (12) MSRVs are operable in reactor modes 1, 2, and 3. With one or more required MSRVs inoperable, the unit is required to be placed in Mode 3 (hot shutdown) within 12 hours and in Mode 4 (cold shutdown) within 36 hours. As such, it is probable that Unit 2 operated outside the TSs longer than allowed. Therefore, TVA is submitting this report in accordance with 10 CFR 50.73(a)(2)(i)(B), as any operation or condition prohibited by the plant's TSs.



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

**III. CAUSE OF THE EVENT**

**A. Immediate Cause**

The immediate cause for this reportable condition is an undetectable out-of-tolerance high-lift setpoint drift condition on the MSRVs which existed for longer than allowed by the TSs.

**B. Root Cause**

The root cause of this condition is a generic industry issue, MSRv pilot valve disc-seat corrosion bonding. A metal oxide film that develops during normal reactor operation which results in a bonding between seat and the disc, which adds resistance to the pressure needed to open the relief valve.

**C. Contributing Factors**

None.

**IV. ANALYSIS OF THE EVENT**

The condition being reported is the operation of Unit 2 in a manner prohibited by the TSs. The as-found valve lift set points following Unit 2 Cycle 15 operation are summarized in the following table.

Valve Position	Serial Number	MSRV TS Setpoint	1st test/dev.	2nd test/dev.	3rd test/dev.
2-PCV-001-0004	1026	1155	1201/4.0%	1178/2.0%	1172/1.5%
2-PCV-001-0005	1061	1145	1181/3.1%	1175/2.6%	1179/3.0%
2-PCV-001-0018	1021	1145	1237/8.0%	1178/2.9%	1176/2.7%
2-PCV-001-0019	1060	1135	1137/0.2%	1136/0.1%	1135/0.0%
2-PCV-001-0022 <sup>(2)</sup>	1065	1145	N/A	N/A	N/A
2-PCV-001-0023	1031	1135	1155/1.8%	1154/1.7%	1152/1.5%
2-PCV-001-0030	1130	1145	1174/2.5%	1157/1.0%	1149/0.3%
2-PCV-001-0031	1072	1135	1271/12.0%	1158/2.0%	1152/1.5%
2-PCV-001-0034	1063	1135	1163/2.5%	1167/2.8%	1151/1.4%
2-PCV-001-0041	1071	1155	1262/9.3%	1185/2.6%	1174/1.6%
2-PCV-001-0042	1073	1155	1145/-0.9%	1172/1.5%	1152/-0.3%
2-PCV-001-0179	1014	1155	1164/0.78%	1170/1.3%	1158/0.3%
2-PCV-001-0180	1029	1155	1254/8.0%	1179/2.1%	1174/1.6%

(1) The shaded values indicate test results outside the TSs required 3 percent tolerance.

(2) Valve failed to lift at 1300 psig test pressure.

The BFN MSRvs are Target Rock Model 7567F two-stage safety/relief valves. The valve is a leak tolerant valve; however, it exhibits significant in-service setpoint drift due to corrosion bonding to the pilot disc to seat. The pilot valve seats are constructed from erosion and wear resistant Stellite 6B. The Stellite alloy develops a hard, metal-oxide corrosion layer on the pilot disc. When placed in an operating environment typical of a Boiling Water Reactor, the steam exposed surfaces can oxidize forming a surface corrosion film. This corrosion forms a bond between the valve seat

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and disc. The bond adds to the resistance of the setpoint adjustment spring pressure necessary to open the valve and increases pressure required to actuate the valve. Generally, once the pilot valve is actuated the corrosion bond is broken; the subsequent lift setpoint is within the TS required tolerance.

**V. ASSESSMENT OF SAFETY CONSEQUENCES**

The safety consequences of this event were not significant. Reactor Vessel overpressure evaluation performed for Unit 2 using the Unit 2 Cycle 15 Reload ASME Overpressure and Plant Transient Analysis at 3458 MWT demonstrates compliance with the ASME upset limit of 1375 psig for peak vessel pressure and dome pressure Safety Limit of 1325 psig. The evaluation of the as-found data from the Unit 2 Cycle 15 MSRVs realized a peak reactor vessel pressure of 1347 psig in the vessel lower plenum and a maximum steam dome pressure of 1316 psig. The anticipated transient without scram overpressure analyses performed using the limiting Unit 2 event resulted in a peak vessel pressure of 1474 psig in the vessel lower plenum which demonstrates compliance with the ASME Service level C Limit of 1500 psig. As such, the pressure relief safety objective of the MSRVs was satisfied during the operating cycle.

BFN has previously installed an electronic logic which automatically opens the MSRVs as appropriate during pressurization transients. The electronic logic, although not safety related utilizes high-quality instrumentation that has proven to be very reliable. During a pressure transient event in the relief mode, safety grade pressure sensors actuate the MSRVs. When the relief mode is actuated the setpoint spring preload is removed from the pilot disc, and full differential pressure is then present across the pilot disk. This electronic logic largely negates the impact on safety presented by this condition. Based on the above, TVA concludes that the health and safety of the public was not affected by this event.

**VI. CORRECTIVE ACTIONS**

**A. Immediate Corrective Actions**

All MSRV pilot cartridges were replaced during the Unit 2 Cycle 15 refueling outage. Prior to installation, each of the replacement cartridges demonstrated a lift setpoint within the TS requirements during bench testing.

**B. Corrective Actions to Prevent Recurrence** - The corrective actions are being managed by TVA's corrective action program.

To resolve the setpoint drift problem, BFN installed platinum coated pilot valves in the discs on the thirteen Unit 2 MSRVs. Brunswick and Fermi plants have upgraded to the platinum plated pilot disc which has helped mitigate the corrosion bonding between the pilot discs and improved the setpoint lift values.

**VII. ADDITIONAL INFORMATION**

**A. Failed Components**

None.

**B. PREVIOUS LERS ON SIMILAR EVENTS**

Numerous previous reports on similar events have been made by BFN. BFN plans to implement corrective actions that have been successful at other boiling water reactors, such as the installation of platinum plated pilot disc.

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**C. Additional Information**

Corrective action document for this report is Problem Evaluation Report 175990.

**D. Safety System Functional Failure Consideration:**

This event is not a safety system functional failure according to NEI 99-02.

**E. Scram With Complications Consideration:**

This event was not a complicated scram according to NEI 99-02.

**VIII. COMMITMENTS**

None.