



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

November 24, 2009

10 CFR 50.73

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D. C. 20555-0001

Browns Ferry Nuclear Plant, Unit 2  
Facility Operating Licenses No. DPR-52  
NRC Docket No. 50-260

**Subject: Licensee Event Report 50-260/2009-008**

The enclosed Licensee Event Report (LER) provides details of the Reactor Core Isolation Cooling System being inoperable longer than allowed by the plant's Technical Specifications.

The Tennessee Valley Authority is submitting this report in accordance with 10 CFR 50.73(a)(2)(i)(B), as any operation or condition which was prohibited by the plant's Technical Specifications.

There are no new regulatory 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,

A handwritten signature in black ink, appearing to read 'R. G. West'.

R. G. West  
Vice President

cc: See page 2

JE22  
NRR

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Enclosure  
cc (w/ Enclosure):

NRC Regional Administrator - Region II

NRC Senior Resident Inspector - Browns Ferry Nuclear Plant

**LICENSEE EVENT REPORT (LER)**

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.

**1. FACILITY NAME**  
Browns Ferry Nuclear Plant Unit 2

**2. DOCKET NUMBER**  
05000260

**3. PAGE**  
1 of 5

**4. TITLE:** Reactor Core Isolation Cooling System Inoperable Longer Than Allowed By the Plant's Technical Specifications

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
09	30	2009	2009	008	00	11	24	2009	N/A	N/A
									FACILITY NAME	DOCKET NUMBER
									N/A	N/A

<b>9. OPERATING MODE</b>  3	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §:</b> (Check all that apply)											
	<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)								
<b>10. POWER LEVEL</b>  000	<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 366A</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
X	BN	65	W290	Y					

**14. SUPPLEMENTAL REPORT EXPECTED**

YES (If yes, complete 15. EXPECTED SUBMISSION DATE)  NO

**15. EXPECTED SUBMISSION DATE**

MONTH	DAY	YEAR
N/A	N/A	N/A

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

On September 30, 2009, at approximately 0830 hours Central Daylight Time, Browns Ferry Nuclear Plant (BFN) Site Engineering personnel concluded that during a September 29, 2009, manual reactor scram, the Reactor Core Isolation Cooling (RCIC) system pump failed to inject into the reactor vessel in response to decreasing water level. At the time the conclusion was made, Unit 2 was in Mode 3 with reactor pressure less than 150 psig; thus, the RCIC system was not required to be operable in accordance with the Applicability of Technical Specification (TS) 3.5.3, RCIC System. Consequently, no entry into the associated TS actions was required. Previously, on September 12, 2009, BFN personnel noted that plant data indicated that since August 27, 2009, the output from the Woodward Electric Governor-Magnetic Pickup (EG-M) control box was lower than expected. On September 29, 2009, the Unit 2 RCIC system failed to properly start and inject into the reactor vessel when the Reactor Vessel Low Low, Level 2 (-45 inches) setpoint was reached following a manual reactor scram. Because the RCIC system failed to inject when needed and the governor output had been lower than expected for an extended period of time, TVA has concluded that the RCIC system had been inoperable longer than the TS 3.5.3, Required Action A.2 Completion Time of 14 days. The root cause of this event was a failure to enter a condition adverse to quality into the corrective action program. When the HPCI system was inoperable, it remained available for injection into the reactor pressure vessel except for a total of five minutes. During the time periods that the HPCI system was unavailable, the remaining emergency core cooling systems were available to perform the HPCI system function. Therefore, TVA concludes that there was no significant reduction in the protection of the public by this event.

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

**I. PLANT CONDITION(S)**

At the time of discovery, Unit 2 was in Mode 3 with reactor vessel pressure less than 150 psig following a manual reactor scram. Units 1 and 3 were at 100 percent power and were not affected by the event. Details of the manual reactor scram are discussed in Licensee Event Report 260/2009-007.

**II. DESCRIPTION OF EVENT**

**A. Event:**

On September 30, 2009, at approximately 0830 hours Central Daylight Time (CDT), BFN Site Engineering personnel concluded that during a September 29, 2009, manual reactor scram, the Reactor Core Isolation Cooling (RCIC) [BN] system pump failed to inject into the reactor vessel in response to decreasing water level. At the time the conclusion was made, Unit 2 was in Mode 3 with reactor pressure less than 150 psig; thus, the RCIC system was not required to be operable. The Applicability of Technical Specification 3.5.3, RCIC system, is Mode 1 and Modes 2 and 3 with reactor steam dome pressure greater than 150 psig. Consequently, entry into the associated TS action was not required.

Previously, on September 12, 2009, BFN Engineering personnel noted that since August 27, 2009, the output from Woodward Electric Governor Magnetic-Pickup (EG-M) control box was lower than expected. On September 29, 2009, at 2323 hours CDT, the Unit 2 RCIC system failed to properly start and inject into the reactor vessel when the Reactor Vessel Low Low, Level 2 (-45 inches) setpoint was reached following a manual scram. Because the RCIC system failed to inject when needed and the governor output had been lower than expected for an extended period of time (greater than 14 days), the Tennessee Valley Authority concluded that the RCIC system had been inoperable longer than allowed by the Completion Time of TS 3.5.3 Required Action A.2. TS 3.5.3 Required Action A.2 requires the RCIC system to be restored to operable status within 14 days.

The Tennessee Valley Authority is submitting this report in accordance with 10 CFR 50.73(a)(2)(i)(B) as any operation or condition which was 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:**

September 29, 2009 2323 hours CDT	Unit 2 Operations personnel insert a manual scram, the reactor vessel water level drops below the RCIC system initiation setpoint and the RCIC system fails to inject.
September 30, 2009 0830 hours CDT	Site engineering personnel notified Operations personnel that the RCIC system failed to inject into the reactor vessel.
September 30, 2009 1408 hours CDT	Operations provided NRC with a revised Emergency Notification System (ENS) Report. The initial ENS Report made following the manual

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reactor scram, indicated that the RCIC system actuated as expected.

**D. Other Systems or Secondary Functions Affected**

None.

**E. Method of Discovery**

The failure of the RCIC system to inject was identified during a review of the data from the September 29, 2009, manual reactor scram.

**F. Operator Actions**

None.

**G. Safety System Responses**

None.

**III. CAUSE OF THE EVENT**

**A. Immediate Cause**

The immediate cause of the event was a failed Woodward EG-M control box. Woodward personnel identified an age related failure of a timing capacitor within the EG-M.

**B. Root Cause**

The root cause of this event was a failure to enter a condition adverse to quality into the corrective action program. On September 12, 2009, an Engineering Specialist noted the change in the output of the Woodward EG-M controller and notified the responsible System Engineer. Neither of these individuals entered the issue into the corrective action program.

**C. Contributing Factors**

None.

**IV. ANALYSIS OF THE EVENT**

TVA's investigation found that the Woodward EG-M controller failed to provide an output signal to the governor valve actuator. The Woodward EG-M failed and provided a -8.00 volts DC output signal to the hydraulic actuator, with the system in standby, instead of the normal output of approximately 1.0 volt DC. This resulted in the RCIC system pump steam turbine governor valve going closed and the RCIC system pump never attaining rated conditions; therefore, not injecting into the pressurized reactor pressure vessel. Had this issue been entered into the corrective action program, system operability would have been evaluated in a more timely manner and the failure to inject following the manual reactor scram may have been prevented.

**V. ASSESSMENT OF SAFETY CONSEQUENCES**

The safety consequences of this event were not significant. Although the RCIC system automatically actuates at the same reactor water level as the High Pressure Coolant Injection (HPCI) system [BJ], Level 2 (-45 inches), the RCIC system is not redundant to HPCI system, is not a safety related system, and is not credited for any design basis accident. The RCIC system pump has a designed output of 600 GPM and is designed to operate following reactor pressure vessel

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isolation accompanied by a loss of feedwater flow. The BFN Technical Specifications allowed continued reactor power operation for up to 14 days with an inoperable RCIC system provided the HPCI system is operable. During this time, the HPCI system was operable except for periods when it was inoperable for required testing. When the HPCI system was inoperable, it remained available for injection into the reactor pressure vessel except for a total of five minutes. On September 22, 2009 the HPCI system was unavailable for two minutes and on September 24, 2009 it was unavailable for three minutes. Both cases were for planned transfer of an inverter power supply. During the time periods that the HPCI system was unavailable, the remaining emergency core cooling systems (i.e., the Automatic Depressurization System in combination with the Low Pressure Coolant Injection mode of the Residual Heat Removal System and the Core Spray System) were available to perform the HPCI system function. Therefore, TVA concludes that there was no significant reduction in the protection of the public by this event.

**VI. CORRECTIVE ACTIONS**

**A. Immediate Corrective Actions**

BFN personnel replaced the Woodward EG-M controller and verified the RCIC system operability. The EG-M controller was sent to the vendor for a failure analysis.

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

The individuals involved were counseled. The counseling stressed the importance of entering conditions adverse to quality into the corrective action program.

A stand-down was held with the System Engineering group. The discussion during the stand-down emphasized the importance of trending and monitoring of equipment parameters as well as entering adverse trends into the corrective action program.

**VII. ADDITIONAL INFORMATION**

**A. Failed Components**

Woodward EG-M controller Model Number 8270-849 failed resulting in the inoperability of the RCIC system.

**B. PREVIOUS LERS ON SIMILAR EVENTS**

None.

**C. Additional Information**

Corrective action document for this report is Problem Evaluation Report 203537.

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

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

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**E. Scram With Complications Consideration:**

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

**VIII. COMMITMENTS**

None.