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

February 18, 2009

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

10 CFR 50.73

TENNESSEE VALLEY AUTHORITY - BROWNS FERRY NUCLEAR PLANT (BFN) - UNIT 1 - DOCKET 50-259 - FACILITY OPERATING LICENSE DPR - 33 - LICENSEE EVENT REPORT (LER) 50-259/2007-007-01

The enclosed report provides details of an automatic reactor scram from a Neutron Monitoring Trip Signal. BFN re-investigated the circumstances surrounding the event. The investigation identified a different root cause than originally submitted. Accordingly, TVA is providing Revision 1 to LER 259/2007-007. Revised portions of the LER are identified by a vertical line in the right margin.

TVA is reporting this in accordance with 10 CFR 50.73(a)(2)(iv)(A), as an event that resulted in a manual or automatic actuation of the systems listed in paragraph 10 CFR 50.73(a)(2)(iv)(B) (i.e., Reactor Protection System including reactor scram or trip, and general containment isolation signals affecting containment isolation valves in more than one system). There are no commitments contained in this letter.

Sincerely,

R. G. West
Site Vice President

cc: See page 2

IE22
NRR

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NRC FORM 366 (6-2004) U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

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

APPROVED BY OMB NO. 3150-0104 EXPIRES 06/30/2007

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	2. DOCKET NUMBER	3. PAGE
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4. TITLE: Automatic Reactor Scram From A Neutron Monitoring Trip Signal

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
									None	N/A
08	11	2007	2007	-007-	01	02	18	2009	FACILITY NAME None	DOCKET NUMBER N/A

9. OPERATING MODE: 1

10. POWER LEVEL: 100

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*

	20.2201(b)		20.2203(a)(3)(i)		50.73(a)(2)(i)(C)		50.73(a)(2)(vii)
	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)	X	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)		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	TELEPHONE NUMBER *(Include Area Code)*
Steve Austin, Licensing Engineer, Licensing and Industry Affairs	256-729-2070

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

☐ 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 type written lines)*

On August 11, 2007, at 1751 hours central daylight time (CDT) Unit 1 automatically scrammed from a Neutron Monitoring Average Power Range Monitor (APRM) signal. Just prior to the scram, a Reactor Recirculation system flow sensing line separated from the Recirculation Pump 1B Flow Transmitter (1-FT-068-081B). This resulted in a false indicated recirculation system low flow with a high reactor core thermal power (100 percent) to the Neutron Monitoring system. Based on these conditions, the neutron monitoring system initiated an APRM Simulated Thermal Power Flow Biased Reactor Scram. TVA's causal analysis concluded the root cause of this event was a lack of rigorous worker practices in the use of place keeping and flagging to keep up with the work steps during the Unit 1 recovery activities. This resulted in inadequate assembly of the compression fitting.

TVA is submitting this report in accordance with 10 CFR 50.73(a)(2)(iv)(A), as an event that resulted in a manual or automatic actuation of the systems listed in paragraph 10 CFR 50.73(a)(2)(iv)(B) (i.e., reactor protection system including reactor scram or trip, and general containment isolation signals affecting containment isolation valves in more than one system).

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

I. PLANT CONDITION(S)

Prior to the event, Unit 1 was operating at approximately 100 percent of rated thermal power (RTP) (3458 megawatts thermal). Units 2 and 3 were operating in Mode 1 at 100 percent RTP (3458 megawatts thermal). Units 2 and 3 were unaffected by the event.

II. DESCRIPTION OF EVENT

A. Event:

On August 11, 2007, at 1751 hours central daylight time (CDT) Unit 1 automatically scrammed from a Neutron Monitoring Average Power Range Monitor [IG] (APRM) signal. Just prior to the scram, a Reactor Recirculation [AD] system flow sensing line compression fitting failed and separated from the transmitter (1-FT-068-081B). The failed fitting resulted in a sudden loss of pressure to the common low-side of the four B-loop recirculation flow transmitters. The failure resulted in a false indicated recirculation system low flow with a high reactor core thermal power (100 percent) to the Neutron Monitoring system. Based on these circumstances, the neutron monitoring system initiated an APRM Simulated Thermal Power Flow Biased Reactor Scram.

During the event, all automatic functions resulting from the scram occurred as expected. All of the control rods [AA] inserted. The reactor water level lowered to below level 3, 528 inches, hence; primary containment isolation system (PCIS) [JE] isolations Group 2 (residual heat removal (RHR) system [BO] shutdown cooling), Group 3 (reactor water cleanup (RWCU) system) [CE], Group 6 (ventilation), and Group 8 (traversing incore probe (TIP) [IG] system were received along with the autostart of the control room emergency ventilation (CREV) [VI] system and the three standby gas treatment (SGT) [BH] system trains. The reactor water level remained above level 2, 470 inches; accordingly, no emergency core cooling systems actuated. Reactor water level was recovered and maintained by the feedwater [SJ] and condensate [SG] systems. Reactor pressure was controlled by the main steam bypass valves [JI].

This report is submitted in accordance with 10 CFR 50.73(a)(2)(iv)(A), as an event that resulted in a manual or automatic actuation of the systems listed in paragraph 10 CFR 50.73(a)(2)(iv)(B) (i.e., reactor protection system including reactor scram or trip, and general containment isolation signals affecting containment isolation valves in more than one system).

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

None.

C. Dates and Approximate Times of Major Occurrences:

August 11, 2007 at 1751 hours CDT	Unit 1 received an automatic reactor scram.
August 11, 2007 at 2025 hours CDT	TVA made a four hour non-emergency report per 10 CFR 50.72(b)(2)(iv)(B) and an eight hour non-emergency report per 10 CFR 50.72(b)(3)(iv)(A).

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

None.

E. **Method of Discovery**

The reactor scram was immediately apparent to the control room staff through alarms and indications.

F. **Operator Actions**

Operations personnel responded to the event according to applicable plant procedures. Operations momentarily entered Emergency Operating Instruction, 1-EOI-1, Reactor Pressure Control, and Abnormal Operating Instruction, 1-AOI-100-1, Reactor Scram. The operator actions taken in response to the reactor scram were appropriate. These included the verification that the reactor was shutdown, the expected system isolations had occurred, and restoration of the affected systems to pre scram alignment.

G. **Safety System Responses**

All control rods inserted. The PCIS Group 2 (RHR system shutdown cooling), Group 3 (RWCU system), Group 6 (ventilation), and Group 8 (TIP) isolations were received as expected, due to the lowering of the reactor water level, along with the auto start of the CREV system and the three SGT system trains. Reactor water level was automatically restored with reactor feed water; therefore, emergency core cooling system actuation was not required.

III. CAUSE OF THE EVENT

A. **Immediate Cause**

The immediate cause of the reactor scram was the sense line for the "B" Reactor Recirculation System [AD] Flow Transmitter, 1-FT-068-081B, becoming separated from the transmitter resulting in an indicated low flow signal to the neutron monitoring system. With the indicated low flow and the reactor at 100 percent power, the neutron monitoring system [JD] initiated an APRM [JC] Simulated Thermal Power Flow Based Reactor Scram.

B. **Root Cause**

TVA's causal analysis concluded the root cause of this event was a lack of rigorous worker practices in the use of place keeping and flagging to keep up with the work steps during the Unit 1 recovery activities. This resulted in inadequate assembly of the compression fitting. Additionally, there was inadequate verification of the assembly of the compression fitting. The individual performing the verification was not present during the assembly of the compression fitting nor did the verifier dissemble the fitting to perform a visual inspection to determine proper engagement.

C. **Contributing Factors**

None.

IV. ANALYSIS OF THE EVENT

The compression fitting that failed leading to this event was installed as part of Unit 1 recovery activities. The manufactures instructions for compression fitting installation include insert tubing into the fitting until the tube bottoms out. Tighten the nut finger tight; then, wrench-tighten the nut

one and a quarter turns to seat the ferrule on the sense line. TVA postulates that those involved in the refurbishment of 1-FT-068-081B, the craft personnel, the second party verifier, and the Quality Control Inspectors failed to perform proper self-checking activities to ensure all of the attributes for the assembly of the compression fitting on the flow transmitter were addressed.

The instrument sense line was pressure tested on several occasions including hydrostatic pressure testing activities performed on March 19, 2007, and the reactor pressure vessel hydro performed on March 28, 2007. Neither of these activities detected the error. TVA postulates that the physical arrangement of the sense line held the tubing in place until it failed on August 11, 2007.

V. ASSESSMENT OF SAFETY CONSEQUENCES

The safety consequences of this event were not significant. The reactor scram was not complicated. All safety systems operated as required. PCIS groups 2, 3, 6, and 8 isolations were as expected. The reactor water level lowered to level 3, but remained above level 2; therefore, ECCS systems did not actuate. Reactor water level was recovered and maintained by the reactor feed pumps.

Reactor scram from a turbine trip from 100% power is a transient for which BFN is analyzed. Therefore, TVA concludes that the health and safety of the public was not affected by this event.

VI. CORRECTIVE ACTIONS

A. Immediate Corrective Actions

Operations personnel placed the reactor in a stable condition according to plant procedures.

The instrument panels in the Unit 1 Reactor Building were inspected to identify leakage or visual fitting deficiencies. Blotter paper was placed under the instrument panels in the Unit 1 Reactor Building and monitored for leakage. Any leaks identified were corrected.

B. Corrective Actions to Prevent Recurrence [1]

TVA revised MAI-4.4A. The instruction requires that second party verifiers physically remove the compression fitting nut following installation to verify proper engagement of the ferrule. TVA revised the initial tube fitting training to support the changes to MAI-4.4.

During the recent Unit 1 cycle 7 refueling outage, the Feedwater system [SJ], Residual Heat Removal system [BP] Recirculation system [AD], and Primary Containment were inspected for compression fitting deficiencies. All identified deficiencies were corrected.

VII. ADDITIONAL INFORMATION

A. Failed Components

None.

B. Previous LERs on Similar Events

LER 259/2007-005 discusses a reactor scram that was the result of a false moisture separator tank high level signal. Although the root cause of this event was the sizing of the Moisture Separator Level Control Dump Valve, a leak in a compression fitting initiated the sequence of events that lead to the reactor scram. TVA's corrective actions for the event initiator were aimed

[1] TVA does not consider these corrective actions regulatory requirements. The completion of these actions is tracked in TVA's Corrective Action Program.

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at the balance of plant moisture separator level controllers. At the time of the scram, there was no indication that similar issues existed in the reactor recirculation system instrumentation discussed in this LER. Therefore, the corrective actions taken in LER 259/2007-005 would not prevent this event.

C. **Additional Information**

Corrective action document for the reactor scram is PER 128756.

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

This event is not considered a safety system functional failure in accordance with NEI 99-02.

E. **Scram With Complications Consideration:**

This event did not result in a complicated scram in accordance with NEI 99-02.

VIII. COMMITMENTS

None.