



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

July 21, 2011

10 CFR 50.73

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

Browns Ferry Nuclear Plant, Unit 3
Facility Operating License No. DPR-68
NRC Docket No. 50-296

Subject: Licensee Event Report 50-296/2011-002-00

On April 27, 2011, severe weather in the Tennessee Valley Service Area caused grid instability and the loss of all 500-kV offsite power sources which resulted in a scram of all three Browns Ferry Nuclear Plant (BFN) units. This resulted in an extended forced outage for all three BFN units until the 500-kV lines could be restored. On May 22, 2011, with Unit 3 in Cold Shutdown during surveillance testing, Unit 3 received a valid Reactor Protection System (RPS) actuation signal from both channels of the RPS due to Scram Discharge Volume high water level.

The Tennessee Valley Authority (TVA) is submitting this report in accordance with 10 CFR 50.73(a)(2)(iv)(A), as any event or condition that resulted in manual or automatic actuation of any of the systems listed in 10 CFR 50.73(a)(2)(iv)(B).

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There are no new regulatory commitments contained in this letter. Should you have any questions concerning this submittal, please contact J. E. Emens, Jr., Nuclear Site Licensing Manager, at (256) 729-2636.

Respectfully,



K. J. Polson
Vice President

Enclosure: Licensee Event Report 296/2011-002-00 - Reactor Scram Due to Scram
Discharge Volume High Water Level

cc (w/ Enclosure):

NRC Regional Administrator - Region II
NRC Senior Resident Inspector - Browns Ferry Nuclear Plant

Enclosure

**Browns Ferry Nuclear Plant
Unit 3**

Licensee Event Report 296/2011-002-00

Reactor Scram Due to Scram Discharge Volume High Water Level

See Attached

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 FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@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 (BFN) Unit 3	2. DOCKET NUMBER 05000296	3. PAGE 1 OF 5
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4. TITLE
Reactor Scram Due to Scram Discharge Volume High Water Level

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
05	22	2011	2011	- 002	- 00	07	21	2011	N/A	05000
									N/A	05000

9. OPERATING MODE 4	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: <i>(Check all that apply)</i>
10. POWER LEVEL 000	<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 checked="" 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 type="checkbox"/> 50.73(a)(2)(i)(B) <input type="checkbox"/> 50.73(a)(2)(v)(D) <input type="checkbox"/> OTHER <div style="font-size: small; margin-top: 5px;">Specify in Abstract below or in NRC Form 366A</div>

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME James W. Davenport, Licensing Engineer	TELEPHONE NUMBER (Include Area Code) 256-729-2690
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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 <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	15. EXPECTED SUBMISSION DATE						
	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th>MONTH</th> <th>DAY</th> <th>YEAR</th> </tr> <tr> <td style="text-align: center;">N/A</td> <td style="text-align: center;">N/A</td> <td style="text-align: center;">N/A</td> </tr> </table>	MONTH	DAY	YEAR	N/A	N/A	N/A
MONTH	DAY	YEAR					
N/A	N/A	N/A					

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

On May 22, 2011, at 17:37 hours Central Daylight Time (CDT), with Browns Ferry Nuclear Plant (BFN) Unit 3 in Cold Shutdown and surveillance testing in progress, Unit 3 received a valid Reactor Protection System (RPS) actuation signal from both channels of the RPS due to Scram Discharge Volume (SDV) high water level. The scram occurred as Maintenance personnel were performing Intermediate Range Monitor (IRM) correlation for range 6 to 7. Maintenance personnel were measuring voltage during the reconnection of a high voltage cable to IRM G channel. A spike occurred on IRMs C and D channels indicating an invalid (safety function had already been completed) full reactor scram. After diagnosing the cause of the IRM scram, Operations personnel reset the scram and immediately received a valid RPS scram signal due to Scram Discharge Volume (SDV) high water level.

The cause of the event was that Operations personnel did not place the SDV high water level switch in bypass as required by procedure before resetting the first RPS scram. Thus, as the initial scram was being reset, the SDV filled with water causing the second scram.

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NARRATIVE

I. PLANT CONDITION(S)

On April 27, 2011, severe weather in the Tennessee Valley Service Area caused grid instability and the loss of all 500-kV offsite power sources that resulted in a scram of all three Browns Ferry Nuclear Plant (BFN) units. This resulted in an extended forced outage for all three BFN units until the 500-kV lines could be restored. At the time of the event being reported [May 22, 2011, at 17:37 hours Central Daylight Time (CDT)], BFN Unit 3 was in Mode 4 (Cold Shutdown) with power supplied from qualified 161-kV offsite power sources.

II. DESCRIPTION OF EVENT

A. Event:

On May 22, 2011, Unit 3 was in Mode 4 (Cold Shutdown) in an extended forced outage due to the loss of all 500kV offsite power sources. Surveillance testing was being performed in support of returning the unit to power operations. At 17:35 hours CDT, Maintenance personnel were performing Intermediate Range Monitor (IRM) correlation for range 6 to 7. The IRM measures neutron flux, and correlation of the two different amplifier circuits within the IRM ensures a smooth transition when switching ranges during reactor power increases. Maintenance personnel were measuring voltage during the reconnection of a high voltage cable to IRM G channel. A spike occurred on IRMs C and D channels indicating an invalid (safety function had already been completed) full reactor scram. At 17:37 hours CDT, after diagnosing the cause of the IRM scram, Operations personnel reset the scram and immediately received a valid Reactor Protection System (RPS) [JC] scram signal due to Scram Discharge Volume (SDV) high water level. The scram occurred because Operations personnel did not place the SDV high water level switch in bypass as required by Abnormal Operating Instruction (AOI) 3-AOI-100-1, Reactor Scram, before resetting the first RPS scram.

As previously stated, the unit was in Cold Shutdown and all control rods were already fully inserted prior to the scram. The reactor water level remained within the prescribed band of 70 to 90 inches, with the highest level of 85 inches recorded. There was no impact to plant operations as a result of this scram.

The scram was not part of a preplanned sequence; therefore, the Tennessee Valley Authority (TVA) is submitting this report in accordance with 10 CFR 50.73(a)(2)(iv)(A), as any event or condition that resulted in manual or automatic actuation of any of the systems listed in 10 CFR 50.73(a)(2)(iv)(B).

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

None

C. Dates and Approximate Times of Major Occurrences:

April 27, 2011, at 16:36 hours CDT

Loss of all 500-kV offsite power sources resulting in a scram of all three BFN units and an extended forced outage until the 500-kV lines could be restored.

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May 22, 2011, at 17:35 hours CDT

While performing IRM correlation for range 6 to 7 by Maintenance personnel, the RPS initiated an invalid reactor scram.

May 22, 2011, at 17:37 hours CDT

Operations personnel entered 3-AOI-100-1, and attempted to reset the RPS scram signal and received a valid scram actuation by both RPS channels due to SDV high water level.

May 22, 2011, at 17:37 hours CDT

Operations personnel re-entered 3-AOI-100-1 and reset the scram signal in accordance with the AOI.

D. Other Systems or Secondary Functions Affected:

None

E. Method of Discovery:

The event was immediately self revealing to Operations personnel.

F. Operator Actions:

Operations personnel re-entered 3-AOI-100-1 and reset the scram signal in accordance with the AOI.

G. Safety System Responses:

The safety systems (RPS and SDV) responded as designed.

III. CAUSE OF THE EVENT

A. Immediate Cause:

The immediate cause of the event was RPS actuation due to SDV high water level.

B. Root / Apparent Cause:

The cause of this event was that Operations personnel did not place the SDV high water level switch in bypass as required by 3-AOI-100-1 before resetting the first RPS scram.

IV. ANALYSIS OF THE EVENT

Maintenance personnel were measuring voltage during the reconnection of a high voltage cable to IRM G channel. A spike occurred on IRMs C and D channels indicating an invalid (safety function had already been completed) full reactor scram. After diagnosing the cause of the IRM scram, Operations personnel reset the scram and immediately received a valid RPS scram signal due to SDV high water level.

The RPS initiates a reactor scram when one or more monitored parameters exceed their specified limits. This preserves the integrity of both the fuel cladding and Reactor Coolant System and minimizes the energy that must be absorbed following a loss of coolant accident. The operability of the RPS is dependent on the operability of the individual

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instrumentation channel functions specified in the Technical Specifications. SDV is one of the RPS channel functions. The SDV receives the water displaced by the motion of the Control Rod Drive pistons during a reactor scram. Should this volume fill to a point where there is insufficient volume to accept the displaced water, control rod insertion would be hindered. Therefore, a reactor scram is initiated while the remaining free volume is still sufficient to accommodate the water from a full core scram. The SDV function of RPS operated as designed. Operations personnel re-entered 3-AOI-100-1 and reset the scram signal, within seconds, in accordance with the AOI. The Unit 3 Reactor water level remained within the prescribed band of 70 to 90 inches, with the highest level of 85 inches recorded.

V. ASSESSMENT OF SAFETY CONSEQUENCES

The RPS and SDV both operated in accordance with the plant design. At the time of this event, BFN Unit 3 was in Mode 4 (Cold Shutdown) with all control rods fully inserted. The reactor scram from high SDV water level is part of the BFN design, and the occurrence of this event from at-power conditions has been analyzed.

Based on the above discussion, there was no adverse safety impact as a result of this event. Thus, there was no effect on the health and safety of the public.

VI. CORRECTIVE ACTIONS

Corrective actions are being managed within TVA's Corrective Action Program.

A. Immediate Corrective Actions:

- Operations personnel re-entered 3-AOI-100-1, and correctly reset the scram signal in accordance with the AOI.
- The oncoming Operations crew reviewed 3-AOI-100-1 for resetting of scrams in outage conditions.

B. Corrective Actions to Prevent Recurrence:

The specific corrective action for this event is the following.

- Operations personnel involved were disciplined in accordance with appropriate TVA administrative procedures.

VII. ADDITIONAL INFORMATION

A. Failed Components:

None

B. Previous LERS or Similar Events:

A search of BFN LERs from January 1, 2006 to the present identified two similar events. LER 50-260/2005-003-00, Reactor Protection System Actuation from Scram Discharge Volume High Level While Shutdown. The cause of this LER was inadequate communication between Operations personnel and Maintenance personnel with regard

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to test equipment status. The corrective actions included that the essential nature of clear, unambiguous communication will be reinforced to site personnel involved in testing activities.

Also, LER 50-260/2009-006-01, Automatic Reactor Protection System Scram While Shutdown. The cause of this LER was that Control Room Operators were unaware of SDV system configuration and work in progress. The corrective actions for this event included performance of a training needs analysis of the event for possible inclusion into Licensed Operator Requalification training.

C. Additional Information:

The corrective action document for this report is PER 373365 which was closed to PER 335574 written to address a generic degradation of BFN Operator performance standards.

D. Safety System Functional Failure Consideration:

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

E. Scram With Complications Consideration:

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

VIII. COMMITMENTS

None