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May 23, 2002

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 3 - DOCKET 50-296 - FACILITY OPERATING LICENSE  
DPR - 68 - LICENSEE EVENT REPORT (LER) 50-296/2002-002-00**

The enclosed report provides details concerning an unplanned event in which two emergency diesel generators automatically started due to a de-energized condition on their respective shutdown boards during a Unit 3 Cycle 10 refueling outage clearance process.

This condition is reportable in accordance with 10 CFR 50.73 (a)(2)(iv)(A) as an event or condition that resulted in a manual or automatic actuation of a system listed in 10 CFR 50.73(a)(2)(iv)(B). There are no commitments contained in this letter.

Sincerely,

ORIGINAL SIGNED BY:

Ashok S. Bhatnagar

cc: See page 2

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Enclosure

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Enclosure

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s:lic/submit/lers/LER 296 2002-02

<b>NRC FORM 366</b> (6-1998)				<b>U.S. NUCLEAR REGULATORY COMMISSION</b>				<b>APPROVED BY OMB NO. 3150-0104</b> EXPIRES 06/30/2001 Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0104), Office of Management and Budget, Washington, DC 20503. If 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>LICENSEE EVENT REPORT (LER)</b>  (See reverse for required number of digits/characters for each block)											
<b>FACILITY NAME (1)</b> Browns Ferry Nuclear Plant						<b>DOCKET NUMBER (2)</b> 05000296		<b>PAGE (3)</b> 1 of 6			
<b>TITLE (4)</b> An unplanned auto-start of two emergency diesel generators due to personnel error during an equipment clearance process.											
<b>EVENT DATE (5)</b>			<b>LER NUMBER (6)</b>			<b>REPORT DATE (7)</b>			<b>OTHER FACILITIES INVOLVED (8)</b>		
MONTH	DAY	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER		
03	26	2002	2002 --- 002 --- 000		05	23	2002	NA	DOCKET NUMBER		
<b>OPERATING MODE (9)</b>		4	20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)		
<b>POWER LEVEL (10)</b>		000	20.2203(a)(1)		20.2203(a)(3)(i)		50.73(a)(2)(ii)		50.73(a)(2)(x)		
			20.2203(a)(2)(i)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71		
			20.2203(a)(2)(ii)		20.2203(a)(4)		X	50.73(a)(2)(iv)(A)		OTHER	
			20.2203(a)(2)(iii)		50.36(c)(1)			50.73(a)(2)(v)		Specify in Abstract below or in NRC Form 366A	
			20.2203(a)(2)(iv)		50.36(c)(2)			50.73(a)(2)(vii)			
<b>LICENSEE CONTACT FOR THIS LER (12)</b>											
<b>NAME</b> James E. Wallace, Jr. Licensing Engineer								<b>TELEPHONE NUMBER (Include Area Code)</b> 256.729.7874			
<b>COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)</b>											
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	
<b>SUPPLEMENTAL REPORT EXPECTED (14)</b>						<b>EXPECTED SUBMISSION DATE (15)</b>		MONTH	DAY	YEAR	
<b>YES</b> (If yes, complete EXPECTED SUBMISSION DATE).				X	<b>NO</b>						
<b>ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)</b>  On March 26, 2002, at 1752 hours, while installing safety grounds to the 3B 4KV Unit Board during the Unit 3 Cycle 10 refueling outage, an electrician inadvertently caused an electric arc flashover when a safety ground connecting rod was positioned too close to an energized breaker high-side stab. The electric arc flashover resulted in de-energizing the Unit Board. Consequently, this de-energized two 4KV shutdown boards causing two emergency diesel generators to auto-start .  The root cause of the event was personnel error due to inattention to detail and failure to adequately self-check. Corrective actions include: (1) Training was given to Electrical Maintenance personnel on the proper methodology to apply safety grounds, (2) A TVA policy/ procedure will be developed for safety ground installations, (3) Training will be developed and conducted on installation of safety grounds of medium voltage compartments, and (4) As appropriate, test carts will be used to reduce the potential for inadvertent electric arc flashover.  This condition is reportable in accordance with 10 CFR 50.73 (a)(2)(iv)(A) as an event or condition that resulted in a manual or automatic actuation of a system listed in 10 CFR 50.73(a)(2)(iv)(B).											

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

**I. PLANT CONDITION(S)**

At the time of the event, Unit 3 was in Mode 4 for a planned refueling outage with moderator temperature of about 188 degrees Fahrenheit. The RHR pump 3B was in shutdown cooling with both recirculation pumps secured. Unit 2 was in Mode 1 at 100 percent reactor power, approximately 3458 megawatts thermal. Unit 1 was shutdown and defueled.

**II. DESCRIPTION OF EVENT**

**A. Event:**

On March 26, 2002, at approximately 1400 hours, Maintenance Electrical personnel (3 utility and 1 contractor, all non-licensed) began to install safety grounds for clearance 3-057-0001 on the Main Generator and turbine breakers to support Unit 3, Cycle 10 outage activities. This clearance involved 25 safety ground installations

At 1730 hours, after the electricians had successfully installed safety grounds on four electric breakers and the generator potential transformers, they began the safety ground installation for the 3B Unit Board breaker (1314) [BKR]. The breaker was racked out fully and removed from the cubicle by Operations personnel (utility, non-licensed). Three separate safety grounds were clamped to a grounding strap on the floor of the breaker cubicle. The other ends of the safety grounds were attached to connecting rods and were placed on the breaker which was positioned 2 feet outside of the breaker cubicle. These connecting rods were to be attached to the three load-side stabs inside the cubicle. Using a Detex Neon Voltage detector, one of the electricians confirmed which stabs were energized with high voltage by observing that the bulb on the detector lit when contact was made with the energized high-side stabs. Then the electrician confirmed the load-side stabs were not energized by observing that the bulb on the detector did not light when contact was made with the load-side stabs. The electrician then re-checked the energized high-side again and set the detector aside.

At 1752 hours, the electrician lifted one of the safety grounds off the disengaged breaker, turned, and walked toward the rear of the breaker cubicle. At that time, the electrician inadvertently caused an electric arc flashover when the safety ground was positioned too close to one of the energized high-side stabs instead of a load-side stab. The flashover resulted in the de-energizing of the 3B 4 KV Unit Board due to a C phase differential current lockout. Consequently, this de-energized two 4 KV shutdown boards (3EC and 3ED) [EB] causing two (3C and 3D) emergency diesel generators (EDGs) [EK] to auto-start and their output breakers to close, re-energizing their respective shutdown boards.

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With the loss of the 3C 4KV shutdown board, the RPS Bus B [JC] was de-energized. This caused a half scram and the expected automatic full or partial actuations or isolations of the following PCIS [JM] systems occurred:

- PCIS group 1, Main Steam Isolation Valves (MSIV)[SB].
- PCIS group 2, Shutdown Cooling mode of the Loop II Residual Heat Removal (RHR) pump 3B [BO]; drywell floor drain isolation valves; drywell equipment drain isolation valves [WP].
- PCIS group 3, Reactor Water Cleanup (RWCU) [CE] system.
- PCIS group 6, primary containment purge and ventilation [JM], Unit 3 reactor zone ventilation [VB]; Units 1, 2, and 3 refuel zone ventilation [VA]; Standby Gas Treatment system [BH]; Control Room Emergency Ventilation system [VI].
- PCIS group 8, Traversing Incore Probe (TIP) [IG].

The 3B Unit Board was secured for investigation. At 1802 hours, Operations personnel returned 3B RPS to service and reset PCIS. At 1807 hours, 3D RHR pump was placed into service for shutdown cooling. At 1815 hours, A, B, and C SGT trains were secured. At 2320 hours, the 3B Unit Board was tagged out to permit disassembly and inspection for extent of damage.

On March 27, 2002, at 1622 hours, the 3B 4KV Unit Board was energized through its alternate feeder breaker. At 1749 hours, the 3C EDG was returned to standby. At 1831 hours, the 3D EDG was returned to standby.

This condition is reportable in accordance with 10 CFR 50.73 (a)(2)(iv)(A) as an event or condition that resulted in a manual or automatic actuation of a system 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:**

March 26, 2002, at 1400 hours, CST	Electricians began to install 25 safety grounds.
March 26, 2002, at 1730 hours, CST	Electricians began to install safety grounds in the 3B Unit Board breaker (1314).
March 26, 2002, at 1752 hours, CST	Electrician inadvertently caused an electric arc flashover which de-energized the 3B 4KV Unit Board. Consequently, two EDGs auto-started.

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March 26, 2002, at 1802 hours, CST

Operations personnel began to return affected equipment back to service.

March 27, 2002, at 1622 hours, CST

The 3B Unit Board was energized by its alternate feeder breaker.

March 27, 2002, at 1749 hours, CST

The 3C EDG was returned to standby.

March 27, 2002, at 1831 hours, CST

The 3D EDG was returned to standby.

## D. Other Systems or Secondary Functions Affected

Unit 3 shutdown cooling isolated as expected and was promptly returned to service by Operators.

## E. Method of Discovery

This condition was discovered when the Unit Operator (utility, licensed) in the control room received indications and alarms [ALM] associated with the loss of the 3B 4KV Unit Board.

## F. Operator Actions

Operator actions taken during this event were appropriate.

## G. Safety System Responses

All safety systems responded as designed.

## III. CAUSE OF THE EVENT

### A. Immediate Cause

A de-energized condition on the 3EC and 3ED shutdown boards due to the de-energized 3B Unit Board resulted in the EDGs to auto-start.

### B. Root Cause

The root cause of this event was a result of personnel error in that there was inattention to detail and failure to adequately self-check. Even though successfully completing safety ground installations (12) on four other similar breakers, the electrician did not maintain adequate distance from energized equipment when applying grounds causing the electric arc flashover.

### C. Contributing Factors

None.

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**TEXT** (If more space is required, use additional copies of NRC Form 366A) (17)**IV. ANALYSIS OF THE EVENT**

On March 26, 2002, safety grounds were scheduled to be attached to several load-side stabs to support a clearance process for outage activities. Operations was responsible for disengaging the breaker from its cubicle. The electricians were responsible for installing the safety grounds on the load-side stabs. At 1730 hours, after Operations had removed the 3B Unit Board breaker from its cubicle.

The electricians began the installation of a safety ground when an electric arc flashover occurred. The flashover was the result of positioning a safety ground too close to the energized high-side stabs.

The flashover caused the Unit Board to de-energize resulting in a de-energizing two 4 KV shutdown boards. Consequently, the associated EDGs auto-started. The cause of the event was personnel error, namely, inattention to detail and failure to adequately self-check when a safety ground was positioned too close to the energized high-side stabs.

Power to the shutdown boards is normally supplied from the appropriate 4KV Unit Boards. If necessary, power to the shutdown boards is supplied from the EDGs. In this event, it was necessary to supply the shutdown board's power from the EDGs. The EDGs functioned as designed. Operator actions were in accordance with plant procedures. All expected isolations and actuations occurred as designed.

**V. Assessment of Safety Consequences**

The response of the plant to the loss of 3B 4KV Unit board was as expected and designed. Loop 2 of RHR was in shutdown cooling at the time of the event. Shutdown cooling isolated as expected in response to loss of power to RPS Bus B.

The purpose of Shutdown Cooling is to remove decay heat necessary to achieve and maintain the reactor in COLD condition. In this event, the plant was in a COLD SHUTDOWN condition, the containment was open and the primary system was still intact. Shutdown cooling tripped and isolated as designed on loss of power and was promptly placed back in service manually as designed. Although decay heat removal was temporarily interrupted, the function was available throughout the event using onsite power sources.

Had onsite power (EDGs 3C and 3D) failed, the RPV would have pressurized and excess energy would have been retained in the primary system until another loop of RHR shutdown cooling could be established. The Torus and Safety Relief Valves were also available to establish a decay heat removal path using suppression pool cooling had the vessel pressurized.

Primary containment was not established at the time of the event nor was it required by Technical Specifications at any time during the event. Based on the fact that all systems operated as designed, there was no loss of safety function, and all technical specification requirements were met, this event did not adversely affect the health and safety of the public.

**VI. CORRECTIVE ACTIONS****A. Immediate Corrective Actions**



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Operations acknowledged associated alarms and reset RPS and PCIS. Appropriate AOIs were entered. The affected equipment was returned to service/standby.

**B. Corrective Actions to Prevent Recurrence** <sup>1</sup>

Corrective actions to preclude recurrence include: (1) Training was given to Electrical Maintenance personnel on the proper methodology to apply safety grounds, (2) A TVA policy/procedure will be developed for safety ground installations, (3) Training will be developed and conducted on installation of safety grounds of medium voltage compartments, and (4) As appropriate, test carts will be used to reduce inadvertent electric arc flashover.

**VII. ADDITIONAL INFORMATION****A. Failed Components**

None.

**B. Previous LERs on Similar Events**

There have been several LERs due to personnel error in which one or more EDGs were inadvertently started. However, no previous events were identified that were caused by improper installation of grounds. Therefore, no previous LER corrective actions would have precluded this event.

**C. Additional Information**

None.

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

This event is not considered a safety system functional failure in accordance with NEI 99-02 in that it did not prevent the fulfillment of safety functions of structures or safety systems that were needed.

**VIII. COMMITMENTS**

None.

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<sup>1</sup> TVA does not consider these corrective actions as regulatory commitments. The completion of these items will be tracked in TVA's Corrective Action Program.

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**FAILURE CONTINUATION**

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**COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)**

[illegible]