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CALVERT CLIFFS
NUCLEAR POWER PLANT

March 20, 2014

U.S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit No. 1; Docket No. 50-317; License No. DPR 53
Licensee Event Report 2014-001, Revision 00
Reactor Trip Due to Turbine Control System Reboot

The attached report is being sent to you as required by 10 CFR 50.73.

There are no regulatory commitments contained in this correspondence.

Should you have questions regarding this report, please contact Mr. Douglas E. Lauver at (410) 495-5219.

Very truly yours,

Mark D. Flaherty
Plant General Manager

MDF/CAN/bjd

Attachment: As stated

cc: N. S. Morgan, NRC
W. M. Dean, NRC

Resident Inspector, NRC
S. Gray, DNR

JEZZ
NRR

LICENSEE EVENT REPORT (LER)

(See Page 2 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 FOIA, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollections.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.

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4. TITLE
Reactor Trip Due to Turbine Control System Reboot

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
01	21	2014	2014	- 001 -	00	03	20	2014	FACILITY NAME	DOCKET NUMBER
										05000
										05000

9. OPERATING MODE **11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFRs:** *(Check all that apply)*

1	<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)
100	<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"/> 50.73(a)(2)(vii)
	<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)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME C. A. Neyman, Senior Engineering Analyst	TELEPHONE NUMBER (Include Area Code) 410-495-3507
-----------------------------------------------------------	------------------------------------------------------

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	TA	TG	G080	Y					

14. SUPPLEMENTAL REPORT EXPECTED <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	15. EXPECTED SUBMISSION DATE MONTH: DAY: YEAR:
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ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On January 21, 2014, at 9:25 p.m., Unit 1 experienced an automatic reactor trip from 100 percent power. The reactor trip occurred when 13 kV Service Bus 21 deenergized due to a ground fault on feeder breaker 252-2104. The loss of the service bus caused a loss of power to safety-related 4 kV Bus 14, which caused an automatic start of the 1B Emergency Diesel Generator to power 4 kV Bus 14. When the 1B Emergency Diesel Generator repowered 4 kV Bus 14, the resultant voltage spike caused the main turbine controls to reboot. This deenergized the electrical trip device solenoids, depressurized the emergency trip supply header, and initiated turbine control valve closure. During this time, the turbine controls could not communicate a trip signal to the Reactor Protective System and the Unit 1 reactor subsequently tripped on high reactor coolant system pressure.

The root cause was determined to be an electrical design vulnerability not anticipated in the original design, where a voltage spike can result in turbine controls rebooting. No actions were required to return systems to pre-event normal status. There have been no recent similar events.

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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 FOIA, Privacy and Information Collections Branch (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.

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NARRATIVE

I. DESCRIPTION OF EVENT:

A. PRE-EVENT PLANT CONDITIONS:

Unit 1 was operating at 100 percent of rated thermal power on January 21, 2014, prior to the subject event.

B. EVENT:

On January 21, 2014, at 9:25 p.m., Calvert Cliffs Nuclear Power Plant Unit 1 experienced an automatic reactor trip from 100 percent power. At that time, Unit 2 experienced a reactor trip caused by loss of power to 13 kV Service Bus 21. Due to the normal electrical alignment, this caused the loss of power to 4kV Bus 14 and subsequent automatic start of 1B Emergency Diesel Generator (EDG). When the 1B EDG repowered 4 kV Bus 14, the resultant voltage spike, which is normal once loads are added to the EDG, caused the main turbine controls to reboot. This deenergized the electrical trip device solenoids, depressurized the emergency trip supply header, and initiated turbine control valve closure. During this time, the turbine controls could not communicate a trip signal to the Reactor Protective System and the Unit 1 reactor subsequently tripped on high Reactor Coolant System (RCS) pressure. Main feedwater continued to operate during the scram response.

Following the reactor trip, the unit transitioned into an unscheduled outage.

Unit 2 experienced a reactor trip when 13 kV Service Bus 21 deenergized. Details of that event will be documented in a separate Licensee Event Report (LER 318/2014-001).

C. INOPERABLE STRUCTURES, COMPONENTS, OR SYSTEMS THAT CONTRIBUTED TO THE EVENT:

There were no inoperable structures, components, or systems that contributed to the event.

D. DATES AND APPROXIMATE TIMES OF MAJOR OCCURRENCES:

The reactor trip occurred on January 21, 2014, at 9:25 p.m.

Operators implemented Emergency Operating Procedure (EOP)-0, Post-Trip Immediate Actions, and performed post-trip immediate actions.

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Operators entered Technical Specification 3.8.1 condition A for loss of one of two offsite power sources.

At 9:44 p.m., operators implemented EOP-1, Reactor Trip, to perform post-trip recovery actions.

At approximately 10:30 p.m., operators paralleled the 1B EDG to off-site power. Power to 4 kV Bus 14 was now being supplied by an alternate feeder.

On January 22 at 0:33 a.m., the Nuclear Regulatory Commission was notified.

At 1:06 a.m., operators implemented Operating Procedure-4, Plant Shutdown from Power Operation to Hot Standby.

On January 24 at 8:47 p.m., 13 kV Service Bus 21 was reenergized.

At 9:25 p.m., operators entered Technical Specification 3.8.1 condition J for failure to meet the 72 hour requirement to exit Technical Specification 3.8.1 condition A.

At 9:58 p.m., operators exited Technical Specification 3.8.1 conditions A and J for loss of one offsite power source. Total elapsed time of inoperability was 72 hours and 33 minutes.

E. OTHER SYSTEMS OR SECONDARY FUNCTIONS AFFECTED:

Letdown flow in the Chemical and Volume Control System was lost due to the loss of power. It was later restored using EOP-1.

As expected for this event, pressure in the RCS reached the set point for actuation of the pressurizer power operated relief valves. Both valves opened momentarily to control RCS pressure.

F. METHOD OF DISCOVERY:

The event was self-revealing.

G. MAJOR OPERATOR ACTION:

None

H. SAFETY SYSTEM RESPONSES:

The Reactor Protective System and Emergency AC Power Systems operated as designed. There were no Safety System Functional Failures.

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II. CAUSE OF EVENT:

The event is documented in station condition report number CR-2014-000616. The root cause was determined to be an electrical design vulnerability not anticipated in the original design, where a voltage spike can result in turbine controls rebooting. This is a protective design characteristic of the turbine control system.

III. ANALYSIS OF EVENT:

The event resulted in valid actuations of the Reactor Protective System and the 1B EDG. The actuations were not part of a pre-planned sequence during testing or reactor operation. Therefore, the event is reportable in accordance with 10 CFR 50.73(a)(2)(iv)(A). Immediate notification of the event (Event Number 49754) was made on January 22, 2014 at 00:33 a.m. in accordance with 10 CFR 50.72(b)(2)(iv)(B) and 10 CFR 50.72(b)(3)(iv)(A).

Inoperability of one off-site power source occurred at the time the ground fault developed on 13 kV Service Bus 21. The power source remained inoperable for 72 hours and 33 minutes. During this time, off-site power continued to be provided by 13 kV Service Bus 11.

The Nuclear Regulatory Commission NRC Performance Indicator for Unplanned Scrams per 7,000 critical hours is projected to increase to approximately 0.8 and remain green.

This event did not result in any actual nuclear safety consequences. The loss of load event is analyzed in Section 14.5 of the Calvert Cliffs' Updated Final Safety Analysis Report. The most limiting Loss of Load event is a turbine trip without a concurrent reactor trip or an inadvertent closure of the turbine stop valves at hot full power. In the event described in Section 14.5, no credit is allowed for the steam dump and bypass system, which requires operation of the steam generator safety valves for RCS heat removal. In the January 21, 2014 event, the steam dump and bypass system operated to control RCS temperature. The event is bounded by the Section 14.5 safety analysis. An estimated conditional core damage probability of 3.5E-06 was calculated for this event.

IV. CORRECTIVE ACTIONS:

A. ACTION TO RETURN AFFECTED SYSTEMS TO PRE-EVENT NORMAL STATUS:

1. No actions were required to return systems to pre-event normal status.

B. ACTION TAKEN OR PLANNED TO PREVENT RECURRENCE:

1. A modification has been implemented to protect the main turbine Mark VI control system from voltage perturbations resulting from loading the 4 kV Bus 14 from the 1B EDG.

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V. ADDITIONAL INFORMATION:

A. FAILED COMPONENTS:

The main turbine Mark VI control system was manufactured by General Electric Corporation (EPIX Identification Number G080).

B. PREVIOUS LERS ON SIMILAR EVENTS:

At Calvert Cliffs, there have been no recent similar events involving a reactor trip caused by a reboot of the main turbine Mark VI control system.

C. THE ENERGY INDUSTRY IDENTIFICATION SYSTEM (EIIS) COMPONENT FUNCTION IDENTIFIER AND SYSTEM NAME OF EACH COMPONENT OR SYSTEM REFERRED TO IN THIS LER:

COMPONENT	IEEE 803 FUNCTION ID	IEEE 805 SYSTEM ID
Main turbine Mark VI control system	TG	TA
13 kV Service Bus 21	BU	EA
Circuit Breaker 252-2104	BKR	EA
EDG 1B	DG	EK

D. SPECIAL COMMENTS:

None