



LICENSEE EVENT REPORT (LER)

(See Page 2 for required number of digits/characters for each block)
(See NUREG-1022, R.3 for instruction and guidance for completing this form
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/>)

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, Library, and Information Collections Branch (T-6 A10M), U. S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by email to Infocollections.Resource@nrc.gov, and the OMB reviewer at: OMB Office of Information and Regulatory Affairs, (3150-0104), Attn: Desk Officer for the Nuclear Regulatory Commission, 725 17th Street NW, Washington, DC 20503; email: oir_submission@omb.eop.gov. The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless the document requesting or requiring the collection displays a currently valid OMB control number.

1. Facility Name Calvert Cliffs Nuclear Power Plant, Unit 2	<input checked="" type="checkbox"/> 050	2. Docket Number 05000318	3. Page 1 OF 3
	<input type="checkbox"/> 052		

4. Title
Automatic Reactor Trip from Reactor Protection System Actuation due to Loss of Unit Service Transformer

5. Event Date			6. LER Number			7. Report Date			8. Other Facilities Involved		
Month	Day	Year	Year	Sequential Number	Revision No.	Month	Day	Year	Facility Name	<input type="checkbox"/> 050	Docket Number
11	16	2023	2023	- 004 -	00	01	12	2024	Facility Name	<input type="checkbox"/> 052	Docket Number

9. Operating Mode: 1-Power Operation
10. Power Level: 100

11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: (Check all that apply)

<input checked="" type="checkbox"/> 10 CFR Part 20	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input checked="" type="checkbox"/> 10 CFR Part 50	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)	<input type="checkbox"/> 73.1200(a)
<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)	<input type="checkbox"/> 73.1200(b)
<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)	<input type="checkbox"/> 73.1200(c)
<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.36(c)(2)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)	<input type="checkbox"/> 73.1200(d)
<input type="checkbox"/> 20.2203(a)(2)(i)	<input checked="" type="checkbox"/> 10 CFR Part 21	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input checked="" type="checkbox"/> 10 CFR Part 73	<input type="checkbox"/> 73.1200(e)
<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 21.2(c)	<input type="checkbox"/> 50.69(g)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.77(a)(1)	<input type="checkbox"/> 73.1200(f)
<input type="checkbox"/> 20.2203(a)(2)(iii)		<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> 73.77(a)(2)(i)	<input type="checkbox"/> 73.1200(g)
<input type="checkbox"/> 20.2203(a)(2)(iv)		<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	<input type="checkbox"/> 73.77(a)(2)(ii)	<input type="checkbox"/> 73.1200(h)
<input type="checkbox"/> 20.2203(a)(2)(v)		<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)		

OTHER (Specify here, in abstract, or NRC 366A).

12. Licensee Contact for this LER

Licensee Contact Michael J. Fick, Principal Regulatory Engineer	Phone Number (Include area code) 410-495-6714
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13. Complete One Line for each Component Failure Described in this Report

Cause	System	Component	Manufacturer	Reportable to IRIS	Cause	System	Component	Manufacturer	Reportable to IRIS
B	EA	XCT	X999	Y					

14. Supplemental Report Expected				15. Expected Submission Date		
<input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes (If yes, complete 15. Expected Submission Date)			Month	Day	Year
				04	05	2024

16. Abstract (Limit to 1326 spaces, i.e., approximately 13 single-spaced typewritten lines)

On November 16, 2023, the Unit 2 reactor automatically tripped due to a Reactor Protection System actuation based on an undervoltage condition. Specifically, the U-4000-22 Unit Service Transformer was lost due to a ground fault signal which resulted in the de-energization of the 22, 23, and 24 4KV buses. This resulted in a loss of both Control Element Drive Mechanism Motor Generator Sets, causing the reactor trip bus undervoltage condition. The Main Feedwater pumps tripped; therefore, Auxiliary Feedwater was manually initiated to supply both Steam Generators. The 2B Emergency Diesel Generator automatically started and restored its bus. Heat removal remained via the normal turbine bypass valves to the main condenser. The cause of the U-4000-22 Unit Service Transformer ground fault signal occurrence is still under investigation at this time; however, all components associated with the suspected ground fault circuitry were replaced prior to placing the transformer back into service. Independent digital relays monitoring the affected transformer and associated Voltage Regulator (2H2103REG) at the time of the event and subsequent equipment testing showed no indication of an actual ground fault condition on the 13KV system at the time.



**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

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1. FACILITY NAME Calvert Cliffs Nuclear Power Plant, Unit 2	<input checked="" type="checkbox"/> 050	2. DOCKET NUMBER 05000318	3. LER NUMBER		
	<input type="checkbox"/> 052		YEAR 2023	SEQUENTIAL NUMBER - 004	REV NO. - 00

NARRATIVE

PLANT AND SYSTEM IDENTIFICATION

Calvert Cliffs Nuclear Power Plant, Unit 2, is a Combustion Engineering Pressurized Water Reactor with a licensed maximum power level of 2737 megawatts thermal. The Energy Industry Identification System code used in the text is identified as [EA].

A. CONDITION PRIOR TO EVENT

Unit: 2
Date: November 16, 2023
Power level: 100
Mode: Unit 2 was in Mode 1 when the condition was discovered.

B. DESCRIPTION OF EVENT

At 0227 on 11/16/2023, the Unit 2 reactor automatically tripped from a Reactor Protection System (RPS) actuation based on a reactor trip bus undervoltage (UV) condition. At that time, a loss of the U-4000-22 Unit Service Transformer (UST) caused a loss of 22, 23, and 24 4KV buses. This resulted in a loss of both Control Element Drive Mechanism (CEDM) Motor Generator (MG) Sets, causing the reactor trip bus undervoltage condition. The loss of 22 and 23 4KV non-safety related (NSR) buses resulted in a trip of Main Feedwater. Auxiliary Feedwater was manually initiated to feed both Steam Generators. The 2B Emergency Diesel Generator (EDG) automatically started and restored the 24 4KV safety related (SR) bus. Heat removal remained via the normal turbine bypass valves to the main condenser.

C. DATES AND APPROXIMATE TIMES OF MAJOR OCCURRENCES

November 16, 2023

- 0227: Unit 2 reactor automatically tripped (scrammed) on reactor trip bus undervoltage due to a loss of U-4000-22 UST. The loss of U-4000-22 UST was caused by its feeder breaker tripping open. The loss of U-4000-22 UST resulted in the following effects:
 - Loss of 4KV NSR buses 22 and 23, and 4KV SR bus 24
 - Loss of 22 and 23 4KV buses de-energized the CEDM MG Sets
 - Loss of CEDM MG sets de-energized all control element assemblies (CEAs) which resulted in the CEAs inserting into the Unit 2 reactor core (SCRAM)
 - Loss of 22 and 23 4KV buses resulted in a trip of Condensate pumps, Condensate Booster pumps and Main Feedwater supplying the Steam Generators. Operations manually initiated Auxiliary Feedwater (AFW) to maintain Steam Generator levels. Heat removal remained through the Turbine Bypass valves to the Main Condenser.
 - Loss of 24 4KV bus automatically started the 2B EDG which loaded onto the 24 4KV SR bus and re-powered the bus as designed based on a valid UV signal from ESFAS.
 - 0330: Power was restored to the 22 and 23 4KV buses via their alternate feeder breakers.
 - 0341: 24 4KV bus was powered from its alternate feeder breaker and the 2B EDG was separated from the bus and secured in accordance with normal operating procedures.



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			2023	- 004	- 00

NARRATIVE

D. CAUSE OF EVENT

The method of discovery for this event was self-revealing and is documented in the site's Corrective Action Program (CAP) under IR 04718086. The Unit 2 reactor automatically tripped (scrammed) on Reactor Trip Bus Undervoltage due to a loss of the U-4000-22 UST. The root cause evaluation for the loss of the U-4000-22 UST due to a ground fault signal is still in progress at the time of the initial LER submittal and a supplement to the LER will be submitted following the completion of the associated CAP product. The ground fault signal was detected by the U-4000-22 UST's protective relaying, tripping the high-side feeder breaker to the Voltage Regulator and the U-4000-22 UST, along with its associated low-side 4KV breakers. Independent digital relays monitoring the affected transformer and associated Voltage Regulator (2H2103REG) at the time of the event and subsequent equipment testing showed no indication of an actual ground fault condition on the 13KV system at the time.

E. SAFETY ANALYSIS

The subject event satisfies the criteria in NUREG-1022, Revision 3, for any event or condition that resulted in manual or automatic actuation of any of the systems listed in 10CFR50.73, paragraph (a)(2)(iv)(B). Specifically, for this event, the Reactor Protection System, the 2B Emergency Diesel Generator, and the Auxiliary Feedwater System. Therefore, this event is reportable pursuant to 10CFR50.73(a)(2)(iv)(A). There were no safety consequences as a result of the event. All safety systems functioned and operated as designed.

F. CORRECTIVE ACTIONS

The ground fault protection circuit, currently suspected of being the source of the failure that led to the loss of U-4000-22, was installed with the U-4000-22 Voltage Regulator (2H2103REG) in the mid-1990's. As part of the troubleshooting activities in support of the automatic trip due to the loss of U-4000-22, the site replaced all components in the suspected ground fault protection circuit, including the ground sensor, ground sensor relay, ground relay timer, lockout relay, and accessible wiring from the ground sensor to the ground sensor relay. The site has also temporarily installed high speed recorders to monitor ground fault protection relays, associated contacts, and ground fault current transformer (CT) outputs; the recorders are providing a direct feed of monitored parameters to the Control Room. As part of the continuing root cause evaluation, an inspection plan is being developed to execute the timely inspection of the ground fault protection circuitry associated with the site's other applicable USTs.

G. PREVIOUS OCCURRENCES

A review of Calvert Cliffs' events was performed. A similar event occurred on Unit 2 on November 7, 2023 as reported in LER 318-2023-002. Although the elapsed time between the November 7, 2023 and November 16, 2023 loss of U-4000-22 events was only nine days, the respective investigations of the two events to this point have identified separate initiating events that led to each of the transformer losses. The on-going root cause evaluation for the November 16, 2023 event will be utilized to identify any commonality or tie between the events.



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Calvert Cliffs Nuclear Power Plant, Unit 2

050

052

2. DOCKET NUMBER

05000318

3. LER NUMBER

YEAR

2023

SEQUENTIAL
NUMBER

- 004

REV
NO.

- 00

NARRATIVE

H. COMPONENT FAILURE DATA

Component

Voltage Regulator Ground Protection Circuit

IEEE 803
FUNCTION ID
XCT

IEEE805
SYSTEM ID
EA