



**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 [Infocollects.Resource@nrc.gov](mailto:Infocollects.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: [oina\\_submission@omb.eop.gov](mailto:oina_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	07	2023	2023	- 002 -	00	01	08	2024	Facility Name	<input type="checkbox"/> 052	Docket Number

9. Operating Mode 1-Power Operation	10. Power Level 100
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11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: (Check all that apply)

<input type="checkbox"/> 10 CFR Part 20	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input 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 type="checkbox"/> 10 CFR Part 21	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input 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 Arthur L. Simpson, Principal Regulatory Engineer	Phone Number (Include area code) 410-495-6913
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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	Month	Day	Year
<input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes (If yes, complete 15. Expected Submission Date)			

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

On November 7, 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 an electrical bus fault. 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 transformer fault was due to a short to ground through Current Transformer (CT) secondary wiring. Inadequate work practices lead to insufficient clearance between the installed CT wire and the live 13 kV bus bar. The CT wire installed during the open phase modification in 2017 was routed too close to the bus bar. An extent of condition review was performed applicable to CT wiring installed during the open phase modification. Issue reports were generated to perform inspection and repairs. One additional CT wire was identified and corrected in the U-4000-22 voltage regulator. No CT wires were found to be in contact with adjacent components for U-4000-21 or U-4000-11. The wiring was replaced, rerouted, and secured. Extent of condition will be performed on U-4000-12 open phase CTs in the 2024 Unit 1 refueling outage.



**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	SEQUENTIAL NUMBER	REV NO.
			2023	- 002	- 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 7, 2023  
Power level: 100  
Mode: Unit 2 was in Mode 1 when the condition was discovered.

**B. DESCRIPTION OF EVENT**

At 16:17 on 11/7/2023, the Unit 2 reactor automatically tripped from the Reactor Protection System (RPS) based on a reactor trip bus undervoltage (UV) condition. At that time, a loss of U-4000-22 transformer 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 7, 2023
- 16:17: Unit 2 reactor automatically tripped (scrammed) on reactor trip bus undervoltage due to a loss of U-4000-22 transformer. The loss of U-4000-22 transformer was caused by its feeder breaker tripping open. The loss of U-4000-22 transformer resulted in the following effects:
  - Loss of 4 kV 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 Emergency Diesel Generator which loaded onto the 24 4kV SR bus and repowered the bus as designed.
  - 17:09: Power was restored to the 22 and 23 4 kV buses via their alternate feeder breakers.
  - 17:33: 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	- 002	- 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 under IR04716036. The Unit 2 reactor automatically tripped (scrammed) on Reactor Trip Bus Undervoltage due to a loss of U-4000-22 Transformer. The cause of the U-4000-22 transformer fault is the "A" phase of the 13kV Voltage Regulator shorted to ground through the Current Transformer (CT) secondary wiring due to insufficient clearance. Inadequate work practices lead to insufficient clearance between the installed CT wire and the live 13kV bus bar. The CT wire was routed too close to the bus bar such that induced heat allowed the wire to sag and contact the 13kV bus bar. The short to ground through the CT's secondary wiring was detected by the U-4000-22 transformer's differential protective relaying, tripping the high-side feeder breaker to the Voltage Regulator and the U-4000-22 Transformer, along with its associated low-side 4kV breakers, thus isolating the fault.

**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 open phase CTs and its wiring for the U-4000-22 and U-4000-21 Voltage Regulators was installed in 2017 during a refueling outage as part of the Open Phase Detection modification. The open phase CTs and its wiring for U-4000-11 and U-4000-12 Voltage Regulators was installed in 2016 as part of the Open Phase Detection Modification for Unit 1. An extent of condition review was performed applicable to the voltage regulator CT wiring installed during the Open Phase Detection modification. Issue reports were generated to perform inspection and repairs. One additional CT wire was identified and corrected in the U-4000-22 voltage regulator. No CT wires were found to be in contact with adjacent components for U-4000-21 or U-4000-11; however, to increase margin, the wiring was replaced, rerouted, and secured. Inspection and repairs, if required, for the U-4000-12 open phase CTs is currently scheduled for the 2024 Unit 1 refueling outage.

**G. PREVIOUS OCCURRENCES**

A review of Calvert Cliffs' events was performed. No events were identified from this review for an automatic reactor trip from the Reactor Protection System due to loss of a unit service transformer.

**H. COMPONENT FAILURE DATA**

Component	IEEE 803 FUNCTION ID	IEEE805 SYSTEM ID
Voltage Regulator Current Transformer	XCT	EA