

CATEGORY 1

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 9908260087 DOC. DATE: 99/08/23 NOTARIZED: NO DOCKET #
 FACIL: 50-317 Calvert Cliffs Nuclear Power Plant, Unit 1, Baltimore 05000317
 AUTH. NAME AUTHOR AFFILIATION
 KIRKWOOD, J.K. Baltimore Gas & Electric Co.
 KATZ, P.E. Baltimore Gas & Electric Co.
 RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 99-004-00: on 990724, reactor tripped due to main transformer bushing flashover. Plant was brought to SS & components were tested & performed satisfactorily. With 990823 ltr.

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PETER E. KATZ
Plant General Manager
Calvert Cliffs Nuclear Power Plant

Baltimore Gas and Electric Company
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*A Member of the
Constellation Energy Group*



August 23, 1999

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 99-004
Reactor Trip Due to Main Transformer Bushing Flashover

The attached report is being sent to you as required under 10 CFR 50.73 guidelines. Should you have questions regarding this report, we will be pleased to discuss them with you.

Very truly yours,

A handwritten signature in dark ink, appearing to read "Peter E. Katz", is written over a horizontal line.

for
Peter E. Katz
Plant General Manager

PEK/JKK/bjd

Attachment

cc: R. S. Fleishman, Esquire
J. E. Silberg, Esquire
A. W. Dromerick, NRC
S. S. Bajwa, NRC

H. J. Miller, NRC
Resident Inspector, NRC
R. I. McLean, DNR
J. H. Walter, PSC

11/25

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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.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of
digits/characters for each block)

FACILITY NAME (1) Calvert Cliffs Nuclear Power Plant, Unit 1	DOCKET NUMBER (2) 050000 317	PAGE (3) 1 OF 04
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TITLE (4) Reactor Trip Due to Main Transformer Bushing Flashover

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
07	24	1999	1999	- 004	- 00	08	23	1999		050000
										050000

OPERATING MODE (9) 1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)										
POWER LEVEL (10) 100	20.2201(b)			20.2203(a)(2)(v)			50.73(a)(2)(i)			50.73(a)(2)(viii)	
	20.2203(a)(1)			20.2203(a)(3)(i)			50.73(a)(2)(ii)			50.73(a)(2)(ix)	
	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)			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)					

LICENSEE CONTACT FOR THIS LER (12)											
NAME J. K. Kirkwood						TELEPHONE NUMBER (Include Area Code) 410-495-2013					

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)											
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	
C	0	0	E120	Y							

SUPPLEMENTAL REPORT EXPECTED (14)						EXPECTED SUBMISSION DATE (16)			MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE).				X	NO						

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

At 1438 on July 24, 1999, Unit 1 tripped from 100 percent power due to electrical arcing (flashover) across the No. 12 Main Transformer (U-25000-12) A-phase 500 kV bushing. The main generator output breaker opened, and the Unit 1 Reactor tripped on loss of turbine load.

A thunderstorm was in progress at the time of the Unit trip with high winds and heavy rain. Witnesses observed a lightning strike near the affected transformer. Lightning apparently struck the A-phase 500 kV transmission line near the transformer, increasing the electrical potential beyond the insulating capabilities of the bushing, creating an electrical arc around the bushing. The arcing across the A-phase bushing affected the A-phase current flow. Protective relays sensed the abnormal condition, and opened two Switchyard Breakers (552-22 and 552-23), the Generator Field Breaker, and the Exciter breaker.

Operators responded appropriately and plant systems functioned as designed. The plant was brought to a safe shutdown condition.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Calvert Cliffs Nuclear Power Plant, Unit 1	05000 '317	99	- 004 -	00	02 OF 04

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

I. DESCRIPTION OF EVENT

During a thunderstorm on July 24, 1999, at 1438, Unit 1 tripped from 100 percent power due to flashover across the No. 12 Main Transformer A-phase, 500 kV (U-25000-12) bushing. The A-phase bushing (H-1, A-phase, Westinghouse Type-O Condenser bushing) apparently flashed-over due to weather-related effects. A security guard saw lightning strike near the main transformer immediately before seeing the A-phase bushing flashover. Another security guard with a different view also reported a lightning strike in the vicinity of the main transformer.

The transformer is a link between the turbine generator (EIIS HA-TG) and the 500 kV transmission lines leaving the plant. The turbine generator tripped on transformer high-side leads differential (indicating that there was an imbalance between phases). The reactor tripped on loss of turbine load on all four channels of the Reactor Protective System. All eight reactor trip breakers actuated, and the reactor was brought to a safe shutdown condition. No engineered safety feature systems were actuated during this event.

II. CAUSE OF EVENT

The Unit 1 Reactor trip was caused by the flashover of the U-25000-12, A-phase 500 kV bushing. The bushing apparently flashed over due to the A-phase voltage increasing beyond the insulating capabilities of the bushing caused by lightning striking the A-phase conductor.

A thunderstorm was in progress at the time of the reactor trip. High winds, heavy rain, and frequent lightning accompanied the storm. Two security guards witnessed a lightning strike in the vicinity of the affected transformer. One security guard witnessed arcing across the A-phase 500 kV bushing immediately after the lightning strike.

The arc across the bushing created an imbalance in the A-phase transformer output. The "High Side Leads Differential Current" and the "Main Generator Differential/Ground" protective relay circuits opened switchyard breakers 552-22 and 552-23 which isolated both Unit 1 main transformers from the switchyard, and opened the main generator field breaker and exciter breaker, causing a loss of load turbine trip and Reactor Protective System trip.

Post-event inspections of the affected transformer found a black scorch mark and holes at the top of the A-phase bushing, and a black scorch mark at the base of the bushing. There were also scorch marks on some of the transformer deluge system heat sensors and spray nozzles located near the A-phase bushing. There was no evidence of a "direct-hit" lightning strike in the area of the A-phase bushing.

Post-event testing of the A-phase bushing indicated no internal damage to the bushing, eliminating bushing failure as a cause of the event.

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

III. ANALYSIS OF EVENT

There was no undue risk to the health and safety of any member of the general public, or risk of exposure to ionizing radiation to any individual from this event. Protective relays and circuit breakers operated as designed, and the unit was brought to a safe shutdown condition without further incident. Operators responded appropriately, and plant systems functioned as designed to stabilize the plant.

Plant Design Engineers concluded that the Lightning Protection system functioned as designed. This conclusion is based on recorded voltage and current waveform traces of the 500 kV system, and the lack of any major physical damage to the electrical hardware, structures, and ground in the vicinity of the transformer U-25000-12.

The lightning created a voltage potential surge on the A-phase. The increased potential resulted in an electrical arc from the high potential at the top of the A-phase bushing to the base of the bushing and other nearby metal components at ground potential. Evidence shows that the Lightning Protection functioned to prevent severe physical damage from the lightning. The A-phase 500 kV bushing of the No. 11 Main Transformer was not damaged. A-phase 500 kV transmission insulators were also undamaged.

This event is reportable in accordance with 10 CFR 50.73(a)(2)(iv), Any event or condition that resulted in a manual or automatic actuation of any engineered safety feature including the Reactor Protective System.

IV. CORRECTIVE ACTIONS

Immediate

- A. The Number 11 and 12 Main Transformers, the main generator, protective relays, and lightning protection were tested for satisfactory performance. All components performed satisfactorily.
- B. The damaged A-phase secondary bushing was replaced.
- C. Unit 1 was restarted on Monday, August 2, 1999.

Long-Term

- D. The lightning protection system will be evaluated for adequacy and acceptability.

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

V. ADDITIONAL INFORMATION

A. Component Identification

Component

IEEE 803
EIIIS Function

IEEE 805
System ID

A-phase bushing

INS

EL

B. Previous Similar Events

In 1987, an event similar to this event occurred involving flashover of the "C"-phase bushing of the same transformer (U-25000-12) during a snowstorm. Details of the event are recorded in Licensee Event Report Number 317/87-015.