NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Calvert Cliffs, Unit 2	0 5 0 0 0 3 1 8	1 OF 0 3

TITLE (4)
Loss of Main Generator Permanent Magnet Generator

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 NAMES	DOCKET NUMBER(S)
1 2	2 1	8 7	8 7	— 0 0 9 —	0 1	0 4	1 5	8 8		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	1 0 0	20.402(b)	20.405(c)	X 50.73(a)(2)(iv)	73.71(b)
		20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (AREA CODE)
Pat Furio, Licensing Engineer	3 0 1 2 6 0 - 4 3 7 4

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
B	T B	P M G	W 1 2 0	Y					

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

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

Unit 2 tripped on December 21, 1987 from 100% power due to a loss of load signal. The loss of load was caused by a failure of the Unit 2 main generator permanent magnet generator due to the stator frame being misaligned. During the post-trip cooldown, an atmospheric dump valve malfunctioned (failed to fully shut) causing a more rapid cooldown than normal. The operators secured the steam loads to minimize cooldown and supplied the steam generators from the auxiliary feedwater system. The cooldown was terminated when the atmospheric dump valve was manually isolated.

The following corrective actions were taken.

1. Turbine-Generator Maintenance Procedures were significantly upgraded.

2. The atmospheric dump valve was repaired and returned to service. The failed roll pin was tested by the materials laboratory. The pin was verified to be made of the proper material. Subsequent maintenance of other atmospheric dump valves has not revealed similar problems. Atmospheric dump valve maintenance procedures have been upgraded.

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

EVENT

Unit 2 tripped at 1804 on December 21, 1987 from 100% power due to a loss of load signal. The loss of load was caused by a failure of the Unit 2 main generator permanent magnet generator (EIIS TB-PMG). The permanent magnet generator failed because of an apparent misalignment of the stator frame with the rotating shaft. This misalignment caused the rotating assembly to rub against the stator insulation, creating a short circuit path. During the generator reassembly an assessment was made that the alignment had not been affected. Therefore, no alignment check was made. The Reactor Protective System (EIIS JC) responded with a loss of load trip for the reactor. The Engineered Safety Features were not activated, with the exception of Auxiliary Feedwater Actuation System (AFAS) (EIIS BA). During the plant cooldown, an atmospheric dump valve (ADV) (EIIS SB-V) malfunctioned (failed to fully shut) causing a more rapid than normal cooldown of the primary system (EIIS AB). The operators secured steam loads (blow down and steam generator feed pumps (SGFP) (EIIS SJ-P)) in order to minimize the cooldown. The steam generator (EIIS SB-SG) was fed from the auxiliary feedwater system. The cooldown was terminated at 519°F when the ADV was manually isolated. The Technical Specification limit for primary system cooldown was not exceeded.

This event occurred at 100% power, which is the worst possible condition for this transient. The loss of load event is analyzed in Chapter 14.5 of the FSAR at 100% power with the turbine bypass valves (EIIS SB-V) and the atmospheric dump valves closed. Because these valves opened, this event was less severe than the analyzed event. No similar events have been reported.

ANALYSIS

Several components did not respond as designed during this transient.

1. Undervoltage alarms on instrument bus #22 (2Y10) (EIIS EE-BU) were received just prior to the trip. A drop in bus voltage was noted by the operators, but the voltage returned to normal almost immediately. The undervoltage alarms cleared on all affected equipment except for the #22 bus. The alarm recurred for several minutes after the trip despite the voltage having returned to normal. Troubleshooting found that the continuing alarms were due to a faulty relay. The relay has been lubricated, recalibrated and returned to service.

2. The ADV could not be closed due to the inner plug becoming disconnected from the valve stem. A roll pin (EIIS SB-V), which prevents the inner plug from unscrewing from the valve stem, failed allowing the inner plug to unscrew from the stem. This created an opening through the valve which allowed steam to leak by. The position indicator in the control room showed that the valve was fully closed even when the valve was leaking steam. The position indicator shows the position of the valve stem which was stroking through its full range of motion. The valve was manually isolated when the operators visually determined that it was leaking.

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

The dump valves are used to assist in the primary cooldown by relieving steam from the secondary system directly to atmosphere. During this event, the safety significance of the open valve is minimal because there were no detectable primary to secondary leaks in the steam generators and therefore, no radiation was released to the atmosphere.

3. The auxiliary feedwater system is actuated by a low steam generator level signal (-170 inches) (EIIS JB-LI). Although the data does not indicate that the steam generator level fell this low, the auxiliary feedwater system spuriously actuated. After the main feedwater pumps were secured by the operators, auxiliary feedwater was used to feed the steam generators. A time delay feature is scheduled to be installed on AFAS during 1988.

CORRECTIVE ACTIONS

The following corrective actions were taken.

1. Turbine-Generator Maintenance Procedures were significantly upgraded.

2. The ADV was repaired and returned to service. The failed roll pin was tested by the materials laboratory. The pin was verified to be made of the proper material. Subsequent maintenance of other atmospheric dump valves has not revealed similar problems. Atmospheric dump valve maintenance procedures have been upgraded.

Permanent Magnet Generator Stator Manufacturer-Westinghouse Electric Corporation Model No. - 8358D48G01

Roll Pin Manufacturer - Copes Vulcan Model No. 96227

BALTIMORE
GAS AND
ELECTRIC

NUCLEAR OPERATIONS DEPARTMENT
CALVERT CLIFFS NUCLEAR POWER PLANT
LUSBY, MARYLAND 20657

April 15, 1988

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Docket No. 50-318
License No. DPR 69

Dear Sirs:

The attached LER 87-009, Rev. 01, is being sent to you as required by 10 CFR 50.73.

Should you have any questions regarding this report, we would be pleased to discuss them with you.

Very truly yours,

J.R. Lemons

J.R. Lemons
Manager - Nuclear Operations Department

JRL:JMO:plv

cc: William T. Russell
Director, Office of Management Information and Program Control
Messrs: J.A. Tiernan
W.J. Lippold

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