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March 7, 2003

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 2003-01
Failure of 4 kV GE Breaker Due to Cracking in Auxiliary Switch Cam Follower

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 black ink, appearing to read "Kevin J. Nietmann".

KJN/MJY/bjd

Attachment

cc: J. Petro, Esquire
J. E. Silberg, Esquire
Director, Project Directorate I-1, NRC
G. S. Vissing, NRC

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

JE22

LICENSEE EVENT REPORT (LER)

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

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4. TITLE
Failure of 4 kV GE Breaker Due to Cracking in Auxiliary Switch Cam Follower

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
01	06	03	2003	- 01 - 00		03	07	2003		05000
									FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE 1	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR *: (Check all that apply)			
	20.2201(b)	20.2203(a)(3)(ii)	50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)
10. POWER LEVEL 100	20.2201(d)	20.2203(a)(4)	50.73(a)(2)(iii)	50.73(a)(2)(x)
	20.2203(a)(1)	50.36(c)(1)(i)(A)	50.73(a)(2)(iv)(A)	73.71(a)(4)
	20.2203(a)(2)(i)	50.36(c)(1)(ii)(A)	50.73(a)(2)(v)(A)	73.71(a)(5)
	20.2203(a)(2)(ii)	50.36(c)(2)	50.73(a)(2)(v)(B)	OTHER Specify in Abstract below or in NRC Form 366A
	20.2203(a)(2)(iii)	50.46(a)(3)(ii)	50.73(a)(2)(v)(C)	
	20.2203(a)(2)(iv)	50.73(a)(2)(i)(A)	50.73(a)(2)(v)(D)	
	20.2203(a)(2)(v)	X 50.73(a)(2)(i)(B)	50.73(a)(2)(vii)	
	20.2203(a)(2)(vi)	50.73(a)(2)(i)(C)	50.73(a)(2)(viii)(A)	
	20.2203(a)(3)(i)	50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(B)	

12. LICENSEE CONTACT FOR THIS LER

NAME M. J. Yox	TELEPHONE NUMBER (Include Area Code) 410-495-6652
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13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
B	EK	BKR	GE	Y					

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

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

On January 6, 2003, with Unit 1 and Unit 2 operating at 100 percent power, the 1B Diesel Generator (DG) Breaker, 1BKR152-1403, Circuit Breaker Assembly 199, failed to close on demand during a required surveillance test. Breaker 1BKR152-1403 is the output breaker for the 1B -DG, which provides power to 4 kV Alternating Current Vital Bus 14. The emergency diesel generators provide a dependable onsite power source capable of starting and supplying the essential loads necessary to safely shut down the plant and maintain it in a safe shutdown condition under all conditions. Subsequent investigation revealed Breaker 1BKR152-1403 could not have been relied on to perform its safety function since the date of the last required surveillance test on December 9, 2002. The immediate physical cause for the breaker failing to close on demand was a physical failure in one of the auxiliary switch cam followers. The auxiliary switch contact provides a close signal to the associated circuit breaker. The auxiliary switch contact will not perform its intended function with a broken cam follower. The failure of Breaker 1BKR152-1403 caused the 1B DG to be unavailable to respond and meet its intended safety function during a design basis event. The emergency on-site power safety function was maintained by the 1A DG during this period.

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

I. DESCRIPTION OF EVENT

On January 6, 2003, with both Unit 1 and Unit 2 operating at 100 percent power, the 1B Diesel Generator Breaker, 1BKR152-1403, Circuit Breaker Assembly 199, failed to close on demand during a required surveillance test. Breaker 1BKR152-1403, a General Electric Magne Blast Circuit Breaker, Type AMH-4.76-250-1D, Model Number 0052, is the output breaker for the 1B Fairbanks Morse Diesel Generator (DG). The 1B DG provides power to 4 kV Alternating Current (AC) Vital Bus 14. The diesel generators are designed to provide a dependable onsite power source capable of starting and supplying the essential loads necessary to safely shut down the plant and maintain it in a safe shutdown condition under all conditions. Subsequent investigation revealed Breaker 1BKR152-1403, and the 1B DG, could not have been relied on to perform their safety functions since the date of the last required surveillance test on December 9, 2002. The immediate physical cause for the breaker failing to close on demand was a failure of the auxiliary switch cam followers. The auxiliary switch contact will not perform its intended function with a broken cam follower. The auxiliary switch contact provides a close signal to the associated circuit breaker.

The 1B DG is one of two onsite standby power sources for Unit 1, each of which is dedicated to a separate 4 kV Engineered Safety Features (ESF) (1E) bus. A DG starts automatically on a safety injection actuation signal or on a 4 kV 1E bus undervoltage signal. In the event of a loss of offsite power to a 4 kV 1E bus, if required, the ESF electrical loads will be automatically sequenced onto the DG in sufficient time to provide for safe shutdown for an anticipated operational occurrence and to ensure that the containment integrity and other vital functions are maintained in the event of a design basis accident. The failure of Breaker 1BKR152-1403 caused the 1B DG to be unavailable to respond and meet its intended safety function during a design basis event.

No additional systems, structures, or components were inoperable during this event that would have contributed to its severity or that could have been used to mitigate this event, with the exception of the 11 High Pressure Safety Injection (HPSI) pump (back-up power from 1A DG). The 11 HPSI pump was unavailable and therefore inoperable, for a period of 61 minutes on December 12, 2002. The actual safety significance of the loss of 11 HPSI for 61 minutes was included in the overall safety assessment. No automatic or manually initiated safety system responses occurred or were necessary to place the unit in a safe and stable condition as a result of the failure of the 1B DG Output Breaker. Unit 2 was evaluated for applicability of this condition at the time it was discovered due to the use of identical type breakers. All similar Model GE 4 kV breakers in Unit 1 and Unit 2 were evaluated for a similar condition and found operable.

The 1B DG Output Breaker failure to close resulted from a cracked cam follower in the auxiliary switch.

Breaker 1BKR152-1403 is a General Electric (GE) Magne-Blast circuit breaker. The breaker is a Type AMH-4.76-250-1D. The function of this breaker is to provide power to downstream equipment, provide remote control and indication, undervoltage trip protection, and other protective trip features for the 1B DG.

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II. CAUSE OF EVENT

The root cause of this event was found to be low cycle fatigue stress cracking of the SBM model auxiliary switch cam follower, resulting from breaker operation. An Operating Experience report has been issued to alert other utilities of this condition.

III. ANALYSIS OF EVENT

This event is reportable in accordance with the following:

- a) 10 CFR 50.73(a)(2)(i)(B); "Any operation or condition that was prohibited by the plant's Technical Specifications."

Calvert Cliffs Nuclear Power Plant Technical Specifications, Limiting Condition for Operation (LCO) 3.8.1.b for AC Sources – Operating, requires that two DGs shall remain operable for each unit. Should one of the required DGs become inoperable, Technical Specification Required Action 3.8.1.B.4 requires restoration of the affected DG to operable status within 72 hours. The failure of Breaker 1BKR152-1403 resulted in a loss of operability for the 1B DG from December 9, 2002 through January 6, 2003. This exceeded the Technical Specification LCO required completion time of 72 hours. The 1A DG was verified to be operable throughout this period, with the exception of a 19-minute period on December 22, 2002 beginning at 2211 hours. The 1A DG was available but inoperable during this time while performing a surveillance test. A dedicated operator was stationed to immediately return the 1A DG to service in the event of a design basis event during this test. The inoperable condition of 1B DG from December 9, 2002 through January 6, 2003 while in Mode 1 was prohibited by Technical Specification LCO 3.8.1.b.

Calvert Cliffs Nuclear Power Plant Technical Specification LCO 3.8.1.b, Required Action 3.8.1.G requires that, if both DGs are inoperable, one DG must be restored to operable status within two hours. This condition was met by restoring the 1A DG to operable status within 19 minutes of initiation of the surveillance test, however, the entry into Technical Specification LCO 3.8.1.G was not realized at the time because of the undiagnosed condition of the 1B DG. With two DGs inoperable on the same unit, there are no remaining standby AC sources to provide power to most of the ESF systems. Insufficient standby AC sources are available to power the minimum required ESF functions, should a loss of offsite electrical power occur with both DGs inoperable. A review of operating logs verified that the required minimum of two offsite power sources was maintained during the 19-minute period in which both DGs were inoperable. This condition was not prohibited by Technical Specifications.

The DGs are designed to provide a dependable onsite power source capable of starting and supplying the essential loads necessary to safely shut down the plant and maintain it in a safe shutdown condition under all conditions. Four diesel generators are provided for the plant although each Unit requires only one diesel generator to supply the minimum power requirements for its ESF equipment. The loss of 1B DG operability did not represent a loss of safety function

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because the 1A DG was available to supply the essential loads necessary to safely shut down the plant and maintain it in a safe shutdown condition. The Station Blackout DG was also available to supply essential loads necessary to safely shutdown one unit and maintain that unit in a safe shutdown condition.

An evaluation of the impact on Core Damage Frequency was performed for the inoperability of the 1B DG, including the period when the 1A DG was out-of-service. This assessment determined a Core Damage Frequency change of less than 1.0E-6/year, which corresponds to an assessment of very low safety significance (Green).

IV. CORRECTIVE ACTIONS

- A. All potentially affected safety-related Unit 1 and Unit 2 GE Magne-Blast 4 kV AC Circuit Breakers, with the exception of seven breakers currently providing power to support Technical Specification requirements for 1E 4 kV busses on both Unit 1 and Unit 2, have been inspected to ensure that required safety functions would not be jeopardized. The seven breakers still affected were determined to be operable because they are currently accomplishing their safety functions. The identified breakers are closed and providing electrical indication, demonstrating that the auxiliary switch failure mode is not present in the trip circuit and the breakers will perform as required in response to any breaker trip signal. These breakers are not load shed breakers and thus are not required to operate during a design basis event. The inspections found a total of four breakers (out of 23 breakers) using the SBM switch with Lexan cam followers. The four switches were replaced with SBM switches with white cam followers (2) or with SB-12 switches (2). The switches with white cam followers are not susceptible to the failure mode identified in this event. A plan is in place to inspect the remaining seven GE Magna Blast Breakers installed in the plant to ensure that all SBM model switches used in the auxiliary switch applications with clear Lexan cam followers are removed and replaced with either updated GE model SBM or GE model SB-12 switches.
- B. The breaker that caused 1B DG to be inoperable, 1BKR152-1403, was repaired and returned to service.

V. ADDITIONAL INFORMATION

A. Component Identification

Component	IEEE 803 EIS Function	IEEE 805 System ID
Circuit Breaker 152-1403	BKR	EK

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B. Previous Occurrences

An additional failure mode identified by the manufacturer is cracking of the clear Lexan cam followers due to exposure to hydrocarbons. A General Electric Service Information Letter was issued for this failure mode prior to April 1980.

The analysis of the subject cam follower for this event has concluded that low cycle fatigue and not exposure to hydrocarbons was the cause of the failure.

An SBM model switch failed by the same apparent failure mode in August 2002. The 22 Saltwater Pump Breaker 2BKR152-2405 closed on demand, but the control circuit was lost and the breaker had to be tripped manually. Corrective actions for this incident included updating maintenance inspection procedures to require inspections of SBM model switch cam followers. The intent of this corrective action was to replace the affected SBM switches on a schedule consistent with the probability of recurrence based upon past failure history. However, the procedure changes were not completed prior to the failure of 1BKR152-1403. An Issue Report was generated to identify and evaluate the timeliness of this schedule, which had led to the ineffectiveness of this earlier corrective action. The inspection procedure changes were incorporated by March 4, 2003.