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October 25, 1996

U. S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit Nos. 1 & 2; Docket Nos. 50-317 & 50-318
Failures of General Electric Type AMH-4.76-250 Circuit Breakers

Calvert Cliffs has experienced two failures of the General Electric type AMH-4.76-250 circuit breaker. Investigation to date has revealed the breaker's manual trip paddles had bent, thus preventing proper automatic or manual closure of the breaker. This problem is being conservatively reported in accordance with 10 CFR 21.21 (a)(2) as an interim notification. Although a defect or noncompliance has not been positively identified, these failures represent a potential challenge to the reliability of safety-related components to perform their intended safety function. We do not yet know exactly why these failures have occurred but the investigation is continuing.

Should you have questions regarding this matter, we will be pleased to discuss them with you.

Very truly yours,

for

C. H. Cruse
Vice President - Nuclear Energy

CHC/CDS/bjd

Attachment

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ATTACHMENT (1)

10 CFR PART 21 INTERIM REPORT CONCERNING BENT MANUAL TRIP PADDLES IN GENERAL ELECTRIC MAGNE BLAST 4-kV CIRCUIT BREAKERS

Calvert Cliffs Nuclear Power Plant, Units 1 and 2

Docket Nos.: 50-317 and 50-318

(i) Name and Address of Individual Making Notification

C. H. Cruse, Vice President-Nuclear Energy
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Calvert Cliffs Nuclear Power Plant
1650 Calvert Cliffs Parkway
Lusby, MD 20657

(ii) Basic Component Affected:

General Electric Magne Blast Circuit Breakers Type AMH-4.76-250

(iii) Firm Supplying Components:

General Electric Nuclear Energy
6901 Elmwood Avenue
Philadelphia, PA 19142

(iv) Nature of the Potential Defect

During surveillance testing in June and July, 1996, the plant found two problems with General Electric type AMH-4.76-250 circuit breakers. In June, a Low Pressure Safety Injection (LPSI) pump breaker failed to close during testing. Investigation revealed that there was no gap between the manual trip rod and the manual trip lever. The trip lever had been bent. The bent trip lever had prevented the trip latch from fully rotating onto the stop pin; thus, there was a smaller than normal trip latch "wipe" (i.e., area of contact). With this reduced wipe, there is no guarantee of breaker closure. The trip lever was replaced.

The function of the manual trip lever is to transmit the forces from the manual trip rod to the trip shaft and facilitate manual tripping of the breaker. The function of the manual trip rod is to transmit forces from the breakers manual trip push button to the manual trip lever.

In July, another LPSI pump breaker failed to close during testing. In this case, investigation revealed that a support "L" bracket attached to the manual trip lever had broken and the trip lever was bent, with the same effect as in the first event. The "L" bracket serves to provide additional support and stiffness to the manual trip lever. As the breaker trips, the manual trip lever quickly rotates until it comes in contact with the breaker frame creating a momentary bending stress in the manual trip lever and the "L" bracket. The breaker was replaced with a spare breaker. The

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broken parts were removed from the breaker and sent to the Baltimore Gas and Electric Company metallurgical laboratory for analysis.

We conducted metallurgical analyses of the broken "L" bracket and bent trip levers. Each of these parts is made of low carbon steel. They appear to have failed due to "strain-aging embrittlement," a phenomenon that affects hot-rolled low carbon steel parts fabricated by cold bending. However, we currently do not feel this is the cause of the trip lever bending and "L" bracket failure we have experienced. More probably, the cracking and bending are a symptom of another problem that is overstressing these components.

As a result of the second failure, an inspection program was initiated for all 4 kV safety-related breakers to look for the broken "L" bracket problem. Just prior to the start of this inspection program, cracks were found in the "L" brackets in two other breakers. The inspection program was accelerated and all breakers were checked for the cracking identified on the "L" brackets. During this inspection, two other breakers were found with no gap between the manual trip lever and the manual trip shaft (one was the breaker which had failed in June; its replacement lever had also bent). A method was developed to verify operability of the safety-related breakers by insuring a gap existed between the manual trip lever and the manual trip rod after each breaker operation.

These breakers have no difficulty in opening. The problem is that they could lose their closing ability. Since Calvert Cliffs uses many of these breakers in safety-related applications, this could challenge the reliability of safety-related components to perform as designed.

(v) Date on Which Potential Defect Was Identified

We determined on August 27, 1996 that this breaker problem could potentially represent a challenge to the reliability of safety-related components to perform their intended safety function. We do not yet know exactly why these failures have occurred but the investigation is continuing.

(vi) Number and Location of Components

Calvert Cliffs has approximately 120 of the General Electric type AMH-4.76-250 circuit breakers on site in safety-related and non-safety-related applications.

(vii) Corrective Actions Taken

At this time, a definitive explanation for the breaker failures has not been confirmed. We are continuing our investigation into the possible causes of the problem. A team was established to evaluate the problem and determine possible causes. A list of possible causes was established and inspections and troubleshooting are currently in progress to validate them.

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CONCERNING BENT MANUAL TRIP PADDLES IN
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Based on the metallurgical evaluation results, an operability evaluation was performed for the rest of the breakers.

We have sent the breaker from July LPSI pump failure to the breaker manufacturer for a more complete failure analysis.

The vendor has recommended a modification to the breakers to prevent additional cases of trip lever bending and "L" bracket failures. We are currently in the process of implementing this recommended modification on the plants General Electric Magne Blast 4 kV breakers. They include replacing the trip paddles, support bracket and the spring discharge link. The trip lever material will change from AISI 1005 Carbon Steel to AISI 1018 Carbon Steel. The "L" brackets will change from AISI 1005 steel to aluminum. In addition, the configuration of the parts will be changed.

Additional corrective actions will be implemented as needed after the final results of the root cause analysis are finalized. This report will be supplemented after the root cause is complete and a complete set of corrective action is in place.