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May 8, 1995

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
10 CFR Part 21 Interim Report Concerning Failures of Gould-Shawmut Fuses

Please find attached a 10 CFR Part 21 notification concerning a recently discovered failure mechanism for Gould-Shawmut A25X 10-15 ampere fuses. The A25X 10-15 ampere fuses have experienced a higher than expected failure rate over the last five months. Investigation into the problem has revealed a certain percentage of these fuses have developed cracks in their fuse elements. As the cracks propagate, the fuse fails to carry current, creating the appearance of a blown fuse.

This failure mechanism has not been verified to have created a substantial safety hazard at Calvert Cliffs. An evaluation to determine the cause of the cracking is continuing. This interim report is being submitted in accordance with 10 CFR 21.21(a)(2) and a supplemental report will be issued after ongoing metallurgical analyses of the fuse elements are completed.

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

Very truly yours,

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PDR ADOCK 05000317
PDR

CHC/CDS/bjd

Attachment

cc: D. A. Brune, Esquire
J. E. Silberg, Esquire
L. B. Marsh, NRC
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ATTACHMENT (1)

10 CFR PART 21 REPORT CONCERNING FAILURES OF GOULD-SHAWMUT A25X 10-15 AMPERE FUSES DUE THE CRACKING OF THE FUSE ELEMENT

Calvert Cliffs Nuclear Power Plant, Units 1 and 2

Docket Nos: 50-317 and 50-318

(i) **Name and address of individual making notification:**

R. E. Denton, Vice President-Nuclear Energy
Baltimore Gas and Electric Company
Calvert Cliffs Nuclear Power Plant
1650 Calvert Cliffs Parkway
Lusby, MD 20657

(ii) **Basic Component Affected:**

Gould-Shawmut A25X (10-15 ampere) fuses

(iii) **Firm Supplying Component:**

Gould Electronics Incorporated
374 Merrimac Street
Newburyport, MA 01950-1998
Telephone: (508) 462-3131

(iv) **Nature of Defect:**

Between November 1994 and March 1995 Calvert Cliffs Units 1 and 2 experienced five failures of Gould-Shawmut A25X 10-15 ampere fuses. When tested with an ohmmeter the fuses read open but with pressure exerted on the ends of the barrel, causing the barrel ends to be pushed together, the fuses read in the 100-1000 ohm range. Based on the high failure rate and unusual failure characteristics, a root cause investigation was initiated.

Gould-Shawmut provided information indicating that a possible cause of the cracking was an old manufacturing process. Prior to January 1993, this type of fuse was manufactured utilizing an external soldering process on the fuse barrel end to attach the zinc fuse element to the fuse barrel. The process utilized an acid core flux. If the soldering process was not hot enough, the acid core flux did not completely burn away and a semi-corrosive flux residue was left on the zinc element. In time, this semi-corrosive flux residue may have led to the development of cracks at the residue line on the zinc element.

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10 CFR PART 21 REPORT CONCERNING FAILURES OF GOULD-SHAWMUT A25X 10-15 AMPERE FUSES DUE THE CRACKING OF THE FUSE ELEMENT

The old soldering process was used at least as far back as the early 1980's according to the Gould-Shawmut. In January 1993 Gould-Shawmut changed the soldering process and solder to improve the yield of the fuse manufacturing process. The soldering flux was changed from the acid core flux to a non-corrosive paste.

It should be noted that we have not yet verified that the manufacturing process described above is the actual cause of the failures. We are currently performing our own metallurgical analysis on the fuses. Our analysis to date has found the thin and flat fuse elements cracked all the way through the element thickness and half way through the element width. The cracking does not occur in all A25X fuses, only in a certain as yet undetermined percentage of the total population.

The fuses are not manufactured as safety-related but are bought commercial grade and dedicated as safety-related.

(v) Date on Which Defect was Identified:

On March 7, 1995 an Issue Report was prepared documenting that five Gould-Shawmut A25X 10-15 ampere fuses had failed since November 1994. Presently it is unclear if these fuses could have failed in a manner that would have rendered redundant trains of safety-related equipment inoperable and created a substantial safety hazard at Calvert Cliffs. However, since we strongly suspect the fuses would fail during a design basis seismic event or certain electrical transients, this interim report is being submitted as a potential defect under 10 CFR Part 21(a)(2).

(vi) Number and Locations of Components:

This problem has been found in only a certain percentage of fuses that have been examined. Therefore, it is not known exactly how many defective fuses were in the plant at the time this defect was discovered. Each Calvert Cliffs Unit has 240 A25X 10-15 ampere fuses installed in circuits associated with the Vital AC busses.

(vii) Corrective Actions Taken:

We have communicated the problem to Gould-Shawmut, who informed us of the manufacturing process change. Gould-Shawmut also indicated that they have had no previous indication of this fuse failure mechanism from their customers.

Prior to the current Unit 2 refueling outage, all 240 A25X 10-15 ampere fuses in the Unit 1 vital AC busses were replaced with new fuses with the exception of spares. During the current Unit 2 refueling outage all 240 of the A25X 10-15 ampere fuses were replaced with new fuses. All spares will be replaced with new fuses after the current Unit 2 refueling outage.

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A metallurgical analysis of some of the failed fuses has been initiated by our Materials Engineering and Inspection Unit. This analysis is expected to be completed by May 31, 1995. Additional information concerning the results of this analysis will be provided in a supplement to this interim report.

An INPO Nuclear NETWORK message has been issued to make other industry personnel aware of this potential problem.

(viii) Other Advice Related to Purchasers or Licensees:

Although the Manufacturer changed the manufacturing process in January 1993, the older type fuses are still being received from fuse suppliers. A new non-corrosive type flux and solder is now used and the method of soldering has changed. The new generation fuses may be distinguished from the old by observing the barrel end. The new fuses have no trace of solder puddles or grinding marks. Please be advised however, that the old manufacturing process has not been verified as the actual cause of the cracking.