

**10 CFR PART 21 INTERIM 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
Dockets Nos: 50-317 and 50-318

BACKGROUND

This 10 CFR part 21 interim notification concerns 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.

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.

DISCUSSION

Between November 1994 and March 1995 Calvert Cliffs Units 1 and 2 experienced five failures of Gould-Shawmut A25X 10-15 Ampere fuses. In each case, the fuses failed as if they had blown, but there were no faults or overload conditions found in the circuits. 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 zink fuse element to the fuse barrel. The process

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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.

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.

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

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).

Although the Manufacturer changed the manufacturing process in January 1993, the older type fuses are still being received from fuse suppliers. 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.

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