



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

ENCLOSURE

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATING TO THE MILLSTONE NUCLEAR POWER STATION, UNIT NO. 2
CONTROL ELEMENT ASSEMBLY ACTION PROGRAM AND
JUSTIFICATION FOR CONTINUED OPERATION
NORTHEAST NUCLEAR ENERGY COMPANY
MILLSTONE, UNIT NO. 2
DOCKET NO. 50-336

1.0 INTRODUCTION

On June 7, 1990, during pre-startup cold functional testing at Maine Yankee, the operators discovered one control element assembly (CEA) was stuck while being inserted. Subsequent inspections revealed that three CEAs had missing center finger end caps and one CEA had a circumferential crack in the center finger end cap weld area. These CEAs are of an old CE design that has B_4C pellets in the center finger extending all the way to the tip. The current CE CEA design has Ag-In-Cd in the tip region and B_4C along most of the length for the center finger. The consequence of the old CEA center finger failure is (1) loss of B_4C absorber material, and (2) CEAs stuck due to B_4C pellets falling to the bottom of guide tubes. The staff is concerned that the CEA failure could seriously affect the plant operation of those CE reactors equipped with the old design. In response to the staff's concerns on the planned use of old design replacement CEAs during the current cycle of operation (Cycle 11) of Millstone Unit 2, Northeast Nuclear Energy Company, the licensee, provided the results of their CEA inspection program and their updated action plan based on these inspection results by letter dated February 4, 1991.

Of the original CEAs, 72 have been inspected since their final discharge. The remaining original CEA was not inspected due to interference problems between the grapple used for the inspection and the spent fuel pool rack location the CEA was stored in. In addition, the 16 old design replacement CEAs reinserted for Cycle 11 were inspected. The exposure of 9 of these CEAs was approximately 1454 EFPD and the remaining 7 had exposures of approximately 1076 EFPDs when they were inspected. There have been no cracks found in any of these CEAs.

2.0 EVALUATION

The lowest exposure for which cracking of a CEA has been observed in the industry is 2732 EFPD. The inspections performed at Millstone 2 resulted in a large amount of data for CEAs with exposures exceeding 2900 EFPD, none of which experienced cracking. Because the CEAs at Millstone 2 are maintained in a fully withdrawn position throughout their lifetimes and the old design

reinserted CEAs have a longer end cap, they see a significantly lower neutron exposure than in other plants and are thus less susceptible to cracking. The staff concludes that the 16 old design CEAs will most likely not be susceptible to failure through Cycle 13, since they will not approach a 2900 EFPD exposure until at least Cycle 14. In addition, we recommend that the licensee continue to monitor the progress of the ABB-CE Owners Group Task 666 to identify the cause of the CEA cracking observed at some plants to assure that the conclusions regarding the expected CEA lifetimes at Millstone 2 are confirmed.

3.0 CONCLUSION

We have reviewed the licensee responses to the staff request for additional information concerning CEA failures. Based on the above evaluation and on the continuing ABB-CE Owners Group Task 666 effort, we conclude that continued operation of Millstone 2 with the old design replacement CEAs is acceptable through Cycle 13. The staff expects the licensee to continue to monitor the CEA performance and to evaluate the failure mechanism for old design CEAs. The NRC should be informed promptly if new evidence warrants reconsideration of the current plan for continued operation with old design CEAs. Likewise, any new conclusions derived from our continuing review of experience at other plants could impact our conclusions for Millstone 2.

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