

NORTHEAST UTILITIES

THE CONNECTICUT LIGHT AND POWER COMPANY
 WESTERN MASSACHUSETTS ELECTRIC COMPANY
 HOLYOKE WATER POWER COMPANY
 NORTHEAST UTILITIES SERVICE COMPANY
 NORTHEAST NUCLEAR ENERGY COMPANY

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October 1, 1990

Docket No. 50-336

B13647

Re: Boraflex Degradation

U.S. Nuclear Regulatory Commission
 Attention: Document Control Desk
 Washington, DC 20555

Gentlemen:

Millstone Unit No. 2
Spent Fuel Racks Boraflex Degradation

In a letter dated August 7, 1990,⁽¹⁾ Northeast Nuclear Energy Company (NNECO) detailed that on July 27, 1990, while preparing Millstone Unit No. 2 Poison Surveillance Coupon No. 5 for routine examination, it was observed that the boraflex material in the area of the vent hole was missing. A visual examination of the remaining surveillance coupons revealed that a similar situation existed in all the coupon samples. This was identified to the NRC Resident Inspector on July 30, 1990.

NNECO's initial assessment was that the deterioration mechanisms were probably due to a combination of radiation exposure and erosion induced by flow and gas generation exiting at the vent hole. Additionally, the erosion was probably limited to the vent location.

On August 24, 1990, at 0830 hours with the plant in Mode 1 at 100 percent power, during performance of neutron blackness testing, gaps were discovered in the boraflex neutron poison material in the Region I spent fuel storage racks. The neutron blackness testing was being performed as part of an investigation for an erosion problem of the boraflex surveillance coupons. Preliminary results from the blackness testing vendor indicate that of the 420 boraflex panels that were tested, 45 panels have a gap in the poison material and 3 panels have two gaps. The largest single measured gap is estimated to be 1.8 inches and the largest addition of two gaps in 1 panel was 1.9 inches. A prompt report of this event was made on August 24, 1990, pursuant to the requirements of 10CFR50.72(b)(1)(ii)(B), "Any event or condition that resulted in the condition of the nuclear power plant, including its principle safety barriers, being seriously degraded, or that resulted in the nuclear power plant being: (b) in a condition that was outside the design basis of the plant." In evaluating the safety consequences of this event, the Combustion Engineering criticality analysis assumed that the boraflex neutron poison material was completely intact. Since gaps were discovered in the

(1) E. J. Mroczka letter to U.S. Nuclear Regulatory Commission, "Millstone Unit No. 2, Spent Fuel Racks Poison Surveillance Coupon, Boraflex Degradation," dated August 7, 1990.

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boraflex material, the Region I spent fuel storage racks were considered, at that time, to be in a condition that was potentially outside of their design basis.

The boron concentration of the spent fuel pool at the time of the event was approximately 2023 ppm, and the fuel assemblies stored in the Region I spent fuel storage racks were arranged in a two-out-of-four storage pattern (check-board). There were no safety consequences as a result of this event since the K_{eff} of the spent fuel pool was maintained less than 0.95 as required by the plant Technical Specifications.

The spent fuel storage racks were manufactured by Combustion Engineering. The Region I storage racks contain 384 storage cells designed for fuel assemblies with a maximum enrichment of up to and including 4.5 weight percent U-235. Each storage cell in Region I contains a poison insert box. Each poison insert box consists of four boraflex panels which are enclosed between two stainless steel sheet panels.

The specific cause of the gaps is unknown, but is believed to be caused by a restraint of the boraflex material coupled with irradiation-induced shrinkage. Combustion Engineering has completed an analysis which confirms that the K_{eff} is less than 0.95 for 2.7-inch gaps located at the same axial elevation throughout all of the Region I spent fuel storage racks for fuel assemblies with a maximum enrichment of 4.5 weight percent U-235. There were no safety consequences as a result of this event since the K_{eff} of the spent fuel pool was maintained less than 0.95 as required by the plant Technical Specifications. An increased surveillance program is currently under review and additional investigations are being performed to determine the root cause of the gaps and the potential for the gap size to increase.

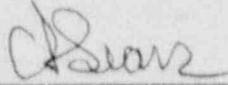
On September 21, 1990, a follow-up notification call was made to the NRC Operations Center that retracted NNECO's prompt report because of the conclusions reached above. This letter is being sent to the NRC Staff for information purposes and requests no specific action to be taken by the Staff.

If you have any questions regarding this information, please contact my Staff directly.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

FOR: E. J. Mroczka
Senior Vice President

BY: 
C. F. Sears
Vice President

cc: T. T. Martin, Region I Administrator
G. S. Vissing, NRC Project Manager, Millstone Unit No. 2
W. J. Raymond, Senior Resident Inspector, Millstone Unit Nos. 1, 2, and 3