UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
631 PARK AVENUE
KING OF PRUSSIA, PENNSYLVANIA 19406

NOV 20 1979

Docket Nos. 50-245

Northeast Nuclear Energy Company
ATTN: Mr. W. G. Counsil
Vice President - Nuclear
Engineering and Operations
P. O. Box 270
Hartford, Connecticut 06101

Gentlemen:

The enclosed IE Bulletin 79-26 is forwarded to you for action. A written response is required. If you desire additional information regarding this matter, please contact this office.

Sincerely,

James M. Allan

Boyce H. Grier
Director

Enclosures:
1. IE Bulletin No. 79-26
2. List of Recently Issued Bulletins

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ENCLOSURE 1

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, D.C. 20555

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IE Bulletin No. 79-26
Date: November 20, 1979

BORON LOSS FROM BWR CONTROL BLADES

Description of Circumstances:

The General Electric Company (GE) has informed us of a failure mode for control blades which can cause a loss of boron poison material. Hot cell examinations of both foreign and domestic blades have revealed cracks near the upper end of stainless steel tubing and loss of boron from the tubes. The cracks and boron loss have so far been confined to locations in the poison tubes with more than 50 percent Boron-10 (B^{10}) local depletion. Observed crack sizes range from a quarter to a half inch in length and from one to two mils in width.

GE has postulated that the cracking is due to stress corrosion induced by solidification of boron carbide (B_4C) particles and swelling of the compacted B_4C as helium and lithium concentrations grow. Once primary coolant penetrates the cladding (i.e., the cracking has progressed through the cladding wall and the helium-lithium pressures are sufficient to open the crack), boron is leached out of the tube at locations with more than 50 percent B^{10} local depletion (local depletion is considered to be twice the average depletion). It was further found with similar cracking but with less than 50 percent local depletion of B^{10}, that leaching did not occur even though primary coolant had penetrated the cladding.

The cracking and boron loss shorten the design life of the control blade. According to the GE criteria the end of design life is reached when the reactivity worth of the blade is reduced by 10 percent, which corresponds to 42 percent B^{10} depletion averaged over the top quarter of the control blade. Because of the leaching mechanism, GE has reduced the allowance for B^{10} depletion averaged over the top quarter of the control blade from the 42 percent value to 34 percent.

The safety significance of boron loss is its impact on shutdown capability and scram reactivity. Although shutdown capability is demonstrated by shutdown margin tests after refueling, the calcu
tests are based on the assumption that
in scram reactivity due to boron loss c
Power Ratio (CPR) reductions during the
the consequences of control rod drop ac

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