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

August 29, 1980

Docket No. 50-333

Power Authority of the State of New York
James A. FitzPatrick Nuclear Power Plant
ATTN: Mr. R. J. Pasternak
Resident Manager
P. O. Box 41
Lycoming, New York 13093

Gentlemen:

Enclosed is IE Bulletin No. 79-26, Revision 1, which requires action by you with respect to your nuclear power facility(ies). The original IE Bulletin No. 79-26 has been revised to adjust the required completion date for reporting the results of examination of an exposed control blade and to correct a typographical error. The revision is identified by use of "R1" in the right margin.

In order to assist the NRC in evaluating the value/impact of each Bulletin on licensees, it would be helpful if your would provide an estimate of the manpower expended in conduct of the review and preparation of the report(s) required by the Bulletin. Please estimate separately the manpower associated with corrective actions following identification of problems through the Bulletin.

Should you have any questions regarding the Bulletin or actions required by you, please contact this office.

Sincerely,

James M. Allan

Boyce H. Grier
Director

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

CONTACT: D. L. Caphton
(215-337-5266)

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cc w/encls:
George T. Berry, President and Chief Operating Officer
J. P. Bayne, Senior Vice President-Nuclear Generation
A. Klausmann, Director, Quality Assurance
M. C. Cosgrove, Site Quality Assurance Engineer
J. F. Davis, Chairman, Safety Review Committee
C. M. Pratt, Assistant General Counsel
G. M. Wilverding, Manager-Nuclear Licensing

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

August 29, 1980

IE Bulletin No. 79-26 Rev. 1

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 calculated control blade worths used in the tests are based on the assumption that no boron loss has occurred. Reduction in scram reactivity due to boron loss could increase the severity of Critical Power Ratio (CPR) reductions during [illegible]ant transients and could increase [illegible]ents.