



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION III  
799 ROOSEVELT ROAD  
GLEN FLYNN, ILLINOIS 60137

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NOV 20 1979

Docket No. 50-255

Consumers Power Company  
ATTN: Mr. R. B. DeWitt  
Vice President  
Nuclear Operations  
212 West Michigan Avenue  
Jackson, MI 49201

Gentlemen:

The enclosed IE Bulletin No. 79-26 is forwarded to you for information.  
No written response is required. If you desire additional information regarding  
this matter, please contact this office.

Sincerely,

*for* *James W. Roney*  
James G. Keppler  
Director

Enclosure: IE Bulletin  
No. 79-26

cc w/encl:  
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Central Files  
Director, NRR/DPM  
Director, NRR/DOR  
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Service Commission  
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November 20, 1979

IE Bulletin No. 79-26

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 safety significance of boron loss is...  
scram reactivity. Although shutdown ca

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