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

DEC 4 1979

MEMORANDUM FOR: Steven A. Varga, Acting Assistant Director for Light Water Reactors, DPM

FROM: Richard P. Denise, Acting Assistant Director for Reactor Safety, DSS

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR ZIMMER 1

Plant Name:	Zimmer 1
Docket No.:	50-358
Milestone No.:	12-27
Licensing Stage:	OL
Responsible Branch: and Project Manager:	LWR #1 I. Peltier
Systems Safety Branch Involved:	Core Performance Branch
Description of Review:	Request for Additional Information
Review Status:	Complete

The Reactor Fuels Section of the Core Performance Branch has prepared the enclosed request for additional information for the Zimmer 1 application.

Richard P. Denise, Acting Assistant
Director for Reactor Safety
Division of Systems Safety

Enclosure: As stated

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Request For Zimmer 1

Reactor Fuels Section

231.12 A copy of IE Bulletin No. 79-26 concerning a recently analyzed failure mode for BWR control rod blades is attached. As a result of observed cracks in the control rod cladding, some B_4C is leached out of the tubes which results in decreased reactivity worth. The bulletin lists actions to be taken by licensees of all operating BWR plants.

To proceed toward an operating license for your plant, we need to have your commitment to perform the same actions as required in the Bulletin.

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OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, D.C. 20555

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 42 percent value to 34 percent.

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