



UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

January 24, 1997

Mr. Nicholas J. Liparulo, Manager
Nuclear Safety and Regulatory Activities
Westinghouse Electric Corporation
Pittsburgh, PA 15230

SUBJECT: THE APPLICATION OF LEAK-BEFORE-BREAK (LBB) METHODOLOGY TO THE
FEEDWATER LINE IN THE WESTINGHOUSE AP600 ADVANCED REACTOR DESIGN

Dear Mr. Liparulo:

In a meeting between the Nuclear Regulatory Commission (NRC) staff and Westinghouse on December 5, 1996, the staff committed to reconsider a Westinghouse proposal to apply LBB methodology to the feedwater line in the AP600 advanced reactor design. To date, no operating reactor or advanced reactor design has been approved for the application of LBB on the feedwater system.

This issue is documented in NRC requests for additional information and in the draft safety evaluation report (DSER) issued in November 1994. In the DSER, the staff stated that the application of LBB to the feedwater line was unacceptable. After the DSER was issued, the staff and Westinghouse continued to hold extensive discussions on this issue. In the course of these discussions, the staff raised many concerns regarding the application of LBB to the feedwater line. These concerns included: consideration of water hammer events, thermal stratification, fatigue, erosion/corrosion, and a lack of operating experience with the new AP600 feedwater system design.

The staff recognizes that Westinghouse has made significant improvements in the proposed feedwater system design to address these concerns in an attempt to qualify the system for LBB consideration. However, the staff's concerns have not been completely eliminated. Two complementary unresolved issues remain: (1) the lack of operating experience with the redesigned feedwater system and (2) the uncertainty that exists in accurately assessing the frequency and magnitude of water hammer events.

The staff has considered all of Westinghouse's proposals and analyses to evaluate the application of LBB methodology to the AP600 plant on the basis of its technical merits. The approval of the application of LBB to a system is based on demonstrating that the probability of a rupture in a fluid system pipe is extremely low. This, in turn, requires a thorough understanding of the dynamic loadings that may occur in the system, their frequency of occurrence, and the ability to conservatively predict the magnitude of the loadings. It is the staff's position that the lack of operating experience with the feedwater system as redesigned for AP600 significantly deters our ability to predict the frequency or the magnitude of water hammer events in the AP600. Therefore, it is not possible to predict the likelihood of occurrence of a water hammer event that could invalidate the assumptions of LBB or cause the unanticipated failure of the feedwater line. The staff finds that, at

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this time, it cannot conclude that an "extremely low" probability of pipe rupture exists for the AP600 feedwater system, as is required by 10 CFR Part 50, Appendix A, General Design Criterion 4.

Therefore, the staff must deny the Westinghouse proposal to apply the LBB methodology to the AP600 feedwater line. It is the position of the staff that operating experience with this system is necessary before any other conclusion can be reached. Accordingly, the staff does not plan to expend any additional resources on this issue.

If you have any questions regarding this matter, you can contact Diane Jackson at (301) 415-8548.

Sincerely,

original signed by:

Thomas T. Martin, Director
Division of Reactor Program Management
Office of Nuclear Reactor Regulation

Docket No. 52-003

cc: See next page

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*See previous concurrence

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Westinghouse Electric Corporation

Docket No. 52-003
AP600

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