

October 16, 1995

The Honorable Shirley A. Jackson  
Chairman  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555-0001

Dear Chairman Jackson:

SUBJECT: FATIGUE ACTION PLAN

During the 425th meeting of the Advisory Committee on Reactor Safeguards, October 5-7, 1995, we completed our deliberations on the Fatigue Action Plan that we started during our 424th meeting, September 7-8, 1995. We had the benefit of discussions with representatives of the NRC staff regarding this matter and of the documents referenced.

The Fatigue Action Plan was developed to help resolve Generic Issue 166, "Adequacy of Fatigue Life of Metal Components." It was intended to address three specific issues: (1) the margin against fatigue failure of older nuclear power plants with reactor coolant pressure boundary components designed to ANSI B31.1 requirements rather than the newer ASME Code Section III, Class 1 fatigue requirements; (2) the effects of reactor coolant environments on fatigue life; and (3) the appropriate staff actions when components have cumulative usage factors (CUFs) greater than 1.

The work done on the Fatigue Action Plan by the staff and the additional work supported by the Department of Energy and the Electric Power Research Institute have shown that, even after including environmental effects, the CUFs for almost all reactor components which were originally designed to ASME Code fatigue requirements will still be less than 1. It also showed that the nuclear piping, which had been designed to the ANSI B31.1 requirements, in general has margins against fatigue failure comparable to those achieved by using the ASME Section III, Class 1, fatigue requirements. Although fatigue failures have been experienced in nuclear plants, these failures have been due to unanticipated loads and not to inadequate design margins for the anticipated cyclic loads.

Based on a probabilistic parametric study, the staff concluded that even if fatigue cracks were initiated, rupture of reactor coolant piping as a result of fatigue crack growth would be a low-probability event. We anticipate commenting on this parametric study at a later time.

The summary of the Fatigue Action Plan provides only general guidance for the appropriate actions to be taken when the CUF is greater than 1. However, the supporting documentation suggests that the proposed nonmandatory appendix to Section XI of the ASME Code provides evaluation methods which may be acceptable to the staff. These methods provide a choice of either the traditional CUF approach or a "flaw-tolerance" approach similar to that widely used in the aerospace industry. We agree that these types of evaluations would be appropriate.

We agree with the staff that maintaining the integrity of the reactor coolant pressure boundary is an important element in defense in depth, and that fatigue is a potentially significant mechanism which can degrade the integrity of the pressure boundary. But, on the basis of the work done by the staff and industry, no immediate staff or licensee action is needed.

Dr. William Shack did not participate in the Committee's deliberations regarding this matter.

Sincerely,

/s/

T. S. Kress  
Chairman

References:

1. Draft Commission Paper, received August 30, 1995, from James M. Taylor, Executive Director for Operations, NRC, to the Commissioners, Subject: Completion of the Fatigue Action Plan (Predecisional)
2. U. S. Nuclear Regulatory Commission, NUREG/CR-6260, "Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components," published March 1995
3. SECY-94-191 dated July 26, 1994, from James M. Taylor, Executive Director for Operations, NRC, to the Commissioners, Subject: Fatigue Design of Metal Components
4. Staff Requirements Memorandum dated May 21, 1993, from Samuel Chilk, Secretary of NRC, to John T. Larkins, Executive Director, ACRS, Subject: Periodic Meeting with the Advisory Committee on Reactor Safeguards, Friday May 14, 1993
5. Letter dated August 17, 1992, from David A. Ward, Chairman, ACRS, to James M. Taylor, Executive Director for Operations, NRC, Subject: Related Branch Technical Position On Fatigue Evaluation Procedures