ACRSR-1869

December 10, 1999

Dr. William D. Travers
Executive Director for Operations
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Dr. Travers:

SUBJECT: PROPOSED RESOLUTION OF GENERIC SAFETY ISSUE-190, "FATIGUE EVALUATION OF METAL COMPONENTS FOR 60-YEAR PLANT LIFE"

During the 468th meeting of the Advisory Committee on Reactor Safeguards, December 2-4, 1999, we reviewed the proposed resolution of Generic Safety Issue (GSI)-190, "Fatigue Evaluation of Metal Components for 60-Year Plant Life." During our review, we had the benefit of discussions with representatives of the NRC staff and of the documents referenced.

RECOMMENDATIONS

- We agree with the staff's proposal that GSI-190 be resolved without any additional regulatory requirements.

- The staff should ensure that utilities requesting license renewal consider the management of environmentally assisted fatigue in their aging management programs.

BACKGROUND

The effects of fatigue for the 40-year initial reactor license period were studied and resolved under GSI-78, "Monitoring of Fatigue Transient Limits for Reactor Coolant System," and GSI-166, "Adequacy of Fatigue Life of Metal Components."

The staff concluded that risk from fatigue failure of components in the reactor coolant pressure boundary was very small for 40-year plant life. In our March 14, 1996 letter, we agreed with the staff's conclusion.

GSI-190 was established to address the residual concerns of GSI-78 and GSI-166 regarding the environmental effects of fatigue on pressure boundary components for 60-years of plant operation. The scope of GSI-190 included design-basis fatigue transients, studying the probability of fatigue failure and its effects on core damage frequency (CDF) of selected metal components for 60-year plant life.

DISCUSSION

Resolution of GSI-190 was based on the results of an NRC-sponsored study performed by the Pacific Northwest National Laboratory (PNNL). In that study, PNNL examined design-basis fatigue transients and the probability of fatigue failure of selected metal components for 60-year plant life and the resulting effects on CDF.

The PNNL study showed that some components have cumulative probabilities of crack initiation and through-wall growth that approach unity within the 40- to 60-year period. The maximum failure rate (through-wall cracks per year) was in the range of 10^{-2} per year, and those failures were associated with high cumulative usage factor locations and components with thinner walls, i.e., pipes more vulnerable to through-wall cracks. There was only a modest increase in the frequency of through-wall cracks in major reactor coolant system components having thicker walls. In most cases, the leakage from these through-wall cracks is small and not likely to lead to core damage. Therefore, the projected increased frequency in through-wall cracks between 40- and 60-years of plant life does not significantly increase CDF. Based on the low contributions to CDF, we agree with the proposed resolution of GSI-190.

Environmentally assisted fatigue degradation should be addressed in aging management programs developed for license renewal. Minimization of leakage is important for operational safety, occupational doses, and for continued economic viability of the plants.

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

Sincerely,

/s/

Dana A. Powers
Chairman

References:

1. Memorandum dated November 12, 1999, from Ashok C. Thadani, Director, Office of Nuclear Regulatory Research, NRC, to John T. Larkins, Executive Director, Advisory Committee on Reactor Safeguards, Subject: Generic Safety Issue-190, "Fatigue Evaluation of Metal Components for 60-Year Plant Life."
2. Letter dated March 14, 1996, from T. S. Kress, Chairman, Advisory Committee on Reactor Safeguards, to James M. Taylor, Executive Director for Operations, NRC, Subject: Resolution of Generic Safety Issue-78, "Monitoring of Fatigue Transient Limits for the Reactor Coolant System."
3. Letter dated October 16, 1995, from T. S. Kress, Chairman, Advisory Committee on Reactor Safeguards, to Shirley Ann Jackson, Chairman, NRC, Subject: Fatigue Action Plan.