NUCLEAR MANAGEMENT AND RESOURCES COUNCIL

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William H. Rasin
Vice President & Director
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November 2, 1993

Mr. William T. Russell
Associate Director
Inspection and Technical Assessment
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Russell:

Enclosed is the Electric Power Research Institute (EPRI) Technical Report TR-102901, "Comparison of Piping Designed to ANSI B31.1 and ASME Section III, Class 1." This report is supplied, for information, in response to the September 17, 1993, request that industry provide relevant information that is deemed appropriate for consideration during the execution of the Fatigue Action Plan. Other information is expected to be supplied by NUMARC in the future.

The report, originally written to support license renewal activities, is scheduled for publication by EPRI early next year, but is provided to the NRC staff in pre-publication form for consideration relative to fatigue concerns in operating nuclear power plants.

The evaluation considers two piping systems: (1) a PWR charging line; and (2) a BWR recirculation system. These systems were selected because of the presence of fatigue significant design features (e.g., abrupt geometric changes and loading characteristics {severe thermal transients}) that are known to result in significant calculated fatigue usage factors. As a result, the study findings are expected to have wide applicability to Class 1 piping systems designed to ANSI B31.1.

The report findings can be summarized as follows: With the exception of very few locations, Class 1 piping systems designed to ANSI B31.1 rules can be shown to have an adequate fatigue design basis. Those very few locations that are found to be potentially fatigue-sensitive can be readily identified, and are characterized by a combination of geometric and loading discontinuities.

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It should be noted that this study addressed only analytical comparisons between ANSI B31.1 design calculations and the detailed fatigue design procedures of the current ASME Code Section III, Class 1 rules. No attempt was made to incorporate specific reactor coolant or primary coolant environments on fatigue life, other than those already encompassed by the current ASME Code limits. Specific environmental effects on fatigue life are the subject of other industry activities, such as the Pressure Vessel Research Committee (PVRC) activities. In support, the study results have been communicated to the PVRC and others.

The study only evaluated design-basis transients. No attempt was made to investigate the effect of actual plant transients that are typically less severe. The effect of inherent conservatisms in ASME Code Section III, Class 1 fatigue design procedures, including conservatism due to the definition of design-basis transients, is the subject of a companion project under the sponsorship of the U.S. Department of Energy (DOE), through Sandia National Laboratories (SNL). When this project is completed, further insight into the issue of fatigue in operating plants will be available.

In the interim, the industry is examining generic efforts to assure that: (1) the guidance for identifying potentially fatigue-sensitive locations in ANSI B 31.1 piping systems provided in this report is useful and acceptable; and (2) the serviceability of these fatigue-sensitive locations can be assured by existing programs. The latter could be as the result of inclusion of these fatigue-sensitive locations in plant inservice inspection programs, with appropriate examination intervals, or could be the result of adequate conservatism in the fatigue design evaluation process. Such conservatism includes that due to the definition of design-basis transients relative to actual plant operating transients.

In summary, we believe that this report demonstrates, with the exception identified in the report, that ANSI B31.1 piping systems have adequate fatigue design basis when compared to the ASME Section III, Class 1 criteria. Furthermore, we expect that if actual plant transients are used as the basis for evaluation, the situation characterized by a combination of geometric and loading discontinuities can be demonstrated to have an adequate fatigue basis. Hence, the effective use of industry and NRC staff resources could be best achieved , we believe, if the focus of the NRC ANSI B31.1 evaluation is limited to assuring that the exception identified in the EPRI report is not a safety issue.

The industry plans to provide the NRC staff with periodic updates on the progress of these generic efforts, with the intent of supplying timely information relative to the staff's Fatigue Action Plan. We welcome the opportunity to discuss these results, and any forthcoming data, and to respond to questions, should it be considered appropriate. Should you or your staff have any questions concerning this report, please contact Kurt Cozens of the NUMARC staff.

Sincerely,

William H. Rasin

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Enclosure

c: Terence Chan, NRC/NRR (5 copies)