



UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D. C. 20555

June 9, 1999

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

Dear Dr. Travers:

SUBJECT: PROPOSED RESOLUTION OF GENERIC SAFETY ISSUE-165, SPRING-ACTUATED SAFETY AND RELIEF VALVE RELIABILITY

During the 463rd meeting of the Advisory Committee on Reactor Safeguards, June 2-4, 1999, we reviewed the proposed resolution of Generic Safety Issue (GSI)-165, "Spring-Actuated Safety and Relief Valve Reliability." During our review, we had the benefit of discussions with representatives of the NRC staff. We also had the benefit of the document referenced.

Recommendation

We agree with the staff's proposal to resolve GSI-165 without any regulatory action.

Background

This Generic Issue was identified after licensees, on a number of occasions, reported that spring-actuated safety and relief valves (SRVs) failed to meet set point criteria within the desired tolerance. At the Shearon Harris plant, failure of an SRV had potentially degraded the high head safety injection system. This failure went undetected for a significant period. The primary concern of this GSI was that failure of SRVs in safety-related support systems could cause a significant diversion of flow from these systems and thus prevent the systems from performing their design function. The scope of GSI-165 was limited to small (< 4 inches) SRVs in safety-related support systems, for which no American Society of Mechanical Engineers (ASME) code requirements for testing existed at the time this concern was raised. GSI-165 was assigned high priority based on the results of a preliminary analysis, which showed that failure of SRVs could raise the core damage frequency (CDF) to a value as high as 5×10^{-2} per reactor year.

Discussion

To resolve this GSI, the NRC staff conducted a study with the technical assistance of the Idaho National Engineering and Environmental Laboratory (INEEL). In this study, piping and instrumentation diagrams (P&IDs) were evaluated along with other plant-specific information provided by licensees for a group of five light-water reactors (LWRs) representative of U.S. LWR designs.

None of these plants were found to contain the type of system cross-tying that contributed to the serious degradation of the high head safety injection system at the Shearon Harris plant. It was determined that many safety-related support systems do not have SRVs, or they have SRVs that cannot produce flow diversion sufficient to cause the failure of their train. Only a single oversized valve in one plant was identified as having the potential for failing its train. The analysis showed an increase in CDF of only 6×10^{-6} per reactor year even for this worst-case situation. This CDF is a conservative estimate of risk since the assumed SRV failure rate included all failure modes, most of which do not lead to significant flow diversion of the associated train.

To confirm the generic applicability of these findings to the other operating plants, the NRC staff reviewed the P&IDs of 19 additional plants. In order to review as many diverse configurations as possible, no sister plants were included in this set. This review confirmed the findings of the INEEL study. The number of configurations reviewed appears to be sufficiently large and diverse to justify generic applicability of the conclusions of the INEEL report.

Review of licensee event reports and the nuclear plant reliability data system database did not identify any other instances of valve spring failure besides the one at the Shearon Harris plant. Furthermore, the additional testing requirements originally contemplated as a possible resolution of this GSI were included in the 1986 Edition of the ASME code. That edition was endorsed in the 1992 update of 10 CFR 50.55a, and most plants are already performing this additional testing. This endorsement effectively resolved GSI-165 as early as 1992. As of now, more than 90 percent of all operating plants have included this testing in their inservice testing (IST) programs, and the remaining plants have committed to including this testing in their IST programs by the next refueling outage. We, therefore, agree with the proposed resolution of GSI-165.

Sincerely,



Dana A. Powers
Chairman

Reference:

Memorandum dated April 2, 1999, from John W. Craig, Office of Nuclear Regulatory Research, to John T. Larkins, Executive Director, ACRS, Subject: Review of Generic Safety Issue 165, Spring-Actuated Safety and Relief Valve Reliability.