

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, DC 20555-0001

March 16, 2000

**NRC REGULATORY ISSUE SUMMARY 2000-05
RESOLUTION OF GENERIC SAFETY ISSUE 165,
SPRING-ACTUATED SAFETY AND RELIEF VALVE RELIABILITY**

ADDRESSEES

All holders of operating licenses for nuclear power reactors, except those licensees who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel.

INTENT

The U.S. Nuclear Regulatory Commission (NRC) is issuing this regulatory issue summary (RIS) to notify nuclear power reactor licensees about the staff's resolution of Generic Safety Issue (GSI) 165, "Spring-Actuated Safety and Relief Valve Reliability," and to provide information that may help licensees determine possible improvements in configuring and/or operating various plant systems to reduce safety and relief valve (SRV) malfunctions. This RIS does not transmit any new requirements or staff positions. No specific action or written response is required.

BACKGROUND INFORMATION

Spring-actuated SRVs are used in many systems to protect piping and components from potential overpressure conditions. GSI 165 was identified after failure of a spring-actuated SRV at the Shearon Harris nuclear plant degraded the high-head safety injection (HHSI) system and went undetected for a significant period. The concerns that led to the development of the GSI were as follows: (1) the failure was serious, (2) there were no American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) requirements for testing most SRVs, and (3) little attention had been focused on these components. Consequently, it could not be concluded that the failure at Shearon Harris was unique. The combination of the operating conditions of the HHSI SRVs, the normally cross-tied configuration of the system trains, and the difficulty of detecting the failures, resulted in a conditional core damage probability of 6×10^{-3} per reactor-year (RY) at the Shearon Harris plant, that could be attributed to failure of the HHSI SRVs to open or close as required. In its initial assessment, the staff used a conservatively bounding methodology in which it was estimated that up to 8 percent of the approximately 60 valves of this type in various safety-related systems in a typical plant could be significant contributors to core damage frequency (CDF), if they failed. In addition, the staff estimated that 10 percent of the SRVs would have the capability to fail their trains. A preliminary analysis

indicated that failure of SRVs in a typical plant could raise the CDF to an upper bound value of $5 \times 10^{-2}/\text{RY}$. Finally, the staff estimated that the SRV failure probability could be significantly reduced by having licensees perform economical tests in their plants.

Because significant NRC and industry resources had been spent on both evaluating the risk and improving the reliability of pressurizer safety valves and main steam safety valves in pressurized-water reactors and main steam SRVs in boiling-water reactors, the focus of this issue was limited to smaller spring-actuated SRVs in safety-related support systems and the effects of their unreliability on plant operation.

SUMMARY OF ISSUE

In its evaluation and resolution of GSI 165, the staff found that its initial assumptions used in estimating the risk significance of the issue were overly conservative or had changed. Review of piping and instrument diagrams for important safety-related systems revealed that Shearon Harris was somewhat unique and that the type of system cross-tying that contributed to the seriousness of the Shearon Harris degradation was not present at most other plants. Review of related valve data identified only a single valve configuration found in high pressure safety injection (HPSI) systems in Combustion Engineering plants that had the potential for failing its train. That SRV configuration was analyzed as a worst case. Due to the low probability of failure of both trains of the system, the analysis showed that the increase in CDF for that SRV configuration was acceptably low, $(6 \times 10^{-6}/\text{RY})$. Review of licensee event reports and Nuclear Plant Reliability Data System narratives during data gathering for failure rate estimation did not reveal any other instances of valve spring failure, other than the failure at Shearon Harris. Finally, and perhaps most significantly, the additional testing requirements for these SRVs contemplated in the initial assessment for the resolution of this GSI were included in the 1986 Edition of the ASME Code inservice testing (IST) requirements and continue to be required in the ASME Code. The additional testing is already being performed at all but a few plants, which still use earlier editions of the ASME Code (i.e., 1983 Edition). It is expected that all plants will have updated their IST programs to include the additional testing by the end of 2002. As a result, the NRC staff closed GSI 165 without any new regulatory requirements being issued.

Backfit Discussion

This RIS requests no action or written response. Consequently, the staff did not perform a backfit analysis.

Federal Register Notification

A notice of opportunity for public comment was not published in the *Federal Register* because this RIS is informational.

If there are any questions about this matter, please contact one of the persons listed below, or the appropriate Office of Nuclear Reactor Regulation project manager for a specific nuclear power plant.

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* See previous concurrence

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LIST OF RECENTLY ISSUED
NRC REGULATORY ISSUE SUMMARIES

Regulatory Issue Summary No.	Subject	Date of Issuance	Issued to
2000-04	Operating Reactor Licensing Action Estimates	03/16/2000	All power reactor licensees
2000-03	Resolution of Generic Safety Issue 158: Performance of Safety- Related Power-Operated Valves Under Design Basis Conditions	03/15/2000	All holders of OLs for nuclear reactors, except for those licensees who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel
2000-02	Closure of Generic Safety Issue 23, Reactor Coolant Pump Seal Failure	02/15/2000	All holders of OLs for nuclear reactors, except for those licensees who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel
2000-01	Changes Concerning Foreign Ownership, Control, or Domination of Nuclear Reactor Licensees	01/27/2000	All NRC licensees
1999-06	Voluntary Submission of Performance Indicator Data	12/01/1999	All holders of OLs for nuclear reactors, except for those licensees who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel
1999-05	Implementing Procedure for Power Reactor NOEDs Processed During the Y2K Transition	12/01/1999	All holders of OLs for nuclear power reactors, except for those licensees who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel

