

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555

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NRC INFORMATION NOTICE 2006-24: RECENT OPERATING EXPERIENCE
ASSOCIATED WITH PRESSURIZER AND MAIN
STEAM SAFETY/RELIEF VALVE LIFT
SETPOINTS

ADDRESSEES

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

PURPOSE

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice (IN) to alert addressees of operating experience insights associated with the pressurizer safety valves (PSVs), main steam safety valves (MSSVs) and boiling-water reactor (BWR) safety/relief valves (SRVs) involving valves that exceeded the lift setpoint tolerance required by technical specifications (TS). It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this IN are not NRC requirements; therefore, no specific action or written response is required.

DESCRIPTION OF CIRCUMSTANCES

The NRC staff reviewed licensee event reports (LERs) that were submitted in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.73, and found that from 2001 through August 2006, 72 LERs involved instances where PSVs, MSSVs or SRVs failed to meet the TS-allowed lift setpoint tolerance. Specifically, the NRC staff noted there were 11 LERs in 2001, 17 LERs in 2002, 9 LERs in 2003, 6 LERs in 2004, 14 LERs in 2005, and 8 LERs in 2006 (as of August).

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The PSVs, MSSVs and SRVs are typically tested during outages, or removed during outages and tested afterwards. When found outside their acceptance criteria, the valves have most likely been in use during plant power operation with the lift setpoint outside the required tolerance limit specified by TS. Therefore, it is important that appropriate preventive and corrective measures be taken to ensure the valves' reliable operation prior to installation.

Many LERs describe comprehensive root cause analyses and corrective actions. The LERs of 2005 and 2006 indicated that some of the main and contributing root causes included: random setpoint drift, corrosion bonding/binding of the valve disk and seat assembly, micro galling of the valve seat, foreign material, and manufacturing or installation defects. Setpoint drift is the result of many random variables and is usually considered a function of time since calibration and setting. Corrosion bonding and micro galling have been common industry problems related to design problems and operational conditions. Some of the corrective actions that were planned or taken include: replacing the valve disks with the pre-oxidized X-750 Inconel material (which is believed to be less susceptible to corrosion), revision of test periodicity, and enhanced use of operating experience to identify emerging failure mechanisms and prevent them.

Operating experience shows that new failure mechanisms or root causes can emerge. For example, a licensee reported in its LER in 2005 that one SRV pilot setpoint remained out of tolerance high, and it was caused by internal binding between the SRV pilot rod and spherical collar, which resulted from a lack of a chamfer on the spherical collar. This was considered a unique case, as industry operating experience and the vendor refurbishment experience showed that there were no previous similar failures. (The additional details for this particular event are available in Agencywide Documents Access and Management System (ADAMS) Accession No. ML051660231.)

The NRC staff's evaluation of the LERs for 2005 and 2006 revealed that the safety significance of individual events was generally low or minimal since the as-found valve setpoints were within the American Society of Mechanical Engineers' (ASME) tolerance limit or within the accident analyses. However, a licensee reported in its LER in 2005 that one of the SRVs failed to reclose when tested. If the valve had actuated during plant operation, it could have stayed open, causing a plant transient or complicating a transient that caused the valve actuation. The licensee determined that likely cause was improper orientation of the main spring during valve re-assembly at an offsite facility. (The additional details for this particular event are available in ADAMS Accession No. ML053270220.)

Since 2005, NRC inspectors identified several findings involving a non-cited violations of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions," for the licensees' lack of timely actions to promptly identify and correct out-of-tolerance lift setpoints for the valves specified. Although the findings were all Green, i.e., issues of very low significance, the number of findings along with the number of reported events highlight the extent of the valve setpoint issue at various plants.

BACKGROUND

The issue of pressurizer and main steam safety or relief valve lift setpoints found to be out of tolerance has been a longstanding industry issue that has been the subject of a number of previous NRC generic communications including:

- IE Bulletin 80-25, "Operating Problems with Target Rock Safety-Relief Valves at BWRs"
- IN 82-41, "Failure of Safety/Relief Valves to Open at a BWR"
- IN 83-82, "Failure of Safety/Relief Valves to Open at a BWR - Final Report"
- IN 84-33, "Main Steam Safety Valve Failures Caused by Failed Cotter Pins"
- IN 85-05 and its Supplement, "Main Steam Safety Valve Test Failures and Ring Setting Adjustments"
- IN 86-56, "Reliability of Main Steam Safety Valves"
- IN 86-12, "Target Rock Two-Stage SRV Setpoint Drift"
- IN 88-30, "Target Rock Two-Stage SRV Setpoint Drift Update"
- IN 95-56, "Inaccuracy of Safety Valve Set Pressure Determinations Using Assist Devices"
- IN 96-03, "Main Steam Safety Valve Setpoint Variation as a Result of Thermal Effects"

DISCUSSION

The PSVs, MSSVs, and SRVs are used to satisfy ASME Code requirements for overpressure protection and are designed to prevent the system pressure from exceeding a limit of 110% of the design pressure. The valves are also credited in mitigating the effects of postulated accidents (e.g., loss of external electrical load, loss of normal feedwater). The consequences of exceeding the ASME pressure limit could include damage to system components, increased leakage, or a requirement to perform additional stress analyses prior to resumption of reactor operation.

Despite previous industry efforts to address this longstanding problem, 72 LERs were submitted during the period 2001 through August 2006 involving the as-found lift setpoint being outside the specified TS limit. Random setpoint drift is a recognized phenomenon that is valid for licensees to include their LER root cause discussion. However, when several out-of-tolerance valves are routinely identified at particular plant, this suggests that other causes may also be a factor. There is a great deal of operating experience available to licensees to assist them in identifying and correcting these other causes. While the safety significance of recent instances of out-of-tolerance valves has been minimal, some plants have found it necessary to perform the surveillance and maintenance more frequently in order to achieve acceptable valve performance.

CONTACT

This information notice does not require any specific action or written response. Please direct any questions about this matter to the technical contacts listed below.

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Note: NRC generic communications may be found on the NRC public Web site, <http://www.nrc.gov>, under Electronic Reading Room/Document Collections.