

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

November 20, 1996

NRC INFORMATION NOTICE 96-61: FAILURE OF A MAIN STEAM SAFETY VALVE TO RESEAT CAUSED BY AN IMPROPERLY INSTALLED RELEASE NUT

Addressees

All holders of operating licenses or construction permits for nuclear power reactors.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees to the failure of a main steam safety valve (MSSV) to reseat during a plant transient as a result of an improperly installed release nut. 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 information notice are not NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances

At Arkansas Nuclear One, Unit 1 (ANO-1), there are eight MSSVs on each of the A and B steam generators. On May 19, 1996, the plant experienced a feedwater transient and a reactor trip. Six of the MSSVs on the B steam header opened as designed, but one of these failed to close following the secondary overpressure condition. As a result of the stuck-open MSSV (PSV-2685), the secondary side of the B steam generator was isolated in accordance with plant emergency procedures and allowed to coil dry. None of the A MSSVs opened during this event, and the A steam generator remained operable.

The licensee determined that PSV-2685 failed to reseat because a release nut on the valve spindle had been improperly installed. The release nut is installed to provide a surface against which a lifting lever can bear to permit opening of the valve manually. The nut is castellated to provide a slot through which a cotter pin may be aligned with a hole in the spindle so that, with the cotter pin engaged in the slot and extending through the hole in the stem, the nut would be prevented from turning. With the nut held in its fixed position, there was to be a specified clearance between the bottom of the nut and the top of the lifting lever beneath to allow for expansion and contraction of the spindle during thermal cycles. Following the ANO-1 event, the licensee found that the release nut had been threaded onto the valve spindle at a position too low to be properly staked by the cotter pin. Because the cotter pin could not prevent the rotation of the nut, vibration occurring during the valve discharge caused the nut to turn and travel down the stem until it rested upon the lifting lever mechanism. Without any clearance between the bottom of the nut and the top of the lever, the valve was held open.

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As a result of its review of the event, the licensee concluded that a contributing cause of the problem was an inadequate instruction related to establishing the proper position of the release nut with respect to the cotter pin hole in the stem. The instruction, derived from vendor guidance, specified the clearance between the release nut and the lifting lever as 1/16 inch to 1/8 inch. The minimum value of 1/16 inch was necessary to allow enough space to accommodate thermal effects on clearances, but the maximum value of 1/8 inch was an unneeded limitation that distracted attention from the need to ensure that the nut was staked sufficiently with the cotter pin to preclude nut rotation. The licensee changed the maintenance procedure to eliminate the confusion about the nut-to-lever clearance and modified the design of the release nut to increase the depth of the slot, thereby providing greater assurance of proper engagement between the cotter pin and the nut. In subsequent action, the licensee determined that the manual lifting devices were unnecessary from an operational standpoint and removed the lever and nut assemblies from all the steam safety valves.

The licensee also found other MSSVs that had less-than-desirable engagement between the release nut and the cotter pin. These valves were on the main steam headers from both the A and the B steam generators. If a transient caused valves on both headers to open and they failed to reseat, reactor decay heat removal could have been accomplished using main or emergency feedwater in a "trickle-feed" process specified in the existing emergency operating procedures.

Discussion

Other operating reactor events have occurred that involved the failure of MSSVs to reseat as a result of the rotation of release nuts. In February 1984, at St. Lucie Unit 2, an MSSV stuck partially open following the actuation of the valve. An MSSV at the Davis-Besse Nuclear Power Station stuck open in March 1984, permitting the steam generator to boil dry. In both of these events, the release nuts on the MSSVs rotated because the cotter pins had corroded and failed. The corrective actions consisted of either replacing the cotter pins with stainless steel pins or removing those parts of the lifting mechanism that the release nut would contact if the nut were to rotate downward. These events are addressed in NRC Information Notice 84-33, "Main Steam Safety Valve Failures Caused by Failed Cotter Pins." More recently, in 1993, an MSSV failed to reseat at Crystal River Unit 3 because the release nut was not engaged with the cotter pin, just as in the current ANO-1 event. The Crystal River event is described in Licensee Event Report 93-09, submitted to the NRC by the licensee, Florida Power Corporation, by letter dated October 13, 1993, Docket No. 50-302.

Licensees have also reported situations in which the cotter pins were missing from the release nuts. A main steam safety valve failed to reseat at ANO-1 in May 1989 because the cotter pin was missing, as reported in Licensee Event Report 89-018. The Oconee licensee reported, under the requirements of 10 CFR Part 50.72, that, during inspections of Units 2 and 3 on October 14, and October 24, 1996, respectively, cotter pins were missing from 4 of 16 main steam safety valves on Unit 2 and from 2 of 16 valves on Unit 3. On

October 31, 1996, the Millstone licensee reported, also under the requirements of 10 CFR Part 50.72, that inspection of the main steam safety valves on Unit 3 showed that the cotter pins were missing from 2 of the 20 valves.

The valves at ANO-1, Davis-Besse, Crystal River, and Millstone were manufactured by Dresser Industries, Inc. The valves at St. Lucie and Oconee were manufactured by Crosby Valve and Gage company.

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.



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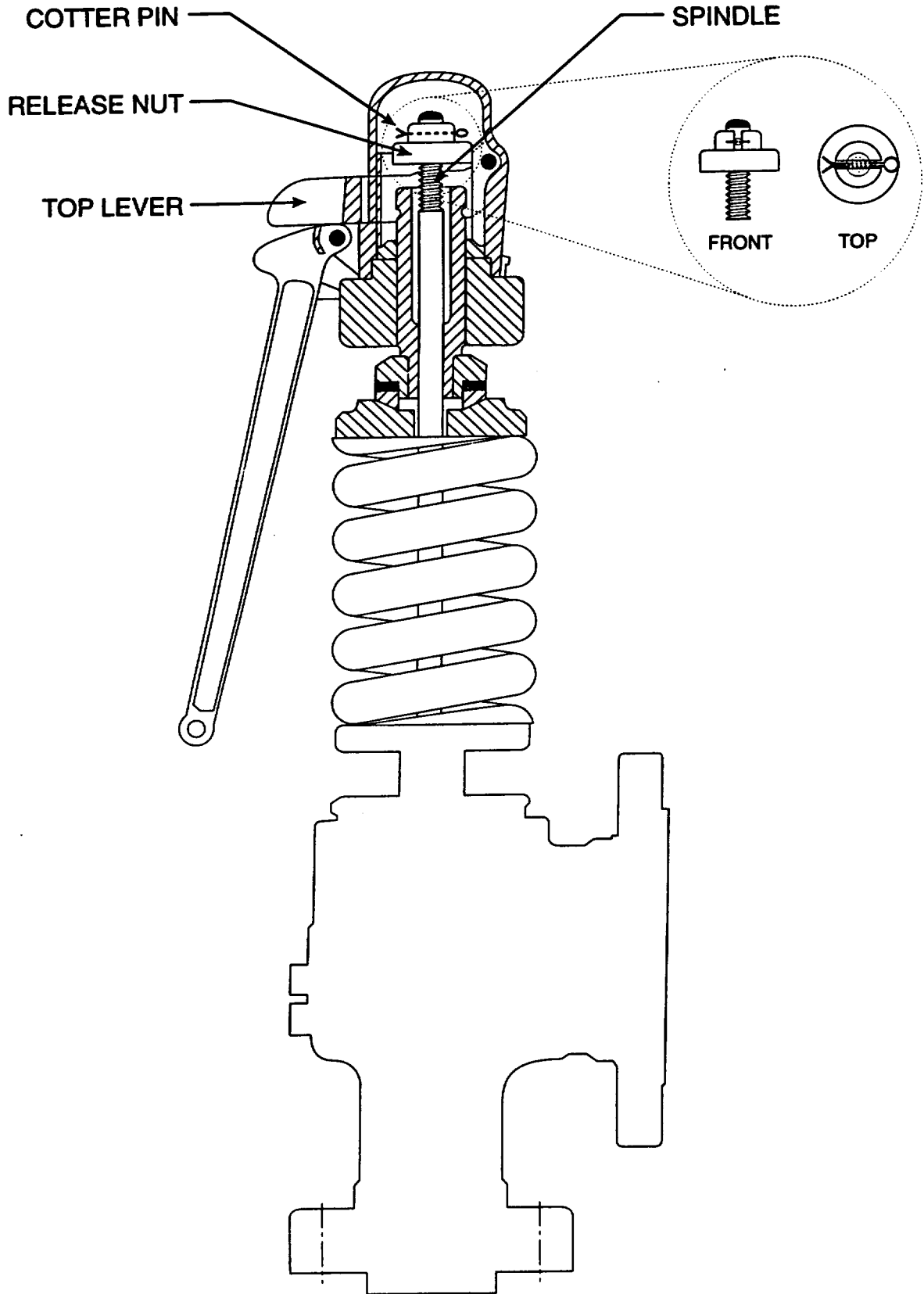
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Attachments:

1. Steam Safety Valve
2. List of Recently Issued NRC Information Notices

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STEAM SAFETY VALVE



LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
96-60	Potential Common-Mode Post-Accident Failure of Residual Heat Removal Heat Exchangers	11/14/96	All holders of OLs or CPs for nuclear power reactors
96-59	Potential Degradation of Post Loss-of-Coolant Recirculation Capability as a Result of Debris	10/30/96	All holders of OLs or CPs for nuclear power reactors
96-58	RCP Seal Replacement with Pump on Backseat	10/30/96	All holders of OLs or CPs for pressurized-water reactors
96-57	Incident-Reporting Requirements Involving Intakes, During a 24-Hour Period That May Cause a Total Effective Dose Equivalent in Excess of 0.05 Sv (5 rems)	10/29/96	All U.S. Nuclear Regulatory Commission licensees

OL = Operating License
CP = Construction Permit

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- Tech Editor reviewed and concurred on 08/24/96

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