

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

March 23, 1989

NRC INFORMATION NOTICE NO. 89-32: SURVEILLANCE TESTING OF LOW-TEMPERATURE  
OVERPRESSURE-PROTECTION SYSTEMS

Addressees:

All holders of operating licenses or construction permits for pressurized-water reactors (PWRs).

Purpose:

This information notice is being provided to alert addressees to potential operability problems due to lack of inservice testing of power-operated relief valves (PORVs) in their low-temperature overpressure-protection (LTOP) mode. 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 do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

Beaver Valley: During an inspection (Inspection Report No. 50-334, 412/86-20), NRC inspectors noted that technical specifications (TS) require that overpressure protection be provided by two PORVs with a nominal trip setpoint of less than or equal to 350 psig whenever the temperature of a non-isolated reactor coolant system (RCS) cold leg is less than or equal to 275°F. The TS surveillance requirement only addresses stroking the operable PORV each time the plant enters Mode 5 (cold shutdown) unless that PORV has been tested within the preceding three months.

The licensee analyzed two cases for an overpressure accident scenario: (1) a mass input case and (2) a heat input case. The most restrictive PORV opening time was identified as the mass input accident which would require a valve to open within 2.5 seconds. An NRC safety evaluation report (SER) dated April 4, 1983 found this analysis to be acceptable. A review of the licensee's maintenance surveillance procedure indicated that the nominal trip setpoint of less than or equal to 350 psig was addressed, but the stroke time was not.

Plant TS and procedures had not implemented PORV stroke times as assumed in the analysis. The licensee performed an evaluation using data from the station's ASME Valve Stroke Log, when compared to SER stroke time assumptions. The licensee

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concluded that the resulting maximum RCS pressure would still have been within specified limits. However, the licensee initiated several procedural improvements to address PORV stroke testing.

Turkey Point: The staff inspected the licensee's overpressure mitigation system (OMS) (Inspection Report Nos. 50-250, 251/88-14 and 88-26). The PORV electronics operability and setpoints are verified before being aligned for low-pressure operations. The inspectors reviewed the stroke times for the Unit 3 and 4 PORVs from May 1984 through May 1988. These tests were performed in accordance with the licensee's inservice test (IST) program. The IST requirement for each PORV is to fully stroke within 15 seconds. The stroke times reviewed ranged from less than 2.0 seconds up to 6.41 seconds. These stroke times are well below the 15-second IST criterion. However, in analyses supporting license amendments, a relief valve opening time of 2.0 seconds was assumed in calculating the setpoint overshoot for the mass input case. The heat input case assumed a relief valve opening time of 3.0 seconds. The PORVs, on average, were not meeting the design-basis stroke time.

The licensee requested relief from the TS requirement in order to prepare for the eventual refueling outage that would place one of the units within the operating regime of the OMS. The request extended to the next refueling outage for each of the units in order to allow the licensee time to resolve this issue. The licensee requested that Westinghouse perform an analysis to determine the magnitude of the overshoot considering the following transients: 1) the start of an idle reactor coolant pump with the secondary water temperature of the steam generator less than or equal to 50°F above the RCS cold-leg temperature; 2) the start of a high pressure safety injection pump and its injection into a water-solid RCS and 3) the inadvertent start of two charging pumps with a loss of letdown. The safety evaluation demonstrated that with a PORV opening stroke time up to 3.45, the OMS could mitigate the most limiting transient (spurious start of a SI pump). The licensee has completed a design change for Unit 4 and is planning to implement the design change on Unit 3 during the next refueling outage. This design change will ensure that the PORVs will open in time to prevent exceeding the 10 CFR 50, Appendix G limits. The surveillance procedures supporting the TS were changed so that future stroke time testing will use an acceptance criterion that is consistent with the design basis.

Shearon Harris: NRC inspectors assessing operational performance (Inspection Report No. 50-400/88-34) noted a discrepancy concerning the testing of the pressurizer PORVs. An IST procedure specified that the PORVs were to be stroke tested from the open to closed position with a maximum stroke time of 2.0 seconds. The licensee tested the PORVs in accordance with an 18-month surveillance test for pressurizer PORV operability. Although no safety analysis credit was taken for the PORVs at power operation, they were required to provide overpressure protection (by opening on demand) during low-temperature operation. Shearon Harris utilizes two of the three PORVs for the LTOP system.

The design basis of the licensee's LTOP is to protect the RCS from overpressure when the transient is limited to: (1) start of an idle reactor coolant pump with secondary-side water temperature less than 50°F above RCS cold-leg temperature or (2) start of a charging safety injection pump and its injection into a water-solid RCS. The PORV setpoints were calculated to maintain the RCS below the maximum allowable system pressure given in 10 CFR 50 Appendix G. The setpoint calculations assumed a valve opening time of 2.0 seconds in determining the possible overshoot. The inspectors noted that if the actual valve opening times were greater than 2.0 seconds, then the pressure overshoot could be greater than originally calculated. A significant increase in valve opening time could result in the 10 CFR 50 Appendix G limits being exceeded during a design-basis transient.

The PORVs were stroked in the open direction so that the licensee could perform the time-to-close test. However, the surveillance procedure did not require that the time to open be determined, and this was not done.

Discussion:

The basic issue in these three cases is that the licensee's inservice testing of its low-temperature overpressure-protection (LTOP) systems may be inadequate. Stroke time requirements used in analyses of the licensee's LTOP systems were not being transferred into IST requirements and eventually into surveillance test procedures. The ASME Code, Section XI, paragraph IWV-3400, requires valves to be exercised to the position required to fulfill their function. Therefore, not testing the LTOP PORVs in the open direction is a concern.

No specific action or written response is required by this information notice. If you have any questions about this matter, please contact one of the technical contacts listed below or the Regional Administrator of the appropriate regional office.

*Charles E. Rossi*  
Charles E. Rossi, Director  
Division of Operational Events Assessment  
Office of Nuclear Reactor Regulation

Technical Contacts: Milton Shymlock, RII  
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Thomas McElhinney, Res. Insp., Turkey Pt.  
(305) 245-7669

Attachment: List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED  
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
89-31	Swelling and Cracking of Hafnium Control Rods	3/22/89	All holders of OLs or CPs for PWRs with Hafnium control rods.
89-30	High Temperature Environments at Nuclear Power Plants	3/15/89	All holders of OLs or CPs for nuclear power reactors.
89-29	Potential Failure of ASEA Brown Boveri Circuit Breakers During Seismic Event	3/15/89	All holders of OLs or CPs for nuclear power reactors.
89-28	Weight and Center of Gravity Discrepancies for Copes-Yulcan Air-Operated Valves	3/14/89	All holders of OLs or CPs for nuclear power reactors.
89-27	Limitations on the Use of Waste Forms and High Integrity Containers for the Disposal of Low-Level Radioactive Waste	3/8/89	All holders of OLs or CPs for nuclear power reactors, fuel cycle licenses and certain by-product materials licenses.
89-26	Instrument Air Supply to Safety-Related Equipment	3/7/89	All holders of OLs or CPs for nuclear power reactors.
89-25	Unauthorized Transfer of Ownership or Control of Licensed Activities	3/7/89	All U.S. NRC source, byproduct, and special nuclear material licensees.
89-24	Nuclear Criticality Safety	3/6/89	All fuel cycle licensees and other licensees possessing more than critical mass quantities of special nuclear material.

OL = Operating License  
CP = Construction Permit

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