

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

August 31, 1987

**NRC INFORMATION NOTICE NO. 87-40: BACKSEATING VALVES ROUTINELY TO  
PREVENT PACKING LEAKAGE**

Addressees:

All nuclear power reactor facilities holding an operating license or a construction permit.

Purpose:

This information notice is provided to alert recipients to potentially significant safety problems that could be caused by backseating valves routinely to prevent packing leakage. It is expected that recipients will review the information for applicability to their facilities and consider actions, if appropriate, to preclude a similar problem. However, suggestions contained in this notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

On June 12, 1987, Virginia Electric and Power Company reported (Licensee Event Report [LER] 87-011-00) that on May 16, 1987, a low flow reactor trip occurred at its Surry Power Station, Unit 1. The cause of the low flow was the failure of the stem of the A hot leg loop stop valve. The stem failure permitted the disk to drop and partially block flow in the A loop. The licensee is performing a detailed metallurgical examination to determine the failure mode and mechanism of the valve stem. The preliminary report indicated that failure was due to stress or fatigue.

Before this event, the licensee had routinely backseated the loop stop valves as part of its Containment Checklist Procedure before startup. In accordance with this procedure, the valves were manually torqued onto their backseats to 1/16-inch deflection while the unit was in cold shutdown. This value was reverified when the unit reached a hot shutdown condition. To reduce the stress on the valve stem, the licensee is revising the operating procedure so that the valves are normally operated off the backseat.

A similar event had occurred with the B hot leg loop stop valve on December 1, 1973. This failure was evaluated by Westinghouse, and a failure report, "Surry Unit No. 1 Reactor Coolant Isolation Valve Stem Failure Report," was issued on March 7, 1974. In the report, the failure mechanism was identified as a high

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strain, low-cycle failure with little deformation. The high strain was attributed to the licensee's practice of routinely electrically backseating the valves on torque during plant startup. In this method, the valve's motor operator is used to drive the valve open until the forces resulting from the disk pressing against the backseat are high enough to cause the open torque switch to open. This practice caused the valve stem to be subjected to high stresses each time the valve was opened. Depending on the gearing within the motor operator, these stresses may have remained until the valve was closed during the next plant shutdown.

The report recommended that the valves not be electrically backseated on torque. It further recommended that if backseating became necessary during maintenance, it should be done manually by the use of the handwheel with minimum applied load and without exceeding the compensating spring pack deflection specified in the manufacturer's revised instruction manual. This manual, "Instruction Manual Motor Operated Reactor Coolant 30" Loop Stop Valves for Reactor Coolant System Westinghouse WNES 546-CAK-70497B Darling Valve S.O. E-5004," states in a caution that manual backseating is permissible only if the open deflector indicator reading does not exceed 1/16-inch maximum and that manual backseating may be used only when the packing needs replacement. As noted above, contrary to this recommendation, it had been the licensee's recent policy to routinely manually backseat these valves during plant startup.

Before the 1973 valve stem failure, it had been the licensee's practice to routinely electrically backseat the valves during plant startup. Although Virginia Electric and Power Company had stopped this practice in 1974, the NRC staff is aware that other licensees routinely electrically backseat valves. The most common reason for this is to stop valve leakage from around the stem on valves that are not readily accessible during plant operations.

The following inspection reports reflect current practices and problems related to electrical backseating.

- (1) NRC Inspection Report 50-321/85-34 provides the results of an inspection at Edwin I. Hatch Nuclear Plant, Unit 1, performed between November 10 and December 20, 1985. In the report, the inspectors noted observing information tags that indicated that the reactor core isolation cooling (RCIC) system inboard steam line isolation and the reactor water cleanup (RWCU) system inboard isolation valves had been electrically backseated. The operating personnel indicated that they were not aware that any testing had been done to verify that the valves would close within the required time limits. A violation was issued when subsequent testing of the RWCU valve demonstrated that it could not close within the required time limits. Additional testing of the RWCU valve showed that it did meet the closure time limits when it was not starting from a backseated condition.

NRC Inspection Report 50-321/86-22 and 50-366/86-22 provides the results of an inspection performed at Hatch Units 1 and 2 between July 28 and August 1, 1986. In the report, the inspectors noted that the licensee routinely electrically backseated containment isolation valves in the high pressure coolant injection, RCIC, RWCU, and recirculating pump systems.

Review of maintenance records indicated that the valves had been electrically backseated as many as 18 times during the previous 2 years. The procedure used by the licensee to electrically backseat the valves consisted of bypassing the open limit switch and then driving the valve disk onto the backseat until the locked motor current of the motor was approached.

- (2) NRC Inspection Report 50-277/86-25 provides the results of an inspection at Peach Bottom Atomic Power Station, Unit 2, performed between December 8 and 19, 1986. In the report, the inspectors noted the licensee's practice of electrically backseating valves suspected of having excessive packing leakage. The procedure used by the licensee involved an operator manually closing the motor contacts at the motor control center. The contacts were held closed until the operator noticed an increase in the motor current shown on a clamp-on amp meter.

Discussion:

General Electric Company's Service Information Letter (SIL) 385 issued November 1982 discusses potential valve damage and provides recommendations for motor-operated valves that are normally backseated or are subjected to excessive backseating torque. This describes the types of damage that could be the result of backseating as valve stem failure, valve stem elongation, backseat damage, cracking of the stem nut, and other related component distress. It also notes that most damage progresses slowly to the point where valve operability is uncertain or valve failure occurs, before the damage is apparent. Among the recommendations were:

- (1) identification of the valves that are normally backseated or that may have had excessive backseating torque applied and establishment of a program for evaluation, inspection, and repair of these valves
- (2) consultation with valve and motor operator vendors to establish any procedures or modifications that could minimize damage, including the use of torque switches or other vendor-recommended alternatives to backseating motor-operated valves.

The inspectors also indicated that the licensees for the Hatch and Peach Bottom plants are taking actions to prevent recurring packing leaks. Georgia Power Company is instituting a program at the Hatch units to replace the packing on these valves at regular intervals and also plans to live load the packing to help prevent packing leakage. At Peach Bottom, Philadelphia Electric Company is modifying the packing gland area, replacing the existing asbestos-based packing with graphite packing, installing carbon bushings, and live loading the packing.

The information herein is being provided as an early notification of a possibly significant matter that is still under consideration by the NRC staff. If NRC evaluation so indicates, further licensee action may be requested.

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

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						C/OGCB:DOEA:NRR
						CHBerlinger <i>CHB</i>
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