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OFFICE OF INSPECTION AND ENFORCEMENT
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IE Bulletin No. 80-25: OPERATING PROBLEMS WITH TARGET ROCK SAFETY-RELIEF
VALVES AT BWRs

Description of Circumstances:

Five events have occurred over a three-month period involving two types of malfunctions of the Target Rock (TR) safety-relief (S/R) valves at Boston Edison Company's Pilgrim Nuclear Power Station Unit 1. On two occasions (July 25 and August 1, 1980), the "D" S/R valve failed to open in response to manual demand. This same "D" valve failed to reclose in response to manual control actions on October 1, 1980. On October 7 and 31, 1980, the "A" S/R valve opened spuriously while the reactor was operating at power and did not reclose in response to repeated attempts until the reactor was shut down and the reactor coolant system depressurized. The first three events represented failures of the S/R valve, whereas the last two events resulted from failures of the nitrogen supply system pressure regulation.

The S/R valves at Pilgrim are two-stage, pilot-operated, dual-purpose valves designed by Target Rock Corporation in accordance with GE criteria for service application in the GE BWR main steam system. The two-stage S/R valve has been designed to replace the TR three-stage S/R valve that had a tendency to leak at the pilot valve and thereby keep the main disk from reseating. The replacement of the three-stage valves at Pilgrim was accomplished during the refueling outage that was completed in May 1980. The Pilgrim reactor has four of the two-stage S/R valves installed plus two spring-loaded safety valves.

When the "D" S/R valve failed to open on July 25, 1980, this event was determined to be caused by a failure of its solenoid actuator to function. During fabrication, the excessive use of Loc-tite (i.e., a trademark adhesive for nuts and bolts) caused the solenoid plunger to adhere to the bonnet, thus preventing pneumatic pressure from entering the pneumatic operator.

When the second failure of the "D" valve to open on August 1, 1980 was investigated, no discrete cause was found. The investigation involved the removal, disassembly, inspection and testing of only the top-works of the valve. It did not include, however, a corresponding inspection and testing of the main-stage internals including the piston and guide.

The October 1, 1980 failure of the "D" valve to reclose was concluded to be caused by foreign material being lodged between piston and guide of the main stage of the valve. This conclusion was reached when scoring marks on the surfaces of the piston and guide were found, although no foreign material was recovered.

The two remaining events of October 7 and 31, 1980 involved the "A" S/R valve that spuriously opened and depressurized the reactor coolant system. These events represented failures of the pneumatic system when excessive pressure in the nitrogen supply system caused the "A" valve to open and then to stay open. The events were addressed in IE Information Notice No. 80-40, "Excessive Nitrogen Supply Pressure Actuates Safety-Relief Valve Operation to Cause Reactor Depressurization," that was issued on November 7, 1980. General Electric recently provided recommendations with regard to these two events caused by high pneumatic supply pressure.

Action to be Taken by Utilities with BWR Plants with Operating Licenses or Near-Term Operating Licenses:

1. If your facility has not yet installed or changed or is presently in the process of changing to the two-stage S/R valves, initiate appropriate quality control procedures to assure inspection of the solenoid actuators for excess Loctite prior to operation. If the solenoid actuator manufactured by Target Rock Corporation is already installed in your facility, confirm its operability either by its operational performance (i.e., it has functioned as designed following an aging period of about 3 months in the higher temperature environment of power operating conditions) or by functional testing at full pressure during the next refueling shutdown of the facility. Include in your report the results of all attempts to operate the two-stage S/R valve(s).
2. In the event that a S/R valve, regardless of make or model (e.g., both two or three stage), fails to function as designed, excepting for pressure setpoint requirements, and the cause of the malfunction is not clearly determined, understood, and therefore corrected, standard operating procedures shall require that the entire valve be removed from service, disassembled, inspected, adjusted, and pressure setpoint tested with steam for proper operation prior to returning the valve to service. These overhaul requirements shall be at least equivalent to those applicable to periodic surveillance rehabilitation requirements. Appropriate revisions to your operating procedures shall be made to include these requirements.
3. A review of your S/R valve pneumatic supply systems shall be performed to determine the potential for and magnitude of an overpressure condition. The determined overpressure potential of the pneumatic supply shall be compared with the maximum operating pressure capabilities of the solenoid actuator valves serving the S/R valves, so as to determine whether supply pressure could result in valve malfunction. Protective devices (such as relief valves) shall be installed in the proximity of the S/R valves and set to protect against supply pressure in excess of the operating pressure capabilities of the solenoid actuator device. In addition, consideration should be given to modification or replacement to reduce the sensitivity of the solenoid actuator to pneumatic supply overpressure. Further, the failure, either high or low, of the pneumatic supply system shall be annunciated to the control room operator. The annunciated supply pressure should be measured at a location as close as practical to the S/R

valves and downstream of any check valve connecting two or more pneumatic sources. Appropriate operating procedures shall be provided to guide operator response to such an occurrence of high or low supply pressure.

4. The results of your review in response to each of the three items above shall be provided within 90 days of the date of this bulletin. The system upgrading identified in Item 3 shall be completed within 6 months of the time that you conclude a replacement or modification would be made and the necessary parts are available; this upgrading shall be reported when completed.

Provide written reports as required above, signed under oath or affirmation, under the provisions of Section 182a of the Atomic Energy Act of 1954. Reports shall be submitted to the Director of the appropriate Regional Office and a copy forwarded to the Director, Office of Inspection and Enforcement, NRC, Washington, D.C. 20555.

This request for information was approved by GAO under a blanket clearance number R0072 which expires November 30, 1983. Comments on burden and duplication should be directed to U. S. General Accounting Office, Regulatory Reports Review, Room 5106, 441 Eighth Street, N. W., Washington, D. C. 20548

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Bulletin No.	Subject	Date Issued	Issued To
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80-24	Prevention of Damage Due to Water Leakage Inside Containment (October 17, 1980 Indian Point 2 Event)	11/21/80	All power reactor facilities with OL or CP
80-23	Failures of Solenoid Valves Manufactured by Valcor Engineering Corporation	11/14/80	All power reactor facilities with OL or CP
80-22	Automation Industries, Model 200-520-008 Sealed-Source Connectors	9/11/80	All radiography licensees
80-11	Valve yokes supplied by Malcolm Foundry Company, Inc.	11/6/80	All light water reactor facilities with OLs or CPs
Supplement 3 79-01B	Environmental Qualification of Class 1E Equipment	10/24/80	All power reactor facilities with an OL
Supplement 2 79-01B	Environmental Qualification of Class 1E Equipment	9/30/80	All power reactor facilities with an OL
80-22	Automation Industries, Model 200-520-008 Sealed-source Connectors	9/11/80	All radiography licensees
79-26 Revision 1	Boron Loss from BWR Control Blades	8/29/80	All BWR power facilities with an OL
80-20	Failures of Westinghouse Type W-2 Spring Return to Neutral Control Switches	7/31/80	To each power reactor facility in your region with an OL or a CP

OL = Operating License
CP = Construction Permit