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UNITED STATES
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OFFICE OF INSPECTION AND ENFORCEMENT
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IE Information Notice No.: 80-40: EXCESSIVE NIROGEN SUPPLY PRESSURE ACTUATES SAFETY-RELIEF VALVE OPERATION TO CAUSE REACTOR DEPRESSURIZATION

Description of Circumstances:

On October 7 and 31, 1980, the reactor coolant system was spuriously depressurized at Boston Edison Company's Pilgrim Nuclear Power Station Unit No. 1. The Pilgrim Station Unit 1 uses a GE BWR. The depressurizations resulted when excessive pressure in the nitrogen supply system caused the "A" Target Rock (TR) safety-relief valve to open and remain open until the excessive supply pressure could be isolated, pneumatic operator pressure vented and the main steam system depressurized sufficiently to allow the main disk to reseat. These two events involved a failure in the pressure regulation of the supply nitrogen and not a failure of the TR safety-relief valve to function as designed.

The safety-relief valves at Pilgrim are designed to be supplied, with other drywell instrumentation, from either the compressed air system or containment atmosphere control system (CACS). The CACS uses nitrogen for containment inerting. The supply for the safety-relief valves is provided from the CACS through an ambient air vaporizer and then through one of two parallel pressure regulators or a parallel bypass line. Shortly before the time of each event a new supply of liquid nitrogen had been added to the storage tanks. At the time of the events the two pressure regulators were in service with the bypass closed. Nitrogen pressure supplying the valves increased to 160 - 165 psi. This may have been caused by liquid nitrogen reaching the pressure regulators or by a failure in a pressure regulator. The result was excessive pressure which was sufficient to leak through the solenoid actuator and initiate the pneumatic operator of the safety-relief valve.

The design normal operating pressure of the compressed air or nitrogen systems supplying the safety-relief valves is 90-110 psi. At a pressure of 145 psi the solenoid valve may begin to leak since excessive pressure acts to unseat the disk. The supply pressure must then decrease to 135 psi or less for the solenoid disk to reseat. In addition, the design of the safety-relief valve is such that as the main steam pressure increases, less instrument pressure is necessary to initiate the pneumatic operator. Approximately 3 to 5 psi at the pneumatic operator is sufficient to initiate the safety-relief valve opening. Such a pressure begins to build with leakage through the solenoid actuator and was reached in the "A" valve at 160 psi supply pressure. According to information from GE and TRC, approximately 180 psi pressure is necessary for all of the safety-relief valves to open as result of supply overpressure. It would appear that under such conditions of overpressure that safety-relief valve openings would be sequential rather than simultaneous.

The particular solenoid actuator valves used with these two-stage safetyrelief valves are manufactured by TRC. Their design is such that excessive control pressure tends to unseat the solenoid valve disk. The three-stage TR safety-relief valves use either AVCO (Automatic Valve Company) or ASCO (Automatic Switch Company) solenoid valves according to information from GE. The AVCo solenoid

valve has been tested to 300 psi and found not to leak and the ASCo solenoid valve tends to seat with increasing supply pressure. Therefore, the NRC believes that the tendency for solenoid leakage and hence safety-relief valve opening is confined to the two-stage safety-relief valve installations.

This information is provided as a notification of a possibly significant matter which is still under review by the NRC staff. It is anticipated that the results of continuing NRC review will culminate in issuance of an IE Bulletin which will recommend or require specific licensee action. In the interim, we expect that recipients will review the information for possible applicability to their facilities, particularly those with installations of the TR two-stage safety-relief valves. If you have questions regarding this matter, please contact the Director of the appropriate NRC Regional Office.

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