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UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, D.C. 20555

August 19, 1986

IE INFORMATION NOTICE NO. 86-72: FAILURE 17-7 PH STAINLESS STEEL SPRINGS IN VALCOR VALVES DUE TO HYDROGEN EMBRITTLEMENT

Addressees:

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

Purpose:

This notice is provided to inform recipients of a potentially significant safety problem that could result from the failure of springs in solenoid globe valves manufactured by Valcor Engineering Corporation. According to the valve manufacturer these valve springs may fail when exposed to high temperature reactor coolant containing hydrogen.

It is expected that recipients will review the information for applicability to their facilities and consider action, as appropriate, to preclude a similar problem from occurring at their facility. However, suggestions contained in this information notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

Difficulties were experienced with the operability of two solenoid-operated globe valves (Model V526-6190A, p/n 454660001) in the charging system at the Fort Calhoun Station, Unit 1 in August 1985. When shut, the valves could not be reopened without securing all charging pumps. During a refueling outage in January 1986, the two valves were disassembled and examined to determine the cause of the valve malfunction. It was found that disc guide assembly springs in both valves had undergone complete and catastrophic failure. The springs, which initially had 25 coils, were found in sections of only 1-2 coils. Metallurgical analysis of the failed springs attributed the probable cause of failure was due to hydrogen embrittlement. The spring is made of 17-7 PH stainless steel.

Discussion with the valve manufacturer, Valcor Engineering Corporation, revealed that during 1982-83 one failure occurred at Prairie Island Nuclear Generating Station and two failures occurred at North Anna Nuclear Generating Station. These spring failures were also attributed to hydrogen embrittlement.


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Discussion:

Based on analysis and evaluation of the earlier spring failures, the valve manufacturer issued a letter in 1983 to affected licensees requesting information on valve application and advised customers of a potential spring problem. Elgiloy springs were offered on receipt of information confirming use with reactor chemistry fluid or specific customer request. With the occurrence of the third similar event, the valve manufacturer is planning to issue a second letter to affected licensees conservatively recommending that valves with spring material of 17-7 PH stainless steel used in borated water or reactor chemistry water be closely monitored and evaluated for any change in normal operation such as increased seat leakage or an increase in the time required to change position. These conditions could be attributed to broken springs. The manufacturer has concluded that hydrogen embrittlement of stainless steel springs is a complex function of high temperature, water chemistry, water flow condition, and time of exposure to the service condition. Therefore, all such springs made of 17-7 PH stainless steel used in Valcor valves in nuclear power plant may be susceptible to this failure mode under these conditions and should be considered for replacement.

The above described events are an indication of potential licensee/vendor interface problem. Based on the information received by the NRC, the vendor was not completely informed via the purchase specifications regarding the service condition to which the valve would be exposed. Further, all users of Valcor valves were not notified of the initial problem through either oversight by the vendor or as a result of the valves being supplied through an intermediate source.

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.


Edward L. Jordan, Director
Division of Emergency Preparedness
and Engineering Response
Office of Inspection and Enforcement

Technical Contact: L. D. Vaughan, IE
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Attachment: List of Recently Issued IE Information Notices

LIST OF RECENTLY ISSUED
 IE INFORMATION NOTICES

Information Notice No.	Subject	Date of Issue	Issued to
86-71	Recent Identified Problems With Limitorque Motor Operators	8/19/86	All power reactor facilities holding an OL or CP
86-70	Spurious System Isolation Caused By The Panalarm Model 86 Thermocouple Monitor	8/18/86	All GE BWR facilities holding an OL or CP
86-69	Scram Solenoid Pilot Valve (SSPV) Rebuild Kit Problems	8/18/86	All BWR facilities holding an OL or CP
86-68	Stuck Control Rod	8/15/86	All BWR facilities holding an OL or CP
86-67	Portable Moisture/Density Gauges: Recent Incidents And Common Violations Of Requirements For Use, Transportation, And Storage	8/15/86	All NRC licensees authorized to possess, use, transport, and store sealed sources
86-66	Potential For Failure Of Replacement AC Coils Supplied By The Westinghouse Electric Corporation For Use In Class 1E Motor Starters And Contractors	8/15/86	All power reactor facilities holding an OL or CP
86-65	Malfunctions Of ITT Barton Model 580 Series Switches During Requalification Testing	8/14/86	All power reactor facilities holding an OL or CP
86-64	Deficiencies In Upgrade Programs For Plant Emergency Operating Procedures	8/14/86	All power reactor facilities holding an OL or CP
86-63	Loss Of Safety Injection Capability	8/6/86	All PWR facilities holding an OL or CP
86-62	Potential Problems In Westinghouse Molded Case Circuit Breakers Equipped With A Shunt Trip	7/31/86	All power reactor facilities holding an OL or CP

OL = Operating License
 CP = Construction Permit