

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

January 4, 1989

NRC INFORMATION NOTICE NO. 89-01: VALVE BODY EROSION

Addressees:

All holders of operating licenses or construction permits for nuclear power reactors.

Purpose:

This information notice is provided to alert recipients to a potential generic problem pertaining to erosion found in carbon steel valve bodies in safety-related systems. 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:

During the Brunswick Steam Electric Plant, Unit 1 refueling outage, inspections performed on December 13, 1988, indicated areas of significant but localized erosion on the internal surfaces of several carbon steel valve bodies. The affected safety-related globe valves were the 24-inch RHR/LPCI system injection and 16-inch suppression pool isolation valves. Subsequent ultrasonic testing of identical valves on Unit 2, which was operating at power, indicated similar erosion. Additional valves used for throttling service (such as high pressure coolant injection) have indicated less erosion possibly due to the fact that they have seen less service.

Discussion:

The valve bodies that have been ultrasonically tested indicate that the minimum measured wall thicknesses are approaching the minimum code allowable thicknesses.

Minimum Wall Thickness - inches

| <u>Valve</u>             | <u>Unit 1</u> | <u>Unit 2</u> | <u>Code Allowable</u> | <u>Nominal</u> |
|--------------------------|---------------|---------------|-----------------------|----------------|
| RHR/LPCI Train A         | 2.7           | 2.6           | 1.47                  | 4              |
| RHR/LPCI Train B         | 1.7           | 1.9           | 1.47                  | 4              |
| Suppression Pool Train A | N/A           | 0.8           | 0.49                  | 2              |
| Suppression Pool Train B | 0.7           | 0.6           | 0.49                  | 2              |

8812300119 ZA

IDAR-11C

The obvious safety concern is that continued operation without weld repair or replacement could lead to rupture of safety-related valve bodies.

The root cause assessment of this erosion phenomenon has not been finalized. The licensee currently believes that the erosion may have resulted from throttling the globe valves below their design flow range. Excessive throttling can promote cavitation which enhances internal valve body erosion.

A similar problem appears to be occurring at Hatch Unit 1. On November 17, 1988, a severe banging noise was heard coming from the line which connects the "B" loop of the RHR system to the Condensate Storage and Transfer System. At the time, the "B" loop of RHR was in the shutdown cooling mode. Further investigation revealed that the cause of the banging was cavitation of the 24-inch RHR/LPCI system injection globe valve. The Unit 1 shift supervisor took action to alleviate the problem by repositioning the valve to increase the flow rate, thus reducing the cavitation. Examination of the valve body wall thickness has not been reported to date.

Past Related Generic Communications:

NRC Information Notice No. 88-17, "Summary of Responses to NRC Bulletin 87-01, 'Thinning of Pipe Walls In Nuclear Power Plants'," dated April 22, 1988, provides additional information on erosion downstream of turbine-driven reactor feedwater pump minimum-flow control valves. LaSalle Unit 1 experienced through-wall erosion in the expander directly downstream of the cone-shaped disc in the minimum-flow control valve.

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

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

Technical Contact: Frank J. Witt, NRR  
(301) 492-0823

Attachment: List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED  
 NRC INFORMATION NOTICES

| Information Notice No. | Subject  | Date of Issuance | Issued to  |
|------------------------|--|------------------|--|
| 88-46,<br>Supp. 2      | Licensee Report of Defective Refurbished Circuit Breakers  | 12/30/88         | All holders of OLs or CPs for nuclear power reactors.                    |
| 88-101                 | Shipment of Contaminated Equipment between Nuclear Power Stations  | 12/28/88         | All holders of OLs or CPs for nuclear power reactors.                    |
| 88-100                 | Memorandum of Understanding between NRC and OSHA Relating to NRC-licensed Facilities (53 FR 43950, October 31, 1988) | 12/23/88         | All major nuclear materials licensees and utilities holding CPs and OLs. |
| 88-99                  | Detection and Monitoring of Sudden and/or Rapidly Increasing Primary-to-Secondary Leakage                            | 12/20/88         | All holders of OLs or CPs for PWRs.                                      |
| 88-98                  | Electrical Relay Degradation Caused by Oxidation of Contact Surfaces   | 12/19/88         | All holders of OLs or CPs for nuclear power reactors.                    |
| 88-97                  | Potentially Substandard Valve Replacement Parts  | 12/16/88         | All holders of OLs or CPs for nuclear power reactors.                    |
| 88-96                  | Electrical Shock Fatalities at Nuclear Power Plants  | 12/14/88         | All holders of OLs or CPs for nuclear power reactors.                    |
| 88-95                  | Inadequate Procurement Requirements Imposed by Licensees on Vendors  | 12/8/88          | All holders of OLs or CPs for nuclear power reactors.                    |
| 88-94                  | Potentially Undersized Valve Actuators   | 12/2/88          | All holders of OLs or CPs for nuclear power reactors.                    |
| 88-93                  | Teletherapy Events   | 12/2/88          | All NRC medical licensees.   |

OL = Operating License  
 CP = Construction Permit

The obvious safety concern is that continued operation without weld repair or replacement could lead to rupture of safety-related valve bodies.

The root cause assessment of this erosion phenomenon has not been finalized. The licensee currently believes that the erosion may have resulted from throttling the globe valves below their design flow range. Excessive throttling can promote cavitation which enhances internal valve body erosion.

A similar problem appears to be occurring at Hatch Unit 1. On November 17, 1988, a severe banging noise was heard coming from the line which connects the "B" loop of the RHR system to the Condensate Storage and Transfer System. At the time, the "B" loop of RHR was in the shutdown cooling mode. Further investigation revealed that the cause of the banging was cavitation of the 24-inch RHR/LPCI system injection globe valve. The Unit 1 shift supervisor took action to alleviate the problem by repositioning the valve to increase the flow rate, thus reducing the cavitation. Examination of the valve body wall thickness has not been reported to date.

Past Related Generic Communications:

NRC Information Notice No. 88-17, "Summary of Responses to NRC Bulletin 87-01, 'Thinning of Pipe Walls In Nuclear Power Plants'," dated April 22, 1988, provides additional information on erosion downstream of turbine-driven reactor feedwater pump minimum-flow control valves. LaSalle Unit 1 experienced through-wall erosion in the expander directly downstream of the cone-shaped disc in the minimum-flow control valve.

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

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

Technical Contact: Frank J. Witt, NRR  
(301) 492-0823

Attachment: List of Recently Issued NRC Information Notices

ECEB:DEST:NRR  
FJWitt  
12/ /88

D:DEST:NRR  
LShao  
12/ /88

*CHB*  
C:OGCB:DOEA:NRR  
CHBerlinger  
12/30/88

*DOEA*  
D:DOEA  
CERossi  
12/30/88

*Info Notice was transmitted  
by memorandum from L. Shao  
to Rossi dated 12/29/88*