

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION  
WASHINGTON, D.C. 20555-0001

August 9, 1995

NRC INFORMATION NOTICE 95-31: MOTOR-OPERATED VALVE FAILURE CAUSED  
BY STEM PROTECTOR PIPE INTERFERENCE

Addressees

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

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees of motor-operated valve (MOV) failures caused by the stem protector pipe interfering with stem nut rotation. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this information notice are not NRC requirements; therefore, no specific action or written response is required.

Background

A stem protector pipe may be attached to an MOV through the housing cover to prevent debris from entering the stem/actuator interface area (see Figure 1). To keep the stem protector pipe from interfering with actuator operation (specifically rotation of the stem nut and its locknut), the threads on the pipe may be restricted to a certain length. Another option is to stake the threads on the stem protector pipe at a specific location. If neither of these precautions is taken, the stem protector pipe may thread sufficiently into the actuator housing to interfere with the rotation of the stem nut locknut. Additional torque may be required to operate the valve, which may cause the torque switch to trip prematurely, motor thermal overload devices to activate, or the motor to be damaged on high torque demand.

Description of Circumstances

On February 11, 1995, a residual heat removal (RHR) MOV at Cooper Nuclear Station failed to close on demand while RHR trains were being switched. Licensee reviews showed that the stem protector pipe on the valve actuator had threaded into the MOV housing and interfered with the stem nut rotation. The motor was damaged during an attempted opening stroke. The replacement stem protector pipe was manufactured by the licensee. The root cause apparently was that a replacement stem protector pipe was not constructed to the same tolerance levels as the original. Specifically, the length of threaded portion of the protector pipe was too long when manufactured. The extended threads allowed the pipe to be threaded to the point where it interfered with

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the stem nut locknut. Also, actions (such as staking) were not taken to prevent threading of the stem protector pipe into the valve actuator housing. Three other valves were found to have stem protector pipes with extended threads that might have interfered with actuator operation. The licensee long-term solution was to stake the extended threads in all of the stem protector pipes of safety-related MOVs.

In addition to the Cooper event, similar failures have occurred at four other plants as reported in the Nuclear Plant Reliability Data System. These failures are discussed below.

On May 24, 1992, an RHR pump discharge valve failed to close on demand. The licensee review showed the stem protector pipe had been threaded too far into the operator and had interfered with actuator operation. This also caused a gear to crack.

On August 14, 1991, an RHR suppression pool full flow discharge isolation valve failed to fully close on demand. The cause of the failure was that the stem protector pipe had interfered with the stem locknut. Two years earlier on January 23, 1989, the plant had experienced the same failure of the RHR suppression pool full flow discharge isolation valve; the problem was corrected by removing approximately one inch of threads from the stem protector pipe. After the second failure, the licensee solution was to stake the threads of the stem protector pipe.

On March 18, 1988, a low-pressure core spray pump suction valve would not stroke manually or electrically. The licensee analysis indicated that the stem protector pipe had been threaded too far into the actuator.

On March 6, 1987, an RHR outboard containment isolation valve tripped on thermal overload while being stroked open. The valve was still operable by hand. The licensee review showed that the stem protector pipe had been inserted too far and had interfered with the actuator.

### Discussion

The NRC staff noted that the failure occurred at Cooper Nuclear Station because the stem protector pipe was manufactured with an extensive thread length. The licensee constructed and installed its own stem protector pipe without taking adequate precautions to prevent the protector pipe from interfering with stem nut rotation. This incident and the earlier problems indicate that such MOV failures are a recurring problem. The trend toward "in house" manufacture of components could result in an increase in this type of failure. The licensee could have prevented this type of failure by manufacturing the stem pipe protector with the same tolerance levels as those made at the factory or adequately staking the stem protector pipe during the installation process.

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

  
Dennis M. Crutchfield, Director  
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Office of Nuclear Reactor Regulation

Technical contacts: Thomas G. Scarbrough, NRR  
(301) 415-2794

Glenn T. Dentel, NRR  
(301) 415-1321

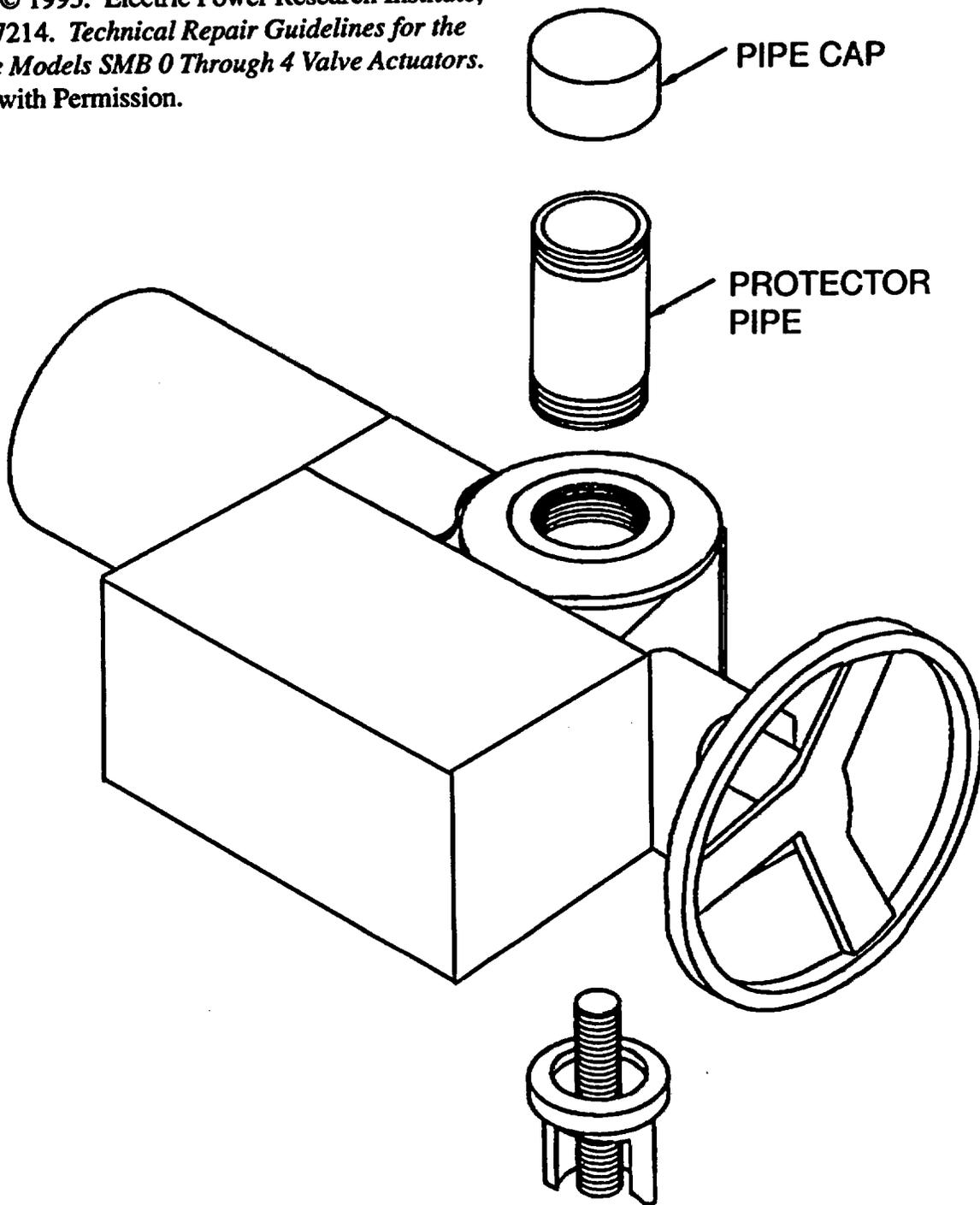
Thomas Greene, NRR  
(301) 414-1175

Attachments:

1. Figure 1: Valve Actuator and Protector Pipe
2. List of Recently Issued NRC Information Notices

*Attachments filed in Jacket*

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EPRI NP-7214. *Technical Repair Guidelines for the  
Limiter Models SMB 0 Through 4 Valve Actuators.*  
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**Figure 1 Valve Actuator with Protector Pipe**

**LIST OF RECENTLY ISSUED  
 NRC INFORMATION NOTICES**

<b>Information Notice No.</b>	<b>Subject</b>	<b>Date of Issuance</b>	<b>Issued to</b>
95-30	Susceptibility of Low-Pressure Coolant Injection and Core Spray Injection Valves to Pressure Locking	08/03/95	All holders of OLs or CPs for nuclear power reactors.
94-66, Supp. 1	Overspeed of Turbine-Driven Pumps Caused by Binding in Stems of Governor Valves	06/16/95	All holders of OLs or CPs for nuclear power reactors.
95-29	Oversight of Design and Fabrication Activities for Metal Components Used in Spent Fuel Dry Storage Systems	06/07/95	All holders of OLs or CPs for nuclear power reactors.
95-28	Emplacement of Support Pads for Spent Fuel Dry Storage Installations at Reactor Sites	06/05/95	All holders of OLs or CPs for nuclear power reactors.
95-27	NRC Review of Nuclear Energy Institute, "Thermo-Lag 330-1 Combustibility Evaluation Methodology Plant Screening Guide"	05/31/95	All holders of OLs or CPs for nuclear power plants.
95-26	Defect in Safety-Related Pump Parts due to Inadequate Heat Treatment	05/31/95	All holders of OLs or CPs for nuclear power reactors.
94-61, Supp. 1	Corrosion of William Power Gate Valve Disc Holders	05/25/95	All holders of OLs or CPs for nuclear power reactors.
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OL = Operating License  
 CP = Construction Permit

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\* See previous concurrence

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OFFICE	OECB/DOPS	Tech ED	S:OECB/DOPS	EMEB/DE	E
NAME	GDentel*	MMejac*	BDennig*	TScarbrough*	
DATE	03/15/95	02/27/95	03/30/95	04/03/95	
OFFICE	C:EMEB/DEDOPS	OECB/DPSS	C:OECB/DPS	E	D:DPW
NAME	RWessman*	RKiessel*	ACHaffee*	DCrutchfield	
DATE	04/03/95	05/08/95	05/15/95	08/4/95	

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OFFICE	C:EMEB/DEDOPS		OECB/DPSS		C:OECB/DPS	E	D:DRPM	
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 Office of Nuclear Reactor Regulation

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DATE	03/15/95		02/27/95		03/30/95		04/03/95	

OFFICE	C:EMEB/DE		OECB/DOPS*		C:OECB/DOPS	E	D:DOPS	
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OFFICE	C:OECB/DOPS	*C:EMEB/DE	E	D:DOPS
NAME	AEChaffee	RWessman		BGrimes
DATE	4/ /95	4/3/95		4/ /95

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 Division of Operating Reactor Support  
 Office of Nuclear Reactor Regulation

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 Glenn T. Dentel, NRR (301) 415-1321

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DATE	03/15/95	02/27/95	03/30/95	03/3/95	

OFFICE	C:OECB/DOPS	C:EMEB/DE	<input checked="" type="checkbox"/> D:DOPS
NAME	AEChaffee	RWessman <i>W</i>	BGrimes
DATE	03/ /95	03/3/95	03/ /95

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DATE	/ /95	/ /95	2/27/95	/ /95

OFC	EMEB:DE	CHF TECH BR	D/DOPS
NAME	Rwessman		BGrimes
DATE	/ /95	/ /95	/ /95

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