

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

December 20, 1993

**NRC INFORMATION NOTICE 93-98: MOTOR BRAKES ON VALVE ACTUATOR MOTORS**

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 to potential problems with the performance of motor-operated valves (MOVs) resulting from improper operation of motor brakes used on valve actuator motors. 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

Some MOVs have motor brakes installed to help minimize the inertial loads during valve closure after the control switch has tripped. Motor brakes also help prevent MOVs with non-locking gear mechanisms from inadvertently opening. One type of motor brake is designed to be electromagnetically released and has friction pads to slow the motor shaft following control switch trip. Improper operation of motor brakes can result in problems with the performance of MOVs.

Description of Circumstances

In Maintenance Update 92-2, Limitorque Corporation informed the nuclear industry that it had discovered, through operating experience and testing, that motor brakes do not substantially minimize the thrust load caused by inertia when closing MOVs. Limitorque also stated that it did not qualify motor brakes through its nuclear qualification testing. Limitorque warned that voltage variation into the motor brake may render the brake inoperable. Limitorque noted that disconnection of the brake leads does not render the brakes inoperable and specified that the friction pads be removed. Each of the following reports involve valves with Limitorque motor operators.

On August 4, 1993, the licensee of Crystal River Nuclear Plant, Unit 3, reported (Licensee Event Report 93-008) that seven MOVs with motor brakes installed might receive insufficient voltage to allow the motor brakes to be released under degraded voltage conditions. Of these seven MOVs, the licensee

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declared a normally closed high-pressure injection suction MOV to be inoperable on July 6, 1993. The licensee removed the friction disks and electrical power connections from this MOV as well as from normally open borated water storage tank suction MOV. The licensee tested another of the seven MOVs to ensure that its motor brake would release under degraded voltage conditions. The remaining four MOVs are locked in their safety function position during plant operation.

On September 14, 1993, the licensee of Millstone Nuclear Power Station, Unit 2, notified NRC that it had declared four feedwater supply MOVs with motor brakes installed inoperable when it determined that the MOVs might receive insufficient voltage during degraded voltage conditions to allow the motor brakes to release. The licensee relies on these MOVs as a backup for feedwater isolation in the event of a main steam line break. The licensee shut down Millstone Unit 2 in accordance with its plant technical specification requirements. The licensee subsequently removed the motor brakes.

On September 28, 1993, the licensee of James A. FitzPatrick Nuclear Power Plant notified NRC of problems with the operation of motor brakes on two low-pressure coolant injection MOVs. The licensee determined that the motor brakes were undersized to prevent the actuator spring pack from relaxing and causing the torque switch to restart the actuator motor on a repeated basis. Continuous restarting of the actuator motor can cause (1) damage to the motor from overheating, and (2) excessive stress to the MOV by driving the valve disk into its seat (sometimes referred to as a "hammering" effect).

#### Discussion

In Generic Letter (GL) 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance," the NRC staff requested nuclear power plant licensees to confirm the capability of safety-related MOVs to perform their intended functions by reviewing MOV design bases, verifying MOV switch settings initially and periodically, testing MOVs under design-basis conditions where practicable, improving evaluations of MOV failures and necessary corrective action, and trending MOV problems. In response to GL 89-10, licensees are implementing programs to evaluate the design-basis capability of MOVs within the scope of the generic letter.

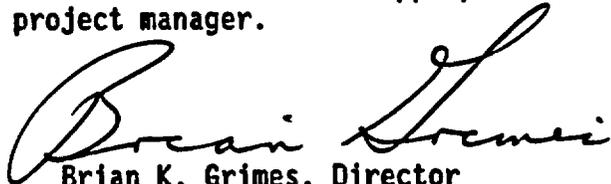
As indicated by the discovery of MOV operability problems at Crystal River and Millstone, some licensees may not be evaluating the minimum voltage required to ensure the proper operation of motor brakes when determining the design-basis capability of MOVs with motor brakes installed. Improper operation of motor brakes on MOVs could allow the motor to restart repeatedly as found at FitzPatrick.

Related Generic Communications

NRC has issued other information notices pertaining to MOVs. During the past year, these have included NRC Information Notices 93-74, "High Temperatures Reduce Limitorque AC Motor Operator Torque;" 93-54, "Motor-Operated Valve Actuator Thrust Variations Measured With a Torque Thrust Cell and a Strain Gage;" 93-01, "Accuracy of Motor-Operated Valve Diagnostic Equipment Manufactured by Liberty Technologies;" 92-83, "Thrust Limits for Limitorque Actuators and Potential Overstressing of Motor-Operated Valves;" and 92-70, "Westinghouse Motor-Operated Valve Performance Data Supplied to Nuclear Power Plant Licensees."

In addition, the hammering effect was specifically addressed in NRC Information Notice 85-20, "Motor-Operated Valve Failures Due to Hammering Effect," and its supplement.

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 project manager.



Brian K. Grimes, Director  
Division of Operating Reactor Support  
Office of Nuclear Reactor Regulation

Technical contacts: P. K. Eapen, RI  
(215) 337-5150

Thomas G. Scarbrough, NRR  
(301) 504-2794

Attachment:  
List of Recently Issued NRC Information Notices

**LIST OF RECENTLY ISSUED  
 NRC INFORMATION NOTICES**

<b>Information Notice No.</b>	<b>Subject</b>	<b>Date of Issuance</b>	<b>Issued to</b>
93-97	Failures of Yokes Installed on Walworth Gate and Globe Valves	12/17/93	All holders of OLs or CPs for nuclear power reactors.
93-96	Improper Reset Causes Emergency Diesel Generator Failures	12/14/93	All holders of OLs or CPs for nuclear power reactors.
93-95	Storm-Related Loss of Offsite Power Events due to Salt Buildup on Switchyard Insulators	12/13/93	All holders of OLs or CPs for nuclear power reactors located close to a large body of salt water.
93-94	Unauthorized Forced Entry into the Protected Area at Three Mile Island Unit 1 on February 7, 1993	12/09/93	All holders of OLs or CPs for nuclear power reactors.
93-93	Inadequate Control of Reactor Coolant System Conditions During Shutdown	12/08/93	All holders of OLs or CPs for nuclear power reactors.
93-92	Plant Improvements to Mitigate Common Dependencies in Component Cooling Water Systems	12/07/93	All holders of OLs or CPs for nuclear power reactors.
91-21, Supp. 1	Inadequate Quality Assurance Program of Vendor Supplying Safety-Related Equipment	12/07/93	All holders of OLs or CPs for nuclear power reactors and all recipients of NUREG-0040, "License Contractor and Vendor Inspection Status Report" (White Book).
89-77, Supp. 1	Debris in Containment Emergency Sumps and Incorrect Screen Configurations	12/03/93	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License  
 CP = Construction Permit

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Original signed by

Brian K. Grimes

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OFFICE	*EMEB/DE/NRR	*C:EMEB/DE/NRR	*D:DE/NRR	*OGCB/DORS/NRR
NAME	TGScarbrough	JANorberg	JTWiggins	RJKiessel/vsb
DATE	9/20/93	9/27/93	12/01/93	10/21/93
OFFICE	*Tech Ed	*EB/DRS/RI	*C:EB/DRS/RI	*D:DRS/RI
NAME	DGable	PKEapen	JPDurr	WDHodges
DATE	10/22/93	11/29/93	11/29/93	11/29/93
OFFICE	*C:OGCB/DORS/NRR	D:DORS/NRR		
NAME	GHEarcus	BKGrimes		
DATE	12/03/93	12/15/93		

Document Name: 93-98.IN

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DATE	10/22/93	11/29/93	11/29/93	11/29/93
OFFICE	C:OGCB/DORS/NRR	D:DORS/NRR		
NAME	GHMarcus <i>GMM</i>	BKGrimes		
DATE	12/3/93	11/ /93 <i>mkm</i>		

Document Name: nrcin.3a1

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Transmitted by JANorberg memorandum dated September 27, 1993

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NAME	DGable	PKEapan	JPDurr	WDHodges
DATE	10/22/93	11/29/93	11/29/93	11/29/93
OFFICE	C:OGCB/DORS/NRR	D:DORS/NRR		
NAME	GHEarcus	BKGrimes		
DATE	11/ /93	11/ /93		

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OB/DRS/RI	C:OB/DRS/RI	D:DRS/RI	*EMEB/DE/NRR	*C:EMEB/DE/NRR
JStewart	LHBettenhausen	MWHodges	TGScarbrough	JANorberg
10/ /93	10/ /93	10/ /93	9/20/93	9/27/93
OGCB/DORS/NRR	Tech Ed	D:DE/NRR	C:OGCB/DORS/NRR	D:DORS/NRR
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10/21/93	10/27/93	10/ /93	10/ /93	10/ /93

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