

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

November 2, 1992

NRC INFORMATION NOTICE 92-59, REVISION 1: HORIZONTALLY-INSTALLED
MOTOR-OPERATED GATE VALVES

Addressees

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

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this revision to Information Notice (IN) 92-59, "Horizontally-Installed Motor-Operated Gate Valves," to clarify the problems with the performance of motor-operated gate valves that are installed in a horizontal position. 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

This revision, which supersedes the original IN 92-59, repeats the original Description of Circumstances and Discussion with the following revisions in the second paragraph of the Discussion.

In the original notice, the NRC staff alerted addressees to problems with the performance of motor-operated valves (MOV) that are installed with their gate valves in a horizontal orientation. This orientation may result in the actuator spring pack, motor, or the limit switch compartment being the lowest point of the MOV. In the original notice, the staff discussed problems that could result from the actuator spring pack or motor being the lowest point of an MOV. This revision was written to point out that installing an MOV with the limit switch compartment as the lowest point also increases the possibility for grease to leak into the compartment and affects MOV operation and maintenance.

Description of Circumstances

Three licensees recently informed the NRC staff that they had problems testing motor-operated valves (MOV) that had been installed with the valve disc oriented horizontally.

On March 13, 1992, the Southern California Edison Company, licensee for the San Onofre Nuclear Generating Station, informed the NRC that two of four

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4-inch gate MOVs in the high pressure coolant injection/low pressure coolant injection (HPCI/LPCI) combined miniflow line at Unit 3 failed to close during design-basis differential pressure and flow testing performed in response to Generic Letter (GL) 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance." The licensee adjusted the MOVs in the Unit 3 miniflow line to satisfy the thrust requirements demonstrated by the tests. Before testing the Unit 3 MOVs, the licensee had added new spring packs and provided higher gear ratios in these MOVs as part of its GL 89-10 program. However, the licensee did not modify the motor operators for the Unit 2 HPCI/LPCI miniflow MOVs, which remained sized and setup under the old assumptions of the licensee's program in response to NRC Bulletin 85-03, "Motor-Operated Valve Common Mode Failures During Plant Transients Due to Improper Switch Settings." Therefore, the licensee shut down Unit 2 as a safety precaution because of the concern that the Unit 2 miniflow MOVs would not be able to perform their safety function. The licensee then improved the Unit 2 miniflow MOVs with new spring packs and higher gear ratios to allow the MOVs to satisfy the higher thrust requirements. The licensee tested the improved Unit 2 miniflow valves under design-basis differential pressure and flow conditions, and they performed satisfactorily. The licensee evaluated the Unit 2 test data and determined that its decision to shut down Unit 2 was appropriate because the test results revealed that the Unit 2 miniflow MOVs could not have operated in their old configuration under design-basis conditions. The licensee believed that the higher thrust requirements for these MOVs resulted from their horizontal orientation, which caused additional sliding friction on the valve discs.

During a midcycle outage in October 1991 at the Crystal River Plant, the Florida Power Corporation, the licensee, tested emergency feedwater (EFW) MOV EFV-14 from EFW pump EFP-1 to the "A" steam generator under differential pressure and flow conditions as part of its program in response to GL 89-10. During the test, the valve did not close electrically under the design-basis differential pressure conditions calculated by the Babcock & Wilcox Company (B&W) for Crystal River. The EFW system at Crystal River has four discharge isolation valves, one in each of the EFW supply lines to the once-through steam generators (OTSGs). The MOVs are required to close during a high-energy line break to isolate flow to the damaged OTSG thereby only supplying the undamaged OTSG. At that time, the licensee believed that the differential pressure calculated for EFV-14 by B&W was greater than the actual design-basis differential pressure. On April 28, 1992, the licensee notified the NRC staff that it had determined that the differential pressure calculated for EFV-14 was actually greater than the value calculated by B&W. Thus, the October 1991 test failure had properly revealed that EFV-14 could not perform its safety function to close under design-basis differential pressure. In its April 28 notification, the licensee indicated that it had closed EFV-14 and the parallel EFV-11 from EFP-2 to the "A" steam generator because of its similar design to EFV-14. The licensee reviewed the results of previous testing and concluded that the EFW control logic could open these MOVs if needed. Before the failed test, the licensee had set EFV-14 using assumptions more conservative than those of some other licensees, but EFV-14 nevertheless failed to operate under design-basis differential pressure conditions. After April 28, the licensee conducted differential pressure tests on the other

three EFW MOVs (including EFV-11) and found those MOVs also to be incapable of closing under design-basis differential pressure and flow. All four of these MOVs are installed horizontally. The licensee attributed the failure of the EFW MOVs to their horizontal orientation. The licensee has modified the four EFW MOVs and successfully tested them under design-basis differential pressure conditions.

On April 14, 1992, the Power Authority of the State of New York, the licensee of the James A. FitzPatrick Nuclear Power Plant, notified the NRC staff that the double disc gate valves 10 MOV-16A and 10 MOV-16B in residual heat removal/low pressure coolant injection pump minimum flow lines might not be able to fully seat during closure because they do not include wedge springs. After conducting MOV tests, the licensee had noted unusual valve behavior reviewing diagnostic traces and requested the valve manufacturer, Anchor/Darling to explain the behavior of these valves. Anchor/Darling informed the licensee that it did not include "wedge springs" and "disc retainers" in its double disc gate valves manufactured before 1975 (such as 10 MOV-16A&B) when it believed that the valves were to be installed with the valve stem vertical and pointing upward. The wedge spring allows the valve to be installed in any orientation by maintaining separation of the discs and preventing wedging before the disc contacts the valve seat. The disc retainers improve performance during valve closure by limiting disc wobble.

Because 10 MOV-16A and 10 MOV-16B are installed horizontally, the licensee determined that premature wedging could prevent these valves from closing when required for containment isolation. The licensee has installed wedge springs in the valves to correct the problem.

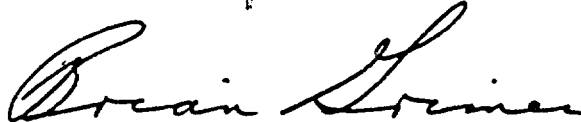
Discussion

Many nuclear power plant licensees have begun testing MOVs as part of their programs in response to GL 89-10. Some licensees have found that the thrust required to operate MOVs under differential pressure and flow conditions is greater than predicted by the valve vendor using the industry's standard equations and valve factors. Some licensees have believed that the higher thrust would be required only under blowdown conditions. However, licensees have found more thrust than predicted is required to operate some MOVs under pumped flow conditions. Although higher-than-predicted thrust requirements have been observed for MOVs in various installed orientations, MOVs in horizontal positions may be especially susceptible to performance problems, including higher thrust requirements.

Installing an MOV in a horizontal orientation can also lead to maintenance and performance problems other than those caused by the friction or binding of the disc. For example, the actuator spring pack, motor, or limit switch compartment might be at the lowest point of an MOV. If the spring pack is at the lowest point, excessive grease in the spring pack might cause hydraulic lock, which would prevent the torque switch from tripping and might overstress the MOV or cause the motor to burn out. If the motor is at the lowest point, the gasket between the motor and actuator might allow grease to fill the motor

and cause it to fail. If the limit switch compartment is at the lowest point, grease leaking into the compartment from the gear case may affect MOV operation or increase the difficulty of maintenance.

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.



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

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

Mckenzie Thomas, RII
(404) 331-5599

Christopher Myers, RV
(510) 975-0260

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LIST OF RECENTLY ISSUED
 NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
92-72	Employee Training and Shipper Registration Requirements for Transporting Radioactive Materials	10/28/92	All U.S. Nuclear Regulatory Commission Licensees.
91-64, Supp. 1	Site Area Emergency Resulting from A Loss of Non-Class 1E Uninterruptible Power Supplies	10/07/92	All holders of OLs or CPs for nuclear power reactors.
92-71	Partial Plugging of Suppression Pool Strainers At A Foreign BWR	09/30/92	All holders of OLs or CPs for nuclear power reactors.
92-70	Westinghouse Motor-Operated Valve Performance Data Supplied to Nuclear Power Plant Licensees	09/25/92	All holders of OLs or CPs for nuclear power reactors.
92-69	Water Leakage from Yard Area Through Conduits Into Buildings	09/22/92	All holders of OLs or CPs for nuclear power reactors.
91-29, Supp. 1	Deficiencies Identified During Electrical Distribution System Functional Inspections	09/14/92	All holders of OLs or CPs for nuclear power reactors.
92-68	Potentially Substandard Slip-On, Welding Neck, and Blind Flanges	09/10/92	All holders of OLs or CPs for nuclear power reactors.
92-67	Deficiency in Design Modifications to Address Failures of Hiller Actuators Upon A Gradual Loss of Air Pressure	09/10/92	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

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

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Mckenzie Thomas, RII
(404) 331-5599

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Brian K. Drines
~~Charles E. Rossi, Director~~ *Reactor Support*
Division of Operational ~~and~~ *Events Assessment*
Office of Nuclear Reactor Regulation

- Technical contacts: Thomas G. Scarbrough, NRR
(301) 504-2794
- Mckenzie Thomas, RII
(404) 331-5599
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(510) 975-0260

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Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

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