

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

May 21, 1996

NRC INFORMATION NOTICE 96-30: INACCURACY OF DIAGNOSTIC EQUIPMENT FOR
MOTOR-OPERATED BUTTERFLY 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 information notice to alert addressees to the increased inaccuracy of certain diagnostic equipment for measuring torque when operating butterfly valves. 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

In Generic Letter (GL) 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance," the NRC staff requested that nuclear power plant licensees and construction permit holders verify the design-basis capability of their safety-related motor-operated valves (MOVs). As an integral part of their MOV programs, most licensees rely on diagnostic equipment to provide information on the torque and thrust required to open and close valves, and the amount of torque and thrust delivered by the motor actuator. Various types of MOV diagnostic equipment are available to estimate torque and thrust for gate, globe, and butterfly valves. Because some licensees make decisions regarding the operability of safety-related MOVs on the basis of diagnostic equipment readings, inaccuracies in MOV diagnostic equipment can adversely affect the safe operation of a nuclear power plant.

On June 28, 1993, the NRC staff issued Supplement 5 to GL 89-10, "Inaccuracy of Motor-Operated Valve Diagnostic Equipment," which discussed then-recent information on the inaccuracy of MOV diagnostic equipment that raised a generic concern regarding the reliability of data provided by certain MOV diagnostic equipment. In Supplement 5 to GL 89-10, the staff stated that the MOV Users' Group of nuclear power plant licensees had released a report indicating that the MOV diagnostic equipment that relied on spring pack displacement to estimate stem thrust in gate and globe valves was less accurate than its vendors claimed. The staff also discussed greater-than-assumed inaccuracy of MOV diagnostic equipment that relies on valve yoke strain to estimate stem thrust in gate and globe valves. As a result of the

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inaccuracy concerns for MOV diagnostic equipment used with gate and globe valves, the staff (in Supplement 5 to GL 89-10) asked licensees to reexamine their MOV programs and to report measures taken or planned to account for uncertainties in properly setting valve operating thrust to ensure operability. The staff stated that licensees should not limit their evaluations to only the specific examples of increased inaccuracy of MOV diagnostic equipment discussed in Supplement 5, but should consider any information reasonably available to them. The staff reviewed the licensees' responses to Supplement 5 to GL 89-10 and conducted additional evaluations during GL 89-10 inspections.

Description of Circumstances

ITI MOVATS Incorporated developed the Butterfly Analysis and Review Test (BART) System as a method for determining the torque output of Limitorque HBC gear boxes equipped with Limitorque motor actuators on butterfly valves. In the BART System, a load cell is mounted between the HBC gearbox housing and the HBC worm gear. Actuator torque is determined by multiplying the force resisted in the load cell by the length of the moment arm. In MOVATS Users Technical Notice (MUTN) 96-01 (dated April 1996), ITI MOVATS stated that the inaccuracy of the BART System had been considered to be equal to the inaccuracy of the load cell (plus or minus the sum of 2 percent of reading and 0.4 percent of full scale). However, recent observations and questions concerning the performance of the BART System under field conditions led ITI MOVATS to perform testing to determine the inaccuracy of the system. In MUTN 96-01, ITI MOVATS reports that its test program revealed the inaccuracy of the various fixture sizes of the BART System to be as follows:

<u>Fixture Size</u>	<u>Inaccuracy</u>
HOBC, H1BC, H2BC	+(14.0% of reading + 5.2% of full scale) -(4.0% of reading + 1.0% of full scale)
H3BC	+(14.0% of reading + 746 foot-pounds) -(14.0% of reading + 311 foot-pounds)

ITI MOVATS notes that the effects of both torque switch repeatability and HBC gear box repeatability are included in the new inaccuracy values. The vendor also states that these inaccuracy values are only valid for torque loads between 20 percent and 100 percent of the full-load rating of the HBC gear box. ITI MOVATS offers no guidance in MUTN 96-01 for predicting inaccuracy outside of this load range.

Discussion

The BART System is typically used to determine torque output at torque switch trip when operating motor-operated butterfly valves under static (no flow) conditions. Overprediction of actual torque at the torque switch trip could result in the motor actuator failing to fully stroke the valve under dynamic flow conditions. Underprediction of actual torque at the torque switch trip could result in exceeding actuator or valve structural limits, or degraded-

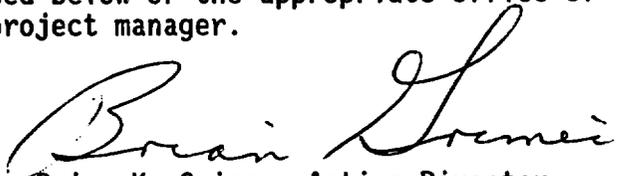
voltage motor capability. Depending on the use of the diagnostic system and the control circuitry of the motor actuator, the operation of limit-switch-controlled butterfly valves might also be adversely affected by the increased inaccuracy of the BART System.

In MUTN 96-01, ITI MOVATS recommends that all quarter-turn valves that have been set up using the BART System be reevaluated using the revised values for inaccuracy. The vendor also suggests that, when using the BART System of sizes H0BC, H1BC, and H2BC, the open and close strokes should begin with the load cell in the relaxed position to simplify determination of zero load. This information notice is being issued because valves that were marginally operable assuming the old inaccuracy may be inoperable based on the new inaccuracy.

Related Generic Communications

The staff has alerted the industry to concerns about inaccuracy regarding other MOV diagnostic equipment. For example, the staff issued Information Notice (IN) 92-23, "Results of Validation Testing of Motor-Operated Valve Diagnostic Equipment;" IN 93-01, "Accuracy of Motor-Operated Valve Diagnostic Equipment Manufactured by Liberty Technologies;" and IN 94-18, "Accuracy of Motor-Operated Valve Diagnostic Equipment (Responses to Supplement 5 to GL 89-10)."

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.



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Attachment: List of Recently Issued NRC Information Notices

Attachment Filed in Jacket

LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
96-29	Requirements in 10 CFR Part 21 for Reporting and Evaluating Software Errors	05/20/96	All holders of OLs or CPs for nuclear power reactors
96-28	Suggested Guidance Relating to Development and Implementation of Corrective Action	05/01/96	All material and fuel cycle licensees
96-27	Potential Clogging of High Pressure Safety Injection Throttle Valves During Recirculation	05/01/96	All holders of OLs or CPs for pressurized water reactors
96-26	Recent Problems with Overhead Cranes	04/30/96	All holders of OLs or CPs for nuclear power reactors
96-25	Transversing In-Core Probe Overwithdrawn at LaSalle County Station, Unit 1	04/30/96	All holders of OLs or CPs for nuclear power reactors
96-24	Preconditioning of Molded-Case Circuit Breakers Before Surveillance Testing	04/25/96	All holders of OLs or CPs for nuclear power reactors
96-23	Fires in Emergency Diesel Generator Exciters During Operation Following Undetected Fuse Blowing	04/22/96	All holders of OLs or CPs for nuclear power reactors
96-22	Improper Equipment Settings Due to the Use of Nontemperature-Compensated Test Equipment	04/11/96	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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Tech Editor has reviewed and concurred on 03/02/96
*See previous concurrence DOCUMENT NAME: 96-30.IN

OFC	RGN-IV/DRS	C/EMEB:DE	C/PECB:DRPM	(A)D/DRPM
NAME	MRunyan*	RWessman*	AChaffee*for	BGrimes
DATE	05/06/96	05/06/96	05/06/96/RLD	5/16/96

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DOCUMENT NAME: G:\TAG\MOVIN.TS3

OFC	RGN-IV/DRS	C/EMEB-DE	C/RECS:DRPM	D/DRPM
NAME	MRunyan <i>MR</i>	RWestman <i>RW</i>	AChaffee <i>AC</i>	BGrimes
DATE	5/6/96	5/6/96	5/6/96 <i>SED</i>	1/96

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