

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

January 4, 1993

NRC INFORMATION NOTICE 93-01: ACCURACY OF MOTOR-OPERATED VALVE DIAGNOSTIC  
EQUIPMENT MANUFACTURED BY LIBERTY TECHNOLOGIES

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 (IN) to alert addressees to new information on the accuracy of motor-operated valve (MOV) diagnostic equipment manufactured by Liberty Technologies when used to estimate the thrust delivered by a motor actuator in opening or closing its valve. 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

Most licensees rely on MOV diagnostic equipment to provide information on the thrust delivered by the motor actuator in opening or closing its valve. The various types of MOV diagnostic equipment estimate valve stem thrust using different parameters, such as displacement of the spring pack or strain in the stem, mounting bolts, or yoke. Liberty Technologies has developed MOV diagnostic equipment, referred to as the Valve Operation Test and Evaluation System (VOTES), that estimates the thrust needed to open or close a valve based on strain of the valve yoke. The VOTES equipment derives thrust from yoke strain that has been calibrated to stem thrust using measured diametral strain of the valve stem and nominal engineering material properties.

Many licensees make decisions regarding the operability of safety-related MOVs that are based on diagnostic equipment thrust readings. Therefore, the use of MOV diagnostic equipment can have a significant effect on the safe operation of a nuclear power plant.

Description of Circumstances

On October 2, 1992, Liberty Technologies notified the NRC, in accordance with Part 21 of the Title 10 of the Code of Federal Regulations, that it had determined that two new factors can affect the thrust values obtained with its

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equipment. Those factors involve (1) the possible use of improper stem material constants and (2) the failure to account for a torque effect when the VOTES equipment is calibrated by measuring strain in the threaded portion of the valve stem. In its October 2 submittal, Liberty Technologies states that the factors mainly cause the thrust estimated by its equipment to be less than the actual thrust. Therefore, the factors will primarily relate to the potential for the maximum allowable thrust limits of MOVs to be exceeded. In its October report, Liberty Technologies provided information on performing manual calculations to address these factors and stated that its new software, Version 2.3, assists in performing corrections to the thrust data.

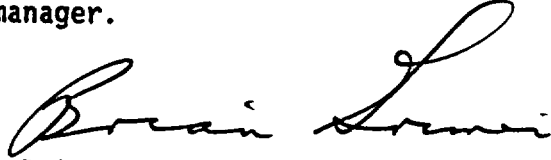
During an inspection of the MOV program at the LaSalle Nuclear Power Station in November 1992 (NRC Inspection Report 50-373/92-023 dated December 16, 1992), the NRC found that the licensee had performed the manual corrections of thrust data from MOV tests in accordance with guidance provided by Liberty Technologies to address the stem material and torque effect issues. In certain instances, the licensee determined that the VOTES equipment had underestimated by as much as 40 percent the thrust delivered by the motor actuator in opening and closing its valve. This underestimation of actual thrust by the VOTES equipment raised questions regarding the effect of higher thrust on the MOV assembly and the operation of the motor under degraded voltage conditions for several MOVs.

#### Related Generic Communications

The NRC has issued other generic communications on the accuracy of MOV diagnostic equipment and thrust limits. Most recently,

- (1) On March 27, 1992, the NRC issued IN 92-23, "Results of Validation Testing of Motor-Operated Valve Diagnostic Equipment," to alert licensees to information regarding the accuracy of MOV diagnostic equipment manufactured by ITI-MOVATS and ASEA-Brown Boveri Impell.
- (2) On December 17, 1992, the NRC issued IN 92-83, "Thrust Limits for Limitorque Actuators and Potential Overstressing of Motor-Operated Valves," to alert licensees to concerns identified in two programs used by licensees to increase thrust limits of Limitorque actuators.

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact the technical contact 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 contact: Thomas G. Scarbrough, NRR  
(301) 504-2794

Attachment: List of Recently Issued NRC Information Notices

*See file jacket*

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LIST OF RECENTLY ISSUED  
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
92-86	Unexpected Restriction to Thermal Growth of Reactor Coolant Piping	12/24/92	All holders of OLs or CPs for nuclear power reactors.
92-85	Potential Failures of Emergency Core Cooling Systems Caused by Foreign Material Blockage	12/23/92	All holders of OLs or CPs for nuclear power reactors.
92-84	Release of Patients Treated with Temporary Implants	12/17/92	All Nuclear Regulatory Commission Medical Licensees
88-23, Supp. 4	Potential for Gas Binding of High-Pressure Safety Injection Pumps during A Design Basis Accident	12/18/92	All holders of OLs or CPs for nuclear power reactors.
92-83	Thrust Limits for Limitorque Actuators and Potential Over-stressing of Motor-Operated Valves	12/17/92	All holders of OLs or CPs for nuclear power reactors.
92-82	Results of Thermo-Lag 330-1 Combustibility Testing	12/15/92	All holders of OLs or CPs for nuclear power reactors.
92-81	Potential Deficiency of Electrical Cables with Bonded Hypalon Jackets	12/11/92	All holders of OLs or CPs for nuclear power reactors.
92-80	Results of Thermo-Lag 330-1 Combustibility Testing	12/07/92	All holders of OLs or CPs for nuclear power reactors.
92-79	Non-Power Reactor Emergency Event Response	12/01/92	All holders of OLs or CPs for test and research reactors.

equipment is calibrated by measuring strain in the threaded portion of the valve stem. In its October 2 submittal, Liberty Technologies states that the VOTES equipment. Those issues involve (1) the possible use of improper stem material constants and (2) the failure to account for a torque effect when the issues mostly cause the thrust estimated by its equipment to be less than the actual thrust. Therefore, the issues will primarily relate to the potential for the maximum allowable thrust limits of MOVs to be exceeded. Liberty Technologies states that its new software, Version 2.3, assists in performing corrections to the thrust data.

During an inspection of the MOV program at the LaSalle Nuclear Power Station in November 1992, the NRC staff found that the licensee had performed the corrections of thrust data from MOV tests in accordance with guidance provided by Liberty Technologies to address the stem material and torque effect issues. In certain instances, the licensee determined that the VOTES equipment had underestimated the thrust delivered by the motor actuator in opening and closing its valve by as much as 40 percent. This underestimation of actual thrust by the VOTES equipment raised questions regarding the structural limits of the MOV assembly and the capability of the motor under degraded voltage conditions for several MOVs.

#### Related Generic Communications

The NRC has issued other generic communications on the accuracy of MOV diagnostic equipment. Most recently, on March 27, 1992, the NRC issued IN 92-23, "Results of Validation Testing of Motor-Operated Valve Diagnostic Equipment," to alert licensees to potential increased inaccuracy of MOV diagnostic equipment manufactured by ITI-MOVATS and ASEA-Brown Boveri Impell.

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\*Transmitted by JANorberg memorandum dated November 27, 1992

Document Name:	NRCIN.2C1 *SEE PREVIOUS CONCURRENCES			
*OGCB:DORS:NRR	*TECH ED	*EMEB:DET:NRR	*EMEB:DET:NRR	*C:EMEB:DET:NRR
RJKiessel:mkm	TGScarbrough	EJSullivan	JANorberg	
12/10/92	12/10/92	11/27/92	11/27/92	11/27/92
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*Original signed by  
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