SSINS No.: 6835
IN 86-02

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, D.C. 20555

January 6, 1986

IE INFORMATION NOTICE NO. 86-02: FAILURE OF VALVE OPERATOR MOTOR DURING ENVIRONMENTAL QUALIFICATION TESTING

Addressees:

All nuclear power reactor facilities holding an operating license (OL) or a construction permit (CP).

Purpose:

This notice is to alert recipients of a potentially significant problem involving the failure of Reliance Motor Corporation magnesium motors during environmental qualification (EQ) testing of Limitorque valve operators for River Bend and Nine Mile Point 2 nuclear power stations. It is expected that recipients will review this information for applicability to their facilities and consider actions, if appropriate, to preclude a similar problem occurring at their facilities. However, suggestions contained in this notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

On August 30, 1985, the General Electric Company (GE) reported to the NRC that they had experienced test anomalies of the Reliance, class RH, ac motors during EQ testing of a Limitorque fast-acting SMB-3-150 valve motor operator for its Gulf States Utilities (River Bend) and Niagara Mohawk (Nine Mile Point 2) BWR customers. These motors have magnesium rotors. Magnesium rotor motors have previously undergone EQ testing by Limitorque (PWR Qualification - Project 600456A) without failures. However, during the current testing, three motors failed during the 100-day design-basis-event (DBE) test. The first motor had been subjected to the 40-year qualification series of radiation, thermal, mechanical, and dynamic aging before the loss-of-coolant-accident (LOCA) testing. This motor had been exposed for 7 days to a steam environment with temperatures as high as 355°F when the rotor bar at the interface with the end ring had corroded, causing separation of the end ring from the conducting bars. A second (unaged) motor was then substituted into the test; after 14 days in the steam environment, with a maximum temperature of 245°F, it experienced the same failure as the first motor. A third (unaged) motor experienced the same failure following 43 days with a maximum temperature of 223°F.

Discussion:

Limitorque Corporation has used Reliance medium and large (180 frame and larger) ac motors, with magnesium alloy as a standard rotor material, in its operators for many years. Although all specific applications and affected power plants could not be identified, Limitorque has concluded that all domestic nuclear power facilities, using Limitorque actuators, would have several motors in 180-frame size and larger containing magnesium alloy rotors. The magnesium alloy rotors have been primarily used where high torque, high horsepower, fast-acting motors are required. Reliance Motor Corporation has stated that, while they are reviewing possible design changes to prevent corrosion of the rotor in high temperature steam environments, there are no existing rotors available to replace the magnesium alloy components and retain the same motor characteristics.

General Electric has reviewed the BWR applications and has provided recommended action via Service Information Letter No. 425 (July 17, 1985). In summary, GE recommends that licensees determine the plant-specific applications of magnesium motors subject to harsh environment, the adequacy of long-term cooling could be evaluated assuming failure of the magnesium rotor MOVs a few days after the DBE. Some systems may allow for the operator to position the valve to its safety position immediately following the DBE instead of waiting for automatic actuation, while other systems may require realignment to a standby mode after initial core cooling. In addition to operator training, it may be prudent to disconnect some of the valve actuation logic following safety positioning to prevent valve realignment without operator initiation. Other corrective actions may be appropriate for specific applications.

PWR owners may wish to review their Limitorque MOV qualification packages in light of this new information. If the review determines that the equipment may not be qualified for its intended use then they may wish to consider taking action, as recommended by GE for BWRs and as described above, to mitigate the potential for long-term core cooling problems caused by motor-operated valve (MOV) failures in the days following a DBE.

No specific action or written response is required by this information notice. If you have any questions about this matter, please contact the Regional Administrator of the appropriate regional office or this office.

Edward L. Jordan, Director
Division of Emergency Preparedness
and Engineering Response
Office of Inspection and Enforcement

Technical Contact: James E. Stewart, IE
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Attachment:
List of Recently Issued IE Information Notices

Attachment 1
IN 86-02
January 6, 1986

LIST OF RECENTLY ISSUED
IE INFORMATION NOTICES

Information Notice No.	Subject	Date of Issue	Issued to
86-01	Failure Of Main Feedwater Check Valve Causes Loss Of Feedwater System Integrity And Water-Hammer Damage	1/3/86	All power reactor facilities holding an OL or CP
85-101	Applicability of 10 CFR 21 To Consulting Firms Providing Training	12/31/85	All power reactor facilities holding an OL or CP
85-100	Rosemount Differential Pressure Transmitter Zero Point Shift	12/31/85	All power reactor facilities holding an OL or CP
85-99	Cracking In Boiling-Water-Reactor Mark I And Mark II Containments Caused By Failure Of The Inerting System	12/31/85	All BWR facilities having a Mark I or Mark II containment
85-98	Missing Jumpers From Westinghouse Reactor Protection System Cards For The Over-Power Delta Temperature Trip Function	12/26/85	All Westinghouse designed PWR facilities holding an OL or CP
85-97	Jail Term For Former Contractor Employee Who Intentionally Falsified Welding Inspection Records	12/26/85	All power reactor facilities holding an OL or CP
85-96	Temporary Strainers Left Installed In Pump Suction Piping	12/23/85	All power reactor facilities holding an OL or CP
85-95	Leak Of Reactor Water To Reactor Building Caused By Scram Solenoid Valve Problem	12/23/85	All BWR facilities holding an OL or CP
85-94	Potential For Loss Of Minimum Flow Paths Leading To ECCS Pump Damage During A LOCA	12/13/85	All power reactor facilities holding an OL or CP

OL = Operating License
CP = Construction Permit