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

May 1, 1989

NRC INFORMATION NOTICE NO. 89-43: PERMANENT DEFORMATION OF TORQUE SWITCH HELICAL SPRINGS IN LIMITORQUE SMA-TYPE MOTOR OPERATORS

Addressees:

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

Purpose:

This information notice is being provided to alert addressees to potential problems resulting from permanent deformation of the torque switch helical springs in Limitorque SMA-type motor operators. 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 do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

Problems with the helical springs were discovered during a series of dynamic tests that were conducted with a motor-operated wedge-gate valve from the decommissioned Shippingport Atomic Power Station (Shippingport). The valve was installed in a portion of the piping system that had been modified to simulate the stiffness of a typical United States piping system. The valve was 30 years old and had its original Limitorque SMA-type motor operator.

One of the main objectives of these tests was to determine the operating capability of the valve when subjected to simultaneous internal hydraulic and seismic loadings. This was typically accomplished by operating the valve to achieve maximum hydraulic loading during maximum seismic loading. During testing, an operability problem with the valve motor operator occurred.

Disassembly and inspection of the motor operator revealed that the torque switch helical spring had a free length of 3.99 inches. Review of the Shippingport records for the valve indicated that the torque switch spring had not been changed while the valve had been in service at Shippingport. Limitorque's records indicated that the original free length of the spring was 4.46 inches. Thus, the spring had developed a permanent deformation of 0.47 inches during the motor operator's 30-year life. Since the spring

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had been installed in a space 4.06 inches in length, a gap of approximately 0.07 inch had existed during the tests. This gap appears to indicate that there was no preload on the helical spring during the tests.

The torque switch helical spring from a second Shippingport valve with a Limitorque SMA-type motor operator was also found to have a permanent deformation. For this second spring, the original free length was 3.84 inches; the current free length was 3.74 inches; and it was installed in a space 3.37 inches in length. However, even though this spring was subjected to a preload and there was no gap, the amount of preload was less than expected because of the permanent deformation.

Discussion:

Permanent deformation of the torque spring without compensating for it will reduce the torque required to open the torque switch. The switch setting that is selected corresponds to the closing torque that the motor operator is to deliver. If the permanent deformation of the spring sufficiently reduces this closing torque, it may cause the motor operator to stop before the valve is fully seated. In an extreme case, the motor operator may stop with the valve partially open.

The design of the SMA-type motor operator is such that the torque switch helical spring is in its most compressed condition when the valve is closed. Thus, a normally closed valve is more likely to experience permanent deformation of the helical torque spring. A review of the Shippingport records indicated that both of these valves had been used as normally closed valves at Shippingport. Thus, normally closed, safety-related valves with Limitorque SMA-type motor operators may not accomplish their intended safety-related function because the original torque switch setting may result in lower output torque caused by the permanent deformation of their torque switch helical springs.

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

Charles E. Rossi

Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

Technical Contacts: Gerald H. Weidenhamer, RES
(301) 492-3839

Richard J. Kiessel, NRR
(301) 492-1154

Attachment: List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
88-97, Supp. 1	Potentially Substandard Valve Replacement Parts	4/28/89	All holders of OLs or CPs for nuclear power reactors.
89-42	Failure of Rosemount Models 1153 and 1154 Transmitters	4/21/89	All holders of OLs or CPs for nuclear power reactors.
89-41	Operator Response to Pressurization of Low-Pressure Interfacing Systems	4/20/89	All holders of OLs or CPs for nuclear power reactors.
88-75, Supplement 1	Disabling of Diesel Generator Output Circuit Breakers by Anti-Pump Circuitry	4/17/89	All holders of OLs or CPs for nuclear power reactors.
89-40	Unsatisfactory Operator Test Results and Their Effect on the Requalification Program	4/14/89	All holders of OLs or CPs for nuclear power reactors.
89-39	List of Parties Excluded from Federal Procurement or Non-Procurement Programs	4/5/89	All holders of OLs or CPs for nuclear power reactors.
89-38	Atmospheric Dump Valve Failures at Palo Verde Units 1, 2, and 3	4/5/89	All holders of OLs or CPs for nuclear power reactors.
89-37	Proposed Amendments to 40 CFR Part 61, Air Emission Standards for Radionuclides	4/4/89	All U.S. NRC licensees.
89-36	Excessive Temperatures in Emergency Core Cooling System Piping Located Outside Containment	4/4/89	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License
CP = Construction Permit

had been installed in a space 4.06 inches in length, a gap of approximately 0.07 inch had existed during the tests. This gap appears to indicate that there was no preload on the helical spring during the tests.

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The draft of this information notice was transmitted to DOEA by RES in a memorandum from MVagins dated March 2, 1989.
*Concurrence with issuance of this information notice was transmitted to OGCB by EMEB in a note from LBMarsh dated April 11, 1989.

		D/DOEA:NRR	*C/OGCB:DOEA:NRR	*RPB:ARM
		CERossi	CHBerlinger	TechEd
		04/25/89	04/20/89	04/18/89
*OGCB:DOEA:NRR	*EME:DE:RES	*C/EME:DE:RES	*EMEB:DEST:NRR	*C/EMEB:DEST:NRR
RJKiessel	GHWeidenhamer	MVagins	EJSullivan	LBMarsh
04/13/89	03/02/89	03/02/89	04/11/89	04/11/89

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04/18/89	03/02/89	03/02/89	04/11/89	04/11/89