

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION  
WASHINGTON, D.C. 20555-0001

June 10, 1997

**NRC INFORMATION NOTICE 97-32: DEFECTIVE WORM SHAFT CLUTCH GEARS IN  
LIMITORQUE MOTOR-OPERATED VALVE  
ACTUATORS**

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 a recent discovery of a defective worm shaft clutch gear in a Limitorque SMB Size 1 motor-operated valve actuator. The defective gear was not made by Limitorque, the original equipment manufacturer (OEM). 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.

Description of Circumstances

On October 8, 1996, personnel at General Public Utilities Nuclear Corporation's Oyster Creek facility discovered that a nonsafety-related Limitorque valve actuator in the circulating water system failed to operate from the control room switch. The licensee determined that the actuator failed to operate because the tripper pin had fallen out of the worm shaft clutch gear. The actuator was sent to the original vendor, Limitorque Corporation in Lynchburg, Virginia, for root cause analysis.

Discussion

The Oyster Creek licensee procured several surplus or refurbished Limitorque actuators from a third party company (non-OEM supplier) for use in nonsafety-related applications. Two of the actuators failed to operate electrically because of problems with the worm shaft clutch gear. One gear was replaced with an original Limitorque worm shaft clutch gear and operated satisfactorily. However, in the second actuator, the worm shaft clutch gear was replaced with a non-OEM part. Subsequently, the Oyster Creek licensee determined that the third party supplier had replaced the original OEM worm shaft clutch gears in the actuators with gears produced by a non-OEM replicator.

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When the actuator was electrically operated from the control room, the worm shaft clutch gear tripper pin fell out because it was not securely fastened onto the worm shaft clutch gear. Consequently, the actuator tripper fingers were not separated as the gear rotated, and the actuator would not operate electrically. Manual actuator operation with the hand wheel is not affected by the loss of the tripper pin.

Limitorque examined the worm shaft clutch gear and found several examples of failure to meet required specifications:

- The tripper pin was not staked to the worm shaft clutch gear.
- The worm shaft clutch gear lugs were not heat treated.
- The gear teeth were inappropriately shaped and not shaved.
- Other non-serious dimensional differences were also identified.

On the basis of this information, Limitorque determined that it had not manufactured the gear and informed the NRC in a letter dated January 23, 1997. Limitorque informed the NRC that it had discovered the non-OEM component installed in the SMB Size 1 nonsafety-related actuator that was received from Oyster Creek for root cause analysis. The letter also stated that Limitorque informed its nuclear customers of record about the defective component.

When compared side by side, some of the differences in the non-OEM and OEM gear can be readily identified. However, if such a comparison is not available to the customer, the non-OEM part may be harder to detect. Licensees may not have sufficient information to detect and recognize a defective worm shaft clutch gear during receipt inspection or dedication for safety-related use.

Failure of the nonsafety-related Limitorque actuator at Oyster Creek was caused by the tripper pin being inadequately fastened to the worm shaft clutch gear. The potential exists for use of non-OEM parts in Limitorque actuators in safety-related applications. This information notice is intended to alert licensees that problems can result from use of non-OEM parts, if those parts are not manufactured to the same specifications as the OEM parts.

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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Information Notice No.	Subject	Date of Issuance	Issued to
97-31	Failures of Reactor Coolant Pump Thermal Barriers and Check Valves in Foreign Plants	06/03/97	All holders of OLs or CPs for pressurized-water reactor plants
97-30	Control of Licensed Material During Reorganizations, Employee-Management Disagreements, and Financial Crises	06/03/97	All material and fuel cycle licensees
97-29	Containment Inspection Rule	05/30/97	All holders of OLs or CPs for nuclear power reactors
97-28	Elimination of Instrument Response Time Testing Under the Requirements of 10 CFR 50.59	05/30/97	All holders of OLs or CPs
97-27	Effect of Incorrect Strainer Pressure Drop on Available Net Positive Suction Head	05/16/97	All holders of OLs or CPs for light-water power reactors, except those licensees who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel
97-26	Degradation in Small-Radius U-Bend Regions of Steam Generator Tubes	05/19/97	All holders of OLs or CPs for pressurized-water reactors

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OL = Operating License  
CP = Construction Permit

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DATE	<del>05/05/97</del> 5/8/97	05/01/97	04/24/97	04/25/97

OFC	C/PECB:DRPM	D/DRPM
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*mkem 5/28/97*

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NAME	D. Skeen	<del>K. Naidu</del>	T. Scarbrough*	R. Wessman*
DATE	5/15/97	5/15/97	04/24/97	04/25/97

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NAME	A. Chaffee	M. Slosson
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Attachments: Figure 1 and Figure 2 - Worm Shaft Clutch Gear  
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DATE	04/24/97	05/11/97	4/24/97	4/24/97

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