SSINS No.: 6835
IN 85-47

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

June 18, 1985

IE INFORMATION NOTICE NO. 85-47: POTENTIAL EFFECT OF LINE-INDUCED VIBRATION ON CERTAIN TARGET ROCK SOLENOID-OPERATED VALVES

Addressees:

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

Purpose:

This information notice is to alert addressees that certain models of Target Rock (TR) solenoid-operated valves have failed during environmental qualification testing. The analysis of the test failure suggests that line vibration induced by hydrodynamic force in piping and other forms of mechanical vibration may cause the loosening of the solenoid holddown nut of those TR solenoid valves with design features similar to TR valve models that were tested.

Because of the potential safety significance of line-induced and other vibrations on TR solenoid operated valves, it is suggested that recipients review this information for applicability to their facilities and consider actions, if appropriate, to preclude a similar problem occurring at their facilities. Suggestions contained in this notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

On November 14, 1984, Arizona Public Services Company provided the NRC with a final report on a 10 CFR 50.55(e) reportable condition relating to qualification testing of certain TR solenoid-operated valves. Four TR valves, procured by Combustion Engineering (CE) for use at Palo Verde Nuclear Generating Station Unit 3, were tested to the requirements of NUREG-0588, Category I. Test valves included two 1-inch TR valves, model 77L-001 and two 2-inch TR valves, model 77L-003. The qualification test involved irradiation to 50 megarads, thermal aging at 260°F for 635 hours, mechanical cycling, vibrational aging to represent normal service vibration, seismic testing, and finally, testing in a simulated LOCA environment. The licensee reported that during the qualification testing, a number of anomalies were identified, and the test was discontinued when the test valves failed to function for different reasons during the seismic testing. CE and TR appraised the overall safety significance of the observed test anomalies for the licensee. They considered the failure of the valve to open on demand as a result of solenoid lead shorting caused by line-induced vibrational

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wear to be a common mode of failure that, in a seismic event, could potentially disable several redundant valves at the same time. This failure of the valve to open on demand is the only observed test anomaly considered to have significant generic safety implications and is the subject of this information notice.

The root cause of the valve failure to open is attributable to the mechanism used to secure the solenoid to the upper works assembly of the valve. The valves used at Palo Verde have a jam nut and a lock washer that are used together to secure the solenoid. If the upper works assembly is rotated during valve handling or installation, the jam nut can become loose, allowing axial rotation of the coil. As a corrective action, the licensee has stated in its latest report to the NRC that existing TR valves Models 77L-0001 and 77L-003 are being upgraded. The upgrading includes a complete factory refurbishment of the valves with potting of the coil into the solenoid housing. The potting will prevent differential movement between the coil and housing to preclude lead wire abrasion during line-induced vibration.

Target Rock Corporation also has reported that the following TR valve models and plants may be affected by line-induced vibration:

Valve Models	Power Plants
72A-001/002/003/004/005/007	Monticello Nuclear Power Plant
72V-001	Duane Arnold Energy Center
73E-002	Trojan Nuclear Plant
75G-002/003/008/009/013	San Onofre Nuclear Generating Station
75GG-001	Grand Gulf Nuclear Station
75KK-204/207	Susquehanna Steam Electric Station
76B-002/024/039/040/041/042/043/044	Midland

TR has made the recommendation to the NRC that the utilities for the above listed power plants consider performing a review of safety-related systems that incorporate the above listed solenoid valves to determine if solenoid locking devices are installed on their valves. TR recommends that locking devices for the listed valves be installed per TR Service Bulletin 8302 (attached), if they have not already been installed and the potential for line-induced vibration exists. (Note: the locking device of Service Bulletin 8302 is different from the potting mechanism used for the Palo Verde solenoids.)

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

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

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Attachments:
1. Target Rock Service Bulletin 8302
2. List of Recently Issued IE Information Notices

Attachment 1
IN 85-47
June 18, 1985

SERVICE BULLETIN

S.B. 8302

Date: 4-6-83

PRODUCT IMPROVEMENT

SOLENOID OPERATED VALVES
ALL MODELS
WITH UNPOTTED SOLENOIDS

ADDING SOLENOID ASSEMBLY
INSULATING WASHERS

1. GENERAL INFORMATION.

A. Description. This Service Bulletin provides a method for checking axial travel of the solenoid assembly and, if found, to obtain the parts necessary to eliminate it.

B. Effectivity. The work called for by this Service Bulletin is applicable to all Solenoid Operated Valves with unpotted solenoids.

C. Reason. To eliminate the possibility of axial travel of the solenoid coil inside the solenoid housing on unpotted solenoid assemblies.

D. Compliance. It is recommended that the work outlined herein be accomplished while the Solenoid Operated Valve is in storage or when the system is off-line as between fuel loadings.

E. Material. A modification kit is needed to perform the requirements of this Service Bulletin. This kit will contain the parts and instructions necessary to perform this procedure. Contact the Field Service Department, Target Rock, for kit information and detailed instructions.

Written by: G. H. Schulman Date: 4-12-83
G. H. Schulman, Technical Writer

Approved by: D. M. Pattarini Date: 4-13-83
D. M. Pattarini, Vice Pres., Engineering

TRPUB-0038(3/83)

Target Rock

Target Rock Corporation, 1966E Broadhollow Road, East Farmingdale, New York 11735

Attachment 1
IN 85-47
June 18, 1985

F. Special Tools. None required.

G. References. Engineering investigations and field service recommendations.

H. Publications Affected. This Service Bulletin shall become a part of and be filed with the applicable Technical Manual(s). Reference to this Service Bulletin shall be made when ordering spares.

2. INSTRUCTIONS.

A. Inspect the Solenoid Operated Valve for axial travel as follows:

(1) Provide an axial lifting force of 50 to 100 pounds to the solenoid housing. Check to see if the solenoid housing moves. Movement of the solenoid housing indicates axial travel of the solenoid coil inside the housing.

(2) If axial travel is evident, obtain a modification kit and perform the procedure contained in the instructions included with the kit.

B. It is recommended that a modification kit be kept on hand. Additional modification kits can be obtained, as required, from the Target Rock Corporation, Field Service Department. Field service assistance may be obtained from the Target Rock Corporation at current rates.

Attachment 2
IN 85-47
June 18, 1985

LIST OF RECENTLY ISSUED
IE INFORMATION NOTICES

Information Notice No.	Subject	Date of Issue	Issued to
85-46	Clarification Of Several Aspects Of Removable Radioactive Surface Contamination Limits For Transport Packages	6/10/85	All power reactor facilities holding an OL
85-45	Potential Seismic Interaction Involving The Movable In-Core Flux Mapping System Used In Westinghouse Designed Plants	6/6/85	All power reactor facilities holding an OL or CP
85-44	Emergency Communication System Monthly Test	5/30/85	All power reactor facilities holding an OL
85-43	Radiography Events At Power Reactors	5/30/85	All power reactor facilities holding an OL or CP
85-42	Loose Phosphor In Panasonic 800 Series Badge Thermoluminescent Dosimeter (TLD) Elements	5/29/85	All power reactor facilities holding an OL or CP
85-41	Scheduling Of Pre-Licensing Emergency Preparedness Exercises	5/24/85	All power reactor facilities holding a CP
85-40	Deficiencies In Equipment Qualification Testing And Certification Process	5/22/85	All power reactor facilities holding an OL or CP
85-39	Auditability of Electrical Equipment Qualification Records At Licensees' Facilities	5/22/85	All power reactor facilities holding an OL or CP
85-38	Loose Parts Obstruct Control Rod Drive Mechanism	5/21/85	All PWR facilities designed by B&W holding an OL or CP

OL = Operating License
CP = Construction Permit