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IN 87-08

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

February 4, 1987

IE INFORMATION NOTICE NO. 87-08: DEGRADED MOTOR LEADS IN LIMITORQUE DC MOTOR OPERATORS

Addressees:

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

Purpose:

This notice is provided to alert recipients of potentially defective dc motors installed in Limitorque motor operators. The motors in question were manufactured at H. K. Porter (now Peerless-Winsmith) between December 1984 and December 1985. The motors are fitted with Nomex-Kapton insulated leads that are susceptible to insulation degradation and subsequent short circuit failure. The Nomex-Kapton leads are different than the leads which were tested and reported in Limitorque Qualification Report B-0009 dated April 30, 1976. Valves with these Nomex-Kapton leads have recently failed to actuate on demand at two nuclear plant sites. It is expected that recipients will review this information for applicability to their facilities and consider actions, if appropriate, to preclude a similar problem from 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 May 6, 1986 the NRC received from Portland General Electric Company a 10 CFR 21 report concerning a motor failure which occurred at its Trojan Nuclear Power Plant. The failure involved shorting of the motor leads inside a Limitorque motor operator connected to an auxiliary feedwater flow control valve. Upon inspection it was determined that the failure was the result of insulation degradation of the motor leads that had allowed two leads to short together. Further, inspection at Trojan revealed three similar motors that also had experienced insulation degradation.

Recently, the NRC has also learned of a failure at the Turkey Point Nuclear Power Plant in which the steam supply valve for the auxiliary feedwater turbine failed to operate after a Limitorque motor operator experienced a similar motor lead short circuit. The Trojan and the Turkey Point Limitorque operators were found to contain motors manufactured with Nomex-Kapton insulated leads.

On January 12-14, 1987, the NRC conducted an inspection at Peerless-Winsmith, Inc., manufacturer of dc motors for Limitorque Co. During this inspection it was determined that the failed Nomex-Kapton leads were different than the leads which were fitted to the motors, tested, and documented in Limitorque Qualification Report B-0009 for dc motor operators. The leads attached to the tested motors were insulated with Nomex plus an epoxy impregnated braided fiberglass sleeve. The NRC knows of no analysis or testing that has been performed to show the Nomex-Kapton leads are acceptable for use in an application requiring environmental qualification. Further, it should be noted that the failures cited above occurred under normal operating conditions, not under the harsh conditions which could occur in areas where environmental qualification is required.

On December 19, 1986, Limitorque notified 30 plant sites (Attachment 1) that had received affected motors and recommended the sleeving of existing Nomex-Kapton motor leads. The sleeving system is still under development and Limitorque expects to have this system tested for environmental qualification by the third quarter of 1987.

Discussion:

The Peerless-Winsmith motors were manufactured between December 1984 and December 1985 and can be identified by the first two letters of the serial number data code on the motors. Motor serial numbers beginning with the letters ZM, NN, PN, QN, RN, SN, TN, UN, VN, WN, XN, YN, and ZN likely contain the Nomex-Kapton leads. The lead insulation consists of one layer of 50 percent overlapped 0.003 inch Nomex plus a 50 percent overlapped layer of 0.0012 inch F616 Kapton/FEP. This insulation system is about one-sixth the thickness of the leads which were part of the Limitorque qualified motor. Peerless-Winsmith has since switched to a third type of insulated lead similar to the ones used originally. No failures with this type of lead have been reported; however, qualification of this type wire also needs to be ensured.

Previous, unrelated problems involving wiring installed in Limitorque motor actuators have been identified in Information Notices 83-72, 86-03 and 86-71.

Although no written response to this notice is required, it is expected that holders of OLs or CPs will review the information in this notice for applicability at their facilities. Because of the failures such as those discussed above and the lack of demonstrated environmental qualification, NRC's evaluation of this problem is continuing. Depending on the results of the evaluation, specific actions may be requested. If you have any questions regarding this

above and the lack of demonstrated environmental qualification, NRC's evaluation of this problem is continuing. Depending on the results of the evaluation, specific actions may be requested. 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

Contact: J. Jacobson, IE
(301) 492-8845

Attachments:
1. List of Affected Plants
2. List of Recently Issued IE Information Notices

*SEE PREVIOUS PAGE FOR CONCURRENCE

VPB:DQAVT*	ASC/VPB:DQAVT*	ABC/VPB:DQAVT*	DIR:DQAVT*	TECH ED:IE*
JJacobson:sam	ETBaker	EWMerschoff	BKGrimes	DGable-Larson
1/29/87	1/29/87	1/29/87	1/29/87	1/29/87

BC/EGCB:DEPER*	D/DEPER	DIR:DEPER
RLBaer	SSchwartz	EJordan
1/29/87	1/30/87	1/30/87

LIST OF RECENTLY ISSUED IE INFORMATION NOTICES

Information Notice No.	Subject	Date of Issue	Issued to
87-07	Quality Control of Onsite Dewatering/Solidification Operations by Outside Contractors	2/3/87	All power reactor facilities holding an OL or CP
87-06	Loss of Suction to Low-Pressure Service Water System Pumps Resulting From Loss of Siphon	1/30/87	All power reactor facilities holding an OL or CP
87-05	Miswiring in a Westinghouse Rod Control System	2/2/87	All Westinghouse power reactor facilities holding an OL or CP
87-04	Diesel Generator Fails Test Because of Degraded Fuel	1/16/87	All power reactor facilities holding an OL or CP
87-03	Segregation of Hazardous	1/15/87	All NRC licensees
87-02	Inadequate Seismic Qualification of Diaphragm Valves by Mathematical Modeling and Analysis	1/15/87	All power reactor facilities holding an OL or CP
87-01	RHR Valve Misalignment Causes Degradation of ECCS in PWRs	1/6/87	All PWR facilities holding an OL or CP
86-110	Anomalous Behavior of Recirculation Loop Flow in Jet Pump BWR Plants	12/31/86	All BWR facilities holding an OL or CP
86-109	Diaphragm Failure In Scram Outlet Valve Causing Rod Insertion	12/29/86	All BWR facilities holding an OL or CP
86-108	Degradation Of Reactor Coolant System Pressure Boundary Resulting From Boric Acid Corrosion	12/29/86	All PWR facilities holding an OL or CP

OL = Operating License
CP = Construction Permit

and the lack of demonstrated environmental qualification, NRC's evaluation of this problem is continuing. Depending on the results of the evaluation, specific actions may be requested. If you have any questions regarding this matter, please contact the Regional Administrator of the appropriate NRC Regional Office, or this office.

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RLBaer	SSchwartz	ELJordan		
1/29/87	1/ /87	1/ /87		

LIST OF LIMITORQUE CUSTOMERS AND ASSOCIATED NUCLEAR POWER FACILITIES WHICH HAVE RECEIVED AFFECTED MOTOR OPERATORS

Limitorque Customer	Associated Facility
Anchor Darling	E. I. Hatch
Anchor Darling	Clinton
Arkansas Power & Light Company	Arkansas Nuclear One #1
Bechtel Power Corporation	Pilgrim
Bechtel Power Corporation	Limerick
Boston Edison	Pilgrim
Carolina Power & Light Company	Brunswick
Carolina Power & Light Company	Brunswick
Cleveland Electric Illuminating Company	Perry
Combustion Engineering	Palo Verde
Commonwealth Edison Company	LaSalle
Detroit Edison Company	Fermi 2
Florida Power Corporation	Crystal River
Florida Power & Light Company	Turkey Point
GPU Nuclear Corporation	Oyster Creek
Gulf States Utilities	River Bend
Iowa Electric Light & Power	Duane Arnold Energy Center
Mississippi Power & Light	Grand Gulf
Nebraska Public Power	Cooper
Northeast Nuclear Energy	Millstone
Pennsylvania Power & Light	Susquehanna SES
Philadelphia Electric Company	Peach Bottom
Portland General Electric Company	Trojan
Posi-Seal International Inc.	Susquehanna SES
Public Service Electric & Gas	Hope Creek
Rockwell International Inc.	South Texas Project
Southern California Edison	San Onofre
Tennessee Valley Authority	Browns Ferry
Tennessee Valley Authority	Browns Ferry
Union Electric Company	Callaway
Velan, Inc.	Nine Mile Point
Washington Public Power Supply System	WNP-2
William Powell Company	Grand Gulf

NOTE: Limitorque records indicate that motor operators with the suspect leads have been shipped to the nuclear power plants listed above. However, failure to be listed should not be considered as assurance that a plant has not received operators with Nomex-Kapton leads.