

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

June 29, 1990

NRC INFORMATION NOTICE NO. 90-43: MECHANICAL INTERFERENCE WITH THERMAL TRIP  
FUNCTION IN GE MOLDED-CASE CIRCUIT BREAKERS

Addressees:

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

Purpose:

This information notice is intended to alert addressees of a manufacturing deviation in certain General Electric (GE) molded-case circuit breakers (MCCBs) which may result in mechanical interference with the thermal overcurrent trip function when internal accessory undervoltage release (UVR) devices are installed. In addition, the information contained herein is intended to emphasize the importance of conducting thorough pre-installation testing to verify that plant components meet the functional performance requirements of their safety-related applications. 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:

In 1989, General Public Utilities-Nuclear (GPUN), the licensee for the Oyster Creek Nuclear Power Plant (Oyster Creek), purchased 170 TED-type and THED-type MCCBs from GE Nuclear Energy in San Jose, California. The MCCBs were purchased as safety-related items and were supplied with GE Nuclear Energy product quality certificates (PQCs). GE Nuclear Energy purchased the MCCBs as commercial grade items (CGIs) from the GE Electrical Distribution and Control Department in Plainville, Connecticut (GE-ED&C), who manufactured the MCCBs at their Humacao, Puerto Rico, factory and installed UVRs at their accessory installation facility in Mascot (Knoxville), Tennessee. The MCCBs were dedicated by GE Nuclear Energy for use in safety-related applications at Oyster Creek, in part, on the basis of testing performed at the Puerto Rico factory.

In November 1989, one 15-ampere TED-type MCCB from this order was bench-tested at Oyster Creek prior to installation. This MCCB had a UVR installed in the standard location by phase "C" (right-hand side). The MCCB failed to trip when 300-percent of rated current was applied to phase C of the MCCB (a time-overcurrent test of the thermal trip function), whereas on phases A and B,

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the thermal trips operated satisfactorily. The licensee returned the MCCB to GE Nuclear Energy for failure and root cause analysis. The results of the analysis have not yet been reported.

In May 1990, according to GPUN reports, Oyster Creek technicians bench-tested seven more UVR-equipped MCCBs from the same order. Five of the seven failed to pass the overcurrent trip test (also at 300 percent of rated current) on phase C only. In addition, GPUN reported opening one of the failed MCCBs, removing the UVR, and retesting the MCCB with satisfactory results for the thermal overcurrent trip test on phase C. These experimental results suggested that the UVR had been interfering with the operation of the phase-C thermal overcurrent trip element because of its close proximity to the phase-C element. However, it should be noted that the UVR is not intended to act on the thermal element, but rather on the common tripper bar that trips all three phases or poles.

#### Discussion:

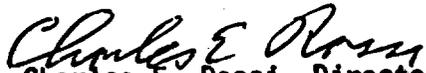
On May 24, 1990, an NRC representative observed the GE ED&C testing of the five GE TED-type MCCBs with UVRs installed (GE catalog number TED136100UV4RS) which had failed pre-installation testing at Oyster Creek. Inspection and testing revealed that the cause of the failure of the overcurrent trip function was improper installation of the calibration screw spring clips by the Puerto Rico factory, instead of improper installation of the UVRs by the Knoxville facility, as previously believed by GE Nuclear Energy. GE ED&C stated that the misoriented calibration screw spring clips have no effect on the operability of the MCCBs unless internal UVRs are installed. The Oyster Creek MCCBs passed the thermal overcurrent trip tests at the GE Puerto Rico factory because the UVRs had not yet been installed. After the UVRs were installed at the GE ED&C Knoxville facility, the presence of the misoriented calibration screw spring clips caused mechanical interference between the UVR and the thermal overcurrent trip function. This was not detected at the GE ED&C Knoxville facility, because testing of all MCCBs normal functions was not performed.

Deficiencies in manufacturing quality control and in the program for dedication of CGIs for safety-related applications were exhibited by the undetected misorientation of the calibration screw spring clips and the lack of adequate retesting following installation of the UVRs. GE ED&C has indicated that action will be taken, including design changes if necessary, to prevent interference between the calibration screw spring clips and the UVRs. In addition, GE ED&C has now instituted overcurrent trip testing of MCCBs following the installation of UVRs at their Knoxville facility.

Although GE ED&C's failure analysis was demonstrated by testing, it has not been firmly established that this condition is isolated to the MCCB shipment in question. However, GE ED&C has stated that the problem is limited only to the thermal overcurrent trip functions on phase C of their 3-pole, E-frame MCCBs (types TED13XXXX and THED13XXXX), and only those equipped with UVRs. This is a result of this model's unique, integral overcurrent trip mechanisms and the proximity of the phase C thermal trip mechanism to the tripping arm of an installed UVR.

Oyster Creek's routine pre-installation testing procedures detected and prevented the use of the faulty MCCBs. Although the MCCBs were procured as safety-related components through GE Nuclear Energy and were supplied with the vendor's 10 CFR Part 50 Appendix B quality assurance certifications, this testing was performed by the licensee in addition to the normal quality assurance receipt inspection.

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 NRR project manager.

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

Technical Contacts: K. R. Naidu, NRR  
(301) 492-0980

S. D. Alexander, NRR  
(301) 492-0995

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LIST OF RECENTLY ISSUED  
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
90-32, Supp. 1	Surface Crack and Subsurface Indications in the Weld of a Reactor Vessel Head	6/19/90	All holders of OLs or CPs for nuclear power reactors.
90-42	Failure of Electrical Power Equipment Due to Solar Magnetic Disturbances	6/19/90	All holders of OLs or CPs for nuclear power reactors.
90-41	Potential Failure of General Electric Magne-Blast Circuit Breakers and AK Circuit Breakers	6/12/90	All holders of OLs or CPs for nuclear power reactors.
90-40	Results of NRC-Sponsored Testing of Motor-Operated Valves	6/5/90	All holders of OLs or CPs for nuclear power reactors.
90-39	Recent Problems With Service Water Systems	6/1/90	All holders of OLs or CPs for nuclear power reactors.
90-38	Requirements for Processing Financial Assurance Submittals for Decommissioning	5/29/90	All fuel facility and materials licensees.
90-37	Sheared Pinion Gear-to-Shaft Keys in Limitorque Motor Actuators	5/24/90	All holders of OLs or CPs for nuclear power reactors.
90-36	Apparent Falsification of State of Connecticut Weight Certificates	5/24/90	All holders of OLs or CPs for nuclear power reactors, and 10 CFR 70 licensees.
90-35	Transportation of Type A Quantities of Non-Fissile Radioactive Materials	5/24/90	All U.S. NRC licensees.

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Oyster Creek's routine pre-installation testing procedures detected and prevented the use of the faulty MCCBs. Although the MCCBs were procured as safety-related components through GE Nuclear Energy and were supplied with the vendor's 10 CFR Part 50 Appendix B quality assurance certifications, this testing was performed by the licensee in addition to the normal quality assurance receipt inspection.

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			*VIB:DRIS:NRR EWBrach 6/06/90

The failure of the Oyster Creek MCCBs in safety-related applications could have jeopardized the safety of the plant. Oyster Creek's routine pre-installation testing procedures detected and prevented the use of the faulty MCCBs. Although the MCCBs were procured as safety-related components through GENE and were supplied with the vendor's 10 CFR Part 50 Appendix B quality assurance certifications, this testing was performed by the licensee in addition to the normal quality assurance receipt inspection.

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UPotapovs

6/06/90

\*D/DRIS:NRR

BKGrimes

06/07/90

\*C/VIB:DRIS:NRR

EWBrach

6/06/90

*Y Campbell*  
06/22/90

Oyster Creek's routine preinstallation testing procedures detected and prevented the use of faulty MCCBs in safety-related applications which could have jeopardized the safety of the plant. It should be noted that this testing was conducted ~~despite the fact~~ <sup>even though</sup> that these components were procured as safety-related and came with vendor 10 CFR Part 50 Appendix B quality assurance certifications.

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