

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

November 17, 1992

NRC INFORMATION NOTICE 92-77: QUESTIONABLE SELECTION AND REVIEW TO DETERMINE
SUITABILITY OF ELECTROPNEUMATIC RELAYS FOR
CERTAIN APPLICATIONS

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 licensees to problems that could develop as a result of inadequate selection and review for the suitability of application of electropneumatic relays in certain safety-related load sequencer 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 are not NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances

On November 21, 1989, the NRC found a problem with the use of Amerace Corporation (Amerace) Agastat commercial time-delay 7000 series relays by the Carolina Power and Light Company (the licensee) in its load sequencer panels at the H.B. Robinson Steam Electric Plant (Robinson). The NRC documented its findings in Inspection Report 50-261/89-25. In an accident, these sequencers provide electrical signals to connect emergency loads in steps to either the offsite or onsite emergency power source. The licensee assumed in the accident analysis for Robinson that load blocks are energized within a ± 2 second operating band. The NRC inspectors reviewed the plant's previous performance history for the Agastat relay applications and found that the relays had failed to consistently meet the ± 2 second operating band assumed in Robinson's accident analysis. The licensee subsequently determined that the actual operating band could allow pump motor starts to unintentionally overlap. In an accident, this could result in the emergency bus voltage being reduced below the setpoint of the degraded voltage relay, thereby interrupting the connection of emergency loads to the preferred power source. This concern prompted the licensee to replace the 7000 series relays with Agastat solid state DSC series digital timers.

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On July 29 - August 30, 1991, the NRC conducted an electrical distribution system functional inspection (EDSFI) at the North Anna Power Station. The NRC found test results indicating the time-delay drift of certain Agastat Class 1E qualified E7000 and commercial 7000 series relays in its EDG load sequencer panels had been outside allowable parameters. The NRC documented its findings in Inspection Report 50-338, 339/91-17. The North Anna technical specifications require that the load sequencers be tested every 18 months and specifies the allowed parameters of starting times of vital loads. The results of load sequencer time-delay tests conducted between March 1987 and July 1991 indicated that numerous time-delay setpoints had drifted outside their allowed technical specification values during the 18-month surveillance interval. The Virginia Electric and Power Company (the licensee) conducted an engineering safety review to determine the effect of these time-delay setpoints being outside their technical specification allowed values. The licensee determined that the loads could have been successfully sequenced and that the EDG safety function would not have been adversely affected. After the inspection, the licensee submitted licensee event reports 50-339/92-04 and 50-338/92-05 in which it was reported that the time-delay setpoints of its EDG load sequencers continued to drift. The licensee committed to perform an engineering evaluation to determine the cause of the timer setpoint drift, and the long term resolution.

During an EDSFI on June 8 - July 10, 1992, at the Joseph M. Farley Nuclear Plant (Farley), the inspection team noted numerous instances in which the EDG load sequencers failed surveillance tests because of problems with the application of Agastat E7000 series time-delay relays. The NRC documented its findings in Inspection Report 50-348, 364/92-17. Farley replaced the relays for the EDG load sequencers between late 1990 and early 1991 because the relays were approaching their projected qualified end of life (10 years). The NRC inspectors found that the time-delay intervals prescribed by the Farley technical specifications were not met in four of the first six EDG sequencer tests performed after the relays were replaced. Testing after the event suggested a generic problem with using the Agastat relays in load sequencer time-delay applications because the repeat accuracy tolerance of the relay was equal to the setpoint drift tolerance as reflected in the technical specifications. Consequently, there was no margin for calibration error.

Discussion

The NRC staff reviewed the Amerace electropneumatic relay catalogs and found that the Agastat Class 1E qualified E7000 series relays have a stated "repeat accuracy at any fixed temperature of $\pm 10\%$ of setting," whereas, the Amerace commercial grade relay catalog for Agastat 7000 series commercial grade relays have a stated repeat accuracy range between $\pm 5\%$ and $\pm 15\%$, based upon relay configuration, time-delay duration, and the fixed temperature at calibration. Amerace stated that temperature changes in the panel may influence time-delay drift.

If time-delay relays are outside the required technical specification parameters, they could cause equipment to start early, simultaneously, or late. These conditions may cause the overloading of the EDGs, resulting in emergency bus voltage and frequency to drop to the point where the loads may be disconnected by undervoltage protection devices. If load connection is delayed, the emergency safety feature equipment may not operate within the time assumed in the accident analysis. Criterion III, "Design Control," of Appendix B to Part 50 of Title 10 of the Code Of Federal Regulations, (10 CFR Part 50), states, in part, that "[m]easures shall also be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the structures, systems and components."

This information notice requires no specific action or written response. If you have any questions about this matter, please contact the technical contact listed below or the appropriate Nuclear Reactor Regulation (NRR) project manager.



Brian K. Grimes, Director
Division of Operating Reactor Support
Office of Nuclear Reactor Regulation

Technical contact: Lee A. Keller, Region II
(803) 345-5683

Joseph J. Petrosino, NRR
(301) 504-2979

Attachment:
List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
92-76	Issuance of Supplement 1 to NUREG-1358, "Lessons Learned from the Special Inspection Program for Emergency Operating Procedures (Conducted October 1988 - September 1991)"	11/13/92	All holders of OLs or CPs for nuclear power reactors
92-75	Unplanned Intakes of Airborne Radioactive Material by Individuals at Nuclear Power Plants	11/12/92	All holders of OLs or CPs for nuclear power reactors.
92-74	Power Oscillations at Washington Nuclear Power Unit 2	11/10/92	All holders of OLs or CPs for nuclear power reactors.
92-61, Supp 1	Loss of High Head Safety Injection	11/06/92	All holders of OLs or CPs for nuclear power reactors.
92-73	Removal of A Fuel Element from A Research Reactor Core While Critical	11-04/92	All holders of OLs or CPs for nuclear power reactors
92-59, Rev. 1	Horizontally-Installed Motor-Operated Gate Valves	11/04/92	All holders of OLs or CPs for nuclear power reactors.
92-72	Employee Training and Shipper Registration Requirements for Transporting Radioactive Materials	10/28/92	All U.S. Nuclear Regulatory Commission Licensees.
91-64, Supp. 1	Site Area Emergency Resulting from A Loss of Non-Class 1E Uninterruptible Power Supplies	10/07/92	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License
CP = Construction Permit

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DOCUMENT NAME: 92-77.IN

*SEE PREVIOUS CONCURRENCE.

OFC	DRP:RII	TECHED	OGCB:DORS	D:DRP:RII
NAME	LAKeller	JMain	JJPetrosino	EWmerschoff
DATE	9/24/92+*	10/21/92*	10/21/92*	9/24/92 +

OFC	BC:OGCB:DORS	EELB:DE	OTSB:DORS	DIR:DORS
NAME	GHMarcus	CHBerlinger	CIGrimes	BKGrimes
DATE	10/23/92*	10/29/92*	10/27/92*	11/13/92

+DIR:DRP Region II, September 24, 1992, memorandum transmitted draft IN.

NOTE: A discussion with Amerace technical staff was conducted on October 28, 1992, between Mr E. Leszczak and J. J. Petrosino, NRR, to verify the Agastat technical details in the IN.

If time-delay relays are outside the required technical specification parameters, they could cause equipment to start early, simultaneously, or late. These conditions may cause the overloading of the EDGs, resulting in emergency bus voltage and frequency to drop below acceptable limits. If this equipment starts late, the emergency safety features equipment may not operate within technical specification requirements, or be within accident analysis assumptions. Licensees are reminded that Criterion III, "Design Control," of Appendix B to Part 50 of Title 10 of the Code Of Federal Regulations, (10 CFR Part 50), states, in part, that "[m]easures shall also be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the structures, systems and components."

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Contact Joe Petrosino @ 504-2979 for pick-up.

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