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## Information Notice No. 93-99: Undervoltage Relay and Thermal Overload Setpoint Problems

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

December 21, 1993

NRC INFORMATION NOTICE 93-99: UNDERVOLTAGE RELAY AND THERMAL OVERLOAD  
SETPOINT PROBLEMS

### Addressees

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

### Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees to continuing discoveries of undervoltage relay and thermal overload setpoints that are set too low. 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.

### Background

In August 1976, the NRC wrote generic letters to all LWR licensees regarding the need for licensees to evaluate any generic implications of several events at the Millstone site involving episodes of sustained degraded grid voltage. On June 2, 1977, as part of multiplant action MPA-23, the staff stated its position that all licensees must have a second level of undervoltage protection with a time delay. (During degraded grid voltage episodes, undervoltage relays and thermal overload protective relays protect the safety equipment.) In a generic letter dated August 8, 1979, the NRC requested all licensees to determine the capability of the offsite power system to operate all required loads within their voltage ratings under all conditions within their design basis. The licensees reviewed their undervoltage relay setpoints on each of these occasions. In 1981, the NRC issued Branch Technical Position, Power System Branch-1, "Adequacy of Station Electric Distribution System Voltages," which discussed, among other things, the addition of a second undervoltage relay with an associated time delay. Between 1981 and 1992, the NRC issued two information notices, in which it discussed undervoltage relay setpoints and other concerns:

1. IN 84-02, "Operating a Nuclear Power Plant at Voltage Levels Lower than Analyzed," issued January 10, 1984.

2. IN 91-29, "Deficiencies Identified During Electrical Distribution System Functional Inspections," issued April 15, 1991.

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3. IN 91-29, Supplement 1, "Deficiencies Identified During Electrical Distribution System Functional Inspections," issued September 14, 1992.

In addition, recognizing that certain degraded grid voltage problems resulted from inadequate control over the design process, on September 12, 1988, the NRC issued Generic Letter 88-15, entitled, "Electric Power Systems - Inadequate Control Over Design Processes."

#### Description of Circumstances

Since 1989, the NRC has performed electrical distribution system functional inspections at nuclear power plants. The NRC has found design weaknesses in several electrical distribution system areas including undervoltage relay setpoints for degraded grid voltage. These are addressed in IN 91-29 and in IN 91-29, Supplement 1. From May 1990 to January 1993, over 30 licensees wrote to the NRC about inadequate setpoints. Licensees found that the undervoltage relay setpoints were set so low that safety equipment would not have been protected if degraded grid voltage had occurred. Three licensees discovered deficiencies in which the thermal overload protective relay setpoints were set too low.

#### Discussion

In the last few years, licensees began extensive efforts to improve the adequacy and completeness of the set of design bases, design analyses, and final design output documents that define the design of their facilities. The licensees began these initiatives primarily because, during inspections such as safety system functional inspections and safety system outage modification inspections, the NRC consistently found that some licensees have made plant modifications which have affected the functionality of safety systems without making the appropriate setpoint change. The NRC inspection findings prompted many licensees to review and reconstitute their design bases.

These reviews and the generic communication documents discussed above prompted licensees to submit technical specification changes for undervoltage relay setpoints that were discovered to be incorrect after the problem was created for one of several reasons shown (see Attachment 1). Attachment 1 was developed from 50.72 reports as a representative summary of the types and number of problems encountered. Subsequent LERs may provide additional information. Of the reports where the cause could be determined based on the event report, design error was the predominant cause of the problem. Licensees have generally found setpoint problems when the setpoints were examined as a result of a special inspection or design basis reconstitution..

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

/S/'D BY BKGRIMES

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

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Attachments:

1. Representative List of Undervoltage  
Relay Setpoint Revisions 1988-1993
2. List of Recently Issued NRC Information Notices

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Attachment 1  
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Representative List of Undervoltage Relay Set Point Revision Notifications and  
Technical Specification Change Proposals for 1988-1993

| Event Notification<br>Number | Licensee              | Event Notification Date | Class |
|------------------------------|-----------------------|-------------------------|-------|
| 11374                        | Pilgrim 1             | January 30, 1988        | 1     |
| 14043                        | Pilgrim 1             | November 18, 1988       | 5     |
| 00000                        | Pilgrim 1             | June 30, 1988           | 1     |
| 14780                        | Cooper 1              | February 17, 1989       | 5     |
| 16540                        | Crystal River 3       | September 8, 1989       | 1     |
| 17121                        | Robinson 2            | November 16, 1989       | 1     |
| 18322                        | Oconee 1, 2 and 3     | April 24, 1990          | 5     |
| 18466                        | McGuire 1 and 2       | May 14, 1990            | 1     |
| 18892                        | St. Lucie 2           | July 14, 1990           | 2     |
| 19023                        | Haddam Neck 1         | August 2, 1990          | 5     |
| 20021                        | Calvert Cliff 1 and 2 | December 6, 1990        | 1     |
| 20435                        | Ft. Calhoun           | February 12, 1991       | 1     |
| 20503                        | Kewaunee 1            | February 20, 1991       | 5     |
| 20542                        | Salem 2               | February 27, 1991       | 2     |
| 21691                        | Dresden 2 and 3       | August 23, 1991         | 5     |
| 22281                        | Dresden 2             | November 20, 1991       | 1     |
| 22498                        | Zion 1 and 2          | December 19, 1991       | 5     |
| 22580                        | Indian Point 3        | January 9, 1992         | 5     |
| 22658                        | Dresden 3             | January 22, 1992        | 5     |
| 22847 (TOL)                  | Washington Nuclear 2  | February 19, 1992       | 5     |
| 22918                        | Washington Nuclear 2  | March 1, 1992           | 1     |
| 23148                        | Vermont Yankee        | April 1, 1992           | 4     |
| 23191                        | Quad Cities 1 and 2   | April 7, 1992           | 5     |
| 23338                        | LaSalle 1 and 2       | April 27, 1992          | 1     |
| 23365                        | LaSalle 2             | April 29, 1992          | 1     |
| 23385                        | Crystal River 3       | May 1, 1992             | 5     |
| 23439 (TOL)                  | Grand Gulf            | May 11, 1992            | 3     |
| 23452                        | Comanche Peak 2       | May 13, 1992            | 1     |
| 23576                        | Crystal River 3       | June 4, 1992            | 1     |
| 23784                        | Zion 1 and 2          | July 2, 1992            | 5     |

|       |                 |                    |   |
|-------|-----------------|--------------------|---|
| 23932 | Byron 1 and 2   | July 24, 1992      | 1 |
| 00000 | Callaway        | July 23, 1992      | 1 |
| 24229 | Crystal River 3 | September 14, 1992 | 1 |
| 24384 | Dresden 2 and 3 | October 6, 1992    | 5 |

\*TOL = Thermal Overload.

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| Event Notification<br>Number | Licensee              | Event Notification Date | Class |
|------------------------------|-----------------------|-------------------------|-------|
| 00000                        | Prairie Island 1 & 2  | November 6, 1992        | 1     |
| 00000                        | St. Lucie 1           | November 30, 1992       | 1     |
| 24757                        | Maine Yankee          | December 15, 1992       | 5     |
| 00000                        | Diablo Canyon 1 and 2 | December 22, 1992       | 1     |
| 24845                        | Point Beach 1 and 2   | January 7, 1993         | 1     |
| 25248 (TOL)                  | Pilgrim               | March 29, 1993          | 5     |
| 25362                        | South Texas           | April 6, 1993           | 5     |

Events Notification Number-00000 Licensees whose undervoltage relay setpoint notifications to the NRC were reported by LERs, licensee letter, etc., and event notification numbers if any, were not known.

#### Class Definitions:

1. Undervoltage Relay setpoints were found to be incorrect because of design errors.
2. Undervoltage Relay setpoints, as found, were not the same as required by the technical specification.
3. Safety load circuit breaker thermal overloads or other trip setpoints were too low because of design errors.
4. Safety load circuit breaker thermal overload, or other trip setpoints, as found, were not the same as required by the technical specification.
5. Membership in one of the preceding four classes could not be definitely established because of incomplete information in the event notification.

*Page Last Reviewed/Updated Tuesday, November 12, 2013*