

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

May 24, 1993

NRC INFORMATION NOTICE 93-38: INADEQUATE TESTING OF ENGINEERED
SAFETY FEATURES ACTUATION SYSTEMS

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 addressees to situations in which inadequate testing of engineered safety features actuation systems was performed. 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

South Texas Units 1 and 2

On September 15, 1992, personnel at the South Texas Nuclear Plant (South Texas) determined that a portion of the containment spray channels between the process instrumentation and the actuation and logic circuitry was not being tested. The containment spray system is an engineered safety feature (ESF) and is required by technical specifications to be verified operable for plant operation.

The controlling logic for the containment spray system is part of the engineered safety features actuation system (ESFAS). The purpose of the ESFAS is to sense plant conditions and, if required, transmit signals to actuate ESF equipment to mitigate the consequences of postulated accidents. During plant operation, a set of overlapping tests verifies that the ESFAS circuitry is operable. These tests are performed from the point at which process conditions are sensed through the signal output of the logic relays. When the containment spray portion of the system is tested, the contacts for the logic relays are opened to prevent inadvertent actuation of the containment spray system. After testing of the containment spray logic is complete, the contacts for the logic relays are returned to the normal closed position. However, the test procedure does not require the test personnel to verify that the contacts are closed and that the circuits are continuous. The licensee has determined that a failure of these contacts to close could render the circuitry inoperable.

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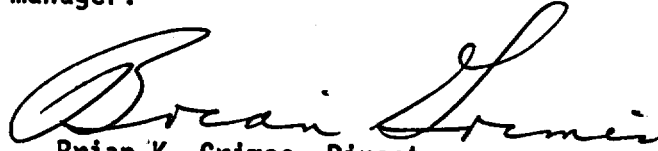
discrepancy. Later, this condition was also found in the same test circuits at the Braidwood Nuclear Power Station (Braidwood) and at McGuire.

Discussion

In three of the events described above, the testing of normally energized ESFAS circuits was found to be inadequate because the licensee did not verify that the contacts which were opened for the test were closed and the circuits continuous after completing the test. Failure to close these contacts could result in the failure of ESF equipment to actuate as required. Because indication of continuity for this type of circuit may not be available in the same manner as for normally energized circuits, other methods may be used to verify that the contacts are closed and that the circuits are continuous. Although these three events occurred at pressurized water reactors, the potential exists for similar conditions at boiling water reactors.

The wiring discrepancy found in the test circuitry at Byron, Braidwood and McGuire may also exist in test circuits supplied by Westinghouse at other sites. At these three facilities, the discrepancy resulted in a failure by the licensee to perform a required technical specification surveillance test of the containment isolation phase B logic.

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.


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

Technical contact: P. Kim VanDoorn, RII
(704) 875-1681

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For most of the circuits in the ESFAS, the bistables are normally energized. The status of these circuits can readily be monitored and displayed on a bistable status monitoring panel. However, to prevent spurious actuation of containment spray, the bistables for the containment spray circuits are normally deenergized and the status of the circuits cannot be monitored in the same manner as the normally energized circuits. At South Texas, a test circuit was provided in the containment spray circuitry to allow verification of circuit continuity between the process instrumentation and the ESF actuation and logic circuitry without actuating the containment spray system. The test personnel were not aware that it was necessary to use this test circuit to verify circuit continuity after closing the contacts.

After making the above discovery, the licensee tested the containment spray circuitry and found the circuits acceptable. The licensee revised the applicable procedures to ensure that these circuits would be tested during future surveillances.

McGuire Units 1 and 2

On February 16, 1993, personnel at the William B. McGuire Nuclear Station (McGuire) Units 1 and 2, determined that, similar to the event at South Texas, continuity checks were not performed for the containment spray logic relay contacts and for a contact in the reactor protection circuitry that was also opened during testing. The contact in the reactor protection circuitry was the channel test relay contact at the bistable output to the solid-state protection system for containment spray. The licensee revised the applicable procedures to ensure that these contacts would be tested during future tests.

Catawba Units 1 and 2

On February 16, 1993, personnel at the Catawba Nuclear Station Units 1 and 2, determined that, similar to the condition at McGuire, continuity checks were not performed for certain normally deenergized contacts. The licensee verified the continuity of the circuits and revised procedures to ensure that the contacts would be tested during future tests. In addition, the licensee found that, for three channels in Unit 1 and two channels in Unit 2, the test points on the printed circuit cards were mislabeled.

Byron Units 1 and 2

On February 22, 1993, personnel at the Byron Nuclear Power Station (Byron) Unit 1, found a wiring discrepancy in a cabinet of the solid-state protection system. The licensee determined that a test connection for containment isolation phase B (set to actuate at 50 percent of the design pressure of the containment) was wired to pin 5 of a terminal board instead of pin 6. Because of this error, surveillance tests performed to verify that the containment isolation phase B logic circuitry was acceptable were actually performed on the containment spray logic circuitry. As a consequence, surveillance tests of the containment isolation phase B logic had not been performed as required. This condition was later found to exist also in Unit 2. The licensee consulted with the supplier, Westinghouse Electric Company, and corrected the

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Information Notice No.	Subject	Date of Issuance	Issued to
93-37	Eyebolts with Indeterminate Properties Installed in Limitorque Valve Operator Housing Covers	05/19/93	All holders of OLs or CPs for nuclear power reactors.
93-36	Notifications, Reports, and Records of Misadministrations	05/07/93	All U.S. Nuclear Regulatory Commission medical licensees.
93-35	Insights from Common-Cause Failure Events	05/12/93	All holders of OLs or CPs for nuclear power plants (NPPs).
93-34, Supp. 1	Potential for Loss of Emergency Cooling Function Due to A Combination of Operational and Post-LoCa Debris in Containment	05/06/93	All holders of OLs or CPs for nuclear power reactors.
93-34	Potential for Loss of Emergency Cooling Function Due to A Combination of Operational and Post-LoCa Debris in Containment	04/26/93	All holders of OLs or CPs for nuclear power reactors.
93-33	Potential Deficiency of Certain Class 1E Instrumentation and Control Cables	04/28/93	All holders of OLs or CPs for nuclear power reactors.
93-32	Nonconservative Inputs for Boron Dilution Event Analysis	04/21/93	All holders of OLs or CPs for pressurized water reactors (PWRs).

OL = Operating License
CP = Construction Permit

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However, later, this condition was also found in the same test circuits

Discussion

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Brian K. Grimes, Director
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Office of Nuclear Reactor Regulation

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(704) 875-1681

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*RII	*RII:DRP
PKVanDoorn	WMiller
05/12/93	05/12/93

DOCUMENT NAME: ESFAS.IN2

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Discussion

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RSanders *for*
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