

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

March 23, 1987

IE INFORMATION NOTICE 87-14: ACTUATION OF FIRE SUPPRESSION SYSTEM CAUSING
INOPERABILITY OF SAFETY-RELATED VENTILATION
EQUIPMENT

Addressees:

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

Purpose:

This notice is to alert recipients to a potential generic problem involving operator errors and single- and common-cause failures that initiate fire suppression systems and cause the inoperability of safety-related systems.

We expect that recipients will review the information for applicability to their facilities and consider actions, if appropriate, to preclude similar problems from occurring at their facilities. 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 June 1983 the NRC issued Information Notice (IN) 83-41. The purpose of that notice was to alert licensees to several reported events during which fire suppression systems actuation resulted in the inoperability of safety-related systems. A continuing series of events indicate that the concerns addressed by IN 83-41 are not resolved.

On October 15, 1986, at Duane Arnold, testing of the deluge system temperature sensors resulted in wetting of the charcoal in both trains of the control room ventilation system. Although procedures called for isolation of the water supply before testing the sensors, the procedures failed to require that the control valves be reset before reopening the supply valve.

On August 27, 1986, the licensee for Pilgrim Nuclear Power Station Unit 1 determined that automatic or manual initiation of the standby gas treatment (SBGT) system deluge fire suppression system would result in the charcoal beds of one train becoming water soaked. Since the Pilgrim SBGT system's redundant trains are cross-connected via pneumatic normally open/fail open dampers, a deluge system actuation without operator action to close the cross connect dampers will result in a complete loss of SBGT system operability.

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PDR I&E Notice 87-014

On May 15, 1985, personnel at Hatch Unit 1 observed water falling from a control room heating ventilation and air conditioning (HVAC) vent onto an analog transmitter trip system panel in the control room. The water was from the control room HVAC filter train deluge system which had been inadvertently activated as a result of unrelated maintenance activities (See Information Notice 85-85). The water resulted in the lifting of a safety relief valve four times. The valve stuck open on the fourth cycle, initiating a severe transient. Moisture also energized the high pressure coolant injection (HPCI) trip solenoid making the HPCI inoperable for vessel makeup during part of this event.

On April 4, 1984, construction workers at the Cooper Nuclear Power Station sheared a hydrant from the fire protection system. When the hydrant was isolated and the system repressurized, a water hammer forced the SBT system fire suppression deluge valves open, flooding the charcoal filters. Both trains of SBT were rendered inoperable.

On March 21, 1984, a pressure transient in the firewater system (that was caused by a false initiation elsewhere in the plant) momentarily opened the deluge valves for both SBT system trains at WNP2. One valve did not reseal properly. Similar events involving only one train occurred on April 4 and 27 of the same year.

On March 24, 1983, incorrect installation of a new control valve in the fire suppression deluge system for one SBT train at Pilgrim Nuclear Power Station resulted in the loss of the train. The deluge system was not tested after modification and the valve leaked as a result of the installation error. As discussed above, because the Pilgrim SBT system design and operational configuration includes normally open cross connection dampers, the continued operability of the redundant SGTs train was threatened.


Discussion:

Events such as those described above are of particular concern, not only because of their impact on systems that are required for accident mitigation, but also because of the special fire safety problem presented by dry charcoal that has been wetted (i.e., lower ignition temperature) and because of water damage to other safety systems. General Design Criterion 3 (Fire Protection) of Appendix A to 10 CFR Part 50 states in part: "Fire detection and fighting systems of appropriate capacity and capability shall be provided and designed to minimize the adverse effects of fires on structures, systems and components important to safety. Fire fighting systems shall be designed to ensure that their rupture or inadvertent operation does not significantly impair the safety capability of these structures, systems and components." Appendix R to 10 CFR Part 50 requires that a fire hazard analysis be performed to assess the probability and consequences of fires in each utilization facility. This analysis should include the effects of inadvertent operation or leaks in moderate energy lines of the fire suppression system. The events reported in this notice subsequent to IN 83-41 indicate that the problem has not been fully resolved.

To date, none of the reported events have resulted in a serious impact on the health and safety of the public. However, each instance cited above could lead to much more serious consequences given a valid demand for the safety systems that were damaged by the event.

Although no written response to this notice is required, it is suggested that holders of OLs or CPs review the information in this notice for applicability at their facilities. The specific events cited occurred at BWRs but our concern is not limited to BWRs. For example, Supplement 2 to Information Notice 86-106 describes actuation of the carbon dioxide fire suppression system at the Surry Power Station as a result of water entering the control panels through the ends of several open conduits. This resulted in carbon dioxide entering the control room, causing shortness of breath, dizziness, and nausea of some personnel.

Because of the recurring failures such as those discussed above, NRC's evaluation of this problem is continuing. Specifically, AEOD is currently evaluating the safety significance of a number of inadvertent actuations of fire suppression systems at operating plants. Depending on the results of the evaluation, further information will be published and/or 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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Attachment: List of Recently Issued IE Information Notices

Attachment 1
IN 87-14
March 23, 1987

LIST OF RECENTLY ISSUED
IE INFORMATION NOTICES

Information Notice No.	Subject	Date of Issue	Issued to
86-106 Sup. 2	Feedwater Line Break	3/18/87	All power reactor facilities holding an OL or CP
87-13	Potential for High Radiation Fields Following Loss of Water from Fuel Pool	2/24/87	All power reactor facilities holding an OL or CP except Fort St. Vrain.
86-106 Sup. 1	Feedwater Line Break	2/13/87	All power reactor facilities holding an OL or CP
87-12	Potential Problems With Metal Clad Circuit Breakers, General Electric Type AKF-2-25	2/13/87	All power reactor facilities holding an OL or CP
87-11	Enclosure of Vital Equipment Within Designated Vital Areas	2/13/87	All power reactor facilities holding an OL or CP
87-10	Potential for Water Hammer During Restart of Residual Heat Removal Pumps	2/11/87	All BWR facilities holding an OL or CP
87-09	Emergency Diesel Generator Room Cooling Design Deficiency	2/5/87	All power reactor facilities holding an OL or CP
87-08	Degraded Motor Leads in Limitorque CD Motor Operators	2/4/87	All power reactor facilities holding an OL or CP
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

OL = Operating License
CP = Construction Permit