

SSINS No.: 6835
In 86-106
Supplement 2

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, DC 20555

March 18, 1987

IE INFORMATION NOTICE NO. 86-106, SUPPLEMENT 2: FEEDWATER LINE BREAK

Addressees:

All nuclear power reactor facilities holding an operating license or a construction permit.

Purpose:

IE Information Notice 86-106 provided general information to addressees about the catastrophic failure of feedwater piping that occurred on December 9, 1986, at Unit 2 of the Surry Power Station and resulted in four fatalities. Supplement 1 to that notice provided information about thinning of piping walls which was the cause of the failure of feedwater piping. This supplement provides addressees with information about potentially generic systems interaction problems that were caused by release of large quantities of feedwater. Recipients are expected to review the information provided for applicability to their facilities and consider actions, if appropriate, to preclude the occurrence of similar problems. However, suggestions contained in this information notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Discussion:

On December 9, 1986, both units at the Surry Power Station were operating at full power when an 18-inch suction line to a main feedwater pump in Unit 2 failed catastrophically releasing, in the turbine building, large quantities of hot feedwater which flashed to steam. Condensed steam saturated a security card reader in the turbine building basement approximately 50 feet from the failed pipe and shorted out the card reader system for the entire plant. As a result, key cards would not open doors controlled by the security system. Controlled-access doors to the control room were blocked open to provide access for operating, emergency, and management personnel. Security personnel were posted at the doors and permitted entry of essential personnel based on personal recognition. Twenty minutes after the failure, the card reader system was functioning normally.

Water also entered a fire protection control panel through an open conduit and shorted circuits in the panel. This resulted in the discharge of 6E water sprinkler heads in the fire suppression system within minutes of failure of the feedwater piping. Actuation of the sprinkler heads did provide cooling of the atmosphere in the turbine building but added to the quantity of water in the

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turbine building basement. Water from the sprinklers outside the Unit 2 cable tray room apparently flowed under the door into the cable tray room, leaked around foam fire seals in floor penetrations, and dripped into the control room. The control room serves Units 1 and 2 and is located beneath the cable tray rooms for these units.

A carbon dioxide fire suppression system is provided for the cable tray rooms. Water from sprinkler heads located directly over and adjacent to control panels for this system and water from the failed feedwater pipe entered the control panels through the ends of several open conduits. Within a few minutes after failure of the feedwater pipe, shorting of fire protection control circuits caused the contents of the main carbon dioxide storage tank to be emptied into the cable tray rooms leaving the station without carbon dioxide in the event of fire. Carbon dioxide, which is heavier than air, entered the control room via stairwells and controlled-access doors which were blocked open. Personnel on the Unit 2 side of the control room complained of shortness of breath, dizziness, and nausea.

A halon fire suppression system is provided for the emergency switchgear rooms for Units 1 and 2. These rooms are located below the control room. The halon system was actuated in the same way that the carbon dioxide system was actuated. Halon leaked into the Unit 1 computer room through floor penetrations and from the computer room into the Unit 1 side of the control room. Halon haze was reported but did not hamper the performance of operators.


An operator who was in the stairwell behind the control room when the card readers failed experienced difficulty in breathing. Because of locked doors, he could not exit through the control room or a switchgear room which contained halon. The other means of egress was through a cable tray room which contained carbon dioxide. An operator in the control room heard him knocking and admitted him.

The security communications system includes radio repeaters that improve the clarity of reception of low-power hand-held radios used in the plant. A radio repeater, located in the Unit 1 cable tray room and approximately 5 feet from a carbon dioxide nozzle, was covered with a thick layer of ice as a result of cooling from the discharge of carbon dioxide. The performance of the radio repeater was temporarily degraded and may have resulted in the need for personnel using hand-held radios to move to other locations in order to communicate effectively.

The licensee intends to seal and shield control cabinets and conduits for the carbon dioxide and halon fire suppression systems from water sources, as necessary, to prevent inadvertent actuation of these systems. Penetrations connecting the computer and emergency switchgear rooms have been sealed, as necessary, to prevent leakage of halon into the control room. Additional actions to preclude system interactions may be warranted.

Additional information about the Surry accident and system interactions can be found in NRC Inspection Reports 50-280/86-42 and 50-281/86-42 dated February 10, 1987, and in Licensee Event Report 86-020-01 in Docket 50-281 dated January 14, 1987.

No specific action or written response is required by this information notice.
If you have any questions about this matter, please contact the Regional
Administrator of the appropriate NRC regional office or this office.


Edward L. Jordan, Director
Division of Emergency Preparedness
and Engineering Response
Office of Inspection and Enforcement

Technical Contact: Roger Woodruff, IE
(301) 492-7205

Attachment:
List of Recently Issued IE Information Notices

LIST OF RECENTLY ISSUED
IE INFORMATION NOTICES

Information Notice No.	Subject	Date of Issue	Issued to
82-11	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 AXF-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
87-05	Miswiring in a Westinghouse Rod Control System	2/2/87	All Westinghouse power reactor facilities holding an OL or CP

OL = Operating License
CP = Construction Permit

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