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UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
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September 27, 1979

IE Bulletin No. 79-24

FROZEN LINES

Summary:

On January 3, 1979, an unusual event occurred at Davis-Besse, Unit 1. The event involved the freezing of the water in a portion of the high pressure coolant injection (HPCI) system recirculation line that is common to both high pressure coolant injection pumps. The line was not thawed until January 5, 1979, and the event was not reported to NRC until March 12, 1979. In addition, over the past five years, there have been several events involving frozen instrument and sampling lines.

Description of Circumstances:

The condition was discovered on January 3, 1979, while the reactor was operating at approximately 96 percent power. During a monthly surveillance test of the HPCI pumps, there was no flow through the recirculation line from the pump discharge to the Borated Water Storage Tank (BWST). Investigation revealed that water in a portion of the line exposed to the outside weather was frozen. This portion of the line to the BWST is common to both HPCI pumps. The line has redundant heat tracing (a heated wire to prevent freezing); it is insulated; and it has a low-temperature alarm system to warn of freezing conditions. Water in the line froze apparently because of prolonged sub-freezing temperatures and a defect in the insulation. There was no apparent malfunction of the heat tracing or temperature alarm circuits, although the temperature sensing elements are located in an area not exposed to the coldest temperature conditions.

This recirculation line serves two purposes: One is to provide a flow path for surveillance testing, and the other is to provide a minimum flow path to prevent possible damage to the pump in the event it is operated against a closed discharge valve or a reactor coolant system pressure greater than the maximum discharge pressure of the pump (approximately 1600 psig).

In the initial review of the event on January 3, 1979, the licensee concluded that the pumps were still operable with the recirculation line frozen. Therefore, no immediate action was taken to thaw the frozen section of the line. On January 5, 1979, the line was thawed and the surveillance test of the pumps was successfully completed.

Cause of Event:

This event is attributed to an inadequate design. The heat tracing provided on this recirculation line was unable to prevent freezing when the line was exposed to sub-freezing temperatures for a prolonged period of time. The temperature sensors which control the heat tracing and which trigger the low-temperature alarm were located in an area not exposed to the coldest temperatures to which the piping is subjected.

Corrective Action:

To prevent recurrence, the licensee increased the temperature setting of the thermostat for the heat tracing on the recirculation line. Further, a temporary enclosure was built around the line and additional heat tracing was installed. After the line was thawed and blown down, surveillance testing to verify pump operability was performed. An engineering evaluation was initiated by the licensee to develop long-term corrective action.

Other Frozen Lines:

In addition to this event at Davis-Besse, there have been many events involving frozen instrument and sampling lines. During the last five years, facilities experiencing events of this kind include:

Arkansas Nuclear One
Davis-Besse
Duane Arnold
Hatch
Fitzpatrick
Haddam Neck
Indian Point
Millstone

Oconee
Pilgrim
Point Beach
Salem
Surry
Trojan
Zion

Action To Be Taken:

All licensees and construction permit holders receiving this Bulletin for action are requested to review their plants to determine that adequate protective measures have been taken to assure that safety-related process, instrument, and sampling lines do not freeze during extremely cold weather. The results of these reviews should be reported to the Regional Director by October 31, 1979.

Approved by GAO (R0072); clearance expires 7/31/80. Approval was given under a blanket clearance specifically for generic problems.

DESIGNATED APPLICANTS FOR OPERATING
LICENSES

Salem 2

North Anna 2

Diablo Canyon 1 & 2

Sequoyah 1

McGuire 1

San Onofre 2

Summer

Watts Bar 1 & 2

LISTING OF IE BULLETINS
ISSUED IN LAST SIX MONTHS

Bulletin No.	Subject	Date Issued	Issued To
79-23	Potential Failure of Emergency Diesel Generator Field Exciter Transformer	9/12/79	All Power Reactor Facilities with an Operating License or a construction permit
79-14 (Supplement 2)	Seismic Analyses For As-Built Safety-Related Piping Systems	9/7/79	All Power Reactor Facilities with an OL or a CP
79-22	Possible Leakage of Tubes of Tritium Gas in Timepieces for Luminosity	9/5/79	To Each Licensee who Receives Tubes of Tritium Gas Used in Timepieces for Luminosity
79-13 (Rev. 1)	Cracking in Feedwater System Piping	8/30/79	All Designated Applicants for OLs
79-02 (Rev. 1) (Supplement 1)	Pipe Support Base Plate Designs Using Concrete Expansion Anchor Bolts	8/20/79	All power Reactor Facilities with an OL or a CP
79-14 (Supplement)	Seismic Analyses For As-Built Safety-Related Piping Systems	8/15/79	All Power Reactor Facilities with an OL or a CP
79-21	Temperature Effects on Level Measurements	8/13/79	All PWRs with an operating license
79-20	Packaging Low-Level Radioactive Waste for Transport and Burial	8/10/79	All Materials Licensees who did not receive Bulletin No. 79-19
79-19	Packaging Low-Level Radioactive Waste for Transport and Burial	8/10/79	All Power and Research Reactors with OLs, fuel facilities except uranium mills, and certain materials licensees
79-18	Audibility Problems Encountered on Evacuation	8/7/79	All Power Reactor Facilities with an Operating License

LISTING OF IE BULLETINS
ISSUED IN LAST SIX MONTHS

Bulletin No.	Subject	Date Issued	Issued To
79-05C&06C	Nuclear Incident at Three Mile Island - Supplement	7/26/79	To all PWR Power Reactor Facilities with an OL
79-17	Pipe Cracks in Stagnant Borated Water Systems at PWR Plants	7/26/79	All PWR's with operating license
79-16	Vital Area Access Controls	7/26/79	All Holders of and applicants for Power Reactor Operating Licenses who anticipate loading fuel prior to 1981
79-14 (Revision 1)	Seismic Analyses For As-Built Safety-Related Piping System	7/18/79	All Power Reactor Facilities with an OL or a CP
79-15	Deep Draft Pump Deficiencies	7/11/79	All Power Reactor Licensees with a CP and/or OL
79-14	Seismic Analyses for As-Built Safety-Related Piping System	7/2/79	All Power Reactor facilities with an OL or a CP
79-13	Cracking In Feedwater System Piping	6/25/79	All PWRs with an OL for action. All BWRs with a CP for information.
79-02 (Rev. 1)	Pipe Support Base Plate Designs Using Concrete Expansion Anchor Bolts	6/21/79	All Power Reactor Facilities with an OL or a CP
79-01A	Environmental Qualification of Class 1E Equipment (Deficiencies in the Environmental Qualification of ASCO Solenoid Valves)	6/6/79	All Power Reactor Facilities with an OL or CP

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Bulletin No.	Subject	Date Issued	Issued To
79-12	Short Period Scrams at BWR Facilities	5/31/79	All GE BWR Facilities with an OL
79-11	Faulty Overcurrent Trip Device in Circuit Breakers for Engineered Safety Systems	5/22/79	All Power Reactor Facilities with an OL or a CP
79-10	Requalification Training Program Statistics	5/11/79	All Power Reactor Facilities with an OL
79-09	Failures of GE Type AK-2 Circuit Breaker in Safety Related Systems	4/17/79	All Power Reactor Facilities with an OL or CP
79-08	Events Relevant to BWR Reactors Identified During Three Mile Island Incident	4/14/79	All BWR Power Reactor Facilities with an OL
79-07	Seismic Stress Analysis of Safety-Related Piping	4/14/79	All Power Reactor Facilities with an OL or CP
79-06B	Review of Operational Errors and System Misalignments Identified During the Three Mile Island Incident	4/14/79	All Combustion Engineering Designed Pressurized Water Power Reactor Facilities with an Operating License
79-06A (Rev 1)	Review of Operational Errors and System Misalignments Identified During the Three Mile Island Incident	4/18/79	All Pressurized Water Power Reactor Facilities of Westinghouse Design with an OL
79-06A	Review of Operational Errors and System Misalignments Identified During the Three Mile Island Incident	4/14/79	All Pressurized Water Power Reactor Facilities of Westinghouse Design with an OL
79-06	Review of Operational Errors and System Misalignments Identified During the Three Mile Island Incident	4/11/79	All Pressurized Water Power Reactors with an OL except B&W facilities

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Bulletin No.	Subject	Date Issued	Issued To
79-05B	Nuclear Incident at Three Mile Island	4/21/79	All B&W Power Reactor Facilities with an OL
79-05A	Nuclear Incident at Three Mile Island	4/5/79	All B&W Power Reactor Facilities with an OL
79-05	Nuclear Incident at Three Mile Island	4/2/79	All Power Reactor Facilities with an OL and CP