

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

December 23, 1992

NRC INFORMATION NOTICE 92-85: POTENTIAL FAILURES OF EMERGENCY CORE COOLING SYSTEMS CAUSED BY FOREIGN MATERIAL BLOCKAGE

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 the potential failure of emergency core cooling systems (ECCS) caused by foreign material blockage. 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

H. B. Robinson Unit 2

On August 23, 1992, while the H. B. Robinson Nuclear Plant was in mode 4, hot shutdown, plant personnel were performing an operations surveillance test of the B safety injection (SI) pump. This test found that the recirculation flow was 20 percent lower than it had been when it was last measured on July 12, 1992. Prompted by the resident inspector, the Carolina Power and Light Company (the licensee) retested this pump on August 24, 1992, and found no recirculation flow. The licensee also tested the A SI pump and found the recirculation flow was 10 percent lower than when it was last measured. The licensee declared both pumps inoperable and took the unit to cold shutdown. On August 25, 1992, the licensee opened the B SI pump recirculation line and removed a single piece of white plastic, about the size of a nickel, from the inline orifice.

Previously, on July 8, 1992, the licensee had declared the B SI pump inoperable after a quarterly inservice inspection surveillance test found that it was producing a recirculation flow of 11.4 Liters [3 gallons] per minute, rather than the required 132.5 Liters [35 gallons] per minute. On July 9, 1992, the licensee shut down the plant to determine the cause of the low flow. The licensee removed the recirculation line for the B SI pump and found that debris was obstructing the inline orifice.

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Notice

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On July 12, 1992, after flushing the B SI pump and verifying that recirculation flows for both SI pumps were acceptable, the licensee returned the unit to service. The licensee also tested all other ECCS pumps that could have had contact with foreign material. The licensee believed, prior to plant startup, that all debris had been removed.

Point Beach Unit 2

On September 28, 1992, the Wisconsin Electric Power Company (the licensee) performed an ASME Section XI quarterly test of containment spray pumps and valves. During the test, the licensee noted that the discharge pressure for the A train containment spray pump was zero and that the pump was making an abnormal noise. The test was stopped and the pump was declared inoperable. Upon disassembly of the pump, a foam rubber plug was found blocking the impeller suction. The licensee removed the plug and retested the pump. The test was successfully completed and the pump was declared operable.

Discussion

The licensee at H. B. Robinson determined that the foreign material found in the SI system was a plastic material that had been used during a modification of the Residual Heat Removal (RHR) system performed in March through June 1992. The plastic material is manufactured by DuPont and the trade name is Delrin-AF. At the time of the RHR modification, the plastic material had been cut into four 23-centimeter [9-inch] diameter, circular pieces for use as weld purge dams. However, after completing the modification, the licensee did not account for two of the four pieces. Delrin-AF decomposes at RCS system conditions because of reaction with the water and thermal degradation. The licensee suspected that the purge dam pieces broke, entered the RHR piping after breaking, and migrated into the refueling water storage tank (RWST) and SI header during initial cavity draindown.

The licensee sent divers with cameras into the RWST to inspect for the plastic. The divers found three fragments of Delrin-AF plastic and also other pieces of miscellaneous debris. The location and size of the recovered Delrin-AF material agrees with the material migration theory since all of the pieces were larger than those recovered from the B SI pump in July and August. The licensee inspected orifices for the SI pump minimum flow recirculation lines and also visually inspected piping, tanks, and components to find and remove any foreign material. Also, the licensee evaluated the potential effect on other ECCS equipment and concluded that the ECCS equipment would continue to be operable and reliable.

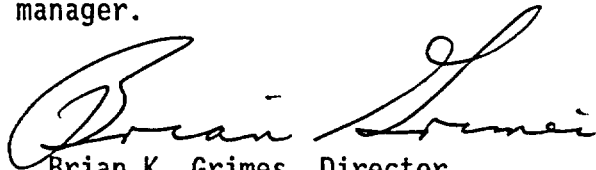
The licensee for Point Beach Unit 2 reviewed plant records and determined that the plug was most likely left in the piping after modifications were made to install full flow test lines in the RHR, containment spray and safety injection systems, during the 1991 refueling outage. The NRC reviewed the event and determined that one train of the safety injection system piping was rendered inoperable in the recirculation mode because of the presence of the plug. This condition had continued for about a year and was caused by inadequate foreign material exclusion controls during the system modifications made in the previous outage.

The presence of small debris may not be detected by operational or post modification testing since blockages may not appear immediately. However, small debris may migrate into areas with smaller cross sections where the debris could collect and cause blockage after extended operation. These examples illustrate the consequences of failure to ensure accountability of all materials that are used when safety systems are opened and to perform cleanliness checks of all affected areas prior to system closure.

Related Generic Communication

On November 21, 1989, the NRC issued Information Notice (IN) 89-77, "Debris In Containment Emergency Sumps and Incorrect Screen Configurations," which addressed problems that could result from debris in containment emergency sumps.

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: Eric Benner, NRR
(301) 504-1171

Attachment: List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
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88-23, Supp. 4	Potential for Gas Binding of High-Pressure Safety Injection Pumps during A Design Basis Accident	12/18/92	All holders of OLs or CPs for nuclear power reactors
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92-82	Results of Thermo-Lag 330-1 Combustibility Testing	12/15/92	All holders of OLs or CPs for nuclear power reactors
92-81	Potential Deficiency of Electrical Cables with Bonded Hypalon Jackets	12/11/92	All holders of OLs or CPs for nuclear power reactors.
92-80	Results of Thermo-Lag 330-1 Combustibility Testing	12/07/92	All holders of OLs or CPs for nuclear power reactors.
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OL - Operating License
CP - Construction Permit

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The licensee for Point Beach Unit 2 reviewed plant records and determined that the plug was most likely left in the piping after modifications were made to install full flow test lines in the residual heat removal (RHR), containment spray and safety injection systems, during the 1991 refueling outage. The NRC reviewed the event and determined that one train of the safety injection system piping was rendered inoperable in the recirculation mode because of the presence of the plug. The NRC issued a Notice of Violation and Proposed Imposition of Civil Penalty in the amount of \$75,000. This violation, which was classified at Severity Level III, continued for about a year and was caused by inadequate foreign material exclusion controls during the system modifications made in the previous outage.

The presence of small debris may not be detected by operational or post modification testing since blockages may not appear immediately. However, small debris may migrate into areas with smaller cross sections where the debris could collect and cause blockage after extended operation. Whenever safety systems are opened, it is important to ensure accountability of any materials that are used and to perform cleanliness checks of all affected areas prior to system closure.

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OEAB:DORS	ASC/OEAB:DORS	ADM:RPB	PM:PD2-1:DRPE		
DGarcia*	AGautam*	JMain*	BZafari*		
10/07/92	10/14/92	09/28/92	10/13/92		
C/SRXB:DSSA	C/OEAB:DORS	OGCB:DORS	OE	C/OGCB:DORS	D/DORS
RJones*	ACHaffee*	JBirmingham	Lieberman*	GMarcus <i>GM</i>	BGrimes
10/08/92	11/09/92	12/11/92	12/09/92	12/11/92	12/ /92
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RJones*	AChaffee*	JBirmingham	JLieberman	GMarcus	BGrimes
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The staff notes that ^{the} presence of small debris may not be detected by operational or post-modification testing since blockages may not appear immediately. However, small debris may migrate into areas with smaller cross sections where the debris can collect and cause blockage after extended operation. Whenever safety systems are opened, it is important to ensure accountability of any materials that are used and to perform cleanliness checks of all affected areas prior to system closure.

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Related Generic Communication

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

Technical contacts: D. Garcia, NRR
(301) 504-1170

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1 / 92

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Charles E. Rossi, Director
Division of Operational Events Assessment
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