

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

January 9, 1992

NRC INFORMATION NOTICE 92-07: RAPID FLOW-INDUCED EROSION/CORROSION  
OF FEEDWATER PIPING

Addressees

All holders of operating licenses or construction permits for pressurized water reactors.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees to problems discovered at the Catawba Nuclear Station, Unit 2, involving the rapid flow-induced erosion/corrosion of feedwater piping. The problem discovered at Catawba affects the piping supplying the upper feedwater nozzles and may apply to all Westinghouse units employing steam generator models D-4, D-5, and E, in which a portion of main feedwater is diverted to the upper feedwater nozzles when the unit is operating. 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

On November 4, 1991, while performing ultrasonic testing on a section of 4-inch feedwater system piping on Catawba's Unit 2 A steam generator, the licensee, Duke Power Company, detected several locations that were at or near minimum acceptable wall thickness. The licensee detected similar results on the other three steam generators. The licensee was performing this testing as part of its prescribed piping erosion/corrosion control program.

The licensee removed sections of the A106B carbon steel piping for analysis or replacement. This analysis revealed that the piping had undergone significant, symmetric, flow-induced, single phase erosion/corrosion. In some areas, the 4-inch schedule 80 pipe (nominal thickness 0.337 inch) had been thinned to 0.185 inch in only four operating cycles. This implies an erosion/corrosion rate of approximately 0.040 inch per cycle. The licensee identified approximately 90 feet of affected pipe for replacement.


It appears that the thinning is directly attributable to the design of the steam generators (Model D5) on Catawba Unit 2, which requires a split-flow feedwater delivery system. In this design, typically 10-20 percent of the total feedwater flow is delivered to the upper feedwater nozzles to prevent

flow-induced vibration damage to the steam generator feedwater preheater section when full feedwater flow is delivered through the main nozzles.

The original Catawba feedwater system design did not employ split-flow delivery at power. As a result, the piping was not sized to accommodate the operating flow rates, resulting in flow velocities of 30-35 feet per second in sections of 4-inch piping. This high flow rate has led to rapid erosion/corrosion. In the case of Catawba, Unit 2, if the subject piping in the feedwater preheater bypass line had ruptured, the break would not have been isolable and would have resulted in the steam generator fluid being released outside containment.

This problem applies to Westinghouse units employing steam generator models D-4, D-5, and E if the flow reaches a high velocity when a portion of normal feedwater is diverted to the upper feedwater nozzles. In numerous generic communications, the staff has previously stated that high velocity flows may cause rapid flow-induced erosion/corrosion in carbon steel piping.

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

  
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Office of Nuclear Reactor Regulation

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Attachment: List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED  
 NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
92-06	Reliability of ATWS Mitigation System and Other NRC Required Equipment Not Controlled by Plant Technical Specifications	01/15/92	All holders of OLs or CPs for nuclear power reactors.
92-05	Potential Coil Insulation Breakdown in ABB RXMH2 Relays	01/08/92	All holders of OLs or CPs for nuclear power reactors.
92-04	Potter & Brumfield Model MDR Rotary Relay Failures	01/06/92	All holders of OLs or CPs for nuclear power reactors.
92-03	Remote Trip Function Failures in General Electric F-Frame Molded-Case Circuit Breakers	01/06/92	All holders of OLs or CPs for nuclear power reactors.
92-02	Relap5/Mod3 Computer Code Error Associated with the Conservation of Energy Equation	01/03/92	All holders of OLs or CPs for nuclear power reactors.
92-01	Cable Damage Caused by Inadequate Cable Installation Procedures and Controls	01/03/92	All holders of OLs or CPs for nuclear power reactors.
91-87	Hydrogen Embrittlement of Raychem Cryofit Couplings	12/27/91	All holders of OLs or CPs for nuclear power reactors.
91-86	New Reporting Requirements for Contamination Events at Medical Facilities (10 CFR 30.50)	12/27/91	All licensees authorized to use byproduct materials for human use.
91-85	Potential Failures of Thermostatic Control Valves for Diesel Generator Jacket Cooling Water	12/26/91	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License  
 CP = Construction Permit