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

June 23, 1989

NRC INFORMATION NOTICE NO. 89-54: POTENTIAL OVERPRESSURIZATION OF THE COMPONENT COOLING WATER SYSTEM

Addressees:

All holders of operating licenses or construction permits for nuclear power reactors.

Purpose:

This information notice is being provided to alert addressees to potential problems resulting from failure of the component cooling water tubing within the thermal barrier heat exchanger of a reactor coolant pump. 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 do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

On May 15, 1989, the licensee for Surry Power Station informed the NRC of a design deficiency in the component cooling water (CCW) system. The deficiency results from underdesign in relief capacity of the CCW lines connected to the thermal barrier heat exchangers on the reactor coolant pumps. The reactor coolant pumps at Surry were manufactured by Westinghouse and rely on heat removal by the CCW system in conjunction with seal injection for reactor coolant pump seal and lower radial bearing cooling. The reactor coolant pump motors are also cooled by component cooling water.

Component cooling water flows through the thermal barrier heat exchangers within 1/2-inch ID tubes. At the request of the licensee for Surry, Westinghouse calculated the maximum reactor coolant flow rate that could occur from a break in a thermal barrier tube. Westinghouse calculated the flow rate into the CCW system assuming a double ended break of the 1/2-inch ID tube. The calculation modeled the reactor coolant flow upstream of the break and the flow out the break into the CCW system. An inleakage of approximately 275 gpm was predicted.

The CCW piping adjacent to the reactor coolant pumps at Surry is of schedule 160 carbon steel and is designed to withstand full reactor system pressure. The lower-pressure sections of the CCW system within containment and within the auxiliary building are designed for 150 psig. In the event of reactor coolant

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system inleakage, the low-pressure sections of CCW piping are protected from overpressure by a check valve on the upstream side of the reactor coolant pump thermal barrier and by a fast-closing, air-operated valve on the downstream side. The isolation valve is designed to close on a high CCW flow signal. In addition, a relief valve which is located on the upstream side of the thermal barrier is designed to open at 150 psig. The licensee determined that this protection was not adequate to protect the low-pressure parts of the CCW system from overpressure if the calculated inleakage (approximately 275 gpm) were to occur. The air-operated isolation valve is not safety related and the relief valve is only designed to pass 167 gpm. Isolation valves are provided on the CCW lines outside the containment building, but these are not designed to withstand reactor system pressure. Failure to isolate the leak inside containment or to provide adequate relieving capacity could lead to an unisolatable reactor coolant leak outside the containment building. The licensee is installing additional relief capacity on the CCW lines upstream and downstream of the reactor coolant thermal barrier heat exchangers at both Surry plants.

In July 1984, Westinghouse notified the NRC (in accordance with 10 CFR Part 21) of a similar problem involving potential overpressure of CCW systems at 18 plants with CCW systems designed by Westinghouse. These plants were equipped with a CCW surge tank vent valve that would close automatically on high radioactivity in the CCW system. Westinghouse stated that in the event that reactor coolant inleakage resulted in closure of the vent valve, the CCW system could be overpressurized downstream of the CCW pumps. At the time of the 10 CFR Part 21 notification, Westinghouse indicated that a thermal barrier tube rupture would result in a leak rate of approximately 260 gpm. Westinghouse recommended several corrective measures designed to ensure continual venting of the surge tank, thereby preventing overpressurization of the low-pressure CCW system. The CCW system at Surry was not designed by Westinghouse and Surry was, therefore, not included with the 18 plants identified by Westinghouse in the 10 CFR Part 21 notification. In view of the potential for CCW over-pressurization identified at Surry, other plant owners may wish to evaluate protection of low-pressure CCW piping from overpressure in the event of failure of the reactor coolant pump thermal barrier tubing.

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

Charles E. Rossi

Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

Technical Contacts: William Lefave, NRR
(301) 492-0862

Walton Jensen, NRR
(301) 492-1190

Attachment: List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
89-53	Rupture of Extraction Steam Line on High Pressure Turbine	6/13/89	All holders of OLs or CPs for nuclear power reactors.
88-46, Supp. 3	Licensee Report of Defective Refurbished Circuit Breakers	6/8/89	All holders of OLs or CPs for nuclear power reactors.
89-52	Potential Fire Damper Operational Problems	6/8/89	All holders of OLs or CPs for nuclear power reactors.
89-51	Potential Loss of Required Shutdown Margin During Refueling Operations	5/31/89	All holders of OLs or CPs for nuclear power reactors.
88-88, Supp. 1	Degradation of Westinghouse ARD Relays	5/31/89	All holders of OLs or CPs for nuclear power reactors.
89-50	Inadequate Emergency Diesel Generator Fuel Supply	5/30/89	All holders of OLs or CPs for nuclear power reactors.
89-49	Failure to Close Service Water Cross-Connect Isolation Valves	5/22/89	All holders of OLs or CPs for nuclear power reactors.
89-48	Design Deficiency in the Turbine-Driven Auxiliary Feedwater Pump Cooling Water System	5/22/89	All holders of OLs or CPs for nuclear power reactors.
89-47	Potential Problems With Worn or Distorted Hose Clamps on Self-Contained Breathing Apparatus	5/18/89	All holders of OLs or CPs for nuclear power reactors and fuel facilities.
89-46	Confidentiality of Exercise Scenarios	5/11/89	All holders of licenses for fuel cycle facilities and byproduct material licensees having an approved emergency response plan.

OL = Operating License
CP = Construction Permit

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overpressure by a check valve on the upstream side of the reactor coolant pumps and by a fast-closing, air-operated valve on the downstream side. The isolation valve is designed to close on a high CCW flow signal. In addition, a relief valve which is located on the upstream side of the thermal barrier is designed to open at 150 psig. The licensee determined that this protection was not adequate to protect the low-pressure parts of the CCW system from overpressure if the calculated inleakage (approximately 275 gpm) were to occur. The air-operated isolation valve is not safety related and the relief valve is only designed to pass 167 gpm. Isolation valves are provided on the CCW lines outside the containment building, but these are not designed to withstand reactor system pressure. The licensee is installing additional relief capacity on the CCW lines upstream and downstream of the reactor coolant thermal barrier heat exchangers at both Surry plants.

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