

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION  
WASHINGTON, D.C. 20555-0001

May 16, 1997

**NRC INFORMATION NOTICE 97-27: EFFECT OF INCORRECT STRAINER PRESSURE  
DROP ON AVAILABLE NET POSITIVE SUCTION  
HEAD**

Addressees

All holders of operating licenses or construction permits for light-water power reactors, except those licensees who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees that two licensees of boiling-water reactors (BWR) have recently identified inaccurate assumptions in licensing-basis calculations for net positive suction head (NPSH). One of the licensees has decided to immediately shut down the reactor to replace suction strainers in the emergency core cooling system (ECCS) before the next refueling outage. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to detect or 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

Monticello

On April 15, 1997, Northern States Power, the licensee for the Monticello Nuclear Power Plant, notified the NRC staff that the NPSH available to the core spray pumps may not meet the required NPSH under all accident conditions. During a review of the ECCS pump NPSH requirements, the licensee calculated a new higher head loss, approximately 3.6 meters (11.7 feet) per 630 L/s (10,000 gpm) rather than 0.3 meter (1 foot) per 630 L/s (10,000 gpm), for clean ECCS suction strainers. The specific scenario of concern involved a failure of the low-pressure coolant-injection loop select logic to select the intact reactor recirculation loop. As a result, the licensee determined that the core spray pumps may not have adequate NPSH available during the first 10 minutes following a design-basis loss-of-coolant accident (LOCA).

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### Dresden Units 2 and 3

On December 20, 1996, Commonwealth Edison, the licensee for the Dresden Nuclear Power Station Units 2 and 3, notified the NRC staff that the ECCS may be susceptible to NPSH problems since the suction strainer design was based on an incorrect head loss value. While conducting a plant-specific analysis in support of its response to NRC Bulletin 96-03, the licensee discovered that the new value for the head loss across clean suction strainers was 1.8 meters (5.8 feet) per 630 L/s (10,000 gpm) versus 0.3 meter (1 foot) per 630 L/s (10,000 gpm) as described in the Updated Final Safety Analysis Report. With the calculated head loss, no credit taken for containment overpressure, and the accident conditions described above, the licensee determined that the ECCS may fail to operate as intended.

### Discussion

During its review of the Monticello operability evaluation, the NRC staff questioned whether the licensee would be able to reflood the reactor core following a LOCA and prevent exceeding the 1204 °C (2200 °F) peak cladding temperature limit as required by 10 CFR 50.46. Monticello has large quantities of fibrous insulation in its drywell. The Monticello ECCS suction strainers have a very small surface area and very high approach velocities. Even a small quantity of insulation reaching the suction strainers, which are located in the torus, can cause sufficient head losses across the strainer to cause a loss of NPSH. This scenario is outside the original licensing basis of the plant, but it could occur, given the current knowledge available.

On May 9, 1997, the licensee for Monticello decided to shut down the reactor and replace the ECCS suction strainers. The existing strainer on each of the four suction lines is a truncated cone design about 43 cm (17 inches) in diameter and 25 cm (10 inches) long. Each strainer will be replaced with two larger strainers, each of which is about 102 cm (40 inches) in diameter and 213 cm (84 inches) long. The plant will remain shut down until the strainers can be procured and installed, currently estimated to be 3 to 4 months.

The Dresden units have large quantities of reflective metallic insulation (RMI) in their drywell. The Dresden Units 2 and 3 strainers are also very small with very high approach velocities. However, the head loss associated with debris beds composed mostly of RMI is typically less severe than head loss associated with debris beds composed of fibrous materials. The existing strainers are being replaced with larger strainers at Dresden Unit 3 during the current refueling outage and the licensee plans to replace them at Unit 2 during the next outage. As an interim corrective action the licensee submitted on January 13, 1997, an emergency technical specification amendment requesting that the staff evaluate an Unreviewed Safety Question (USQ) associated with the operation of Dresden Units 2 and 3 with the existing strainers. The licensee's submittal sought staff approval of operation of both units with the increased head loss across the clean ECCS strainers; revised Technical Specifications (TS) values for a lower allowable water temperature in the suppression chamber and the ultimate heat sink; and a revised TS bases that states credit was taken for 13.8 kilopascals (2 psig) of containment pressure (this compensates for a slight increase in the amount of NPSH deficiency during the first 10 minutes following a LOCA). The NRC staff issued the amendments on January 28, 1997.

The staff notes that continued operation by BWR licensees during the development of the resolution of the BWR ECCS strainer clogging issue is based on the premise that licensees will be able to reflood the reactor core immediately following a design-basis LOCA. In response to NRC Bulletin 93-02, Supplement 1, BWR licensees implemented interim measures to ensure that they could mitigate a design-basis LOCA should the ECCS strainers clog. The acceptability of the licensees' interim measures depended upon (1) adequate time for operators to respond to clogged strainers to align alternate water sources (both safety-related and nonsafety-related sources), (2) emergency operating procedures (EOPs) which provide adequate guidance on mitigating a strainer clogging event, (3) operator training to mitigate a strainer clogging event, (4) recent cleaning of suppression pools, and (5) the removal of loose and temporary fibrous materials stored in the containment.

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.



Marylee M. Slosson, Acting Director  
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Information Notice No.	Subject	Date of Issuance	Issued to
97-26	Degradation in Small-Radius U-Bend Regions of Steam Generator Tubes	05/19/97	All holders of OLs or CPs for pressurized-water reactors
87-10, Sup. 1	Potential for Water Hammer During Restart of Residual Heat Removal Pumps	05/15/97	All holders of OLs or CPs for boiling-water reactors
97-25	Dynamic Range Uncertainties in the Reactor Vessel Level Instrumentation	05/09/97	All holders of OLs or CPs for Westinghouse pressurized-water reactors
97-24	Failure of Packing Nuts on One-Inch Uranium Hexafluoride Cylinder Valves	05/08/97	All U.S. Nuclear Regulatory Commission licensees and certificatees authorized to handle uranium hexafluoride in 30- and 48-inch diameter cylinders
97-23	Evaluation and Reporting of Fires and Unplanned Chemical Reactor Events at Fuel Cycle Facilities	05/07/97	All fuel cycle conversion, enrichment, and fabrication facilities
97-22	Failure of Welded-Steel Moment-Resisting Frames During the Northridge Earthquake	04/25/97	All holders of OLs or CPs for nuclear power reactors
97-21	Availability of Alternate AC Power Source Designed for Station Blackout Event	04/18/97	All holders of OLs for nuclear power reactors

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OL = Operating License  
CP = Construction Permit

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Tech Editor reviewed and concurred on 05/14/97

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