

File # 7

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

May 19, 1988

NRC INFORMATION NOTICE NO. 88-28: POTENTIAL FOR LOSS OF POST-LOCA
RECIRCULATION CAPABILITY DUE TO
INSULATION DEBRIS BLOCKAGE

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 regarding debris that could block containment emergency sump screens in a pressurized water reactor (PWR) or debris that could block emergency core spray pump or residual heat removal pump strainers in a boiling water reactor (BWR). 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 March 14, 1988, Pennsylvania Power & Light (the licensee for Susquehanna) notified the U.S. Nuclear Regulatory Commission of a 10 CFR Part 21 reportable item concerning deterioration of drywell insulation and the potential for the aluminum foil coating of the insulation to block emergency core cooling system (ECCS) strainers during a loss-of-coolant accident (LOCA).

While the unit was in a refueling outage, the licensee inspected the Susquehanna Unit 2 drywell. The licensee observed extensive delamination of the aluminum foil coating on the surface of the fiberglass insulation used on valve bodies and pipe hangers and in other areas that are awkward or difficult to insulate.

The aluminum foil covering is 1-mil thick and is bonded to the outer covering of Alpha Maritex fiberglass cloth (style #2025/9480 HT) that is used as a covering for Temp-Mat insulation. An upper-bound estimate is that 5000 square feet of this insulation is used in more than 300 different locations within the drywell. The licensee estimates that 50 percent of the insulation has undergone some degradation. This is the first time the licensee has observed degradation to this extent, although some degradation had been noticed earlier. A different insulation material is used at Susquehanna Unit 1, and no insulation delamination has been observed at that unit. Alpha Associates, Inc. supplied the insulation

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to the licensee through Bechtel. However, representatives of Alpha Associates, Inc., have indicated that other companies supply the same or similar insulation and that its use may be widespread.

After the event at Susquehanna Unit 2, the licensee for Millstone Unit 1 reported, that in a worst-case scenario, the net positive suction head margin for ECCS pumps could be compromised because of suction strainer blockage resulting from LOCA-generated insulation debris. At Millstone Unit 1, Temp-Mat insulation is used without a foil facing. In this case, the concern was that the fiberglass cloth covering would be freed during a LOCA and migrate to the ECCS pump suction strainers. The licensee is evaluating the feasibility of replacing the existing strainers with strainers that have a larger area as a possible solution of the problem of transported insulation.

Discussion:

In PWRs the containment emergency sumps provide for the collection of reactor coolant and chemically reactive spray solutions following a LOCA, thus serving as water sources to effect long-term recirculation for residual heat removal and containment atmosphere cleanup. In a BWR, the suppression pool serves as the water source for effecting long-term recirculation cooling.

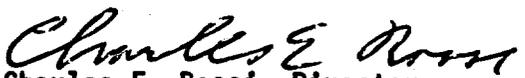
Debris, transported as a result of an event, can block sump debris interceptors and sump outlets, ~~resulting in degradation or loss of recirculation flow margin.~~ At Susquehanna, the ECCS core spray pump suction screen has a cross-sectional area of 18.3 square feet, while each residual heat removal pump suction screen has a cross-sectional area of 43.8 square-ft. In comparison, the insulation covering that could block recirculation flow covers an area of several thousand square feet. However, the potential effect of insulation on sump performance is plant specific. Thus, plant insulation surveys, methods for estimating debris generation and transport, debris transport experiments, and other information have shown that the effects of debris-blockage depend on the types and quantities of insulation used, the primary system layout within the containment, and post-LOCA recirculation flow rates. The staff addressed similar concerns in resolving Unresolved Safety Issue A-43, "Containment Emergency Sump Performance." In particular, the staff's technical findings concluded that a single generic solution is not possible, but rather that the effects of debris blockage are governed by plant-specific design features and post-LOCA recirculation flow requirements.

The NRC staff has investigated the buoyancy, transport, and headloss characteristics of reflective metallic insulation and construction materials and the results are summarized in NUREG/CR-3616, "Transport and Screen Blockage Characteristics of Reflective Metallic Insulation Materials." Briefly, the tests showed that thin metallic foils could be transported at low flow velocities and that flow blockage could occur at the lower portion of the screen.

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Although the exact cause of the degradation of the foil covering on the insulation at Susquehanna is not known, the causes may include temperature, humidity, and the effects of radiation on the neoprene-type adhesive used in the bonding process.

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


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

Technical Contact: L. Zerr, NRR
(301) 492-1177

Attachment: List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
88-27	Deficient Electrical Terminations Identified in Safety-Related Components	5/18/88	All holders of OLs or CPs for nuclear power reactors.
85-35, Supplement 1	Failure of Air Check Valves to Seat	5/17/88	All holders of OLs or CPs for nuclear power reactors.
88-26	Falsified Pre-Employment Screening Records	5/16/88	All holders of OLs or CPs for nuclear power reactors and all major fuel facility licensees.
88-25	Minimum Edge Distance for Expansion Anchor Bolts	5/16/88	All holders of OLs or CPs for nuclear power reactors.
88-24	Failures of Air-Operated Valves Affecting Safety-Related Systems	5/13/88	All holders of OLs or CPs for nuclear power reactors.
88-23	Potential for Gas Binding of High-Pressure Safety Injection Pumps During a Loss-of-Coolant Accident	5/12/88	All holders of OLs or CPs for PWRs.
88-22	Disposal of Sludge from Onsite Sewage Treatment Facilities at Nuclear Power Stations	5/12/88	All holders of OLs or CPs for nuclear power reactors.
88-21	Inadvertent Criticality Events at Oskarshamn and at U.S. Nuclear Power Plants	5/9/88	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License
CP = Construction Permit

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Attachment: List of Recently Issued NRC Information Notices

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LZerr:db
5/6/88

*EAB:NRR
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5/13/88

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Licensees who use Alpha Maritex or similar insulation coverings inside the containment are alerted to that delamination of exterior coatings could occur, especially if large amounts of this type of insulation have been used.

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[Handwritten signatures and initials over typed distribution list]

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*R. Kiesel reviewed for O&CB
and C Berlinger
was not available.
C Rossi*