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FOR IMMEDIATE RELEASE
(Wednesday, October 19, 1994)

NOTE TO EDITORS:

The Nuclear Regulatory Commission has received the attached report, in the form of a letter, from its Advisory Committee on Reactor Safeguards. The report comments on the potential for boiling water reactor emergency core cooling system strainer blockage caused by debris from an accident.

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Attachment:
As stated

October 14, 1994

The Honorable Ivan Selin
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Chairman Selin:

SUBJECT: POTENTIAL FOR BWR ECCS STRAINER BLOCKAGE DUE TO LOCA
GENERATED DEBRIS

During the 414th meeting of the Advisory Committee on Reactor Safeguards, October 6-7, 1994, the Committee was briefed by the NRC staff on the emergency core cooling system (ECCS) recirculation strainer blockage issue raised by the event that occurred at the Barsebäck plant in Sweden on July 28, 1992. We heard previous briefings in January 1993, July 1993, and April 1994. During the present meeting, the staff discussed (1) a proposed Revision 2 to Regulatory Guide (RG) 1.82, "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident," (2) the contractor draft report NUREG/CR-6224, "Parametric Study of the Potential for BWR ECCS Strainer Blockage Due to LOCA Generated Debris," which has been issued for public comment, and (3) the staff plan for issuing a generic letter on this matter in August 1995. A representative of the Boiling Water Reactor Owners Group (BWROG) presented industry views and actions. We also had the benefit of the documents referenced.

The Barsebäck event involved BWR ECCS strainer blockage caused, in this case, by debris dislodged as a result of inadvertent safety valve discharge into the drywell. Our assessment of this event indicates that strainer blockage due to accident generated debris is an important safety issue for at least some BWRs and that strainer blockage was not adequately addressed in the 1985 resolution of Unresolved Safety Issue (USI) A-43, "Containment Emergency Sump Performance." The present version of RG 1.82, which formed the basis for resolution of USI A-43, deals principally with PWR ECCS sumps and provides prescriptive detailed information for PWR designs acceptable to the staff (design sketches, dimensions, etc.). The staff apparently plans to provide similarly prescriptive design information for BWR suppression pool ECCS suction strainers through its planned revision to RG 1.82.

Both the staff and BWROG agree that this is a compliance issue. However, BWR licensees may be reluctant to make plant modifications (beyond those interim compensatory measures required by NRC Bulletin 93-02 and its supplement) until the staff completes its deliberations on the revision to RG 1.82. Some obvious actions that licensees could have taken after the Barsebäck event to

protect against the effects of LOCA generated debris are: (1) replacement of fibrous insulation with reflective metallic insulation, (2) installation of strainers with larger screen areas or other improvements, (3) installation of differential pressure sensors on ECCS pump suction strainers to detect strainer blockage, and (4) installation of strainer cleaning systems. It is our understanding that most European operators of BWRs have made or are making some or all of these modifications.

We question whether the approach the staff is taking will result in timely corrective actions. It seems to us that the onus should have been on the BWR licensees to evaluate the vulnerability of their plants to ECCS strainer blockage due to LOCA generated debris and to propose appropriate plant-specific modifications to deal with the issue. The survey performed by the BWROG in 1992 indicated that each plant is unique with respect to the nature of and potential for debris generation and strainer design and backflush capability. Therefore, plant-specific solutions are needed.

Draft NUREG/CR-6224, which was not initiated until September 1993, provides valuable insights and confirms quantitatively much that was qualitatively known and understood shortly after the Barsebäck event. A troubling insight among these is the indication that ECCS strainer blockage contributes significantly to core damage frequency (CDF) for the reference plant and similar BWRs. However, the authors of the report point out that there are many limitations and uncertainties associated both with the analysis that led to the reference plant results and with extrapolating these results to other BWRs.

Three comments evolved from our review. First, we are concerned by the implications of the prediction that the contribution due solely to strainer blockage is over three times the CDF represented in the reference plant Individual Plant Examination (IPE). We encourage the staff to examine the treatment of LOCA generated debris in other plant IPEs.

Second, we believe that the scope of draft NUREG/CR-6224 should be expanded to look at debris generation resulting from the flow of steam/water mixtures at some distance from the LOCA break location. This flow and pressure may dislodge pipe insulation, particularly if pressure equilibration is slow across the insulation, and may damage other debris producing targets such as the very large containment air handling units in the drywell.

Third, there is the potential for damaging ECCS pump seals or causing a loss of bearing cooling due to LOCA-generated fibrous and/or particulate matter. It is our understanding that most or all operating BWRs use pump discharge water for seal injection and bearing cooling. This issue, which we first raised in our letter of September 16, 1985, to the NRC Executive Director for Operations (EDO), has been discussed with the staff during our recent series

of meetings. We believe that this issue needs to be evaluated and resolved as a part of the resolution of the ECCS strainer blockage issue.

In summary, we are concerned by the slow pace at which this important safety issue is being addressed. We recommend that the EDO and his senior staff critically review the current action plan and take the necessary steps to facilitate prompt resolution.

We plan to continue to monitor the NRC staff and industry's resolution of this issue.

Sincerely,

T. S. Kress
Chairman

References:

1. Memorandum dated August 26, 1994, from Joseph A. Murphy, Office of Nuclear Regulatory Research, NRC, to Gary M. Holahan, Office of Nuclear Reactor Regulation, NRC, Subject: Review of DG-1038, Proposed Revision 2 to RG 1.82, "Water Sources for Long-Term Recirculation Cooling Following A Loss-of-Coolant Accident"
2. U. S. Nuclear Regulatory Commission, NUREG/CR-6224, Draft Report for Comment, "Parametric Study of the Potential for BWR ECCS Strainer Blockage Due to LOCA Generated Debris," August 4, 1994
3. U. S. Nuclear Regulatory Commission, OMB No. 3150-0011, NRCB 93-02: Debris Plugging of Emergency Core Cooling Suction Strainers, May 11, 1993
4. Letter dated September 16, 1985, from David A. Ward, Chairman, ACRS, to William J. Dircks, Executive Director for Operations, NRC, Subject: ACRS Review of Proposed Resolution for USI A-43, "Containment Emergency Sump Performance" and Regulatory Guide 1.82, Revision 1, "Water Sources for Long Term Recirculation Cooling Following a Loss of Coolant Accident"