

February 26, 1996

The Honorable Shirley Ann Jackson
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Chairman Jackson:

SUBJECT: PROPOSED FINAL NRC BULLETIN 96-XX, "POTENTIAL PLUGGING OF EMERGENCY CORE COOLING SUCTION STRAINERS BY DEBRIS IN BOILING WATER REACTORS" AND AN ASSOCIATED DRAFT REVISION 2 OF REGULATORY GUIDE 1.82, "WATER SOURCES FOR LONG-TERM RECIRCULATION COOLING FOLLOWING A LOSS-OF-COOLANT ACCIDENT"

During the 428th meeting of the Advisory Committee on Reactor Safeguards, February 8-10, 1996, we heard presentations by and held discussions with representatives of the NRC staff and the Boiling Water Reactor Owners Group (BWROG) concerning the proposed final Bulletin and the Revision 2 to Regulatory Guide 1.82. We also had the benefit of the documents referenced.

The emergency core cooling system (ECCS) strainer blockage event was initially raised following an event at Barsebäck Unit 2 in Sweden on July 28, 1992. The event involved containment spray system strainer blockage caused by debris dislodged as a result of a safety valve discharge and the activation of the drywell sprays. Subsequently, three strainer blockage events occurred at U.S. nuclear power plants: two at the Perry Nuclear Power Plant in April and November 1993, and one at the Limerick Plant in September 1995. If strainer blockage is coupled with a sustained loss-of-coolant accident (LOCA), the potential exists for serious core damage due to the impairment of plant emergency core cooling systems.

We were briefed previously by the staff on its response to the Barsebäck event in January 1993, July 1993, April 1994, and October 1994. In our report dated October 14, 1994, we expressed a concern about the slow pace of NRC and industry actions in response to this important safety issue. The staff planned to provide prescriptive design information for BWR suppression pool strainers in a revision to Regulatory Guide 1.82 similar to that provided in the current version of this Regulatory Guide for pressurized-water reactor (PWR) ECCS sumps (design sketches, dimensions, etc.). We questioned this approach and stated that the onus should be on the BWR licensees to evaluate the vulnerability of their plants to ECCS strainer blockage due to LOCA-generated debris and to propose appropriate modifications to deal with this plant-specific issue. The staff reviewed our concern and concluded that its action plan

for resolving this issue was appropriate. The Executive Director for Operations did, however, ask the staff to accelerate its resolution schedule to the extent practicable.

The staff believes continued operation of BWRs is acceptable while the actions requested in proposed Bulletin 96-XX are being implemented. This belief is based on the assessment that licensees have adequately responded to Bulletin 93-02 and its supplement and to Bulletin 95-02, which required interim actions to minimize foreign materials from drywells and suppression chambers that could clog ECCS strainers.

Proposed Bulletin 96-XX requires all BWR licensees (except for Big Rock Point, which has a dry containment) to submit a report, within 180 days of issuance of the Bulletin, detailing their planned actions. Licensees would then be required to complete needed plant modifications before the end of the first refueling outage following their submittal.

The staff has identified three resolution options:

Installation of large capacity passive strainers

Installation of self-cleaning strainers

Installation of strainer backflush systems and associated instrumentation alarms and operator training in the use of the system

Both the staff and BWROG prefer the first option, but realize that it may be difficult for some licensees to provide the structural support needed for LOCA-induced hydrodynamic loads.

The staff will allow licensees to propose other solutions. (A licensee may also propose no action, but must provide a detailed description of the safety basis for its decision.) Licensees must propose suitable Technical Specifications for the surveillance requirements for their planned actions. Both the staff and the BWROG agree that the potential for ECCS strainer blockage following a LOCA is a compliance issue. Accordingly, the staff will require the use of safety-grade equipment in any plant modifications that are made unless a licensee can provide a suitable technical basis for using nonsafety-grade equipment.

We have a number of observations regarding the present status of the resolution of this issue:

Each of the options described above requires that strainer debris loading be calculated in accordance with the proposed Revision 2 to Regulatory Guide 1.82. This Regulatory Guide, however, only delineates the phenomena that should be considered in calculating strainer debris loading. The staff has told the BWROG that an additional year will be necessary for the staff to develop the calculational methodology to

evaluate the performance of existing and retrofit strainer designs. The staff has stated that the purpose of this effort is to be able to respond to anticipated licensee responses to the Bulletin. This is a major change from the earlier staff position that it would provide prescriptive information for the design of BWR ECCS strainers in the revision to the Regulatory Guide.

The BWROG has performed extensive analytical and experimental work and has developed and tested several potential hardware modifications, including improved passive strainer designs and a self-cleaning strainer. Documentation will be completed and submitted to the NRC over the next few months. The BWROG is also developing a guidance document to assist licensees in complying with the final Bulletin and Regulatory Guide. This document is scheduled for completion in June 1996. The staff is committed to promptly review and comment on this document.

It may not be possible to predict with confidence the character and amount of debris that would challenge ECCS strainers. Strainers would still be susceptible to common-mode failure. A diverse means of providing emergency core cooling is desirable. The revised Regulatory Guide provides guidance for the licensees to review, and improve where required, the procedures related to core cooling from alternative sources of water. We believe that this is an important aspect of the resolution to the problem.

We agree with the staff that the Bulletin and revised Regulatory Guide should be issued as soon as possible in order to move toward resolution of this issue. The BWROG has not had an opportunity to review these documents in detail, but appears to be in general agreement with this course of action. Continued, close interaction between the staff and the BWROG will be needed to bring this issue to timely closure.

We note that the staff is reviewing the need for further action for PWRs beyond that taken in the 1985 resolution of Unresolved Safety Issue A-43, "Containment Emergency Sump Performance." We believe that this is appropriate in light of what has been learned about debris generation and transport.

Finally, we continue to believe that the response of the staff and the BWR licensees to this important nuclear safety issue has been unacceptably slow. We have asked the staff to keep us informed of the activities to bring this matter to closure.

Sincerely,

/s/

T. S. Kress
Chairman

References:

1. Memorandum dated January 23, 1996, from F. Miraglia, Office of Nuclear Reactor Regulation, NRC, to E. Jordan, Committee to

Review Generic Requirements, NRC, Subject: Request for Review and Endorsement of the Proposed Bulletin Titled, "Potential Plugging of Emergency Core Cooling Suction Strainers by Debris in Boiling Water Reactors" (Draft Predecisional)

2. Memorandum dated January 5, 1996, from L. Shao, Office of Nuclear Regulatory Research, NRC, to J. Larkins, ACRS, Subject: ACRS Review of Regulatory Guide 1.82, Revision 2, "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident"
3. U.S. Nuclear Regulatory Commission, NRC Bulletin 95-02, "Unexpected Clogging of a Residual Heat Removal (RHR) Pump Strainer While Operating in Suppression Pool Cooling Mode," dated October 17, 1995
4. U.S. Nuclear Regulatory Commission, NRC Bulletin 93-02, "Debris Plugging of Emergency Core Cooling Suction Strainers," dated May 11, 1993
5. Letter dated October 14, 1994, from T. S. Kress, Chairman, ACRS, to Ivan Selin, Chairman, NRC, Subject: Potential for BWR ECCS Strainer Blockage due to LOCA Generated Debris
6. Letter dated January 27, 1995, from James Taylor, Executive Director for Operations, NRC, to T. S. Kress, Chairman, ACRS, Subject: Potential for BWR ECCS Strainer Blockage due to LOCA Generated Debris

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