



UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D. C. 20555

September 14, 1998

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

Dear Chairman Jackson:

SUBJECT: EMERGENCY CORE COOLING SYSTEM STRAINER BLOCKAGE

During the 455th meeting of the Advisory Committee on Reactor Safeguards, September 2-4, 1998, we continued our review of the issue involving emergency core cooling system (ECCS) strainer blockage. During several meetings since January 1993, we discussed issues related to boiling water reactor (BWR) ECCS strainer blockage, and the staff has issued numerous regulatory documents on this matter. During these meetings, we had the benefit of discussions with representatives of the NRC staff and the BWR Owners Group (BWROG). We also had the benefit of the documents referenced.

BACKGROUND

On July 28, 1992, an event at Barsebäck Unit 2, a Swedish BWR, resulted in the blockage of two ECCS pump suction strainers. Subsequently, strainer blockage precursor events also occurred at U.S. plants. As a result of these events, the staff initiated analyses to estimate the potential for losing net positive suction head for ECCS pumps at BWR facilities and used the results of these analyses to identify corrective actions.

On November 20, 1996, the BWROG submitted topical report NEDO-32686 "Utility Resolution Guidance for ECCS Suction Strainer Blockage," also known as the URG. The topical report, which supports licensees' implementation of the guidance in Revision 2 to Regulatory Guide (RG) 1.82, "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident," provides a methodology for establishing strainer debris loading design criteria. The staff accepted the URG, with exceptions, as documented in the Safety Evaluation Report (SER) issued on August 20, 1998.

CONCLUSIONS AND RECOMMENDATIONS

- The guidance provided in Revision 2 to RG 1.82, the URG, and the associated SER will allow licensees to design and install strainers that resolve the strainer blockage issue.
- In the SER, the staff identified several areas where it did not agree with the conclusions stated in the URG. We believe that the staff's exceptions were justified.
- Generic Letter (GL) 98-04 ["Potential for Degradation of the Emergency Core Cooling System and the Containment Spray System After a Loss-of-Coolant Accident Because of Construction and Protective Coating Deficiencies and Foreign Material in Containment"] contains information that could be useful to licensees in resolving the issues related to containment coatings. Resolution of these issues will allow licensees to respond completely to Bulletin 96-03, "Potential Plugging of Emergency Core Cooling Suction Strainers by Debris in Boiling-Water Reactors."
- We recommend that the staff continue working with industry groups to expeditiously complete ongoing activities associated with the ECCS strainer blockage issue. Research necessary to support these activities should be given high priority.
- We recommend that generic letters not be used to specify enforcement actions.

DISCUSSION

Since our last report to the Commission on this issue on February 26, 1996, the staff has issued Bulletin 96-03 and RG 1.82, Revision 2, to resolve the safety issue regarding ECCS strainer blockage by debris resulting from a loss-of-coolant accident. In November 1996, the BWROG submitted the URG to the staff. After much correspondence and several meetings between the staff and the BWROG, the staff issued an SER on the URG. In the SER, the staff identified several areas where it disagreed with the conclusions stated in the URG. We believe that the staff's exceptions were justified. The staff concluded, however, that in general the URG provides licensees valuable guidance for evaluating the strainer blockage issue and acceptable methods for sizing strainers. The staff determined that the data obtained by the BWROG through analytical and experimental work establish an adequate basis to conclude that the URG is reasonable and/or conservative. Licensees using the URG methodology (or resolution options not accepted by the staff) need to resolve the staff's concerns with the URG identified in the SER.

The staff has taken actions to address the issue of foreign material that could block an ECCS or a safety-related containment spray system flow path in pressurized water reactors (PWRs), the latest being issuance of GL 98-04. We believe that the issues discussed in GL 98-04 regarding the application and maintenance of protective coatings adequately address concerns about failed coatings that could cause restrictions in PWR ECCS flow paths. In GL 98-04, the staff stated that in some circumstances failure by the licensees to meet the existing requirements could warrant enforcement actions. We do not endorse the use of generic letters to specify enforcement actions.

The staff is reaching closure on the issues addressed in Bulletin 96-03, including the maintenance of coatings and the assurance of adequate net positive suction head for ECCS pumps. The staff plans to conduct audits at four to six plants to verify the adequacy of the implementation of commitments made in response to Bulletin 96-03. In parallel, the staff and industry are pursuing research in the area of protective coatings, strainer blockage at PWRs, and adequate net positive suction head for ECCS and containment spray system pumps. We expect that the staff's review of the strainer blockage issue at PWRs will be completed in a more expeditious manner than its review of the issue at BWRs. We would like to be informed of the results of these activities when they become available.

We recognize that the issue of strainer blockage is complex. Licensees not only have to consider the type and amount of debris that can cause strainer blockage, but also must evaluate plant maintenance practices, including inspection of qualified coatings in the containment. The cooperation between the staff and the BWROG has established a process for resolving this issue.

Sincerely,



R. L. Seale
Chairman

References:

1. U. S. Nuclear Regulatory Commission Generic Letter 98-04: Potential for Degradation of the Emergency Core Cooling System and the Containment Spray System After a Loss-of-Coolant Accident Because of Construction and Protective Coating Deficiencies and Foreign Material in Containment, dated July 14, 1998.
2. U. S. Nuclear Regulatory Commission Generic Letter 96-03: Potential Plugging of Emergency Core Cooling Suction Strainers by Debris in Boiling-Water Reactors, dated May 6, 1996.
3. Memorandum dated August 20, 1998, from Gary M. Holahan, Office of Nuclear Reactor Regulation, to John T. Larkins, ACRS, Subject: Transmittal of Final Safety Evaluation Report on the BWROG's Utility Resolution Guidance for ECCS Suction Strainer Blockage, NEDO-32686.
4. Letter dated June 18, 1997, from R. L. Seale, Chairman, ACRS, to L. Joseph Callan, Executive Director for Operations, NRC, Subject: Proposed Generic Letter, "Potential for Degradation of the Emergency Core Cooling System and the Containment Spray System After a Loss-of-Coolant Accident Because of Construction and Protective Coating Deficiencies and Foreign Material in the Containment."
5. Report dated February 26, 1996, from T. S. Kress, Chairman, ACRS, to Shirley Ann Jackson, Chairman, NRC, 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."

6. Report 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.