



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

ACRSR-1726

PDR

October 10, 1997

Mr. L. Joseph Callan
Executive Director for Operations
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Mr. Callan:

SUBJECT: RESOLUTION OF THE DIFFERING PROFESSIONAL OPINION RELATED TO
STEAM GENERATOR TUBE INTEGRITY

During the 445th meeting of the Advisory Committee on Reactor Safeguards, October 2-3, 1997, we reviewed the proposed resolution of the subject differing professional opinion (DPO). On several previous occasions, we have reviewed the issues raised in the DPO and related matters. During these reviews, we had the benefit of discussions with representatives of the NRC staff and the author of the DPO. We also had the benefit of the documents referenced.

The DPO initially arose during the development of Generic Letter (GL) 95-05 "Voltage-Based Repair Criteria for Westinghouse Steam Generator Tubes Affected by Outside-Diameter Stress-Corrosion Cracking." The staff recognizes that the use of alternate repair criteria such as the voltage-based limit for outside-diameter stress corrosion cracking (ODSCC) in tube support plates might permit operations with the presence of short through-wall cracks. The issues raised in the DPO focus on concerns that arise when steam generators are permitted to operate with such degradation. The concerns raised in the DPO bear upon GL 97-xx, "Steam Generator Tube Integrity," and the draft regulatory guides DG-1074, "Steam Generator Tube Integrity," and DG-1073, "An Approach for Plant-Specific, Risk-Informed Decision Making; Induced Steam Generator Tube Rupture," only insofar as to whether they provide adequate guidance for the development of alternate repair criteria.

We believe that the DPO-issues-response document prepared by the staff accurately summarizes the issues associated with the DPO. The staff grouped the issues into five related areas and noted they are not independent. These areas are: nondestructive examination (NDE) reliability; leakage under design-basis accident (DBA) conditions, including main steamline break (MSLB); increased frequency of core damage with containment bypass; nonconservative estimates of iodine spiking during depressurization transients, such as an MSLB; and increases in the frequency of thermally induced tube failures under certain severe-accident scenarios.

In his recent presentation to us, the DPO author agreed that two of these issues, iodine spiking and thermally induced tube failure, had been resolved adequately by the staff. He felt that the remaining three issues noted below were properly stated by the staff, but he did not concur with the proposed resolution of these issues: NDE reliability; leakage under DBA conditions including MSLB; the increased frequency of core damage with containment bypass. The last two issues are closely linked.

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The higher frequency of core damage with containment bypass estimated by the author of the DPO is largely due to the much higher levels of leakage that he projects to occur during DBAs. The DPO-issues-response document notes that leakage through degraded tubes under DBAs was addressed in GL 95-05 for voltage-based repair criteria for ODSCC at tube support plates. In GL 95-05, an empirical correlation relating leakage to eddy-current voltage is used to estimate leakage under DBAs. Recognizing that such empirical correlations involve large uncertainties, the staff proposed that these uncertainties be addressed through performance monitoring and statistical analyses, and the staff provided guidelines for such analyses and monitoring.

The author of the DPO argues that such an approach does not adequately assess the uncertainties in the leakage estimates. As discussed in draft NUREG-1477, "Voltage-Based Interim Plugging Criteria for Steam Generator Tubes," such empirical correlations are in much better agreement with existing laboratory data and field experience on leakage than estimates based on the fracture mechanics cited by the author of the DPO.

We believe the DPO-issues-response document provides a good statement of the issues and represents a serious attempt by the staff to resolve them. We believe that the staff should issue this document for public comment.

Dr. William J. Shack did not participate in the Committee's deliberations regarding this matter.

Sincerely,



R. L. Seale
Chairman

References:

1. Memorandum dated May 23, 1997, from L. Joseph Callan, Executive Director for Operations, NRC, to NRC Commissioners, Subject: Steam Generator Rulemaking.
2. Letter dated November 20, 1996, from T. S. Kress, Chairman, ACRS, to James M. Taylor, Executive Director for Operations, NRC, Subject: Proposed Rule on Steam Generator Integrity.
3. Memorandum dated June 27, 1997, from L. Joseph Callan, Executive Director for Operations, NRC, to NRC Commissioners, Subject: J. Hopenfeld's Differing Professional Opinion Concerning Voltage-Based Repair Criteria for Steam Generator Tubes: Steam Generator Rulemaking.
4. Memorandum dated September 19, 1997, from Brian W. Sheron, Office of Nuclear Reactor Regulation, NRC, to John Larkins, ACRS, Subject: ACRS Review of the Differing Professional Opinion Related to Steam Generator Tube Integrity (Predecisional).
5. Memorandum dated August 12, 1997, from T. T. Martin, Office of Nuclear Reactor Regulation, NRC, to John Larkins, ACRS, Subject: ACRS Review of the Proposed Steam Generator Generic Letter (Predecisional).
6. U. S. Nuclear Regulatory Commission, Draft Regulatory Guide DG-1073, "An Approach for Plant-Specific, Risk-Informed Decision Making: Induced Steam Generator Tube Rupture," Revised August 26, 1997.

7. U. S. Nuclear Regulatory Commission, NUREG-1477, "Voltage-Based Interim Plugging Criteria for Steam Generator Tubes," June 1993.
8. U. S. Nuclear Regulatory Commission, NRC Generic Letter 95-05: Voltage-Based Repair Criteria for Westinghouse Steam Generator Tubes Affected by Outside Diameter Stress Corrosion Cracking, August 3, 1995