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Mr. James M. Taylor
Executive Director for Operations
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Mr. Taylor:

SUBJECT: REVIEW OF BEST-ESTIMATE MODELS FOR EVALUATION OF EMERGENCY CORE COOLING SYSTEM PERFORMANCE

During the 421st meeting of the Advisory Committee on Reactor Safeguards, May 4-6, 1995, we discussed the methodology being applied by NRR for reviewing the acceptability of best-estimate calculations of emergency core cooling system (ECCS) performance in accordance with the revisions made to 10 CFR 50.46 (ECCS Rule). Our Subcommittee on Thermal Hydraulic Phenomena held a meeting on May 2, 1995, to discuss this matter. During these meetings, we had the benefit of discussions with representatives of NRR and the Westinghouse Electric Corporation. We also had the benefit of the documents referenced.

A historical impediment to the use of best-estimate predictions of plant behavior following a large-break LOCA was the lack of a method for determining the accuracy of the predicted peak cladding temperature. In a September 16, 1986 report, the ACRS made the following comment:

> "The acceptability of realistic evaluation models rests on the development of a satisfactory methodology for determination of the code overall uncertainty. . . . We recommend that the methodology used to evaluate uncertainty be subjected to peer review."

This was done and the ACRS reviewed and endorsed the resulting Code Scaling, Applicability, and Uncertainty (CSAU) evaluation methodology. It is our view that the CSAU methodology provides a well-structured, traceable, and practical technical basis for quantifying best-estimate code uncertainty. It was the development and demonstration of the CSAU methodology that allowed the successful promulgation of the revision to the ECCS Rule.

Westinghouse Electric Corporation is presenting an alternative approach to the CSAU methodology for determining the uncertainty in its best-estimate computer code predictions for both existing plants and the AP600 passive plant design. This best-estimate code is intended to meet the requirement of the ECCS Rule that to a "high level of probability," the ECCS criteria will not be exceeded. Although the ECCS Rule allows alternative approaches, none has been reviewed to date nor have review criteria been developed. If Westinghouse persists in following its present path, it is unclear if the intent of 10 CFR 50.46 will be met. Based on the staff presentations, it appears that adoption of the alternative approach would require a weakening of the acceptance criterion

for evaluating uncertainty. We believe the staff should be able to confirm that the Westinghouse uncertainty evaluation conforms to the applicable requirements of 10 CFR 50.46 Paragraph (a)(1)(i) in terms of both high probability and high confidence.

During our meeting, we learned that at least two more applicants are requesting approval of best-estimate computer codes. We do not know how they plan to address the nonexceedance requirement of 10 CFR 50.46. A clear statement is needed from the staff as to what constitutes an acceptable demonstration that the ECCS nonexceedance criterion has been met. We would like to see such a statement before the staff begins its review of these other best-estimate codes.

Several aspects of the current review process that were discussed during our meeting should be noted. The review of the Westinghouse best-estimate code has been under way since 1992. We were told that during this period, there has been no formal documentation of this review. Key elements of the alternative approach proposed by Westinghouse for uncertainty have not been addressed. The material submitted by Westinghouse in support of its best-estimate code application is confusing and difficult to follow.

The staff waits for Westinghouse to present its arguments and then reacts as best it can, using some of the provisions of Regulatory Guide 1.157 to guide the review. This reactive approach is a risky procedure for both Westinghouse and the staff. Furthermore, it is much more resource intensive to both because of the iterative nature of "wait-and-see," followed by rounds of questions and answers. This process is time consuming, unstructured, and difficult to trace.

We recommend prompt attention to these matters.

Sincerely,

T. S. Kress
Chairman

References:

1. 10 CFR 50.46(a), as amended through August 31, 1992, Acceptance Criteria for Emergency Core Cooling Systems for Light Water Nuclear Power Reactors

2. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.157, "Best-Estimate Calculations of Emergency Core Cooling System Performance" May 1989

3. Westinghouse Electric Corporation Report Addressing Compliance of the Westinghouse Best-Estimate LBLOCA Code and Methodology described in WCAP-12945-P with NRC Regulatory Positions Described in Regulatory Guide 1.157 (Westinghouse Proprietary), transmitted by telecopy from Westinghouse Electric Corporation dated March 31, 1995

4. Table 2.1.2-1, Comparison of Regulatory Guide 1.157 Requirements and Westinghouse's Best-Estimate Large-Break LOCA Model (Draft), transmitted by telecopy from INEL dated March 23, 1995

5. Westinghouse Response to Requests for Additional Information on WCAP-12945-P, Volume 5, COBRA/TRAC Code Qualification Document, transmitted by telecopy from INEL dated April 12, 1995, [Westinghouse Proprietary]

6. U.S. Nuclear Regulatory Commission Report, "Quantifying Reactor Safety Margins - Application of Code Scaling, Applicability, and Uncertainty Evaluation Methodology to a Large-Break, Los-of-Coolant Accident," NUREG/CR-5249, December 1989

7. Letter dated April 24, 1995, from L. W. Ward, INEL, to F. Orr, Office of Nuclear Reactor Regulation, NRC, transmitting Draft Westinghouse Report, "Review and Evaluation, Westinghouse Code Qualification for Best Estimate LOCA Analysis," dated April 24, 1995

8. ACRS Report dated September 16, 1986, from D. A. Ward, Chairman, ACRS, to L. Zech, Jr., Chairman, NRC, Subject: ACRS Comments on the Proposed Revision to the ECCS Rule in 10 CFR 50.46, "Acceptance Criteria for ECCS for Light Water Nuclear Power Reactors," and Appendix K, "ECCS Evaluation Models"

9. ACRS Report dated July 20, 1988, from W. Kerr, Chairman, ACRS, to V. Stello, Jr., Executive Director for Operations, NRC, Subject: Comments on the Staff's Draft Safety Evaluation of the Westinghouse Topical Report, WCAP-10924, "Westinghouse Large-Break LOCA Best-Estimate Methodology"

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