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

July 22, 1999

Dr. William D. Travers
Executive Director for Operations
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Dr. Travers:

SUBJECT: REVISION OF APPENDIX K, "ECCS EVALUATION MODELS," TO 10 CFR PART 50

During the 464TH meeting of the Advisory Committee on Reactor Safeguards, July 14-16, 1999, we reviewed the proposed rule to revise Appendix K to 10 CFR Part 50. Our Subcommittee on Thermal-Hydraulic Phenomena reviewed this matter during its May 26, 1999 meeting. During this review, we had the benefit of discussions with representatives of the NRC staff and the Caldon corporation. We also had the benefit of the documents referenced.

The proposed rule will permit a reduction in the conservatism of the reactor power level assumed for loss-of-coolant accident (LOCA) analysis. Specifically, the staff proposes to relax the requirement that the licensee use 1.02 times licensed power for the Appendix K Emergency Core Cooling System (ECCS) analysis. This rulemaking is in response to efforts of licensees to seek credit in safety analyses for reduction in uncertainties in measurement of reactor power by use of more accurate flow measurement systems. This rule change will avoid a large number of anticipated exemption requests and will reduce regulatory burden. Licensees granted this regulatory relief are likely to pursue small power uprates or cost-saving changes to plant operating parameters, which may have to be approved by the NRC.

Conclusion and Recommendation

- We agree with the intent of the proposed rule.
- The staff should evaluate the possible impact of the proposed rule on parts of the regulations other than Appendix K, such as limits on fuel performance.

Discussion

With this rule, the staff has embraced the principle that because margins have been incorporated into the regulations to account for uncertainties, appropriate reduction in these margins may be made when these uncertainties have been reduced. We support this principle.

In the current case, some simple arguments may suffice to justify relaxation of conservatism. In a more general situation, the connection between conservative assumptions and margins of safety is less obvious. One would have to be specific about the relationship between the allowable technical limits and more direct measures of safety, as well as the metric on which margins below those limits are measured. One would then need to evaluate the effects of assumptions and uncertainties in measurement, information (e.g., physical property data) and analysis of the probability of exceeding specified limits, given that the existence of certain margins was considered in making design decisions, perhaps on the basis of "best estimate" calculations. This is a major task. We expect that the staff will eventually need to develop a process, complete with clear definitions, methods of analysis, calculation procedures, and so on. In other words develop the entire technical structure to turn a good concept into a functioning methodology. As this structure is developed, words such as "conservative," "uncertainty," "risk," "margin," and "safety" should have more quantitative and rigorous interpretations.

We are concerned that the relaxation of the 102-percent power requirement is being considered only in the context of Appendix K. The modification of this requirement has margin implications that are not being addressed in the context of this rule change. Relaxation of the 102-percent power assumption in the ECCS rule will likely result in the same changes in initial condition assumptions in all Chapter 15 accident analyses. As noted above, it will likely result in requests to increase licensed reactor power levels. Although some plants are "LOCA-limited" such that the concern with margin reduction is addressed within the context of the rule, some other plants are "flow-limited." In these plants, this change will reduce existing margins to fuel performance limits under normal operation. Yet, the impact of such margin reduction is not being considered in the context of this rule change.

Sincerely,

Dana A. Powers

Dana A. Powers
Chairman

References:

1. Memorandum dated January 13, 1999, from William D. Travers, Executive Director for Operations, NRC, for the Commissioners, SECY-99-014, Subject: Rulemaking Plan: Revision of Appendix K to Title 10, Part 50, of the Code of Federal Regulations (10 CFR Part 50).
2. Memorandum (undated) from William D. Travers, Executive Director for Operations, NRC, for the Commissioners, Subject: Proposed Rule: Revision of Part 50, Appendix K, "ECCS Evaluation Models," received June 24, 1999.
3. Memorandum dated November 17, 1983, from William J. Dircks, Executive Director for Operations, NRC, for the Commissioners, SECY-83-472, Subject: Emergency Core Cooling System Analysis Methods.
4. Caldon, Inc., Engineering Report- 80P, Topical Report, ER-80P, "Improving Thermal Power Accuracy and Plant Safety While Increasing Operating Power Level Using the LEFM✓ (TM) System," Revision 0, March 1997.

5. Caldon, Inc., Responses to NRC Staff Questions ConcerningTopical Report: Improving Thermal Power Accuracy and Plant Safety While Increasing Operating Power Level Using the LEFM✓ (TM) System as Applied to Comanche Peak, dated September 29, 1998 (Proprietary Version).
6. Letter dated July 7, 1999, from C. R. Hastings, Caldon, Inc., to D. A. Powers, Chairman, ACRS, Subject, Proposed Revisions to 10 CFR Part 50, Appendix K to Allow Minor Power Level Increases