UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, DC 20555 - 0001

March 11, 2005

The Honorable Nils J. Diaz
Chairman
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: REVISED DRAFT NUREG REPORT "ESTIMATING LOSS-OF-COOLANT ACCIDENT (LOCA) FREQUENCIES THROUGH THE ELICITATION PROCESS"

Dear Chairman Diaz:

During the 520th meeting of the Advisory Committee on Reactor Safeguards, March 3-5, 2005, we reviewed the revised draft NUREG Report, "Estimating Loss-of-Coolant Accident (LOCA) Frequencies Through the Elicitation Process," (Reference 1). We reviewed a previous draft of this report (Reference 2) during the 518th meeting, December 2-4, 2004, and issued a report on December 10, 2004 (Reference 3). During these reviews, we had the benefit of discussions with the NRC staff and of the documents referenced.

RECOMMENDATION

The revised draft NUREG Report should be issued for public comment.

DISCUSSION

In our report dated December 10, 2004 (Reference 3), we recommended that the November 4, 2004 version of the draft NUREG Report be revised prior to being issued for public comment. We also commented that the Executive Summary should contain the composite distribution the analysts believe represents the expert community's current state of knowledge regarding loss-of-coolant accident (LOCA) frequencies. Below, we comment further on the appropriate choice of a composite distribution.

There are numerous ways in which individual expert opinions can be adjusted for potential biases and aggregated to produce a composite distribution that represents the group's judgment. The NUREG Report acknowledges this fact and presents several sensitivity analyses that provide insights into the numerical impact on the results of alternative assumptions and methods.

In our earlier report, we noted that the aggregation method chosen by the staff is at variance with the method described in NUREG-1150 (Reference 4) and NUREG/CR-6372 (Reference 5), i.e., taking the arithmetic average of the probability distributions of the experts. The staff has now produced composite distributions using the method in NUREG-1150 and NUREG/CR-6372 and called this method "mixture distribution aggregation."

The aggregation method may have a significant impact on the final results. The method the authors of the draft NUREG Report favor is the "geometric averaging" of the expert percentiles with some adjustment for potential overconfidence on the part of some experts. The composite distribution that the staff reports as best representing the expert consensus is the result of this geometric averaging. This distribution is less conservative than the composite distribution produced using the mixture distribution aggregation used in NUREG-1150 and NUREG/CR-6372.

The purpose of eliciting expert opinions is to provide input to the decisionmaking process, which in the present case is the selection of the transition break size in risk-informing 50.46. Ideally, the decisionmakers would be provided a probability distribution of the frequencies of the various LOCA categories that would reflect the current state of the art. As recognized in the draft NUREG Report, there is no consensus regarding the preferred method for processing individual expert opinions, and different methods may lead to significantly different results. In addition, the authors of the draft NUREG Report state that the study has limitations with respect to the scenarios and mechanisms considered.

One way of treating these issues is to select a bounding value for the break size, i.e., one that is larger than the break sizes from all the sensitivity analyses at a frequency of 10^{-5} per year. If a break size that is not bounding is selected, then the appropriateness of this selection would have to be justified with suitable rationale.

The revised NUREG Report should be issued for public review and comment. We would like to review the draft final version of the NUREG report after resolution of public comments.

Sincerely,

/RA/

Graham B. Wallis
Chairman

References:

1. Letter dated February 17, 2005, from Michael E. Mayfield, Director, Division of Engineering Technology, RES, to John T. Larkins, Executive Director, RES, Subject: Transmittal of Revised Draft NUREG Report, "Estimating Loss-of-Coolant (LOCA) Frequencies Through the Elicitation Process" and Associated Appendices (Pre-Decisional).
2. Memorandum dated November 4, 2004, from Michael E. Mayfield, Director, Division of Engineering Technology, RES, to John T. Larkins, Executive Director, ACRS, Subject: Transmittal of Draft NUREG on Passive System LOCA Frequency Development for use in Risk-Informed Revision of 10 CFR 50.46, Appendix K to Part 50, and GDC and Appendices (Pre-Decisional).

References (continued)

3. Letter dated December 10, 2004, from, Mario V. Bonaca, Chairman, ACRS, to Luis A. Reyes, EDO, NRC, Subject: Estimating Loss-of-Coolant Accident Frequencies Through the Elicitation Process.
4. U.S. Nuclear Regulatory Commission, *Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants*, Report NUREG-1150, 1990.
5. R.J. Budnitz, G. Apostolakis, D.M. Boore, L.S. Cluff, K.J. Coppersmith, C.A. Cornell, and P.A. Morris, *Recommendations for Probabilistic Seismic Hazard Analysis: Guidance and Use of Experts*, Report NUREG/CR-6372, 1997.