

November 20, 2000

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

Dear Dr. Travers:

SUBJECT: PROPOSED FRAMEWORK FOR RISK-INFORMED CHANGES TO THE
TECHNICAL REQUIREMENTS OF 10 CFR PART 50

During the 477th meeting of the Advisory Committee on Reactor Safeguards, November 2-4, 2000, we met with representatives of the NRC staff to discuss Attachment 1 to SECY-00-0198 entitled, "Framework for Risk-Informed Changes to the Technical Requirements of 10 CFR 50." Our Subcommittee on Reliability and Probabilistic Risk Assessment met on July 11, 2000, to discuss an earlier version of the proposed framework. We also had the benefit of the documents referenced.

The purpose of the framework is to provide guidance to the staff for the identification and development of risk-informed changes to the technical requirements of 10 CFR Part 50 (Option 3). The proposed framework is a work in progress. The staff has identified the elements that are important to the prioritization of candidate regulations to be risk informed. We agree with the staff that improvements will be made to the framework as experience is gained from evaluating its application to risk-informing candidate regulations such as 10 CFR 50.44 related to combustible gas control systems and 10 CFR 50.46 concerning emergency core cooling systems. We offer the following comments for consideration as the work progresses.

The structuralist approach to defense in depth has been applied to the top tiers of the framework by adopting the cornerstones of the revised reactor oversight process, i.e., limiting the frequency of accident initiating events and the conditional core damage probability (CCDP) given an initiating event, and limiting radionuclide releases and public health effects given core damage. The "tactics" for achieving these goals include safety margins and redundancy, diversity, and independence. We recommend that the tactics for implementing defense in depth be clarified. Will defense in depth be applied at all levels of the framework? Will it be invoked at lower tiers when it has already been applied to the top tiers?

In our May 19, 1999 report and the associated attachment, we offered a "preliminary proposal" to apply the structuralist approach at lower tiers only when there are significant uncertainties that have not been included in the probabilistic risk assessment (PRA) and could reduce confidence that the higher-level goals are met. For uncertainties that are included in the PRA, we

recommended that the rationalist approach be followed, i.e., appropriate safety margins and redundancy, and diversity would be developed by quantitative analyses. Even though the framework is consistent with this approach, an expanded discussion of these issues would be beneficial.

We are pleased that the proposed framework recommends the quantification of safety margins in terms of probabilities. While present PRA methods can provide estimates of the contribution of multiple barriers (defense-in-depth measures) to the risk metrics, the contribution from safety margins is not normally quantified. We believe that the quantification of safety margins would be an important step toward the wider use of the rationalist approach. It would also make the integrated decision-making process of Regulatory Guide 1.174 easier to implement.

The framework proposes goals for the frequency of three groups of initiating events: anticipated, infrequent, and rare initiators. Even though this is reasonable for the standard initiating events for light water reactor PRAs, there is a potential pitfall. The concept of an initiating event is not defined rigorously. For an infrequent initiating event, the framework requires that the CCDP be less than or equal to 10^{-2} per reactor-year. One could envision partitioning this initiating event into a number of more specific initiating events, each with a frequency less than or equal to 10^{-5} per reactor-year. These new initiating events would then belong to the group of rare initiators, and there would be no constraints imposed on the CCDP. Thus, creative definitions of initiating events could be used to inappropriately relax the CCDP goal.

The external events in a PRA, such as earthquakes and fires, affect all of the cornerstones. The treatment of events that affect more than one cornerstone extensively should be discussed.

We look forward to reviewing additional refinements to the framework as progress is made in its application to developing risk-informed alternative regulations.

Sincerely,

/RA/

Dana A. Powers
Chairman

References:

1. Memorandum dated September 14, 2000, from William D. Travers, Executive Director for Operations, for the Commissioners, Subject: SECY-00-0198, Status Report on Study of Risk-Informed Changes to the Technical Requirements of 10 CFR Part 50 (Option 3) and Recommendations on Risk-Informed Changes to 10 CFR 50.44 (Combustible Gas Control).
2. Report dated September 13, 2000, from Dana A. Powers, Chairman, Advisory Committee on Reactor Safeguards, to Richard A. Meserve, Chairman, NRC, Subject: Proposed Risk-Informed Revisions to 10 CFR 50.44, "Standards for Combustible Gas Control System in Light-Water-Cooled Power Reactors."

3. Report dated May 19, 1999, from Dana A. Powers, Chairman, Advisory Committee on Reactor Safeguards, to Shirley Ann Jackson, Chairman, NRC, Subject: The Role of Defense in Depth in a Risk-Informed Regulatory System.
4. Paper by J. N. Sorensen, G. E. Apostolakis, T. S. Kress, D. A. Powers, "On the Role of Defense in Depth in Risk-Informed Regulation," presented at the American Nuclear Society, International Topical Meeting on Probabilistic Safety Assessment, PSA '99, Washington, DC, August 22-26, 1999.
5. Memorandum dated February 3, 2000, from Annette Vietti-Cook, Secretary, NRC, to William D. Travers, Executive Director for Operations, NRC, Subject: Staff Requirements - SECY-99-264 - Proposed Staff Plan for Risk-Informing Technical Requirements in 10 CFR Part 50.
6. U. S. Nuclear Regulatory Commission, Regulatory Guide 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," July 1998.