ACNWR-0156

August 2, 2000

The Honorable Richard A. Meserve
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Chairman Meserve:

Subject: BRANCH TECHNICAL POSITION ON A PERFORMANCE ASSESSMENT METHODOLOGY FOR LOW-LEVEL RADIOACTIVE WASTE DISPOSAL FACILITIES

At the 119th meeting of the Advisory Committee on Nuclear Waste (ACNW), June 13-15, 2000, the NRC staff presented a summary of the final draft of NUREG-1573, "Branch Technical Position (BTP) on a Performance Assessment Methodology for Low-Level Radioactive Waste Disposal Facilities." The ACNW supports the general effort to prepare a document that presents a rigorous and consistent method for performance assessment. We commend the staff for the work and thought that went into this document. The NRC is a leader in the development of risk-informed, performance-based (RIPB) regulatory approaches. We believe that the BTP is a valuable document that continues this tradition of leadership, identifies significant technical and policy issues in performance assessment modeling, and advances RIPB methods and approaches to help resolve these issues. The ACNW does have some concerns about the document, however, and we present these below.

We were disappointed to learn that the document was now scheduled to be released as a "NUREG" and not as a "BTP." We interpret this decision as a lack of confidence by the staff in the position expressed. We also think that the value of the document would be diminished if it is issued as a NUREG. The ACNW knows that there are currently no licenses for low-level waste (LLW) facilities pending and that the NRC involvement in LLW is minimal. There is no guarantee that this minimal involvement will continue indefinitely, however. Thus, we believe that care should be taken to provide a sound RIPB foundation for any future activity. We think that the staff should state its position and stand by it.

Recommendation

The document should be issued as a Branch Technical Position.

We have several comments on the material contained in the document. We have focused on a few key areas and have not included an analysis of public comments and responses. We note, however, that these same issues are also raised in many of the public comments. Most of our comments address the notion that the BTP should

reflect current knowledge about probabilistic performance assessment within the regulatory framework. That is, we believe that the BTP should indicate the position of the staff on performance assessment given current knowledge.[1]

1. In the document, the NRC staff indicates that either a deterministic or a probabilistic analysis is acceptable. In fact, the statement in footnote 3 – that the staff does not recommend a probabilistic, scenario-driven approach – is antithetical to accepted practices of risk analysis. Although the Committee realizes that there may be situations in which it is possible to bound the risk clearly and convincingly, as a matter of principle a risk-informed finding requires a risk assessment, however simple or complex it may be. Of course, a risk assessment does not have to be any more complicated than is warranted. We concur with the staff's recommendation of an iterative approach, starting with simple models and becoming complex only as needed. The Committee prefers that simplicity be achieved in the scope of the risk assessment rather than by a substitute analysis that is not risk informed.

   Recommendation

   The staff should indicate in the Branch Technical Position that a risk assessment is the acceptable method of safety analysis the scope of which should be commensurate with the complexity of the facility.

2. The staff recommends the use of conservative assumptions and ranges of parameters that could effectively bound the reference geologic setting for the site. The ACNW does not agree with this approach in the context of a probabilistic risk assessment. A performance assessment should aim to display the best information available, including uncertainties, about how the system will perform. Conservatism should enter at the point of deciding what it means to "meet the standard."

   Recommendation

   The staff should provide guidance to the applicant to use realistic ranges and distributions of parameter values and conceptual models when conducting risk analyses.

3. For a probabilistic analysis, the staff recommends that the dose standard be evaluated by requiring that the peak of the mean doses (the mean taken across multiple realizations of the model with randomly sampled parameters) be less than 25 mrem and that the 95th percentile be less than 100 mrem. Although this approach aims to incorporate uncertainty in the evaluation, it disregards all

---

[1] The BTP has been in production for a long time, mainly because of limitations on staff time to devote to the effort. Our technical understanding and the policy framework have evolved since 1995, however, and the document should be edited to reflect this fact. For example, the literature cited is deficient in post-1995 references.

information about the distribution of the results except the mean and 95th percentile. A more satisfactory approach is to use the complementary cumulative distribution function (CCDF). This distribution, when presented as a family of percentile curves, shows all aspects of the uncertainty and is extremely useful for deciding how to employ conservatism into regulating exposures. For example, the standard could be set by requiring that there be less than 1 chance in 10, or 1 chance in 100, or 1 chance in 1,000 that the dose will exceed 25 mrem over the compliance period.

Recommendation

The staff should consider recommending a complementary cumulative distribution function approach to treating uncertainty in a probabilistic interpretation of the dose standard.

4. The draft NUREG-1573 suggests that a 500-year lifetime for engineered barriers may be appropriate. The ACNW previously questioned this particular issue in a letter dated June 28, 1995, and still thinks that 500 years is too prescriptive. An RIPB approach would allow a license applicant to establish a case for whatever lifetime was defensible and place the responsibility of evaluating the claim on the NRC.[2] An implied requirement for any specific lifetime is inconsistent with existing and draft regulations for high-level waste.

Recommendation

The staff should consider eliminating the suggestion of a 500-year engineered barrier lifetime.

Finally, we understand that one of the points of greatest contention about the draft position is the 10,000-year time of compliance. We understand the reasons for choosing a fixed time for evaluation. We also appreciate that a time frame longer than several hundred years may be needed in cases in which LLW contains significant quantities of uranium, plutonium, and other long-lived isotopes. One possible resolution to arguments about whether the time frame should be 500 years or 10,000 years would be to make the decision on a case-by-case basis. In a letter from the ACNW to the Commission dated February 11, 1997, the Committee advocated the use of a time frame for compliance based on a calculation of time to peak dose. The staff may want to reconsider the Committee's advice on a time frame for compliance offered in the February 11 letter.

Sincerely,

/RA/

B. John Garrick
Chairman

---

[2] The document allows for a license applicant to use a different lifetime with a credible analysis. If this is to be the intent of the staff's position, however, why have the 500-year specification at all?

References:

1. ACNW letter dated February 11, 1997, from Paul W. Pomeroy, Chairman, to Shirley Ann Jackson, Chairman, NRC, Subject: Time of Compliance for Low-Level Nuclear Waste Disposal Facilities.
2. ACNW letter dated June 28, 1995, from Martin J. Steindler, Chairman, to Ivan Selin, Chairman, NRC, Subject: Regulatory Issues in Low-Level Radioactive Waste Performance Assessment.