



UNITED STATES
NUCLEAR WASTE TECHNICAL REVIEW BOARD
2300 Clarendon Boulevard, Suite 1300
Arlington, VA 22201

June 11, 2001

Mr. Lake Barrett
Acting Director, Office of Civilian Radioactive Waste Management
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585

Dear Mr. Barrett:

The U.S. Nuclear Waste Technical Review Board (Board) thanks you for your opening comments and for supporting the participation of personnel from the Department of Energy (DOE) and its contractor team at the April 13, 2001, meeting on developing multiple lines of evidence. The Board is pleased to provide you with its impressions of that meeting.

As you know, the Board's view is that developing multiple lines of evidence is an essential element of any site recommendation decision by the DOE. Board members and representatives of the DOE who participated in the meeting agreed that some multiple lines of evidence could increase the level of confidence in the projections of repository behavior derived from the DOE's integrated performance assessment of Yucca Mountain. However, the Board believes that other lines of evidence could reduce confidence in the conclusions of performance assessment. Therefore, the DOE should indicate which performance assessment conclusions are supported by multiple lines of evidence, which are contradicted by multiple lines of evidence, and which are not supplemented at all by multiple lines of evidence.

There seemed to be agreement on potential approaches that the DOE might take to develop multiple lines of evidence, such as natural and anthropogenic analogues, simplified calculations, direct observation and measurement, first principles, and laboratory and field testing of predictions. (Of course, the last two approaches should be an integral part of any rigorous model development program as well.) The choice of approaches used will need to be determined on a case-by-case basis; none of the approaches appears to be inherently superior to any other.

The more these lines of evidence can be derived independently of performance assessment, the more they can serve as a "check" on the conclusions of performance assessment. Multiple lines of evidence that provide insights into phenomena whose uncertainty significantly affects estimates of repository performance are especially useful. Furthermore, the Board was encouraged to hear from DOE representatives that a case for multiple barriers and defense-in-depth might be advanced using lines of evidence other than performance assessment.

In the final analysis, however, the meeting demonstrated to the Board that talking about multiple lines of evidence in the abstract is less useful than examining specific examples that reinforce (or call into question) a particular scientific conclusion. The technical basis of the site recommendation decision for the proposed Yucca Mountain repository would be strengthened by

the extensive use of such examples. William Dudley's thoughtful analysis of multiple lines of evidence corroborating the estimate of mean present-day infiltration is a good model for what the Board has in mind.

The DOE also mentioned other possible approaches for developing multiple lines of evidence, such as confirmatory monitoring, additional field-testing after licensing approval, and peer review. Although each of these latter approaches can improve the technical rigor of performance assessment models and assumptions, the Board would view these approaches as carrying less weight for site recommendation than physically based lines of evidence assembled before the site recommendation.

The Board appreciates the DOE's participation in this meeting and looks forward to additional interactions as the DOE develops multiple lines of evidence to broaden the basis of its repository safety case.

Sincerely,

{Signed by}

Jared L. Cohon
Chairman