



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

April 7, 1998

Mr. Lake H. Barrett
Acting Director
Office of Civilian Radioactive Waste Management
U.S. Department of Energy
1000 Independence Avenue, SW
RW-1
Washington, DC 20585

Dear Mr. Barrett:

On behalf of the Nuclear Waste Technical Review Board, I would like to thank you and your staff and contractors for participating in the Board's January 1998 meeting. In particular, we appreciate your response to the points raised in the Board's recent letter report to Congress and the Secretary of Energy and your effort to make yourself available throughout the entire public-comment session on the first day of the meeting.

This letter provides the Board's comments on the January meeting and reflects our ongoing effort to provide feedback to the Office of Civilian Radioactive Waste Management (OCRWM) after Board meetings. The Board's January meeting focused on site-characterization activities related to the saturated zone (SZ). The OCRWM also presented an overview of the status of the environmental impact statement (EIS) for the proposed repository and provided a brief update on thermal testing activities at the site.

Presentations on Characterization of the Saturated Zone

The Board was particularly interested in SZ site-characterization activities that have been completed and activities that are under way related to the SZ, including the hydraulic and tracer studies at the C-well complex, the geochemical and isotopic age-dating data on the SZ water, the regional studies of discharge areas, the influences of climate and population changes, and the effects of increased groundwater withdrawals. The Board looks forward to receiving updates on the data obtained from these ongoing studies and learning more about the detailed plans for the second C-well-type complex for larger-scale hydraulic and tracer testing of the SZ, the regional geochemical studies, and the proposed well(s) for investigating the large hydraulic gradient north of the proposed repository. (The Board also will be interested in receiving progress reports on the studies of transport in the unsaturated zone being conducted at Busted Butte.) The Board believes that a review of these proposed test plans by an outside technical panel like the one convened for the expert elicitation on the SZ would be beneficial for the project.

These studies should provide much useful information. However, it is clear that answering questions about the effects of molecular diffusion, hydrodynamic dispersion, and sorption on dilution in the SZ will be difficult. The most direct way to obtain answers to these questions would be to perform large-scale tracer tests. However, such tests may be impractical because it could take many years for the tracers to travel from Yucca Mountain to the monitoring wells. Although some data may be obtained from the proposed SZ well complex, which will be located south of the proposed repository, uncertainties will remain about the dilution that the SZ can provide.

Expert Elicitation on the Saturated Zone

The Board is pleased that the DOE convened an expert panel for quantifying key uncertainties in the SZ studies. Several of the panel members expressed doubt about whether a large amount of dilution could occur in the SZ. Those panel members noted that present modeling of the dilution processes in the total system performance assessment for the viability assessment (TSPA-VA) assumes an optimistic and, indeed, unsubstantiated amount of mixing of waters and thus an unsubstantiated increase in dilution. The Board is deeply concerned that such a high mixing factor and so few data to back up that assumption could raise challenges in the future. The Board believes that the DOE should use dispersion-dilution models in the reference case TSPA-VA that are more in accord with the expert opinions.

The Board is pleased with the program's progress in integrating available data and expert opinions into modeling of the *unsaturated* zone. However, we concluded from the presentations on the SZ modeling that far more model integration and reality checking using data obtained from the site need to occur before these models can be viewed as credible and robust. It appears that the researchers involved in modeling the SZ are using several hydrologic models that may not be consistent with each other and that very few data are available to develop, bound, and validate models of the SZ.

Presentation by the State of Nevada's Contractor

A contractor for the state of Nevada, Linda Lehman, presented an interesting conceptual model of SZ flow. Her model, which is based on temperature data and was developed using uncomplicated modeling techniques, correlates SZ flow with fault zones and other features of the site. The OCRWM should carefully review her findings, if it has not already done so.

The EIS

The Board believes that the session outlining the OCRWM's plans for preparing an EIS provided the opportunity for a useful exchange of views and information. We would like to thank you for ensuring that the Board will have access to all requested information. The Board noted that the EIS presentation did not include essential analyses of alternative designs for the repository and waste package that should normally be part of any National Environmental Policy Act process. Without these analyses, the OCRWM will have difficulty making its case that all "reasonable" alternatives have been examined. The Board believes that ensuring that the EIS is technically defensible and tightly reasoned should remain a high program priority.

Thermal Testing Update

Significant uncertainty persists about the thermo-hydrologic response of Yucca Mountain to high temperatures and the resulting waste package environment during a period of high temperatures. Thus, progress on the thermal tests remains absolutely vital to site characterization. The Board believes that the single-heater and drift-scale heater tests have been well planned and executed and that the results are being analyzed appropriately.

To provide feedback in a time frame that will be useful to the OCRWM, we are furnishing the foregoing preliminary and formative thoughts. Accordingly, it seems inappropriate for the Board to request or expect a written response—although your informal reactions would be welcome. We thank you again for the time you spent at the meeting and for your attention to the comments in this letter.

Sincerely,

[signed by]

Jared L. Cohon
Chairman