



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

April 19, 2007

Mr. Edward F. Sproat III
Director
Office of Civilian Radioactive Waste Management
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585

Dear Mr. Sproat:

Thank you very much for participating in the U.S. Nuclear Waste Technical Review Board's meeting in Las Vegas, Nevada, on January 24, 2007. The Board appreciates the efforts of Office of Civilian Radioactive Waste Management (OCRWM) senior managers in presenting an overview of the Yucca Mountain Project. The Board believes that the Department of Energy's (DOE) proposed management initiatives — establishing a nuclear culture, initiating effective integration of preclosure and postclosure safety, and integrating the science and engineering programs — will enhance the technical basis of DOE's work at Yucca Mountain.

Your presentation made it clear that the Project's key milestones and issues are tied to the goal of submitting a license application (LA) by June 30, 2008. The Board recognizes your commitment to implementing initiatives that will help meet that objective and supports the Project's long-term emphasis on fostering intellectual continuity from repository licensing to closure. The Board also believes that the appointment of a director for the Office of Quality Assurance is a positive step. We look forward to hearing more about the Project's strategic licensing decisions and how those decisions will influence the repository design.

Waste Management System

It is clear from the waste management system (WMS) presentation that considerable progress has been made in designing repository surface facilities. The Board looks forward to continuing its review of the surface facility conceptual design. We are particularly interested in obtaining information on how the design will conform to preclosure safety requirements (i.e., the event sequences that require analysis and the implications for dose from those events).

The Board continues to believe that a "systems" analysis is needed to evaluate the interrelationships among diverse components of the WMS. The Total System Model can play a valuable role in analyzing the operational interdependencies of the WMS and the utility of the transportation, aging, and disposal (TAD) canister. Improvement is needed in developing a well-thought-out and clearly articulated thermal management strategy that forms the basis for integrating waste management activities. It is not clear, for example, how the Initial Handling Facility (IHF), used solely to handle canisterized high level waste and naval spent fuel fits into the Project's thermal-management strategy. In general, the role of the IHF needs to be explained

more fully. The Board also believes that lessons learned from associated activities can be used to assess the interactions of WMS components. Accordingly, the Board is interested in hearing how experience gained from safety and facility maintenance in the Exploratory Studies Facility could be applied to subsurface repository design and operations.

The Board encourages DOE to evaluate surface-facility designs and operational concepts for opportunities to reduce the number of times waste is handled. For example, DOE should assess the need for and, to the extent practicable, limit the size of large aging pads called for in the current surface facilities design. An issue not covered at the meeting that may affect the number of times that waste is handled is disposal of spent fuel currently stored in dual-purpose canisters (DPC's). The Board urges DOE to evaluate the safety, operational, and economic issues related to opening, unloading, and disposing of empty DPC's in comparison to possible direct disposal of DPC's in Yucca Mountain. DOE's position on the related issues of criticality and burn-up credit should be clarified in the LA as part of an assessment of the feasibility of direct disposal of DPC's. In addition, the Board requests an explanation of the technical basis for the selection of borated stainless steel as a neutron absorber in TAD canisters.

The Board notes with some concern the following: First, while technical interaction between DOE and the nuclear utilities is ongoing, it is not apparent to the Board that this dialogue includes all key issues warranting coordination within a successful waste management system. Second, DOE has assigned postclosure planning responsibility to the Office of the Chief Scientist, while preclosure planning responsibility has been assigned to the Office of the Chief Engineer. The Board has not observed a systematic or comprehensive linking of these two components or recognition by DOE of the interdependencies of important repository design and operating elements (e.g., thermal management). Finally, the Board notes that DOE preclosure safety analysis starts with shipment receipt at the surface facility and does not take into consideration safety factors related to waste transportation or waste acceptance sites. Consequently, DOE waste-management strategies that might reduce risk at surface facilities but increase risk during waste acceptance would be viewed as a reduction of risk rather than a transfer of risk.

The Board is encouraged by the Project's efforts in developing a strategic transportation plan and will follow with interest the evolution of the national and Nevada transportation systems. DOE should monitor the upcoming Department of Homeland Security and Pipeline and Hazardous Materials Safety Administration rulemakings on routing criteria and route risk assessments involving radioactive material shipments by rail. DOE should also monitor the anticipated changes being made by the Federal Motor Carrier Safety Administration concerning security route risk assessments for motor carrier transport of radioactive materials to ensure that DOE's approach is consistent with this legislation and guidance.

Office of the Chief Scientist

The Board found interesting the presentation on science investigations supporting the LA and believes that maintaining a core scientific effort is very important. The technical and scientific activities assigned to the Office of the Chief Scientist are numerous but necessary in supporting performance and operational concepts.

New estimates of infiltration of precipitation into the hydrogeologic unsaturated zone are higher than previously estimated. For example, the mean present-day infiltration rate was reported to be 13.4 mm/year—approximately 3 times higher than previously estimated. Because the rate of infiltration is a factor in controlling radionuclide transport and dose, the Board wants to understand thoroughly, the technical basis of DOE's new infiltration estimates. The Board's panel meeting on infiltration on March 14, 2007, in Berkeley, California, provided an excellent forum for addressing and discussing these issues.

The engineering update highlighted the importance of understanding the long-term cumulative effects of seismicity on the geologic environment. The Board realizes that seismic risks are generally of low probability but that such events could diminish waste isolation during the postclosure period, especially if the repository compliance period is extended to 1 million years. Estimates of seismic ground motion during the period of repository operation significantly affect the engineering design of surface facilities. For example, for meeting current preclosure safety requirements, the current surface facility design includes structural walls made of steel-reinforced concrete that are more than 4 feet thick. The Board long has encouraged DOE to develop more-realistic estimates of ground motion for both preclosure and postclosure periods and supports DOE scientific and engineering activities aimed at developing such realistic estimates.

The Project is to be commended for the sustained support of the Probabilistic Volcanic Hazard Assessment Update (PVHA-U). That long-term effort benefits from a rigorous, well-defined, and state-of-the-art methodology and from careful examination of a number of potential buried basaltic volcanic deposits (or "anomalies") that were delineated through a high-resolution aeromagnetic survey. Many of those anomalies have been investigated by drilling into them, and the preliminary conceptual and numerical models have been updated to reflect the results of the investigation. This investigation is proceeding on its own schedule, independent of the LA, but may be completed in 2008. When the PVHA-U becomes available, it will aid in a realistic assessment of the significance of low-probability volcanic hazards at Yucca Mountain.

The Project has continued to evaluate the ^{36}Cl problem. The most recent studies have not determined conclusively the origin of sporadic measurements of ^{36}Cl in samples collected from within Yucca Mountain. This remains an outstanding issue whose resolution could greatly enhance confidence in understanding fluid flow within Yucca Mountain.

Science and Technology (S&T) program

The Board strongly supports scientific activities currently performed under the S&T program. The Board is concerned, however, that budget constraints in fiscal year (FY) 2007 and the elimination of funding for this purpose in OCRWM's budget request for FY 2008 will negatively affect the continuation of these activities that otherwise might support the technical basis of important elements of the LA. Of particular importance is work on the source term, natural barriers, and materials performance. Scientific efforts in other areas also are potentially important. DOE appears to be making progress on waste package corrosion, potential use of cementitious materials in the repository, and understanding how heat and water vapor will move in three dimensions through the mountain for hundreds to thousands of years after the waste is

emplaced in the drift tunnels. The Board also is interested in recent results from the backfill thermal conductivity test, which seem to point to a potential means of mitigating both seismic and igneous consequences by using backfill.

In general, in reviewing the information presented at the January meeting, the Board is encouraged by project management initiatives and progress made in addressing technical and scientific issues.

Sincerely,

{Signed By}

B. John Garrick
Chairman