



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

April 5, 2004

Dr. Margaret S. Y. Chu
Director
Office of Civilian Radioactive Waste Management
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585

Dear Dr. Chu:

The Board's Panel on the Engineered System held a meeting January 20, 2004, in Las Vegas. The theme of the meeting was "Repository Design Update." There were nine presentations at the meeting: five by the staff of your Office of Repository Development, one by a representative of your Office of Strategy and Program Development, two by a representative of Nye County, and one by a representative of the Nuclear Energy Institute. In addition, representatives of OCRWM's Management and Operating Contractor, BSC, were present at the meeting to answer questions. The purpose of this letter is to thank you again for the participation in the meeting by you, your staff, and your contractor and to provide the following Board feedback from the meeting.

- As described at the meeting, the design of the repository surface facilities includes temporary storage for up to 40,000 metric tons of spent fuel. We understand that the current plan is to construct only 1,000 metric tons of storage capacity and that additional storage would be constructed only as needed and only to the extent needed. We also understand that the DOE intends that the entire 40,000 metric tons of storage capacity will be included in the license application. The technical justification for a 40,000 metric ton storage facility is unclear. As pointed out in BSC's February 2002 "Thermal Operating Modes" white paper, a larger surface facilities area with a pad for extended surface aging could affect the analysis of aircraft-crash hazard. The Board recommends that the technical justification for such a large storage facility be explained.
- The Board understands that BSC recently awarded a fixed-price contract to build the first full-scale waste-package prototype. We believe that the technical information obtained during the course of performance of this contract will be very important, and we agree that more waste-package prototypes are needed. We understand that the reasons for building prototypes include reasons other than obtaining technical information. However, we would like more explanation about the technical information that will be obtained by the current plan to build 14 more prototypes.

- While not unprecedented, the stainless-steel perforated plate and stainless-steel bolt system proposed as the ground-support system for emplacement drifts is highly unusual and expensive. We would like to learn more about the technical basis for the selection of stainless steel as the material of construction, particularly for the perforated plate. We also would like to know which other materials were considered for ground support and the technical bases for their rejection. We understand that the emplacement-drift ground-support system is designed for a preclosure service life of 100 years and “not to preclude” a preclosure period of up to 300 years. We would like a description of the planned inspection and maintenance activities — including a description of how those activities would be conducted — for both the first 100 years and the subsequent 200 years.
- The Board notes that changes have been made in the subsurface repository design to increase the radius of each emplacement drift turnout and to move the ventilation control door to the outer end of each turnout. These changes will affect postclosure waste-package temperatures, particularly the temperatures of packages close to the turnouts. In addition, these changes are likely to exacerbate “cold trap” effects near and in the turnouts. We strongly recommend that temperature and relative humidity calculations be revised to reflect the design changes, if that has not been done already.
- The Nye County work on the evolution of chemistry in the engineered barrier system and on the topic of natural ventilation is very interesting. These topics are important because they influence both waste-package corrosion and transport from the engineered barrier system. It is clear that the environment in drifts is not a quasi-static or slowly changing one but a dynamic one driven in part by temperature differences among waste packages and along the drifts. Such differences will always exist but will be greater during the thermal pulse period. A repository at Yucca Mountain will have some degree of natural ventilation or natural circulation regardless of whether it is deliberately engineered into the repository design or not. Models for temperature and relative humidity predictions must take these natural processes into account fully.

We would like to thank you again for your participation in the meeting and for the assistance of your staff in preparing for the meeting. We particularly appreciate the technical coordination assistance provided by Claudia Newbury and the excellent presentations on repository design by Paul Harrington.

Sincerely,

{Signed By}

Ronald M. Latanision
Chair, Panel on the
Engineered System