



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

August 13, 2009

The Honorable Steven Chu
Secretary
U. S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585

Dear Secretary Chu:

The Nuclear Waste Policy Amendments Act of 1987 established the Nuclear Waste Technical Review Board as an independent agency in the executive branch. The Act charged the Board with evaluating the technical validity of U. S. Department of Energy (DOE) activities regarding the management and disposal of high-level radioactive waste and spent nuclear fuel. The Board held a public meeting on June 11, 2009, in Las Vegas, Nevada. The purpose of this letter is to provide feedback from that meeting.

The Administration has proposed a significant change in national policy for managing and disposing of high-level radioactive waste and spent nuclear fuel. I acknowledged that change in my opening remarks at the June meeting and articulated plans for the Board to continue providing independent and objective technical advice to Congress and the Secretary of Energy in accordance with the Board's mandate. The Board anticipates that its technical evaluations will be useful not only to Congress and the Secretary but also to a "blue ribbon" commission that may study options for managing nuclear waste.

The Board has established the following objectives to facilitate its evaluations:

1. To the extent that DOE engages in technical work related to the management and disposal of high-level radioactive waste and spent nuclear fuel, the Board will continue to monitor and evaluate that work and report on the technical validity of the work to Congress and the Secretary.
2. The Board will continue developing and compiling objective technical information to inform Congress, the Secretary, and a blue-ribbon commission. In developing such information, the Board will look broadly at an integrated waste management system and potential waste management alternatives and will provide its objective view of technical questions and issues that need to be addressed.
3. The Board will draw on its extensive experience, including knowledge gained from observing efforts in other countries, to develop and provide technical information and technical "lessons learned" about the U. S. nuclear waste management program, including the operational and safety risks of alternatives for managing high-level radioactive waste.

The following findings, conclusions, and recommendations reflect information conveyed at the Board's June meeting and are within the context of the three objectives noted above.

Very-Long-Term Dry Storage: Technical Issues

The Administration has announced that it intends to terminate the Yucca Mountain project and convene a blue-ribbon commission to develop and examine alternatives for the management and disposal of spent nuclear fuel and high-level radioactive waste. Any alternative is likely to require dry storage of spent nuclear fuel and high-level radioactive waste for extended periods. There appear to be no technical factors that would prevent designing and safely operating dry-storage systems for at least several decades — providing that there is regular monitoring. However, whether the current technical basis is adequate for designing and operating dry-storage facilities for very long periods is not clear.

At its meeting, the Board convened a panel of experts to discuss research and data needs for very-long-term dry storage ("very long term" was defined for purposes of discussion as 120 years or more). The panel included a representative of nuclear utilities, a representative of a firm that designs and manufactures dry storage systems, and a representative of the Electric Power Research Institute. The purpose of the panel was to brainstorm potential technical issues that might be associated with the storage of waste for a very long period.

On the basis of discussions among panelists and Board members, the technical basis for designing and operating dry-storage systems for a very long term warrants improvement. Potential issues and the need for technical data may differ, depending on the location of the storage facility (e.g., coastal or desert), the environment (e.g., humid or arid), and the materials of construction (e.g., carbon steel, stainless steel, concrete). What is most important is the condition of the spent fuel in the canisters because it must be shipped, possibly repackaged, and eventually disposed of (or reprocessed) after a long period of dry storage. The U.S. experience in examining the behavior of spent fuel in dry storage is limited to very few spent fuels having burnups significantly lower than current practice. The Board is preparing a white paper on technical needs for very-long-term dry storage.

Future Dry Cask Storage Systems

DOE has contracted with manufacturers of dry-storage systems to develop designs for transportation, aging, and disposal (TAD) canisters for transporting commercial spent fuel, storing commercial spent fuel at reactor sites or other sites, or disposing of commercial spent fuel in a Yucca Mountain repository. Dry-storage and transportation canister-based systems that are already widely used by nuclear utilities have significantly higher capacity in terms of numbers of assemblies and heat load than DOE's TAD canisters do, and the trend is for even higher future capacities. A decision to terminate the Yucca Mountain project and the low capacity of TAD canisters are likely to hinder significantly the acceptance of TAD canisters by nuclear utilities. The Board has recommended in the past that DOE modify its waste package system to allow direct disposal of loaded dual-purpose canisters without repackaging the spent fuel. This would require full burnup credit and a slight increase in the diameter of waste packages.

Drip Shield

In June 2008, DOE submitted to the U. S. Nuclear Regulatory Commission a license application for constructing a repository at Yucca Mountain. At the Board's June 11 meeting, a State of Nevada representative stated that, on the basis of the "drip shield early failure" case in the license application, the U. S. Environmental Protection Agency dose standard would be exceeded if drip shields were omitted from the repository.

The license application contains many modeling assumptions. Some of them include the composition of water seeping onto drip shields from the roofs of emplacement drifts, the initiation and propagation rate of waste-package localized corrosion due to seepage, the size and shape of any penetrations due to seepage-based localized corrosion, the degradation of the waste form once it is contacted by water, and the mobilization and transport of radionuclides from the degraded waste form. The cumulative effects of these modeling assumptions may result in a lack of realism about how barriers and waste would behave in a repository. In other words, depending on the assumptions and the model chosen to represent the degradation mechanisms, the performance of the drip shield may or may not be as represented in the current model.

The Board continues to urge DOE to develop more-realistic models. In addition, as the Board has pointed out in past letters and reports, DOE has not developed prototypes, or even scale models, for the drip shield. Just as important, if not more so, is that prototypes have not been developed for the equipment that would emplace, monitor, inspect, adjust, or, if necessary, retrieve the drip shields. Both the drip shields and the equipment for emplacing them are simple in concept, but they are unprecedented and, in our view, require prototypes. DOE has had a program for drip shield and related equipment prototypes on its books for years but has never implemented it.

Fuel-Cycle Research

One speaker at the June 11 meeting raised the subject of DOE's proposed fuel-cycle research and development program for fiscal year 2010. We note that the justification for the proposed program is almost entirely related to waste management and that the program would be undertaken largely to improve options for waste storage and disposal, reduce the amount or longevity of waste, or promote safe and secure management of waste. In accordance with its enabling legislation, the Board will evaluate the technical validity of activities undertaken within the fuel-cycle research and development program to the extent that they relate to the management and ultimate disposal of spent nuclear fuel and high-level radioactive waste. In particular, the Board will be holding a public meeting in the Washington, D. C., area on September 23, where this issue will be an important topic of discussion.

DOE-Owned Spent Nuclear Fuel and High-Level Radioactive Waste

DOE owns more than 2,000 metric tons of spent nuclear fuel and the equivalent of more than 7,000 metric tons of high-level radioactive waste. Almost all of this waste has accumulated as a byproduct of the nation's defense activities. These waste materials are stored primarily at Hanford, the Savannah River Site, and Idaho National Laboratory. Although much of the spent fuel already is in solid form in dry storage, most of the high-level waste is stored as liquid or sludge in large tanks. With only a few possible exceptions, these wastes appear to have no current or future value; they must be disposed of eventually.

A representative of DOE's Office of Environmental Management presented an overview of the inventory of DOE-owned spent fuel and high-level radioactive waste at the June 11 meeting. The Board visited the Hanford site last month and plans to visit the Savannah River Site in January 2010 and Idaho National Laboratory in June 2010 to observe and discuss first-hand the management of spent fuel and high-level radioactive waste at each site. We expect to issue a report shortly after visiting the last site and hope that the technical information in that report will be useful to Congress, the Secretary of Energy, the public, and the blue-ribbon commission.

Sincerely,

{Signed by}

B. John Garrick
Chairman