

**Summary of Statement of Dr. B. John Garrick, Chairman**  
**U.S. Nuclear Waste Technical Review Board**  
**Before the Subcommittee on Energy and Air Quality**  
**July 15-16, 2008**

- The Board's role was established in the Nuclear Waste Policy Amendments Act of 1987. The Board is expected to perform ongoing peer review of the technical and scientific validity of DOE activities related to implementing the Nuclear Waste Policy Act. The Board reports its findings and recommendations at least twice a year to Congress and the Secretary of Energy.
- The Department of Energy's (DOE) submittal of a Yucca Mountain license application to the Nuclear Regulatory Commission (NRC) represents the achievement of a major program milestone.
- Because the Board is completely independent, it does not have a direct stake in the development of a Yucca Mountain repository and will not be a party to the licensing proceeding. That is as it should be.
- Focusing on fundamental understanding as opposed to regulatory compliance, the Board evaluates the technical basis of DOE's approach to the entire waste management system, from waste acceptance through transportation and isolation of spent nuclear fuel and high-level radioactive waste as proposed at Yucca Mountain.
- The Board makes its technical evaluation available by posting Board documents, including letters, reports, congressional testimony, and meeting transcripts, on its Web site at [www.nwtrb.gov](http://www.nwtrb.gov). Anyone can use this information, including parties involved in NRC's licensing proceedings.
- The Board has identified several technical issues that if addressed could increase operational effectiveness or feasibility, enhance the technical basis for repository performance estimates, or improve fundamental understanding. The Board did not uncover any issue that it believes would have prevented DOE from submitting its license application for regulatory review.
- Operational issues identified by the Board include developing contingencies in case of (1) delay in the development of a Nevada rail spur, (2) lower rate of TAD utilization, and (3) potential problems related to drip shield installation.
- Technical issues that might affect calculated repository performance estimates are deliquescence-induced localized corrosion of the waste packages during the thermal pulse, general corrosion of waste packages, and water recharge that results from climate change. DOE also is investigating seismicity and volcanism at Yucca Mountain.
- DOE has made very significant progress over the last several years, but given the million-year timeframe, some uncertainty in repository performance estimates is inevitable. Uncertainty can be addressed in several ways, and different approaches require different time and resource commitments.
- The Board is very comfortable with its statutory mandate and looks forward to continuing its independent technical peer review.

**Statement of Dr. B. John Garrick, Chairman  
U.S. Nuclear Waste Technical Review Board  
Before the  
Subcommittee on Energy and Air Quality  
Committee on Energy and Commerce  
United States House of Representatives  
July 15, 2008**

Mr. Chairman and members of the Subcommittee, good morning. My name is John Garrick. I am Chairman of the U.S. Nuclear Waste Technical Review Board. The 11 part-time members of the Board are appointed by the President and most of us have other occupations. In my case, I am a consultant specializing in the application of the risk sciences to complex technological systems in the space, defense, chemical, marine, and nuclear fields. I am pleased to represent the Board at this hearing on “progress toward opening a storage facility for high-level civilian nuclear waste at Yucca Mountain in Nye County, Nevada.”

As has been discussed, Mr. Chairman, after many years of characterizing Yucca Mountain for its suitability as the proposed site for a deep geologic repository for the permanent disposal of spent nuclear fuel and high-level radioactive waste, the Department of Energy (DOE) recently submitted a license application to the Nuclear Regulatory Commission (NRC). This action represents the achievement of a major program milestone. The questions asked by the Subcommittee in its invitation letter about what happens next are very timely. The questions are paraphrased in my written statement, and I will do my best to present the Board’s answers to the questions as directly and succinctly as possible.

***What is the timing of decisions on the license application?***

NRC will address the adequacy of DOE's license application in relation to NRC regulations and will determine whether the proposed repository complies with whatever repository radiation standard is ultimately promulgated by the Environmental Protection Agency. The NRC is therefore in a better position to respond to questions about the timeline for decisions on a license application.

***What is the Board's role going forward?***

The Board's congressional mandate, set forth in the 1987 amendments to the Nuclear Waste Policy Act (NWPA), is to perform an unbiased ongoing peer review of the technical and scientific validity of DOE activities related to implementing the NWPA. Because the Board is completely independent, it does not have a direct stake in the development of a Yucca Mountain repository and will not be a party to the licensing proceeding. That is as it should be.

In carrying out its technical peer review, the Board takes an integrated view of the many diverse components of the DOE program and focuses on fundamental understanding as opposed to regulatory compliance. Using the extensive scientific and engineering expertise of its members, the Board evaluates the technical basis of DOE's approach to the entire waste management system, from waste acceptance (i.e., handling of waste at generation sites) through transportation and isolation of spent nuclear fuel and high-level radioactive waste at Yucca Mountain. The Board provides an integrated technical assessment of whether the waste management system will work, based on answers to the following questions:

- Will DOE (or any managing entity) be able to effectively implement the design and fabrication of waste packages; accept spent nuclear fuel at reactor sites or high-level

radioactive waste at federal facilities; transport the waste to the repository; perform necessary surface operations at the repository site, including storage; and emplace waste packages and other engineered barriers underground?

- How strong is the technical basis supporting DOE's assessment that the repository system, including the natural and engineered barriers, will perform as planned?

The Board attempts to make its body of technical work available to the public. For example, most of the Board's public meetings are held in Nevada. The Board reports its findings and recommendations regularly to Congress and the Secretary of Energy. Finally, Board documents, including letters, reports, congressional testimony, and meeting transcripts, are posted on the Board's Web site at [www.nwtrb.gov](http://www.nwtrb.gov). Anyone can use this information, including parties involved in NRC's licensing proceedings.

Going forward, based on its ongoing technical review the Board will continue to make recommendations to DOE on designing and implementing a safe and effective waste management system, including a permanent repository. We hope that Congress will find the Board's technical findings and recommendations useful as context for policy decisions about radioactive waste management.

***What are the outstanding technical issues that could potentially cause delay or increase the costs associated with developing a repository?***

Mr. Chairman, as part of its ongoing evaluation, the Board has identified several priority technical issues that if addressed could increase operational effectiveness or feasibility, enhance the technical basis for repository performance estimates, or improve fundamental understanding. Before I present examples of the technical issues, Mr. Chairman, I want to make clear that the Board's identification of these issues should not be construed as comment on the sufficiency of DOE's license application; NRC will make that determination. Furthermore, the Board's

systematic review of DOE activities did not uncover any issue that it believes would have prevented DOE from submitting its license application for regulatory review.

I will begin by commenting on issues related to the first component of the waste management system: preclosure operations.

#### *Preclosure Operational Issues*

Several operational and design issues identified by the Board could significantly affect funding requirements and schedules.

First, DOE has designed its waste management system around a canister system that can be used for transportation, aging, and disposal (TAD) of spent nuclear fuel. The Board believes that the TAD concept may have merit. However, a smaller TAD that could be transported by truck does not currently exist. DOE representatives confirmed at a Board meeting held in January that developing a waste management system using TADs makes the Nevada rail line necessary. DOE also has acknowledged in correspondence to the Board that constructing a Nevada rail line may present significant institutional challenges. The Board therefore has recommended that DOE initiate contingency planning to identify alternatives that can be implemented if significant delays are encountered during construction of the rail line to Yucca Mountain.

Second, DOE has established requirements for a TAD-based repository design assuming that 90 percent of commercial spent nuclear fuel will arrive at the repository in TAD canisters. However, utilities may need incentives to use TADs, and some nuclear power plants appear to lack the necessary infrastructure for handling the large TAD canisters. If TAD utilization falls below the planned 90 percent, the lower utilization rate could adversely affect surface facility throughput. It also may require constructing additional waste handling facilities or increasing the amount of spent nuclear fuel that must be placed in storage at the repository site, thus reducing the rate of waste emplacement into the repository. The Board recommends that DOE consider

operational and design contingencies that could be implemented if TAD utilization rates are significantly lower than the 90 percent utilization currently assumed, including an analysis of the effects of direct disposal of dual-purpose canisters.

Third, repository performance estimates included in DOE's total system performance assessment (TSPA) depend on functioning drip shields to prevent water and rocks from falling on waste packages. However, DOE assumptions about drift degradation and repository tunnel tolerances may make installation of the drip shields, as currently designed, problematic.

#### *Issues Affecting Repository Performance Estimates*

Examples of technical issues that could affect calculated repository performance estimates are the potential for the occurrence of deliquescence-induced localized corrosion of the waste packages during the thermal pulse, questions about the rates of general corrosion of waste packages, and the magnitude and variability of water recharge that occurs as a result of climate change. The Board also will continue to follow DOE's ongoing scientific investigations of seismicity and volcanism at Yucca Mountain. It is very likely that many of these issues will be addressed during licensing. In any case, the Board believes that addressing these issues is feasible and could reduce uncertainty and strengthen the technical basis for DOE's repository performance estimates.

Mr. Chairman, we can report that DOE has made very significant progress over the last several years in enhancing the technical basis for the assumptions and analyses supporting its repository performance estimates in the TSPA used in the license application. As can be expected, however, for time periods of up to one million years, some uncertainty related to estimates of repository performance are inevitable.

Deciding on the best way to address such uncertainties can be challenging. DOE has addressed uncertainties by making conservative assumptions and using probabilistic representations of performance indicators. In its letters and reports, the Board has suggested design changes, contingency planning, and additional research as ways of addressing uncertainties. Different approaches require different time and resource commitments. The Board will continue to evaluate the possible use of all of these methods to achieve defensible technical assessments.

***Does the Board have any recommendations related to nuclear legislation or policy?***

Mr. Chairman, the Board historically has not recommended changes in legislation or policy because it views its role as providing needed technical context and information for decision-makers. The Board is very comfortable with its statutory mandate and takes its mission very seriously. The Board looks forward to continuing its independent technical peer review, as described earlier in my statement.

On behalf of the Board members, I thank the Subcommittee for inviting us to participate in this hearing. We hope that the information we have furnished today will be useful.

I will be pleased to respond to your questions.