Subcommittee on Energy and Water Development
Committee on Appropriations
U.S. House of Representatives
Hearing on NWTRB Fiscal Year 1996 Appropriation Request
March 16, 1995

Questions from Chairman Myers

1. *As an independent Board charged by Congress to review scientific aspects of the Department's plans for disposal of high-level radioactive waste, the Nuclear Waste Technical Review Board is uniquely situated to comment upon the Yucca Mountain criticality debate. Has the Board undertaken an analysis of the criticality theories offered by Dr. Bowman at Los Alamos National Laboratory?*

Ans. Under certain conditions, the disposal in a geologic repository of radioactive material with high concentrations of uranium or plutonium could generate a self-sustaining nuclear reaction. This situation is called in-repository "criticality." In a well-designed repository for spent fuel from civilian reactors, criticality is a very remote possibility.

Criticality, if it were to occur in such a repository, would not necessarily lead to a nuclear explosion. Despite recent headlines, the potential for in-repository criticality has been recognized for years, if not decades. The Board has not reviewed Dr. Bowman's paper. However, we have addressed the issue of in-repository criticality at past meetings and are scheduled to do so again at our April 1995 meeting. At that time, the DOE has been asked to discuss its current plans for analyzing in-repository criticality and to update the Board on the DOE's response to Dr. Bowman's theory.

In a paper drafted by Drs. Bowman and Venneri at Los Alamos National Laboratory (LANL), weapons-grade plutonium (dispersed in a borosilicate glass "log") is disposed of in an idealized repository. It is not yet known how relevant the assumptions in this paper might be to a repository at Yucca Mountain, which will be designed to hold utility spent fuel and some defense waste from reprocessing. (Weapons-grade plutonium is not currently slated for disposal in Yucca Mountain.) First, it is not clear whether the idealized conditions used in this paper are realistic. Second, it is more difficult to achieve criticality with the plutonium in commercial spent fuel than with weapons-grade plutonium. In any event, extrapolating calculations for glass logs containing weapons-grade plutonium to the more impure plutonium in utility spent fuel will be difficult.

The scientific debate about Dr. Bowman's theories has been confined thus far to LANL. However, it is our understanding that Dr. Bowman's paper and a rebuttal paper by those who do not agree with Dr. Bowman will be submitted to a peer-reviewed journal. We

believe this is an appropriate process for beginning to resolve this issue. Making firm conclusions about Dr. Bowman's theories at this time would short-circuit the peer review process.

2. *When do you expect the White House to make nominations to fill the five vacancies on the Board?*

Ans. The White House is currently screening technically qualified Board candidates nominated by the National Academy of Sciences. As in the past, the care given to identifying nominees who also must satisfy the rigorous conflict of interest requirements of the Nuclear Waste Policy Act has slowed the appointment process. This careful screening is necessary to assure that the Board retains its credibility, which is the foundation of its effectiveness. We understand that the White House is actively working to fill the five Board member vacancies. It is our hope that these appointments will be made soon.

In any case, one legislative change that could substantially facilitate the work of the Board would be to amend the Nuclear Waste Policy Act to provide for automatic extensions of the terms of Board members until such time as they have been reappointed or their replacements have been appointed. Because of the comprehensive nature of the program and the breadth of scientific and technical expertise required to adequately evaluate the program, the loss of a single Board member can make the Board's work more difficult. To operate at peak effectiveness, the Board should have its full complement of eleven members, which is something it has never had. Our budget request assumes that the five new members will be named to the Board during this fiscal year.

3. *Do you have any comment on the recent decision of the Mescalero Apaches to pursue development of a monitored retrievable storage facility on tribal lands in cooperation with private utilities? Will the Board have any role in evaluating technical aspects of the plan?*

Ans. There are no real technical impediments to building or transporting spent fuel to such a facility. Under current law, both federal and private facilities for commercial spent fuel storage would be licensed by the Nuclear Regulatory Commission. The difficulties associated with developing a private storage facility, as with the development of any storage option, are primarily political and institutional and are mostly related to public concern over siting of the facility and the public's perception of risk related to transporting the waste. The Board is charged by Congress to review only those activities undertaken by the *Secretary of Energy* to manage commercial spent fuel and high-level waste. Therefore, unless the Board's mandate is changed, we will not be formally evaluating any specific plans for a private interim storage facility. However, we plan to issue a report in the next few months that will analyze the technical and nontechnical implications of the various options for extended storage of spent fuel.

4. *Has the Board formulated any opinions on nuclear waste legislative proposals pending in Congress? In particular, do either the Johnston bill (S.167) or the Upton bill (H.R. 1020) significantly impact the scientific effort associated with the nation's current nuclear waste policy as articulated in the Nuclear Waste Policy Act?*

Ans. The Board has not taken a position on any of the legislative proposals that have been introduced. However, some proposals could shift the emphasis of national policy on spent fuel and high-level waste management, at least in the short term, from disposal to storage of utility spent fuel. It is important to recognize that the repository site-characterization program at Yucca Mountain is at a critical stage where actual underground excavation is currently underway. Maintaining the momentum of this very important work will require a consistent and predictable commitment of funds. The Board has some concern that, should a shift in policy toward storage occur, funds for site-characterization could be constrained. Diverting funds from the site-characterization program at this critical time could have an adverse effect on the development of a permanent repository at Yucca Mountain not only by reducing the amount of scientific and technical work that could be done but also through loss of the site-specific expertise of professionals who work on the program. Even if the decision is made to change national policy to emphasize storage of spent fuel, continuing a program of site investigations to confirm the feasibility of disposal will be important in helping alleviate concern that storage will be the final, not the interim, solution.

5. *Please describe generally the status of the Department's efforts to design waste packages and develop multi-purpose canisters for spent nuclear fuel. Does much technical research and development remain in this area?*

The DOE has initiated a procurement process for a multipurpose canister that can be used to store and transport spent fuel. These new dual-purpose canisters can be designed and produced using existing technology. However, it is not clear at this point that the MPC will be compatible with waste packages that will be used for disposal of the commercial spent fuel in a repository. The Board has encouraged the DOE to take into consideration requirements for a disposal waste package as it develops its MPC concept.

The disposal waste package is a critical part of the engineered barrier system that will be used to isolate the radioactive waste in the repository from the accessible environment. Deciding which waste package design is most appropriate requires both a knowledge of what the repository environment (e.g., temperature) will be and extensive testing of materials degradation (corrosion) that will take up to ten years to complete. This testing began in earnest last year after several years of delay. It should be continued and adequately funded. The DOE also needs to carry out research on waste package fabrication, including welding, as well as developing methodology for nondestructive examination of metals and welds in the presence of ionizing radiation.

6. Your testimony notes that the Board has, on several occasions, criticized the

Department's, "allocation of resources as fundamentally inconsistent with the optimistic work schedule the DOE set for itself " Does the Department's budget for science education activities perpetuate this inconsistency?

Ans. In the past, the DOE has allocated a high proportion of its total program funds to overhead and infrastructure costs, thereby limiting the amounts available for critical scientific work. In addition, the DOE has established a very optimistic schedule for determining site suitability and applying to the NRC for a license to construct a repository, should the site prove suitable. The Board has expressed its concern that the OCRWM's allocation of such a high proportion of its funds to overhead and infrastructure costs makes it even more difficult to obtain the data necessary to make site suitability and licensing decisions in accordance with its ambitious schedule. The Board's primary concern has been that to meet this schedule, critical scientific work would have to be truncated. The costs of the DOE's science education activities, while they may be part of overhead costs, are so small relative to other overhead costs that eliminating them would not significantly enhance the scientific program. Furthermore, continuing to inform the public is an essential requirement for this kind of undertaking.

7. *It appears that the interstate transportation of nuclear waste is one of the more politically challenging aspects of nuclear waste storage. Could you please comment on the technical aspects of nuclear waste transportation? What scientific or technical hurdles, if any, must be overcome in order to plan and develop a nuclear waste transportation network?*

Ans. Numerous past studies and three decades of experience in this and other countries with these activities have shown that the health and safety risks associated with transporting spent fuel and high-level radioactive waste are small. The Office of Civilian Radioactive Waste Management has not yet started developing a transportation network on the scale that will be necessary to move large quantities of spent fuel from various locations in the country to a storage facility or a repository, should either begin operation. However, development of such a network and providing technically sound assessments of system safety do not appear to present any insurmountable technical challenges. The DOE will have to address a number of technical issues. Among these are (1) the weight of the MPC overpack, (2) safe handling of the spent fuel, (3) a system for tracking waste shipments, and (4) route-specific factors. As you point out, even though there are no insurmountable *technical* hurdles, transporting nuclear waste may be *politically* challenging.

Question from Mr. Bevill

1. *In several instances in your testimony, you indicated that sometimes the most onerous problems in dealing with the storage of our radioactive waste may be political or process oriented. You cited a 1993 Special Report of the Board that observed that the task of providing safe storage of spent fuel does not appear to present any substantial technical*

problems. Could you please elaborate on what you mean by this.

Ans. Safely storing spent fuel does not appear to present any serious technical problems. The Nuclear Regulatory Commission has found that spent fuel can be stored safely — in pools or in dry storage casks — for at least 100 years. The safety risks associated with transporting spent fuel also are quite small. Furthermore, constructing and operating an interim storage facility do not present any significant *technical* challenges. Even though from a technical point of view the risks associated with spent fuel storage are quite small, the public's *perception* of risk may be a very significant factor as decisions are made about interim storage options.