UNITED STATES
NUCLEAR WASTE TECHNICAL REVIEW BOARD
1100 Wilson Boulevard. Suite 910
Arlington, VA 22209

July 20, 1995

The Honorable Edward J. Markey
U. S. House of Representatives
2133 Raybum House Office Building
Washington, DC 20515-6107

Dear Representative Markey:

I appreciated the opportunity to present testimony on behalf of the Nuclear Waste Technical Review Board at the June 30, 1995, oversight hearing by the Subcommittee on Energy and Power on the proposed permanent repository at Yucca Mountain, Nevada.

On behalf of the Board, I am submitting answers to the questions you sent to me on July 7. Also enclosed are answers to questions submitted to the Board by Representative Frank Pallone, Jr. I apologize for the delay in our response.

Sincerely,

John E. Cantlon

John E. Cantlon
Chairman

Enclosure

cc: The Honorable Dan Schaefer, Chairman
Subcommittee on Energy and Power

Telephone: 703-235-4473 Fax: 703-235-4495

Subcommittee on Energy and Power
Committee on Commerce
U.S. House of Representatives
Hearing on High-level Nuclear Waste Policy
June 28, 1995

U.S. Nuclear Waste Technical Review Board
Answers to questions the record

Questions from Representative Edward J. Markey

1. *In a report submitted to Congress in March, the Nuclear Waste Technical Review Board expressed concern that the current schedule for Yucca Mountain may not allow sufficient time for certain necessary activities to be completed in time for a 1998 site-suitability decision.*

   a. *What specific activities do you fear might not be completed in time?*

Ans. Some of our concerns were outlined in our December 6, 1994, letter to the DOE (which is enclosed and was attached to our June 30 testimony before the House Subcommittee on Energy and Power). In that letter, the Board expressed its view that the DOE would have to complete a number of basic activities before a site-suitability decision could be made with a reasonably high level of confidence. We are most concerned about maintaining progress on those activities related to exploratory tunneling, verifying geologic structures at depth, and initiating the necessary hydrogeologic and thermal tests.

The DOE's phased approach for exploring, testing and licensing the Yucca Mountain site includes a "technical" site-suitability decision in 1998. The DOE acknowledges that this approach will involve collecting less data and therefore carries a greater risk that, at some point in the future, something could be found to indicate that the site is in fact unsuitable for repository development. Consequently, the Board still is of the opinion that before a site-suitability decision can be made with confidence, the basic activities set forth in its December 6, 1994, letter need to be completed.

b. *How would the Energy and Water Appropriations Bill's proposed budget cuts and its redirection of the program towards construction of an interim storage facility affect these activities?*

Ans. Under the bill's approach, it will take the DOE even longer to complete site-characterization activities than is currently planned. However, some of the necessary tests will take several years to complete in any case. In fact, it is not clear to the Board how the necessary testing and data analysis can be completed

to support a technically defensible site-suitability decision until sometime between 2000 and 2005, even if the program received its requested funding.

2 *Page 9 of your prepared testimony states that even if a decision were made today to develop interim storage capacity, "it probably would take 5-10 years to site, license, construct, and begin operations"*

a. In light of your testimony regarding the time frame required to complete an interim facility, isn't it highly unlikely that the very tight deadlines set forth in the Upton bill (which require DOE to begin accepting waste at an interim facility by 1998) will be met?

b. Is there a risk that having to meet the artificial deadlines established in the bill would compromise public health, safety, and environmental protection?

Ans. Although the DOE could administratively begin *accepting* legal title to spent fuel at reactor sites in 1998, beginning to accept spent fuel at a storage facility by 1998 would present a very difficult challenge under current regulatory and statutory requirements. Under the best of circumstances, significant amounts of spent fuel could not realistically be moved from reactor sites to a storage facility until sometime around 2003.

None of the tasks associated with developing a storage facility pose insurmountable technical difficulties; however, time will be required to demonstrate compliance with existing safety and environmental protection standards. Before an interim storage facility can be placed in operation, the DOE would need to select a site and characterize its suitability (e.g., seismic hazards, etc.), construct the facility, and have it licensed by the Nuclear Regulatory Commission (NRC). The DOE also would need to develop a truck and rail infrastructure capable of transporting the spent fuel from reactor sites to the storage facility.

It is possible that this process could be expedited, for example, if an existing DOE defense site with an extensive database of site characteristics were selected as the site for a storage facility. The process also might be expedited if the NEPA process were altered, for example, to eliminate consideration of alternative sites. However, the Board notes that a significant short-circuiting of existing laws and regulations could have negative repercussions among stakeholders.

Balancing the desire to expedite this process to meet the desires of utilities to remove spent fuel from reactor sites, with the need to assure the public that safety will be maintained, is a delicate process.

3. *As you know, some in the Senate have been trying to revive reprocessing as an option for dealing with the waste issue by calling for spent fuel to be shipped over to Great Britain or France to be reprocessed.*

a. What are the risks involved in shipping nuclear fuel across the Atlantic for reprocessing in Great Britain and France?

Ans. The United States first began shipping highly enriched uranium fuel to foreign research reactors under the auspices of the "Atoms for Peace" program in the 1950s. We also have accepted return shipments of the spent fuel. Except for shipments from Canada, all of the spent fuel has been transported by sea — in casks. The historical safety record of these and other international ship transports of high-level waste has been good. The Board believes that with full compliance with transportation regulatory requirements and with proper care, the risks associated with the marine transport of spent fuel should be reasonably low.

b. How do these risks compare with the risks of rail or truck transport of waste to a geologic repository?

Ans. Truck and rail transport of spent fuel in the United States also has a long history. The safety record has been good, and quantitative risk analyses have corroborated low risk estimates. Although risks are low, there are some differences in the nature of the hazard in ocean transport, the principal risk being that of a ship sinking. If a ship were to sink in a coastal area, it is likely that its cargo of spent fuel casks could be recovered. If the ships were to sink in the deep ocean, the casks could only be recovered at great expense and with great difficulty.

4. *How would we ultimately dispose of the reprocessed fuel and any wastes produced as a result of reprocessing? What would be the costs of reviving the reprocessing option compared to deep geologic disposal?*

Ans. Reprocessing is not a substitute for geologic disposal. Much reprocessing waste is high-level waste, which ultimately will require deep geologic disposal. Reprocessing may delay by a decade or two the need to dispose of the reprocessing wastes, but it does not postpone the need to permanently dispose of the high-level waste. Reprocessing may result in the need for a slightly smaller repository, but it is unclear whether this is of significance. In the end, the high cost of reprocessing would be in addition to, rather than in place of, expenditures for deep geologic disposal.

5. *According to published reports, NRC chairman Ivan Selin has testified that it would cost the U.S. $82 billion to build and operate its own commercial reprocessing facilities and that the tab for sending the more than 22,000 metric tons of spent fuel piling up at U.S. reactors over to England or France for reprocessing would be about $62 billion.*

a. Are these estimates consistent with your cost estimates?

Ans. To date, the Board's activities have centered on evaluating the technical activities associated with the current national program on high-level radioactive waste management, which includes those activities related to the transportation, storage, and permanent disposal of high-level waste in a deep geologic repository. We have not estimated the costs associated with any other waste management alternative, such as reprocessing.

h. *Isn't it true that the utility industry has shown little recent interest in reprocessing, due to its great cost?*

Ans. Yes, reprocessing in this country has been uneconomical for more than a decade.

6. *The 1992 Waste Policy Act directs the EPA to issue radiation release standards for a repository. However, HR 1020 states that the EPA "shall not promulgate...standards for protection of the public from releases of radioactive materials or radioactivity from the repository" Do you think it advisable to bar the expert regulatory agency in this are a from fillfilling its function as a defender of public health and the environment?*

Ans. The Energy Policy Act of 1992 specifies the current method of establishing a safety standard, and directs the National Academy of Sciences (NAS) to evaluate the technical bases for a Yucca Mountain standard. The Act also directs the Environmental Protection Agency (EPA) and the NRC to modify their regulations in accordance with the NAS recommendations. In the Board's judgment, the Congress might consider permitting the NAS to complete its evaluation of the technical bases for a Yucca Mountain standard before revisiting the EPA's role in establishing radiation standards for a repository.

7. *In his prepared testimony Dr. Makhijani criticizes the current radioactive waste categorization for sometimes labeling as "low-level," radioactive wastes that are actually several times more radioactive than other streams of waste. He notes that this has resulted in long-lived plutonium-239 being stored in a now closed low-level waste facility in Maxey Flats, Kentucky, where it leaked out into the environment and forced an expensive clean up effort. Should we follow his advice and move to a system similar to that in use in Sweden, in which disposal methods are determined by the longevity of the waste?*

Ans. There are a number of different, but equally good, ways to classify low-level radioactive wastes. The system used in this country for identifying Class A, B, and C low-level wastes is based on a combination of factors, including radionuclide longevity, radionuclide concentration, and radiotoxicity. Limiting waste classification only to radionuclide longevity does not account for concentration and toxicity, both very important parameters.

8. *In his prepared testimony, Dr. Makhijani suggests that if we were to adopt the Swedish approach, we'd have approximately 225,000 cubic meters of waste that would have to go to the high-level repository, and that this would force the size of the repository to be increased by an additional 140 to 1,200 acres in addition to the 2,400 acres already needed for spent fuel and reprocessing wastes. Do you agree, and if so, what would this mean for Yucca Mountain's suitability as a repository?*

Ans. Since underground exploration at the Yucca Mountain site has not entered the proposed repository area, it is very difficult, at this time, to accurately estimate the overall capacity of the Yucca Mountain site. The physical size of the repository required for the disposal of spent fuel and high-level waste will depend on the amount of space required to dissipate the heat generated by those wastes that go into it (i.e., the thermal load) — not the physical volume of the wastes. This is not the case for low-level wastes, which generate essentially no heat. For any repository used for low-level waste disposal, the repository size would only need to correspond to the volume of the low-level waste.

9. *H.R. 1020 establishes a radiation release standard of up to one third of the natural background radiation to an average member of the surrounding population. This exposure level is equivalent to 100 millirems and correlates to one cancer death in every 285 exposed individuals. In contrast, EPA regulations employ a stronger standard, limiting total body radiation exposures to 25 millirems. What are the public health and safety consequences of abandoning the EPA standard for the weaker standard proposed in the bill?*

The acceptability of any particular level of risk is a public policy judgment that is beyond this Board's purview. According to currently accepted theories of cancer risk from radiation exposure, an exposure to 100 millirem per year for a full 70-year human lifetime would increase the average cancer risk by about one chance in 285, as indicated in the question. Of course, if the standard were 25 millirem per year, rather than 100 millirem per year, the statistically predicted frequency of cancer incidence due to radiation exposure would be lower by a factor of four. The public health consequences of either standard when applied to Yucca Mountain would be difficult to document due to the currently sparse population in the Yucca Mountain area.