



## Department of Energy

Washington, DC 20585

January 30, 2013

RECEIVED FEB - 4 2013

Doctor Rodney C. Ewing  
Chairman  
United States Nuclear Waste  
Technical Review Board  
2300 Clarendon Boulevard, Suite 1300  
Arlington, Virginia 22201-3367

Dear Dr. Ewing:

Thank you for your December 11, 2012, letter providing the Nuclear Waste Technical Review Board (Board) observations and suggestions on information presented by the U.S. Department of Energy (DOE) at the Board's meeting on October 16-17, 2012. Our responses to your comments are enclosed.

Your comments on our presentations provide useful insights and we look forward to future interactions with the Board. If you require further clarification regarding any of these issues, please contact me or Jeff Williams, at (202)586-9620.

Sincerely,

A handwritten signature in cursive script that reads "Peter Lyons".

Peter B. Lyons,  
Assistant Secretary  
for Nuclear Energy

Enclosure



## **Transportation, Storage and Disposal System Analyses**

### **Board Observation and Comment**

The Board observed that several comments from the public at the meeting indicated that the transportation of spent nuclear fuel (hereinafter referred to as used nuclear fuel) and high-level radioactive waste (HLW) remains a major concern. The Board noted that DOE needs to remain sensitive to this concern and address it in a candid and transparent manner.

In response to Dr. Mark Nutt's presentation regarding the development of an integrated system architecture for managing commercial used nuclear fuel from acceptance at reactor sites to disposal in a geologic repository, the Board stated that such an architecture should recognize the realities of the current situation in which the disposition pathway for the widely used dual-purpose canisters is highly uncertain and that interest in standardized canisters is growing. In the Board's view, the modeling results presented appear to be rudimentary accounting calculations that as yet do not yield particularly deep insights. Uncertainties in material flows do not seem to be represented. In addition, potential upsets in the flows are not incorporated into the modeling. The possibility of developing multiple sites, either for consolidated storage facilities or for the final repository, also is excluded from the architecture. The Board expects that these issues will be addressed as the system analyses mature.

### **DOE Response:**

DOE is aware of the public concern regarding the transportation of used nuclear fuel and HLW, and plans to actively engage with its stakeholders to address this concern in a candid and transparent manner.

DOE agrees that the architecture should recognize that the potential disposition pathway for dual purpose canisters is uncertain and that there is some interest in standardized canisters. DOE intends to address the issues identified by the Board with the existing modeling and results will be addressed as system analyses mature.

DOE also appreciates the Board's input and suggestions regarding the development of logistics tools for simulating an integrated system architecture for managing commercial used nuclear fuel. As indicated in Dr. Mark Nutt's presentation, DOE is utilizing logistic simulation tools that have been used in previous used nuclear fuel management analyses conducted by DOE. These tools continue to be modified and enhanced, in order to reflect the current used nuclear management situation and to evaluate a wide range of potential disposition strategies. Many factors, including the ability to model multiple consolidated storage facilities and repositories, are being considered as the tools and modeling approaches evolve.

### **Board Observation and Comment**

In response to Mr. Jeffrey Williams' presentation on the logistical and operational issues associated with the transport of stranded fuel from shutdown reactor sites, the Board noted that

there would be challenges to transporting used nuclear fuel from the shutdown reactor sites. In addition, the Board noted that used nuclear fuel was largely held in storage-only casks and that there was some question about whether even the used nuclear fuel currently stored in dual-purpose casks will need to be repackaged prior to shipment. The Board urged DOE to put a high priority on developing a comprehensive plan for ensuring that cask licenses and yet-to-be fabricated casks will be available to support DOE's transportation requirements and schedule.

**DOE Response:**

DOE has begun a preliminary evaluation of removing used nuclear fuel from the shutdown sites and has identified many of the same challenges noted by the Board. At the nine shutdown reactor sites discussed in Mr. Williams' presentation (Maine Yankee, Yankee Rowe, Connecticut Yankee, Humboldt Bay, Big Rock Point, Rancho Seco, Trojan, La Crosse, and Zion), all used nuclear fuel is held (or will be held in the case of Zion) in canisters that are transportable and therefore would not need repackaging. There is no used nuclear fuel held in storage-only casks at these sites. The only exception to this may be six damaged fuel assemblies stored in 5 fuel canisters at the Rancho Seco site. These six fuel assemblies are stored in fuel-with-control-component-dry-shielded-canisters (FC-DSCs), not in failed fuel dry shielded canisters. Historically, the certificates of compliance for transportation casks have been updated periodically by the cask vendors and the DOE does not anticipate a problem in this area. For example, the NAC-UMS certificate of compliance was renewed by NAC in October 2012. However, DOE acknowledges that availability of transportation casks is likely to be a critical path item in any effort to remove used nuclear fuel from shutdown reactor sites. This is reflected in the recently completed draft report "Preliminary Evaluation of Removing Used Nuclear Fuel from Nine Shutdown Sites."

**Board Observation and Comment**

The Board expressed concern regarding an issue associated with system integration. The Board believes that many of the dry storage system designs presently in use contain material that may not meet the current criticality-control requirements for disposal and that this situation raises the possibility that these storage systems may have to be opened and the fuel assemblies transferred into containers that conform to criticality-control regulations for disposal. The Board recommends that DOE evaluate the disposal criticality control of the dry storage systems presently being loaded.

**DOE Response:**

DOE agrees with the Board's recommendation on evaluating disposal criticality for existing dry storage systems and has work ongoing on such an evaluation. DOE initiated work in Fiscal Year 2012 on evaluating any potential issues related to disposal of the existing storage systems, including handling and thermal output.

**Evaluations of Canister and Waste-Package Temperatures****Board Observation and Comment**

The Board observed that both the presentation by Mr. Harold Adkins on an analysis of the thermal evolution of waste packages placed into dry storage and the presentation by Dr. Ernie Hardin on disposal conditions in “open” generic geologic repositories, where the emplacement media was salt, clay, and granite, were technically refined and valuable. The Board also observed that together these presentations suggest there may be more flexibility in terms of waste-package size than had previously been presumed. The Board believes this work should be continued. In particular, the two research strands should be coupled to provide temperature predictions of used fuel cladding in a waste package that has been emplaced in a drift, which could be important data if, for example, a waste package had to be retrieved.

**DOE Response:**

Analyses show that a range of waste package sizes (up to 32-PWR size) can be disposed of depending on the geologic medium and fuel characteristics. The numerical tools presently exist to couple heat transfer processes outside the waste package to those within to provide temperature predictions of used fuel cladding in a waste package that has been emplaced in a drift. DOE is planning to continue research to provide thermal predictions of used fuel cladding in a waste package that has been emplaced in a drift and to understand thermal evolutions.

**The Importance of DOE Fully Engaging Stakeholders and Being Clear and Transparent****Board Observation and Comment**

In place of the top-down models of communication that were common in the past, the Board believes that future efforts to communicate with stakeholders would benefit from an iterative, collaborative model that fully engages and involves stakeholders from start to finish. Having broad, meaningful stakeholder input throughout the process ensures that informational materials and communication products are informed by, and responsive to, the concerns and information needs of the public. In developing a plan to engage stakeholders early on, the Board urges DOE to draw upon the extensive body of literature on risk communication as well as important exemplars from successful health and environmental risk communication programs. By doing so, DOE would be able to ensure that its efforts are consistent with a consent-based approach, clear and transparent, and have a sound technical basis.

**DOE Response:**

DOE agrees with the Board’s recommendation to engage and involve stakeholders from start to finish in an iterative and collaborative manner. In July 2012, the Office of Nuclear Energy (NE) established cooperative agreements with the State Regional Groups to collaborate with NE on issues associated with the transportation of used nuclear fuel, such as the implementation of Section 180(c) of the Nuclear Waste Policy Act, as amended, determination of preliminary routes from the shutdown sites, and development of a draft National Transportation Plan. Subtasks to support these efforts include compiling a full text bibliography of existing risk perception studies, developing an approach for a baseline risk perception study on trust, communication mechanisms, and working with the National Transportation Stakeholders

Forum's Communications Working Group to identify preferred and effective methods for discussion of highly technical and controversial topics. We anticipate involving stakeholders in drafting future communication products.