



**UNITED STATES  
NUCLEAR WASTE TECHNICAL REVIEW BOARD**

2300 Clarendon Boulevard, Suite 1300  
Arlington, VA 22201-3367

October 10, 2014

Dr. Peter B. Lyons  
Assistant Secretary for Nuclear Energy  
U.S. Department of Energy  
1000 Independence Avenue, SW  
Washington, DC 20585

Dear Dr. Lyons:

On August 6, 2014, the U.S. Nuclear Waste Technical Review Board held a public meeting in Idaho Falls, Idaho. The principal focus of the meeting was the management and ultimate disposition of the spent nuclear fuel (SNF) and high-level radioactive wastes (HLW) that are the responsibility of the U.S. Department of Energy (DOE) Office of Nuclear Energy (DOE-NE) and Office of Environmental Management (DOE-EM). The Board also toured a number of Idaho National Laboratory facilities on August 5, 2014.

The Board thanks the DOE employees who prepared material for the two DOE-NE presentations at the public meeting and the representatives of the DOE Idaho Operations Office and its contractors who led an excellent tour of the facilities. The DOE and contractor representatives provided very informative descriptions of the facilities and activities on site and gave in-depth answers to many detailed questions asked by Board members and staff.

As the Board nears completion of its report on management and disposal of DOE SNF, the information gathered at the meeting and the facilities tour will be of great value. The Board's report will review DOE SNF and SNF storage facilities at Hanford, Idaho National Laboratory, Savannah River Site, and Fort St. Vrain, and will identify technical issues that the Board believes that DOE will need to address as DOE continues to store SNF and plan for the disposal of DOE SNF.

The purpose of this letter is to provide observations and recommendations based on the Board's analysis of material presented at the meeting. These observations and recommendations are organized into two sections: (1) issues that cut across DOE-NE and DOE-EM responsibilities and (2) issues that the Board identified from presentations made by the DOE Office of Nuclear Energy.

## Cross-cutting Issues

The Board recognizes that DOE-NE and DOE-EM have different responsibilities; however, both offices manage SNF and HLW that will need to be disposed of in a geologic repository. Consequently, the issues of integration, transportation, and knowledge management and retention apply to both DOE-NE and DOE-EM and affect the ability of DOE to dispose of DOE SNF and HLW.

### Integration

The closure of the Office of Civilian Radioactive Waste Management (OCRWM) and the subsequent suspension of most of the activities of the National Spent Nuclear Fuel Program have led to a lack of integration of activities related to SNF and HLW management. OCRWM had many responsibilities and functions (for example, transportation and disposal studies) that served to integrate both the defense and commercial SNF and HLW programs. However, it appears that some of OCRWM's responsibilities have not been explicitly reassigned within the management structure of DOE. For example, no DOE organization is explicitly responsible for research and development related to long-term disposition of DOE SNF and HLW. As compared with commercial SNF, DOE SNF is more damaged, includes many more types of fuel and cladding, and contains highly enriched uranium, all of which are important considerations when designing and implementing an integrated SNF management and disposal program. Also, DOE will need to dispose of three other solid HLW forms in addition to the vitrified HLW that has been created from commercially generated SNF and is being produced at the Defense Waste Processing Facility at the Savannah River Site. As an example, the calcined HLW at Idaho National Laboratory will be processed for geologic disposal. *The Board recommends that DOE review OCRWM's past responsibilities and functions and explicitly assign the responsibilities, that have not been already been reassigned, to specific DOE organizations to facilitate the management and disposal of DOE SNF and HLW.*

The National Spent Nuclear Fuel Program previously enabled interactions among the technical staff responsible for managing SNF at the DOE sites. The program also addressed SNF management issues that cut across the whole DOE complex. For example, until 2011 the National Spent Nuclear Fuel Program maintained the Spent Fuel Database that served as the single source of data for DOE SNF. *The Board recommends that DOE revitalize the National Spent Nuclear Fuel Program to integrate approaches at the staff-level, in order to address issues affecting the DOE SNF program, and update and maintain the Spent Fuel Database.*

Mr. Gary DeLeon, Director of the Office of Nuclear Materials Disposition (DOE-EM), provided an overview of the current and future inventory of SNF stored or planned to be stored by DOE at the Idaho National Laboratory and at other DOE sites. He noted that in order to address the challenges of managing the wide range of DOE fuel types and facilities, DOE-EM will charter a new Spent Nuclear Fuel Corporate Board. This organization will include representatives from DOE-EM, DOE-NE, DOE's Office of Science, and the National Nuclear Security Administration. Mr. DeLeon noted that one purpose of the SNF Corporate Board will be to better utilize the resources and technical capabilities for SNF management across the DOE. The Board notes that a "Corporate Board" usually establishes policy and makes budget decisions

in order to implement policy. Both Mr. DeLeon's description of the SNF Corporate Board and the charters of other DOE Corporate Boards (for example, the High-Level Waste Corporate Board and the Tank Waste Corporate Board) suggest that the responsibility of the DOE Spent Nuclear Fuel Corporate Board will focus on coordination and cooperation on SNF management and disposition activities, and will only make recommendations to the Assistant Secretary for Environmental Management. The Board looks forward to learning more about the Corporate Board, its functions and authorities, its members, the issues it will address, and what role the Corporate Board will play in addressing the integration of SNF and HLW management and disposal activities across the DOE.

### Transportation

A number of DOE-EM presentations addressed transportation of DOE SNF and HLW to a geologic repository. However, the issue of SNF and HLW transportation is a good example of how the closure of OCRWM has led to a loss of the crucial linkage between the different waste types and transportation strategies. Prior to its closure, OCRWM was responsible for designing, obtaining U.S. Nuclear Regulatory Commission (NRC) certification for, and fabrication of the transportation cask system for DOE-EM SNF and HLW. OCRWM was also responsible for the transport of DOE-EM and commercial SNF and DOE-EM and commercial vitrified HLW to a repository. Now there appears to be no clear, central coordination of transportation issues related to commercial and DOE SNF and HLW, and several presenters noted that no organization is currently charged with the responsibility of transporting DOE SNF and HLW. *The Board recommends that DOE explicitly assign responsibility for the coordination of all transportation activities for SNF and HLW.*

### Knowledge Management and Retention

In an August 2013 Board report, *Review of U.S. Department of Energy Activities to Preserve Records Created by the Yucca Mountain Project*, the Board provided observations and recommendations on one part of DOE's knowledge management activities. As part of its review, the Board conducted spot checks to assess the preservation and retrievability of OCRWM's records of the Yucca Mountain Project. The report focused on records created by OCRWM in support of the Yucca Mountain project, but did not explicitly address records created by the DOE field offices responsible for the management of SNF and HLW. Under the Yucca Mountain program, these field offices would have eventually supplied the SNF and HLW *and records associated with the waste* (for example, information on the radionuclide contents and details on packaging) to OCRWM. However, several of the DOE-EM presentations at the meeting required retrieval of information on past DOE operations and, according to the DOE-EM presenters, this proved to be difficult. *The Board recommends that DOE assess the level of record preservation and retrieval capability of DOE field office site organizations and ensure that all records related to the past management of SNF and HLW are preserved and retrievable in order to support future waste management activities.*

Based on presentations at the meeting, it appears likely that portions of DOE's knowledge base related to past SNF handling operations and other management activities have been lost in recent years. For example, in trying to respond to a Board question on the dry cask

storage characterization program conducted at Idaho National Laboratory during the late 1990s, no DOE employee or DOE contractor present was able to provide the details of the program. However, a member of the audience, who is no longer affiliated with DOE or its contractors, provided details on the dry cask storage characterization program during a public comment session at the meeting. Many of the key personnel who were involved in the Yucca Mountain Project and in the National Spent Nuclear Fuel Program have retired or left DOE, and very few are still available to pass on their knowledge and experience to others. This knowledge will be invaluable when determining requirements for SNF and HLW packaging, transportation, and disposal. As time passes and experienced personnel retire, there is a high likelihood that this very valuable and necessary information will be lost. *The Board recommends that DOE take early action to capture this critical knowledge so that it can be used to support later DOE efforts related to handling of the wastes, certification of transportation and storage packages, and interim storage and final disposal.*

## **DOE Office of Nuclear Energy**

### 1995 Settlement Agreement

Mr. Lance Lacroix, DOE Idaho Operations Office, gave a presentation on the management of NE-owned SNF and HLW at the Idaho National Laboratory. Mr. Lacroix described the management of Advanced Test Reactor SNF and sodium-bonded SNF, including the Experimental Breeder Reactor-II SNF and the HLW forms from electrochemical processing of sodium-bonded SNF. Many of DOE's activities related to SNF and HLW at the Idaho National Laboratory are driven by the commitments and milestones documented in the 1995 Settlement Agreement between DOE, the U.S. Navy, and the State of Idaho. For example, the Settlement Agreement requires DOE to complete the transfer of all the DOE SNF from wet storage facilities to dry storage by December 31, 2023. Mr. Lacroix noted that DOE-NE SNF is presently in wet storage facilities, and he described the different challenges DOE faces, for each SNF type, in order to meet the 2023 deadline. The Board recognizes the national importance of the Advanced Test Reactor to nuclear research and to the production of cobalt-60 for medical applications and understands DOE's plans to continue operations beyond 2023. The Board is encouraged that DOE is assessing options for disposition of Advanced Test Reactor SNF. *The Board recommends that DOE assess the implications of the future generation and storage of SNF from the Advanced Test Reactor beyond 2023 on DOE's proposed packaging facility.*

The 1995 Settlement Agreement requires DOE to remove all SNF from the State of Idaho by January 1, 2035, with some exceptions for SNF being maintained for purposes of testing. A 2008 addendum to the 1995 Settlement Agreement, related only to the receipt and storage of naval SNF at Idaho National Laboratory, provided additional exceptions to the 2023 and 2035 SNF deadlines. The Board notes that DOE-NE will need to complete processing of all its sodium-bonded SNF by 2035. The 1995 Settlement Agreement also requires HLW that existed at the time of the agreement to be treated so that it is ready to be transported out of Idaho for disposal by 2035.

Because the requirements and schedules for a consolidated interim storage facility or geologic repository for SNF are not known, it was noted by DOE personnel that plans and

designs for a facility to package DOE SNF for offsite transportation, storage, and disposal cannot be finalized. Previously, DOE had considered the Idaho Spent Fuel Facility, which is licensed by the NRC but has not been constructed, as the potential packaging facility. That facility would have relied on the waste acceptance system requirements for Yucca Mountain, which included the DOE standard canister as the basis for the packaging of DOE SNF. *Regarding the plans for the management of SNF at Idaho, the Board recommends that DOE review and update the scope of the proposed packaging facility, taking into account the possibility that some SNF could be stored at the site beyond 2035, and examine how this extended period of storage could impact the capabilities needed and the timing for packaging the SNF.*

#### Research and Development in Support of Extended Dry Storage of SNF

Dr. William Boyle, Director of the Office of Used Nuclear Fuel Disposition Research and Development, presented information regarding DOE's research and development efforts related to high burnup SNF and briefly discussed other DOE-NE work on "accident tolerant" fuels. *The Board recommends that in addition to evaluating the performance in the reactor of the new "accident tolerant" fuels, DOE should also evaluate how these fuel types will perform during extended dry storage and subsequent transportation and disposal.*

The Board commends DOE for its research and development efforts related to high burnup SNF, particularly given the limited funding and resources available to support it. However, given the importance of this work, the Board remains concerned that more work is not being undertaken in this and related areas, in line with the comments recorded in the Board's letter to you dated June 5, 2014. *In this respect, the Board encourages DOE to become more active in international efforts to develop a better understanding of the changes in fuel and cladding characteristics during extended periods of dry storage so that it can benefit from shared results of other research and development programs.*

DOE conducted a dry cask storage characterization program at Idaho National Laboratory during the late 1990s and DOE continues to store the commercial SNF in the casks used in that study. *As DOE reviews and updates the scope of the proposed packaging facility, the Board recommends that DOE consider the infrastructure that may be needed to support DOE's research and development efforts related to high burnup SNF and to the periodic examination of the commercial SNF that is currently in dry storage at Idaho National Laboratory.*

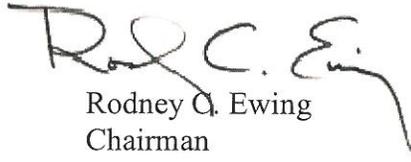
#### Poster Session

The Board appreciates the Idaho National Laboratory staff support of the poster session that followed the public meeting. The session was a valuable opportunity for interaction between the public and technical staff. The Board especially appreciates the considerable effort made by Mr. Mike Patterson in organizing and participating in the poster session on the Materials & Fuels Complex programs.

The Board will follow with interest DOE-NE efforts to manage and ultimately dispose of its SNF and HLW and its research and development efforts in support of extended dry storage of

SNF. We look forward to continuing our ongoing review of the technical and scientific validity of DOE's activities in these important areas.

Sincerely,



Rodney C. Ewing  
Chairman

cc: Mr. Mark Whitney  
Mr. Richard Provencher