UNITED STATES
NUCLEAR WASTE TECHNICAL REVIEW BOARD
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Repository Performance Monitoring and Retrievability of Emplaced High-Level Radioactive Waste and Spent Nuclear Fuel Is Subject of U.S. NWTRB Report

On June 18, 2018, the U.S. Nuclear Waste Technical Review Board posted on its website (www.nwtrb.gov) a report to the U.S. Congress and the Secretary of Energy, entitled *Geologic Repositories: Monitoring and Retrievability of Emplaced High-Level Radioactive Waste and Spent Nuclear Fuel*. The report is based on presentations and discussions at the Board's March 27, 2018, meeting on that topic held in Washington, D.C. The report records the views of experts from several countries who made presentations at the meeting on challenges intrinsic to both monitoring and waste retrieval. It also includes Board observations based on the meeting discussions.

Worldwide, there is strong consensus on the value of a stepwise approach to implementing a geologic repository program where the implementer and regulator periodically reassess whether the proposed disposal concept and repository design will meet health, safety, and environmental requirements. Two actions are integral to the success of such an approach: first, monitoring of the repository and, second, retaining the option to retrieve the emplaced waste, if necessary.

In the United States, the Nuclear Regulatory Commission has promulgated requirements related to high-level radioactive waste (HLW) and spent nuclear fuel (SNF) retrievability, as well as the requirement for "performance confirmation" monitoring during an appropriate period of operation of the repository to confirm that subsurface conditions are within licensing limits and that natural and engineered barriers are functioning as intended.

At the Board meeting, the presenters were asked to address three questions:

1. What are the requirements for undertaking operational and performance confirmation monitoring and retrievability?
2. What are the potential technical and institutional challenges involved in carrying out those activities?
3. What lessons can be learned from international programs that can be applied to the U.S. geologic repository program?

Based on presentations and discussions at the meeting, the Board makes the following observations in the report:

- Retrievability is an important consideration in the initial repository design, adding only a small increment to the cost of repository development but offering substantial cost reduction, if retrieval is determined to be necessary.
- Monitoring to assess operations and to support decisions related to repository operations or waste retrieval is also an integral part of repository development.
- It is essential that the monitoring objectives and limitations are understood, the indicators that will signal the need for a modified path or retrieval are transparent, and the collected data are broadly accessible to enhance public trust and for use in performance confirmation modeling by the implementer and other stakeholders.
- Underground research laboratories and repository pilot facilities improve the technical basis and confidence in the future success of monitoring technologies and potential retrieval and can serve as demonstration sites to build public acceptance.
- Long-term research, development, and demonstration of monitoring and sensor technologies are needed to address current technology limitations.
- A stepwise approach to repository program implementation and decision-making is important because it provides opportunities to reassess decisions and modify future plans.
- Measures are needed to facilitate knowledge transfer to future generations so that expertise is available to access and interpret monitoring data.

The Board was established in the Nuclear Waste Policy Amendments Act of 1987 to perform ongoing evaluation of the technical and scientific validity of DOE activities related to the management and disposal of SNF and HLW. The Board is required to report its findings, conclusions, and recommendations to Congress and the Secretary of Energy. Board members are appointed by the President from a list of nominees submitted by the National Academy of Sciences. The Board is an independent federal agency in the Executive Branch.

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