



UNITED STATES
NUCLEAR WASTE TECHNICAL REVIEW BOARD
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January 27, 2020
For Immediate Release

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External Affairs

The Critical Role of Underground Research Laboratories in the U.S. Department of Energy Geologic Disposal Research and Development Program Is Subject of U.S. NWTRB Report

On January 27, 2020, the U.S. Nuclear Waste Technical Review Board released a report to the U.S. Congress and the Secretary of Energy, titled *Filling the Gaps: The Critical Role of Underground Research Laboratories in the U.S. Department of Energy Geologic Disposal Research and Development Program*. The report is a product of the Board's review of the Department of Energy's (DOE) underground research laboratory (URL)-related research and development (R&D) activities and their relationship to a spent nuclear fuel (SNF) and high-level radioactive waste (HLW) disposal program. The report may be downloaded from the Board's website at www.nwtrb.gov.

Although DOE is not conducting site-specific SNF and HLW disposal research, it is conducting generic R&D activities on geologic disposal in alternative host rocks (crystalline, clay, and salt) and repository environments that are very different from that for a Yucca Mountain repository. Siting, developing, and operating a geologic repository for HLW and SNF is a multi-generational grand environmental challenge and URLs are critical to successful repository programs. Repository programs in other countries use succinct safety cases describing the hazards and risks together with prescribed safety functions for each engineered and natural barrier against those hazards and risks as their technical foundation. These countries use URLs to test and strengthen the technical bases underlying their safety cases, to demonstrate and build confidence in their operational capabilities, and to help guide their R&D program. Since 2012, DOE's collaborative research in URLs located in Europe and Asia has provided DOE-funded researchers access to data and to decades of experience gained in different disposal environments in a cost-effective manner and has advanced DOE's SNF and HLW disposal R&D program. Until 2018, DOE's URL-based R&D activities focused on the disposal concepts of the URL host countries. Those concepts do not include a disposal alternative that could apply to some or much of the U.S.

inventory of commercial SNF, i.e., the direct disposal of SNF in large dual-purpose canisters that would have a higher thermal load than smaller canisters.

The report presents findings and recommendations in areas related to (i) international URL R&D activities, (ii) using URL R&D results to develop and update repository safety cases, (iii) pursuing one or more domestic URLs to advance the development and demonstration of disposal concepts and provide a platform for training the next generation of U.S. scientists, engineers, and skilled technical workers, and (iv) advancing DOE's thermal-hydrological-mechanical-chemical-based research and model development and pursuing more studies, particularly at elevated temperatures.

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.
