

# **Observations on the United States Research and Development Program for Deep Geologic Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste**

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Worldwide, every nation that has a significant inventory of spent nuclear fuel and high-level radioactive waste has come to the conclusion that deep geologic disposal is the scientifically preferred option for isolating wastes from the human environment. The United States (US) is no exception: the US Department of Energy has conducted research and development since 2010 on generic disposal concepts in multiple lithologies, including salt, crystalline rock, and argillaceous rock. These investigations have benefited greatly from experience gained in other programs. For example, Finland is moving forward with construction of a repository in Precambrian gneiss, Sweden is seeking authorization for a repository in granite, France is conducting research in argillite, Canada is considering both granitic and sedimentary rocks, Germany has extensively investigated disposal options in salt, and the US has disposed of intermediate-level transuranic waste in salt at the Waste Isolation Pilot Plant in New Mexico.

Detailed assessments of the long-term performance of different disposal concepts indicate the primary factors contributing to robust isolation differ depending on site-specific geology and the engineered barrier system (including waste packaging) designed for the site-specific subsurface environment. Overall, decades of research and development in the U.S. and other nations support a conclusion that robust isolation is achievable for various repository concepts in many host lithologies by relying on diverse combinations of natural and engineered barriers.

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