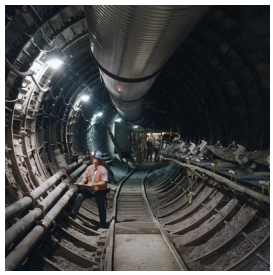
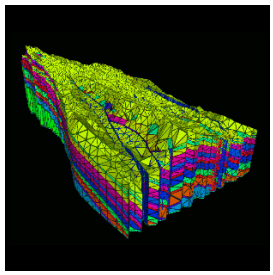





We are applying our unique scientific and engineering capabilities to ensure the safety of the nation's first high-level nuclear waste repository.

Yucca Mountain

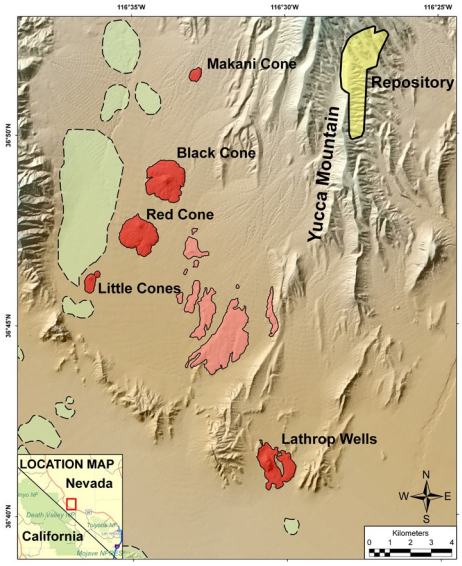
Yucca Mountain in Nevada is a dry, brown, and seemingly uninteresting ridge, but scientists from Los Alamos National Laboratory and other institutions have studied it intensely for nearly 3 decades because it is a potential site for disposal of high-level radioactive waste. It was chosen largely because its water table is among the deepest in the world, which allows construction of a repository that is deep underground yet well above the flow of groundwater. With the thousands of tons of radioactive waste accumulating from nuclear power plants, the naval fleet, and dismantled nuclear weapons, the nation needs a storage site that will safely contain highly radioactive fission products for eons. And with energy demand projected to rise and global climate change calling fossil fuel use into question, the need for carbon neutral energy sources, like nuclear power, will heighten the urgency for well-engineered repositories like Yucca Mountain.

For 25 years, Los Alamos has made important contributions to the Yucca Mountain project, starting with site selection and characterization continuing through to the recent preparation of the 8,600-page license application. Los Alamos scientists have characterized the mountain's subsurface geology, mineralogy, hydrology, and geochemistry to ensure that the natural geologic system can impede the movement of radionuclides should they ever be released from the engineered repository. Reliable risk assessment requires a vast amount of scientific data about the site—for example, its groundwater chemistry, the sorption characteristics of site minerals, and potential groundwater flow paths—as well as about the radionuclides that will be stored there. Los Alamos scientists have conducted countless laboratory and field tests over the years to amass these data, which have been combined to assess the performance of the complex physical and chemical system over many millennia. Because no experiment can come close to determining radionuclide migration over such a long period of time, Los Alamos has developed computer models that can look 10,000 years into the future to simulate the potential migration. The Los Alamos Finite Element Heat and Mass (FEHM) computer code is used by the project to predict water flow and the migration of radionuclides through the entire natural system.

Yucca Mountain, Nevada

A Los Alamos scientist examines the migration of dye-laced water injected into unsaturated rock. These studies confirmed the conceptual model for water movement through the unsaturated tuffs of Yucca Mountain.

Los Alamos researchers have also led efforts to analyze the probability and consequences of volcanic activity at the Yucca Mountain repository site. The possibility of

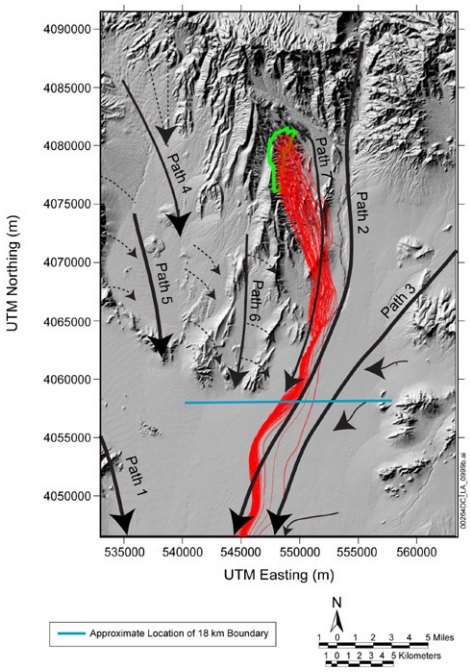


Assessment of ages of buried volcanoes in the vicinity of Yucca Mountain, developed for the purpose of estimating the probability of future disruptions of the repository due to igneous activity.

such activity must be considered because a dozen small volcanoes lie within 20 kilometers of the mountain. Six of the volcanoes have erupted within the last 1 million years. The pioneering research conducted to assess the probability of a volcanic eruption at Yucca Mountain is critical to predicting the risk posed by the repository.

In addition, the Los Alamos-led Test Coordination Office assisted project scientists for 20 years by coordinating all surface-based and underground tests to ensure that quality assurance, environmental safety and health, and potential impacts to the integrity of a future repository were systematically addressed.

On June 3, 2008, the Department of Energy submitted a license application to the Nuclear Regulatory Commission (NRC) for consideration of Yucca Mountain as the nation's first high-level nuclear waste repository. The license application is the most significant milestone in the history of the Yucca Mountain Project and sets into motion a regulatory process during which the nation will make its final determination of whether to use geologic disposal at Yucca Mountain, and possibly other future sites, as the solution to its high-level nuclear waste issue. Los Alamos staff members were lead authors or co-authors of the following 5 sections of the application related to long-term performance: Climate and Infiltration, Waste Package and Drip Shield Corrosion, Radionuclide Transport in the Unsaturated Zone, Saturated Zone Flow and Transport, and Igneous Activity. These authors were supported by numerous scientists, engineers, technicians, and administrative and quality specialists at Los Alamos and other National Laboratories to produce documents that meet the exacting standards required for the submittal of a license application to the NRC. The approval of this license application may be crucial to the continued and expanded role of nuclear power as a sustainable energy source.



Los Alamos model of flow paths through the aquifer beneath Yucca Mountain, based on water level measurements, hydrogeologic characterization, geochemistry, and advanced groundwater modeling techniques.

Los Alamos scientists played a major role in preparing Yucca Mountain's 8,600-page license application.

Los Alamos National Laboratory is operated by Los Alamos National Security, LLC, a team composed of Bechtel National, the University of California, The Babcock & Wilcox Company, and Washington Division of URS for the Department of Energy's National Nuclear Security Administration.

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