# The Million-Year Promise

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In the grand scheme of the American west, Yucca Mountain appears to be little more than a geologic afterthought. Not even a unified "mountain," but an amalgamation of long, low, and bone-dry ridges, it lies unsung within a desolate region of southern Nye County, Nevada, sandwiched between Death Valley National Monument some 30 miles to the west and the Nevada Test Site a stone's throw to the east.

The mountain is far from an afterthought for the Department of Energy (DOE). In 1982, Congress, by way of the Nuclear Waste Policy Act, made DOE responsible for licensing, building, and operating an underground repository where the nation could bury its radioactive debris. Five years later, Congress charged DOE with assessing whether the repository could be built inside one of Yucca Mountain's parched ridges.

DOE's assessment had to describe how the repository would be built and operated but also address the issue of long-term risk. The waste—spent fuel from commercial and military nuclear reactors and the "hot" leftovers from decades of nuclear weapons work—would remain highly radioactive for more than a million years. Could DOE demonstrate a "reasonable expectation" that a person living near the mountain would receive only a negligible dose if the waste were to leak from the repository 100 or 100,000 years from now?

To answer that question meant gaining a fundamental understanding of how some radioactive atoms—radionuclides—might become mobile and enter the local environment. Yucca Mountain therefore became one of the most scientifically scrutinized pieces of real estate in the world, with DOE employing approximately 2,000 scientists over the years to map, measure, and model its every essence.

Los Alamos scientists were key players in the massive research effort and made major contributions toward understanding the mountain's geology, hydrology, and geochemistry and the region's volcanism. The Laboratory also led the Test Coordination Office (TCO), which coordinated all tests conducted at the site. Currently headed by Los Alamos' Doug Weaver, the TCO was crucial to ensuring that every experiment was vetted properly and that the data and their analysis met all criteria for scientific integrity.

After two decades and millions of hours of investigations, DOE was able to assess the viability of Yucca Mountain. The conclusion: Yes! The repository can be built and operated safely and will pose little risk to future generations.