



Gnome-Coach, New Mexico, Site A Nevada Offsite

This fact sheet provides information about the **Gnome-Coach site**. Long-Term stewardship responsibilities for this site are managed by the **U.S. Department of Energy Office of Legacy Management**.

Site Information and History

The Gnome-Coach site is approximately 25 miles southeast of Carlsbad in southern Eddy County, New Mexico. The site consists of two parcels of land covering approximately 680 acres.

The U.S. Atomic Energy Commission, a predecessor agency to the U.S. Department of Energy (DOE), acquired the site through a land withdrawal from the U.S. Bureau of Land Management (BLM) in the early 1960s for underground nuclear testing through the Plowshare Program. The Plowshare Program was a research and development initiative started in 1957 to determine the technical and economic feasibility for peaceful applications of nuclear energy. The Gnome-Coach site was the first location selected for underground nuclear testing under this program. The purposes of the underground nuclear test, identified as Project Gnome, were to: study the possibility of converting the energy from nuclear detonations into electricity, investigate the production and retrieval of radioisotopes, measure neutron activation cross sections of specific isotopes, collect data on the characteristics of nuclear explosions in salt formations, and collect data for use in future Plowshare programs.

The nuclear test was performed in the Salado Formation at a depth of 1,184 feet on December 10, 1961. The Salado Formation is a 2,500-foot-thick bed of halite that is virtually impermeable due to its plastic nature under pressure. The underground nuclear detonation produced extremely high temperatures that vaporized a volume of rock and

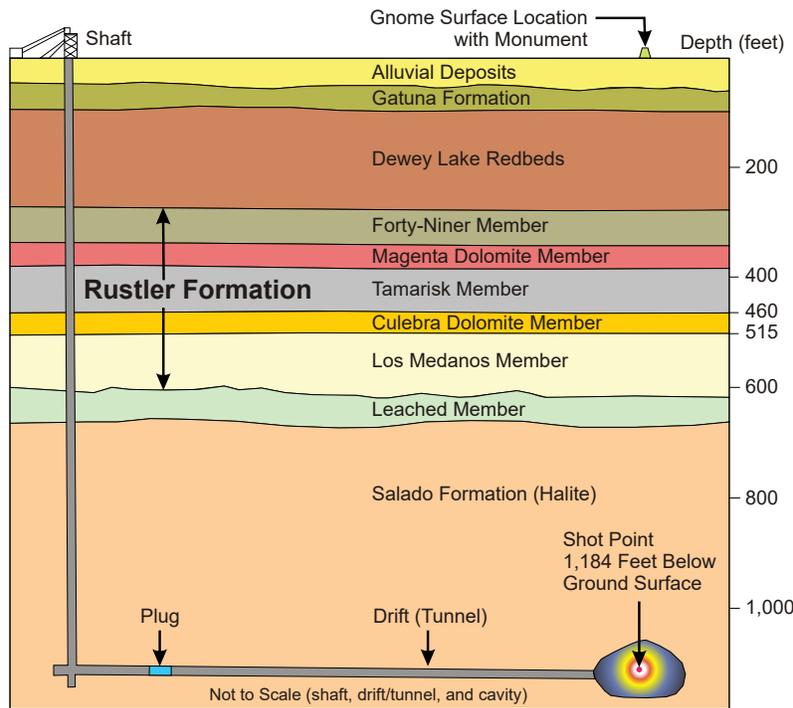
produced a cavity at the detonation depth. The cavity is well studied because scientist entered the cavity five months after the test in May 1962. A video showing the scientists in the cavity is available at <https://www.youtube.com/watch?v=Xh9eYitrLaM>.

Post-test drilling operations and preparations for another underground nuclear test, identified as Project Coach, began shortly after the Gnome test. The Coach experiment was initially scheduled for 1963 but was canceled and never executed. The site is still referred to as the Gnome-Coach site.

A groundwater tracer test was conducted in 1963 using four dissolved radionuclides — tritium, iodine-131, strontium-90, and cesium 137 — as tracers. These isotopes were injected into groundwater of the Culebra Dolomite Member of the Rustler Formation. The purpose of the tracer test was to estimate the dispersion coefficient and effective porosity of the Culebra for use in evaluating the potential movement of radionuclides.

Surface Conditions

Cleanup of the surface and shallow subsurface contamination resulting from the underground nuclear testing, post-test drilling, and groundwater tracer test took place in 1968 and 1969. A second major cleanup was conducted from 1977 to 1979. During these phases of cleanup, liquid waste was pumped into the detonation cavity through existing vent holes. Contaminated material was disposed in the emplacement shaft and Coach tunnel through existing drill holes. Uncontaminated equipment was moved off-site, and drill holes were plugged, except those retained for use as groundwater monitoring wells. The emplacement shaft was also reinforced with a concrete plug to secure the shaft. A third cleanup was conducted by the DOE National Nuclear Security Administration Nevada Site Office in 2002 and 2003.



Gnome-Coach, New Mexico, Site Cross Section

During this phase of the cleanup, soil contaminated with petroleum hydrocarbons was excavated and disposed of off-site and a post-remediation surface radiological survey was conducted. The results from the cleanup were submitted to the state of New Mexico Voluntary Remediation Program.

Subsurface Conditions

DOE initiated subsurface activities in 1972 that included collecting groundwater samples annually from on-site and off-site locations. Laboratory results obtained using conventional analytical methods detected no radionuclides related to the underground nuclear test or tracer test at the off-site locations. In 2009, the DOE Office of Legacy Management (LM) analyzed historical data and refined the monitoring network to focus on monitoring the on-site wells. The on-site wells monitor the detonation-related radionuclides in the Salado Formation and groundwater in the Culebra Dolomite Member of the Rustler Formation. The Salado Formation is characterized as a regional aquiclude because of the hydraulic properties of the bedded halite salt within the formation. The Culebra Dolomite is a widespread, laterally continuous, fractured carbonate aquifer. Groundwater within the Culebra is of poor quality because of high concentrations of dissolved solids. LM continues to conduct investigations to obtain data that will enhance monitoring of the subsurface at the site.

Regulatory Setting

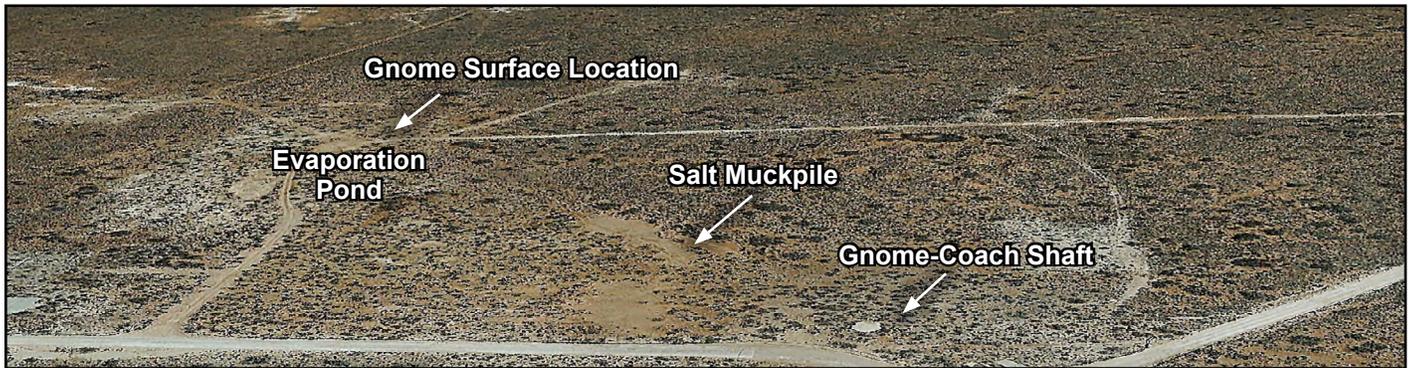
DOE maintains responsibility for radioactive material at the Gnome-Coach site under authority of the Atomic Energy Act of 1954, as amended under Title 42 United States Code (USC), Section 2011. DOE has conducted cleanup activities

through a Voluntary Remediation Agreement with the state of New Mexico and was granted a Conditional Certificate of Completion for the site surface cleanup in 2015. The certificate documents that the surface remediation has been completed in accordance with the state of New Mexico requirements. It also specifies long-term management requirements.

Institutional Controls and Land Use

The Gnome-Coach site is withdrawn from all forms of appropriation associated with mining laws and leasing through Public Land Order 2526 (Federal Register, 61-10429, November 1, 1961), which prohibits future oil and gas leasing or mineral claims at the site. BLM maintains the surface rights, and the designated surface use is for grazing and nonresidential land use. The principal land use in this remote, nonresidential area is livestock grazing, oil and gas exploration and production, and public land use.

The term institutional controls (ICs) is used to broadly define the instruments (documents) and mechanisms (physical features) that are maintained to ensure long-term protectiveness of a site. Surface cleanup activities have been completed, but subsurface contamination (more than 20 feet below ground surface) remains in the emplacement shaft, tunnels, detonation cavity, and Culebra Dolomite near the wells used for the tracer test. The surface restrictions include no excavation within 40 lateral feet of the concrete cap that protects the emplacement shaft. The subsurface restrictions include no drilling, excavating, or other activities that would disturb materials deeper than 20 feet below ground surface. The monument and signs installed around the emplacement shaft and perimeter of the site notify the public of ICs.



Top: View of Gnome-Coach, New Mexico, Site (1961); Bottom: View (2014)

Legacy Management Activities

LM is responsible for implementing the annual groundwater monitoring program, inspecting the site and maintaining the ICs, evaluating and reporting the groundwater monitoring data, and documenting the records and data management processes for the site. These activities are performed according to the site-specific Long-Term Surveillance and Maintenance Plan. Groundwater monitoring and site inspection results are documented in annual groundwater monitoring and inspection reports.



CONTACT INFORMATION

**IN CASE OF AN EMERGENCY AT THE SITE,
CONTACT 911.**

Site-specific documents related to the Gnome-Coach site, are available on the LM website at www.energy.gov/lm/gnome-coach-new-mexico-site.

For more information about LM activities at the Gnome-Coach site, contact:

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