# Low-Level Radioactive Waste Disposal

Los Alamos NATIONAL LABORATORY

## Program Profile

Area G within Technical Area 54, or TA-54, has been used for disposal of Los Alamos National Laboratory's low-level radioactive waste since 1957. While other Laboratory sites also have been used for these disposals, Area G is the only low-level waste disposal facility currently operating. It also is expected to remain the only such facility in the future.

Through its period of use, Area G has accepted different categories of waste consistent with applicable regulations and guidelines in place at the time. A 1998 assessment documents that the area meets the Department of Energy's current performance objectives, and is safe from harmful radiological exposures to the public for centuries to come.

## About the Disposal Site

The site sits atop the Mesita del Buey, adjacent to Native American lands and 1.3 miles from the nearest residential community of White Rock, which did not exist when the site was established. The U.S. Geological Survey selected this site for its favorable natural characteristics, which minimize the possibility of contamination reaching the regional water-supply aquifer.

Most of the waste is slightly contaminated laboratory paper, packaging materials and other trash; together with building rubble; conduit; soil; and other debris from cleanup activities. Higher-activity radioactive waste consists of tritium, plutonium and other special nuclear materials, and residues from medical radioisotopes .

Wastes are disposed of in pits or shafts; the latter primarily are used for the higher-activity wastes. Disposal pits are excavated to depths of approximately 65 feet. Shafts are vertical holes drilled into the ground up to a depth of 65 feet.

Once full, pits and shafts are covered with uncontaminated, native-soil backfill, which is seeded with native grasses. When the site goes through final closure by the Laboratory's Environmental Restoration group, an engineered cap will be added to this cover.

The surface of the mesa is about 900 feet above the regional aquifer. The site's topography, combined with the semiarid climate, has an important effect on its ability to contain contaminants. Nearly all of the precipitation at the site is removed by evaporation and transpiration. Thus, the amount of water coming into contact with the waste is extremely small.

Many of the contaminants disposed of at Area G do not dissolve in water and so cannot leach toward the regional aquifer. In addition, many natural minerals present in the rock beneath Area G bind to those contaminants that *do* dissolve in water, providing an additional barrier to migration.

**Disposal of waste drums and other containers is done in full compliance with Department of Energy requirements for low-level radioactive waste disposal.**

## Long-Term Exposure Assessment

Department of Energy orders required the Laboratory to conduct an Area G assessment to develop a comprehensive evaluation of the potential radiological exposures to the future public from past, present and future disposals at the site. Doses were extrapolated and projected beyond 1,000 years after the facility is projected to close. The results then were compared with dose limits determined by national and international technical and regulatory bodies. The projection of future doses involved modeling releases of radioactivity from Area G through air, water, soil and biological systems for the 10-century period.

### Assessment Assumptions

- Future public exposure to radiation will be minimized if radioactivity is locally contained and if there is no human intrusion into the waste.
- Current natural conditions of the site will prevail while extreme events are taken into account.
- A government entity will maintain and control the site.

### Summary of 1000-Year Results

Projections were based on models using historical data and assumed site-use trends. Projected doses were small in all cases considered and well below DOE's performance objectives.

Radioactivity projections over the next 1,000 years:

- *Air pathway*: The calculated peak concentration of contamination in the air in Cañada del Buey resulted in a radiation dose of 0.066 mrem per year compared to the 10 mrem per year limit set by the Environmental Protection Agency. The calculated concentration at the nearest residential community of White Rock was a dose of 0.016 mrem per year, again compared with the Department of Energy's limit of 10 mrem per year.
- *All pathways*: The maximum all-pathways dose was calculated to be 0.00013 mrem per year compared to a 25 mrem per year limit. (*See Note*)
- *Groundwater*: Because of the natural features of the terrain, concentrations of contaminants reaching the regional water-supply aquifer over the 1,000-year period are expected to be in insignificant doses, measuring in the millionths-of-a-mrem, compared to a 4 mrem per year limit.

**Note: The methods for calculating the DOE all-pathways dose and the EPA air pathways dose are not comparable. Consideration of shielding, occupancy and correction factors are allowed only in the DOE calculation. As a result, the air pathway dose in certain cases may be greater than the all-pathways dose.*

## Quick Facts

Annual budget – $2.8 million
Total technical and support staff – approximately 14 full-time equivalent employees

**Contaminated soil from clean-up efforts at other Laboratory sites also goes into pits at TA-54's Area G.**

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