

Low-Level Radioactive Waste Disposal

safety ❖ performance ❖ cleanup ❖ closure



In 1961, the U.S. government began utilizing the Nevada Test Site, now known as the Nevada National Security Site (NNSS), for disposing low-level radioactive waste. Initially, the waste was generated by the weapons testing program; however, later it was also generated through U.S. Department of Energy (DOE) environmental restoration activities.

Since 1976, NNSS disposal activities have expanded to include the receipt of low-level radioactive waste generated at other DOE and U.S. Department of Defense-approved facilities throughout the United States. The DOE, National Nuclear Security Administration Nevada Site Office manages these NNSS programs and is committed to conducting disposal operations in a manner that protects workers, the public and the environment.

Suitable Disposal Location

A combination of various conditions make the NNSS suitable for safely and responsibly disposing low-level radioactive waste. The two disposal facilities, located in Areas 3 and 5, are well above regional groundwater levels (approximately 1,600 feet and 800 feet, respectively), and are contained in closed basins. Disposal conditions at the NNSS benefit from the arid desert environment and the typically high temperatures, which serve to maximize evaporation. This environment makes it highly unlikely that any contamination would reach groundwater.

Area 3

Historically, larger or bulk-type packages of low-level radioactive waste were disposed in designated subsidence craters in Area 3 of the NNSS. These craters, formed in the early 1960s by underground nuclear testing, cover approximately 128 acres and have a limited available capacity remaining. Common types of low-level radioactive waste packages disposed at this facility include concrete monoliths and cargo containers. The waste packages disposed in Area 3 are layered in the cells and separated by a 1- to 3-foot layer of clean fill soil. Once the two currently inactive disposal cells are filled to capacity, it is anticipated that the Area 3 disposal facility will undergo the closure process.



An aerial view of the NNSS Area 5 Radioactive Waste Management Site.

Area 5

Currently, only the Area 5 Radioactive Waste Management Site is used for low-level and mixed low-level radioactive waste disposal at the NNSS. The Site covers 740 acres, of which approximately 200 acres have been

Definitions

Closed Basin: Topography that prevents the external drainage of surface water. The surface water collects within the basin and eventually evaporates.

Low-Level Radioactive Waste: Radioactive waste that cannot be characterized as high-level, transuranic, spent nuclear fuel, or by-product materials, such as uranium mill tailings. Low-level waste includes material contaminated with radioactive atoms with an atomic number less than or equal to 92 or greater than 92 if the concentrations are less than 100 nanocuries per gram. Examples of elements with atomic numbers less than or equal to 92 include hydrogen, oxygen, cobalt, cesium, nickel, aluminum, iron, radon, radium, thorium, and uranium. Those greater than 92 include plutonium and americium.

Radiological Surveys: Inspections using a variety of methods and equipment to detect potential alpha, beta, gamma, and neutron radiation which would indicate the presence of radioactive material.

Waste Generator: U.S. Department of Defense and U.S. Department of Energy Environmental Management sites that generate low-level and mixed low-level radioactive waste through cleanup activities.

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developed for radioactive waste storage and disposal. Low-level radioactive waste is generally shipped to the NNSS in drums and boxes that are placed in excavated disposal cells, which range in depth from 12 to 48 feet. Once delivered to the designated disposal cell, waste containers are carefully stacked and methodically arranged to facilitate tracking and monitoring. As the cells are filled, workers cover the waste with an 8-foot layer of native soil. At closure, a final cap is optimized and placed on the complex. A closure plan for 92 acres used for disposal from 1961-2010 was approved by the State of Nevada. Construction of the final cap and re-vegetation will be completed in 2011.

Waste Acceptance Process

The Nevada Site Office Radioactive Waste Acceptance Program must approve all low-level radioactive waste *prior* to shipment to the NNSS. Upon arrival at the appropriate disposal facility, radiological surveys are completed for each truck, trailer and container to ensure compliance with U.S.



Packages of low-level radioactive waste are positioned in a disposal cell at the Area 5 Radioactive Waste Management Site.

Department of Transportation regulations and NNSS Waste Acceptance Criteria. A final survey is performed on all trucks and trailers prior to release.

Safe Disposal Requirements

The Nevada Site Office is committed to safely accepting, disposing, and providing long-term management of radioactive waste at the NNSS. This is accomplished through compliance with strict federal and state safety and environmental regulations, stringent nuclear safety requirements and NNSS Waste Acceptance Criteria (WAC) as well as by honoring commitments to State regulators and stakeholders. One such commitment is the Agreement in Principle through which the State of Nevada Division of Environmental Protection (NDEP) is involved in the acceptance and disposal of low-level radioactive waste at the NNSS to include the following activities:

- *Radioactive Waste Acceptance Program* - reviews procedures and conducts site visits (some unannounced) to certify waste generator programs. Upon Program approval, radiological composition, characterization, and packaging for each proposed waste stream is verified to conform to the stringent NNSS WAC prior to shipment and disposal.
- *Performance Assessments* - Computer models are developed to ensure the disposal facility maintains its integrity for the protection of the surrounding environment. These models provide conservative forecasts on potential short-term and long-term risks associated with waste disposal.
- *Air, Groundwater, and Soil Monitoring* - serves as an early detection system in the unlikely event that any contamination migrates from the immediate disposal area.
- *Closure Program* - focuses on developing earthen closure caps for disposal sites to protect against potentially damaging environmental forces, such as erosion. In accordance with legal agreements and permits, closure plans are prepared and must be approved by NDEP.

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