



Aerial view of Technical Area 21

LOS ALAMOS NATIONAL LABORATORY

Los Alamos National Laboratory (the Laboratory) is a multidisciplinary research facility owned by the Department of Energy (DOE) and managed by the University of California. The Laboratory is located in north-central New Mexico approximately 20 miles northwest of Santa Fe. The Laboratory covers 43 square miles of the Pajarito Plateau; the Plateau consists of a series of finger-like mesas that are separated by deep canyons containing perennial and intermittent streams running from west to east.

RISK REDUCTION AND ENVIRONMENTAL STEWARDSHIP ENVIRONMENTAL RESTORATION PROJECT

The Laboratory's Environmental Restoration (ER) Project (implemented by the Risk Reduction and Environmental Stewardship [RRES] Division) is a part of a DOE nationwide program. DOE's environmental restoration efforts began in 1989. The ER Project investigates whether hazardous chemicals and/or radioactive wastes are present as a result of past Laboratory operations and cleans up and restores such sites as needed.

MATERIAL DISPOSAL AREAS AT THE LABORATORY

Material disposal areas (MDAs) at the Laboratory are sites where waste material has been disposed of on or below the ground surface in excavated pits, trenches, or shafts. There are 26 major MDAs at the Laboratory.

TECHNICAL AREA 21 (TA-21)

TA-21, also known as Delta Prime (DP) Site, is on DP Mesa situated immediately east-southeast of the Los Alamos townsite at an elevation of 7140 feet. Runoff from TA-21 drains into Los Alamos Canyon to the south and DP Canyon to the north. Depth to groundwater is approximately 1150 feet beneath the mesa top. TA-21 was the site of chemical research for refining plutonium and plutonium metal production from 1945 to 1978. As a result, most waste disposal activities involved plutonium. Material Disposal Areas (MDAs) located at TA-21 include MDA "A", MDA "B", MDA "T", MDA "U" and MDA "V". These MDAs are all listed as solid waste management units (SWMUs) in the HSWA Module VIII of the Laboratory's Hazardous Waste Facility Permit.

MATERIAL DISPOSAL AREA "A"

MDA "A" (SWMU 21-014) is a 1.25-acre inactive disposal site located adjacent to MDA "T" near the center of TA-21. The site was used intermittently from 1945 to 1949 and 1969 to 1977 for disposal of radioactively contaminated solid waste, debris from decommissioning and decontamination (D&D) activities and radioactive liquids. MDA A consists of two buried tanks known as the "General's Tanks" (50,000 gallons each), two rectangular pits (18 feet wide by 12.5 feet long by 12.5 feet deep), and one large central pit (approximately 172 feet long by 134 feet wide by 22 feet deep).

- 1940s** The Laboratory was founded in 1943 as part of the Manhattan Project. Processes used to carry out the Laboratory's past and present missions involve the use of hazardous and radioactive materials.
- 1950s** During and after World War II, materials were disposed of on Laboratory property or otherwise released into the environment.
- 1960s** Congress enacted basic legislation to protect the environment. The Department of Energy's predecessor, the Atomic Energy Commission, and the Laboratory began to conduct surveys and to clean up areas where spills and disposal had occurred.
- 1970s** Congress enacted the Resource Conservation and Recovery Act (RCRA) that governs the day-to-day operations of hazardous waste generation, treatment, storage, and disposal facilities (sites).
- 1980s** Congress amended RCRA by passing the Hazardous and Solid Waste Amendments (HSWA). HSWA prescribes a corrective action process that focuses primarily on the investigation and cleanup, if required, of inactive sites.
- 1989** Environmental restoration began at the Laboratory to clean up sites that were formerly involved in weapons research and production.
- 1990s - Present** The ER Project investigates and cleans up sites that have the potential to affect human health or the environment, in accordance with the Laboratory's Hazardous Waste Facility Permit.

INFORMATION SHEET: TECHNICAL AREA 21 MATERIAL DISPOSAL AREAS



Straw and sandbags to control runoff at Solid Waste Management Unit 21-014



Straw in place to control runoff at Solid Waste Management Unit 21-014



Material Disposal Area B

Tanks

The "General's Tanks" named for General Groves, are located at the western end of MDA A. They were placed 20 feet apart in pits 12 feet deep, 15 feet wide and 86 feet long on 4 concrete piers. Beginning in 1945, plutonium processing waste solutions was stored in the tanks. Between 1975 and 1983 the liquid phase was removed from the tanks and transferred to the TA-21 wastewater treatment facility. An unknown volume of sludge remains in the bottom of each tank. The area between the tanks and the remainder of the pit were filled with packed earth. A concrete slab 8 inches thick, 56 feet wide and 69 feet long was poured 1.5 feet above the tanks and approximately 5 feet of fill was placed above the tanks covering the slab.

Pits

The two rectangular pits located in the eastern portion of MDA A received lab equipment, building construction material, paper, rubber gloves, filters from air cleaning systems and radioactively contaminated chemicals. Contaminants of concern include plutonium, polonium, uranium, americium, curium, radium/lanthanum and actinium. The estimated quantity of waste in the pits is 4000 cubic yards. In addition, several hundred 55-gallon drums containing a sodium hydroxide and stable iodine solution were stored on the surface of the east end of the MDA during the early 1950's. Corrosion of the drums resulted in releases to surface soils. The containers were removed in 1960 and the storage area was paved to immobilize contaminants released to surface soils. The central and largest disposal pit at MDA A contains building debris contaminated with plutonium, uranium, depleted uranium decay products and other radioactive isotopes associated with those elements from TA-21 D&D activities. The capacity of the pit is approximately 18,000 cubic yards. As of March 1974 the pit was estimated to be 2/3 full (12,000 cubic yards). MDA A was decommissioned in May 1978 and a crushed tuff cover was placed over the entire site. In 1985, cover stabilization activities implemented at the site involved removal of surface contamination, and placement of additional cover material, followed by recontouring and reseeding.

The surface of MDA A was sampled extensively in 1990 and the surface of the area between the MDA A fence line and the rim of DP Canyon was sampled in 1992. An addendum to the sampling and analysis plan described in the TA-21 RFI Work Plan is under preparation detailing the remaining field investigations at MDA A.

MATERIAL DISPOSAL AREA "B"

MDA B (SWMU 21-015) is a 6-acre inactive disposal site located on DP Mesa just west of the fenced area of TA-21 and south of commercial businesses on DP Road. MDA B operated from 1945 through 1948. Runoff from this site drains to BV Canyon to the south. The TA-21 RFI Work Plan states that buried waste pits occupy 5580 square yards with an estimated volume of 27,612 cubic yards. MDA B consists of two areas: an unpaved fenced eastern area and a paved fenced western area. A 1998 geophysical survey determined that there are two disposal trenches at MDA B. The western trench is approximately 15 feet wide by 1000 feet long by 12 feet deep, and the eastern trench is approximately 15 feet wide by 800 ft long by 12 feet deep. The trenches are not lined.

INFORMATION SHEET: TECHNICAL AREA 21 MATERIAL DISPOSAL AREAS



Material Disposal Area T

The radiological inventory includes plutonium, polonium, uranium, americium, curium, lanthanum, and actinium. The disposal capacity of the pits is estimated to be about 760,000 cubic feet. The entire pit is estimated to contain no more than 6.13 curies of plutonium-239.

In 1984, the unpaved portion of MDA B was resurfaced with a variety of cover systems during a pilot study conducted in support of the National Low-Level Waste Management Program and the Environmental Protection Agency'. The total cover thickness on this portion of MDA B is 6.5 feet.

The RFI fieldwork was completed in 2001 and the MDA B RFI report is scheduled for completion in 2003.

MATERIAL DISPOSAL AREA "T"

MDA T (SWMU 21-016) consists of four inactive absorption beds where radioactively contaminated liquid waste from the plutonium-processing laboratories at TA-21 was discharged between 1945 and 1952. Stormwater runoff from this site drains to the north to DP Canyon. In 1952, the first TA-21 liquid waste treatment plant (Building 21-35) was constructed to remove plutonium and other radionuclides from processing waste streams. Thereafter, the absorption beds received relatively small quantities of low-level waste (LLW) until 1967 when a new liquid waste treatment process was initiated. Between 1968 and 1983, treated liquid waste was mixed with cement and pumped into 62 shafts at MDA T for disposal. Beginning in 1975, liquid wastes with concentrations greater than 10 nano-curies per gram plutonium were mixed with cement, poured into corrugated metal pipes and buried at MDA T. The total volume of cement paste disposed of in the shafts at MDA T was 122,500 cubic feet.



Material Disposal Area U

Approximately 18.3 million gallons of wastewater were discharged to the MDA T absorption beds between 1945 and 1967. As of January 1973, soil/sediment within the absorption beds contained 10 curies of plutonium-239. As of July 1976, the disposal shafts contained 7 curies of uranium-233, 47 curies of plutonium-238, 3761 curies of americium-241, and 3 curies of mixed fission products.

Phase I RFI surface and subsurface investigations are complete. Evaluation of the Phase I RFI data conducted during 2002 indicated that additional sampling is required to complete the RFI. An addendum to the sampling and analysis plan described in the TA-21 RFI Work Plan will be prepared in 2003 to address the remaining field investigations at MDA T.

MATERIAL DISPOSAL AREA "U"

MDA U (SWMU 21-017(a)-99) is a 0.2-acre inactive disposal site located north of Buildings 21-152 and -153 at TA-21 on DP Mesa. MDA U consists of two absorption beds. Stormwater runoff from this site drains north to DP Canyon. Wastewater from a former laboratory and filter building (Buildings 21-152 and -153, respectively) was discharged to the absorption beds from 1948 to 1968. MDA U also received process-cooling water from the Tritium Systems Test Assembly building until 1976. As constructed, the two absorption beds had a surface area of approximately 1800 square feet with an estimated volume of about 18,000 cubic feet.



Material Disposal Area U

INFORMATION SHEET: TECHNICAL AREA 21 MATERIAL DISPOSAL AREAS



Non-traditional in situ vitrification cold test site at Material Disposal Area V

Terms and Definitions

Outfall: The vent or end of a drain, pipe, sewer, ditch, or other conduit that carries wastewater, sewage, storm runoff or other *effluent* into a stream.

Resource Conservation Recovery Act (RCRA) Facility Investigation (RFI): The investigation that determines if a *release* has occurred and the nature and extent of the contamination at a *hazardous waste* facility.

Solid Waste Management Unit (SWMU): Any discernible unit at which *solid wastes* have been placed at any time, irrespective of whether the unit was intended for the management of *solid or hazardous waste*.

Geophysical survey: the use of one or more geophysical techniques to study the earth (seismic, geologic, electric, gravity, magnetic, or thermal).

Tuff: A compacted deposit of volcanic ash and dust that contains rock and mineral fragments accumulated during an eruption.

nCi/gm: nanocuries per gram weight. A nanocurie is one billionth of a curie. A curie is unit of radioactivity.

BV Canyon: A small canyon located south of Material Disposal Area B.

Area of Concern (AOC): Areas at the Laboratory that might warrant further investigation for *releases* based on past facility waste-management activities.

An associated distribution box, Structure 21-164, was located between the two beds. An interim action was conducted in 1985 to remove the distribution box, associated distribution lines and some actinium-contaminated soil. The excavation was covered with topsoil, recontoured, and reseeded.

The RFI fieldwork was completed in 2001 and the MDA U RFI report is scheduled for completion in 2003.

MATERIAL DISPOSAL AREA "V"

MDA V (SWMU 21-018(a)-99) is a 0.88-acre site at TA-21 consisting of three absorption beds that occupy 1670 square yards and have a volume capacity of 5560 cubic yards. Stormwater runoff from this site drains to Los Alamos Canyon. Wastewater was discharged from the former laundry in Building 21-20 and the sump (AOC 21-030) in former Building 21-45 (AOC C-21-015) occupied by the former Waste Studies Group to the absorption beds from October 1945 to 1961. The laundry facility processed clothing from plutonium refinement operations, and the Waste Studies Group developed processes to recover plutonium, uranium and other scarce metals from process waste streams.

A non-traditional in situ vitrification (NTISV) cold demonstration was performed near MDA V in 1999 in preparation of a plan to vitrify a portion of one of the contaminated absorption beds at MDA V. Results of the cold test have been reported. The NTISV hot demonstration was conducted in absorption bed 1 at MDA V in 2000. Sampling of the vitrified product to evaluate the effectiveness of the NTISV technology was completed during 2002; analytical results will be reported in 2003.

Phase I RFI surface and subsurface investigations are complete. A data analysis will be completed in early 2003 to determine if additional sampling is required to complete the RFI.

OPPORTUNITIES FOR PUBLIC INVOLVEMENT

Contact the Communications & Outreach Team

Carmen M. Rodriguez
Phone: (505) 665-6770
Fax: (505) 665-7369
Email Address: carmenr@lanl.gov

Web site: <http://erproject.lanl.gov>