

CHAPTER 1 - INTRODUCTION

WIPP is the world's first underground repository with the necessary permits and certifications for safe and permanent disposal of TRU radioactive and mixed waste generated by defense-related activities. A TRU waste is eligible for disposal at WIPP if it has been generated in whole or in part by one or more of the activities listed in the Nuclear Waste Policy Act of 1982 (41 *United States Code* [U.S.C.] 10101[3]), including naval reactors development, weapons activities, verification and control technology, defense nuclear materials production, defense nuclear waste and materials by-products management, defense nuclear materials security and safeguards and security investigations, and defense research and development.

TRU waste is defined in the WIPP Land Withdrawal Act of 1992 (Public Law [Pub. L.] 102-579) as radioactive waste containing more than 100 nanocuries (3,700 becquerels [Bq]) of alpha-emitting TRU isotopes per gram of waste, with half-lives greater than 20 years. A TRU isotope is an isotope of an element with an atomic number greater than uranium (92). There are certain exceptions to the WIPP Land Withdrawal Act definition, including high-level radioactive waste; waste that the Secretary of Energy has determined, with the concurrence of the Administrator of the EPA, does not need the degree of isolation required by 40 CFR Part 191 disposal regulations; or waste that the NRC has approved for disposal on a case-by-case basis in accordance with 10 CFR Part 61. Most TRU waste is contaminated industrial trash, including used protective clothing, rags, tools and equipment, sludges from solidified liquids, and glass, metal, and other materials from dismantled buildings.

The WIPP Project is authorized by the DOE National Security and Military Applications of Nuclear Energy Authorization Act of 1980 (Pub. L. 96-164). WIPP's legislative mandate is to demonstrate the safe disposal of TRU wastes from national defense activities and programs. To fulfill this mandate, WIPP has been designed to safely handle, store, and dispose of TRU waste in a fully operational disposal facility. After more than 20 years of scientific study, public input, and regulatory struggles, WIPP received its first shipment of waste on March 26, 1999.

When TRU waste arrives at WIPP, it is transported into the Waste Handling Building. The waste containers are removed from the shipping containers, placed on the waste hoist, and lowered to the repository level of 655 m (2,150 ft; approximately 0.5 mi) below the surface. During the disposal phase, the containers of waste are removed from the hoist and placed in excavated storage rooms in the Salado Formation, a thick sequence of salt beds deposited approximately 250 million years ago (Figure 1.1). Once a disposal area has been filled with waste, specially designed closures will be placed in the excavated disposal rooms, and seals will be placed in the shafts. Salt under pressure is relatively plastic, and mine openings will be allowed to creep closed for final disposal, encapsulating and isolating the waste.

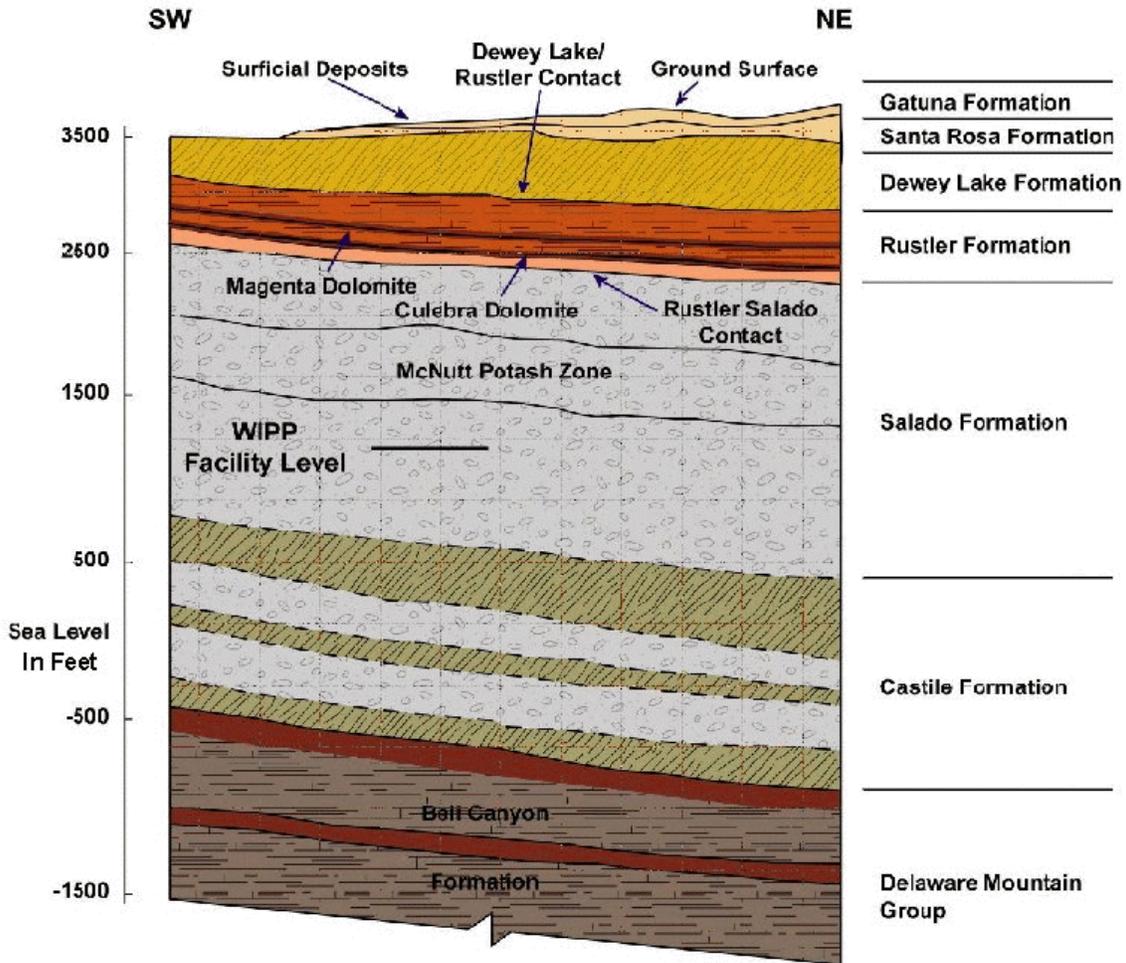


Figure 1.1 - WIPP Stratigraph

1.1 WIPP History

Government officials and scientists initiated the WIPP site selection process in the 1950s. At that time, the National Academy of Sciences conducted a nationwide search for stable geological formations to contain wastes for thousands of years. In 1955, after extensive study, salt deposits were recommended as a promising medium for the disposal of radioactive waste.

Salt was chosen as the material for the planned disposal of nuclear waste for several reasons. Most deposits of salt are found in stable geological areas with very little earthquake activity, assuring the stability of a waste repository. Salt deposits also demonstrate the absence of flowing fresh water that could move waste to the surface. Water, if it had been or were present, would have dissolved the salt beds. In addition,

Waste Isolation Pilot Plant 2001 Site Environmental Report DOE/WIPP 02-2225

salt is relatively easy to mine. Finally, rock salt heals its own fractures because it is relatively plastic. This means salt formations will slowly and progressively move in to fill mined areas and will safely seal radioactive waste from the environment.

Government scientists searched for an appropriate site for the disposal of radioactive waste throughout the 1960s, and finally tested the area of southeastern New Mexico in the early 1970s. Salt formations at WIPP were deposited in thick beds during the evaporation of an ancient ocean, the Permian Sea. These geologic formations consist mainly of sodium chloride, the same substance as table salt. However, at WIPP, the salt is not granular, but is in the form of solid rock. The main salt formation at WIPP is about 610 m (2,000 ft) thick, and begins 259 m (850 ft) below the earth's surface. Formed about 225 million years ago during the Permian Age, the large expanses of uninterrupted salt beds provide a repository that has been stable and free from the disturbances of large earthquakes for more than 200 million years. This proven stability over such a long time span offers the predictability that the salt will remain stable for the comparatively short 10,000-year period that WIPP is mandated to isolate the waste from the human environment.

In 1979, Congress authorized the construction of WIPP, and the DOE constructed the facility during the 1980s. In late 1993, the DOE created the CBFO to lead the TRU waste disposal efforts. The CBFO coordinates the TRU program at waste-generating sites and national laboratories.

In 1999, WIPP received its first waste shipment. On March 25, the first waste bound for WIPP departed Los Alamos National Laboratory in New Mexico; it arrived at WIPP the following morning, and the first wastes were placed underground later that day. On April 17, WIPP celebrated its official grand opening. Ten days later, on April 27, the first out-of-state shipment arrived at WIPP, from the Idaho National Engineering and Environmental Laboratory. Later in the year, on October 27, the Secretary of the NMED issued a WIPP HWFP, which allows WIPP to manage, store, and dispose of contact-handled TRU mixed waste. Mixed waste is waste contaminated by both hazardous and radioactive substances. "Contact-handled mixed waste" is TRU mixed waste with a surface dose rate less than 200 millirem per hour.

1.2 WIPP's Mission

Current temporary radioactive waste storage facilities at 23 locations across the United States were never intended to provide permanent disposal. WIPP is the nation's first operating underground repository for defense-generated TRU waste and is a critical step toward solving the nation's nuclear waste disposal problem. Its mission is to provide for the safe, permanent, and environmentally sound disposal of TRU radioactive waste left from research, development, and production of nuclear weapons. Over the next 35 years, WIPP is expected to receive about 37,000 shipments of waste from locations across the United States.

Waste Isolation Pilot Plant 2001 Site Environmental Report
DOE/WIPP 02-2225

The mission of the CBFO is to protect human health and the environment by opening and operating WIPP for safe disposal of TRU waste and by establishing an effective system for management of TRU waste from generation to disposal.

1.3 WIPP Location

Located in Eddy County in the remote Chihuahuan Desert of southeastern New Mexico (Figure 1.2), the WIPP site encompasses approximately 41.1 km², or 16 mi². The site is 42 km (26 mi) east of Carlsbad in a region known as Los Medaños. This part of New Mexico is relatively flat and is sparsely inhabited, with little surface water. The WIPP site boundary extends a minimum of 1.6 km (1 mi) beyond any of the WIPP underground developments. The WIPP Land Withdrawal Act was signed into law on October 30, 1992, transferring the land from the Department of the Interior to the DOE. With the exception of facilities within the boundaries of the posted 5.7 km² (2.2 mi²) Off-Limits Area, the surface land uses remain largely unchanged from pre-1992 uses, and are managed in accordance with accepted practices for multiple land use. However, mining and drilling for purposes other than those which support WIPP are prohibited within the WIPP site.

The majority of the lands in the immediate vicinity of WIPP are managed by the Department of the Interior's Bureau of Land Management (BLM). Land uses in the surrounding area include livestock grazing; potash mining; oil and gas exploration and production; and recreational activities such as hunting, camping, hiking, and bird watching. The region is home to diverse populations of animals and plants.

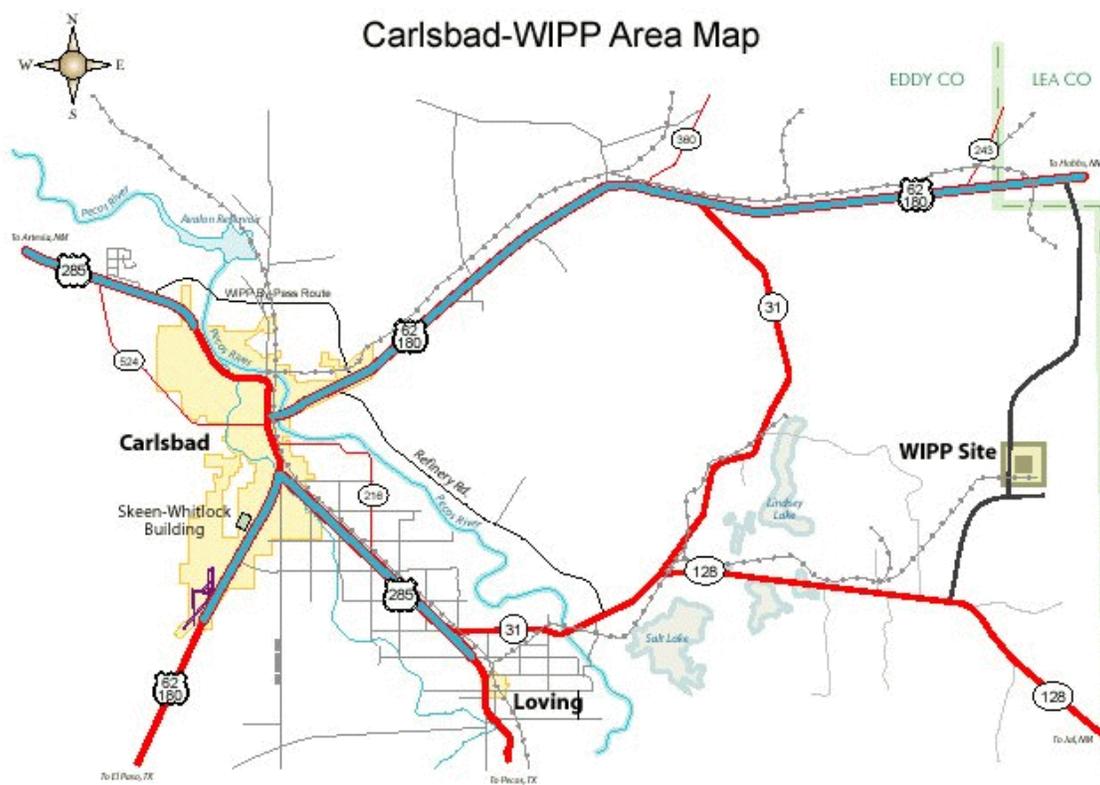


Figure 1.2 - WIPP Location

1.3.1 WIPP Property Areas

Five types of property areas are found within WIPP's boundary (Figure 1.3).

Property Protection Area

The interior core of the facility encompasses approximately 0.129 km² (0.05 mi²) surrounded by a chain link fence. This area is under tight security and uniformed security personnel are on duty 24 hours a day.

Exclusive Use Area

The Exclusive Use Area comprises 1.12 km² (0.432 mi²). It is surrounded by a five-strand barbed wire fence and is restricted exclusively for the use of the DOE and its contractors and subcontractors in support of the project. In addition, this area is defined as the point of closest public access for the purpose of analyzing accident consequences to the general public in the WIPP Safety Analysis Report (DOE/WIPP 95-2065). This area is marked by DOE warning (e.g., "no trespassing")

Waste Isolation Pilot Plant 2001 Site Environmental Report
DOE/WIPP 02-2225

signs and is patrolled by WIPP security personnel to prevent unauthorized activities or uses.

Off-Limits Area

Managed as an area where unauthorized entry and introduction of weapons and/or dangerous materials is prohibited, the Off-Limits Area includes 5.7 square kilometers (km²) (2.2 square miles [mi²]). Pertinent prohibitions are posted at consistent intervals along the perimeter. Grazing and public thoroughfare will continue in this area until such time that these activities present a threat to the security, safety, or environmental quality of WIPP. This sector is patrolled by WIPP security personnel to prevent unauthorized activity or use.

WIPP Land Withdrawal Area

The WIPP site boundary delineates the perimeter of the 41.4 km² (16 mi²) WIPP Land Withdrawal Area. This tract includes properties outlying the Property Protection Area, the Exclusive Use Area, and the Off-Limits Area. This sector is designated as a Multiple Land Use Area, and is managed accordingly.

Special Management Areas

Certain properties used in the operation of WIPP (e.g., reclamation sites, well pads, roads) are, or may be, identified as Special Management Areas (SMA). A SMA designation is made due to values, resources, and/or circumstances that meet criteria for protection and management under special management designations. Unique resources of value that are in danger of being lost or damaged, areas where ongoing construction is occurring, fragile plant and/or animal communities, sites of archaeological significance, locations containing safety hazards, or sectors that may receive an unanticipated elevated security status would be suitable for designation as a SMA. Accordingly, the subject sector would receive special management emphasis under this stipulation. Special Management Areas will be posted against trespass and will be safeguarded commensurate with applicable laws governing property protection. WIPP security personnel will patrol these areas to prevent unauthorized access or use.

**Waste Isolation Pilot Plant 2001 Site Environmental Report
DOE/WIPP 02-2225**

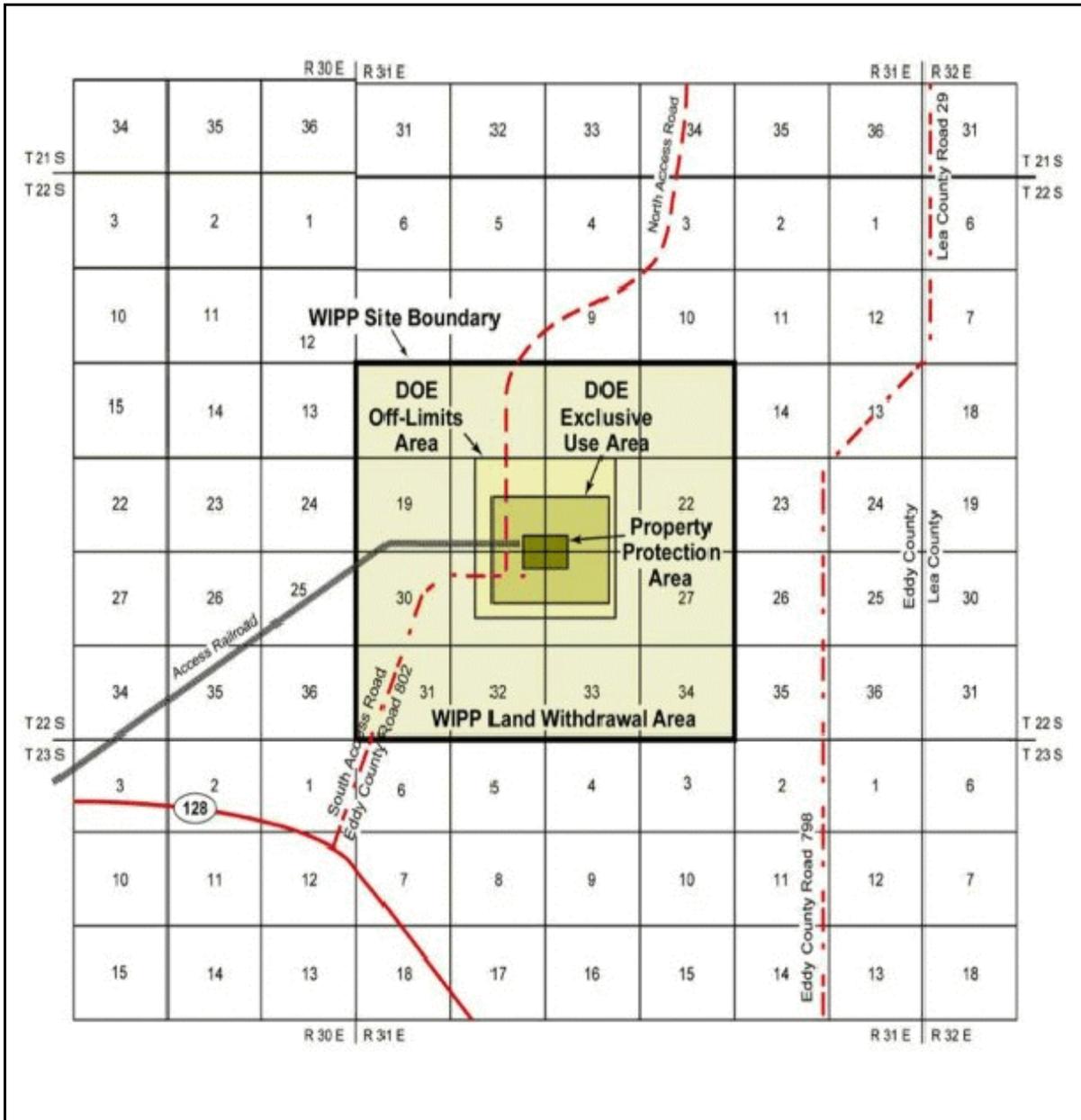


Figure 1.3 - WIPP Property Areas

1.3.2 Population

Approximately 26 residents live within 16 km (10 mi) of the WIPP site. The majority of the local population within 80.5 km (50 mi) of WIPP is concentrated in and around the communities of Carlsbad, Hobbs, Eunice, Loving, Jal, and Artesia, New Mexico. The nearest community is the village of Loving (current estimated population 1,326), 29 km (18 mi) west-southwest of WIPP. The nearest major populated area is Carlsbad, 42 km (26 mi) west of WIPP. The current estimated population of Carlsbad is approximately 25,625. The population within 16 km (10 mi) of WIPP is associated with ranching, oil

Waste Isolation Pilot Plant 2001 Site Environmental Report DOE/WIPP 02-2225

and gas exploration/production, and potash mining. There are two nearby ranch residences (Smith Ranch and Mills Ranch) which are continuously monitored as part of the EMP.

1.4 Environmental Performance

The DOE's Environmental Policy Statement (DOE, 1986) describes the DOE's commitment to environmental protection and pledges to conduct operations "in an environmentally safe and sound manner. . . in compliance with the letter and spirit of applicable environmental statutes, regulations, and standards" (DOE, 1986). The Statement also affirms the DOE's commitment to "good environmental management in all of its programs and at all of its facilities in order to correct existing environmental problems and to anticipate and address potential environmental problems before they pose a threat to the quality of the environment or public welfare." Additionally, it states, "It is DOE's policy that efforts to meet environmental obligations be carried out consistently across all operations and among all field organizations and programs. . ." (DOE, 1986).

The DOE used laboratory tests, field tests, and computer models to demonstrate WIPP's expected 10,000 year performance as a permanent disposal site. The EPA certified, in May 1998, WIPP's ability to protect the environment and human health, while assuring continued compliance through periodic recertification.

WTS conducted the Environmental Monitoring Program at WIPP in CY 2001 to monitor for any potential radiological effects of WIPP on people and the environment. Other organizations oversee the WIPP program, including the EPA, which is responsible for certifying whether radioactive material disposal requirements are met; the state of New Mexico, which regulates the handling of the hazardous components of mixed wastes; and the Environmental Evaluation Group (EEG), an independent technical oversight group that participates in and comments on various WIPP issues and activities. The Carlsbad Environmental Monitoring and Research Center conducts a supplementary environmental monitoring program around WIPP. Several other agencies, committees, and panels monitor progress at WIPP and contribute to the project's development through regulation, review, and comment at the state and federal levels.

This Waste Isolation Pilot Plant 2001 Site Environmental Report was prepared in accordance with DOE Order 231.1. This report documents WIPP's radiological, nonradiological, and groundwater monitoring programs and their results for CY 2001.