1986 WIPP OVERVIEW AND ACCOMPLISHMENTS

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ABSTRACT

The purpose of this presentation is to provide information on the status of the Waste Isolation Pilot Plant (WIPP) facility, as of the end of 1986. The WIPP mission was established in 1979, by Public Law 96-164, to perform research and development on the emplacement of defense-related nuclear wastes; additionally, the WIPP Project may evolve into a permanent repository for transuranic (TRU) waste if all applicable project requirements are met. The WIPP will emplace both contact-handled (CH) TRU waste (less than 200 mrem surface dose) and remote-handled (RH) (less than 100 R surface dose) waste. The waste originates from 10 defense facilities throughout the United States, and will be shipped to the WIPP facility by Transuranic Waste Transport Package truck (TRUPACT) and railroad. Experiments will also be conducted on defense high-level waste in the future.

The site is located about 33 miles east of Carlsbad, New Mexico. The actual waste repository resides 2150 feet below the surface, in the Salado geologic salt formation (Fig. 1).

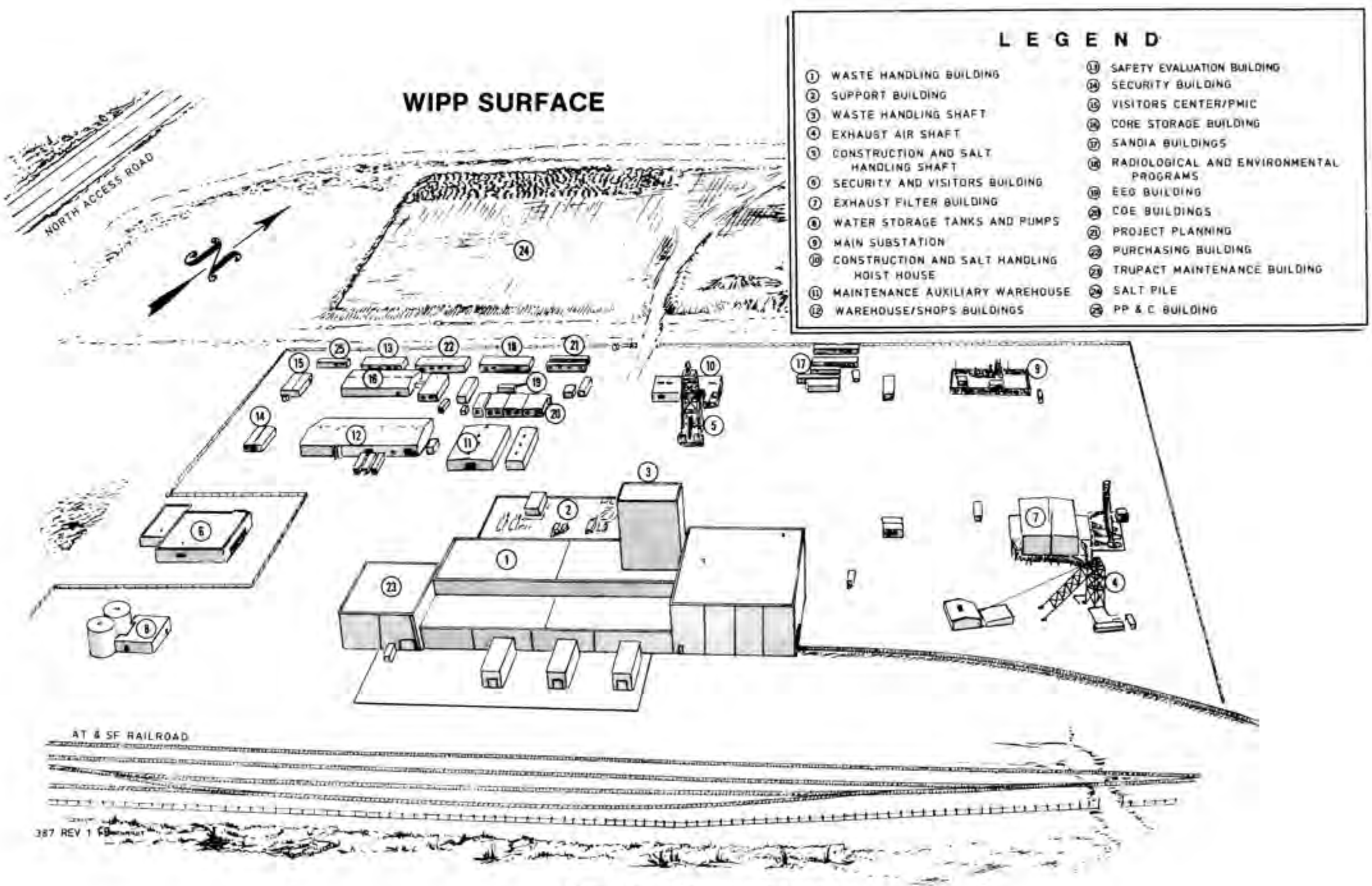

Fig. 1. The WIPP Site.

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PROGRESS THROUGH 1986

Construction (see Table I)

1986 witnessed the completion of most of the WIPP surface facilities. Underground construction activities focused primarily on the waste shaft and supporting waste shaft station utilities. The Guard and Security Building, which also houses the Visitors Center, was completed in 1986. The Support Building, which is the main office facility, was also completed. This enabled the moving of Westinghouse and DOE people out of warehouse office spaces and into permanent offices.

The TRUPACT Maintenance Facility Building was completed, with adequate space to set up waste handling equipment for testing and training. Portions of the Waste Handling Building were completed, and were used to store ancillary waste handling equipment which will be installed upon construction completion. All structural work in the building is completed, and work is continuing on the interior rail system, installation of hot cell manipulators, and final finishing and painting with a nuclear coating which facilitates decontamination, if needed.

The waste hoist structural work is complete; the hoist is roped, the repository station concrete is poured, and checkout of the hoist has commenced.

The Exhaust Filter Building contract is essentially complete, although the ducting connection to the exhaust shaft is not scheduled until late 1987. The Central Monitoring System (CMS) to provide operational monitoring of site systems is proceeding on schedule. Table I provides a tabulation of construction progress.

TABLE I

Construction Status

Waste Handling Building	95%
Waste Shaft and Utilities	97%
Exhaust Filter Building	99%
TRUPACT Maintenance Facility	100%
Guard and Security Building	100%
Support Building	100%
CMS	75%

Waste Certification

The waste certification program requires an audit of the established packaging procedures and practices for each waste form, and correction of any audit findings. The audit process provides assurance that all waste will meet the established criteria for shipment to and emplacement at the WIPP. As of the end of 1986, approximately 75% of the newly generated waste has been certified. This amount of waste will provide a more than adequate backlog for opening the facility in October 1988. Table II, below, provides illustrations of the certification status of waste.

Operations

The CH waste flow process has been examined in detail, so as to provide manpower and radiation exposure estimates. As part of this process several major handling improvements were developed, including the following:

1. Shrink wrap was used to package six ("6-pack") 55-gallon drums, replacing a heavy and expensive metal frame.
2. Slip sheets were developed for use between 6-packs, to allow safer and easier removal from the shipping pallet and emplacement in the waste stack underground.
3. Slip plates were developed for use as loading pallets, thus minimizing the labor to load and unload TRUPACTs and more safely handle palleted waste within the facility.
4. An automatic TRUPACT door unbolter was developed, to minimize time and labor in opening the door. This was a facility throughput constraint.

A TRUPACT mockup, a loading/unloading dock, and a waste emplacement stack were built in a Westinghouse facility in Pittsburgh. The wrapping, loading, unloading, and stacking operations were all tested satisfactorily. The flow process manpower requirements for these operations were also verified. The equipment was then delivered to the WIPP, where it is being utilized for operator training.

The RH waste flow process has also been examined in detail. Equipment fabrication was completed and tested. The RH emplacement equipment (Fig. 2) was delivered to the site, set up in the TRUPACT Maintenance Facility, and operators have since completed equipment qualification training.

As part of the effort to prepare for operation following completion of construction, approximately 78 operating procedures were written; 2,430 maintenance instructions were written primarily for preventive maintenance; 147 training qualifications were developed; 1,700 spare parts were ordered; and 40 starting tests developed.

Underground initial construction was completed in 1985. Since then underground excavation has become part of the routine operation of the WIPP facility. The mining concept is to complete a waste panel just prior to its need for waste emplacement. This will establish a maximum waste volume following excavation; it will also result in less expensive equipment costs and a continuous on-site waste handling capability.

Excavation work is on schedule for completing the first panel by October 1988. Figure 3 shows the completed and planned excavation throughout the facility lifetime.

Two major productivity and safety improvements were implemented this past year. Various mining machine modifications improved the production from 40 tons/cutter head hour (T/CHH) to more than 80 TCHH, thereby exceeding the design rate of 75 T/CHH. Availability was also improved to over 90%. In addition, a blowout preventer technique is being used to drill in advance of the excavation work. This provides for greatly improved operator safety, should an air-pressurized crack be encountered.

TABLE II

Site Waste Certification Status

Site	Initial Audit Held	Certified Waste Forms
Argonne National Laboratory	Yes	3 of 4
Los Alamos National Laboratory	No	0 of 7
Lawrence Livermore National Laboratory	No	0 of 3
Mound	Yes	2 of 4
Oak Ridge National Laboratory	Yes	1 of 2
Rocky Flats Plant	Yes	11 of 13
Rockwell Hanford Operations	Yes	2 of 5
Savannah River Plant	Yes	1 of 5
Idaho National Engineering Laboratory	Yes	Drums with permeable gaskets
Nevada Test Site	Yes	0 of 1

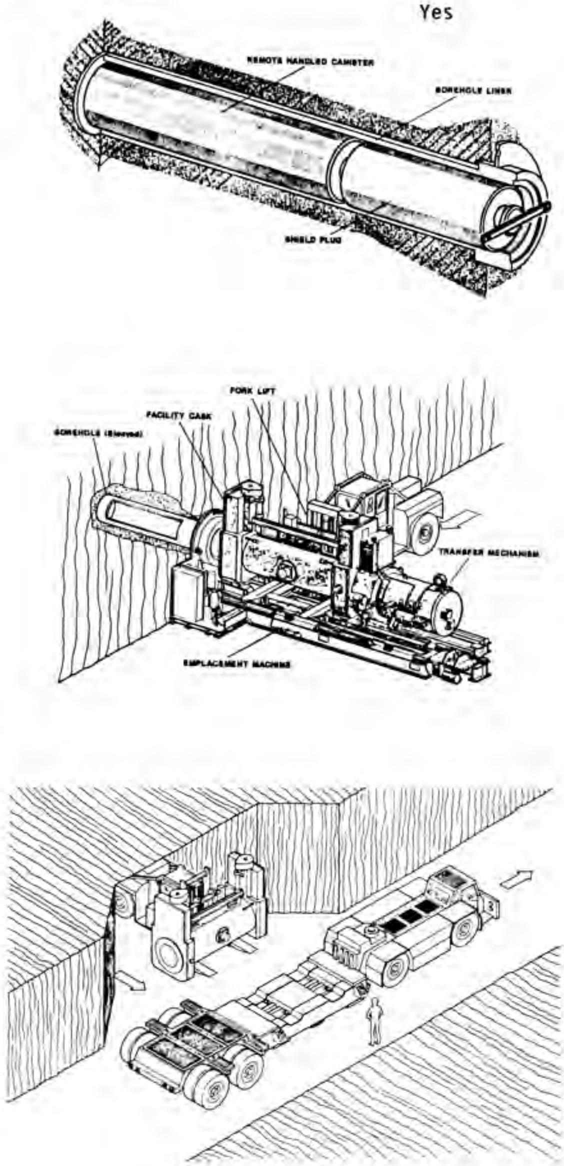

Fig. 2. RH Emplacement Equipment.

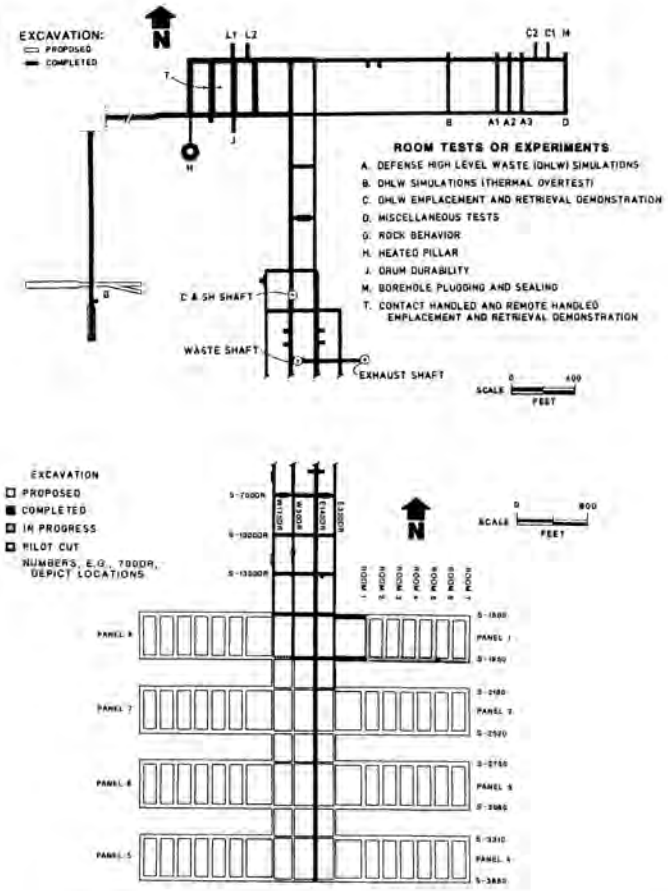

Fig. 3. Completed and Planned Excavation.

The safety record for the site has been excellent, with an incident rate of 1.1 reportable injuries per 200,000 man-hours--compared to the mining industry average of about 11.

The final underground design validation report has been submitted. Based on work closure data, the report confirmed that several waste emplacement room configurations are satisfactory and present a safe working environment.

Testing

The thermal interaction tests which are being conducted so as to determine accelerated room closure rates are progressing and data is being evaluated. Data is being taken on ambient temperature rooms, to assess TRU waste operations and impacts. To date, the data indicates closure rates are 2 to 3 times the predicted values; however, this is still acceptable with regard to long-term excavation and waste emplacement plans.

The waste emplacement room seals are a multi-component design. Testing two of the five design components has been initiated. These components include an immediate low permeability concrete, and salt and dry materials which will develop low permeability at a later time. These have compatible properties with the surrounding rock.

Small scale plugging and sealing tests were successfully completed on salt base concrete materials. Holes up to 36 inches in diameter were tested. Permeability of the plugs and the plug borehole interface are being evaluated. Thirty-six inch diameter holes are now being prepared, to test the properties of salt and salt clay block and salt mortar. Measurements are being made throughout the underground, to assess permeability of the rock formations.

Several waste container tests are being conducted. Brine migration is being examined, in conjunction with the thermal interaction tests. It now appears that the brine migration rate and volume are higher than anticipated; however, the effect of this on expected corrosion rates is not clear although expected to be acceptable.

A drum corrosion test was initiated for mock TRU waste, with 55-gallon drums exposed to various levels of moisture, ranging from brine emersion tests to environments where the waste was covered with dry salt backfill. Drums are also being emplaced to simulate a waste stack, so as to evaluate the possible crushing of the waste stack that may occur as a result of creep closure. Eight simulated RH waste canisters were emplaced with different types of backfill, to determine brine migration effects as well as corrosion rates (Fig. 4).

The Material Interface and Interaction Tests (MIIT) were initiated as part of an international cooperative agreement to examine the stability of various borosilicate and candidate waste container material glass composition material in heated brine. These tests are part of the non-radioactive defense high-level waste experimental program.

Fig. 4. Room J Waste Container Tests.

Environmental and Institutional

The Environmental Monitoring Program to gather baseline data prior to waste receipt was initiated in June 1985. This program includes an evaluation of salt dispersion by the wind from the WIPP salt pile. The salt forms a very hard crust in a few weeks and no significant effects have been noted.

The Waste Emplacement Program calls for a demonstration of up to 5 years of waste emplacement activities before a decision will be made whether to declare the facility a permanent repository. A set of criteria have been developed and issued, specifying the basis upon which this decision will be made. The major factor involves compliance with 40 CFR 191, Part B, commonly known as Performance Assessment. Initial scoping activities have commenced for this first-of-a-kind highly complex analytical modeling and testing method for evaluation of the site.

The Project maintains a continuing dialog with the State of New Mexico, in accordance with the DOE/State Agreement for Consultation and Cooperation. Issues currently being discussed with the State involve the timing of the Performance Assessment and the design of the shipping packages to be used to transport CH TRU wastes to the WIPP. Recently developed regional geohydrologic characteristics are also being mutually evaluated by the State and the Project Scientific Advisor (SNL).

TRUPACT

The transuranic waste transport package (TRUPACT) is a Type B container in which waste will be transported to WIPP. The prototype unit involved a single containment vented package, with completed compliance testing and certification. This unit is no longer being developed. Replacing it is TRUPACT II, a production unit which will be double-contained and non-vented, so as to adhere with the most stringent compliance requirements. This production unit will undergo full compliance testing. Contracts were placed for the design of the unit and a facility is under construction in Carlsbad, New Mexico, where the units will be assembled (Fig. 5).

FUTURE MILESTONES

The major WIPP objectives for 1987, in preparation for waste receipt in October 1988, are as follows:

1. To complete construction of the remaining surface facilities listed in Table I.
2. To complete refurbishment of the Construction and Salt Handling shaft and hoist. This will provide modifications needed to convert the shaft from a construction function to an operating function for the 25-year design life of the facility.
3. To conduct in-situ underground waste retrieval demonstrations for both RH and CH waste.
4. To initiate construction of a new ventilation supply shaft, which will permit multi-function waste handling and testing activities underground on the same shift.

5. To initiate sorbing trace tests that support the Performance Assessment determination of radionuclide migration.

6. To complete the TRUPACT-II design and commence fabrication of the subassemblies.

PROJECTIONS

All activities and plans, to date, are adequately supported and are on a schedule that will fully prepare the WIPP site for the receipt of initial shipments in October 1988.

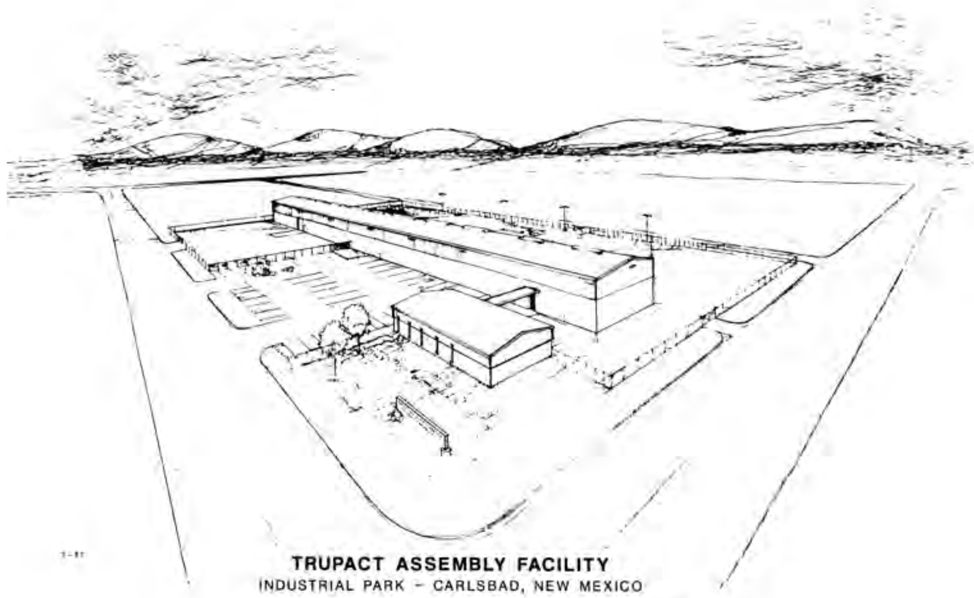

Fig. 5. TRUPACT Assembly Facility.