WIPP WASTE HANDLING PROCESSES AND EQUIPMENT

W. R. Chiquelin and T. W. Halverson
Westinghouse Electric Corporation
Carlsbad, New Mexico 88220

ABSTRACT

The Start Clean, Stay Clean operating philosophy of the Waste Isolation Pilot Plant (WIPP) has resulted in a total quality waste handling environment. The WIPP can handle both contact-handled (CH) and remote-handled (RH) waste independently of one another, beginning with truck or rail shipments. The presentation describes the waste emplacement and retrieval procedures that will be validated prior to the October 1988 receipt of waste, emphasizing the WIPP's implementation of the latest technology and the project's application of many waste handling improvement techniques.

INTRODUCTION

The Waste Isolation Pilot Plant (WIPP), located in Carlsbad, New Mexico, is operated by the Waste Isolation Division of Westinghouse Electric Corporation for the U.S. Department of Energy (DOE).

The WIPP Waste Handling Program addresses all onsite radioactive waste handling activities involving the safe and efficient receipt and movement of defense transuranic waste at the WIPP. Activities included in the Waste Handling Program are physical receipt of waste; its examination and inspection; surface and underground waste handling; waste retrieval (as required); and WIPP-generated waste. Primary emphasis is placed on safety and quality, especially regarding the protection of working personnel, the public, and the environment.

The major operating philosophy of the Waste Handling Program is to START CLEAN, STAY CLEAN. Consequently, waste handling operations will be discontinued in any area where contamination occurs. The contaminated area will be thoroughly decontaminated to clean limits before operations resume in that area. By following this strategy, isolated contamination occurrences will be prevented from spreading throughout the facility. This practice also extends to the underground, where the ventilation system is designed to eliminate the air exchange from the waste handling area into the mining area.

The waste received at the WIPP is composed of two basic types: (1) contact-handled transuranic (CH TRU) waste, which is limited to surface dose rates not greater than 200 mrem/hr; and (2) remote-handled transuranic (RH TRU) waste, which has surface dose rates of greater than 200 mrem/hr (but less than 100 rem/hr for routine RH TRU waste, and up to 1000 rem/hr on an exception basis). While personnel can operate in the immediate vicinity of CH TRU waste, RH TRU waste does require personnel to be shielded from its radiation field. Therefore, specialized handling equipment and a hot cell have been provided to conduct safe RH TRU operations.

Contact-Handled Waste: The CH TRU waste system is designed to receive, unload, transfer (to underground facility storage areas), and emplace the CH waste. During waste handling operations, protection against accidental radionuclide release is accomplished by design redundancy in monitoring systems, equipment, and administrative procedure controls. The system is also capable of performing CH waste retrieval, which will be demonstrated with mock waste containers.

CH TRU waste arrives by railcar or truck in a Transuranic Package Container (TRUPACT) designed to meet DOT Type B shipping requirements for transporting CH TRU waste. Upon entering the WIPP yard TRUPACTs from railcars are transferred to trailers. Trailers bearing all TRUPACTs are then backed into the airlocks and into the Waste Handling Building, where they remain until they are unloaded (Fig. 1). TRUPACTs from rail shipments are transferred back to railcars.

The TRUPACT is unloaded by backing the TRUPACT trailer up to a specially designed unloading dock located inside the Waste Handling Building (Fig. 2). The dock interfaces with the TRUPACT to provide an extension of the TRUPACT inner cavity floor surface. The waste containers are winched out of the TRUPACT on specially designed slip-plates (metal plates with slick lower surfaces). Health physics (HP) technicians perform radiation and contamination surveys of palletized waste containers; any faulty or damaged containers are overpacked, and the TRUPACT is decontaminated (if required). Waste packages are inspected, surveyed, and swiped prior to being transferred back to the main unloading dock area in the Waste Handling Building.

A typical TRUPACT contains up to three loaded slip-plates, which may contain either drums or boxes on them. The first slip-plate is pulled onto a facility pallet and then winched laterally to make room for the remaining slip-plate loads.

The loaded facility pallet is moved by forklift and placed upon the shaft conveyance loading car outside the waste shaft. The conveyance loading car deposits the facility pallet onto support stands designed within the shaft conveyance. The conveyance loading car itself remains at the surface. Next, the hoist lowers the shaft conveyance until it reaches the storage level. The facility pallet is off-loaded from the hoist cage by winching the pallet and sliding it directly onto a waiting transporter truck bed. The hoist cage is then

Work supported by the U.S. Department of Energy Assistant Secretary for Defense Programs, Office of Defense Waste and Transportation Management, under DOE Contract No. DE-AC07-76ID01570.

FIGURE 1

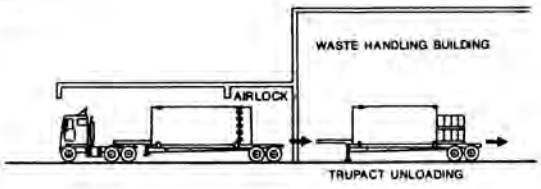

FIGURE 2

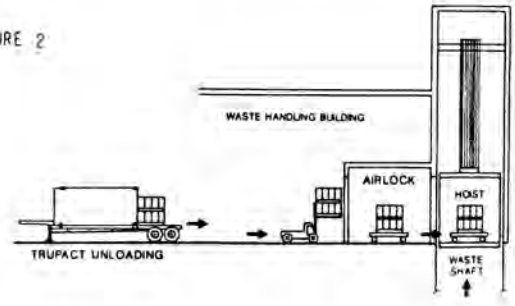

FIGURE 3

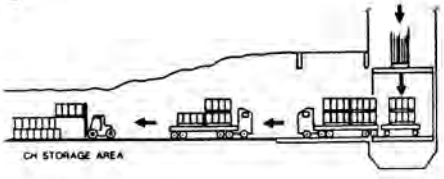

Fig. 1., 2., and 3. Improved CH Waste Handling Flowpath.

returned to the surface, taking empty pallets and slip-plates to the surface.

An underground transporter carries the facility pallet and waste to the designated waste storage room, where a forklift removes the waste packages (six-packs or boxes) and stacks them in the storage array (Fig. 3). The location of each waste package is entered into the record for that waste package, using the WIPP Waste Information System (WWIS) computer data base as a permanent record of the disposed waste. Empty facility pallets and slip-plates are returned to the waste shaft station with the transport.

CH waste retrieval is achieved through a sequence that reverses the process of emplacement. Waste packages would be disinterred, and the condition of the container would be determined. Faulty or contaminated containers would be overpacked, transported to the surface, and shipped from the WIPP site as directed. The retrieval operation would be performed in a controlled environment, including high-efficiency particular air (HEPA) filters, as required.

Remote-Handled Waste: RH TRU is shipped to the WIPP in a shipping cask containing a single canister, designed and certified as a DOT Type B container. The cask is designated as a truck cask, because its weight (50,000 lbs.) allows overhighway trucking without overweight permits. This cask also is utilized as a rail cask if RH TRU waste is shipped by rail.

Trucks and railcars bearing the RH cask enter the WIPP site and are spotted within the WIPP yard. HP technicians survey each shipment for external contamination. In the case of railcars, a WIPP locomotive moves the cask car into the cask receiving area of the Waste Handling Building. Truck trailers are also taken into the cask receiving area (Fig. 4). Inside, HP technicians again survey the cask for contamination for damage at this point. Date and arrival time are entered into the WWIS data base.

During transit, the cask is supported in a horizontal position. In the Waste Handling Building, a yoke is used to rotate the cask into a vertical position onto the transporter.

FIGURE 4

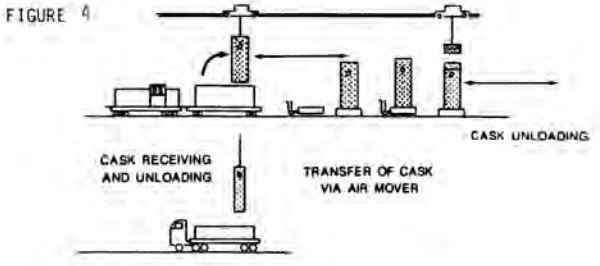

FIGURE 5

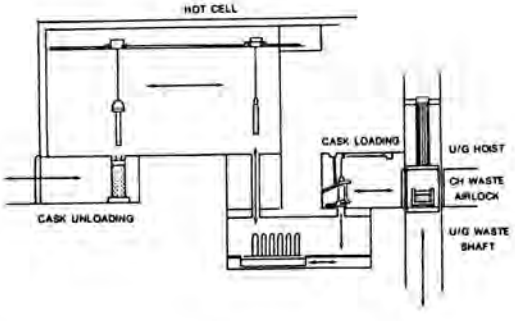

FIGURE 6

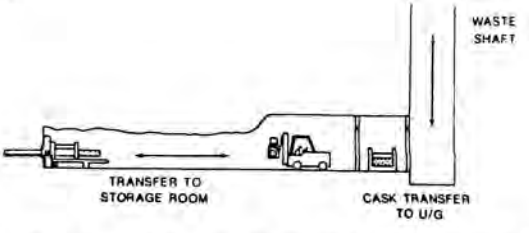

Fig. 4., 5., and 6. RH Waste Handling Flowpath.

While on the transporter, the cask is moved through the open shield door and into the cask unloading room, where it is positioned under the hot cell unloading port (Fig. 5). To prevent any potential contamination spread and to control hot cell ventilation, the cask is mated to the hot cell, using the cask seal collar. The shield door is then closed. Using the hot cell crane, a waste handling technician removes the shield plug from the hot cell unloading port. The cask closure lid is removed, and the canister is taken from the cask using appropriate equipment in the hot cell. The canister is next moved to the inspection stations, where it is inspected and where swipes are taken remotely for surface contamination. Should the canister be faulty, the waste handling technician moves it to the overpack station. The damaged canister is placed in an overpack, and the closure is welded.

The canister, or overpacked canister, is next lowered into the canister shuttle car located in the transfer cell under the hot cell (Fig. 5). This shuttle car positions the canister under the port shield valve of the facility cask loading room. With the facility cask in a vertical position above the port, the telescoping port shield is raised to interface with the cask. The shield bell is positioned on the cask, and the grapple is lowered into the facility cask; the cask shield valves and the port shield valve are then opened. The canister is grappled and drawn upward into the facility cask. The shield valves are closed; the telescoping shield is retracted from the bottom of the facility cask; the facility cask is rotated into a horizontal position and moved into the shaft conveyance on a motorized transfer car (Fig. 5). The facility cask is then lowered into the mine.

Upon reaching the storage horizon, the cask transfer moves the load out into the station area. A large forklift is used to move the cask to the underground storage room (Fig. 6).

Horizontal emplacement holes are prebored into the storage room walls at a specified height and spacing. The cask is placed on the emplacement machine, which is positioned at the receiving hole. The emplacement machine then transfers the canister through the cask into the borehole, using an appropriate sequence of opening shield valves to maintain waste handling technician safety. The shield plug is then inserted into the borehole by the emplacement machine, prior to removal of the cask. The empty transporter cask is then returned to the waste shaft and surface. Accurate records are entered into the WWIS data base, as to the location of each RH canister.

If required, RH TRU canisters will be retrieved using the same emplacement equipment and reversing the order of the procedure.

In summary, it is clear that the WIPP has employed the latest technology in its waste handling equipment and processes. A total quality environment, and the application of many improvement techniques have effected safe, high quality, and efficient methods of handling CH TRU and RH TRU wastes at the WIPP. As a result, WIPP can handle both CH TRU and RH TRU wastes independently of one another, utilizing either truck or rail shipments. Concept demonstrations have already been performed for verifications of WIPP waste handling methods. Complete equipment checkouts and system demonstrations, as well as operational readiness reviews are scheduled prior to actual waste handling at the WIPP.