



## Transportation Casks



TRUPACT-II



HalfPACT



TRUPACT-III



RH 72-B

The U.S. Department of Energy (DOE) has established an elaborate system for safely transporting transuranic, or TRU, radioactive waste to the Waste Isolation Pilot Plant (WIPP) for permanent disposal, or between generator sites. The waste is transported in four shipping casks approved for use by the U.S. Nuclear Regulatory Commission (NRC).

Three shipping casks, the TRUPACT-II, HalfPACT and TRUPACT-III, are designed for hauling contact-handled (CH) TRU waste, while the RH72-B is used to transport remote-handled (RH) TRU waste. All four casks meet NRC and U.S. Department of Transportation radiation limits for public safety

### TRUPACT-II

Each stainless steel TRUPACT-II is approximately eight feet in diameter, 10 feet high, and constructed with leak-tight inner and outer containment vessels. The TRUPACT-II can hold up to 14 fifty-five gallon waste drums, 8 eighty-five gallon drums, six one hundred gallon drums, two standard waste boxes or one 10-drum overpack. The TRUPACT-II underwent extensive testing at Sandia National Laboratories in Albuquerque, New Mexico. A single WIPP shipment can consist of a maximum of three TRUPACT-II's, or a combination of TRUPACT-II's and HalfPACT's.

### HalfPACT

Some shipments will consist of CH TRU waste drums that weigh as much as 1,000 pounds each. The total weigh of the shipment (including the truck and trailer) can weigh no more than 80,000 pounds under U.S. Department of Transportation requirements. To meet these requirements, DOE designed the HalfPACT, a cask for contact-handled waste that is shorter, and therefore lighter, than the TRUPACT-II. Each HalfPACT can carry up to seven fifty-five gallon drums, four eighty-five gallon drums, or three one hundred gallon drums. A single WIPP shipment can consist of a maximum of three HalfPACT's or a combination of HalfPACT's and TRUPACT-II's. The HalfPACT is expected to eliminate about 2,000 shipments of TRU waste over the 35-year operating life of WIPP.

### TRUPACT-III

Large CH TRU waste containers known as Standard Large Box 2's (SLB2's) are too big to fit inside either the TRUPACT-II or HalfPACT. In an effort to accommodate these SLB2's, DOE designed a third CH TRU waste shipping cask. TRUPACT-III is a large rectangular cask used to transport the SLB2. The cask is comprised of inner and outer stainless steel plates and polyurethane foam to protect against potential punctures and fire danger. One TRUPACT-III is transported on a custom designed trailer. The maximum allowable weight of a TRUPACT-III cask can be up to 55,116 pounds making a fully loaded TRUPACT-III shipment 84,096 pounds. A TRUPACT-III shipment is a non-divisible load, meaning parts of the shipment cannot be removed to lessen the weight. Therefore, overweight shipping permits can be obtained for shipments to WIPP.

## Testing Requirements

- Drop test
- Fire test
- Puncture test
- Pressure test



TRUPACT-II Drop Test



TRUPACT-III Drop Test



HalfPACT Puncture Test



HalfPACT Fire Test

## RH 72-B

Some TRU waste emits large amounts of penetrating gamma radiation. This “remote-handled” waste must be shipped in different casks that provide more shielding. The RH TRU 72-B is designed to safely transport these wastes. Like the CH waste casks, the RH TRU 72-B is leaktight and constructed with inner and outer containment vessels. It is a large cylinder approximately 12 feet long and about 3.5 feet in diameter. The cylinder fits into circular impact limiters, similar to shock absorbers, designed to protect the container and its contents in the event of an accident. The RH TRU 72-B has a one-and-5/8-inch-thick lead liner to shield people from gamma rays. It also has an outer thermal shield to protect the container against potential fire damage.

## Testing and Certification

All transportation casks used to transport TRU waste to WIPP are NRC certified Type B casks. Type B casks must meet stringent NRC design, fabrication, operation, and maintenance requirements. Designs for the Type B casks must withstand normal transportation conditions, such as exposure to high and low temperatures, varying external pressure, and impact from debris.

In addition, NRC certification requires Type B casks to withstand a series of hypothetical accident scenarios without failing. The NRC regulations (10 Code of Federal Regulations Part 71) allow computer-simulated, scale model, or full-scale model testing to demonstrate a transportation container’s suitability for certification. A combination of these methods is commonly used. The tests performed include:

- Free-Drop Test. The transportation cask is dropped from 30 feet onto a flat, unyielding surface (such as a steel-reinforced concrete pad), striking the surface at the container’s weakest point.
- Puncture test. Next, the transportation cask is subjected to a 40-inch free drop onto a six-inch diameter steel bar at least eight inches long.
- Burn Test. The transportation cask is drenched with jet fuel and ignited, subjecting it to a temperature of 1,475 degrees Fahrenheit for 30 minutes.
- Immersion Test. Using specialized analyses, a separate transportation cask of the same design is subjected to external pressure equivalent of being immersed under 50 feet of water.

When all the requirements for design and testing are met, NRC issues a Certificate of Compliance for the design of the transportation cask. The certificate specifies procedures for the manufacture, operation and maintenance of the packaging. It also defines the packaging’s authorized contents. The certificate is valid for five years. At the end of this period, DOE may apply to renew a container’s certification.

## Transportation

The U.S. Department of Energy employs professional trucking firms that offer excellent safety records and years of experience in transporting hazardous materials.

WIPP drivers must pass stringent safety and emergency response examinations and maintain good driving records.

# WIPP TRANSPORTATION SYSTEM



## For more information

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Drivers work in pairs to assure that the truck and payload are attended at all times and that drivers are rested when it is their turn to drive.

## Vehicles

WIPP uses conventional diesel tractors and specially designed trailers. The trailers can carry a total of three TRUPACT-II's or HalfPACTs, one TRUPACT-III or one RH-72B per shipment.

Features in the tractor cab include:

- A computer keyboard linking the vehicle with a satellite tracking system
- Continuous tracking by a central control room at the WIPP site
- Redundant two-way communication systems

Each shipment is inspected to the Commercial Vehicle Safety Alliance Level VI standards, the industry's highest level, prior to departing a TRU waste generator site. WIPP drivers are required to stop and check their trucks and payload every 150 miles or three hours en route. The trucks are also subject to inspection at state ports of entry.

Other transportation safeguards include:

- Designated safe parking areas along all routes for use in inclement weather or off-normal conditions
- The ability to replace or repair tractors en route within eight hours

## Shipping Routes

U.S. Department of Transportation regulations require radioactive materials to be shipped on the interstate highway system unless states designate other routes. WIPP shipment protocols were developed through cooperative efforts with the states, tribal governments and the U.S. Department of Energy.

