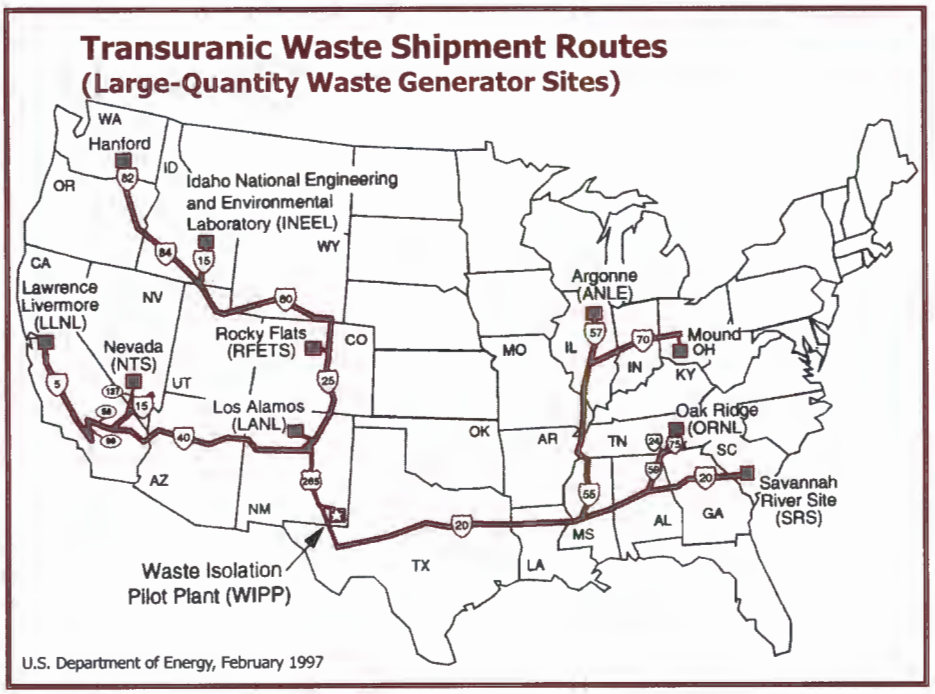
Backgrounder on the Waste Isolation Pilot Plant

An informational series by the Environmental Health Center, a division of the National Safety Council

How Are WIPP Transportation Routes Chosen?

The first shipments of transuranic radioactive waste are scheduled for delivery to the Waste Isolation Pilot Plant (WIPP) in mid-1998. The WIPP, a U.S. Department of Energy (DOE) facility near Carlsbad, New Mexico, is the first deep geologic repository for permanent disposal of defense-related transuranic waste in the United States. Transuranic waste consists primarily of protective clothing, tools, glassware, equipment, soils, and sludges that have been contaminated with trace amounts of manmade radioactive elements, such as plutonium. Only transuranic wastes generated at U.S. nuclear weapons production facilities are to be disposed of at the WIPP.



Over the next 35 years, a maximum of 215,418 cubic yards of transuranic waste will be disposed of at the WIPP from 23 generator and storage sites throughout the United States. More than 99 percent of this waste will come to the WIPP from 10 large-quantity generator and storage sites (see box on page 2). The remaining waste, about 790 cubic yards, will come from 13 additional sites (see box on page 2). DOE estimates that nearly 38,000 shipments of transuranic waste will travel from these sites to the WIPP. Initial shipments will consist of contact-handled waste only. Shipments of remote-handled waste will begin no sooner than 2003.

An individual shipment of transuranic waste en route to the WIPP could pass through as many as 10 states, including New Mexico and the shipment's state of origin. About 30 states will have routes designated for shipping transuranic waste to the WIPP. The map on

Types of Transuranic Waste

Contact-Handled Transuranic Waste

About 97 percent of the volume of transuranic waste is contact handled. This means that it can be safely handled under controlled conditions without any shielding of the 55-gallon metal drum or metal box used to package it. Contact-handled transuranic waste is transported in special casks.

Remote-Handled Transuranic Waste

Remote-handled transuranic waste has a higher level of radioactivity than contact-handled transuranic waste and must therefore be handled and transported in shielded casks.

this page shows the routes for transporting transuranic waste from large-quantity waste generator sites. DOE is still in the process of proposing the routes to the WIPP from the small-quantity generator sites.

Routing Regulations

DOE has been working with the states since the early 1980s to develop feasible routes for transporting transuranic waste to the WIPP. DOE proposed potential routes to the states in its final environmental impact statement, which was issued in October 1980. In February 1982, the U.S. Department of Transportation (DOT) issued new regulations that set guidelines for selecting routes for transporting certain radioactive materials. The regulations can be found in Title 49, Part 397, Subpart D, in the U.S. Code of Federal Regulations. They require that certain radioactive shipments, known as Highway Route Controlled Quantity shipments, follow "preferred routes." Preferred routes, according to the regulations, are interstate highway routes where an alternative route has not been designated by a state routing agency, state-designated routes selected by a state routing agency, or both. Where possible, shipments are to be routed onto bypasses or beltways to avoid traveling through highly populated areas. Interstate highways are preferred because they are well designed, engineered, and maintained and because they allow ready access by emergency responders in the event of an accident or emergency. Although the majority of WIPP shipments will not meet the definition of a Highway Route Controlled Quantity shipment, DOE voluntarily agreed to use the DOT regulations in selecting transportation routes to the WIPP.

To develop proposed routes, DOE used a number of route-comparison factors, including accident rates, traffic counts, highway segment length, vehicle speeds, population distribution, and nearby land use. DOE also used several computer programs to help compare potential truck routes. After DOE proposed the most feasible routes based on its evaluation, state agencies and Indian tribes were given the opportunity to assess DOE's routes and designate alternatives that may prove safer.

Large-Quantity Generator Sites

- Argonne National Laboratory-East, Illinois
- Hanford Reservation, Washington
- Idaho National Engineering and Environmental Laboratory, Idaho
- Lawrence Livermore National Laboratory, California
- Los Alamos National Laboratory, New Mexico
- Mound Plant, Ohio
- Nevada Test Site, Nevada
- Oak Ridge National Laboratory, Tennessee
- Rocky Flats Environmental Technology Site, Colorado
- Savannah River Site, South Carolina

Small-Quantity Generator Sites

- Ames Laboratory, Iowa
- ARCO Medical Products Company, Pennsylvania
- Babcock & Wilcox-NES, Virginia
- Battelle Columbus Laboratories, Ohio
- Bettis Atomic Power Laboratory, Pennsylvania
- Energy Technology Engineering Center, California
- General Electric-Vallecitos Nuclear Center, California
- Knolls Atomic Power Laboratory, New York
- Lawrence Berkeley Laboratory, California
- Missouri University Research Reactor, Missouri
- Paducah Gaseous Diffusion Plant, Kentucky
- Sandia National Laboratories, New Mexico
- U.S. Army Materiel Command, Illinois

Influence of the States

State agencies or Indian tribes that choose to designate different routes for shipping transuranic waste must perform a comparative route analysis following DOT's *Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials* (DOT/RSPA/HMS/92-02, August 1992) or an equivalent route analysis that adequately considers overall risk to the public. In addition, the states must consult extensively with any affected local jurisdictions and neighboring states to ensure that all potential effects are considered and that the designated routes remain continuous. This consultation typically involves public meetings, public hearings, or other communications to solicit input from people who may be affected. A state's evaluation might include the results of emergency response training and field exercises, the availability of safe parking locations, weather

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conditions, medical preparedness, and rush-hour traffic. Once a state has completed its analysis, the state gives written notice of its designated routes to DOT's Federal Highway Administration (FHWA). The state-designated route becomes effective once the FHWA sends the state written acknowledgement of receipt of the notice.

States will reevaluate the routes periodically. Some factors they may examine include the number of incidents along the route involving radiological material shipments, the number of incidents along the route involving other commercial trucks, locations with high accident rates or weather problems, and other concerns. This information will be used to consider alternate routes or to alert drivers to road segments of concern.

For more information on the WIPP

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The remote location of the WIPP made selecting routes in New Mexico challenging. Some travel on two-lane, nondivided highways will be necessary until road improvements are completed. DOE worked with the state of New Mexico to obtain funding from Congress to repair and upgrade the roads selected by the state. In addition, DOE is helping the state to finance a relief route (bypass) around Santa Fe. A two-lane relief route around Santa Fe is expected to be completed by July 31, 1998, and the full four-lane relief route is expected to be completed in late 1999. The designated transportation routes in New Mexico are shown on the map on page 4.

Role of State Collaborations

The western states have been working with the federal government since the 1980s to develop feasible routes and a transportation safety program for waste bound for the WIPP. In 1989, the Western Governors' Association (WGA) established a Technical Advisory Group to address transportation safety issues and help ensure the "safe and uneventful" movement of transuranic waste. This group originally consisted of representatives from the seven states along the initial planned transportation corridors: New Mexico, Colorado, Wyoming, Utah, Idaho, Washington, and Oregon. The group subsequently expanded to include California, Nevada, and Arizona, states through which shipments will occur later.

In late 1995, WGA signed a memorandum of agreement with DOE to develop a regional protocol for the safe transport of transuranic waste to the WIPP. The memorandum of agreement supported implementation of the *Western Governors' Association WIPP Transportation Safety Program Implementation Guide*, which addressed such issues as strict safety protocols, accident prevention, emergency preparedness, medical preparedness, and route designation.

WGA works with states, DOE, and its contractors to ensure that emergency personnel are prepared

to support transuranic waste shipments. After reviewing and updating WIPP procedures, WGA sponsored an exercise to test the transportation and emergency response system using mock shipments from the Idaho National Engineering and Environmental Laboratory, the Rocky Flats Environmental Test Site, and the Los Alamos National Laboratory. The results are being used to further refine WIPP transportation procedures.

The Southern States Energy Board (SSEB) established a Transuranic Waste Transportation Working Group in 1989 to begin planning for shipments of transuranic waste across southern states. This committee provides DOE with a perspective on transportation issues important to the region. Members of the committee are gubernatorial appointees from 11 SSEB member states: Alabama, Arkansas, Georgia, Kentucky, Louisiana, Mississippi, Missouri, Oklahoma, South Carolina, Tennessee, and Texas. An additional six states outside of the SSEB region participate in the working group because of their connection to the region's transportation corridor: Illinois, Indiana, Iowa, New York, Ohio, and Pennsylvania. Committee members are emergency response planners, radiological health professionals, and other knowledgeable officials. The SSEB Working Group meets twice each year to identify, prioritize, and resolve issues related to the transportation of transuranic waste.

Coming Soon:

- Transuranic Waste Transport Containers
- Which Wastes Will Be Sent to WIPP?
- How Safe Is DOE's Transportation System?

EHC Publications on WIPP Now Available:

- A Reporter's Guide to the Waste Isolation Pilot Plant
- Transporting Waste to the WIPP
- International Perspectives on Deep Geologic Disposal of Nuclear Waste
- Selecting a Shipment Method: Trucks Versus Trains

Transportation Routes in New Mexico

In September 1997, SSEB released its *Transportation Planning Guide for the U.S. Department of Energy's Shipments of Transuranic Waste,* which documents regulatory and extra-regulatory actions that apply to shipments of transuranic waste in the southern region. The guide addresses the various aspects of transportation planning, including designating radioactive materials routes, performing vehicle inspections, disseminating public information, and providing emergency response planning and training.

In late 1997, SSEB signed a memorandum of agreement with DOE for the "Regional Protocol for the Safe Transport of Transuranic Waste to the Waste Isolation Pilot Plant." The memorandum of agreement endorses the principles and procedures presented in the *Transportation Planning Guide.*

This document was prepared by the Environmental Health Center under a cooperative agreement with the U.S. Department of Energy.

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Selecting a Shipment Method: Trucks Versus Trains

The first shipments of transuranic radioactive waste are scheduled for delivery to the Waste Isolation Pilot Plant (WIPP) in mid-1998. The WIPP, a U.S. Department of Energy (DOE) facility near Carlsbad, New Mexico, is the first deep geologic repository for permanent disposal of defense-related transuranic waste in the United States. Transuranic waste consists primarily of protective clothing, tools, glassware, equipment, soils, and sludges that have been contaminated with trace amounts of manmade radioactive elements, such as plutonium. Only transuranic wastes generated at U.S. nuclear weapons production facilities are to be disposed of at the WIPP. DOE estimates that nearly 38,000 shipments of transuranic waste will travel from these sites to the WIPP.

The Land Withdrawal Act of 1992, which withdrew the land around the repository from public use, required DOE to submit a report to Congress comparing truck and rail shipment of transuranic waste to the WIPP. In early 1994, DOE published the results of its analysis of the alternatives for transporting transuranic waste to the WIPP. Based in part on these results, DOE has determined that shipment via tuck is currently the most feasible alternative.

Shipment Options

To determine the best method to transport transuranic wastes to the WIPP, DOE analyzed three possible methods: trucks, regular trains, and dedicated trains. (Only truck shipments were considered for waste from the Nevada Test Site and Los Alamos National Laboratory, which are not accessible by rail.)

A *truck shipment* would consist of a modified flatbed trailer attached to a conventional diesel tractor. Each truck would have the capacity to carry up to three containers specifically designed to transport transuranic waste. The trucks would be part of a fleet dedicated to the WIPP project and would not be used for other purposes.

A *regular train shipment* would consist of one railcar transporting as many as 6 containers specifically designed to transport transuranic waste. A total of up to 18 of these containers could be transported by a single regular train. As required by law, the waste-carrying cars would be flanked by empty "idler," or "buffer," cars. The trains would also carry their regular freight in additional cars.

A *dedicated train shipment* would consist of a locomotive, two or three railcars carrying a total of up to 18 containers specifically designed to transport transuranic waste, buffer cars in front and back of the cargo cars, and a caboose or passenger car at the rear of the train. The last car would carry an emergency response specialist trained in WIPP shipments. Dedicated trains would transport only transuranic waste and would not carry other freight.

Comparison of the Options

Cost: In 1993 dollars, truck transportation costs were estimated at between $236.8 million (contract) and $258.1 million (commercial). The costs of regular train shipments (including truck transportation from the Nevada Test Site and Los Alamos National Laboratories) were estimated at between $[illegible] million (contract) and $332 million (commercial). Dedicated train shipment costs were estimated to be approximately $850 million. These costs were calculated for the 35-year period that waste would be transported to the WIPP.

Health and Environmental Risks: DOE's analysis indicates that normal, incident-free train and truck travel would pose no significant risks to human health or the environment. The projected radiological exposure to people and the environment is well below the measured natural, or "background," rates of radiation. The potential environmental effects from incident-free truck or train shipments are primarily associated with air quality, such as pollution from vehicle emissions, fugitive dust, and particulate matter. These pollutants are not related to the type of cargo. In addition, the estimated emissions from trains and trucks that would transport waste to the WIPP are well below the regulatory limits for these pollutants.

The primary environmental effects of an accident would be on the surrounding plant and animal life and landscape caused by the heavy equipment used to clean up the accident. Any cleanup would require that

soil contaminated with fluids from the vehicle be removed and the area returned to preaccident conditions. In terms of radiological risk in an accident, truck shipments would be slightly safer, since they carry fewer packages than the rail shipments.

Timing: The Nuclear Regulatory Commission requires that all shipments to the WIPP be unsealed within a 60-day period to keep hydrogen gas from accumulating in the special shipping containers. This period starts as soon as the outer lid of the container is sealed. Regular rail shipment is typically slower than highway or dedicated rail shipment. This means that regular rail carriers cannot guarantee that DOE would be able to unseal the containers within 60 days of loading.

Tracking: DOE's satellite-based Transportation Tracking and Communication System (TRANSCOM) will track all WIPP shipments from beginning to end. TRANSCOM can be used with truck, regular train, or dedicated train shipments. Two communications satellites will relay vehicle positions to the TRANSCOM control center in Oak Ridge, Tennessee, where they will be displayed continuously on computer-generated maps. If a shipment gets off the designated route or stops moving without explanation, control center operators follow up to identify and solve the problem. Authorized federal, state, and tribal officials will be able to monitor this information and other shipment data 24 hours a day.

Emergency Response: Emergency response in the event of an accident involving truck or train shipments to the WIPP would be similar. County or city responders would act first to assess the situation. State and federal teams would respond upon notification of the incident. Both truck and train carriers have emergency plans for accidents involving hazardous

materials. In addition, over the last several years, more than 12,000 emergency responders in the communities along the proposed highway transportation routes have taken special WIPP emergency response training.

Shipment Method Selected

DOE has investigated, and continues to investigate, the possibility of using rail transportation for shipping transuranic waste to the WIPP, but this method is currently less feasible than truck transportation. The primary factors that make rail transportation less feasible are as follows:

- ❑ Commercial rail carriers cannot guarantee that DOE would be able to unseal the containers within 60 days of loading, as required by Nuclear Regulatory Commission Certificate of Compliance for the special shipping containers.
- ❑ Commercial rail carriers have demonstrated limited interest in handling shipments of transuranic waste.
- ❑ Dedicated rail transportation is significantly more expensive than truck transportation.
- ❑ Acquiring the additional transport containers needed for rail transportation (because three times as many containers are carried on each shipment) would add to the costs involved.

Regular train shipments to the WIPP may be considered in the future because they cost less and pose no additional risk.

For more information on the WIPP

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