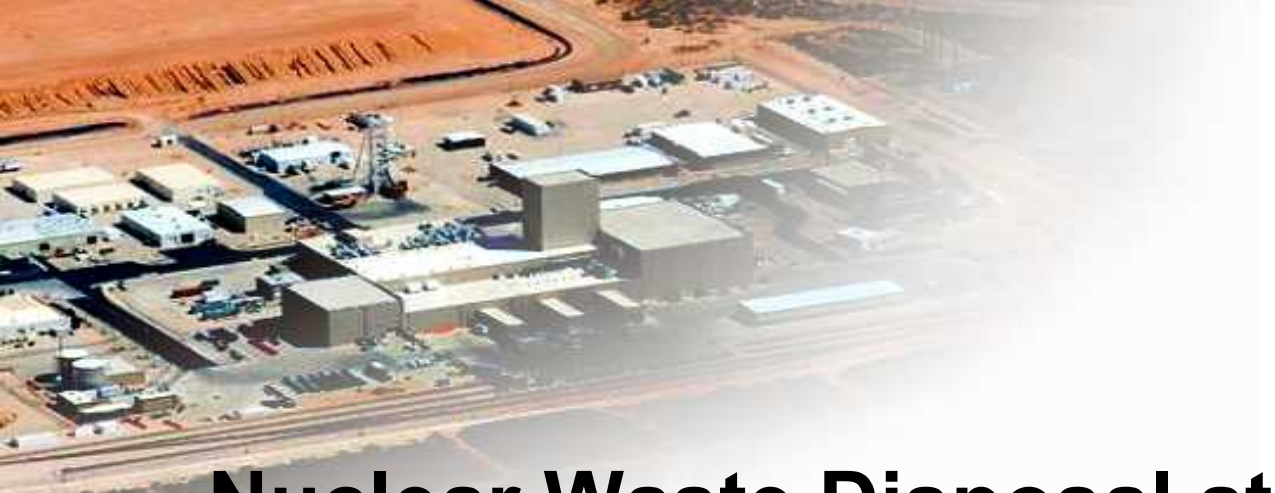

SAND2012-1517P

# Nuclear Waste Disposal at WIPP: A National Success Story

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March 1, 2012

U.S. DEPARTMENT OF ENERGY

NNSA National Nuclear Security Administration

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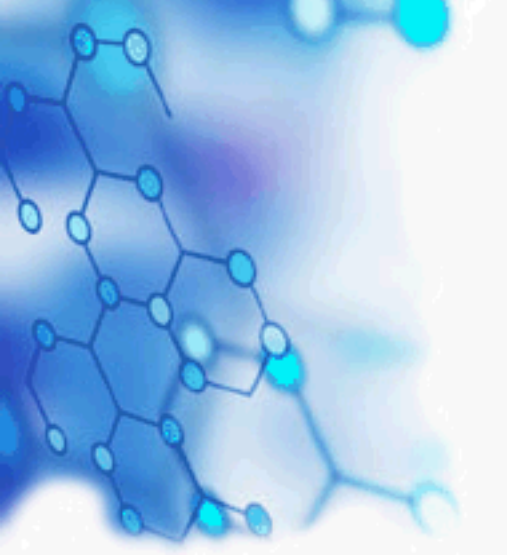


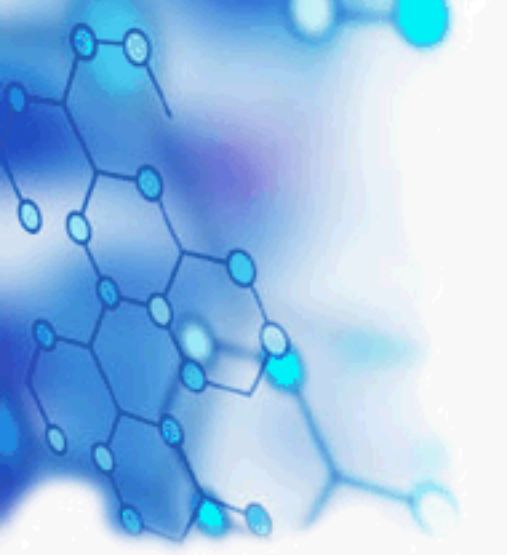
# THEORY

# Gaining Social Acceptance for Nuclear Waste Disposal Activities

- Risk assessments performed are an important tool used to gain social acceptance
- Risk assessments must be performed with high integrity, transparency, and independence
- To the degree possible, rely upon independent scientists to conduct the risk assessment work (rather than “hired guns”)
- At the very least, involve scientific organizations with very high levels of public trust and confidence in very visible ways

# Gaining Acceptance (con't.)

- Refrain from both the fact and the appearance of having made a decision about the acceptability of nuclear waste disposal activities before the risk assessment work is complete, presented, and properly vetted
- This can be very difficult, since the very nature of the process for obtaining regulatory approval to engage in nuclear waste disposal activities obliges the sponsoring government agency to use the risk assessment results to make arguments *for* compliance and to respond to critics who argue *against* compliance
- This regulatory approval process often moves in parallel with the conduct of risk dialogues with the public

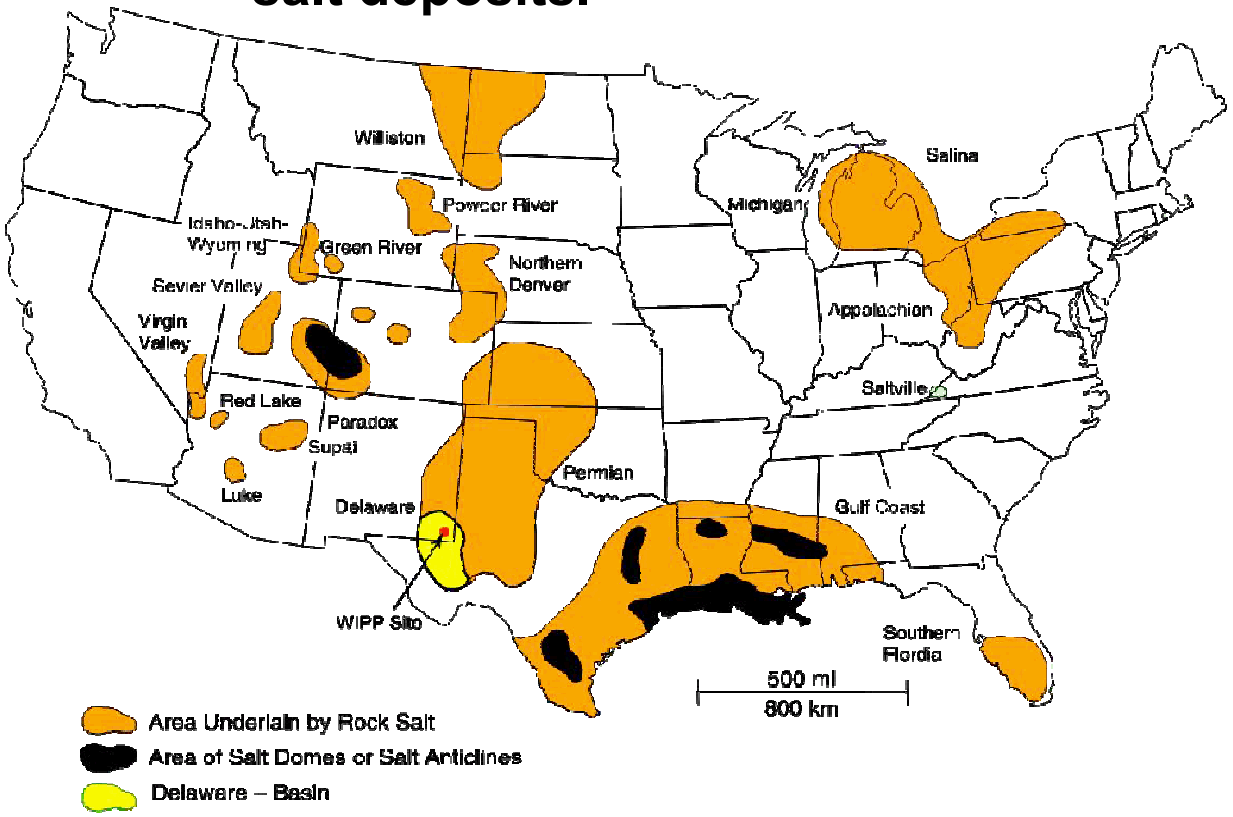


# PRACTICE

# National Academy of Science

**1957**

- **National Academy of Sciences concludes that the most promising disposal option for radioactive wastes is in salt deposits.**




*–"Salt at great depth flows. It will encapsulate any waste placed at depth and isolate it from the surface environment for eons."*

*–"The great advantage is that no water can pass through salt. Fractures are self healing…."*



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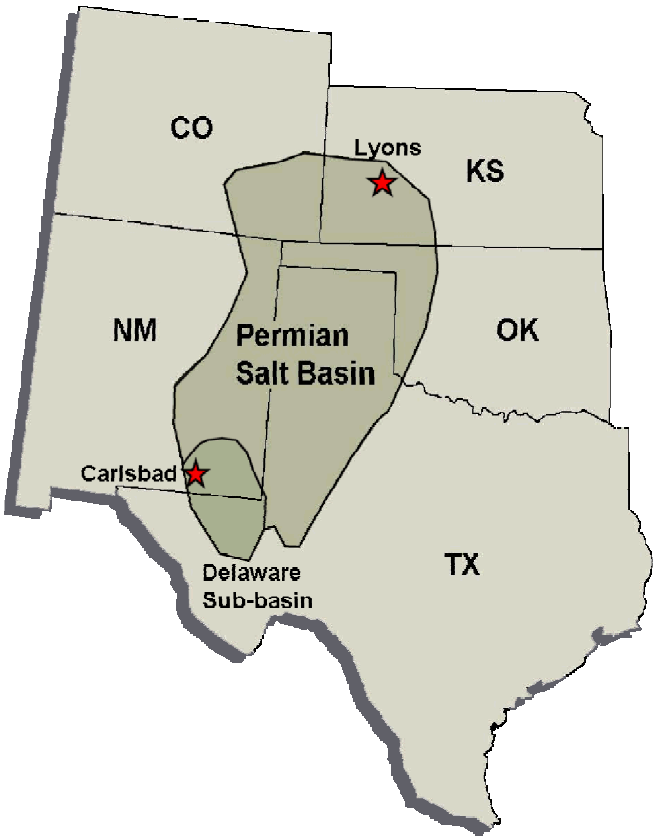
# Initial Candidate Sites Focused on Bedded Salt

**1968**
**1971**

- **Project Salt Vault near Lyons Kansas.**
  - **Nearby oil production provided easy targets for critics and the Lyons site became politically troubled very quickly.**

**1972**

- **Local leaders from Carlsbad, NM learn of problems at Lyons and actively pursue AEC to explore nearby potash district for candidate sites.**
  - **Delaware Basin turns out to be deepest and thickest, but nearby oil production and potash mining still make site selection controversial.**



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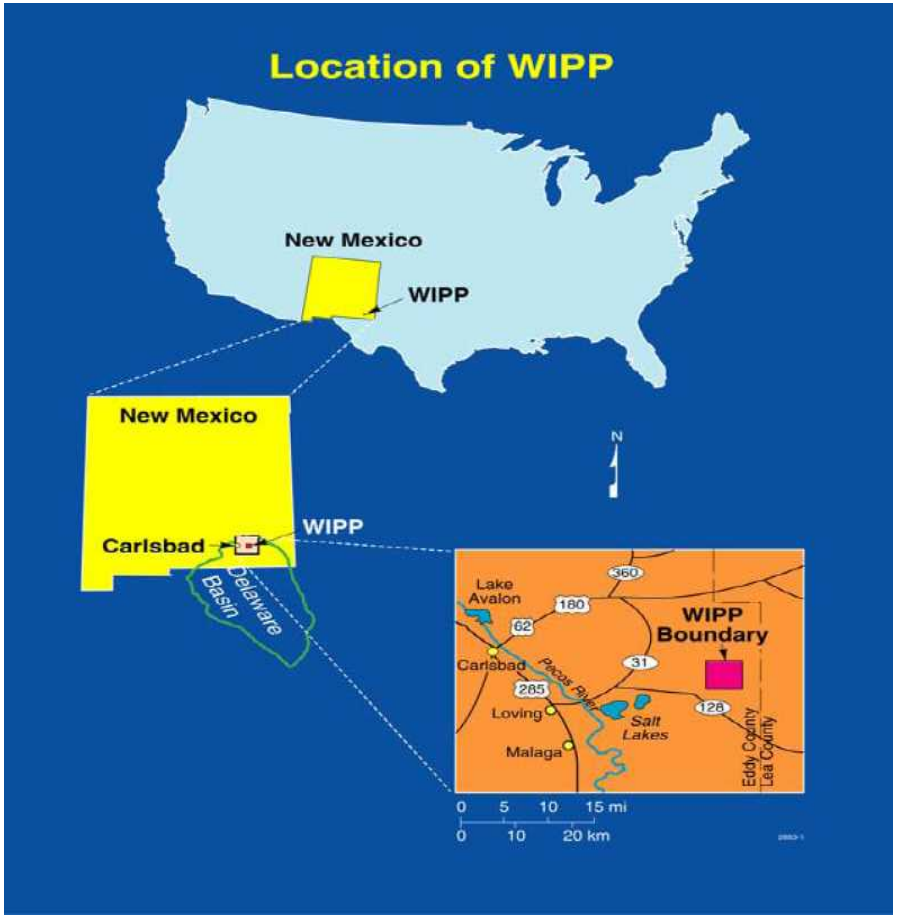
# DOE National Security and Military Applications of Nuclear Energy Authorization Act of 1980

**1979**

- **Act authorized DOE to construct WIPP and to seek New Mexico endorsement to operate a geologic repository for disposal of defense-generated radioactive waste (weapons development waste).**
  - **Act does not allow disposal of waste from civilian power production.**
- **Substantial influence by both local and state politicians to proceed. Economic impact (jobs) drove influence but 'good science' demanded at every step!**

# WASTE ISOLATION PILOT PLANT (WIPP)




**WIPP, located approximately 42 km (26 miles) southeast east of Carlsbad, New Mexico, is the first deep geologic repository certified in the U.S. to safely and permanently dispose of transuranic waste generated from the research and production of nuclear weapons.**

**TRU waste is the U.S. equivalent to Europe's intermediate-level waste, between low-level waste (LLW) and high-level waste (HLW), and requires long-term isolation in a deep geologic repository.**



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# Site Selection

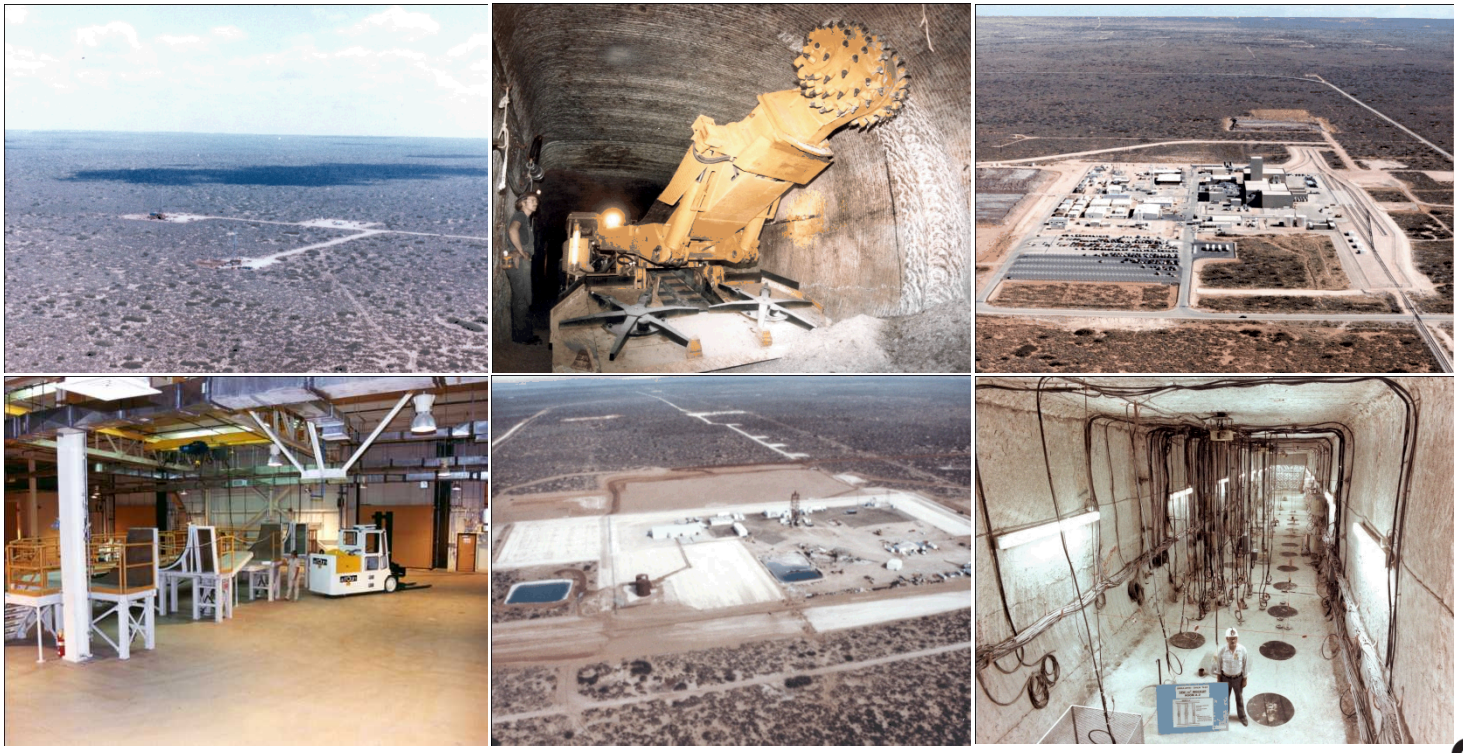
# Construction of WIPP

**1974** • First exploratory borehole drilled

**1981** • Surface construction of WIPP begins.

**1983** • First underground rooms are completed.

**1988** • Engineered facility is ready for waste disposal.





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# WIPP Today



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# Major WIPP Events After the Facility Readiness

| | |
|---|---|
| 1989 | • Nuclear Regulatory Commission certifies the TRUPACT-II shipping container |
| 1992 | • WIPP Land Withdrawal Act designates EPA as WIPP's primary regulator |
| 1993 | • EPA issues environmental radiation protection standards for radioactive waste disposal |
| 1996 | • EPA issues criteria for demonstrating compliance with disposal standard |
| 1998 | • EPA certifies that WIPP complies with 40CFR191 |
| 1999 | • First shipment of TRU waste from Los Alamos National Laboratory |
| 1999 | • New Mexico Environment Department issues a Hazardous Waste Facility Permit |
| 2004 | • Recertification CRA-2004 |
| 2007 | • Begin Remote Handled Waste Disposal |
| 2009 | • Recertification CRA-2009 |


CARLSBAD
CURRENT-ARGUS

sstand (36 cents home-delivered) | 26 Pages | SUNDAY | April 18, 1999 | Serving Eddy County, New Mexico

It's official: WIPP's open for business

Richardson, N.M. congressmen on hand for grand opening ceremony

By Victoria Parker-Stevens

CARLSBAD — As a thank you to those who worked more than 25 years to see a nuclear waste repository open, the Waste Isolation Pilot Plant held special ceremonies Saturday morning.

While the first shipment arrived at the plant March 26

"Today I'm especially proud to be an American and associated with those who made this possible."





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# Land Withdrawal Act Summary

- LWA authorized WIPP
  - Withdrew public land for disposal operations
  - Defined DOE and EPA responsibilities
  - Required EPA to promulgate Certification Criteria
  - Set limits for waste
  - Defined transportation requirements
  - Requires DOE to demonstrate continued compliance with the EPA's disposal requirements (recertification) every 5-years

# Waste Characterization

- **WIPP waste is thoroughly characterized to assure that it meets WIPP waste acceptance criteria**
  - **For transportation requirements**
  - **For disposal criteria**
  - **For health and safety requirements**

# Types of TRU Waste at WIPP

- **Contact-Handled (CH)**
  - Has a surface does rate not greater than 200 mrem/hr at the surface of the waste container
  - Can be physically handled by operators
  - May be mixed with hazardous constituents

- **Remote-Handled (RH)**
  - Has a surface dose rate greater than 200 mrem/hour at the surface of the waste container, but it cannot exceed 1000 rem/hr
  - Robotics and machinery are required
  - May be mixed with hazardous constituents

# WIPP Transportation

- Monitored by satellite tracking system
- Drivers are highly trained
- Emergency responders are trained
- Robust packaging

–72-B Cask for RH Waste


•Double confinement
•3 drums, 240 PE-Ci and/or 60 watts
•Total vehicle weight ≈ 36,300 kg
•Primary option for RH transportation

–TRUPACT-II for CH Waste


–The TRUPACT-II is a dual containment Type B shipping container used in shipments of contact-handled waste from generator sites to WIPP.

–As of mid-January, 2012, more than 10,284 shipments of waste have come to WIPP

–WIPP transports have traveled more than 19 million kilometers (12 million miles)



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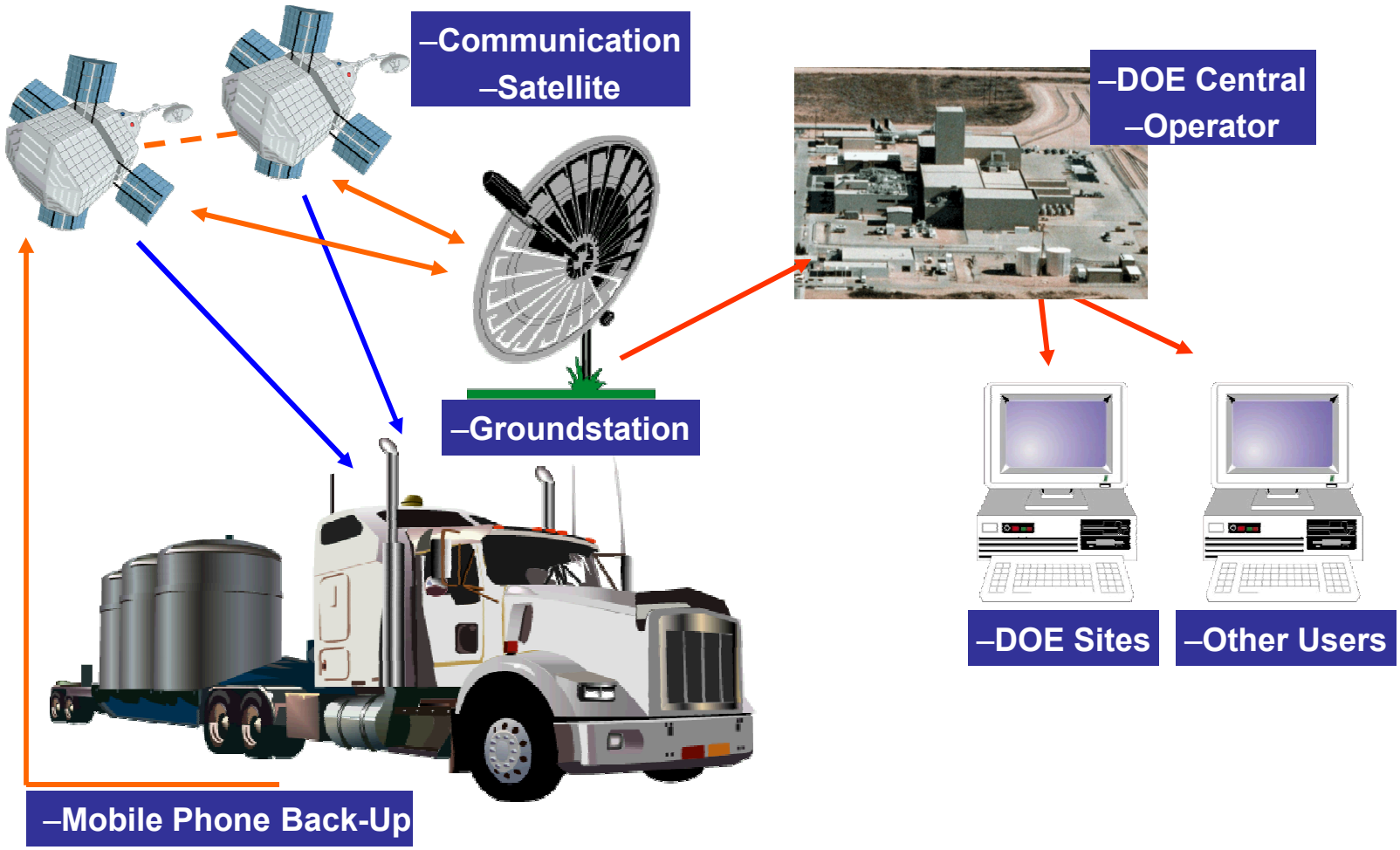
# TRANSCOM Tracking System



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# NRC Type B Package Testing

- 800° C burn
- 9.1 m drop
- Computer modeling to equal immersion in 15.2 m of water



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# WIPP – Approved Shipping Routes




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# Training Along Shipment Routes

- **WIPP's training program meets the requirements in the 1992 WIPP Land Withdrawal Act**

- **WIPP's Training and Education Program has trained more than 20,000 emergency response professionals**

- **Classes address**
  - **Caring for accident victims**
  - **Guarding the public welfare**
  - **Protecting the environment**
  - **Ensuring the safety of responders**

# Waste Handling


**In this picture, the TRUPACT-II is in the WIPP Waste Handling Building TRU-dock to be unloaded. The Outer Containment Vessel (OCV) lid is being removed and will be placed on the round (grey) rack in the lower left corner of the picture. After the OCV lid is removed, the Inner Containment Vessel (ICV) will be removed in a similar fashion, allowing access to the waste packages within the ICV. The ICV lid can be seen as it remains on the TRUPACT-II container.**

# Waste Emplacement

Contact Handled (CH) Waste is emplaced in rooms mined out of ancient salt beds. MgO is placed on waste stack to limit solubility of radionuclides

Emplacement of remote-handled (RH) waste in the wall of a WIPP panel

**As of mid-January, 2012, more than 79,000 $m^3$ of waste in 156,539 containers have been emplaced in the repository**

# Summary

- Safety and Transparency at every phase of the project has been of utmost importance
  - Site selection, construction and operation
  - Site characterization/data collection
  - Performance assessments
  - Compliance demonstrations and license decisions
- Assembled the strongest technical team possible, effectively use expert panels, and focus on documentation, QA and safety
- Developed a relationship of “mutual respect” with the regulator, ensuring appropriately resourced dialogue and face-to-face meetings with regulators
  - Independent regulatory standards and criteria
  - Recognize regulators will represent applicants to public

# Summary (continued)

- Early involvement of stakeholders and independent oversight group(s)
- Involved and educated the public and sincerely addressed their concerns
- Recognized that some opponents probably would probably not be convinced; expected and prepared for legal challenges
- Balanced desire to increase public confidence, achieve transparent processes, with resources needed to meet regulatory requirements
  - Committed and focused project management
  - Recognized the time to go from R&D to compliance (certification/licensing)
- Success directly related to strong local and political support