WIPP Regulatory and Operations Overview

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Outline

• TRU Waste Definition
• WIPP History
• WIPP Regulatory Compliance Framework
• Waste Characterization
• Transportation
• Operations
  • Surface and underground waste handling overview
  • Panel 8 mining
  • Underground status & Capital Projects
WIPP Disposal of “transuranic” waste

- Radioactive waste materials generated by atomic energy defense activities.
- Materials contaminated with man-made radioactive elements heavier than uranium
  - Debris: clothing, tools, rags, containers, etc.
  - Soils
  - Homogeneous solids, residues
- TRU waste > 100 nCi/g:
  - alpha emitting isotopes
  - half-life > 20 years
- Two types of TRU waste
  - Contact-Handled (<200 mrem/hr)
  - Remote-Handled (≥ 200 mrem/hr)

Atomic number > 92 (transuranic) - mostly Plutonium
TRU waste was generated during the production of nuclear weapons at DOE facilities across the country.

After 1970, TRU waste was put into containers such as 55-gallon drums and stored in above-ground and shallow-burial facilities for eventual retrieval and disposal.

The WIPP Mission

Characterization  Transportation  Disposal


Page 1-5: “Over its 25-year operating life, the WIPP could receive about 6.2 million cubic feet of contact-handled [CH] TRU waste and as much as 250,000 cubic feet of remotely handled [RH] TRU waste. This would account for all of the TRU waste currently held in interim storage in Idaho, two-thirds of that expected to be generated at all DOE facilities between now and 1990, and all of that expected to be produced from 1990 through 2003.”

http://www.wipp.energy.gov/library/NEPA/feis80.htm
• January 1981, DOE publishes the *Waste Isolation Pilot Plant, Record of Decision*, 46 Federal Register 9162. The Record of Decision (ROD) documents the DOE decision to proceed with the “…WIPP Project at the Los Medaños Site in the Delaware Basin of southeast New Mexico as directed by the U.S. Congress in Public Law 96-164…”

• Alternative 2: “…designed to retrievably emplace approximately 6.2 million cubic feet of contact-handled TRU waste and as much as 250,000 cubic feet of remotely handled TRU waste …”

January 28, 1981
EIS-0026: Record of Decision
Waste Isolation Pilot Plant
https://energy.gov/nepa/listings/records-decision-rod?page=10


- SECTION 7. Disposal operations,
- SECTION 8. Environmental Protection Agency disposal regulations
- SECTION 9. Compliance with environmental laws and regulations.
- SECTION 10. Sense of Congress on commencement of emplacement of transuranic waste.

# WIPP Regulatory Framework

<table>
<thead>
<tr>
<th>Agency</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>U.S. Environmental Protection Agency (EPA)</strong></td>
<td>Long-term repository performance certification, waste characterization inspections, PCB/TRU waste</td>
</tr>
<tr>
<td><strong>New Mexico Environment Department (NMED)</strong></td>
<td>RCRA hazardous waste, review and approval of generator storage site audits, water discharge, groundwater, air</td>
</tr>
<tr>
<td><strong>U.S. Nuclear Regulatory Commission (NRC)</strong></td>
<td>Transportation Type B packages for nuclear materials</td>
</tr>
<tr>
<td><strong>U.S. Department of Transportation</strong></td>
<td>Highway transportation, Type A containers</td>
</tr>
<tr>
<td><strong>U.S. Department of Energy</strong></td>
<td>Worker Safety &amp; Health Program, Industrial Safety, Nuclear Safety, Occupational Radiation Protection, National Environmental Policy Act</td>
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</tbody>
</table>
• WIPP geologic repository is defined as a “miscellaneous unit” under 40 CFR §260.10.
• “Miscellaneous unit” means a hazardous waste management unit where hazardous waste is treated, stored, or disposed of and that is not a container, tank, surface impoundment, waste pile, land treatment unit, landfill, incinerator, containment building, boiler, industrial furnace, or underground injection well....
• Miscellaneous unit must follow 40 CFR §264.601 Environmental Performance Standards
• The WIPP geologic repository has been divided into ten discrete hazardous waste disposal units, 8 of which have been permitted for use under 40 CFR Part §264, Subpart X.
WIPP Hazardous Waste Facility Permit - Table of Contents

• PART 1 - GENERAL PERMIT CONDITIONS
• PART 2 - GENERAL FACILITY CONDITIONS
• PART 3 - CONTAINER STORAGE
• PART 4 - GEOLOGIC REPOSITORY DISPOSAL
• PART 5 - GROUNDWATER DETECTION MONITORING
• PART 6 - CLOSURE REQUIREMENTS
• PART 7 - POST-CLOSURE CARE PLAN
• PART 8 - CORRECTIVE ACTION FOR SWMUs and AOCs
• Attachments: A through O

40 CFR 270.42 Permit Modifications at the Request of the Permittees

Classification:

• Class 1 Permit Modification Notification (PMN) – minor changes to keep permit current... do not substantially alter permit conditions

• Class 2 Permit Modification Request (PMR) – apply to changes that are necessary to enable Permittees to respond in a timely manner to variations in types and quantities of wastes, technological advancements, new regulations

• Class 3 Permit Modification Request – Class 3 modifications substantially alter the facility or its operation.

https://www.env.nm.gov/hazardous-waste/wipp/

https://www.ecfr.gov/cgi-bin/text-idx?SID=de66ea380e5504bb1e0da417840b8002&mc=true&node=se40.29.270_142&rgn=div8
https://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr191_main_02.tpl

40 CFR Part 194 - Criteria for the Certification and Recertification of the Waste Isolation Pilot Plant's Compliance with the 40 CFR 191 Disposal Regulations
https://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr194_main_02.tpl

TITLE 40 - PROTECTION OF ENVIRONMENT
Part 191 - Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes

Table of Contents:
Subpart A - Environmental Standards for Management and Storage
  191.1. Applicability
  191.2. Definitions
  191.3. Standards
  191.4. Alternative standards
  191.5. Effective date

Subpart B - Environmental Standards for Disposal
  191.11. Applicability
  191.12. Definitions
  191.13. Containment requirements
  191.14. Assurance requirements
  191.15. Individual protection requirements
  191.16. Alternative provisions for disposal
  191.17. Effective date

Subpart C - Environmental Standards for Ground-Water Protection
  191.21. Applicability
  191.22. Definitions
  191.23. General provisions
  191.24. Disposal standards
  191.25. Compliance with other Federal regulations
  191.26. Alternative provisions
  191.27. Effective date

https://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr191_main_02.tpl
Key Elements of 40 CFR 191

- **Subpart A**: Management and Storage, Environmental Dose Limits During Operational Period
- **Subpart B**: Individual Protection, Dose Limits for Undisturbed Performance; Containment: Release Limits for Undisturbed & Disturbed Performance; Assumption: Monitoring, Institutional Controls, Multiple Barriers, Natural Resources
- **Subpart C**: Ground-Water Protection: Dose Limits for Undisturbed Performance

Timeline:
- First TRU Waste Receipt
- Final Facility Closure
- Post Closure
- 10,000 years

Additional elements:
- WIPP Disposal Operations
40 CFR 194.4 – Conditions of Compliance
In 40 CFR 194.4(b)(3)(i) and (ii), EPA describes the reporting process that the Department shall follow for reporting any planned or unplanned changes in activities or conditions pertaining to the disposal system that differ significantly from the most recent compliance application.

**Planned Changes**

- Planned Change Request (PCR)
- Planned Change Notice (PCN)

**Periodic Recertification**

- CRA-2004
- CRA-2009
- CRA-2014
- CRA-2019
- CRA-2024

**WIPP Land Withdrawal Act, P.L. 102-579, as amended by P.L. 104-201, Section 8(f)**

PERIODIC RECERTIFICATION.—
(1) BY SECRETARY.— Not later than 5 years after the initial receipt of transuranic waste for disposal at WIPP, and every 5 years thereafter until the end of the decommissioning phase....

40 CFR 194.15 - Content of Compliance Recertification Application(s).
§ 194.15 Content of compliance re-certification application(s).

(1) All additional geologic, geophysical, geochemical, hydrologic, and meteorologic information;
(2) All additional monitoring data, analyses and results;
(3) All additional analyses and results of laboratory experiments conducted by the Department or its contractors as part of the WIPP program;
(4) An identification of any activities or assumptions that deviate from the most recent compliance application;
(5) A description of all waste emplaced in the disposal system since the most recent compliance certification or re-certification application. Such description shall consist of a description of the waste characteristics and waste components identified in §§ 194.24(b)(1) and 194.24(b)(2);
(6) Any significant information not previously included in a compliance certification or re-certification application related to whether the disposal system continues to be in compliance with the disposal regulations; and
(7) Any additional information requested by the Administrator or the Administrator’s authorized representative
WIPP Performance Assessment Methodology

System Description

- Site Characteristics (Geology)
- Facility Characteristics (Repository)
- Waste Characteristics (Inventory)
- Scenario Development
  - Scenario Probabilities
  - Consequence Analysis
  - Uncertainty Analysis, CCDF Construction, and Performance Results
- FEPs Identification and Screening
- WIPP Recertification (TRU waste inventory update, planned changes, model & parameter refinements)
- Regulatory Context (40 CFR 191/194)
On an annual basis, DOE TRU waste generator sites report volume, radiological, non radiological characteristics (i.e., cellulose, plastic, and rubber), and general TRU waste information using a cutoff date of December 31 of the prior year. TRU waste inventory update is published in the Annual Transuranic Waste Inventory Report (ATWIR): http://www.wipp.energy.gov/national-tru-program-documents.asp

<table>
<thead>
<tr>
<th>WIPP Waste Data System (WDS):</th>
<th>Reported by the TRU Waste Generator Sites:</th>
</tr>
</thead>
</table>
| **Emplaced Inventory**  
Waste in above ground storage at the WIPP or disposed in the WIPP underground *(Included in PA calculations)* | **WIPP-bound Inventory**  
Appear to meet the requirements for emplacement into the WIPP *(Included in PA calculations)*  
- **Stored Inventory** – Already generated, but not yet shipped  
- **Projected Inventory** – Not yet generated, but expected to be generated in the future  
- **Anticipated Inventory** – Sum of the total stored and total projected inventory |
| **Potential Inventory**  
Not slated for emplacement into the WIPP due to regulatory or physical constraints (i.e., lack of characterization data) and in some cases require additional legislative action *(Not included in PA calculations)* |
40 CFR Part 191, Subpart B, 191.13 Containment requirements

(a) Disposal systems for spent nuclear fuel or high-level or transuranic radioactive wastes shall be designed to provide a reasonable expectation, based upon performance assessments, that the cumulative releases of radionuclides to the accessible environment for 10,000 years after disposal from all significant processes and events that may affect the disposal system shall:

(1) Have a likelihood of less than one chance in 10 of exceeding the quantities calculated according to Table 1 (Appendix A); and

(2) Have a likelihood of less than one chance in 1,000 of exceeding ten times the quantities calculated according to Table 1 (Appendix A).
Waste Characterization

- The process of knowing what is inside a waste container
- Must be TRU waste generated by atomic energy defense activities
- Only properly characterized containers from an approved waste stream can be certified to be transported to, managed at, and disposed of at the WIPP.
TRANSURANIC WASTE ACCEPTANCE CRITERIA
FOR
THE WASTE ISOLATION PILOT PLANT

Revision 8.0

Effective Date: July 5, 2016

This document supersedes DOE/WIPP 02-3122, Rev. 7.4
U.S. Department of Energy Carlsbad Field Office

Figure 1.0 Regulatory Basis of TRU Waste Acceptance Criteria
(WIPP Top Tier Documents)

- NRC
  - TRUPACT-II, TRUPACT-III, HALFPACT, RH-TRU 72-B, 10-160B
  - CERTIFICATES OF COMPLIANCE

- NMED
  - WIPP HAZARDOUS WASTE FACILITY PERMIT

- DOE/CBFO
  - WIPP DOCUMENTED SAFETY ANALYSIS
  - FEIS, SEIS I, SEIS II

- EPA
  - WIPP COMPLIANCE RECERTIFICATION DECISION
  - RH APPROVAL

- CONGRESS
  - WIPP LAND WITHDRAWAL ACT

DATA INPUT TO WWIS

PROGRAMMATIC OR WASTE-SPECIFIC TRANSURANIC WASTE AUTHORIZED METHODS FOR PAYLOAD CONTROL (TRAMPAC)

QUALITY ASSURANCE PROJECT PLAN (QAP/P)

WASTE CERTIFICATION PLAN

This document supersedes DOE/WIPP 02-3122, Rev. 7.4
U.S. Department of Energy Carlsbad Field Office

http://www.wipp.energy.gov/library/wac/WAC.pdf
TRU Waste Acceptance Criteria for WIPP

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U.S. Department of Energy Carlsbad Field Office

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Pu FGE Limits for CH-TRU Waste Payload Containers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste Container Type</td>
<td>Be/BeO Limits</td>
</tr>
<tr>
<td>Non-Machine Compacted Waste</td>
<td></td>
</tr>
<tr>
<td>55-gallon drum configured as a POC (e., e Standard, S100, S200, and S300)</td>
<td>≤ 1% by weight of the waste</td>
</tr>
<tr>
<td>55-gallon drum configured as a CCO</td>
<td>≤ 1% by weight of the waste</td>
</tr>
<tr>
<td>Shielded Container</td>
<td>≤ 1% by weight of the waste</td>
</tr>
<tr>
<td>SLB2</td>
<td>≤ 1% by weight of the waste</td>
</tr>
<tr>
<td>SWB</td>
<td>≤ 1% by weight of the waste</td>
</tr>
<tr>
<td>TDOP</td>
<td>≤ 1% by weight of the waste</td>
</tr>
<tr>
<td>55- gallon drums (excluding POCs and CCOs)</td>
<td>&gt;1% by weight of the waste up to 100 kg</td>
</tr>
</tbody>
</table>
Waste characterization determines the physical, chemical and radiological contents of waste containers to ensure that waste is defense TRU waste and acceptable for disposal at WIPP.

Acceptable Knowledge
- documentation, records, analyses, historical data

Real Time Radiography
- X-ray imaging device used to evaluate containerized waste for prohibited items, such as aerosol cans or liquids

Nondestructive Assay
- Assay equipment used determine radiological characterization data

Information on process used to generate waste, material inputs, & as well as data resulting from the analysis of waste, if performed.
The WIPP Transportation System

WIPP Transportation Fleet
- TRUPACT-II
- HalfPACT
- TRUPACT-III
- RH-72B
TRUPACT-II Shipping Container

- Licensed by NRC -1989
- Extensive testing
  - 30-foot drop
  - 30 minutes in 1,475-degree jet fuel fire
- Multiple payload options
- Double containment

For Contact Handled Waste
Transportation - continued

- Waste containers are loaded into protective shipping containers (such as TRUPACT-II).
- Shipping containers are loaded onto specially designed flatbed trailers. State personnel inspect load before departure.
- Drivers inspect their rigs and loads every 3 hours or 150 miles. Some states require additional inspections at their ports of entry.
- For safety and security reasons, shipments are tracked throughout their journey using a satellite system (TRANSCOM).
- WIPP-trained state and local emergency responders (~30,000) along all shipping routes, with frequent training exercises.

TRANSCOM Control room at WIPP
Each shipment receives security inspection, radiological survey, and documentation review.

Shipping containers are unloaded and moved into the Waste Handling Building thru airlocks.

Health physics technicians perform radiological surveys as shipping containers are unloaded.

Waste is lifted from shipping containers using overhead cranes.
Waste containers are placed on waste hoist for 2,150’ descent into underground.

In underground, waste is removed from the waste hoist and transported to a disposal room.

Waste is emplaced in mined disposal room.
WIPP Status

• Restarted shipments April 2017
  ✓ More than 180 shipments since restart
• Emplacement rates have ramped up to ~8 shipments per week
  ✓ Panel 7 will take approximately 3 years to fill
• Shipments from Oak Ridge, Idaho, LANL, WCS and SRS
• Installed and started Supplemental Ventilation System to facilitate Panel 8 mining
• Panel 8 mining restarted January 2018; more than 3,000 tons of salt mined to date
• Mining on day shift, waste emplacement on back shift
Underground Status Map

Mining

Waste Emplacement
Panel 8 mining resumed with start up of the supplemental ventilation system.

Filled waste panels (Panels 1-6)

Current waste emplacement: Panel 7 Room 5

South end pending closure
### Projected Shipments
February 2018 to January 2019

<table>
<thead>
<tr>
<th>Site</th>
<th>Shipments</th>
</tr>
</thead>
<tbody>
<tr>
<td>INL</td>
<td>150</td>
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<tr>
<td>LANL</td>
<td>25</td>
</tr>
<tr>
<td>ORNL</td>
<td>90</td>
</tr>
<tr>
<td>SRS</td>
<td>20</td>
</tr>
<tr>
<td>ANL</td>
<td>5</td>
</tr>
<tr>
<td>WCS</td>
<td>10</td>
</tr>
<tr>
<td>TOTAL</td>
<td>300</td>
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</table>
Questions