WIPP Regulatory and Operations Overview

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Underground Status Map

Mining

Waste Emplacement
• 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
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
Selected WIPP Historical Events

1970-1979

1980-1989

1990-1999

2000-2009

2010-2019

2020 -

Conceptual Design

Preliminary Design

Design Validation

Panel 1 Filled 2003

Panel 2 Filled 2005

Panel 3 Filled 2007

Panel 4 Filled 2009

Panel 5 Filled 2011

Panel 6 Filled 2014

2017 Resume TRU Waste Ops

• 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.
| **U.S. Environmental Protection Agency (EPA)** | Long-term repository performance certification, waste characterization inspections, PCB/TRU waste |
| **New Mexico Environment Department (NMED)** | RCRA hazardous waste, review and approval of generator storage site audits, water discharge, groundwater, air |
| **U.S. Nuclear Regulatory Commission (NRC)** | Transportation Type B packages for nuclear materials |
| **U.S. Department of Transportation** | Highway transportation, Type A containers |
| **U.S. Department of Energy** | Worker Safety & Health Program, Industrial Safety, Nuclear Safety, Occupational Radiation Protection, National Environmental Policy Act |
• 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 Permitees

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.ecfr.gov/cgi-bin/text-idx?SID=de66ea380e5504bb1e0da417840b8002&mc=true&node=se40.29.270_142&rgn=div8

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

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>
<thead>
<tr>
<th>Subpart A - Environmental Standards for Management and Storage</th>
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<td>191.1. Applicability</td>
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<td>191.2. Definitions</td>
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<th>Subpart B - Environmental Standards for Disposal</th>
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<td>191.11. Applicability</td>
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<td>191.12. Definitions</td>
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<td>191.13. Containment requirements</td>
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<td>191.14. Assurance requirements</td>
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<td>191.15. Individual protection requirements</td>
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<td>191.16. Alternative provisions for disposal</td>
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<td>191.17. Effective date</td>
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<table>
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<tr>
<th>Subpart C - Environmental Standards for Ground-Water Protection</th>
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<tr>
<td>191.21. Applicability</td>
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<td>191.22. Definitions</td>
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<tr>
<td>191.23. General provisions</td>
</tr>
<tr>
<td>191.24. Disposal standards</td>
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<td>191.25. Compliance with other Federal regulations</td>
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<tr>
<td>191.26. Alternative provisions</td>
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<td>191.27. Effective date</td>
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[https://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr191_main_02.tpl](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

Subpart B
Containment: Release Limits for Undisturbed & Disturbed Performance

Subpart C
Ground-Water Protection:
Dose Limits for Undisturbed Performance

Containment: Release Limits for Undisturbed & Disturbed Performance

Assurance: Monitoring, Institutional Controls, Multiple Barriers, Natural Resources

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

WIPP Disposal Operations

www.energy.gov/EM
GENERALIZED 40 CFR 191/194 REGULATORY PROCESS

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

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

- Regulatory Context (40 CFR 191/194)
- Site Characteristics (Geology)
- Facility Characteristics (Repository)
- Waste Characteristics (Inventory)
- FEPs Identification and Screening
- Scenario Development
- Scenario Probabilities
- Consequence Analysis
- Uncertainty Analysis, CCDF Construction, and Performance Results
- WIPP Recertification (TRU waste inventory update, planned changes, model & parameter refinements)
Annual TRU Waste Inventory Report

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](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>
<tbody>
<tr>
<td><strong>Emplaced Inventory</strong></td>
<td><strong>WIPP-bound Inventory</strong></td>
</tr>
<tr>
<td>Waste in above ground storage at the WIPP or disposed in the WIPP underground <em>(Included in PA calculations)</em></td>
<td>Appear to meet the requirements for emplacement into the WIPP <em>(Included in PA calculations)</em></td>
</tr>
<tr>
<td><strong>Potential Inventory</strong></td>
<td></td>
</tr>
<tr>
<td>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 <em>(Not included in PA calculations)</em></td>
<td></td>
</tr>
</tbody>
</table>
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

http://www.wipp.energy.gov/library/wac/WAC.pdf
## 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

### Table 1 239 Pu FGE Limits for CH-TRU Waste Payload Containers

<table>
<thead>
<tr>
<th>Waste Container Type</th>
<th>BeBeO Limits</th>
<th>Special Waste Container Geometry/Material Requirements</th>
<th>239Pu FGE Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Machine Compacted Waste</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>55-gallon drum configured as a POC (i.e., a standard, S100, S200, and S300)</td>
<td>≤ 1% by weight of the waste</td>
<td>None</td>
<td>≤ 200</td>
</tr>
<tr>
<td>55-gallon drum configured as a CCC</td>
<td>≤ 1% by weight of the waste</td>
<td>None</td>
<td>≤ 200</td>
</tr>
<tr>
<td>Shielded Container</td>
<td>≤ 1% by weight of the waste</td>
<td>None</td>
<td>≤ 360</td>
</tr>
<tr>
<td>SLB2</td>
<td>≤ 1% by weight of the waste</td>
<td>None</td>
<td>≤ 325</td>
</tr>
<tr>
<td>SWB</td>
<td>≤ 1% by weight of the waste</td>
<td>None</td>
<td>≤ 325</td>
</tr>
<tr>
<td>TDOP</td>
<td>≤ 1% by weight of the waste</td>
<td>None</td>
<td>≤ 325</td>
</tr>
<tr>
<td>55-239 Pu Excluding POCs and CCCs, 55- and 100-gallon drums</td>
<td>&gt;1% by weight of the waste up to 100 kg</td>
<td>None</td>
<td>≤ 100</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.
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
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.
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.

Contact-Handled Waste Disposal Operations
Contact Handled Waste Emplacement

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

Current waste emplacement: Panel 7 Room 5

Filled waste panels (Panels 1-6)

South end pending closure

Panels 8-6

New Shaft

New Filter Building
# 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>
</tr>
<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