

WIPP COMPLIANCE

National Academies of Sciences

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April 16, 2019

Outline

- WIPP Regulatory Compliance Framework
- Waste Characterization
- Capacity
- WIPP Status

WIPP Regulatory Compliance Framework

	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

40 CFR Part 191 - *Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel and Transuranic Radioactive Wastes*

https://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr191_main_02.tpl

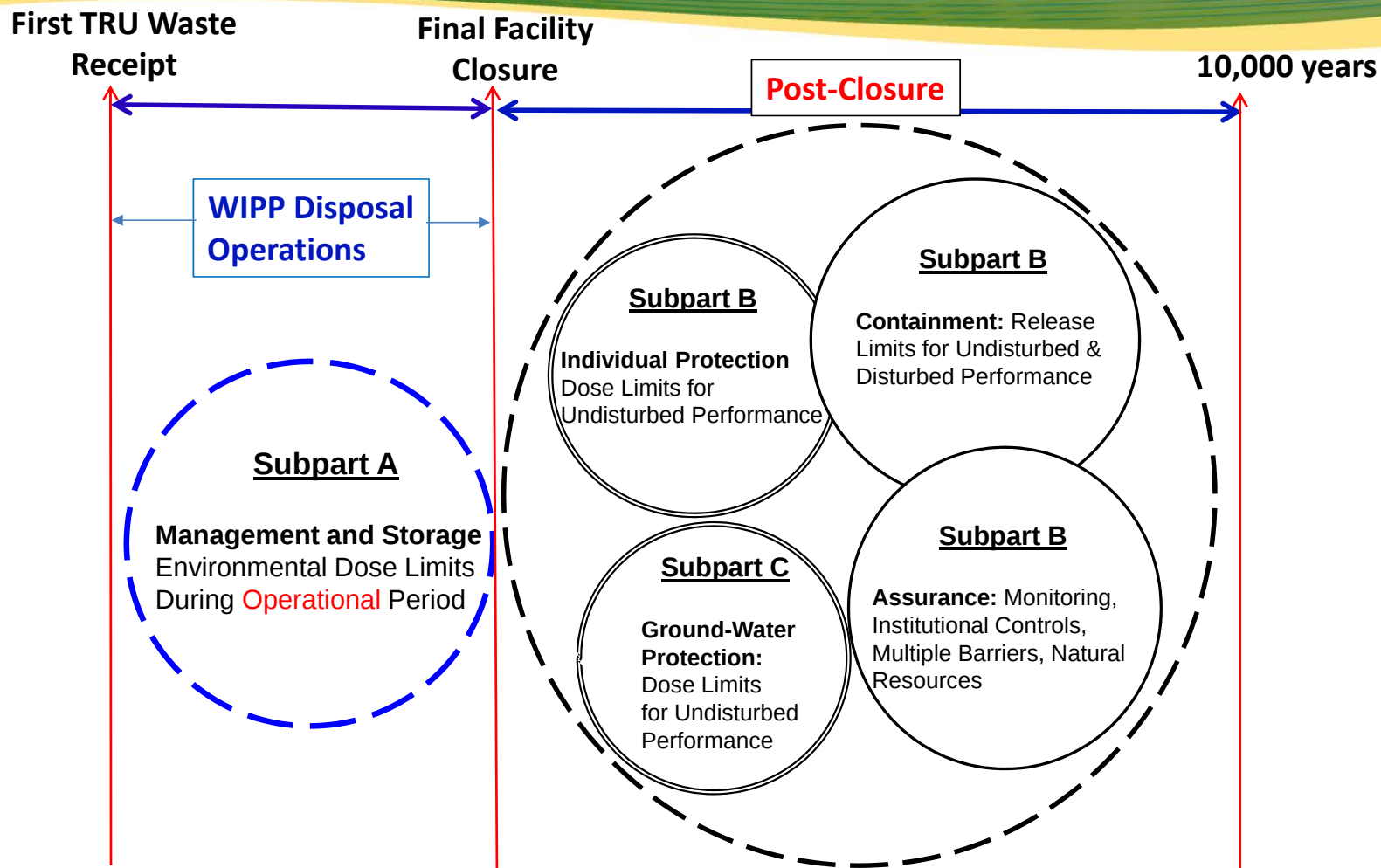
40 CFR Part 194 - *Criteria for the Certification and Recertification of the Waste Isolation Pilot Plant's Compliance with the 40 CFR 191 Disposal Regulations*

https://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr194_main_02.tpl

EPA Region 6 - 40 CFR Part 176 – *Disposal of PCB/TRU and PCB/TRU Mixed Waste at the U.S. Department of Energy (DOE) Waste Isolation Pilot Plant, Conditions of Approval*

http://www.wipp.energy.gov/rcradox/final/EPA_Permit_Approval_2013.pdf

Key Elements of 40 CFR 191



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 CHANGES

PCR

PCR

PCN

PCR

PCN

- 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).

WIPP Hazardous Waste Facility Permit

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

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

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.

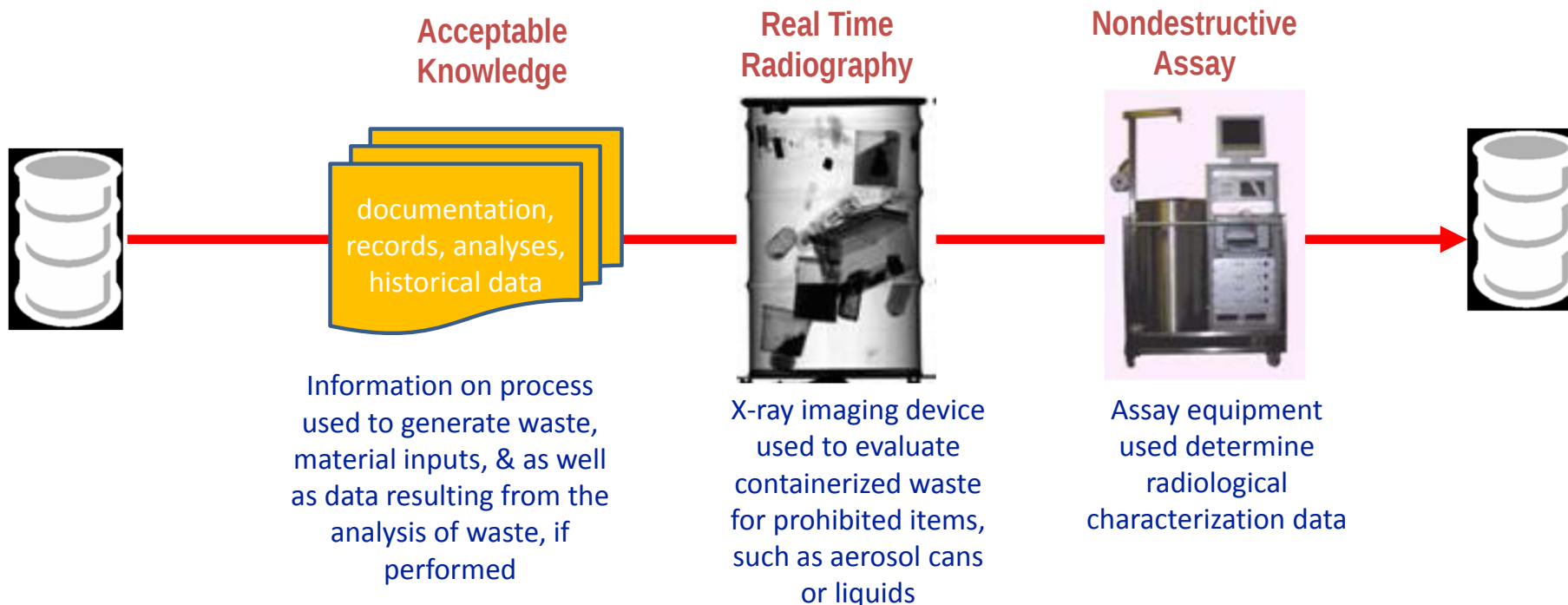
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TRU Waste Characterization, Certification & Transportation

- TRU waste shipped to WIPP from DOE waste generator sites must be characterized by a WIPP Certified Program (WCP), in compliance with WIPP's disposal, packaging and transportation requirements, as outlined in WIPP's TRU Waste Acceptance Criteria (WAC).
- WIPP TRU WAC describes the controlling (i.e., the most restrictive) requirements to be used by the DOE sites in preparing their TRU waste for transportation to and disposal at the WIPP.
- Each WCP is responsible for developing and implementing CBFO-approved TRU waste program plans and procedures that address applicable WIPP top-tier requirements and the WIPP TRU WAC for packaging, characterizing, and certifying defense TRU waste for WIPP disposal
- In order to ship TRU waste to WIPP, a waste generator site's waste characterization and transportation program must be DOE-certified, with approval from the New Mexico Environment Department and an initial baseline approval from the EPA.

TRU Waste Characterization

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



Capacity of WIPP

October 1992, President signed the *Waste Isolation Pilot Plant Land Withdrawal Act of 1992*, Public Law 102-579.

September 1996, President signed the *Waste Isolation Pilot Plant Land Withdrawal Act Amendments*, Public Law 104-201.

- **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.**

PUBLIC LAW 102-579
THE WASTE ISOLATION PILOT PLANT LAND
WITHDRAWAL ACT

as amended by Public Law 104-201 (H.R. 3230, 104th Congress)

SECTION 7. DISPOSAL OPERATIONS.

(a) **TRANSURANIC WASTE LIMITATIONS.—**

(1) **REM LIMITS FOR REMOTE-HANDLED TRANSURANIC WASTE.—**

- (A) **1,000 REMS PER HOUR.—** No transuranic waste received at WIPP may have a surface dose rate in excess of 1,000 rem/s per hour.
- (B) **100 REMS PER HOUR.—** No more than 5 percent by volume of the remote-handled transuranic waste received at WIPP may have a surface dose rate in excess of 100 rem/s per hour.

(2) **CURIE LIMITS FOR REMOTE-HANDLED TRANSURANIC WASTE.—**

- (A) **CURIES PER LITER.—** Remote-handled transuranic waste received at WIPP shall not exceed 23 curies per liter maximum activity level (averaged over the volume of the canister).
- (B) **TOTAL CURIES.—** The total curies of the remote-handled transuranic waste received at WIPP shall not exceed 5,100,000 curies.
- (3) **CAPACITY OF WIPP.—** The total capacity of WIPP by volume is 6.2 million cubic feet of transuranic waste.

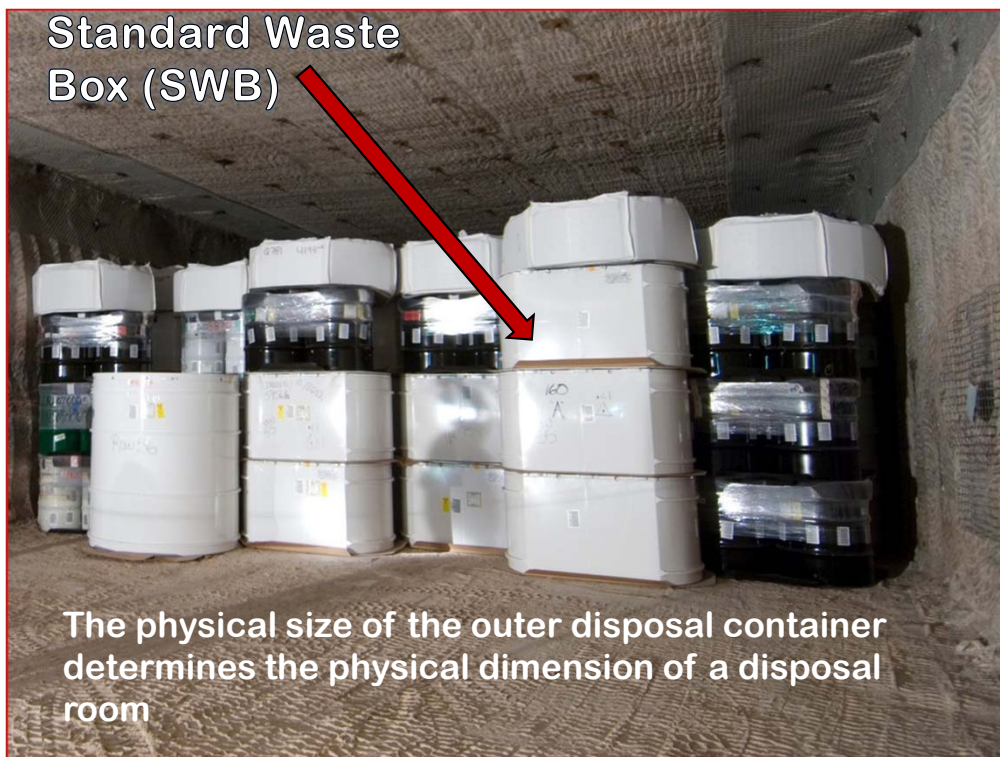
<http://www.wipp.energy.gov/library/CRA/BaselineTool/Documents/Regulatory%20Tools/10%20WIPPLWA1996.pdf>

Annual TRU Waste Inventory Report

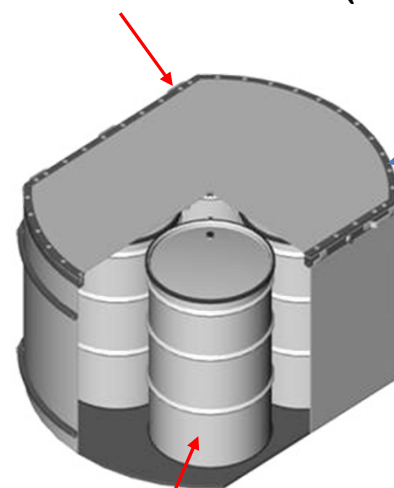
On an annual basis, DOE TRU waste generator sites report volume, radiological, non radiological characteristics (i.e., cellulose, plastic, and rubber), and general TRU waste information using a cutoff date of December 31 of the prior year. TRU waste inventory update is published in the Annual Transuranic Waste Inventory Report (ATWIR): <http://www.wipp.energy.gov/national-tru-program-documents.asp>

WIPP Waste Data System (WDS):	Reported by the TRU Waste Generator Sites:	
<u>Emplaced Inventory</u> Waste in above ground storage at the WIPP or disposed in the WIPP underground <i>(Included in Performance Assessment compliance calculations)</i>	<u>WIPP-bound Inventory</u> Appear to meet the requirements for emplacement into the WIPP <i>(Included in Performance Assessment compliance calculations)</i> • 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	<u>Potential Inventory</u> 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 <i>(Used by CBFO for out year strategic planning purposes. Typically not included in Performance Assessment compliance calculations.)</i>

Clarification of TRU Mixed Waste Disposal Volume Reporting



Standard Waste Box (SWB)



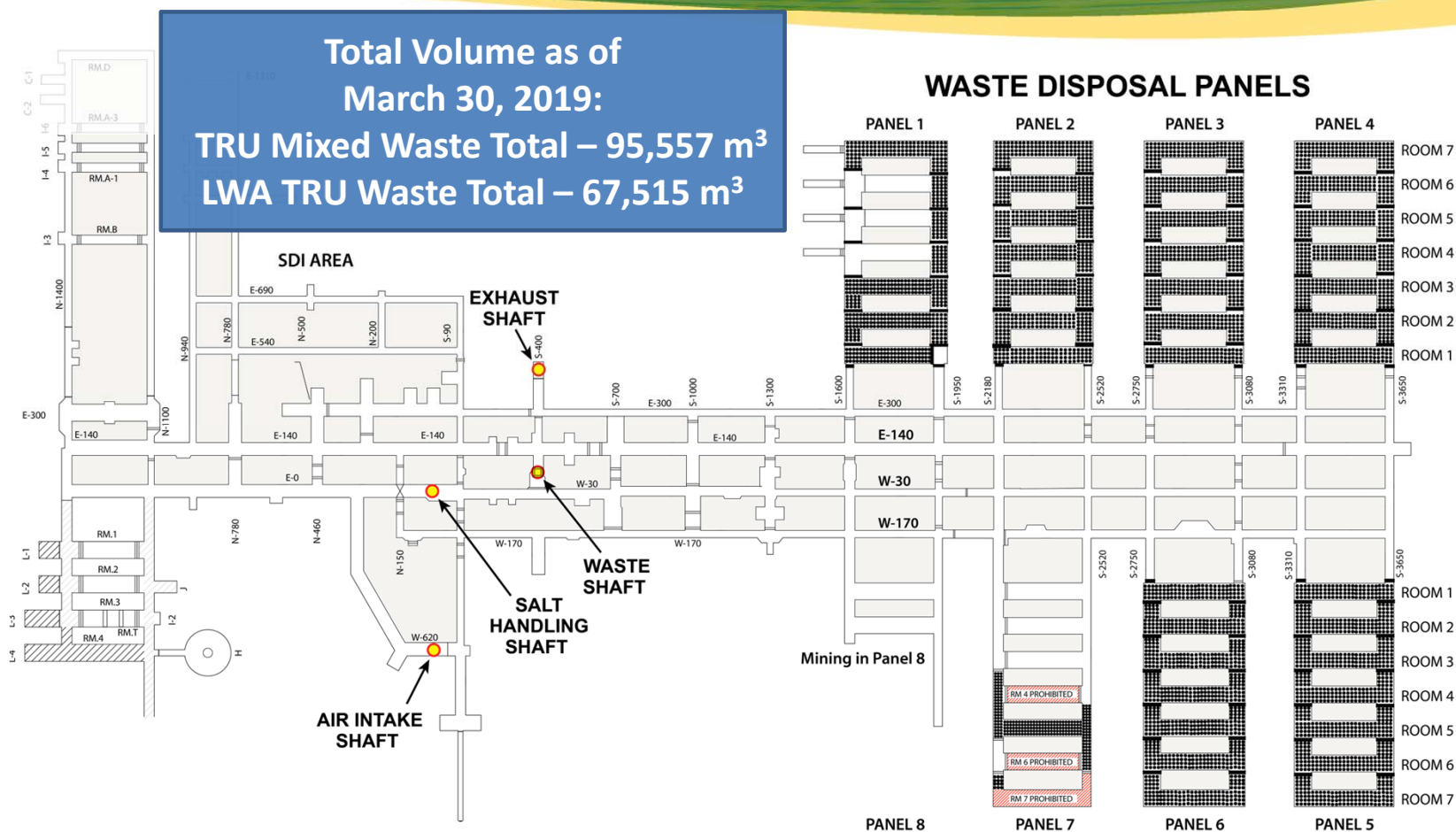
Inner volume of
a SWB:
Volume = 1.8 m³

Volume of four (4)
55-gallon drums in
a SWB:
 $0.2 \text{ m}^3 \times 4 = \underline{0.8 \text{ m}^3}$

55-gallon drum

TRU Waste Emplacement Status

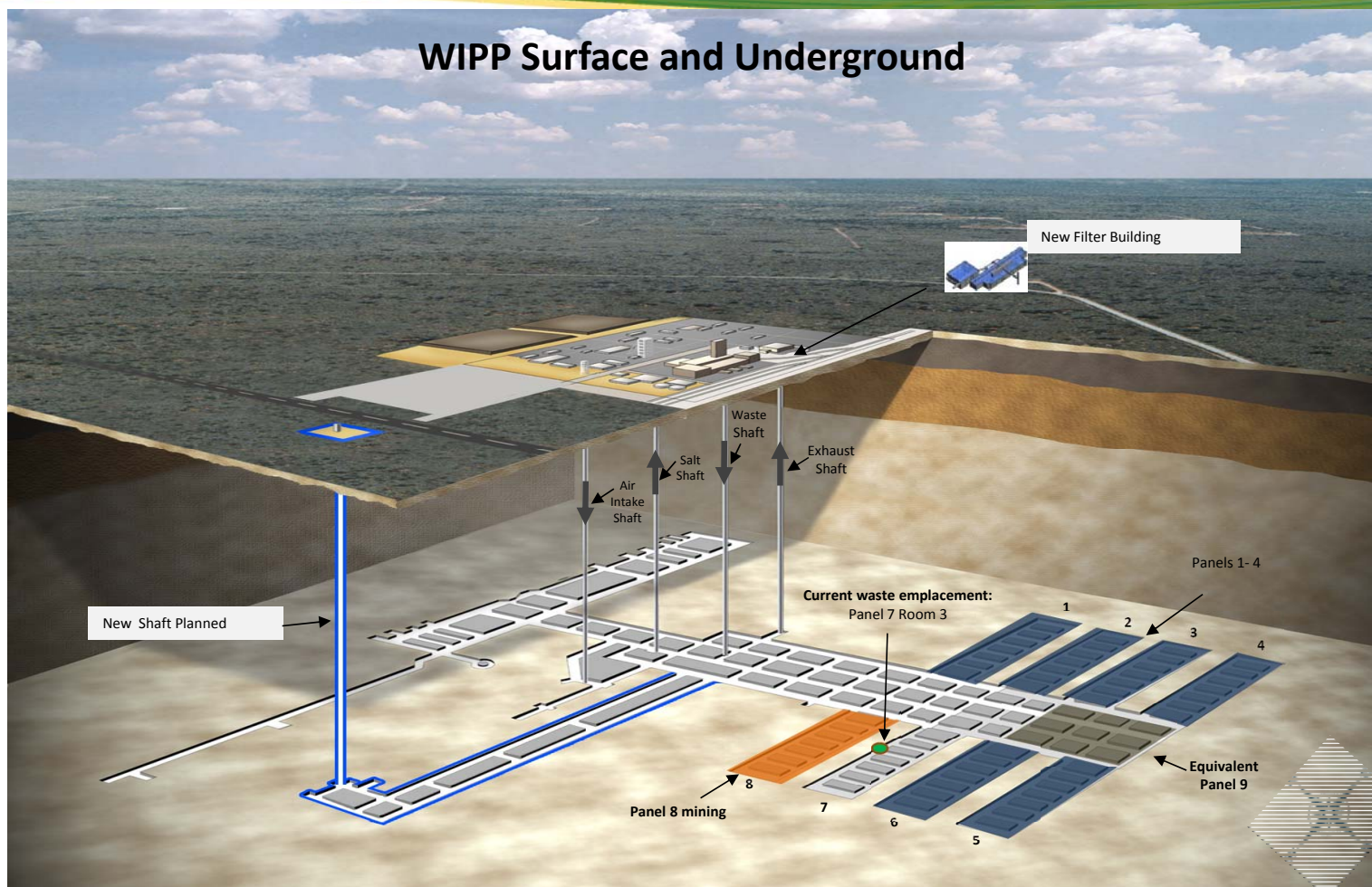
Total Volume as of
March 30, 2019:
TRU Mixed Waste Total – 95,557 m³
LWA TRU Waste Total – 67,515 m³



WIPP Status

- **WIPP's 20 Year Anniversary - March 26, 2019**
 - First TRU Waste Shipment - March 26, 1999
- **Emplacement rates ~8 shipments per week**
- **Shipments from Oak Ridge, Idaho, ANL, LANL, WCS and SRS**

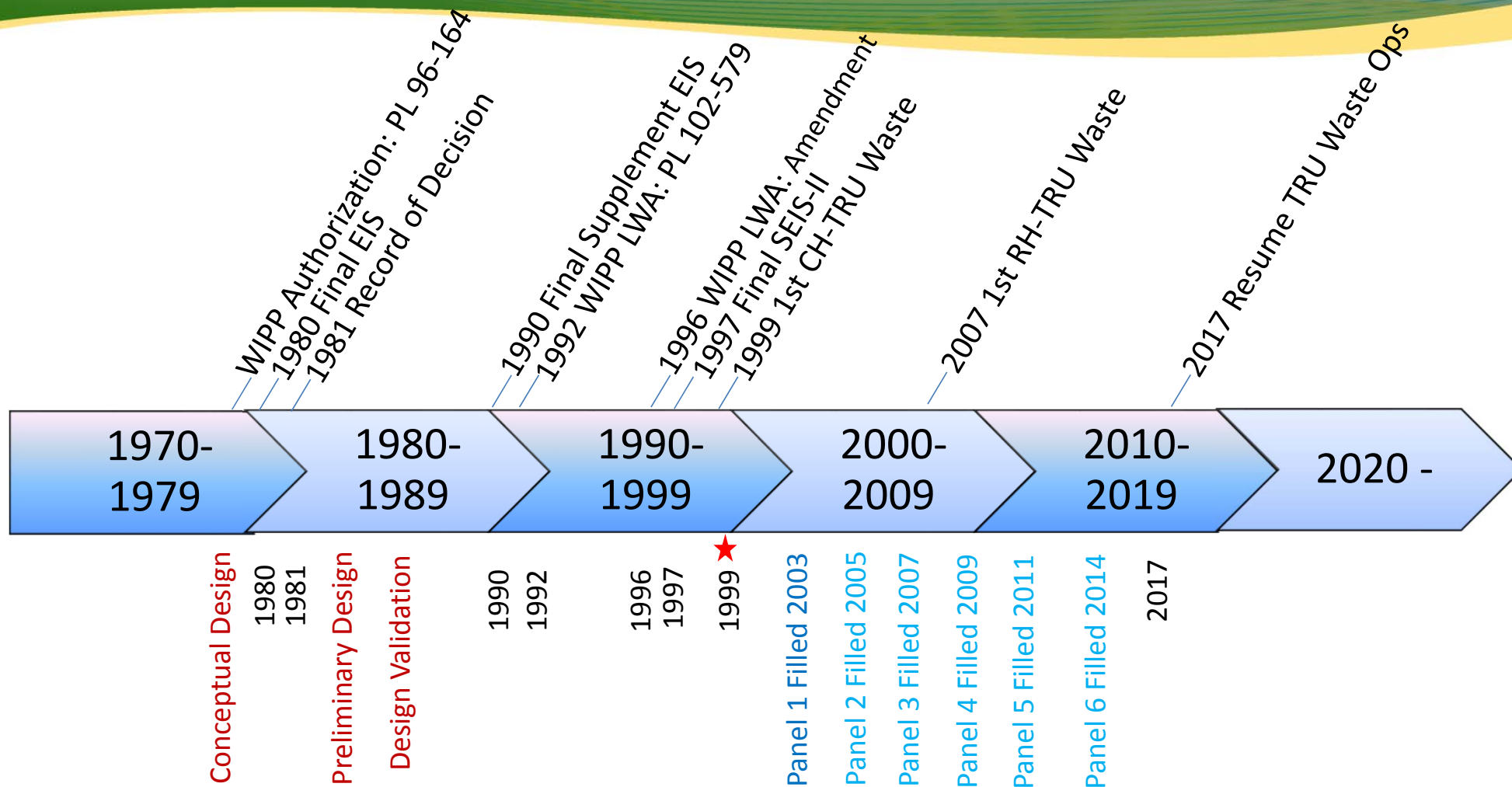




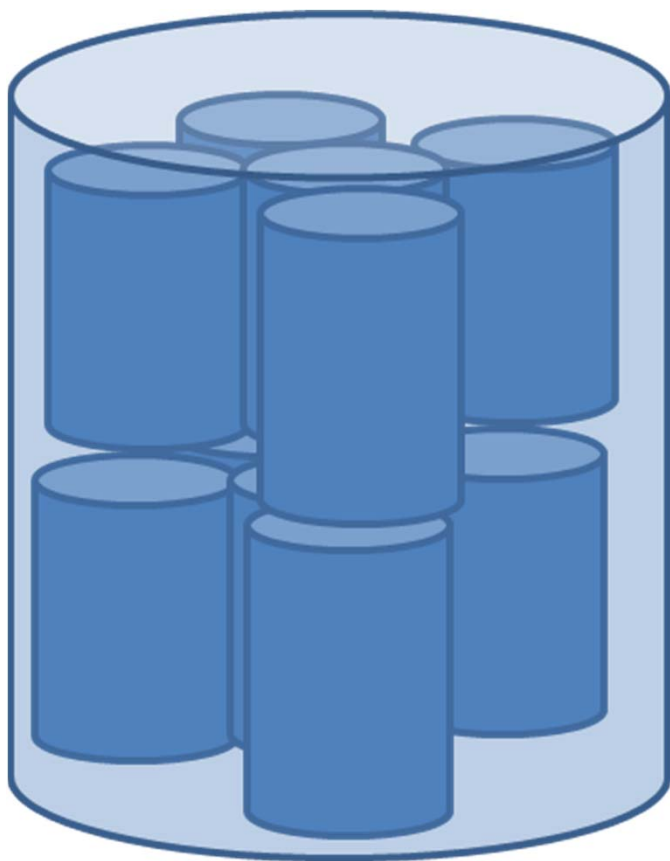
Questions

BACK UP SLIDES

Selected WIPP Historical Events



Ten Drum Over-pack



Primarily used for over-packing 208-liter drums

Outer volume: 4.5 m³

Inner volume of drums: 2.1 m³
(ten 208-liter drums)

New Mexico Environment Department

- On October 27, 1999 – **Secretary of the New Mexico Environment Department (NMED)** issued a Hazardous Waste Facility Permit to the WIPP Permittees to manage, store and dispose of transuranic mixed waste.
- Permits must be renewed every 10 years, requiring submittal of a renewal application, and includes but is not limited to, public comment and a hearing.
- On November 30, 2010 - NMED Secretary renewed the WIPP Hazardous Waste Facility Permit (HWFP).
- The WIPP HWFP authorizes CBFO and the Management & Operations Contactor (**the Permittees**) to manage, store, and dispose contact-handled (CH) and remote-handled (RH) **transuranic (TRU) mixed waste at WIPP**, and establishes the general and specific standards for these activities.

Containment Requirements

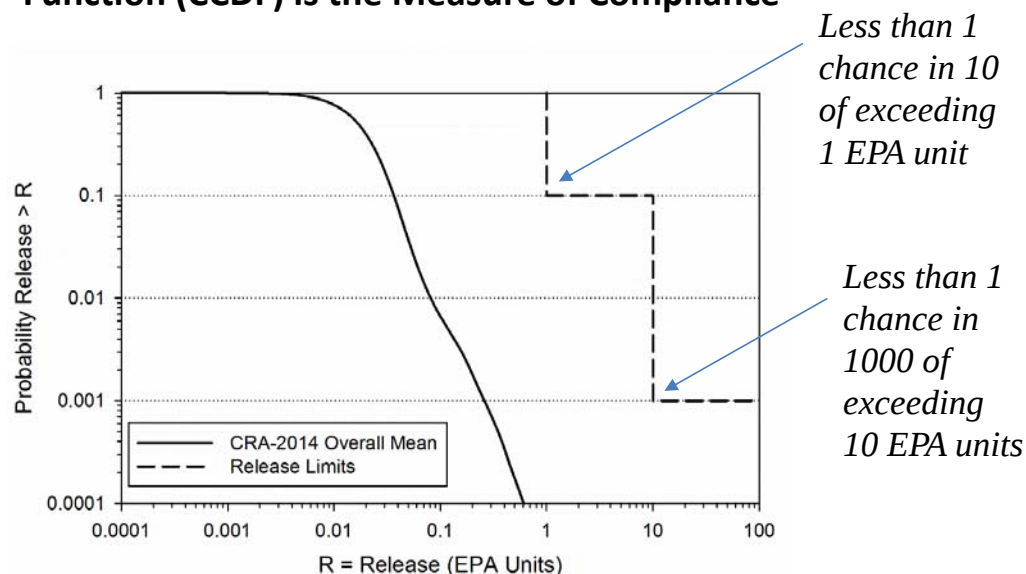
40 CFR Part 191, Subpart B

§ 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).

Total Release Mean Complimentary Cumulative Distribution Function (CCDF) is the Measure of Compliance



Reasonable Expectation

§ 191.13 Containment requirements.

(b) Performance assessments need not provide complete assurance that the requirements of §191.13(a) will be met. Because of the long time period involved and the nature of the events and processes of interest, there will inevitably be substantial uncertainties in projecting disposal system performance. Proof of the future performance of a disposal system is not to be had in the ordinary sense of the word in situations that deal with much shorter time frames. Instead, what is required is a reasonable expectation, on the basis of the record before the implementing agency, that compliance with § 191.13 will be achieved.

33106 Federal Register / Vol. 82, No. 137 / Wednesday, July 19, 2017 / Notices

ENVIRONMENTAL PROTECTION AGENCY

[EPA-HQ-OAR-2014-0609; FRL-9965-08- OAR]

Criteria for the Certification and Recertification of the Waste Isolation Pilot Plant's Compliance With the Disposal Regulations; Recertification Decision

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice; recertification decision.

SUMMARY: With this notice, the Environmental Protection Agency (EPA or the Agency) recertifies that the U.S. Department of Energy's (DOE) Waste Isolation Pilot Plant (WIPP) continues to comply with the "Environmental Standards for the Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic (TRU) Radioactive Waste."

40 CFR Part 191 - Definitions

§ 191.02 Definitions.

- (l) **Disposal** means permanent isolation of spent nuclear fuel or radioactive waste from the accessible environment with no intent of recovery, whether or not such isolation permits the recovery of such fuel or waste. For example, disposal of waste in a mined geologic repository occurs when all of the shafts to the repository are backfilled and sealed.
- (m) **Management** means any activity, operation, or process (except for transportation) conducted to prepare spent nuclear fuel or radioactive waste for storage or disposal, or the activities associated with placing such fuel or waste in a disposal system.

§ 191.12 Definitions.

Performance assessment means an analysis that: (1) Identifies the processes and events that might affect the disposal system; (2) examines the effects of these processes and events on the performance of the disposal system; and (3) estimates the cumulative releases of radionuclides, considering the associated uncertainties, caused by all significant processes and events. These estimates shall be incorporated into an overall probability distribution of cumulative release to the extent practicable.

EPA Standards for WIPP

40 CFR Part 191

[CFR] [TITLE 40] [PART 191]

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

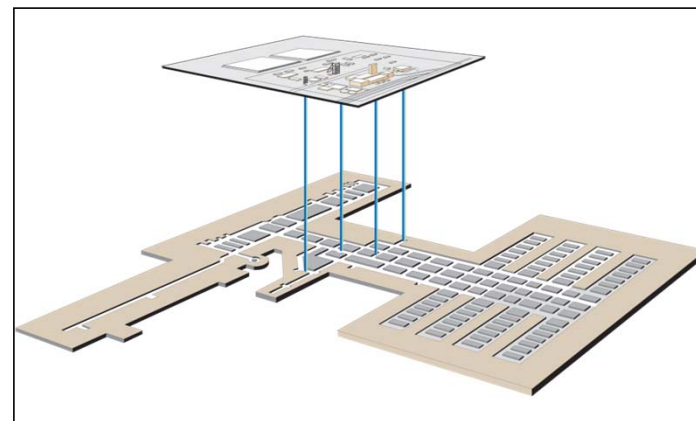
Subpart B - Environmental Standards for Disposal

- 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



Contact-Handled Waste Disposal Operations

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 Emplacement Operations

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



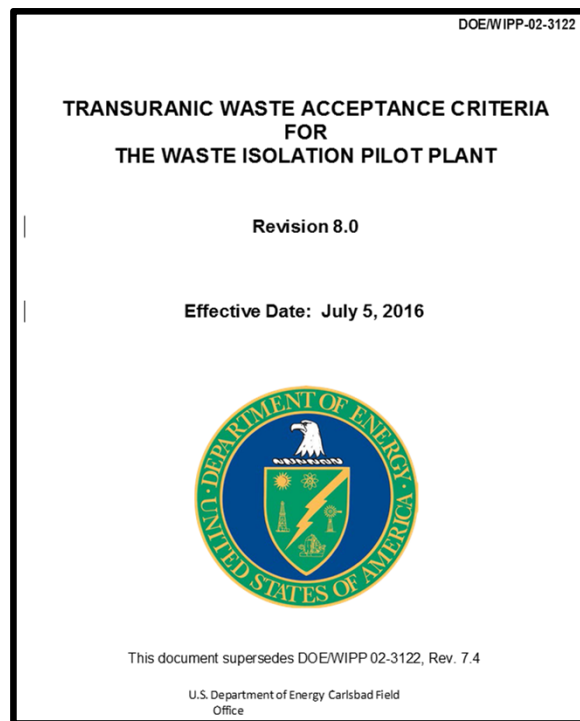
Waste is emplaced in mined
disposal room.



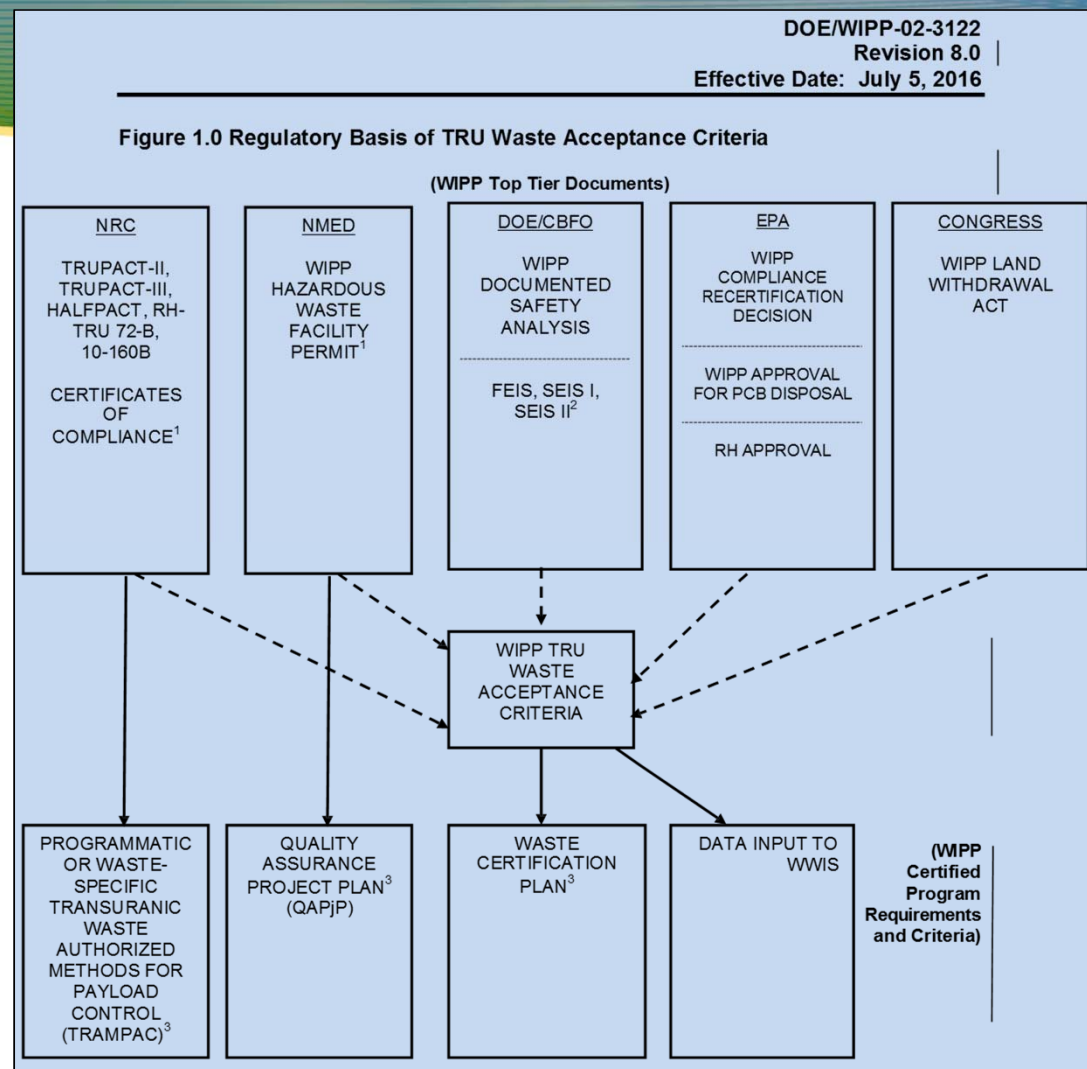
Waste Characterization



- 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.



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



TRU Waste Acceptance Criteria for WIPP - Example

DOE/WIPP-02-3122

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

DOE/WIPP-02-3122
Revision 8.0
Effective Date: July 5, 2016

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

Waste Container Type	Be/BeO Limits	Special Waste Container Geometry/Material Requirements	²³⁹ Pu FGE Limit
Non-Machine Compacted Waste			
55- (excluding POCs and CCOs), 85-, and 100-gallon drums	≤ 1% by weight of the waste	None	≤ 200
55-gallon drum configured as a POC (i.e., a Standard, S100, S200, and S300)	≤ 1% by weight of the waste	None	≤ 200
55-gallon drum configured as a CCO	≤ 1% by weight of the waste	None	≤ 380
Shielded Container	≤ 1% by weight of the waste	None	≤ 200
SLB2	≤ 1% by weight of the waste	None	≤ 325
SWB	≤ 1% by weight of the waste	None	≤ 325
TDOP	≤ 1% by weight of the waste	None	≤ 325
55- (excluding POCs and CCOs), 85-, and 100-gallon drums	>1% by weight of the waste up to 100 kg	None	≤ 100