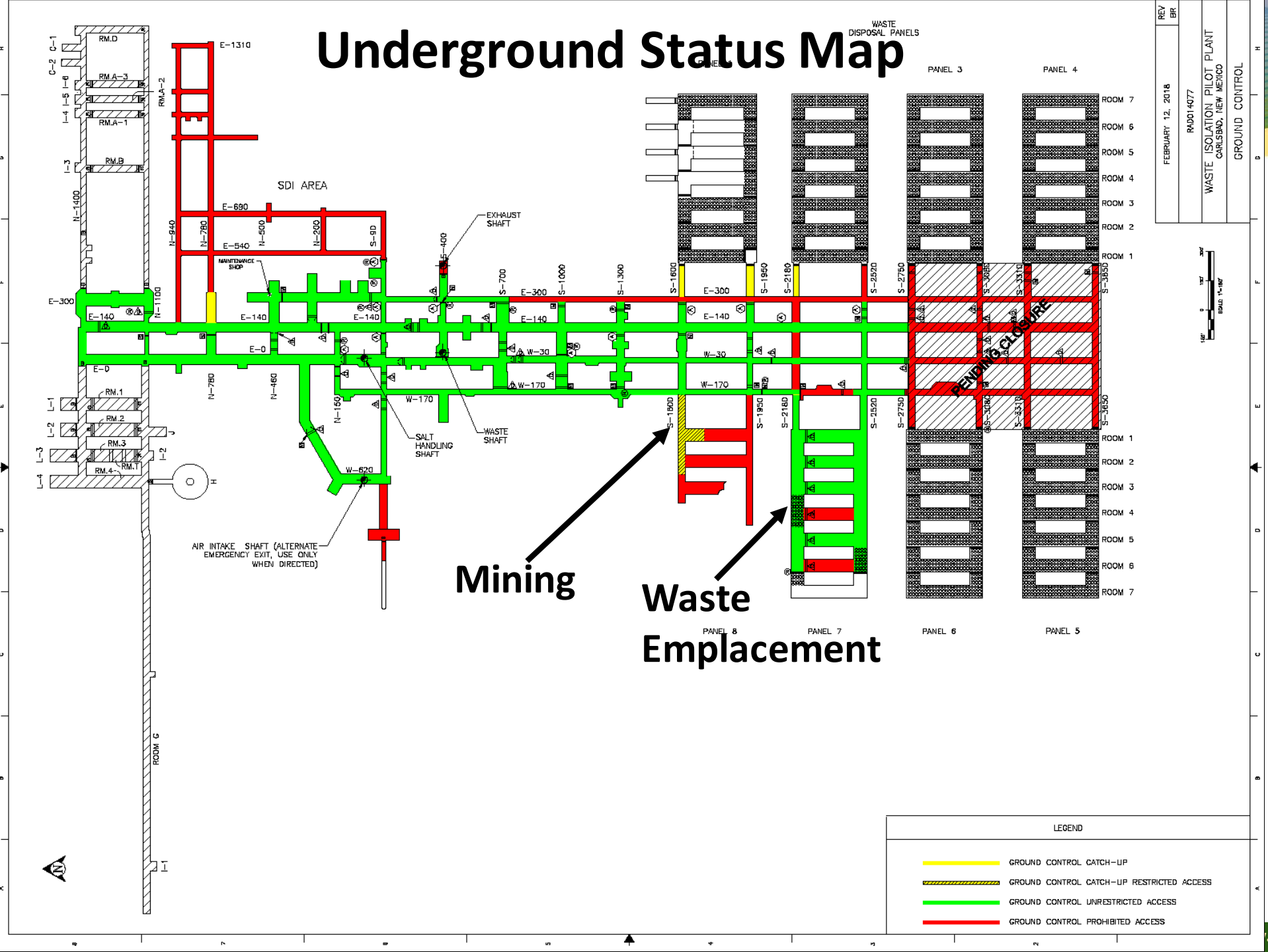
WIPP Regulatory and Operations Overview

Todd Shrader, CBFO

George Basabilvazo, CBFO

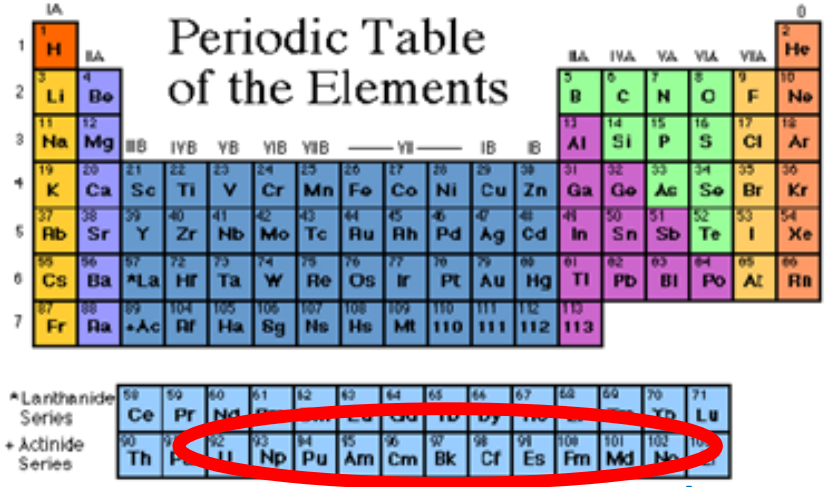
Underground Status Map



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

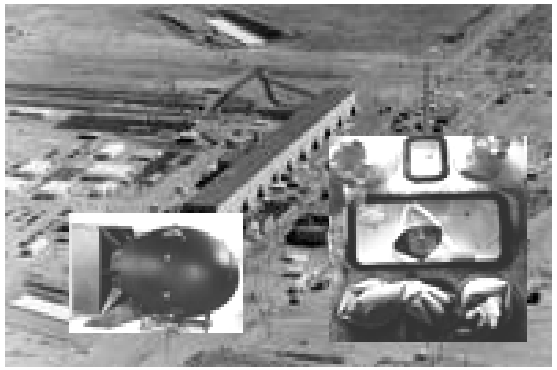
WIPP Disposal of "transuranic" waste



- 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

Transuranic (TRU) Waste Cycle



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

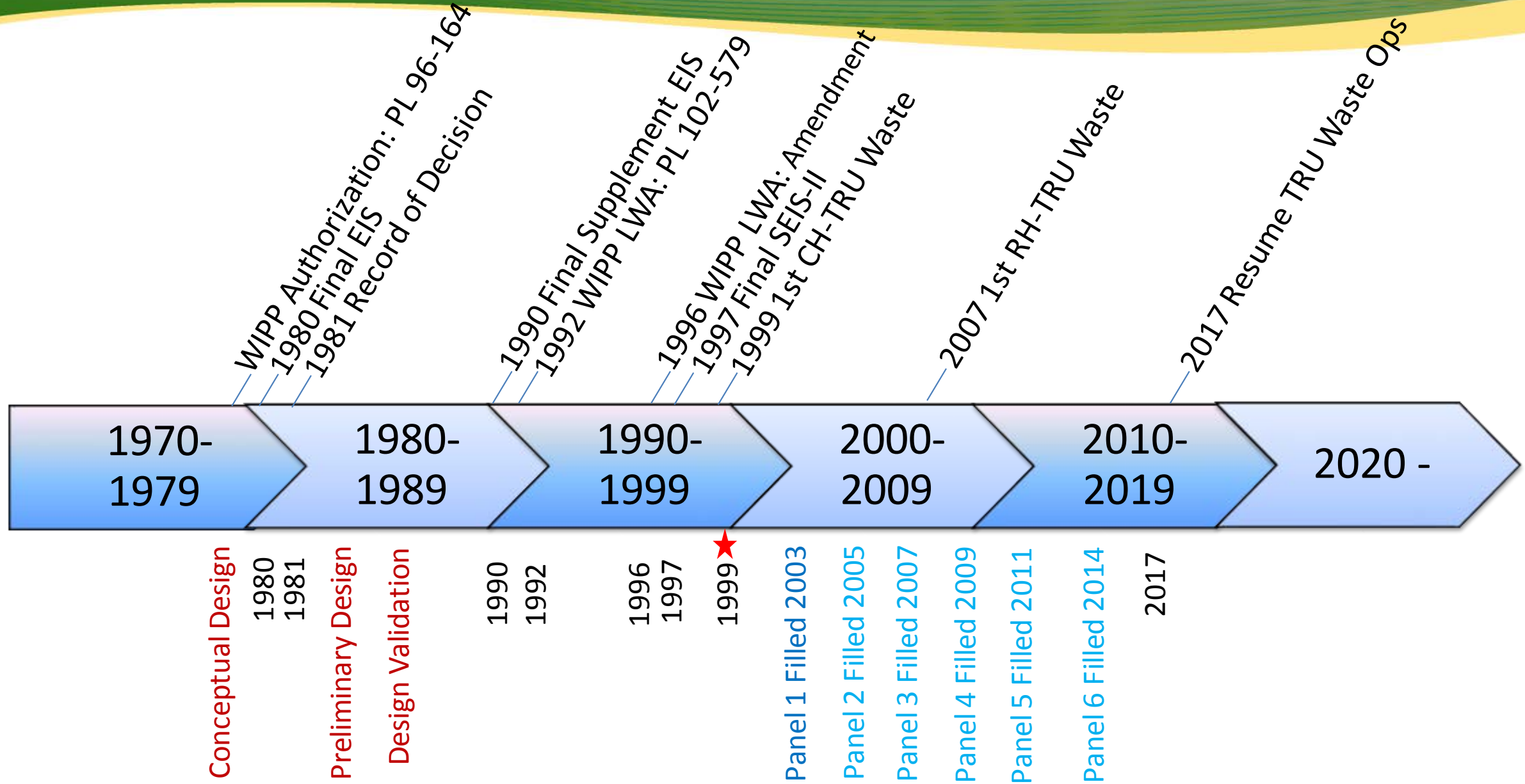
Public Law 96-164. 1979. *DOE National Security & Military Application of Nuclear Energy Authorization Act of 1980*

Characterization

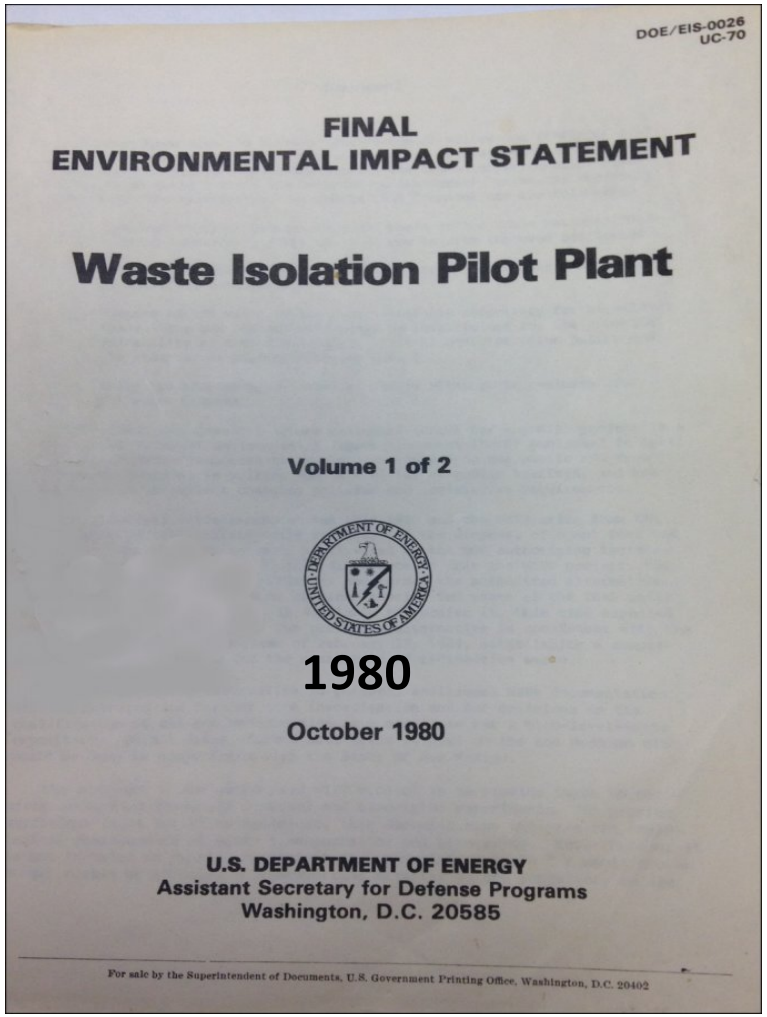
Transportation

Disposal

Selected WIPP Historical Events



1980 DOE Final Environmental Impact Statement


DOE/EIS-0026
UC-70

FINAL
ENVIRONMENTAL IMPACT STATEMENT

Waste Isolation Pilot Plant

Volume 1 of 2

1980

October 1980

U.S. DEPARTMENT OF ENERGY
Assistant Secretary for Defense Programs
Washington, D.C. 20585

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402

- October 1980, DOE issued the *Final Environmental Impact Statement, Waste Isolation Pilot Plant*, DOE/EIS-0026.
  - 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

1981 DOE Record of Decision Federal Register / Vol. 46, No 18

- 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

9162 Federal Register / Vol. 46, No. 18 / Wednesday, January 28, 1981 / Notices

DEPARTMENT OF ENERGY

Waste Isolation Pilot Plant (WIPP); Record of Decision

This Record of Decision has been prepared on the Waste Isolation Pilot Plant (WIPP) Project pursuant to Regulations of the Council on Environmental Quality, 40 CFR 1505.

Decision

The U.S. Department of Energy (DOE) has decided to proceed with the WIPP project at the Los Medanos Site in the Delaware Basin of southeast New Mexico as directed by the U.S. Congress in Public Law 96-164 "Department of Energy National Security and Military Applications of Nuclear Energy Authorization Act of 1980". The WIPP project, which is described as Alternative 2 in the Final Environmental Impact Statement (FEIS), DOE/EIS-0026, October, 1980, will be developed "as a defense activity of the DOE for the express purpose of providing a research and development facility to demonstrate the safe disposal of radioactive wastes resulting from the defense activities and programs of the United States" Public Law 96-164. Construction of permanent surface and underground facilities will proceed on a phased basis consistent with the evaluation of data obtained during the Site and Preliminary Design Validation (SPDV) program as defined in the FEIS. If significant new environmental data results from the SPDV program or other WIPP project activities, the FEIS will be supplemented as appropriate to reflect such data, and this decision to proceed with phased construction and operation of the WIPP facility will be reexamined in the light of that supplemental National Environmental Policy Act (NEPA) review.

The WIPP facility will dispose of defense transuranic (TRU) waste stored retrievably at the Idaho National Engineering Laboratory (INEL). By approximately 1990 all existing waste stored at INEL will have been removed to WIPP, and the WIPP facility would be in a position to receive and dispose of TRU waste from other defense waste generating facilities. In addition, WIPP will include an experimental facility for conducting experiments on defense wastes, including small volumes of defense high-level waste. The high-level waste used for experiments will be retrieved and removed from the site prior to decommissioning of the WIPP facility.

A-1

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

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

September 1996, President signed the W*aste 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 rems 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 rems per hour.

(2) CURIE LIMITS FOR REMOTE-HANDED 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

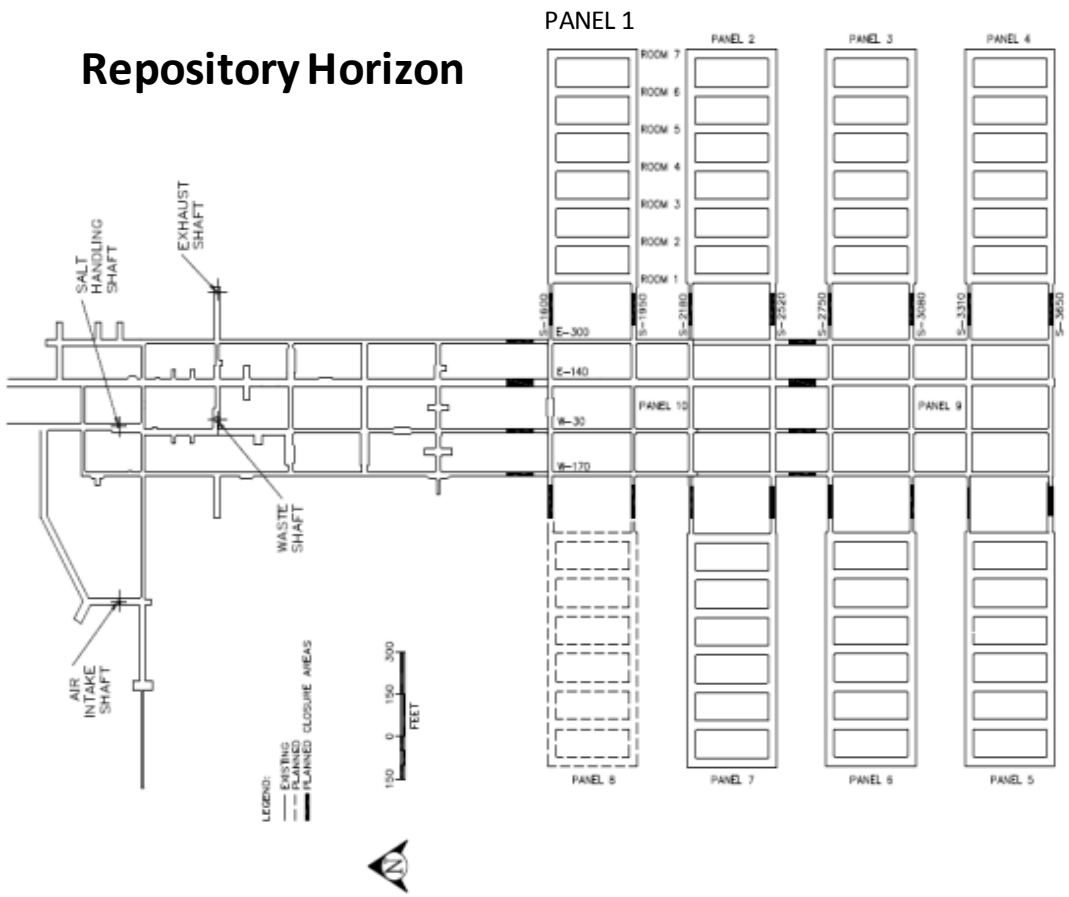
WIPP REGULATORY FRAMEWORK

	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 264 Subpart X – Miscellaneous unit

- 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.

DISPOSAL AREA - PANELS 1 THROUGH 10 (HAZARDOUS WASTE DISPOSAL UNITS)



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 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

Environmental Protection Agency

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

EPA Standards for WIPP 40 CFR Part 191

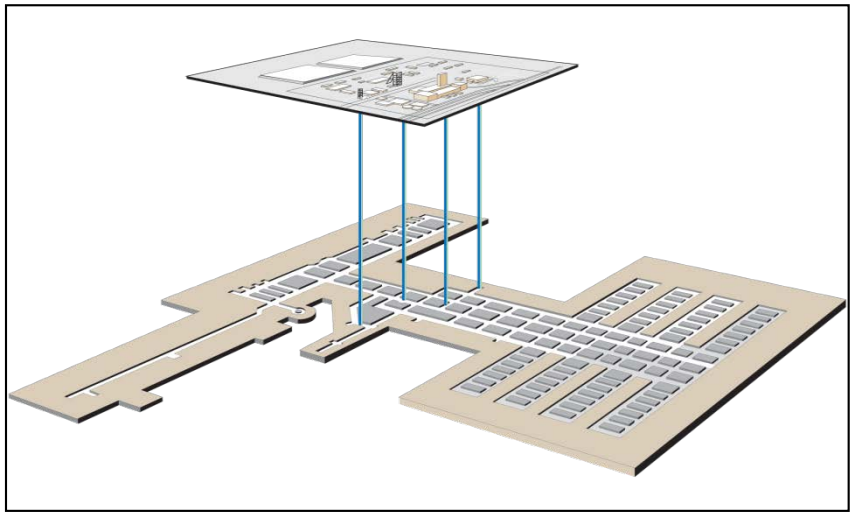
[CFR] [TITLE 40] [PART 191]

TITLE 40 - PROTECTION OF ENVIRONMENT

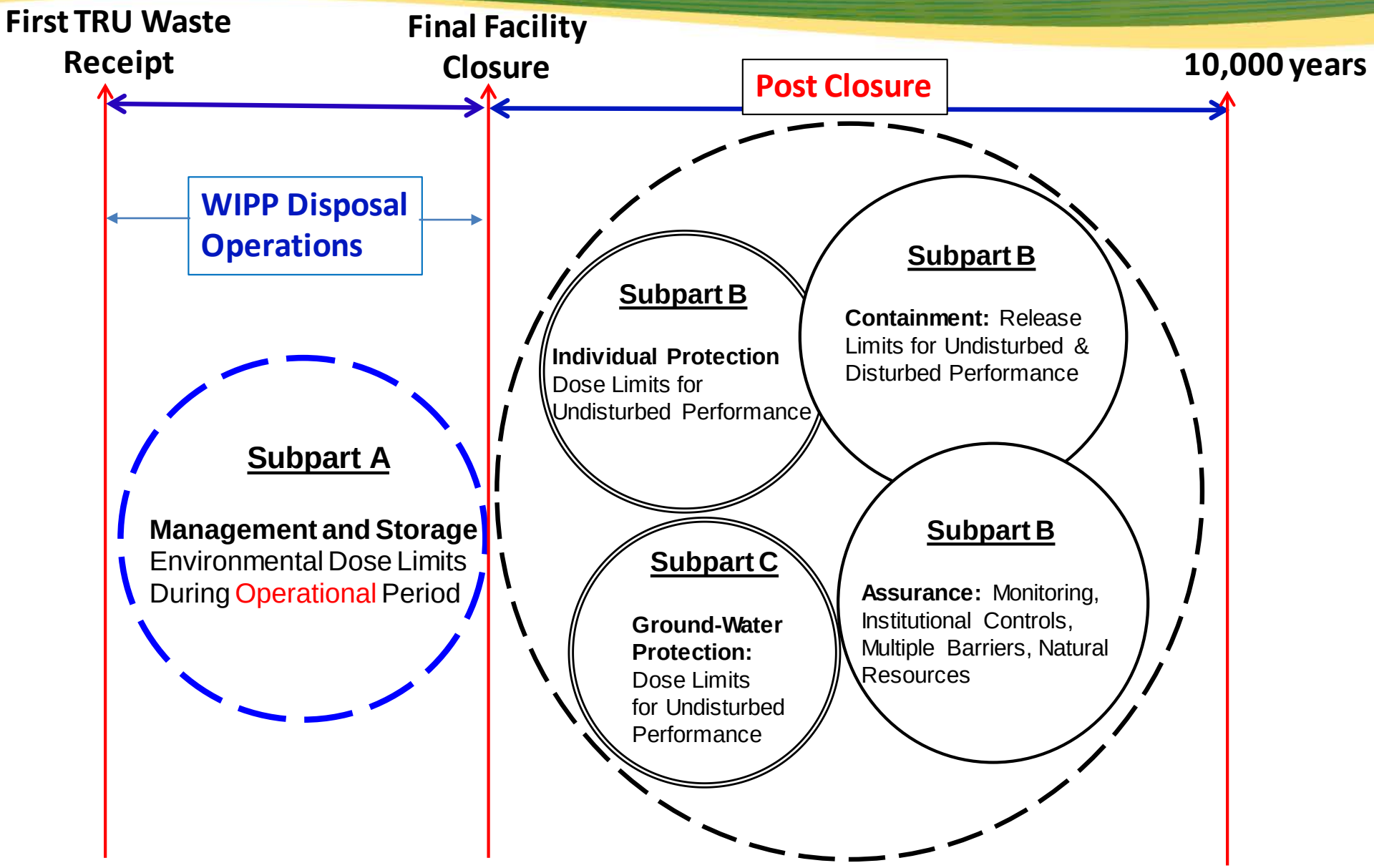
Part 191 - Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes

Table of Contents:

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

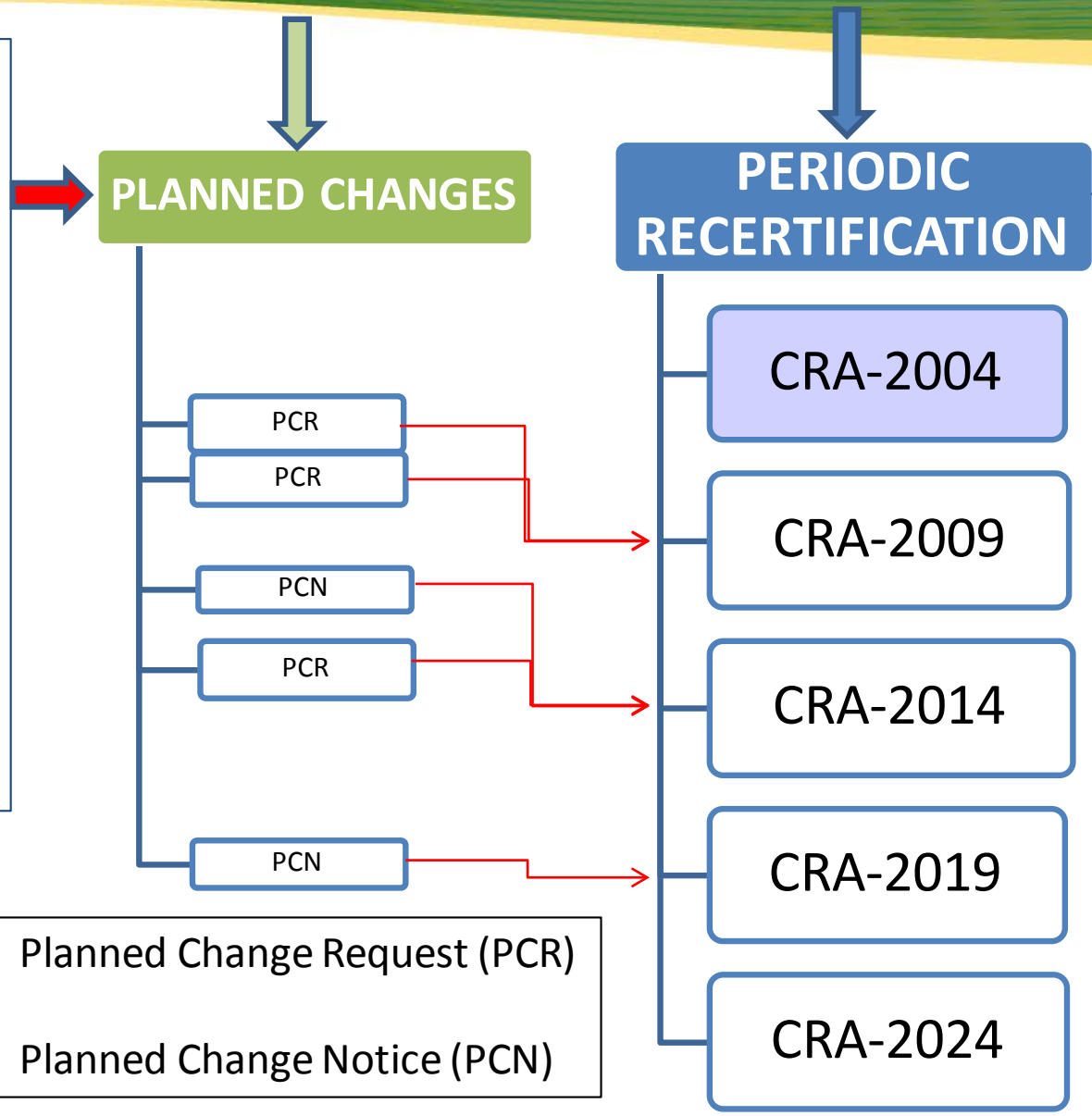


Key Elements of 40 CFR 191



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 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).

Content of Recertification Applications (CRA)

§ 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;

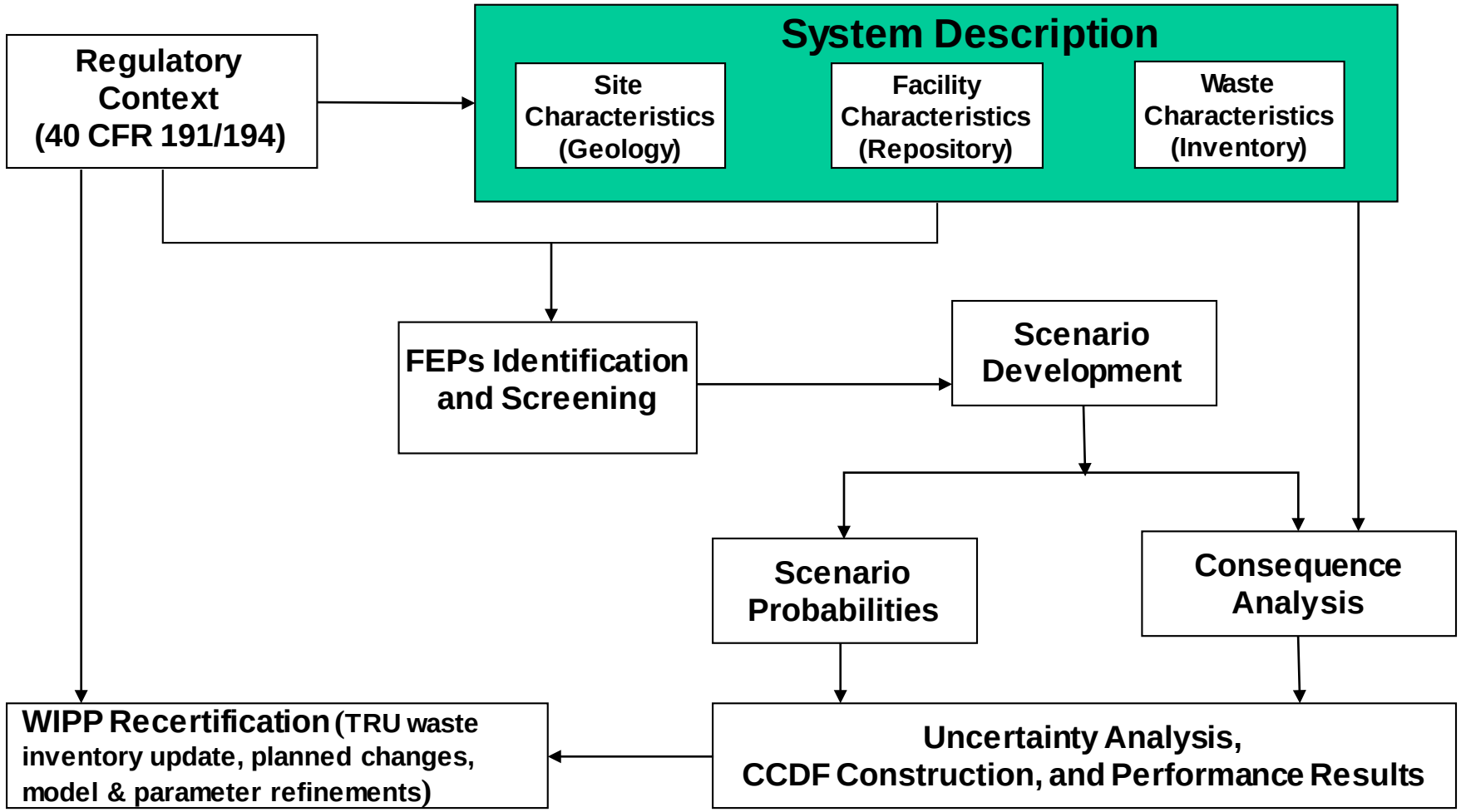
(4) An identification of any activities or assumptions that deviate from the most recent compliance application;

(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



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:	
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)*

Containment Requirements

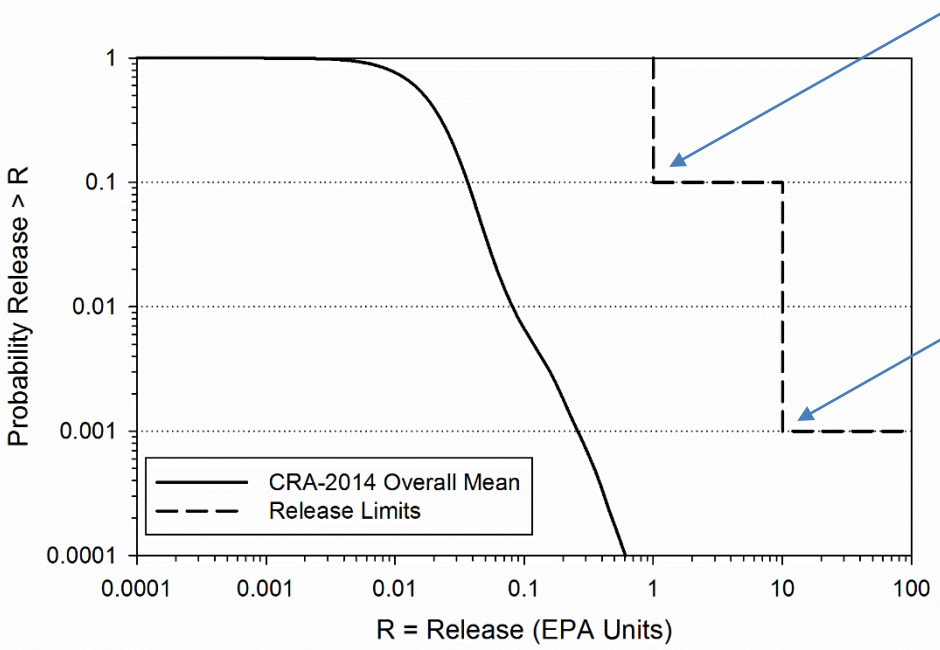
40 CFR Part 191, Subpart B, **191.13 Containment requirements**

(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 CCDF is the Measure of Compliance



Less than 1 chance in 10 of exceeding 1 EPA unit

Less than 1 chance in 1000 of exceeding 10 EPA units

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.

DOE/WIPP-02-3122

TRANSURANIC WASTE ACCEPTANCE CRITERIA FOR THE WASTE ISOLATION PILOT PLANT

Revision 8.0

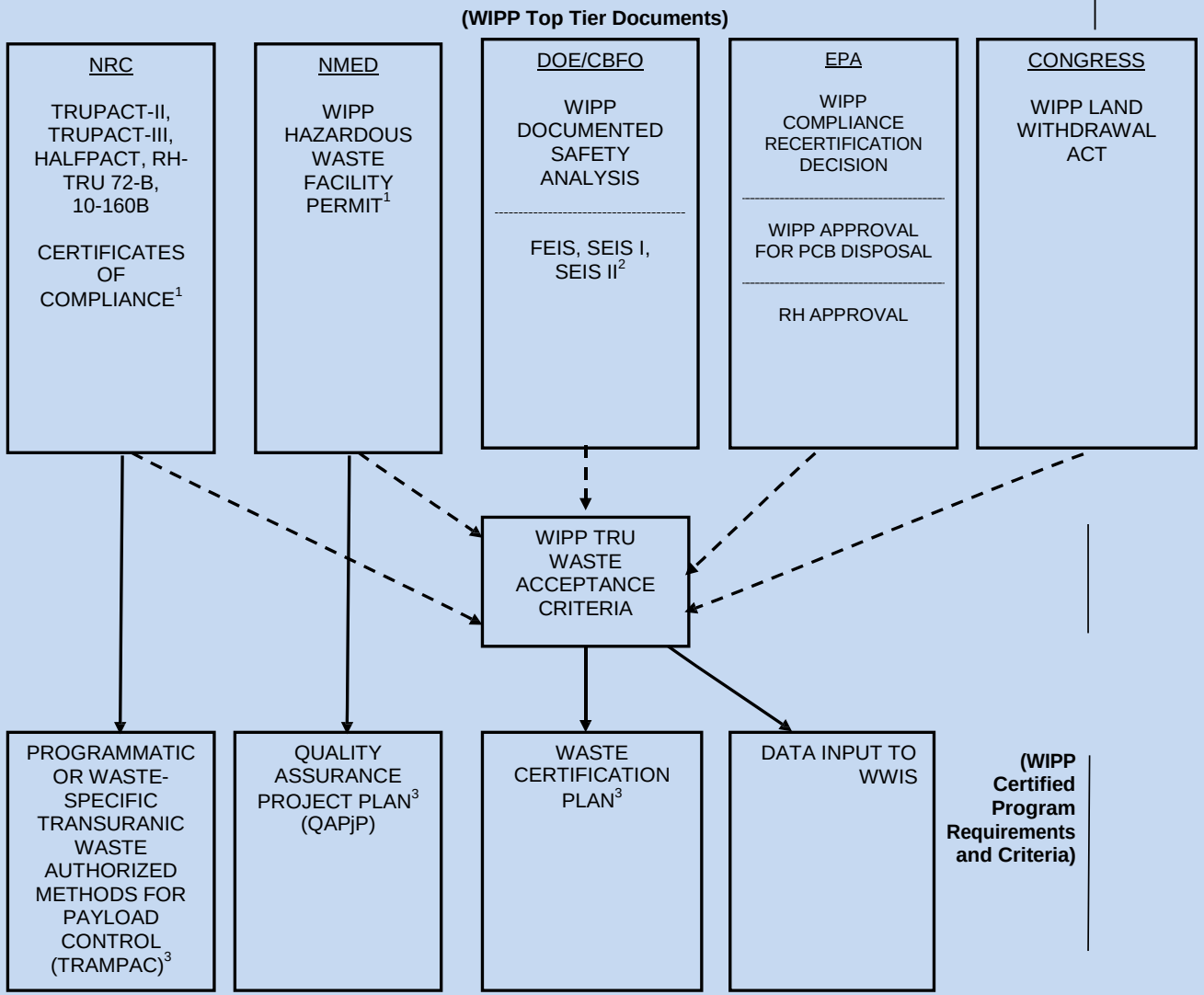
Effective Date: July 5, 2016

This document supersedes DOE/WIPP 02-3122, Rev. 7.4

U.S. Department of Energy Carlsbad Field Office

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

Figure 1.0 Regulatory Basis of TRU Waste Acceptance Criteria



TRU Waste Acceptance Criteria for WIPP

DOE/WIPP-02-3122

TRANSURANIC WASTE ACCEPTANCE CRITERIA FOR THE WASTE ISOLATION PILOT PLANT

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U.S. Department of Energy Carlsbad Field Office

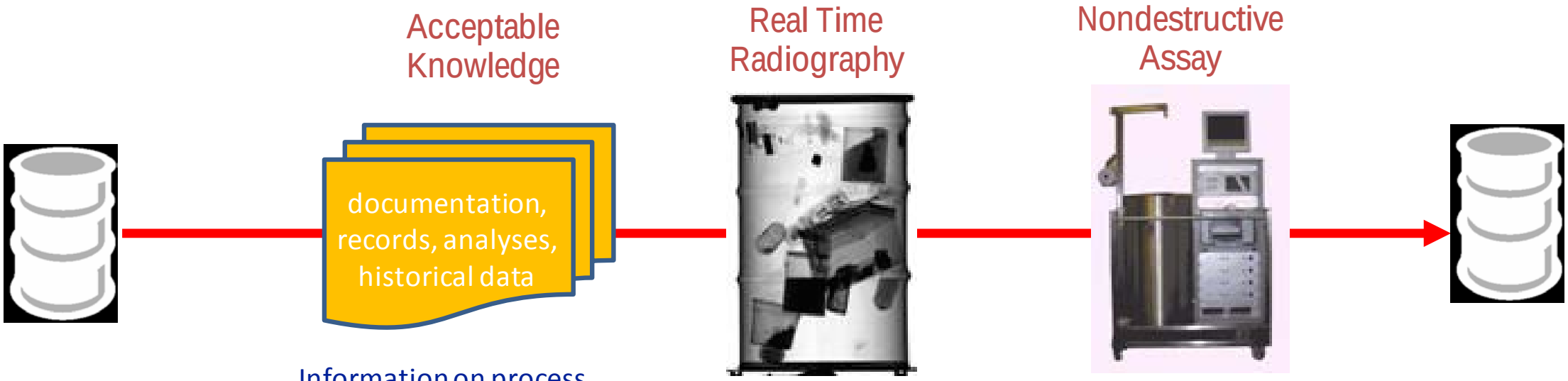
DOE/WIPP-02-3122
Revision 8.0
Effective Date: July 5, 2016

Table 1 ^{239} Pu 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

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



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

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

Assay equipment used determine radiological characterization data

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

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

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.

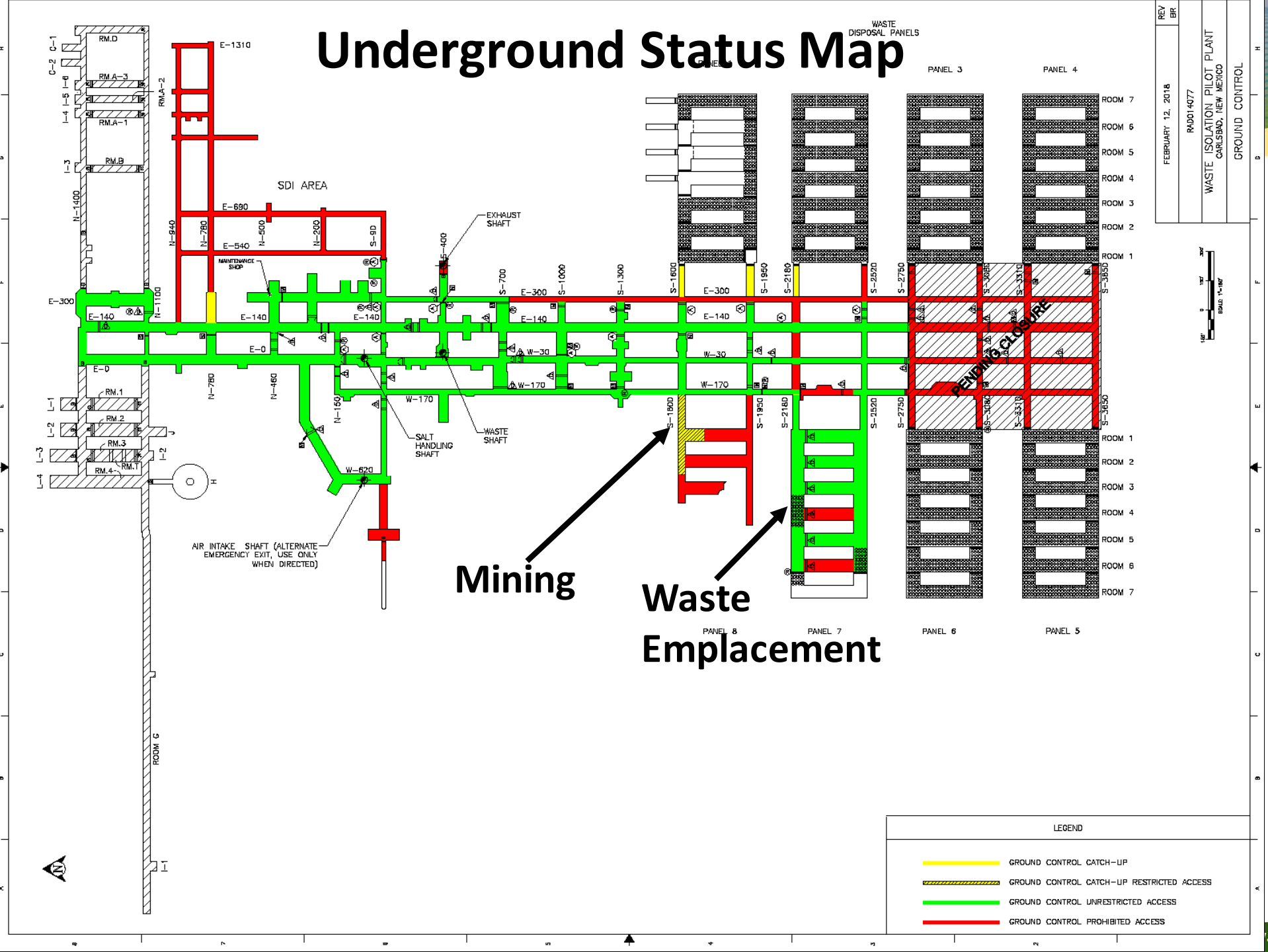
WIPP Status

- **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**

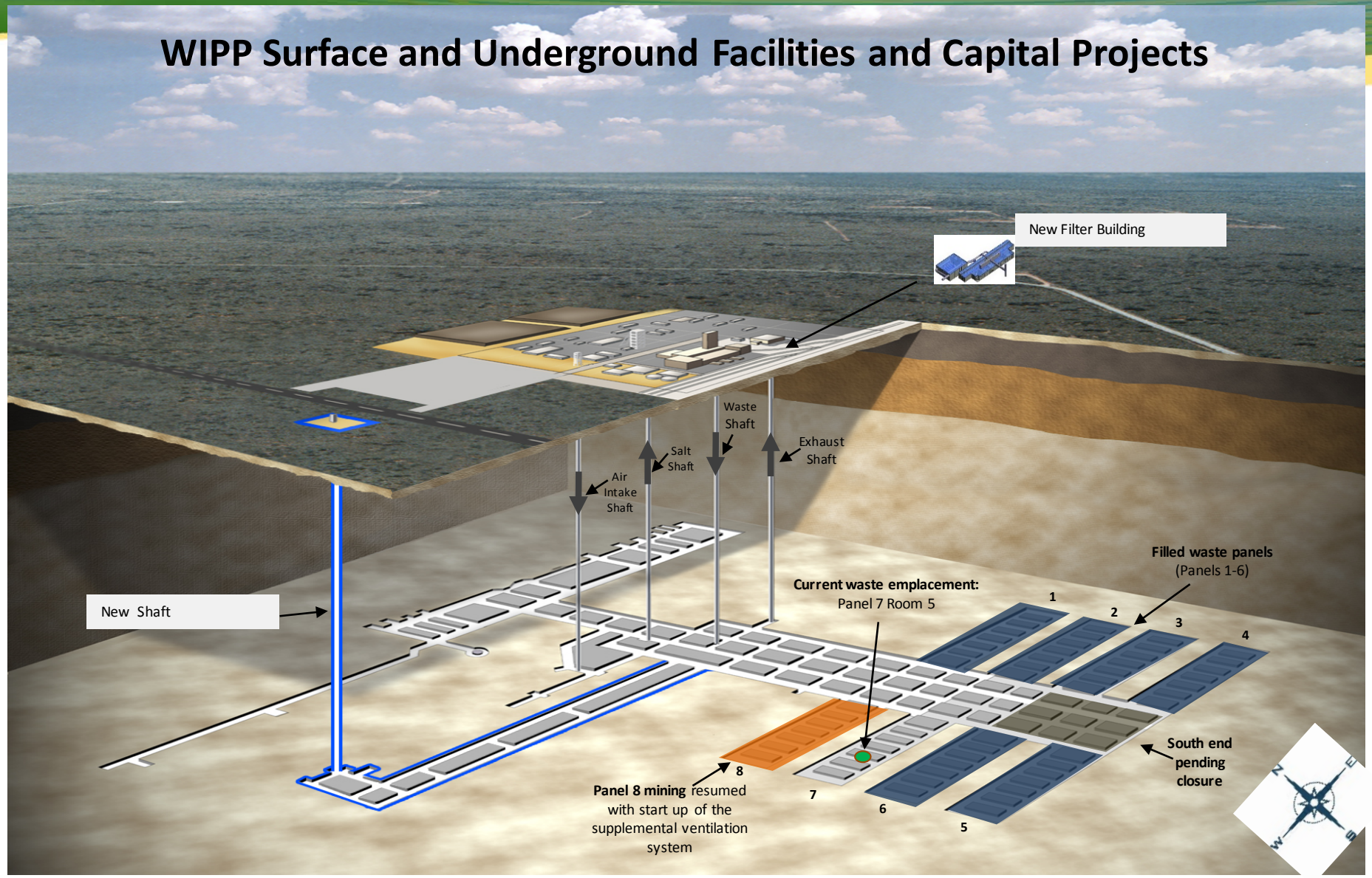
WIPP Status

- 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



WIPP Surface and Underground Facilities and Capital Projects



Projected Shipments
February 2018 to January 2019

Site	Shipments
INL	150
LANL	25
ORNL	90
SRS	20
ANL	5
WCS	10
TOTAL	300

Questions