

High-Level Nuclear Waste Storage and Disposal

North Dakota High-Level Radioactive Waste
Advisory Council

November 4, 2019

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Southwest Research and Information Center

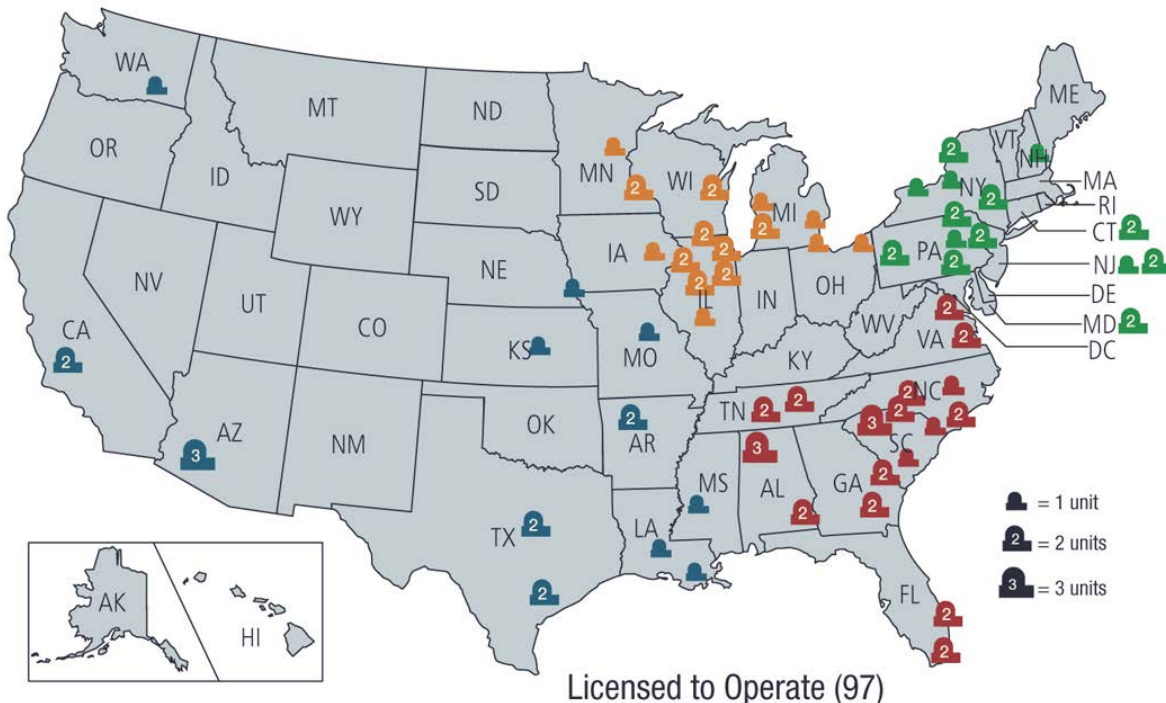
Albuquerque, NM

Discuss Today

- ❖ How is spent fuel generated?
- ❖ How and where is the waste stored?
- ❖ Will it be disposed at Yucca Mountain?
- ❖ What is consolidated storage?
- ❖ Why could waste come to North Dakota or not come?
- ❖ Can DOE change waste classifications?
- ❖ What was the DOE borehole program?
- ❖ What is WIPP's role in demonstrating "safe disposal" of defense TRU waste?
- ❖ Other questions you have

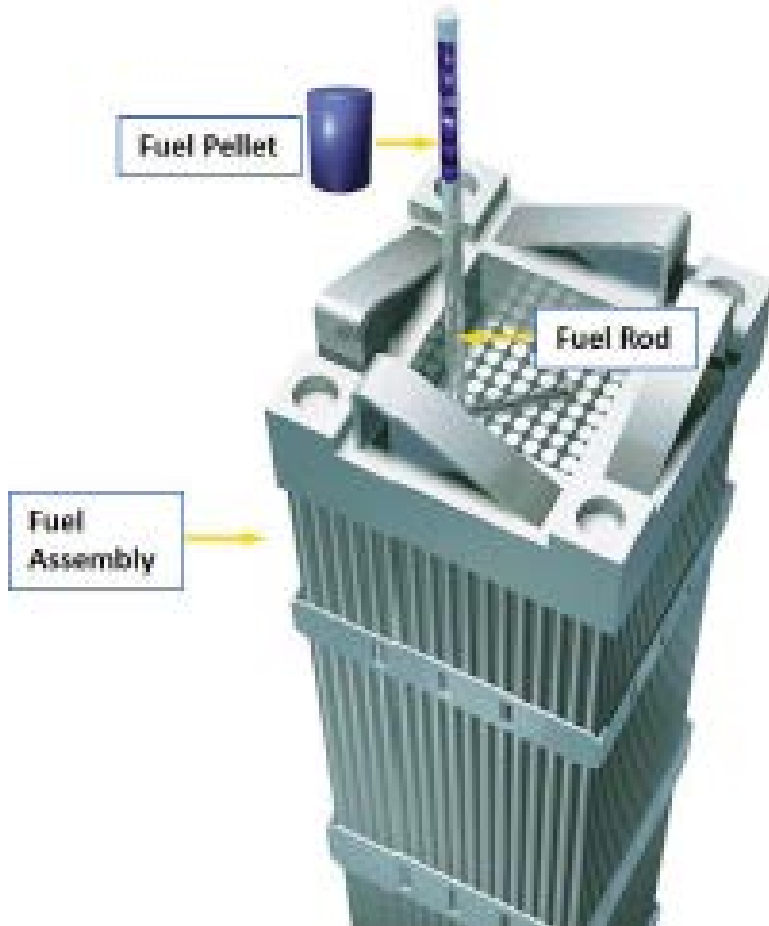
Nuclear Power Plants

U.S. Operating Commercial Nuclear Power Reactors



- ~ 94% of operating reactors are east of 100th meridian
- ~ 92% of spent fuel is east of 100th meridian

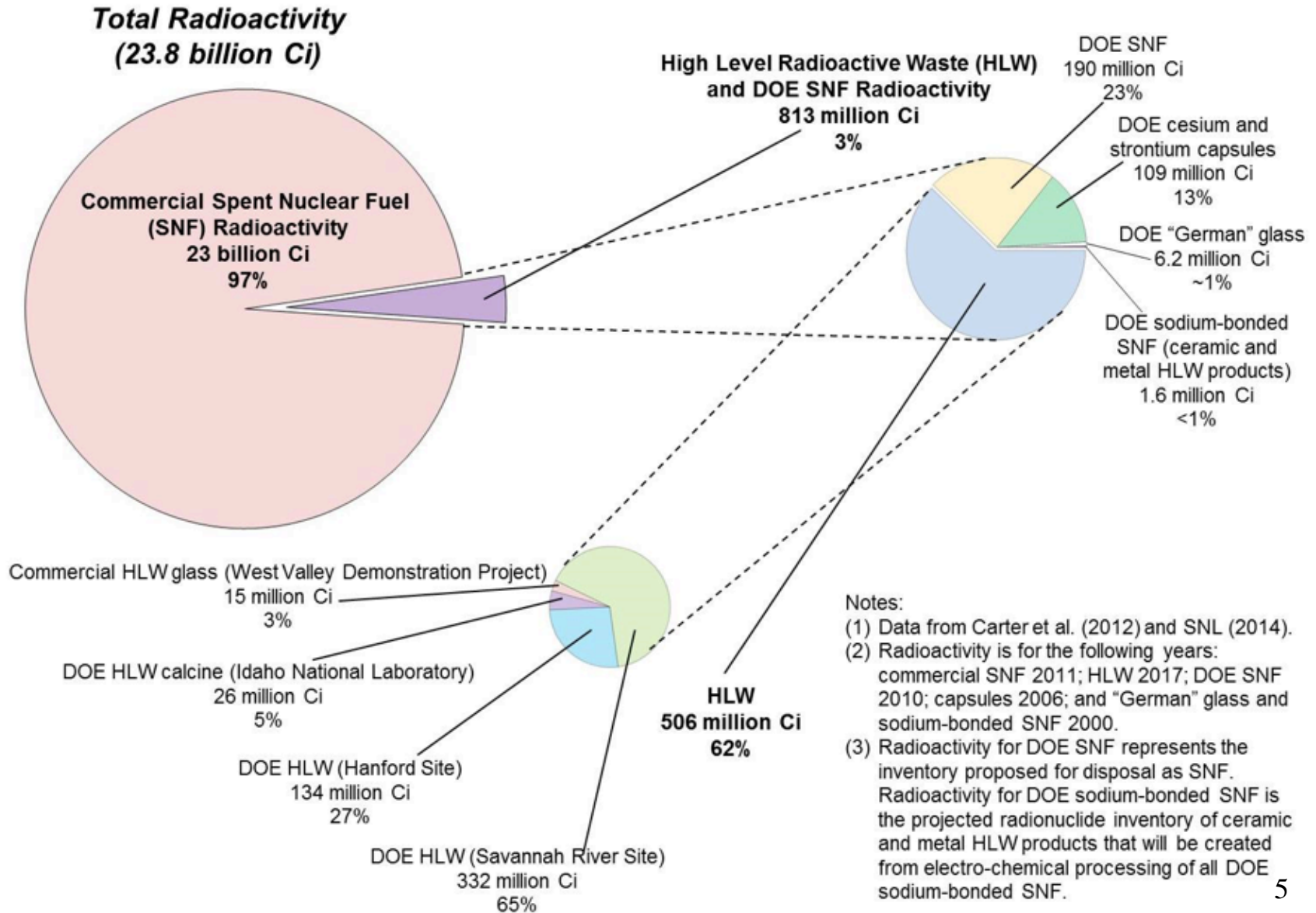
How much waste?



Current amount of commercial spent fuel = ~80,000 metric tons

About 2,000 metric tons generated each year

VERY Radioactive Waste

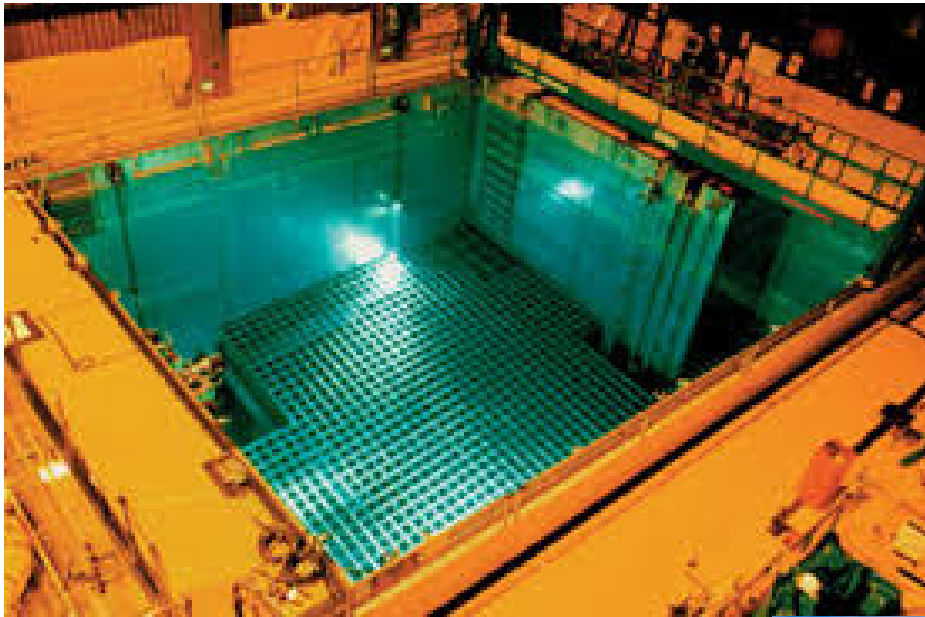


VERY Long Timeframe

“We recommend calculation of the maximum risks of radiation releases whenever they occur as long as the geologic characteristics of the repository environment do not change significantly. The time scale for long-term geologic processes at Yucca Mountain is on the order of **approximately one million years.**”

National Research Council, *Technical Bases for Yucca Mountain Standards*, 1995, pp. 71-72.

Storage Today



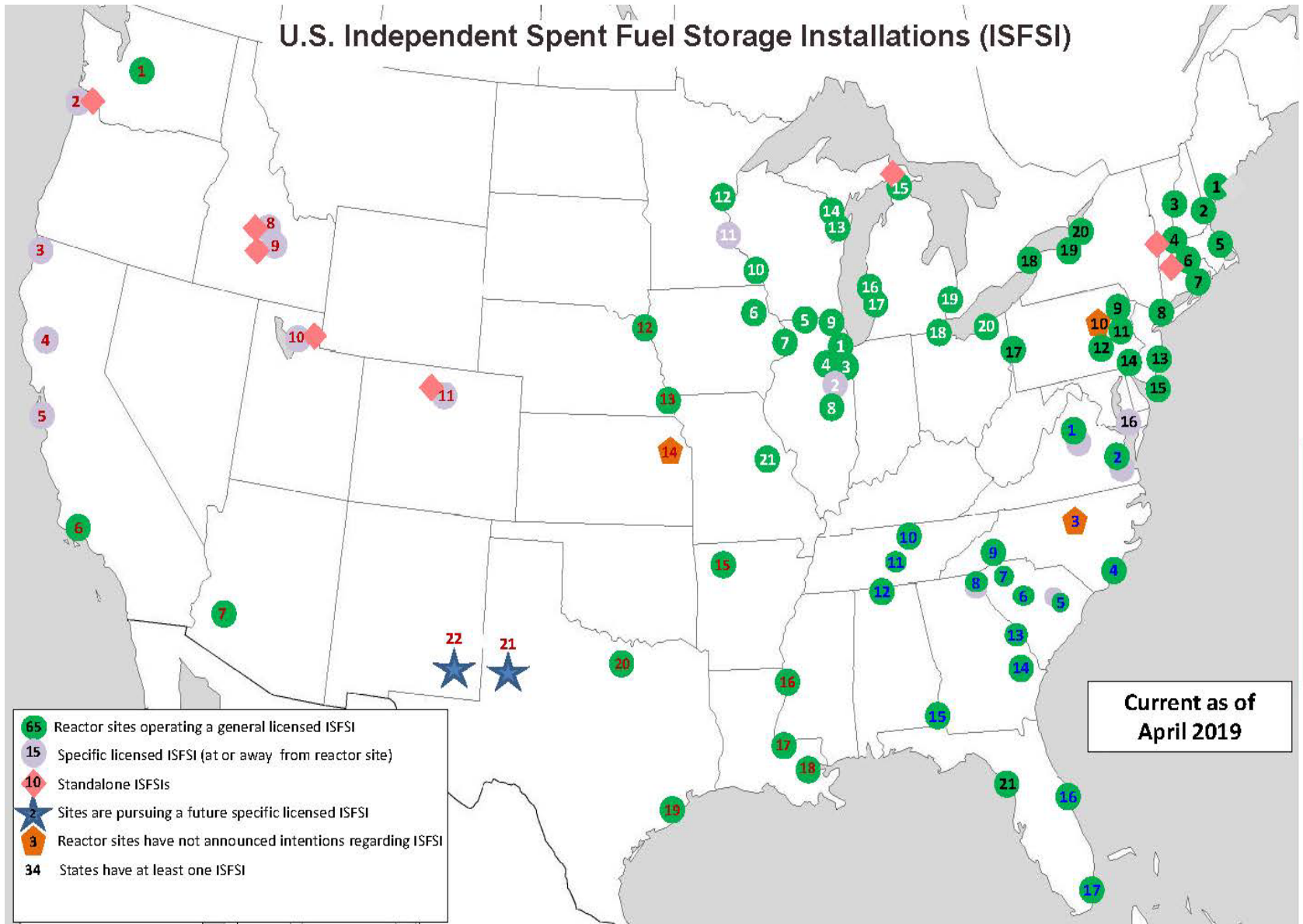
Surry - Virginia



San Onofre -
California

Storage Sites

U.S. Independent Spent Fuel Storage Installations (ISFSI)



Law: Nuclear Utilities do Storage

“the generators and owners of high-level radioactive waste and spent nuclear fuel have the primary responsibility to provide for, and the responsibility to pay the costs of, interim storage of such waste and spent fuel until such waste and spent fuel is accepted by the Secretary of Energy in accordance with the provisions of this Act.” NWPA Sec. 111(a)(5).

Law: DOE does Disposal

“following commencement of operation of a repository, the Secretary [of Energy] shall take title to the high-level radioactive waste or spent nuclear fuel.....” NWPA Sec. 302(a)(5)(A).

Yucca Mountain, NV is the only disposal site considered since 12/22/1987.

NWPA Sec. 160(a)(2).

Yucca Mountain, NV



**State of Nevada and Indian Tribes
have many technical & legal objections**

Yucca Mountain Timeline

- ❖ 2/15/2002 – Pres. Bush selects Yucca Mtn.
- ❖ 4/8/2002 – Nevada Notice of Disapproval
- ❖ House overrides on 5/8/2002 by 306-117
- ❖ Senate overrides on 7/9/2002 by 60-39
- ❖ DOE License application to NRC on 6/3/2008
- ❖ DOE asks to Withdraw application on 3/3/10
- ❖ DC Court of Appeals decision 8/13/13
- ❖ No DOE Yucca Mtn. funding – FY 2010-2019

Existing Consolidated Storage

- ❖ Private Fuel Storage is located in Tooele County, Utah
- ❖ NRC issued 20-year license on February 21, 2006
- ❖ Site not used because of public and state opposition, establishment of Cedar Mountain Wilderness Area, BLM not granting access, and BIA not approving lease

Proposed Consolidated Storage



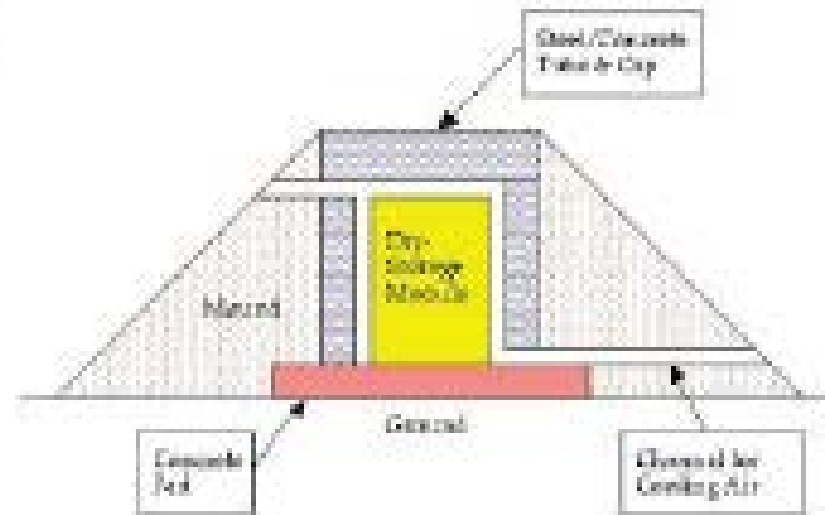
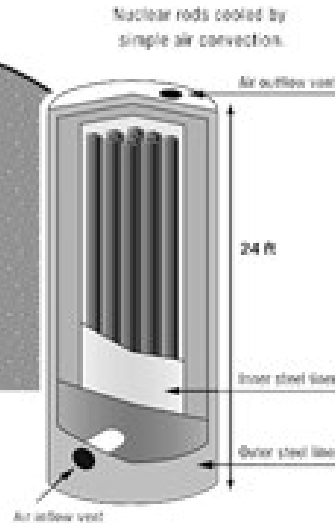
Either site requires changing NWPA to fund private storage sites.
Strong objections from New Mexico and Texas officials.

Hardened On-Site Storage (HOSS)

Earth/gravel berm should surround each cask and hide from ground-level view.



Potential Target: 24 to 36 Bundles of Nuclear Rods



Why would North Dakota be considered?

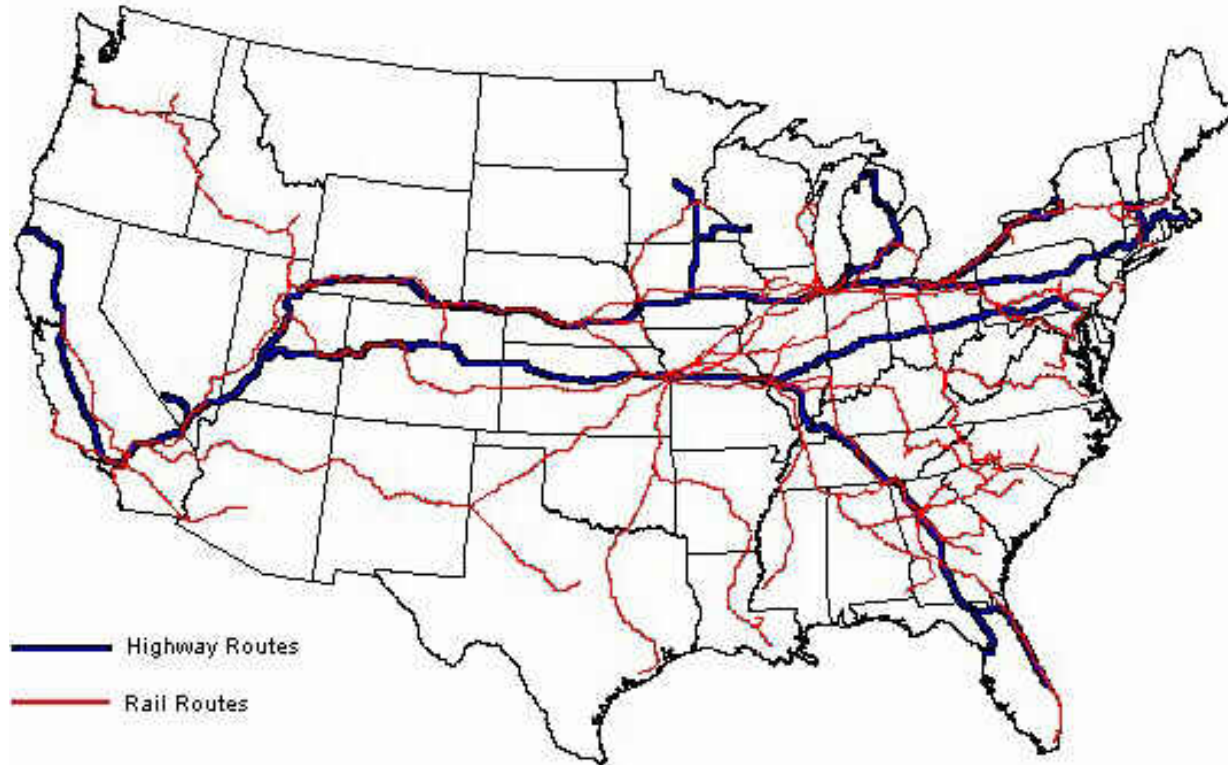
- ❖ Proposed sites do not proceed
- ❖ Borehole proposals revived
- ❖ NWPA changes
- ❖ No spent fuel or high-level waste

Why would North Dakota NOT be considered?

- ❖ State law banning high-level waste
- ❖ No nuclear power plants
- ❖ No unique geologic/historic features
- ❖ One of very few states not on transportation routes – unless waste is coming to ND

Transportation to Yucca Mountain

Nuclear Waste Shipment Routes



North Dakota is one of very few states not on likely routes

Can DOE change waste classifications?

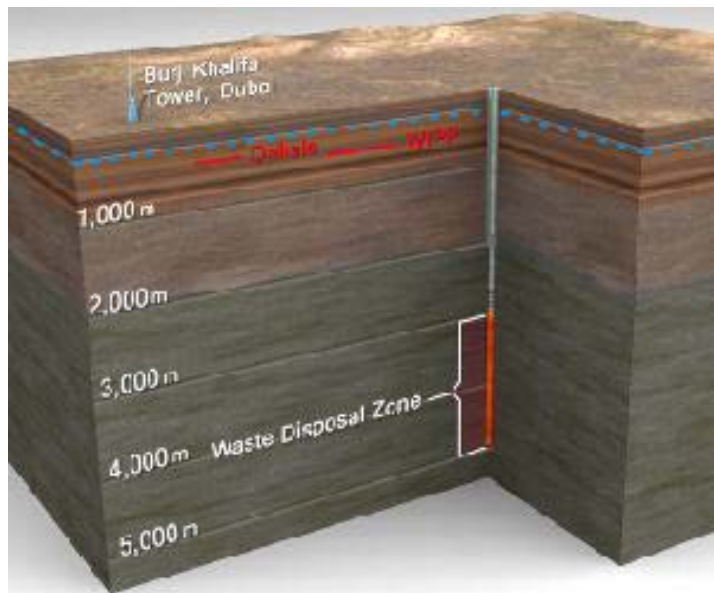
- ❖ DOE proposes to re-classify some defense high-level waste. That waste is currently in WA, ID, SC, and NY.

84 Federal Register 26835-47 (6/10/2019)

- ❖ DOE cannot re-classify commercial spent fuel under the NWPA.
- ❖ NRC classifies low-level waste.

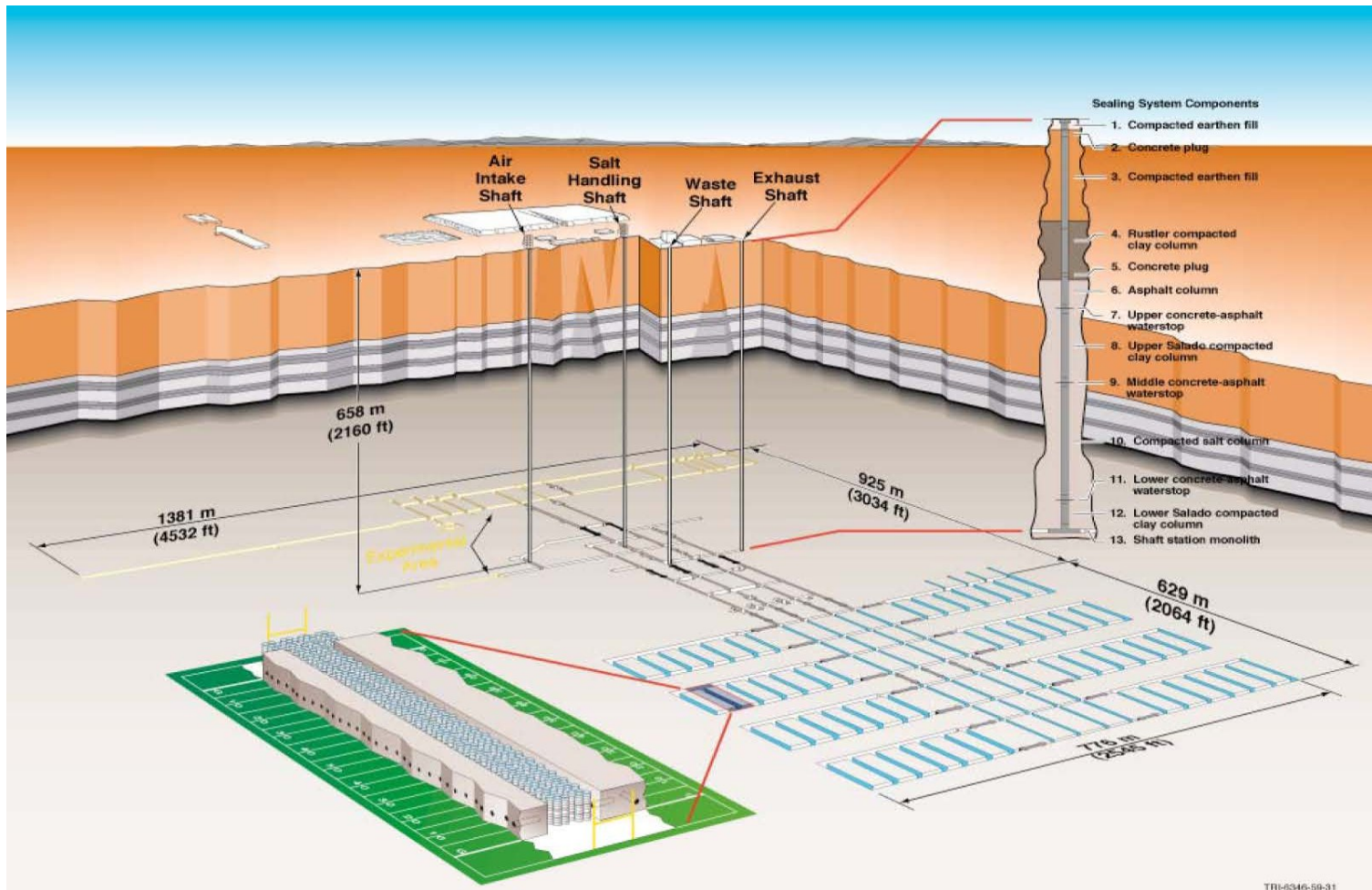
What was the DOE borehole program?

Geologic Disposal option



- ❖ Rugby, ND contract 1/5/2016
 - ❖ Moved to SD, failed again
- ❖ Four contracts 12/19/2016 - TX, NM (2), SD
- ❖ Termination announced 5/23/2017

WIPP Geologic Disposal



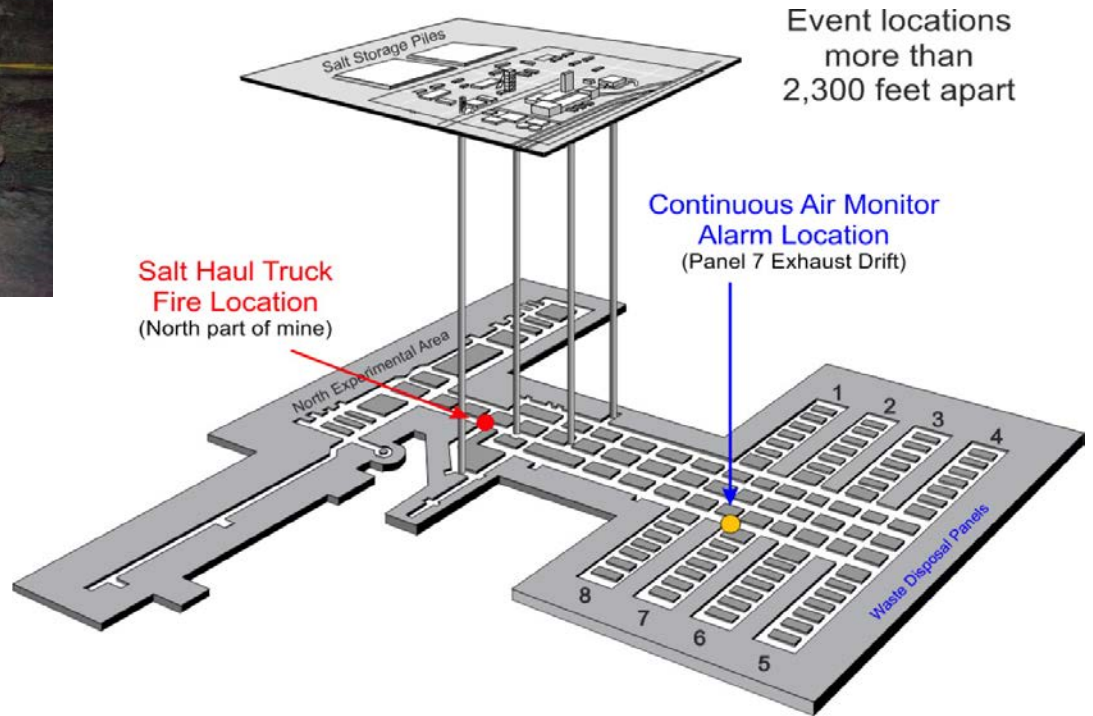
What is WIPP's role in demonstrating "safe disposal" of defense TRU waste?

- ❖ Authorized in 1979 Public Law 96-164 § 213
- ❖ Consultation & Cooperation Agreement (1981)
- ❖ WIPP Land Withdrawal Act (1992) (PL 102-579)
- ❖ EPA Certification 63 FR 27354-27406 (5/18/98)
- ❖ First shipment – March 26, 1999 from LANL
- ❖ NM Hazardous Waste Permit (10/27/1999)

WIPP's Mission

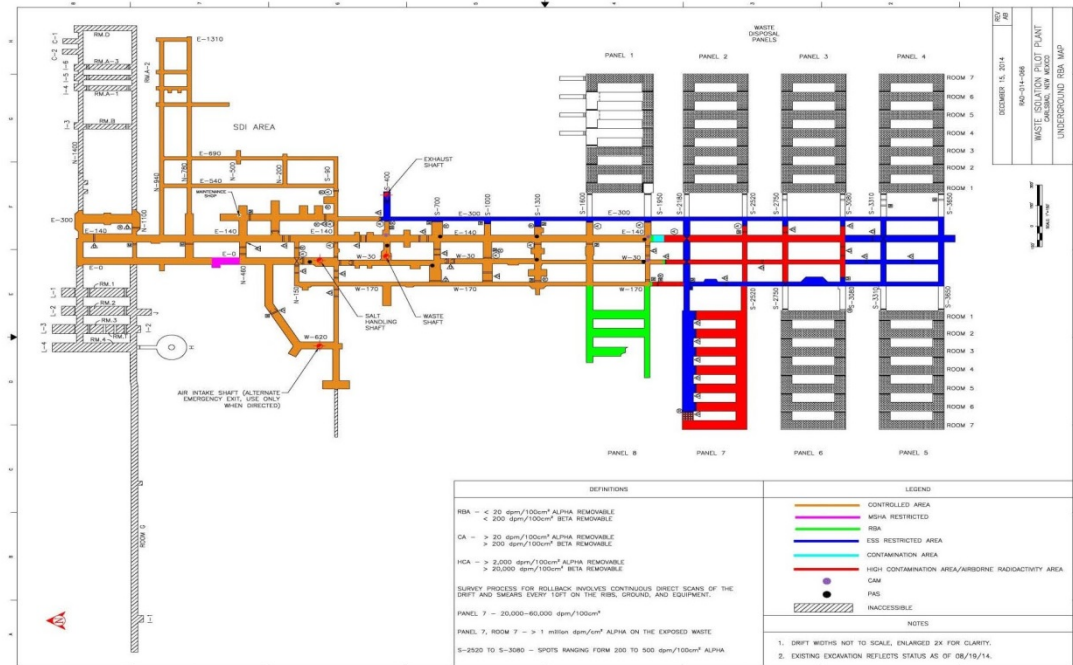
- ❖ “Start Clean, Stay Clean” to dispose of up to 175,564 m³ of defense TRU waste
- ❖ Safely transport TRU waste through more than 20 states without serious accidents or releases
- ❖ Safely clean up TRU waste at DOE sites
- ❖ Safely close, decontaminate, and decommission the WIPP site beginning in about 2030 or earlier

February 2014 Fire & Radiation Release



Radiation Release Results

More than 8,000 feet of contaminated tunnels



Status of the WIPP Underground Rollback Areas for this Reporting Period
December 15, 2014

No waste shipments for 3 years, 2 months

Resources

NRC documents:

<https://www.nrc.gov/waste/ql-waste.html>

Nuclear Waste Technical Review Board:

<https://www.nwtrb.gov>

State of Nevada Nuclear Waste Project Office:

<http://www.state.nv.us/nucwaste/>

DOE spent fuel research:

<https://www.energy.gov/ne/initiatives/spent-fuel-and-waste-disposition>

DOE HLW re-interpretation:

<https://www.energy.gov/em/program-scope/high-level-radioactive-waste-hlw-interpretation>

WIPP's website:

<https://www.wipp.energy.gov>

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