



# SE NM's Nuclear Corridor

By: John Heaton

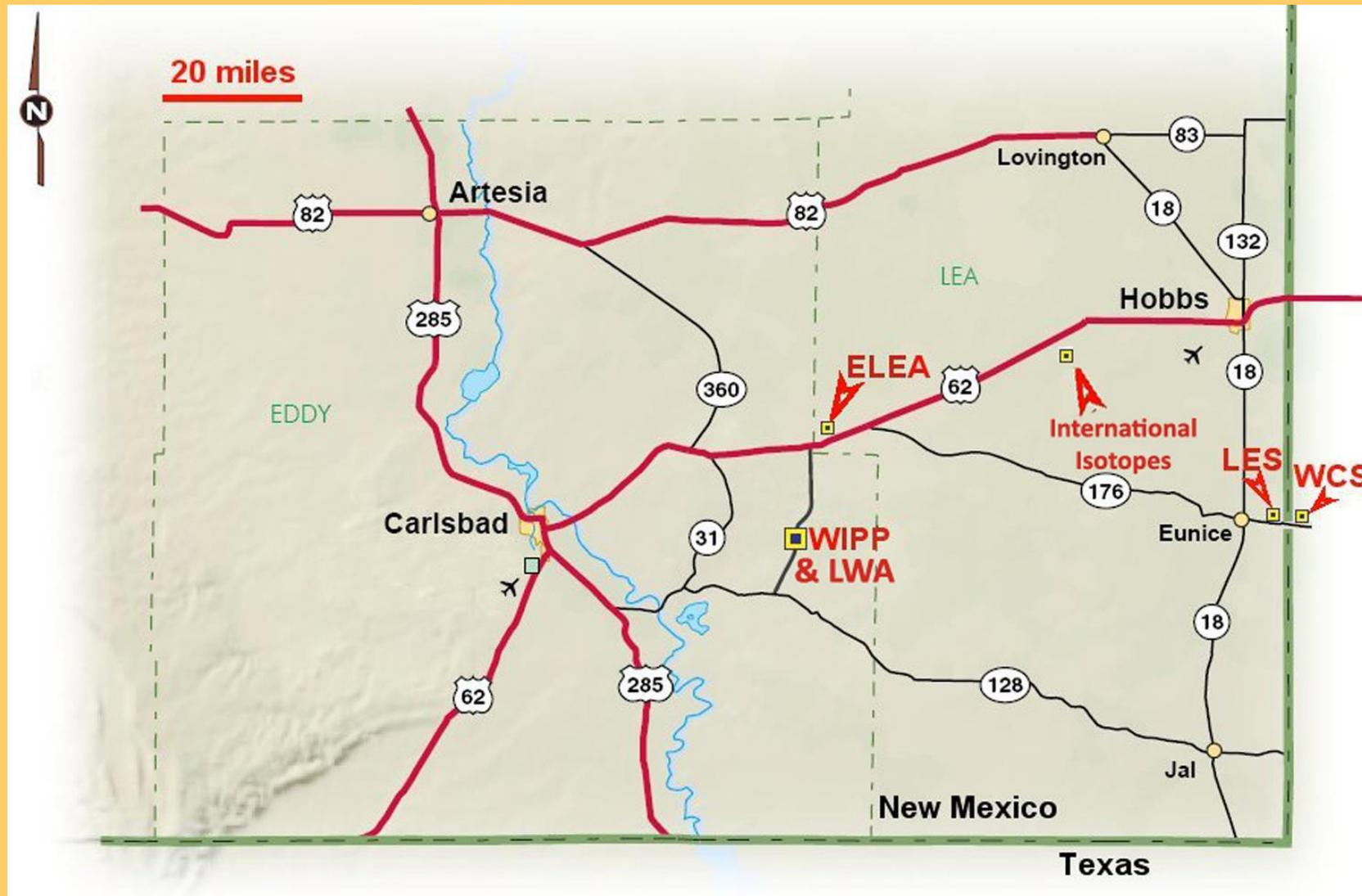
November 19, 2013

LEGISLATIVE SCIENCE, TECHNOLOGY,  
& TELECOMMUNICATIONS COMMITTEE

# SE New Mexico's Nuclear Corridor

- Operational Nuclear Facilities
  - Waste Control Specialists
  - URENCO Enrichment Plant
  - Waste Isolation Pilot Plant
- Proposed Nuclear Facilities/Activities
  - International Isotopes
  - Eddy-Lea Interim Storage Site (ELEA)
  - Generic Thermal Load Studies in Salt

# SE New Mexico's Nuclear Corridor



# WCS low-level radioactive waste



# WCS

## Disposal

- Low-level and mixed
- RCRA/TSCA Regulated Waste
- Texas Exempt Waste
- Byproduct Material

## Storage

- Radioactive Waste, incl. GTCC, LLRW, Sealed Sources, and Byproduct Material
- RCRA/TSCA Waste

## Treatment/Processing

- Mixed LLRW (MLLW)
- RCRA/TSCA Waste
- Exemption to treat and store Special Nuclear Material (SNM)



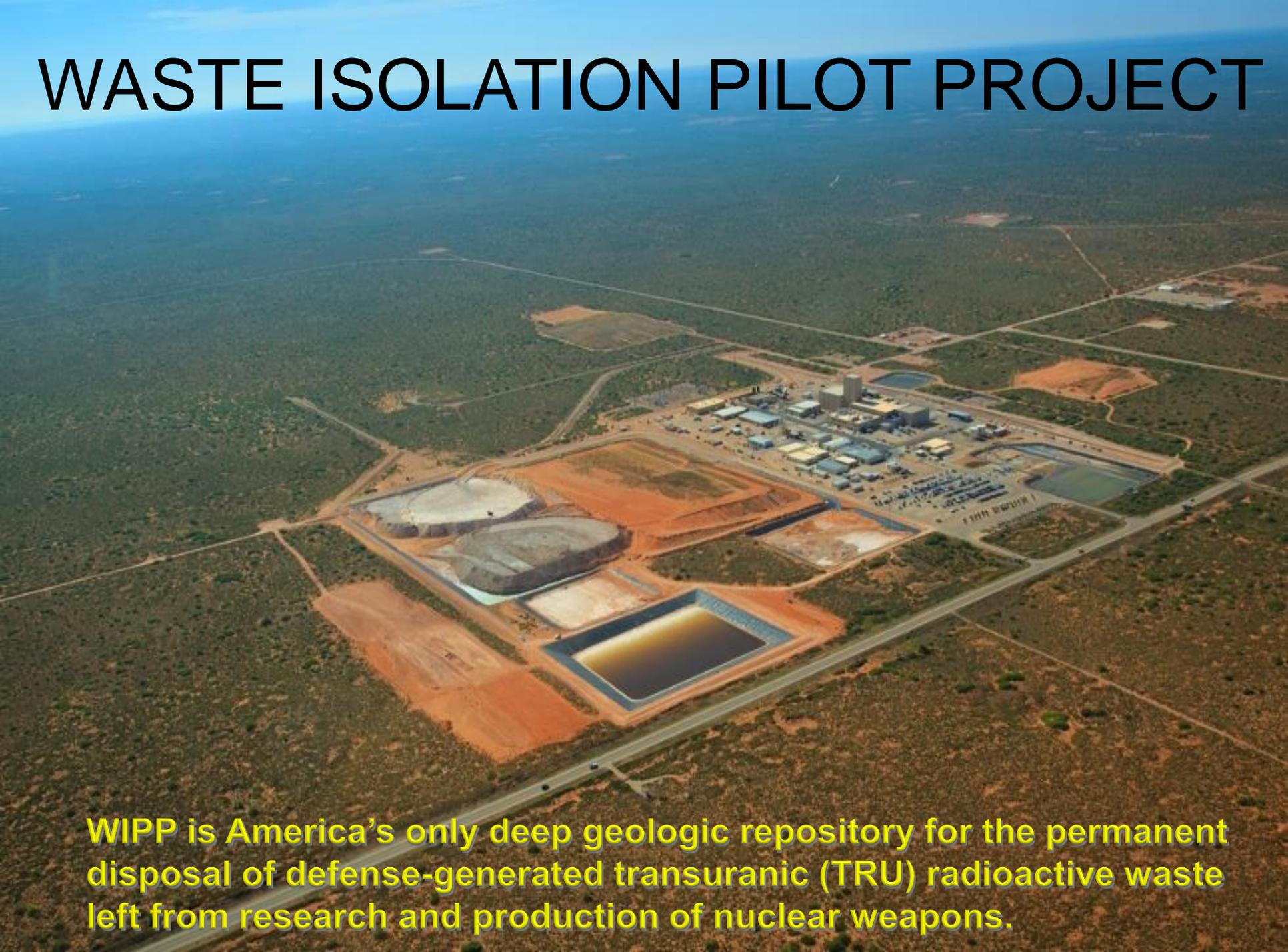
# URENCO USA



# URENCO USA

- Uranium enrichment facility with corporate headquarters located in Eunice, NM
- Uses latest centrifuge technology
- Operational with expansion underway
- Approximately 350 full-time URENCO USA employees
- Facility currently has approximately 1000 construction related staff
- Nuclear Regulatory Commission approval to operate was received June 10, 2010

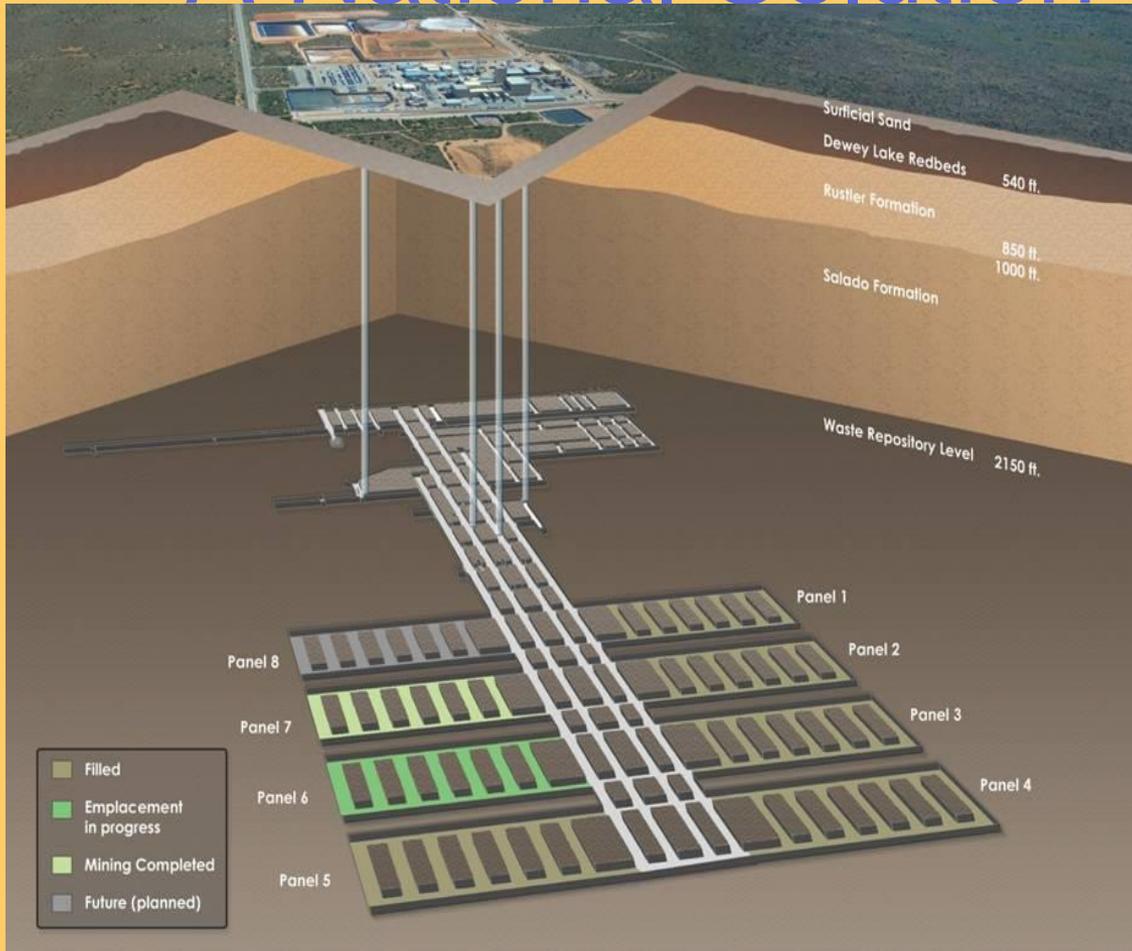
# WASTE ISOLATION PILOT PROJECT



WIPP is America's only deep geologic repository for the permanent disposal of defense-generated transuranic (TRU) radioactive waste left from research and production of nuclear weapons.

# Next Pilot Mission for WIPP

## A National Solution for DHLW



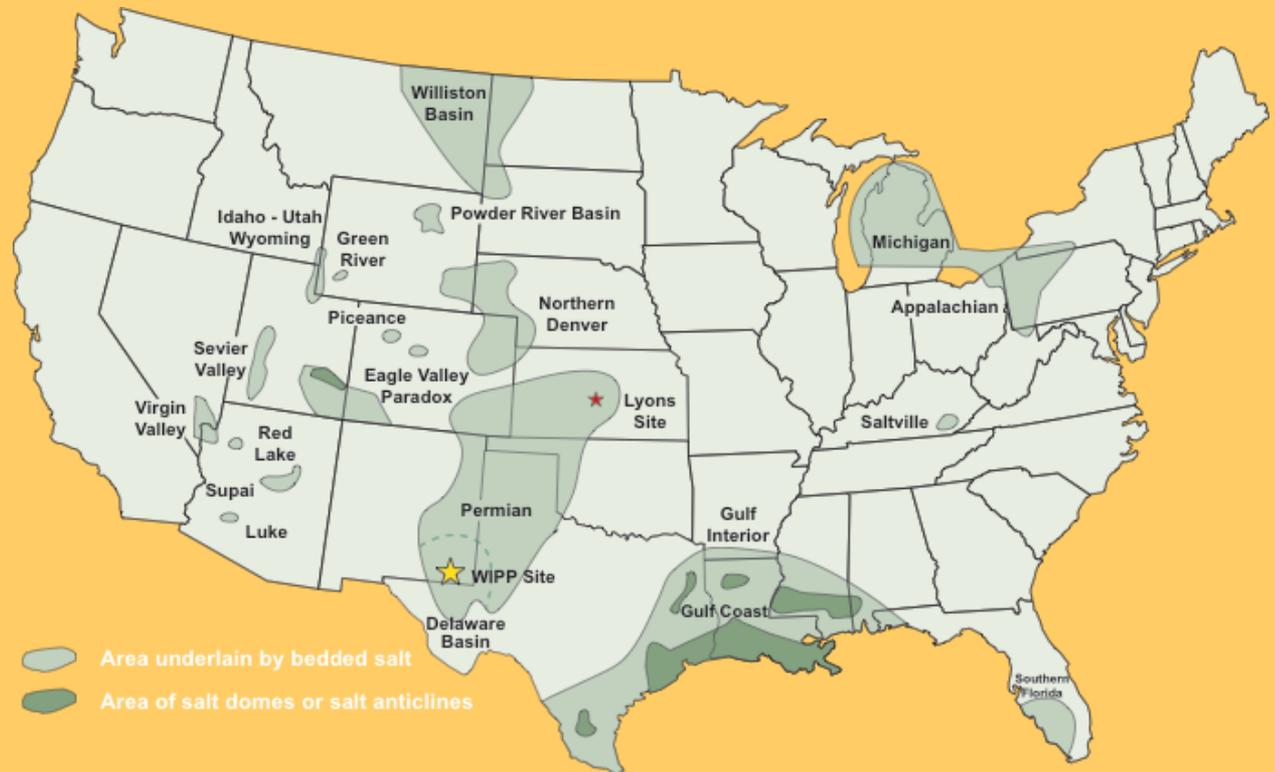
WIPP is America's only deep geologic repository for the permanent disposal of defense-generated transuranic (TRU) radioactive waste.

Originally being characterized for HLW

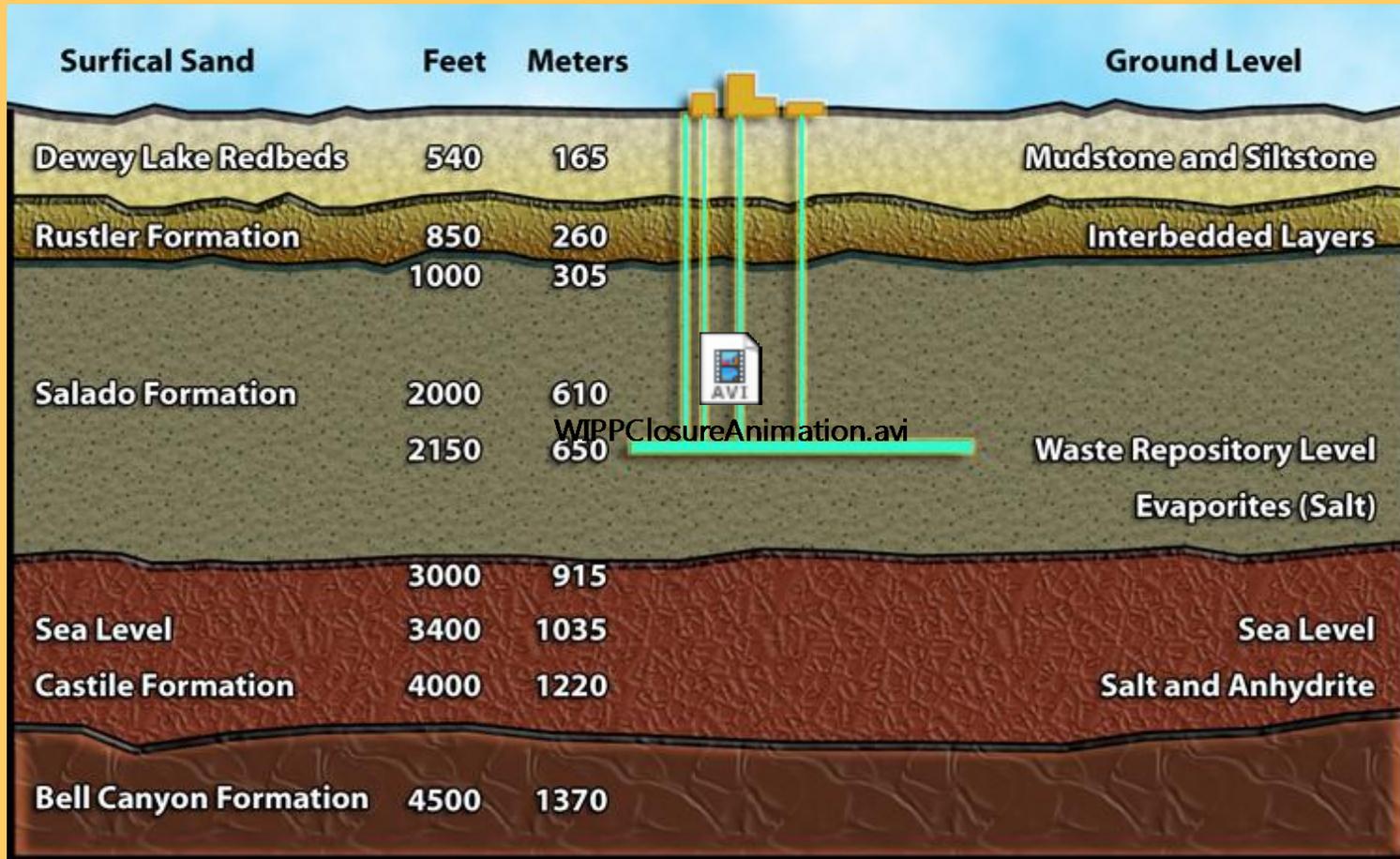
Salt was recommended by NAS

# Salt Is The Reason For WIPP's Location

- Stable geology
- Lack of water
- Impermeable to water
- Easy to mine
- Fractures close
- Plastic quality of salt allows it to encapsulate the waste
- No engineered barriers needed

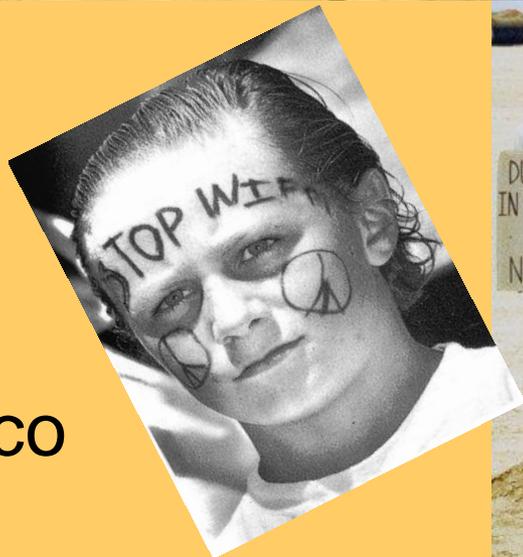


# Geologic Profile



# Available Withdrawn Land





1980's  
Santa Fe  
New Mexico

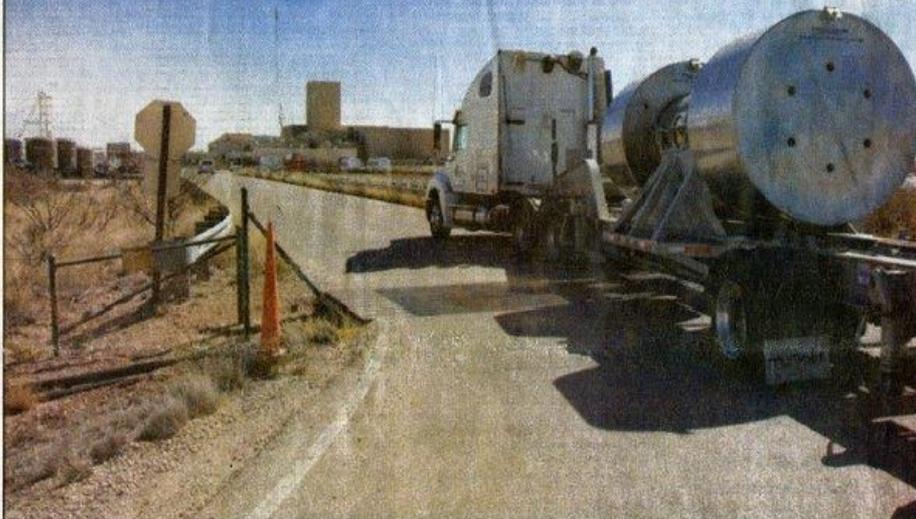


# News-Sun

JAL EUNICE HOBBS LOVINGTON TATUM SEMINOLE DENVER CITY

Carlsbad's mayor says the land near WIPP is perfect to store highly radioactive nuclear waste

## 'The next Yucca Mountain'



AP PHOTO

This Feb. 27 photo courtesy of the U.S. Department of Energy's Carlsbad Field Office shows the arrival of remote-handled transuranic waste at the Waste Isolation Pilot Plant near Carlsbad.

## 'The community's ready, the timing couldn't be better'

ALBUQUERQUE (AP) — Longtime Carlsbad Mayor Bob Forrest recalls the days when no one wanted to take the federal government's radioactive waste except his southern New Mexico community.

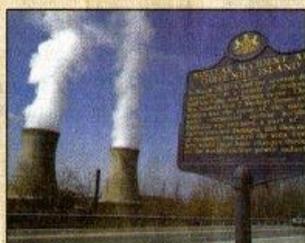
Ten years after it opened, the Waste Isolation Pilot Plant, commonly known as WIPP, remains the government's only radioactive waste dump.

But now, Forrest says, the climate for all things nuclear has changed, and communities across the nation are fighting for projects.

Forrest himself believes the vast, 250 million-year-old salt beds that house WIPP east of his community of about 35,000 could store high-level nuclear waste such as that once destined for the Yucca Mountain project the Obama administration is apparently abandoning.

Such a repository would be separate from WIPP, he said.

WIPP excavated 2,150 feet below the surface of the desert, is designed for so-called transuranic waste generated by the nation's defense work — such



An historic marker is seen as the cooling towers of Three Mile Island's Unit 1 Nuclear Power Plant pour steam into the sky in Middletown, Pa.

SEE YUCCA, Page 3

## Global warming giving nuclear power new support

MIDDLETOWN, Pa. (AP) — The nation's worst nuclear power plant accident was unfolding on Pennsylvania's Three Mile Island when an industry economist took the rostrum at a nearby business luncheon. It did not go well.

Those in the standing-room-only crowd listened to economist Doug Biden's thoughts about cheap, reliable nuclear power, but Biden could not calm their nerves or answer their pointed questions: Should they join the tens of thousands of people fleeing south-central Pennsylvania? Should they let their children drink local milk?

Three decades later, fears of an atomic

SEE NUCLEAR, Page 3

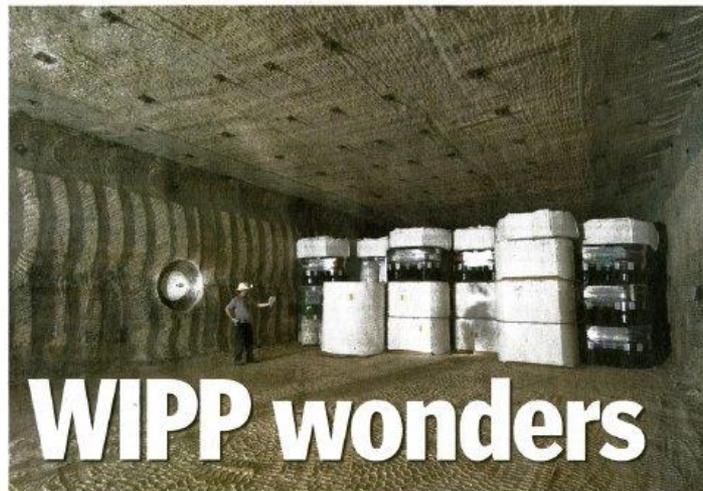
# THE SANTA FE NEW MEXICAN

SUNDAY, MARCH 29, 2009

www.santafenewmexican.com

\* ONE DOLLAR

Ten years in operation, the nation's only nuclear waste disposal site boasts a sterling safety record and continued community support



## WIPP wonders

STORAGE After radioactive waste arrives at the Waste Isolation Pilot Plant in containers, it's placed in a series of tunnels called panels. Each panel has a series of rooms that are filled, then sealed and left so the rock salt can slowly encase the waste. See videos of the underground tour at [www.santafenewmexican.com](http://www.santafenewmexican.com).

By Sue Vorenberg  
The New Mexican

CARLSBAD — Deep in an underground tunnel, standing 20 feet away from a stack of barrels of nuclear waste left over from the Cold War, Roger Nelson, chief scientist at WIPP, brought up the issue of safety.

It's been 10 years since the Waste Isolation Pilot Plant began operations, and more than 7,200 shipments later the site and its transportation system have had no major problems, including no releases to the environment and no worker contamination, Nelson said proudly.

"Both of those categories have to be zero, or we're not doing our jobs," Nelson said.

After more than 30 years of planning and operations, the site remains the only functioning nuclear waste disposal site in the United States. In the 10 years since it started

taking waste, the site has maintained a strong safety record — which has led to some very early discussions, at least by Carlsbad politicians, of the creation of new nuclear waste disposal sites in the area.

That includes a possible alternative to the Yucca Mountain nuclear waste repository that continues to be stalled through political opposition in Nevada.

"WIPP's been a great success story for us," said Carlsbad Mayor Bob Forrest, who added that he plans to lobby for a Yucca Mountain-like facility to come to the area should plans for the current site fail.

Still, some officials from the state government are not particularly fond of that idea, at least not if it involves expanding WIPP's mission to handle high-level waste.

"The federal government must abide by the promise it made to New Mexicans more than a decade ago and focus on WIPP's original purpose to dispose of only transuranic waste"

— trash containing radioactive elements such as plutonium — New Mexico Environment Department Secretary Ron Curry said. "We will vigorously oppose any attempt to expand or alter the mission of WIPP to allow high-level waste at the site."

As far as WIPP's current mission, and thinking back on the site's history, Sen. Jeff Bingaman, a Silver City Democrat, said he's impressed by how well things have gone so far. The site has been a valuable national asset for getting rid of some types of defense-related nuclear waste and a boon to the economy of southeastern New Mexico, he said.

"I think the WIPP site has worked out well for the purpose we established it for," said Bingaman, who has worked on legislative aspects of the site since 1981. "It has operated smoothly and our state has benefited economically from the employment."

Please see WIPP, Page A-6



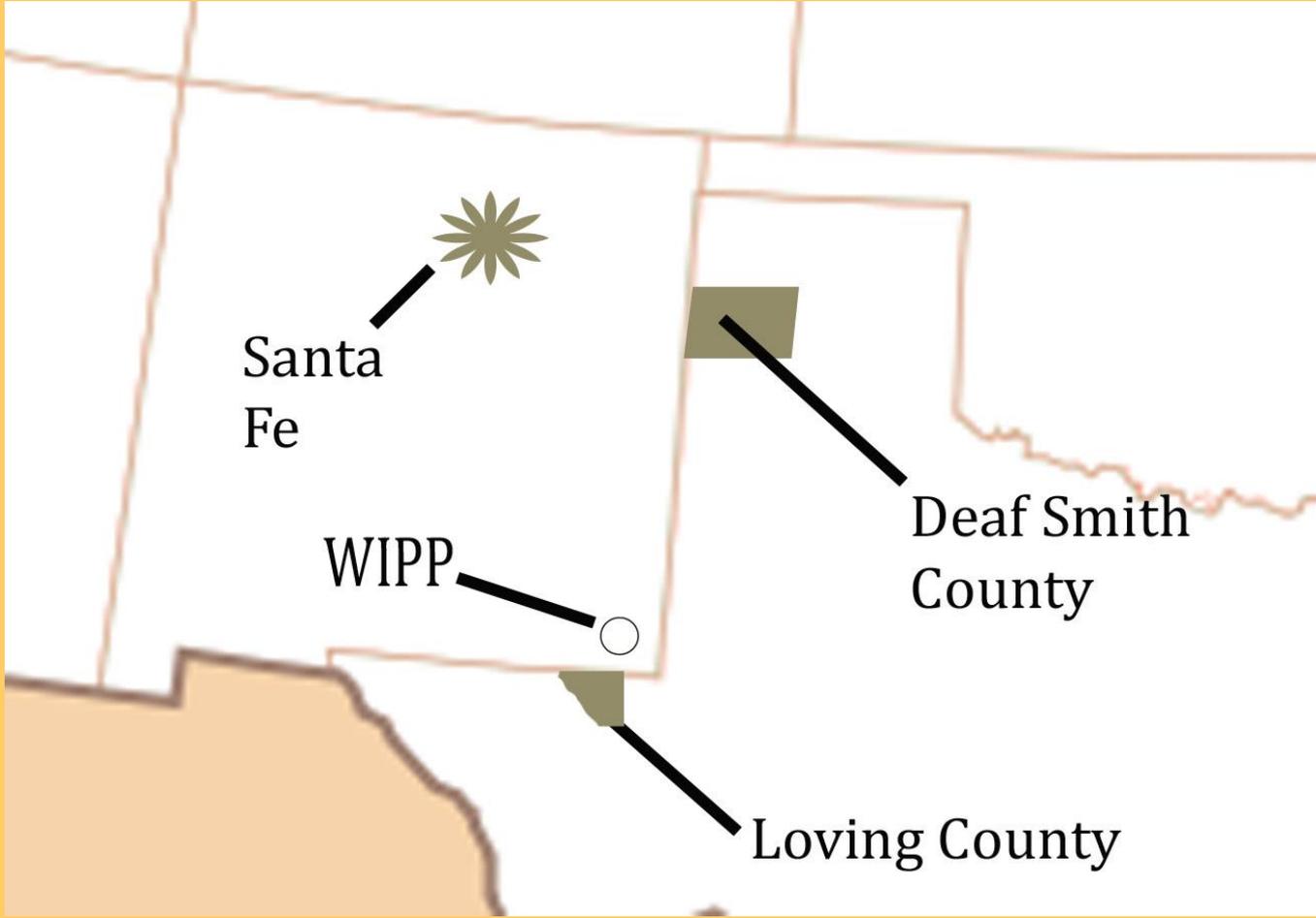
TRANSPORTING WASTE A container called RH-72B is a lead-lined cask used for shipping remote-handled transuranic waste.



SALT WALLS A continuous miner is used to carve disposal rooms out of the salt formation, nearly a half-mile below the surface.

# WIPP SUCCESSES LEAD THE WAY

- Safe Operation Since 1999 for 14 years
- More Than 13.9 Million Loaded Miles
- More than 11,600 Shipments
- Repository approximately half full
- CH volume more than 88,000 cu. meters
- RH volume more than 350 cu. meters
- Total capacity 176,000 cu. Meters
- Passed Two EPA 5 year certifications
- Passed One State 10 year RCRA certification
- Clean up of 22 sites in 12 states & RFETS



Santa Fe

WIPP

Deaf Smith County

Loving County

# FUTURE PROJECTS

- INTERNATIONAL ISOTOPES
- INTERIM STORAGE FACILITY
- GENERIC HIGH THERMAL LOAD EXPERIMENTS TO PROVE SALT AS MEDIUM
- SMALL MODULAR REACTOR POWER SUPPLY

# International Isotopes

## Depleted Uranium De-Conversion And Fluorine Extraction Project



Historically – the DU “tails” issue has not been addressed

- 1.6 Billion pounds Currently stored by DOE.
- Paducah: 39,000 Cylinders – 4 lines ( $\sim 1,500$  cylinders/yr) = 26 years of processing time
- Portsmouth: 25,000 Cylinders – 3 Lines ( $\sim 1,125$  cylinders/yr) = 22.2 years of processing time
- Embroiled in political chaos

# INTERIM STORAGE

## Eddy-Lea Energy Alliance

- ❑ ELEA purchased 1,000 acres of land approximately halfway between Carlsbad and Hobbs for potential use
- ❑ ELEA is an LLC that includes the cities of Hobbs and Carlsbad, New Mexico, and Eddy and Lea counties
- ❑ Land studied extensively during Global Nuclear Energy Partnership process



# Eddy-Lea Energy Alliance

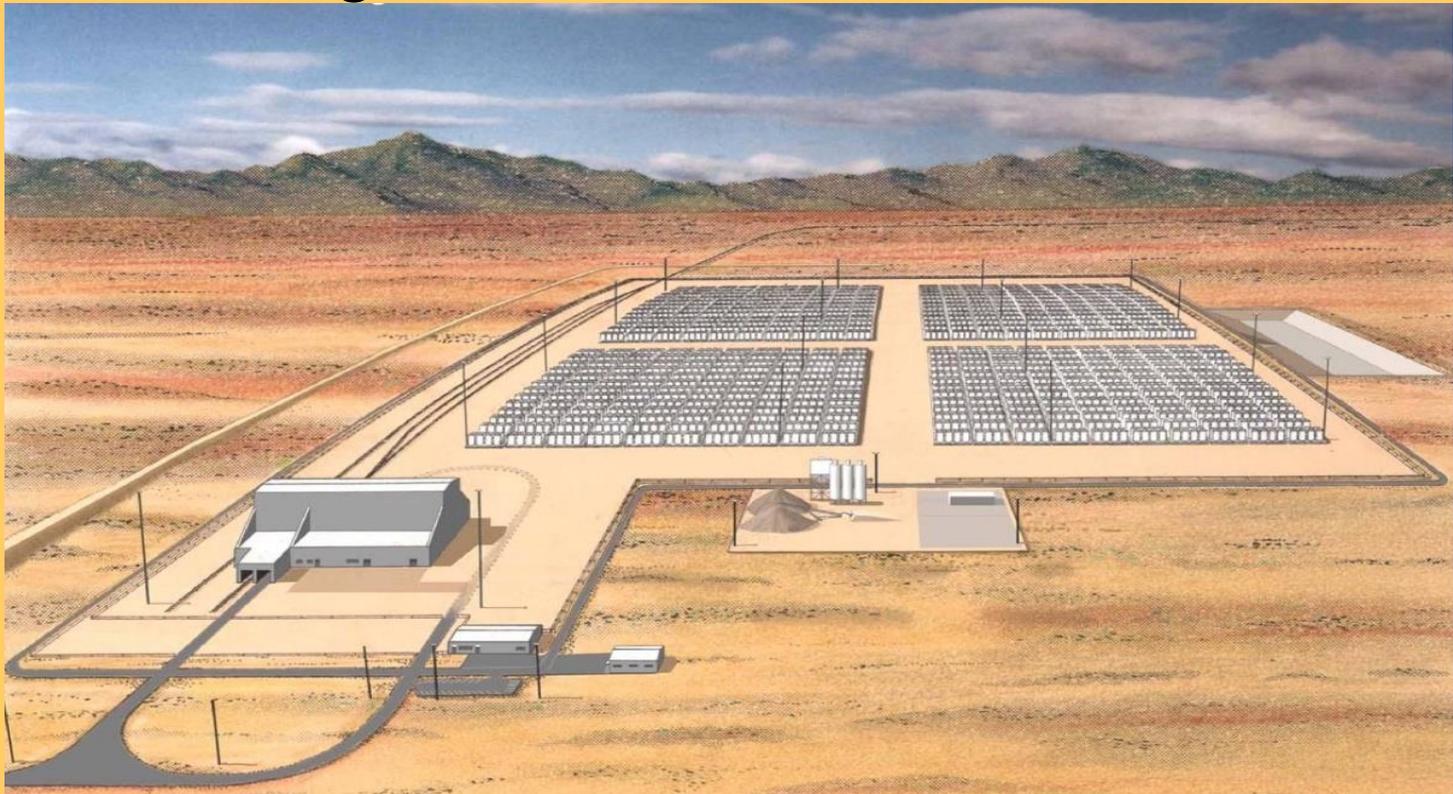
## Why ELEA Interim Storage Site?



- ▶ Remote location
- ▶ Geologic stability
- ▶ Dry area
- ▶ Infrastructure present, including rail
- ▶ Pre-existing robust scientific and nuclear operations workforce
- ▶ Excellent location because future repository may develop nearby
- ▶ Highly supportive community

# Private Fuel Storage

- Application submitted June 1997
- License issued February 2006
- Toole County, Utah
- Designed for 40,000 tons

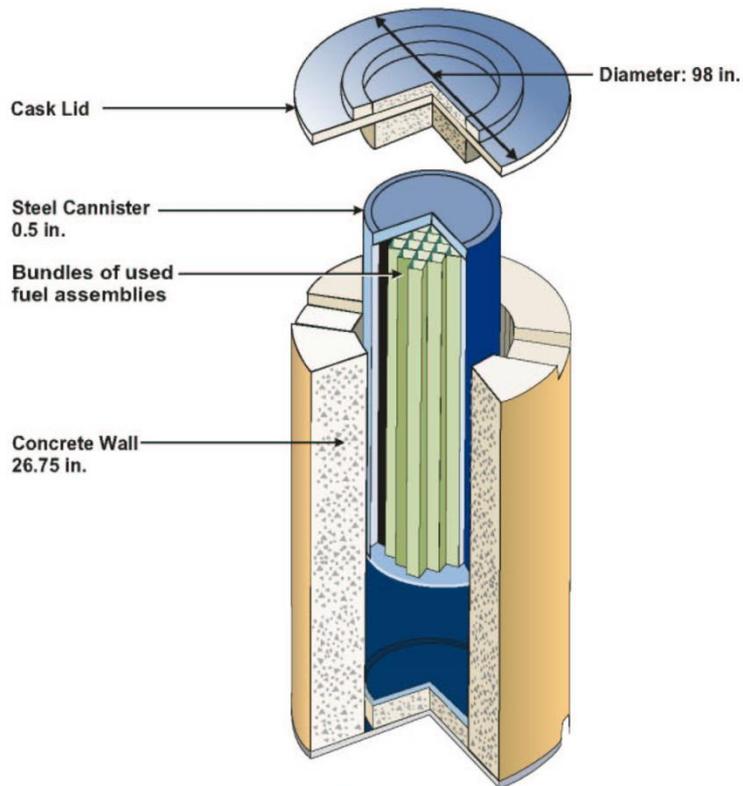


# A Pilot Probabilistic Risk Assessment of a Dry Cask Storage System at a Nuclear Power Plant - NUREG-1864

- The overall risk of dry cask storage was found to be extremely low.
- The estimated aggregate risk is an individual probability of a latent cancer fatality of  $1.8 \times 10^{-12}$  during the first year of service, and  $3.2 \times 10^{-14}$  per year during subsequent years of storage.
- Extremely low risk
- Extremely Benign

# Spent Fuel Storage Casks

## Dual Purpose Storage Cask\*

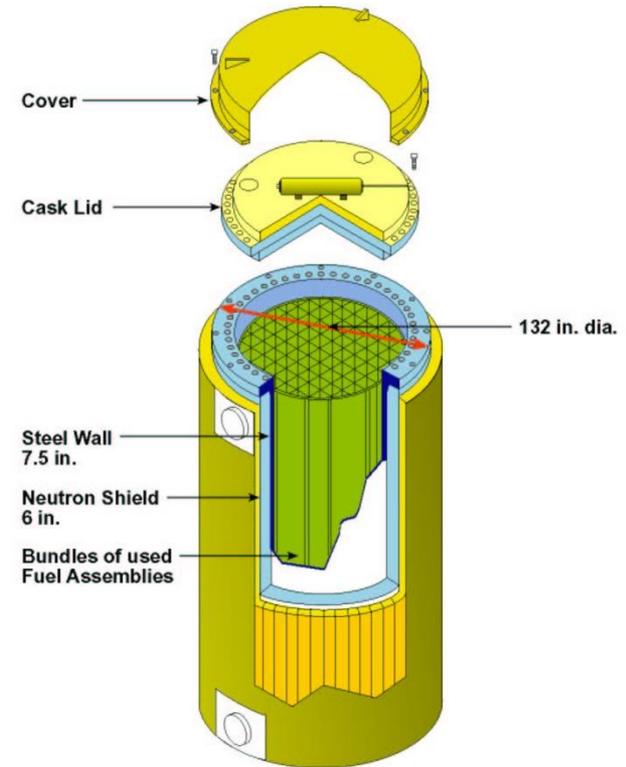


(Holtec International  
HI-STORM 100)

Overall Length: 197 to 225 in.  
Loaded Weight: 360,000 lbs.  
Typical Payload: 24 PWR Bundles

\* Storage and Transportation

## Dual Purpose Cask\*

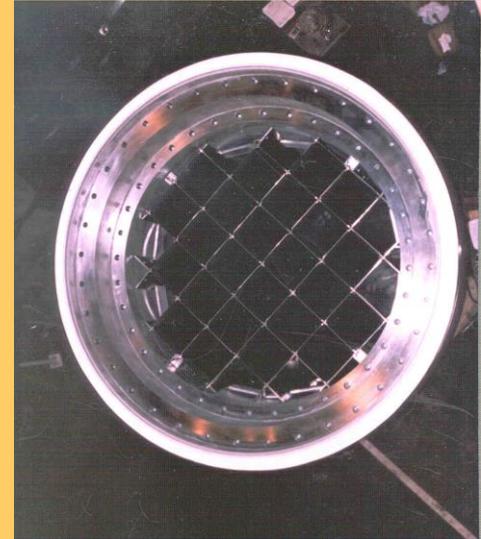


(Transnuclear TN-68)

Overall Length: 178 in  
Loaded Weight: 240,000 lbs.  
Typical Payload: 68 BWR Bundles

# Example: Canister Integrity

- Safety Functions
  - Confinement
  - Inert environment
  - Criticality control
- Technical Challenges
  - Long-term corrosion
  - Basket properties
  - Absorber efficiency
  - Monitoring sealed internals



# Fuel Loading in Transfer Cask



# Transfer of Canister into Overpack



# Transfer of Overpack to ISFSI Pad



# Transfer of Overpack to ISFSI Pad



# Transfer of Canister into Module



# Casks Superimposed on Site



# WHY IS INTERIM STORAGE IMPORTANT?

- Power plants wet storage over-packed
- Power plants have little dry capacity
- Treasury will pay out \$20billion by 2020 and \$500million per year thereafter
- Power plants are in high population areas
- DOE needs defense interim storage
- Repackaging for repository is needed

# ECONOMIC BENEFITS

- Interim storage operations -----150 jobs
- R&D facility for Used Fuel/Canister Integrity validation ----- 100jobs
- Repackaging facility-----100 jobs
- Inter-modal maintenance facility – 50 jobs
- State Requirement \$30-50 million/yr
- Eddy-Lea Partners \$5 million/yr

# INTERIM STORAGE STATUS

- CENTERPIECE OF BRC
- NWAA IN SENATE INCLUDES INTERIM STORAGE
- SEN. FEINSTEIN INCLUDES LANGUAGE IN E&W APPROPS BILL
- HOUSE REPUBLICANS OPPOSE ANY STORAGE OR REPOSITORY LANGUAGE
- UPON AUTHORIZATION MOVE INTO “CONSENT BASED PROCESS”

# GENERIC SALT DEFENSE DISPOSAL INVESTIGATION

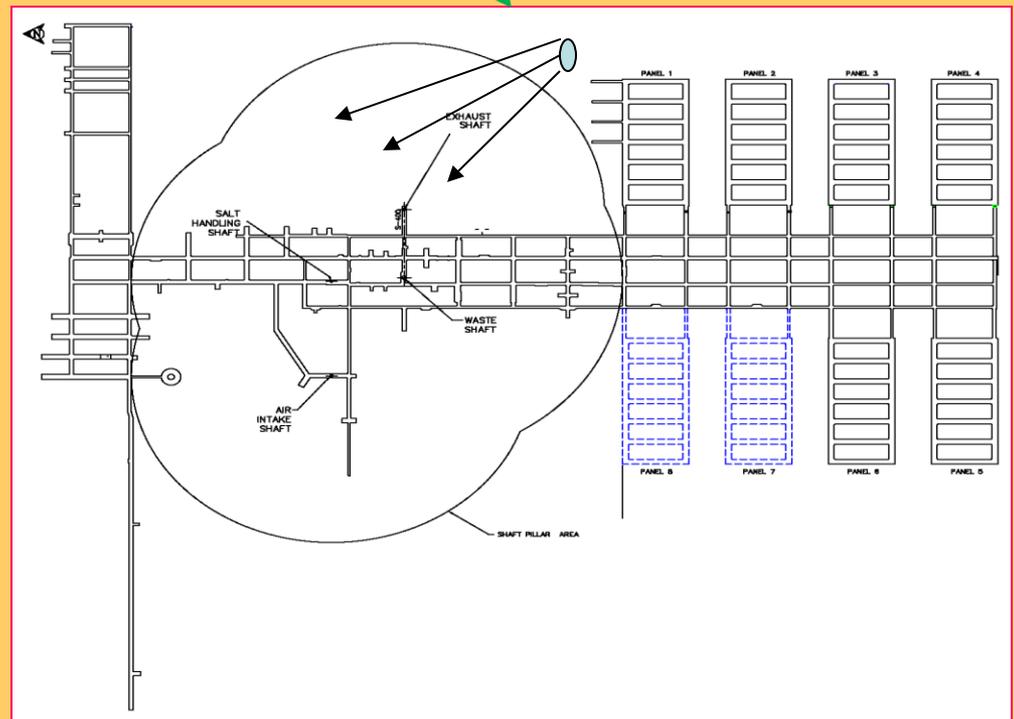
# Why Conduct SDDI Field Test at WIPP?

- COST SAVINGS BY TENS OF MILLIONS OF DOLLARS
- TIME SAVINGS BY DECADES DUE TO INFRASTRUCTURE
- TESTS CAN BEGIN NOW

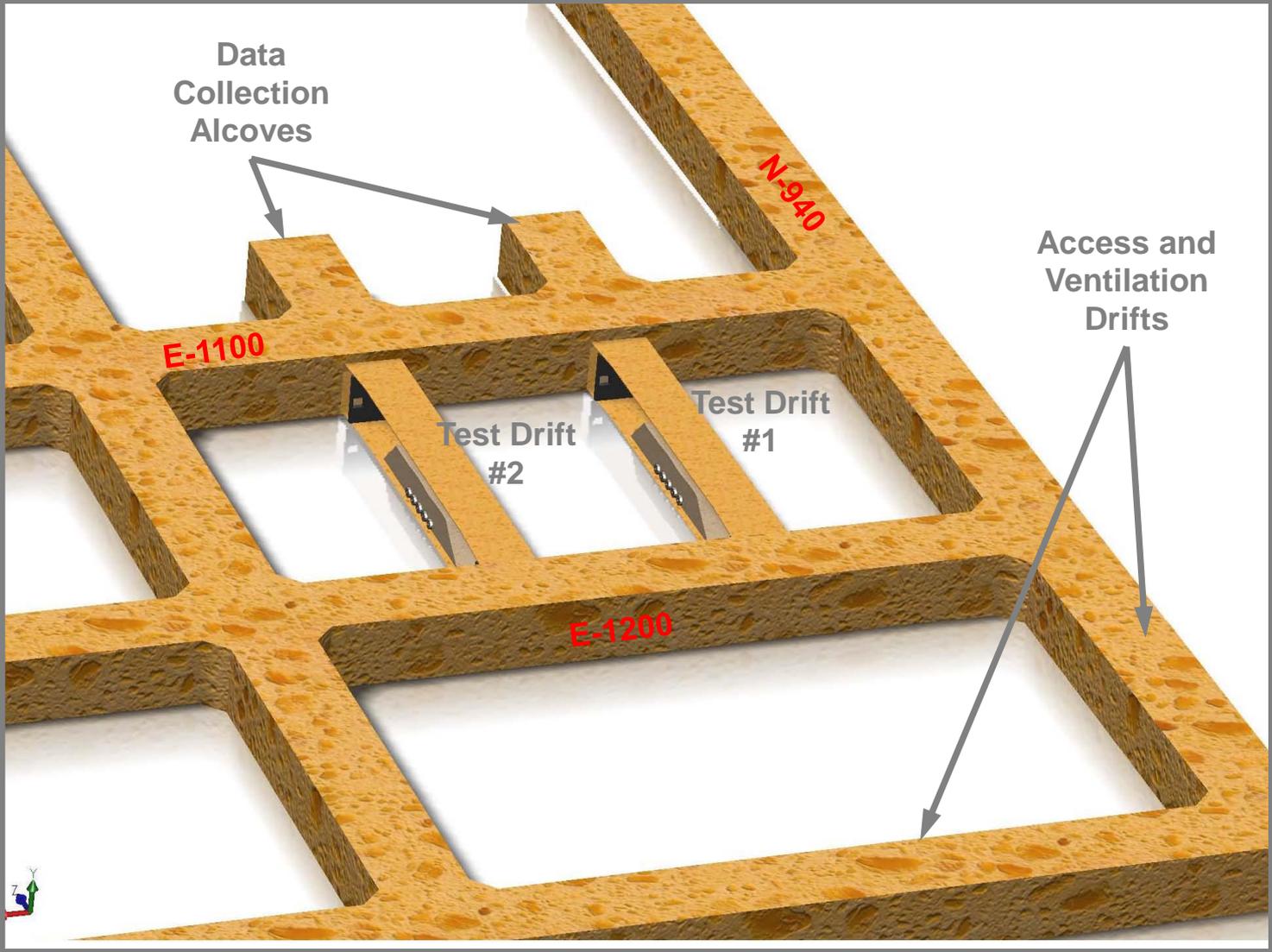
- TESTS TO PROVE & CONFIRM:

- Instrumented to measure:
  - >water movement
  - >temperature
  - >deformation rate
  - >alcove closure rate
  - >crushed salt pressure
  - >ventilation conditions
- Confirm lab tests
- Dispersion of heat

## Access SDDI Drifts Heater Test



# SDDI Test Area Layout



# SDDI Test Drifts

## SDDI Test Drift #1

80 ft Long Test Drift

Temp, Mech



**5-Canister Heaters (2' dia) Representing 200W Disposal Canisters**  
**3 ft center-to-center Spacing**

## SDDI Test Drift #2

80 ft Long Test Drift



**5-Canister Heaters (2' dia) Representing 150W Disposal Canisters**  
**3 ft center-to-center Spacing**

# Potential Heater – Outer Canister

- These are 9 feet long (plus a 1 foot neck), 2 feet dia, 1 cm wall thickness 304L stainless steel DHLW pour canisters, originally part of the Nevada Nuclear Waste Storage Investigations (NNWSI) project.



# SDDI SCHEDULE

ID	Task Name	2011			2012			2013			2014			2015			2016			2017			2018			2019			2020		
		Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
1	Plan and Design the SDDI Test	█																													
2	Mine and Construct the Test				█																										
3	Commit to Major Procurements/Contracts											◆																			
4	Install and implement the Test											█																			
5	Baseline and RH TRU Waste Demo														█																
6	Heating Start – DHLW SDDI Test														◆																
7	Conduct the Test														█																
8	Cool-Down																	█													
9	Conduct Post-Test Forensics																				█										

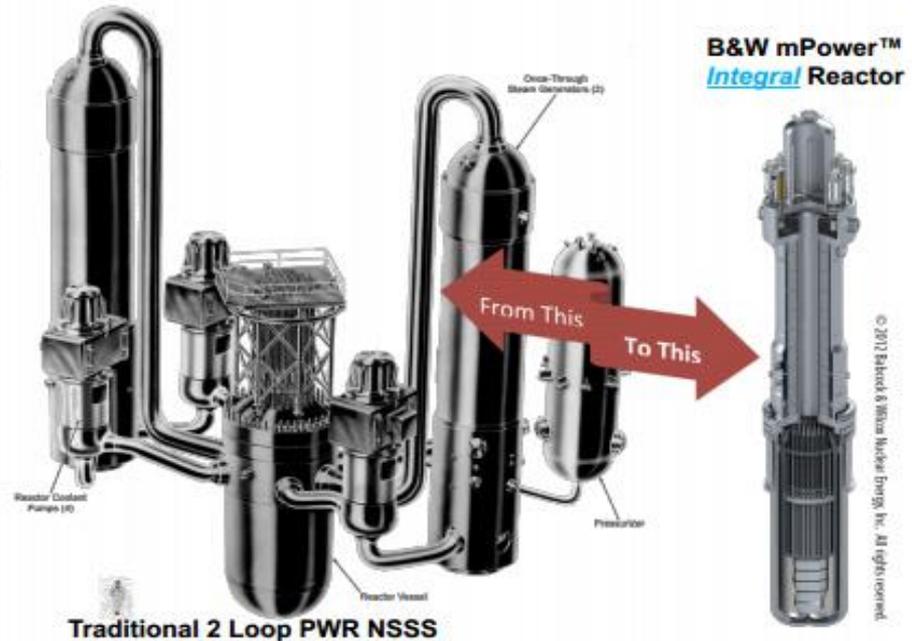
# SMALL MODULAR REACTORS

# SMR PROPOSITION

- Xcel is eliminating 500MWe from co-ops
- Begin final phase out in 2022
- 4 Eastern NM co-ops affected and Western Farmers
- Must replace a minimum of 360 MW by 2023
- WF will provide long term Power Purchase Agreement (PPA)
- Viability based on cost/kwh & gas price

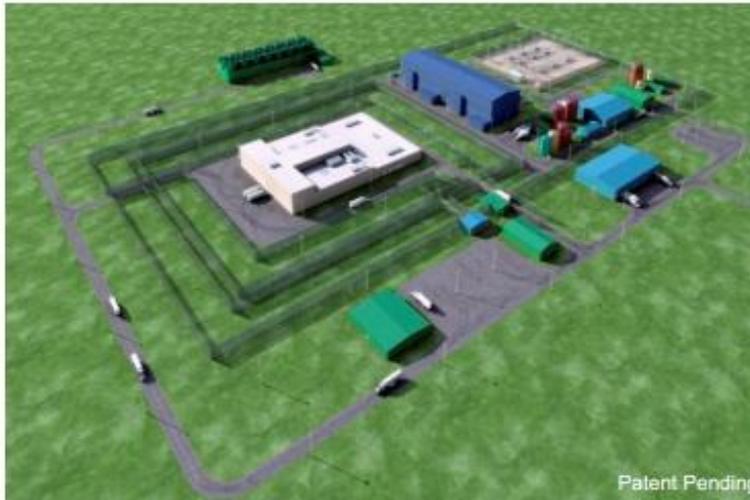
## What is a Small Modular Reactor (SMR)?

- Less than 300 MWe
- Integral nuclear system module
- Simplified design
- Factory Built
- Installed Underground



*Driving faster deployment of nuclear energy , helping  
create jobs and enhance energy security*

## “Twin Pack” mPower Plant Site Layout



mPower “Twin Pack” Site Layout  
with Water-Cooled Condenser

### The 10 Game-Changers:

1. 2 x 180MWe units
2. Compact <40-acre site footprint
3. Separated Nuclear and Turbine Islands
4. All safety-related systems underground
5. One-to-one reactor to T/G alignment
6. Optimized for minimum staff and O&M
7. Water- or air-cooled condenser option
  - Water-cooled = 7,959 GPM or 12,846 AF/YR
  - Air-cooled = 1,019 GPM or 1,645 AF/YR
8. Conventional steam cycle components
9. “Island Mode” and load following operation
10. Small EPZ radius, down to 1000 feet

***More Flexible, More Practical, More Affordable***



Stock Picks To Beat The Rush



Where You Might Not Shop In 2012



Top-Earning Grammy Winners



AdVoices Walki

## Nuke Us: The Town That Wants America's Worst Atomic Waste



Carlsbad residents (including former mayor Bob Forrest, center, in grey sweater) show their support for the Waste Isolation Pilot Plant.

**There's a secure solution to America's nuclear waste problem: bury it under Carlsbad, New Mexico. The locals are ready — if only Washington would get out of the way.**



QUESTIONS???