



Presentation  
to  
IDAHO  
LEADERS IN NUCLEAR ENERGY

November 16, 2011

Carlsbad, New Mexico

By John Heaton



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# PRESENTATION OVERVIEW

- OVERVIEW OF WIPP
  - REVIEW OF INTERIM STORAGE
  - REVIEW OF THERMAL SALT TESTING
  - STRATEGIES
    - DECOUPLING DHLW & GHLW FROM SNF
    - REDEFINE HLW PREPARATION
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# 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.

# Available Withdrawn Land

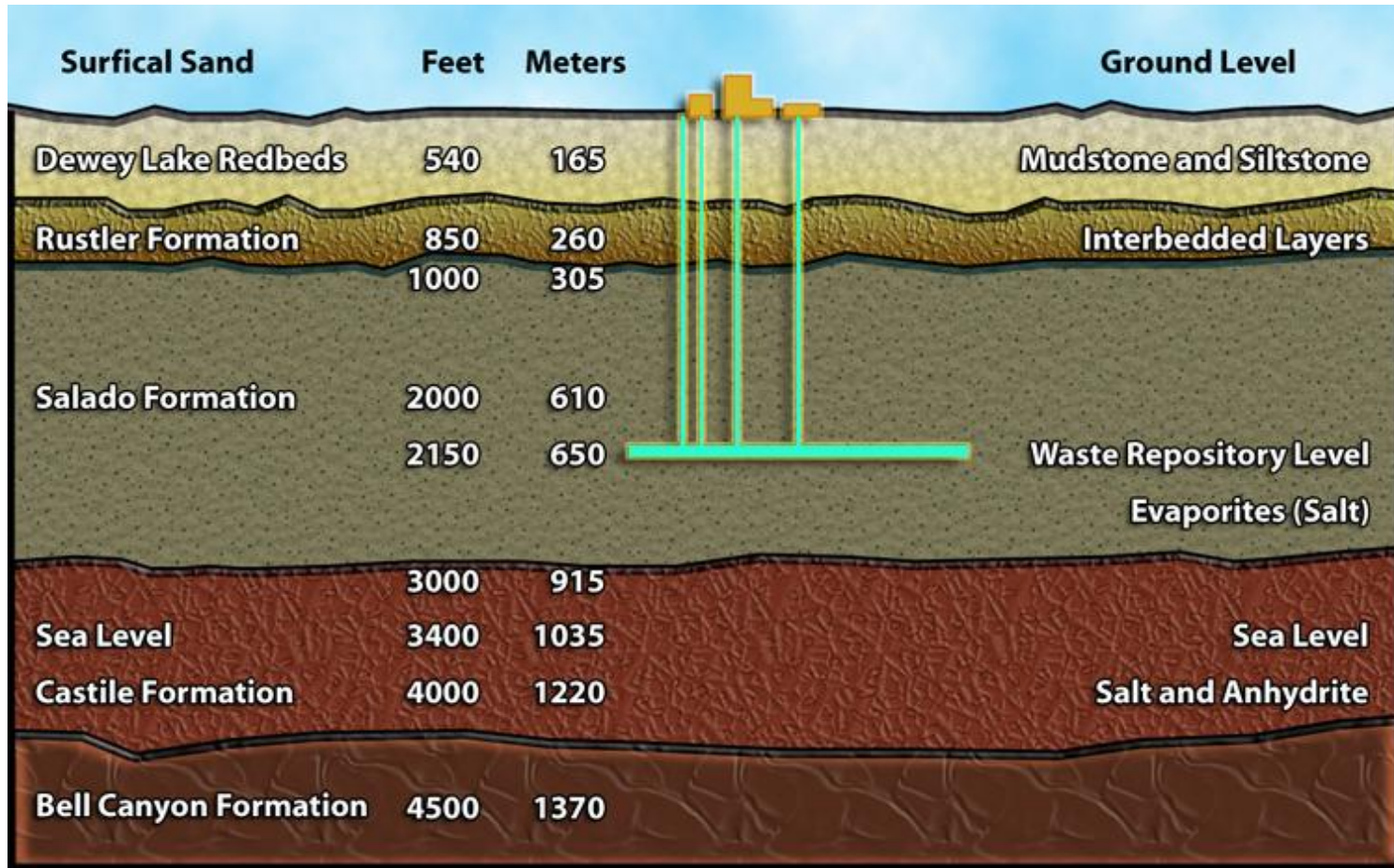


# Salt Is The Reason For WIPP's Location

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

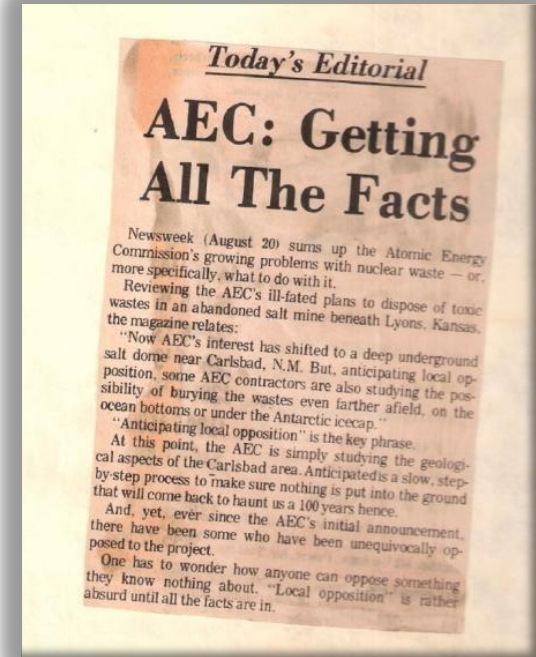


# Geologic Profile



# History

- 1957–The National Academy of Sciences recommends deep geologic disposal for radioactive waste and suggested salt
- 1968 – A demonstration, “Project Salt Vault,” is tested at a mine near Lyons, Kansas
- 1971 – State Senator Joe Gant Jr. contacts U.S. Congressman Harold Runnells and suggests that the Atomic Energy Commission take a look at Carlsbad’s salt beds
- 1979 – Congress authorizes WIPP as a research and development facility
- 1981 C&C Agree, EEG Formed, Leg Over Sight Committee formed
- 1981 – The Department of Energy proceeds with construction of WIPP



# History



- 1982 – NWPA enacted
- 1985 – NWPA Co-Mingling Amend
- 1987 – NWPA Designates Yucca Mtn
- 1989 – The DOE completes repository construction
- 1992 – Congress passes the WIPP Land Withdrawal Act. The act is amended in 1996.
- 1998 – The EPA certifies that WIPP meets all applicable regulations
- 1999 – The first shipment of TRU waste arrives at WIPP on March 26. The New Mexico Environment Department issues a hazardous waste facility permit in October
- 2005 – The final TRU waste shipment from Rocky Flats is received at WIPP
- 2007 – The first shipment of RH-TRU waste arrives at WIPP on January 23



# SAFETY ABOVE ALL FROM THE BEGINNING



- We watched the containers dropped, burned in jet fuel, tested under water.
- Regular meetings to present science findings
- Star level in DOE's Voluntary Protection Program (since 1994)
- Repository & Transport based on best science



# TRU Waste

- Clothing, tools, rags, debris, residues and other items contaminated with man-made radioactive elements that are heavier than uranium



# CONTACT WASTE HANDLING IN WIPP



- Primarily emits alpha radiation (less penetrating)
- Can be handled without any shielding beyond the container itself
- About 96 percent of waste to be disposed at WIPP

# REMOTE HANDLED WASTE EMPLACEMENT MACHINE



- Emits more penetrating radiation than CH-TRU
- Transported and handled in certified casks that provide additional shielding
- About four percent of waste to be disposed at WIPP

# WIPP Transportation System



“...The [WIPP transportation] system is safer than that employed for any other hazardous material in the U.S....”

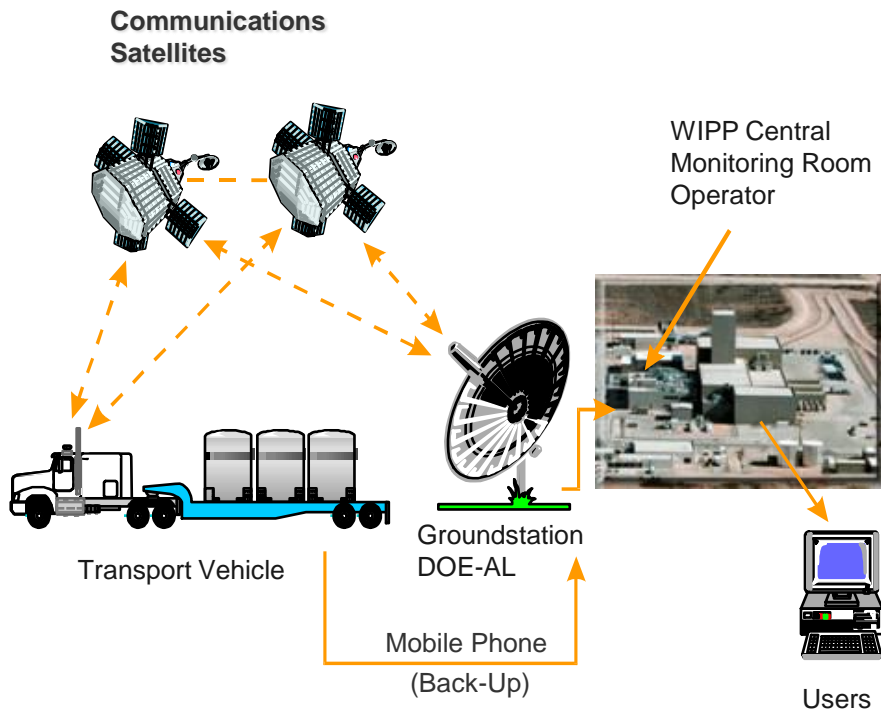
*National Academy of Sciences, WIPP Panel*

# Safest Shipping Containers on the Road

- Nuclear Regulatory Commission certified Type B Shipping Containers
  - TRUPACT-II
  - Half-PACT
  - RH-72B
  - TRUPACT-III
- Proven leak tight after rigorous testing
  - 30-foot drop
  - Puncture bar test
  - TRUPACT-II tested for 30 minutes in 1,475-degree jet fuel fire



# Shipments Tracked by Satellite



- Fully automated nationwide tracking to within 500 feet
- Five-minute updates
- States and tribes have access to password-protected Web site
- Drivers in constant communication with WIPP's Central Monitoring Room

# Emergency Responders Trained Along Pre-approved Routes

- Since 1988, more than 30,000 first responders have been trained
  - Exercises
  - State, tribe and hospital personnel training
  - Outreach





# Key Regulatory Success



- Environmental Protection Agency

- Recertification every five years until closure
- Documents compliance with long-term disposal regulations
- WIPP recertified for the second time since opening on November 18, 2010

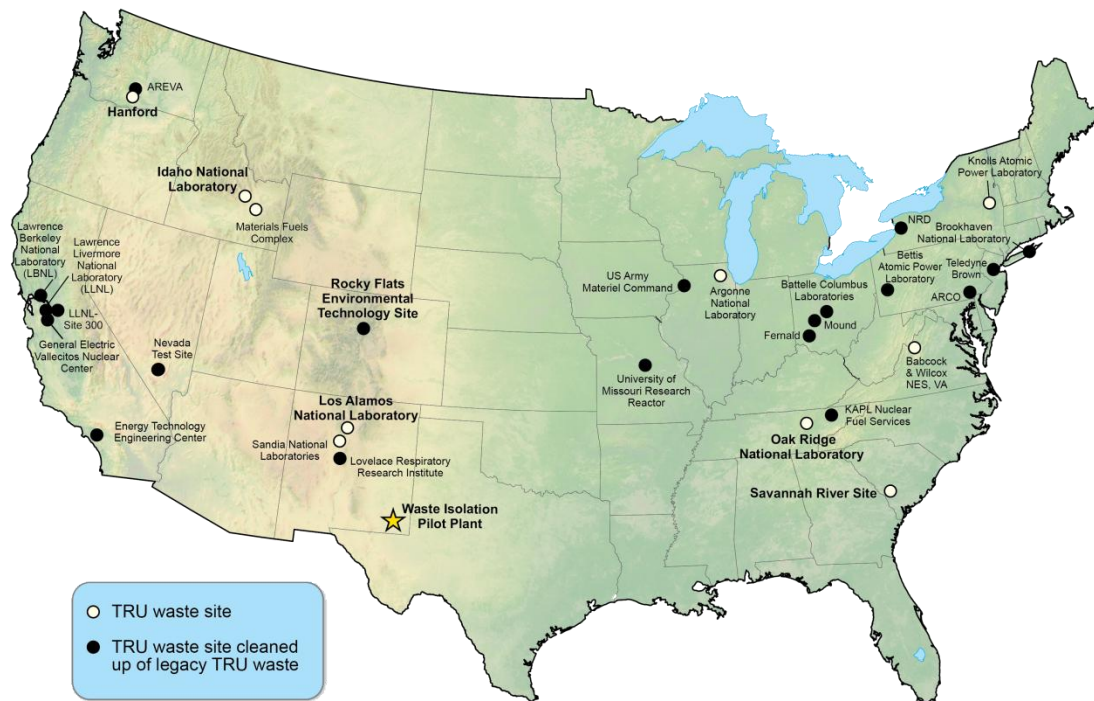


- Hazardous Waste Facility Permit

- Required for disposal of TRU waste mixed with hazardous materials
- Original 10-year permit issued by New Mexico Environment Department in October 1999
- Permit renewed on November 30, 2010

# WIPP's Record of Success

## 13 Years of **Safe** Operation



- Three sites cleaned up in 2011
- **22** TRU waste sites cleaned up to date
- More than **11,000** safe shipments
- Over **12 million** loaded miles traveled
- More than **84,000** Cu Meters disposed
- More than **150,000** containers disposed

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# ROCKY FLATS

**1989**



**2006**



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# A SOLUTION TO USED FUEL STORAGE

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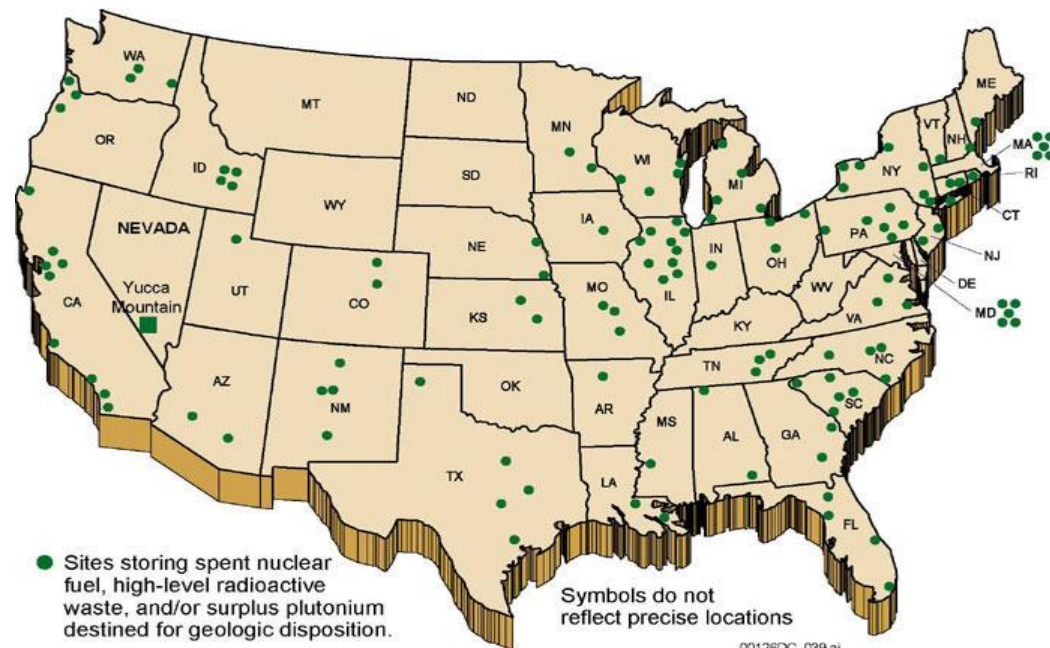
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# WHAT WILL WE DO WITH NUCLEAR WASTE/SNF?

- Fukushima, tornados, fires, floods, earthquakes have changed the world
  - Decisions to build new nuclear plants are being made
  - Clean power will require nuclear energy
  - We must, however, have a plausible, integrated, durable policy and plan to manage used fuel responsibly.
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# USED NUCLEAR FUEL STORAGE

- Used fuel inventory June 2012
  - Approximately 69,000 MTU
  - Add 2,000 – 2,400 MTU annually
- Dry storage thru 2009
  - 14,600 MTU
  - Over 1200 casks loaded
  - 49 Operating ISFSIs
- Dry inventory by 2020
  - Estimating 26,200 MTU
  - 2,600 casks loaded
  - At 75 dry storage facilities
  - Fuel from 118 units



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# USED FUEL CURRENT EVENTS

- Yucca Mountain project being terminated
  - New NRC rules for fuel pools, dry cask storage and earthquake proofing
  - Center piece of Blue Ribbon Commission on America's Nuclear Future recommendations is centralized interim storage
  - Waste Confidence Rule stricken down
  - Fed-Corp legislation introduced last year
  - Interim Storage bill introduced this year
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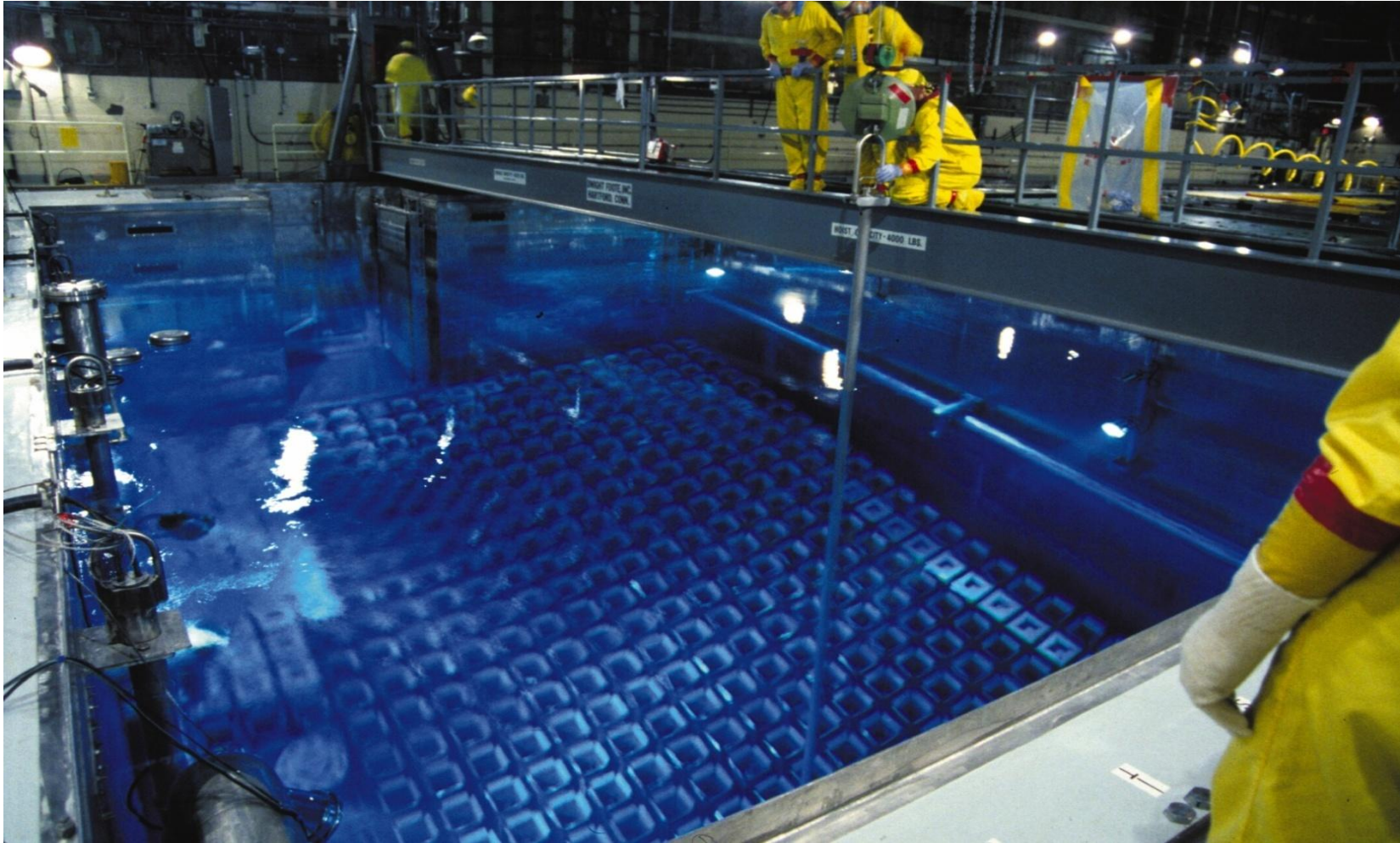
# USED NUCLEAR FUEL

- 40 years of nuclear electricity generation has produced only a small amount SNF
  - entire inventory would only cover a single football field about 7 yards deep

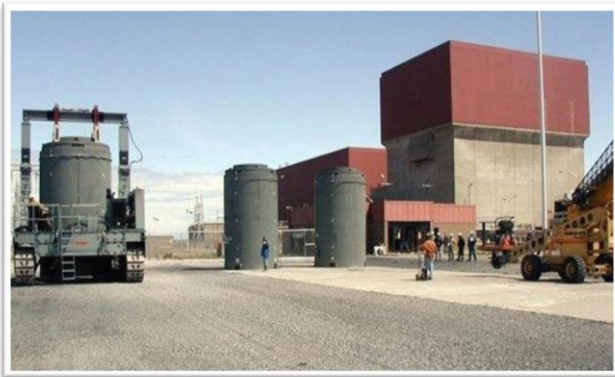
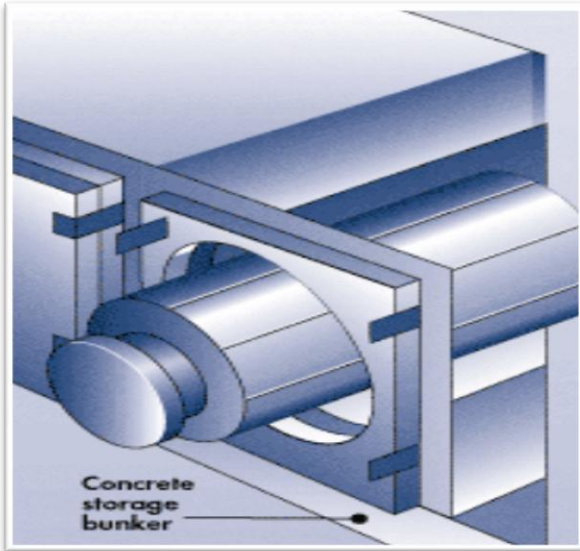




# USED FUEL STORED IN POOL



# WHY CENTRAL INTERIM STORAGE OF USED FUEL?



- **Controlled, safe, proven technology**
- **Reduces risks to high-density populations**
- **Averts over-packing of used fuel pools due to limited storage space**
- **Allows decommissioned facilities to move waste off site**
- **Provides path forward for defense HLW**
- **Halts fines and settlement payments related to waste disposition**
- **Allows more time for evaluation of best long-term solution**

# HORIZONTAL STORAGE SYSTEM



**Southern California Edison – SONGS Units 1, 2, and 3**

# VERTICAL STORAGE CASKS



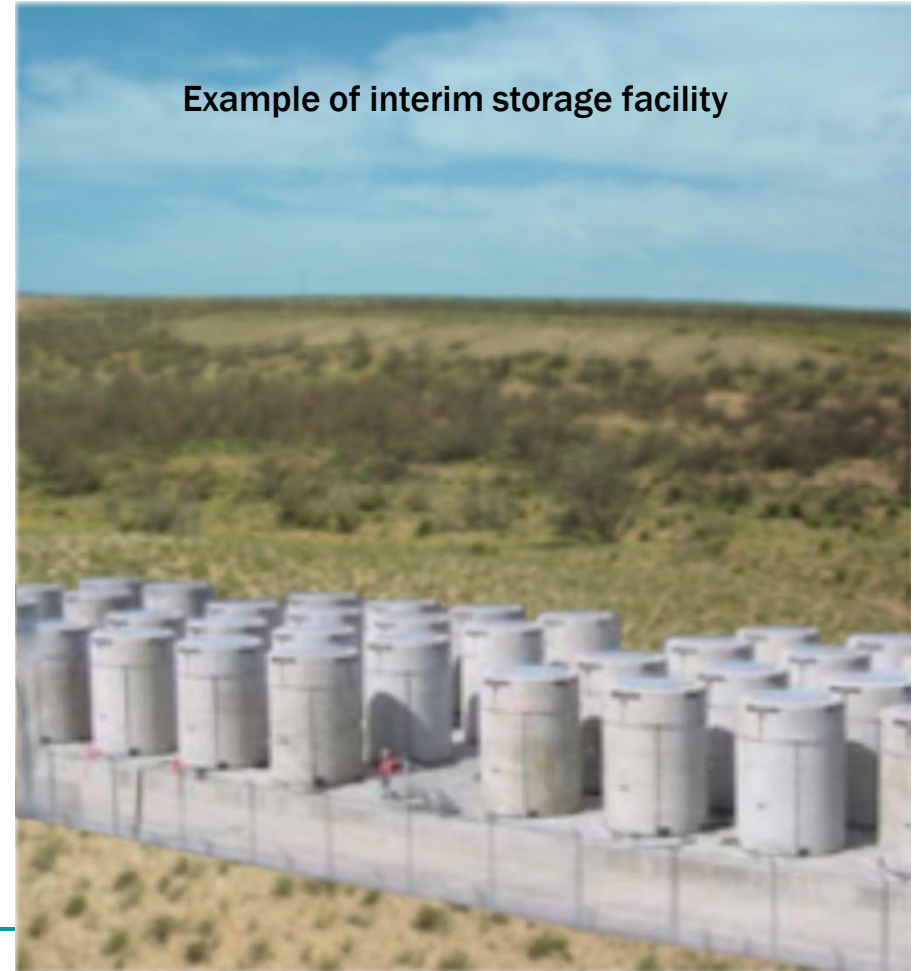
**Yankee Rowe**

**Connecticut Yankee**



# EDDY LEA ENERGY ALLIANCE (ELEA)

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



# WHY THE ELEA SITE?



- **Remote location**
- **Geologic stability**
- **Dry area**
- **Infrastructure present, including rail**
- **Preexisting robust scientific and nuclear operations workforce**
- **Excellent location for future repository nearby**
- **Highly supportive community**

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# CONCLUSION

- The nation wants and needs more nuclear energy
  - The BRC and nuclear industry are pursuing integrated approach to used fuel management
  - Used fuel inventories in storage will continue to grow
  - Dry cask storage can safely accommodate this growth, especially at consolidated storage sites
  - An implementable and sustainable federal used nuclear fuel management plan must be developed
    - Plan must address all elements of integrated approach: consolidated storage, recycling and disposal
  - A Consolidated Storage Facility is doable
  - Saves Treasury \$500 million per by 2020 in Settlements
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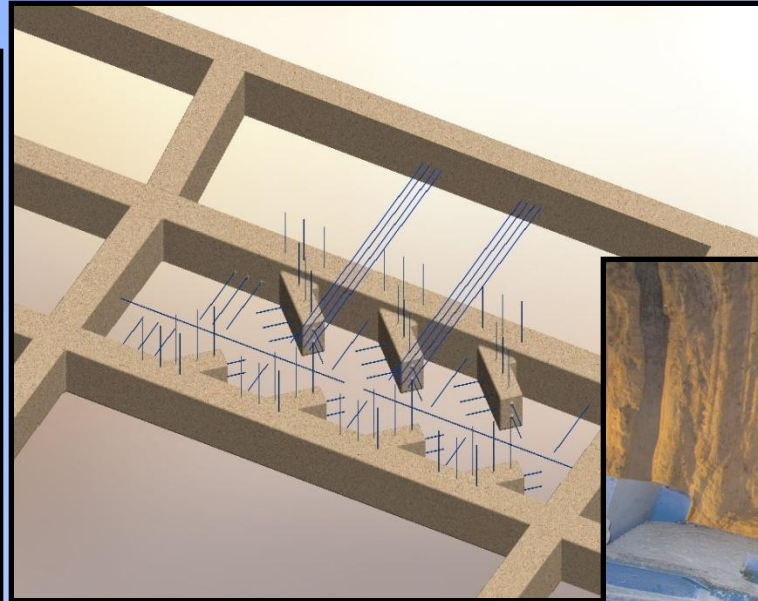
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# NEXT STEPS

- Interview potential companies to be corporate partner
  - Choose partner
  - Complete negotiations with corporate partners to:
    - Manage the facility
    - Manage collecting and shipping of used fuel
    - Manage container research
    - Manage container manufacturing
  - Complete business plan; objectives, milestones, goals
  - Establish political objectives and implementing strategies
  - Funding opportunities
    - Federal corporation
    - Waste fund
    - Transfer of settlement fund
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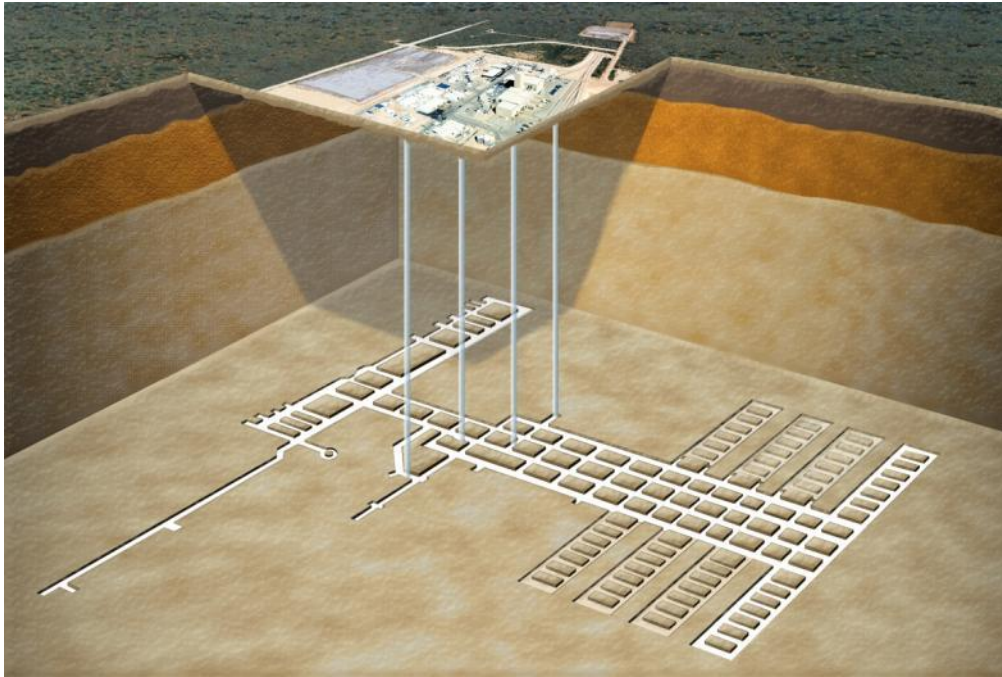


# GENERIC SALT DISPOSAL INVESTIGATIONS (with a field scale heater test at WIPP)



# 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

# What is the SDDI Proposal?

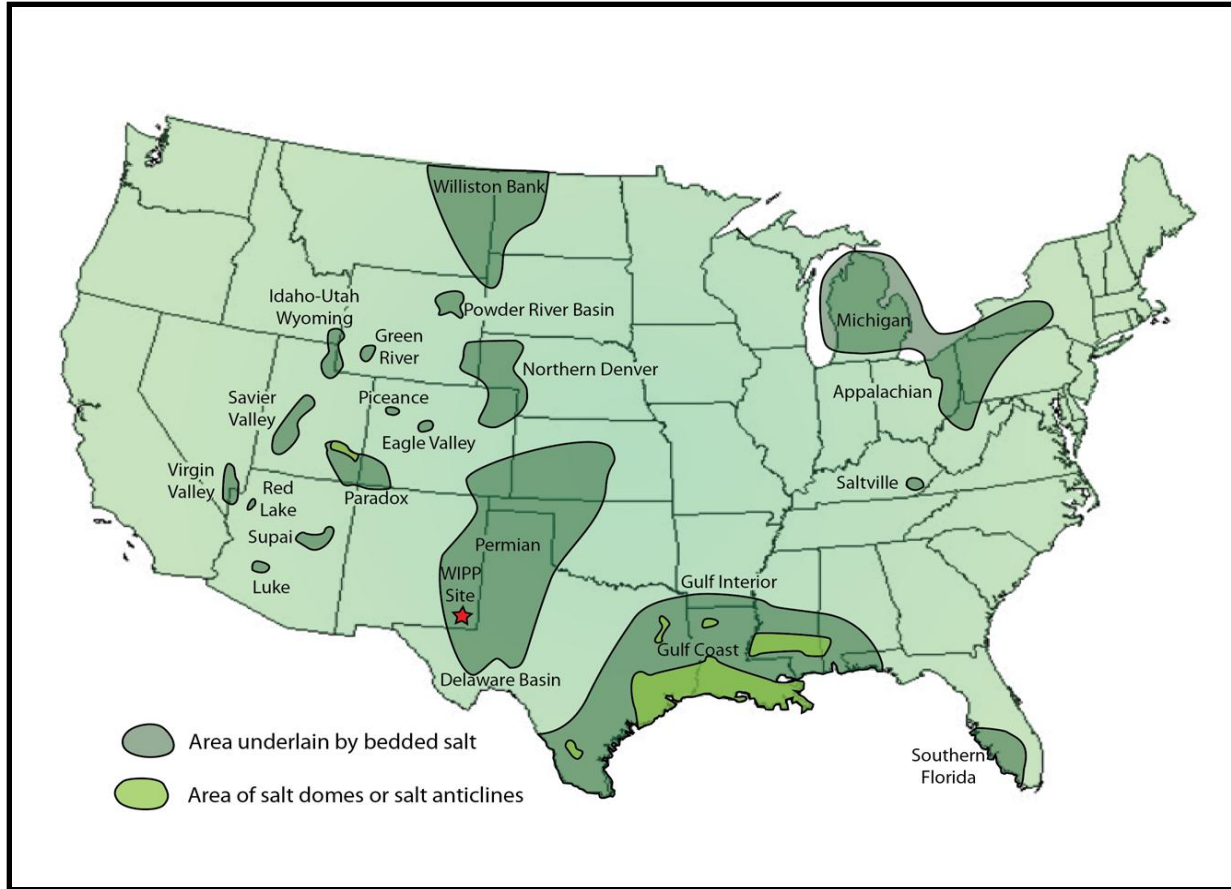
- Salt Defense Disposal Investigation of heat-generating nuclear waste in salt consisting of:
  - laboratory testing
  - modeling efforts
  - an underground field test at WIPP
- Tests disposal arrangement of balancing heat loading with waste and repository temperature limits
- Majority of laboratory and modeling conducted at the national laboratories
- Builds upon past experiences – thermal tests at WIPP, Kansas, Louisiana, and Germany



# Salt is an Ideal Disposal Medium

➤ Salt is widely distributed

➤ Salt has existed underground for millions of years and has a stable geology.



➤ “The great advantage is that no water can pass through salt. Fractures are self healing...”

National Academy of Sciences, 1957

➤ Bedded salt is preferred over domed salt due to the inherently larger areas contained in the bedded geologic salt formations.

➤ No engineered barriers are needed – disposal in salt is permanent.

➤ Salt at great depth ‘flows.’ It will encapsulate waste and isolate it from the surface for eons.

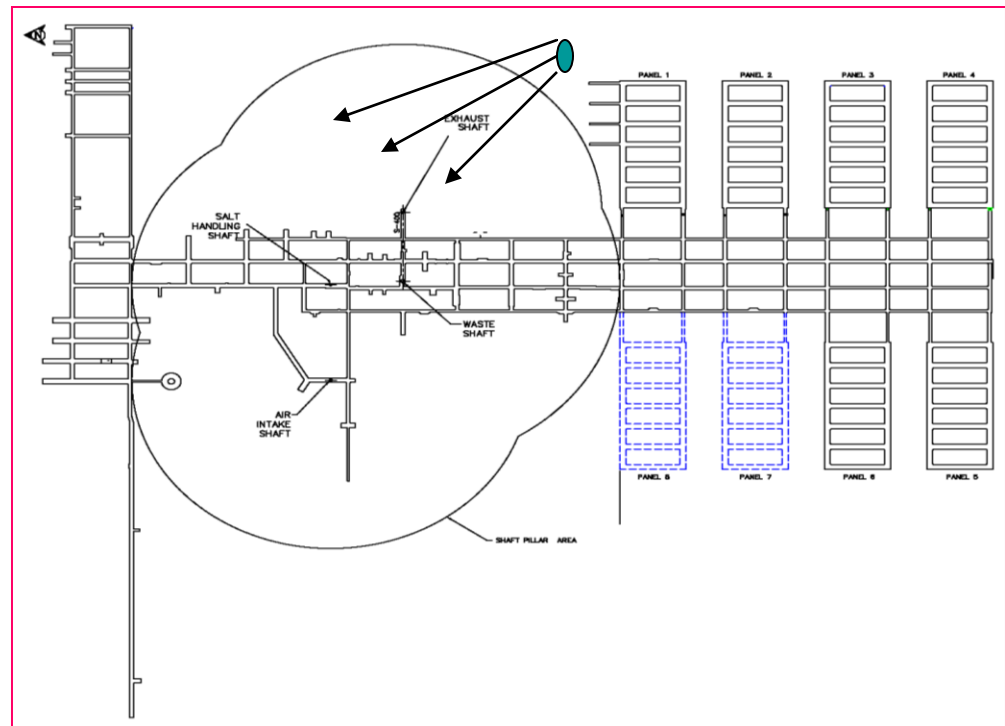
# Why Conduct the Field Test at WIPP?

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

- TESTS TO PROVE & CONFIRM:

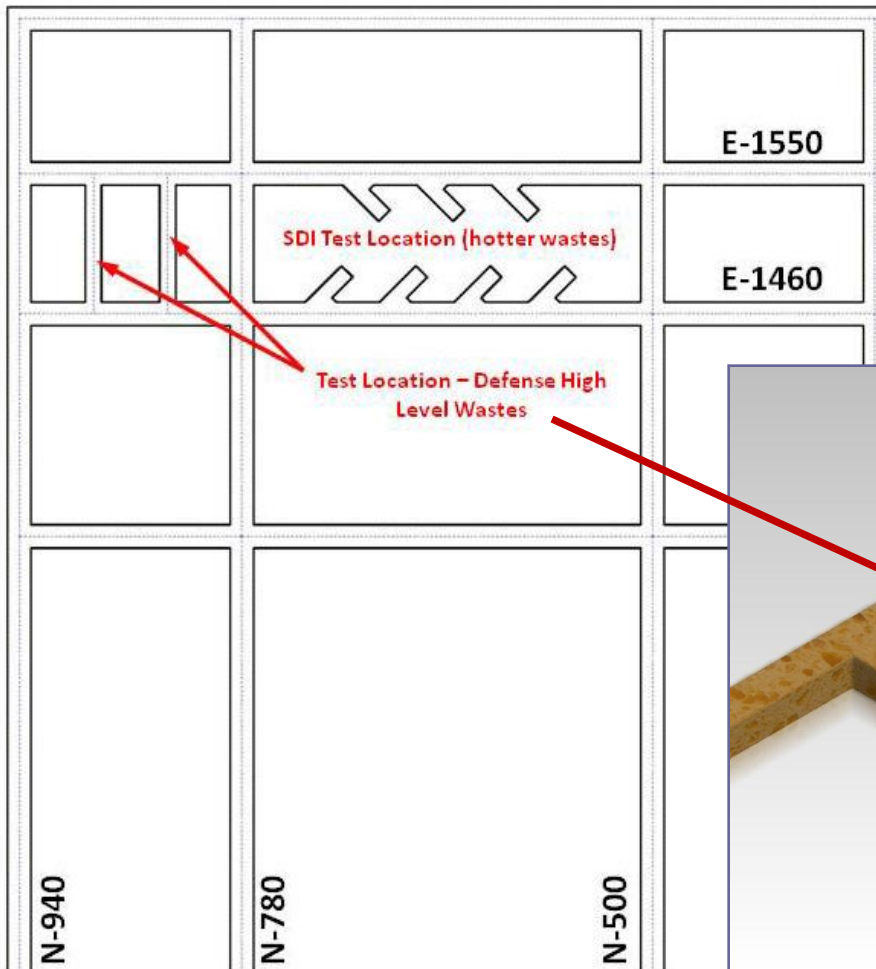
- Instrumented to measure:
  - >water movement
  - >temperature
  - >deformation rate
  - >alcove closure rate
  - >crushed salt pressure
  - >ventilation conditions
- Confirm lab tests
- Dispersion of heat

## Access SDDI Drifts Heater Test

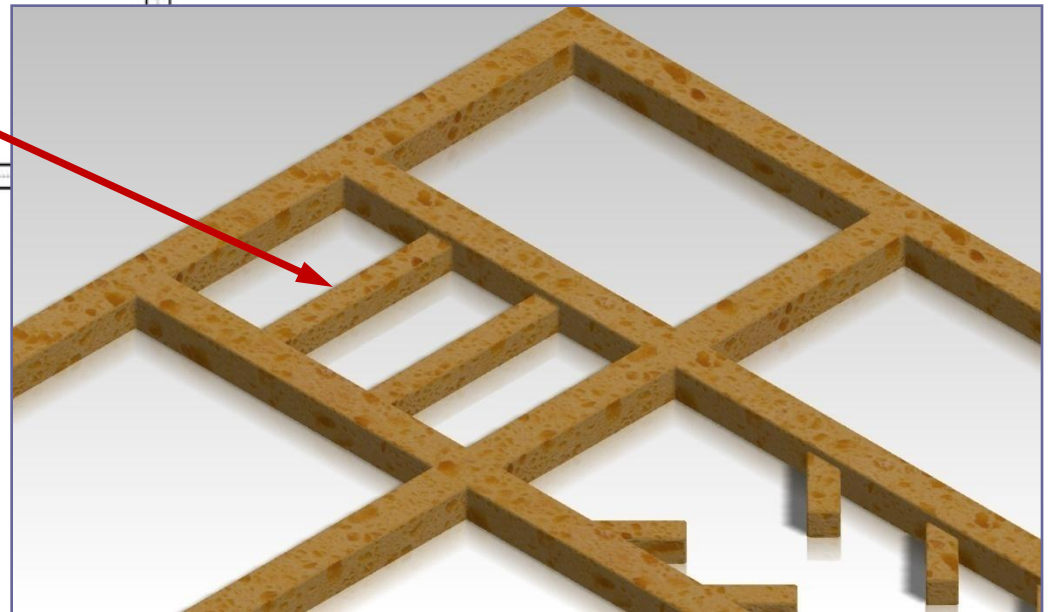


# Potential Test Location Within WIPP URL

SDDI could be conducted in drifts near the planned test location for the hotter SDI experiments.

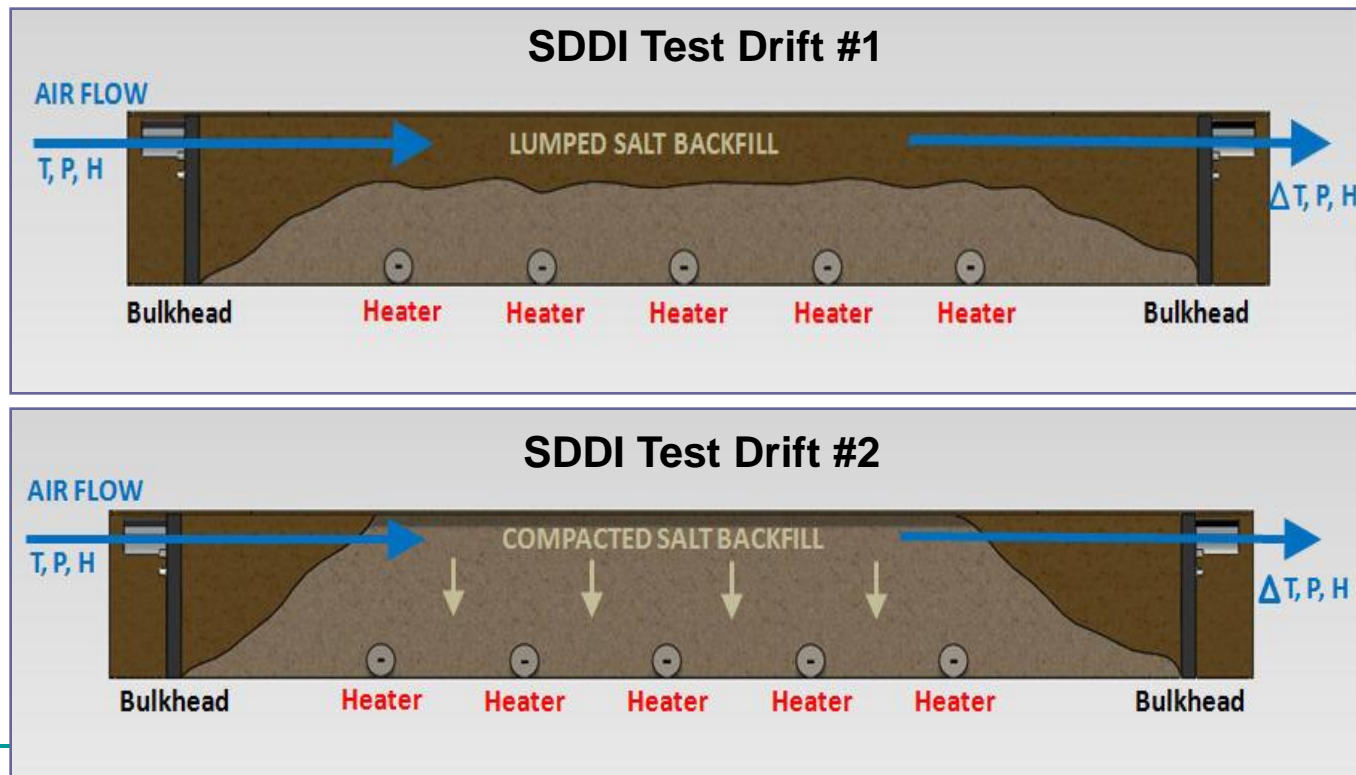


Two 80 ft long drifts spaced approximately 35 ft apart (rib to rib). Each drift would be excavated with minimal mining (~10' tall x 16' wide).



# The SDDI Field Test

- Two test drifts, constructed and instrumented very similar.
- Each contains five heaters on the floor mimic in-drift disposal techniques.
- Drift #1: Run-of-mine backfill placed on top of canisters mimicking initial placement
- Drift #2: Backfill compacted to the crown representing conditions ~30 yrs into repository operations



# SDDI Goals and Objectives

- Explore the efficacy of salt for spent fuel and high-level waste
    - Acquire FY 2013 funding (total SDI program = \$25M over 6 yrs)
    - Mine experimental area beginning in FY 2012
  - Confirm bedded salt as appropriate HLW repository medium
  - Utilize WIPP's highly skilled workforce, scientists & infrastructure to insure most accurate possible results
  - Serve the nation to provide the most economically and timely information regarding the best repository science related to salt
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**STRATEGY  
PERSPECTIVES  
AND  
CONSIDERATIONS**

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# NATURAL DISASTERS & RISK



Drought



Fukushima



Sandy 2012



Sandy



Sandy

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# GOALS & STRATEGIES

- WHAT ARE THE GOALS?
  - WHY HAVEN'T WE SUCCEEDED?
  - WHO IS IN CHARGE?
  - WHO KNOWS WHAT A CONSENT BASED PROCESS IS?
  - HOW DO WE GET THERE FROM HERE?
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# WHAT ARE THE GOALS?

- BRC Outlined Them Well
    - Two or More Repositories
    - Two or More Interim Storage Facilities
    - Development of a Transportation System
    - A Consent Based Process
    - A Fed-Corp
    - Rate Payer Funding go to Fed-Corp
    - Make the Necessary Legal Changes
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# WHY HAVEN'T WE SUCCEEDED?

- Still Adhere to a Top Down Process
  - Naive Understanding by Politicians
  - Failure to Recognize States Have Final Say
  - Failure by the Country and Industry to NOT Have More Than a One Trick Pony
  - There is NO Coalition of the 39 Nuclear State's Governors to Solve the Problem
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# WHO IS IN CHARGE?

- Is it the Community?
  - Is it the State?
  - Is it the Congress?
  - Is it the President?
  - Is it the Regulator?
  - Is it the Scientific Community?
  - Who Else Controls the Industry?
-

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# WHAT IS A CONSENT BASED PROCESS?

- For a Repository Geology Plays Role
  - Community Acceptance
  - Confirm acceptability of the site
  - Obtain Consultation and Cooperation Agreement With Governor – Host Contract
  - Proceed with Funding for Underground Characterization for Site Confirmation
  - Massive Educational Process Undertaken in the State.
-

# PROCEED WITH DEFENSE HIGH LEVEL WASTE REPOSITORY IN SALT

Government Owned  
And Defense High  
Level Waste

DECOUPLE



Commercial High  
Level Waste

- DOE is responsible for this waste and the budget to create a repository
- Cleaner financially to DECOUPLE
- DHLW is old, cold and worthless
- Reprocessing decision 30 years away
- Next logical step to build confidence
- Must meet commitments to states to remove DHLW or law suits
- Transportable by highways
- It is more efficient to expedite disposal of DHLW in a defense-only repository (e.g., WIPP), saving potentially up to \$75 billion rather than starting from scratch



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# WE SHOULD REDEFINE HLW PREPARATION FOR DISPOSAL

- Why are we using a vitrification paradigm?
  - Much DHLW in other forms
  - Is a \$20 billion Vit Plant necessary or even technically possible?
  - Why aren't repository life cycle costs considered?
  - Why would we bury SNF & then retrieve it, if it is to be reprocessed?
  - Why are we chasing a repository medium other than salt?
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# DHLW NEXT STEPS

- FOCUS ON DHLW (not leaving SNF behind)
  - INITIATE GENERIC SALT STUDIES \$25 MILLION OVER 6 YEARS BY “EM” AT DOE (\$4 in 2013)
  - DOE & STATE CONFER ON C & C AGREEMENT STANDARDS AND PROCESS
  - PROVIDE STATE WITH \$3MILLION PER YEAR FOR TECHNICAL SUPPORT FOR C & C
  - STATE AND DOE AGREE ON C&C
  - CHANGE NWPA TO ALLOW RESEARCH & SEARCH FOR ANOTHER SITE
  - THE PILOT PLANT NOW READY FOR DHLW: AMEND LWA TO REMOVE SEC. 12
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# INTERIM STORAGE NEXT STEPS

- SUPPORT FEINSTEIN E&W CSF LEGISLATION
  - CONVIENCE UPTON, SHIMKUS, WHITFIELD IT DOES NOT DETER YM
  - SUPPORT “GANG OF THREE” EFFORTS TO DEVELOP CSF
  - DEFEAT REPOSITORY FIRST STRATEGY THAT MAKES NO SENSE
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Stock Picks To Beat The Rush



Where You Might Not Shop In 2012



Top-Earning Grammy Winners



AdVoices Walkie

## 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.**



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Questions???

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# Back-up Slides

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# Legal & Regulatory Changes for Additional Repositories

- 1987 NWPA amended to authorize consent based process to be used for selecting and evaluating repository sites
  - EPA 40 CFR Part 191 needs to be standardized and should be generic to implement NRC 10 CFR Part 60
  - “Safety and other performance standards and regulations should be finalized prior to the site selection process
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# HLW & 10CFR72: Licensing Requirements for Independent Storage of SNF Reactor-Related GTCC

- Establishes requirements for licensing an ISFSI
  - ❑ Can be licensed to any person in the U.S. (§72.2(b)) [FedCorp included]
- Limited to storage of power reactor SNF, power reactor-related GTCC, & other rad material associated with SNF storage (no HLW) (§72.3)
  - ❑ If DOE owns then cannot be located at any site of candidate HLW repository (§72.96)
  - ❑ NRC does not prohibit DOE from owning and operating an ISFSI



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## Cont: 10CFR72: Licensing Requirements for Independent Storage of SNF, HLW & Reactor-Related GTCC

- Establishes requirements for licensing an MRS
  - Includes allowance to store HLW but only “from civilian nuclear activities” (§72.3)
    - Up to 10,000 MTHM until repository receives material (15,000 MTHM thereafter)
    - Construction may only begin after construction on an approved repository begins
    - Must be co-located with repository (§72.96)
    - Must not be located at any site of candidate HLW repository or in Nevada (§72.96)
  - 1987Act should be modified to allow consent based process to site, license, and construct multiple storage facilities with adequate capacity and to clarify the use of the NWF for this purpose
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# What Is A Consent Based Strategy?

- A Cooperation and Consultation Process with the states will be critical – WIPP model
    - Establishes standards of expectation in an agreement
      - Communication process
      - Oversight
      - Reporting
      - Meeting licensing requirements
      - Who is responsible for licensing
      - Financial Assurance
      - Incentives
    - Establishes standards
-

# Electricity Demand

Current Capacity = 1TW 2050 Capacity = 1.5 TW

<u>Current Source</u>	<u>Current %</u>	<u>2050 Source</u>	<u>2050 %</u>
Coal	50%	Coal	33%
Natural Gas	20%	Natural Gas	20%
Nuclear	20%	Nuclear	39%
Hydro	7%	Hydro	5%
Renewables	3%	Renewables	3%

# NATURAL DISASTERS & RISK



Drought



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Sandy 2012



Sandy



Sandy

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# The Case for Centralized Interim Storage

- **Controlled, safe, proven technology**
  - **Reduces risks to high-density populations**
  - **Averts over-packing of used fuel pools due to limited storage space**
  - **Allows decommissioned facilities to move waste off site**
  - **Provides path forward for defense HLW**
  - **Halts fines and settlement payments related to waste disposition \$500 Million per year by 2020**
  - **Allows more time for evaluation of best long-term solution**
  - **Reprocessing decision is 30 to 50 years away**
  - **Makes no sense to spend Millions burying and Millions retrieving if we will reprocess**
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# LICENSING YUCCA

- The Majority in House Energy Committees are polarized & committed to Yucca
  - Support for licensing may allow them to accept other alternatives
  - Licensing will prove we can actually do it
  - The Industry has been responsible for the polarization and is obligated to reverse it
  - Licensing (if it can be) does not mean it will open. State can stop it!!
  - Irresponsible of House to stop other options
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Questions???

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