



Integrated Planning for Packaging, Transportation, and Storage of Commercial SNF at an Interim Storage Facility

U.S. Nuclear Waste Technical Review Board

Summer 2018 Board Meeting

**Presentation By: Myron M. Kaczmarsky
Senior Director, Holtec Government Services**

June 13, 2018

Topics

- Holtec International Corporate Overview
- Holtec's View of Consolidated Interim Storage
- HI-STORE CISF: A Consolidated Interim Storage Facility for Spent Nuclear Fuel & High Level Waste
- Spent Nuclear Fuel is Transported Safely & Securely
- Integrated Planning and Path Forward

Holtec International Corporate Overview



- A vertically integrated turnkey supplier of goods and services to the power generation industry
 - ✓ Design & Engineering
 - ✓ Licensing
 - ✓ Fabrication
 - ✓ Critical Material Supply
 - ✓ Construction
 - ✓ Site Installation
 - ✓ Operations
- Established in 1986
- Financially Strong
 - ✓ Orders booked for future deliveries: 5.0+ Billion USD
 - ✓ No history of long-term debt
 - ✓ Highest industrial credit rating [D&B-1R2]
 - ✓ Self-financed R&D: SMR-160, Decommissioning & Consolidated Interim Storage
- Business Mix:
 - ✓ 85% Nuclear power & nuclear waste
 - ✓ 10% Fossil power – combined cycle
 - ✓ 5% Renewables – solar, wind, etc.



Holtec's Manufacturing Capabilities

Three Major U.S. Manufacturing Plants

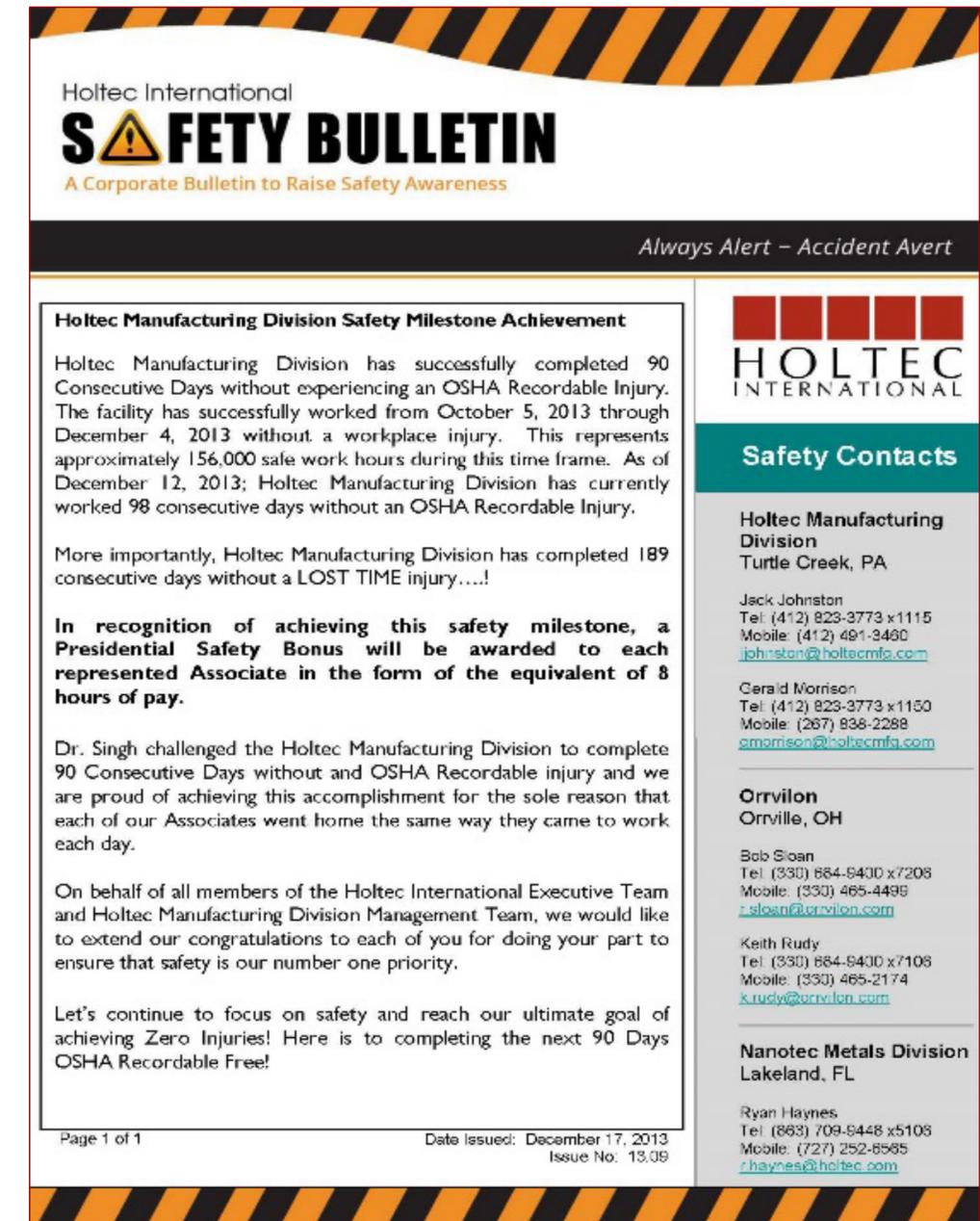


- Holtec Manufacturing Division (HMD)
 - Turtle Creek, PA
- Orrvilon, Inc. (ORR)
 - Orrville, Ohio
- Advanced Manufacturing Division (AMD) **NEW!**
 - Holtec Technology Campus, Camden, NJ
- Precision Fabrication Systems (PFS) **NEW!**
 - Dahej, India
- Over 1.3 Million square feet of Manufacturing Space



Safety Program

- Holtec approaches safety through a holistic and proactive Injury and Illness Prevention Program (IIPP).
- The elements of Holtec's safety program consist of:
 - ✓ Management Commitment
 - ✓ Employee Involvement
 - ✓ Hazard Recognition and Mitigation
 - ✓ Program Evaluation and Continuous Improvement
 - ✓ Employee Training and Knowledge Management
 - ✓ Safety Procedures



Holtec International
SAFETY BULLETIN
A Corporate Bulletin to Raise Safety Awareness

Always Alert – Accident Avert

Holtec Manufacturing Division Safety Milestone Achievement

Holtec Manufacturing Division has successfully completed 90 Consecutive Days without experiencing an OSHA Recordable Injury. The facility has successfully worked from October 5, 2013 through December 4, 2013 without a workplace injury. This represents approximately 156,000 safe work hours during this time frame. As of December 12, 2013; Holtec Manufacturing Division has currently worked 98 consecutive days without an OSHA Recordable Injury.

More importantly, Holtec Manufacturing Division has completed 189 consecutive days without a LOST TIME injury....!

In recognition of achieving this safety milestone, a Presidential Safety Bonus will be awarded to each represented Associate in the form of the equivalent of 8 hours of pay.

Dr. Singh challenged the Holtec Manufacturing Division to complete 90 Consecutive Days without and OSHA Recordable injury and we are proud of achieving this accomplishment for the sole reason that each of our Associates went home the same way they came to work each day.

On behalf of all members of the Holtec International Executive Team and Holtec Manufacturing Division Management Team, we would like to extend our congratulations to each of you for doing your part to ensure that safety is our number one priority.

Let's continue to focus on safety and reach our ultimate goal of achieving Zero Injuries! Here is to completing the next 90 Days OSHA Recordable Free!

Page 1 of 1 Date Issued: December 17, 2013 Issue No: 13.09

HOLTEC INTERNATIONAL

Safety Contacts

Holtec Manufacturing Division
Turtle Creek, PA

Jack Johnston
Tel: (412) 823-3773 x1115
Mobile: (412) 491-3460
jjohnston@holtecmfg.com

Gerald Morrison
Tel: (412) 823-3773 x1150
Mobile: (267) 838-2288
gmorrison@holtecmfg.com

Orrvilon
Orrville, OH

Bob Sloan
Tel: (330) 684-6400 x7208
Mobile: (330) 465-4498
b.sloan@orrvilon.com

Keith Rudy
Tel: (330) 684-6400 x7108
Mobile: (330) 465-2174
k.rudy@orrvilon.com

Nanotec Metals Division
Lakeland, FL

Ryan Haynes
Tel: (863) 709-6448 x5108
Mobile: (727) 252-6565
r.haynes@holtec.com

"Safety Starts with Me"

Quality Program



■ Holtec's Quality Assurance Program has been approved to meet the following applicable industry quality assurance standards:

- ✓ Established in 1986
- ✓ 10CFR50 Appendix B
- ✓ 10CFR71 Subpart H (Approval Number 0784)
- ✓ 10CFR72 Subpart G
- ✓ NQA-1
- ✓ ISO 9001:2008



■ Triennially audit results provided by the U.S. NRC, NUPIC, and other organizations

■ Holtec design centers and fabrication facilities operate under the same QA Program

■ Holtec holds all ASME code stamps actively used in the industry (nuclear and non-nuclear)

- ✓ ASME III N-Stamp (N1, N2, N3, NB)
- ✓ ASME III NPT-Stamp (design and fabrication)
- ✓ ASME III R-Stamp (in-shop repair)
- ✓ ASME U-Stamp

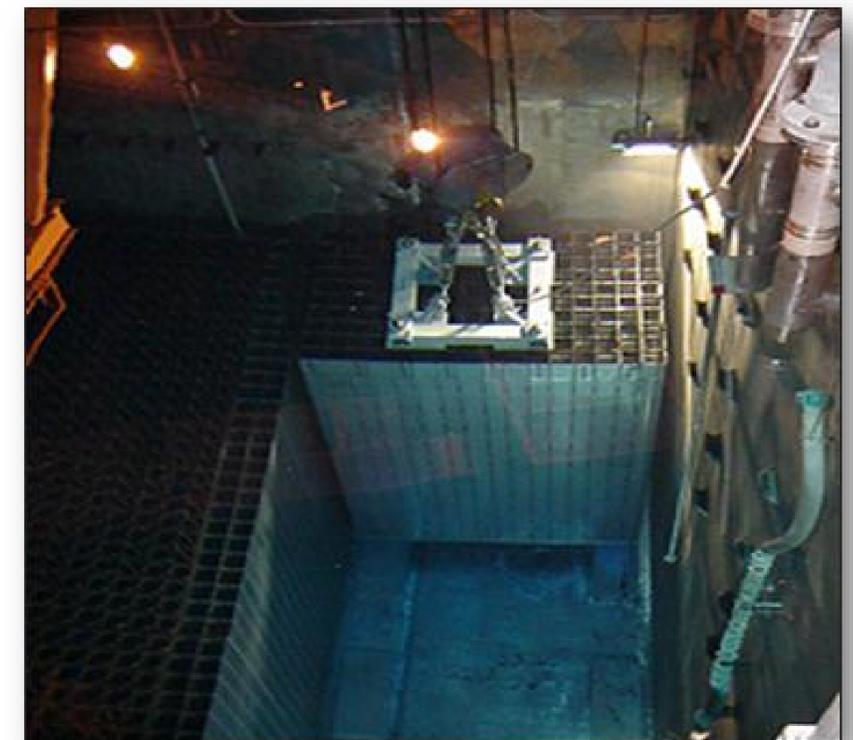


Holtec is Dedicated to Deploying Safe & Secure Spent Fuel Storage Technologies

- Spent nuclear fuel dry storage & transport systems for all fuel types
 - ✔ Over 100 nuclear plants worldwide are under contract for Holtec's dry storage systems
 - ✔ Almost one half of the available world market
 - ✔ Over 1,000 Holtec systems have been successfully loaded. This number is growing by over 100 canisters per year.
- High density in-pool spent nuclear fuel storage systems
 - ✔ Over 120 nuclear plants on four continents racked with Holtec's wet storage technology
 - ✔ Over 60% of available world market



Used Fuel Dry Storage Facility

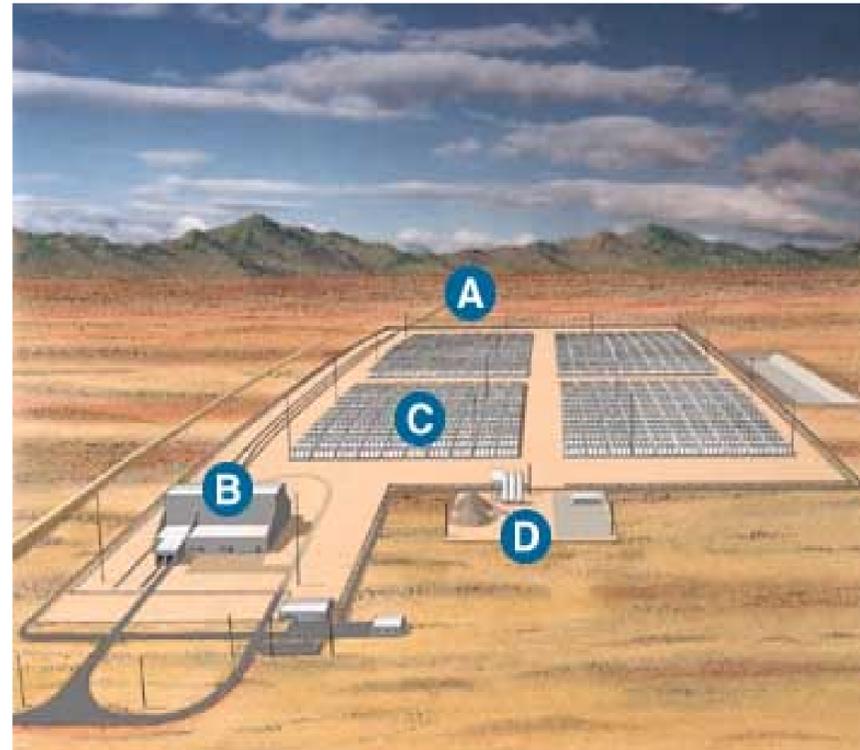


High Density Wet Storage Racks

Holtec's CIS Expertise

Only world supplier with extensive experience in developing CIS:

1. America's only licensed CIS (Skull Valley, Utah)
2. Ukraine's facility in Chernobyl



Private Fuel Storage,
CISF licensed
for 4,000 Holtec
Storage Systems
(Licensed in 2003)



Ukraine's Central
Storage Facility
(under construction)

Ukraine Central Storage Facility

- Store spent fuel from Energoatom's nine VVER reactors (Rivne, Khmelnytsky, and South Ukraine)
- The State Nuclear Regulatory Inspectorate of Ukraine (SNRIU) issued Certificate #E0001060 on June 29, 2017
 - ✓ Authorized Energoatom to construct and commission a central storage facility in the Chernobyl Exclusion Zone
- Groundbreaking ceremony held on November 9, 2017
 - ✓ Construction work to be completed in mid-2019



Ukraine Central Storage Facility

- Plant-use equipment being manufactured (in USA); all delivered by mid-2019
 - ✔ Double walled canister: HI-STAR 190
- Initial CSFSF-use equipment will also be delivered by mid-2019
 - ✔ HI-STORM 190 overpack



Ukraine Central Storage Facility

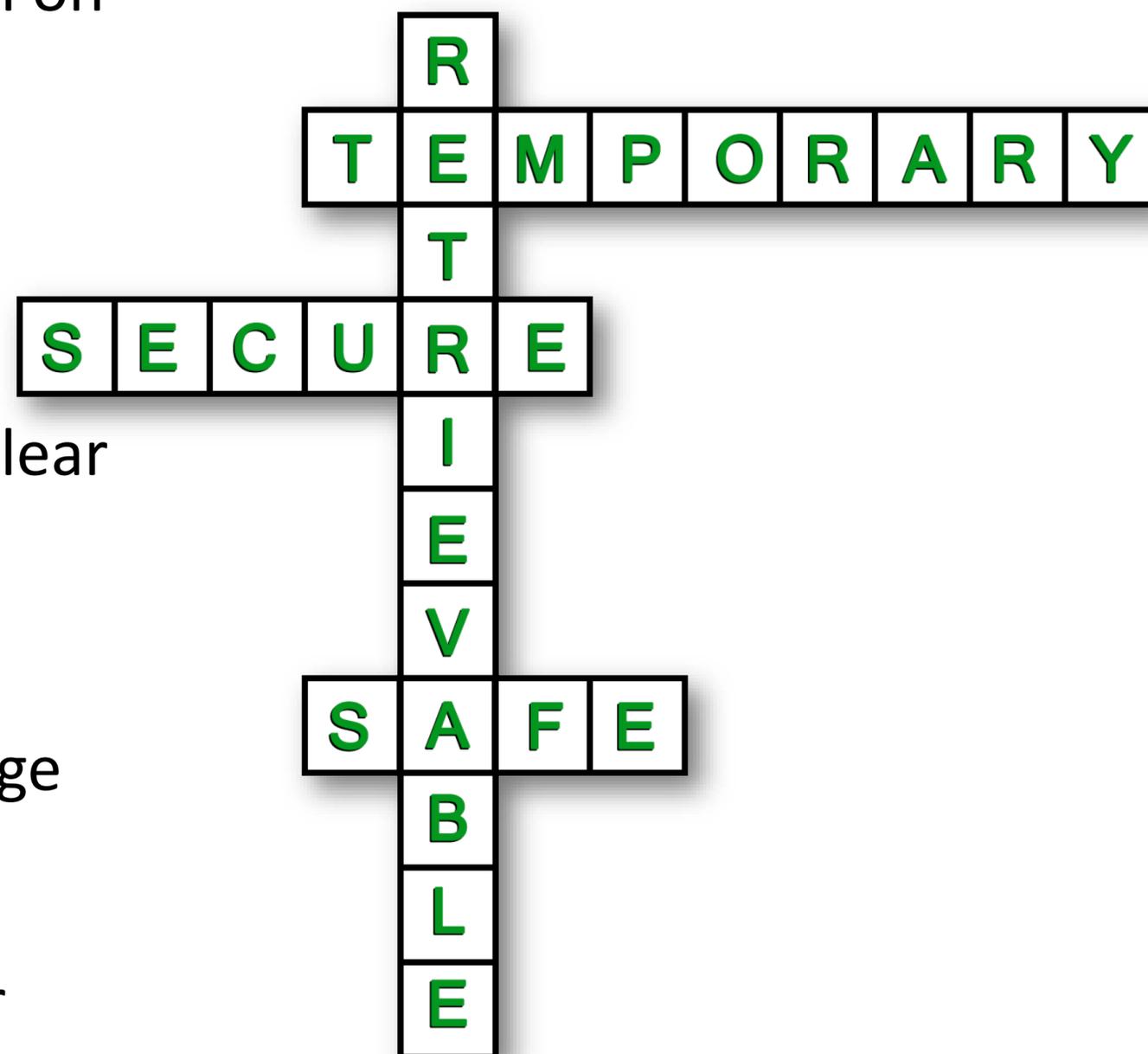
- 8-Axle & 12-Axle railcars designed:
 - ✓ Two (2) 12-Axle fabricated
 - ✓ One (1) 8-Axle fabricated
- Follow-on deliveries include:
 - ✓ 3 additional transportation systems (HI-STAR, Impact Limiters, and Railcars)
 - ✓ 90 more MPC/HI-STORM systems
- Initial fuel moves will occur in late 2019



12-Axle Railcar for Ukraine Central Storage Project

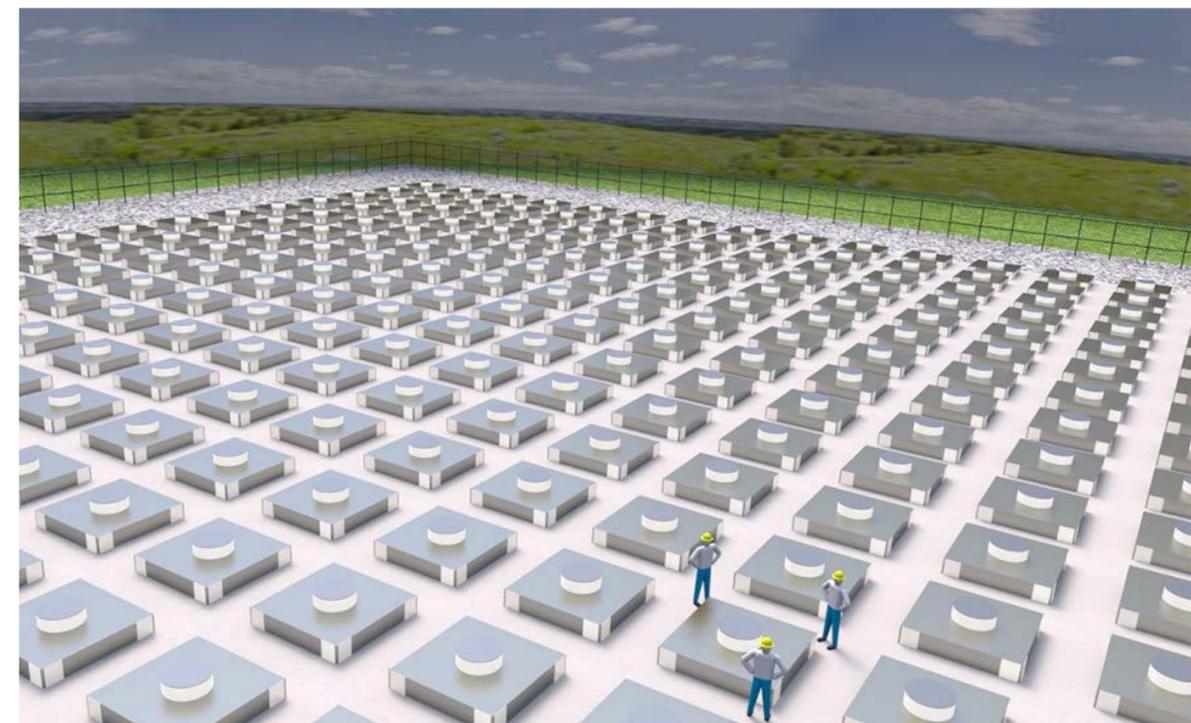
Holtec's View of Consolidated Interim Storage

- Opportunity for DOE to follow through on the government's promise to defuel nuclear plant sites
- Supplements long-term repository
- Allows removal of spent fuel from nuclear plant sites sooner than awaiting final repository
- Cost efficient away-from-reactor storage
- Eliminate stakeholder & political challenges with fuel storage at nuclear plant site by relocating fuel to area with strong local and state support



HI-STORE CISF: A Consolidated Interim Storage Facility for Spent Nuclear Fuel & HLW

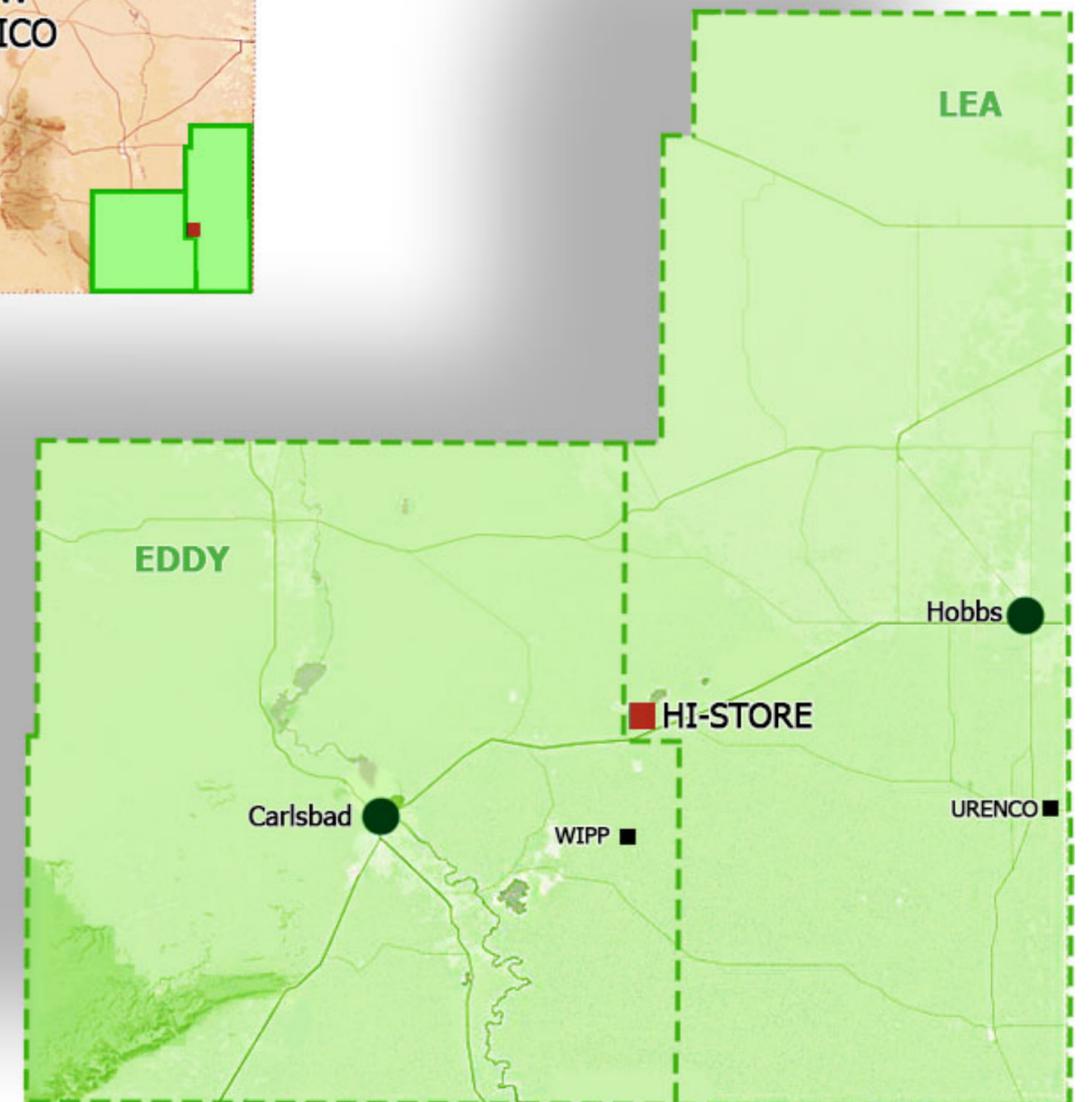
- Holtec & ELEA Team – Public Private Partnership (2016)
- Eddy-Lea Energy Alliance, LLC
 - ✓ Long-standing NM alliance
 - ✓ Owners are:
 - Counties of Eddy & Lea
 - Cities of Carlsbad & Hobbs
 - ✓ Formed in 2006 under the NM Local Economic Development Act
- ELEA owns the property
- Holtec funding the HI-STORE & HI-STORM UMAX applications
- Holtec will operate facility



Future HI-STORE CISF

HI-STORE CISF Site

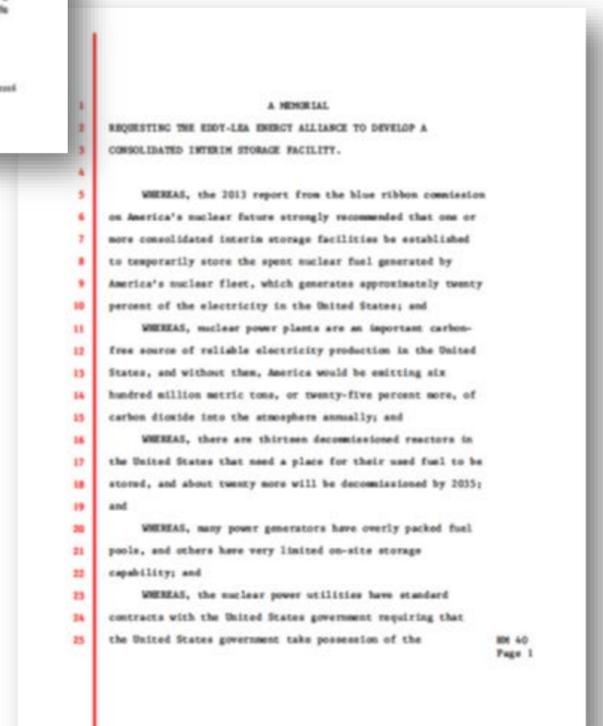
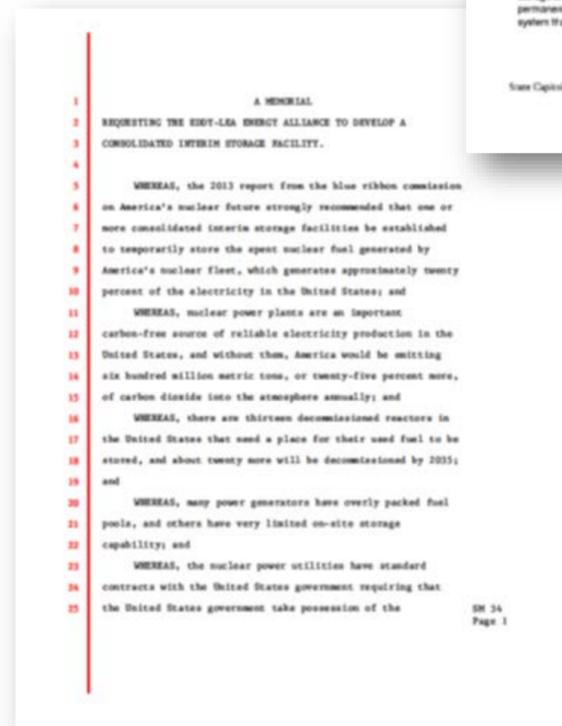
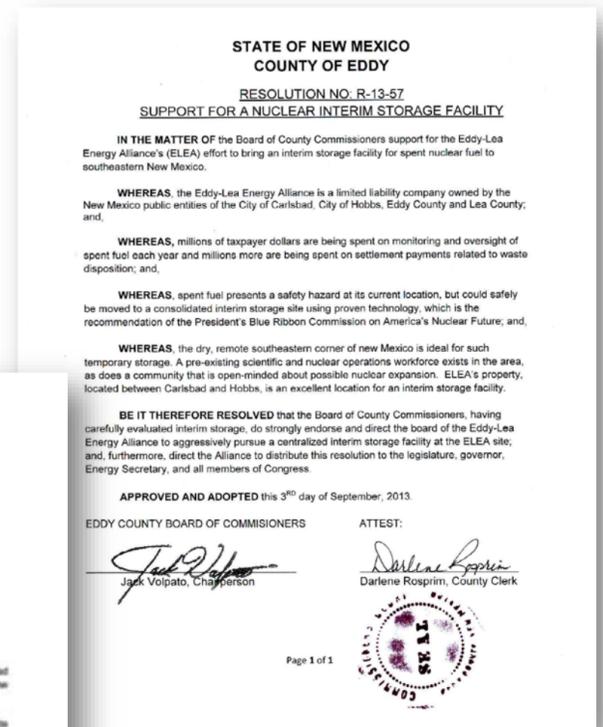
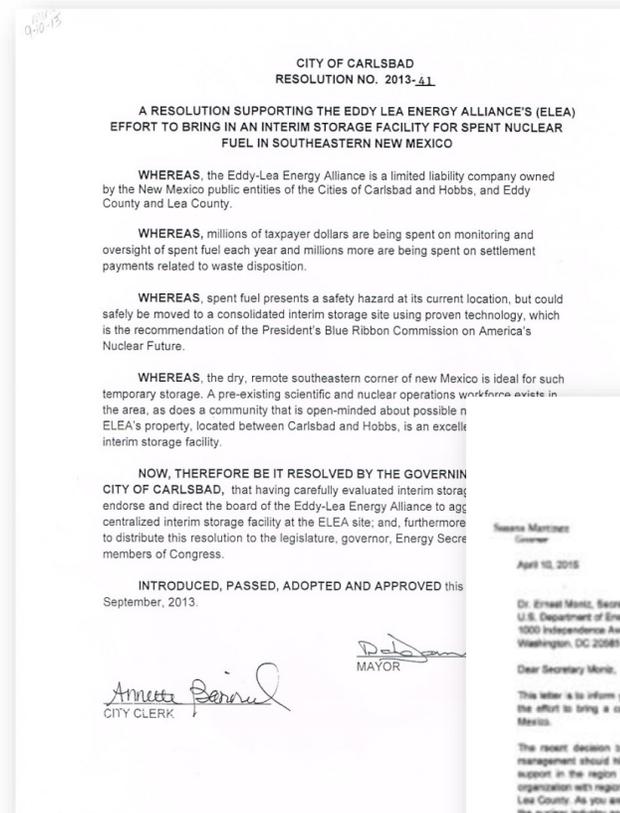
- 1,000 acres: Geologically stable, dry, elevated land
- Developed infrastructure: Electric, water, roads & rail
- Remote location:
 - ✓ 35 miles from nearest town
 - ✓ Midway between Carlsbad & Hobbs, NM
- Populace: Robust scientific & nuclear workforce
 - ✓ WIPP
 - ✓ URENCO



Strong Local Support

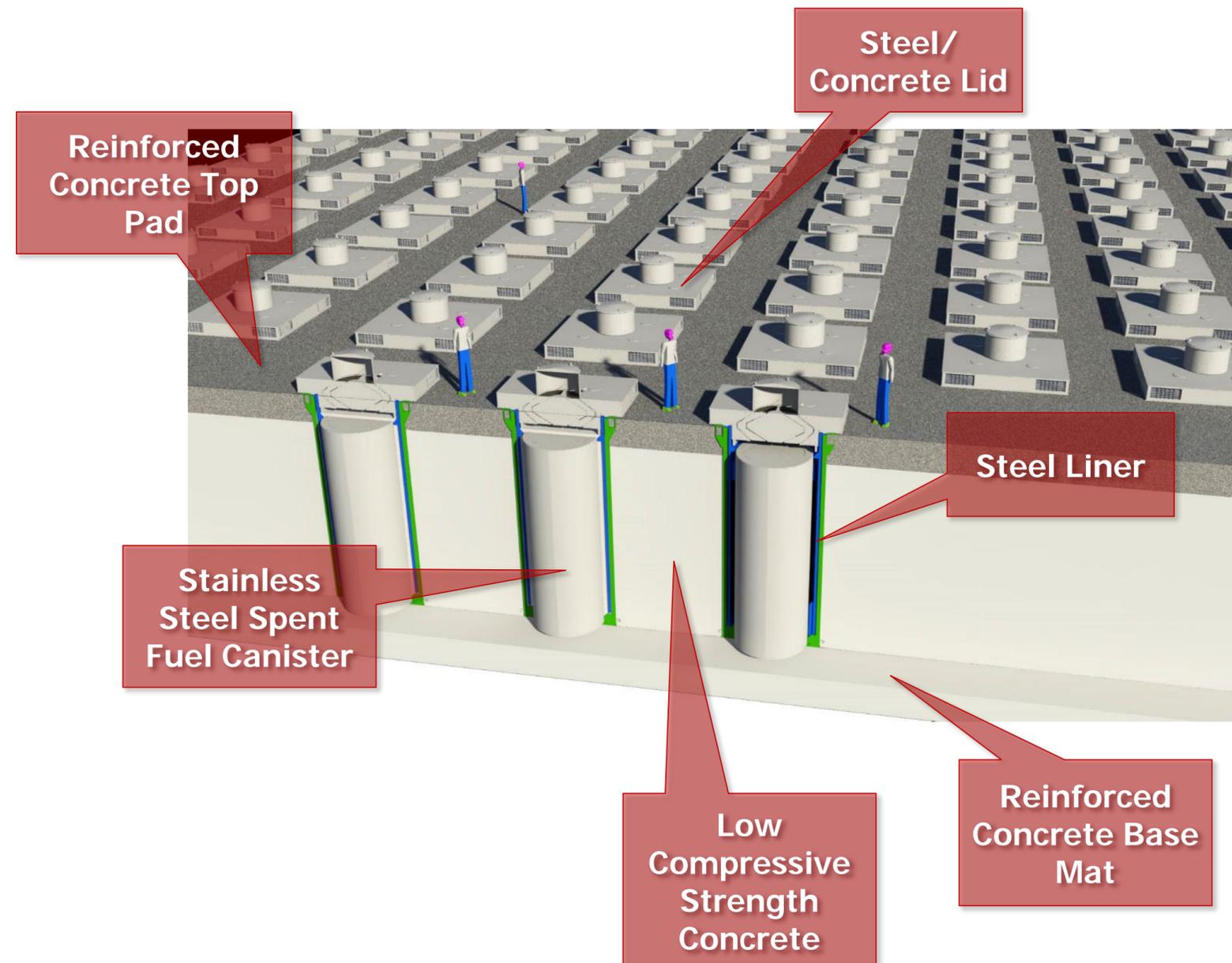


- Strong support:
 - ✓ Local communities
 - ✓ State & Local government
- Letters from the Cities of Carlsbad and Hobbs
- Letters from Counties of Eddy and Lea
- Letter from Governor of New Mexico
- Memorial Letters from House and Senate of New Mexico

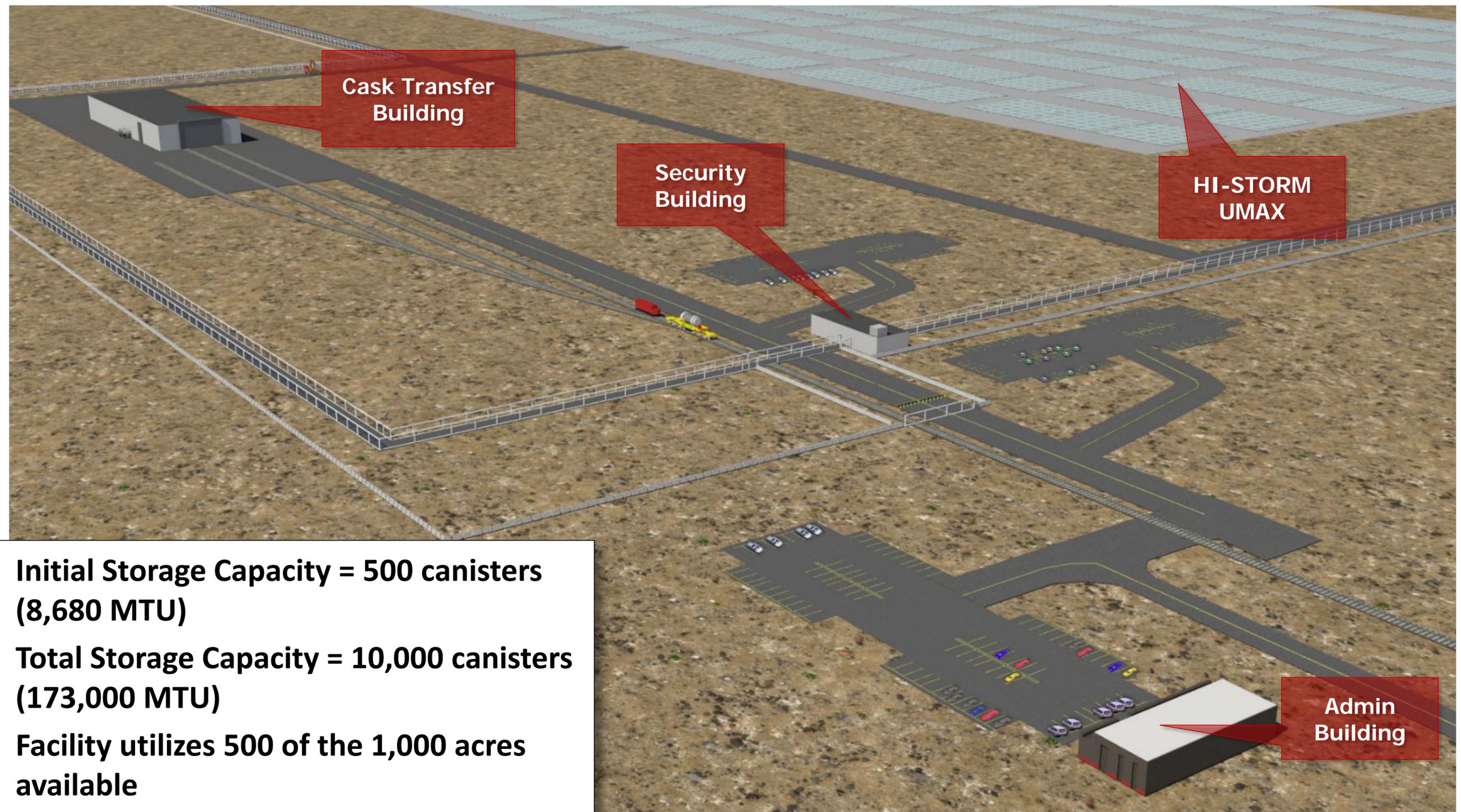


HI-STORE CISF Utilizes the HI-STORM UMAX Technology

- Below-grade, passive, vertical, air-cooled
- Maximizes Safety & Security
- Store canisters up to:
 - ✓ 75 ¾ in dia. / 213 in tall
- Any US-origin commercial nuclear fuel:
 - ✓ Packaged in dry storage canisters
 - ✓ Stored in fuel pools
- Operational Advantages
- No repackaging required

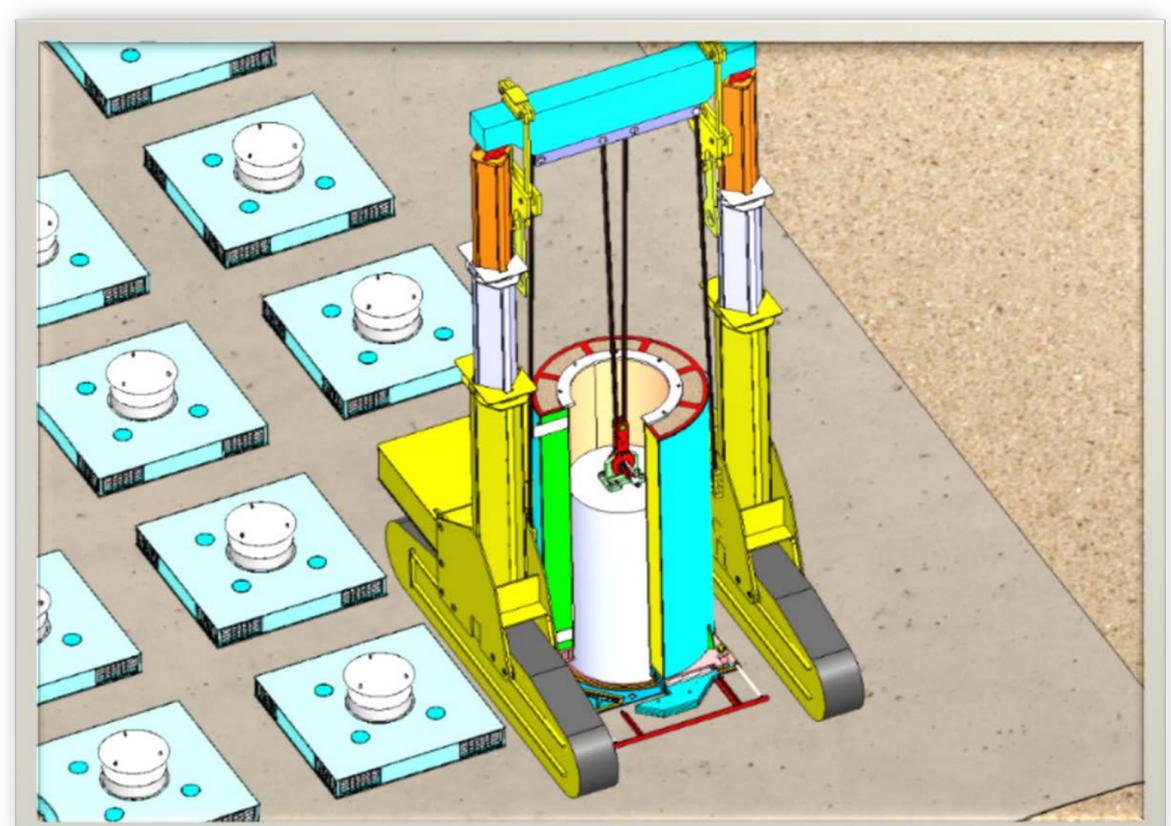
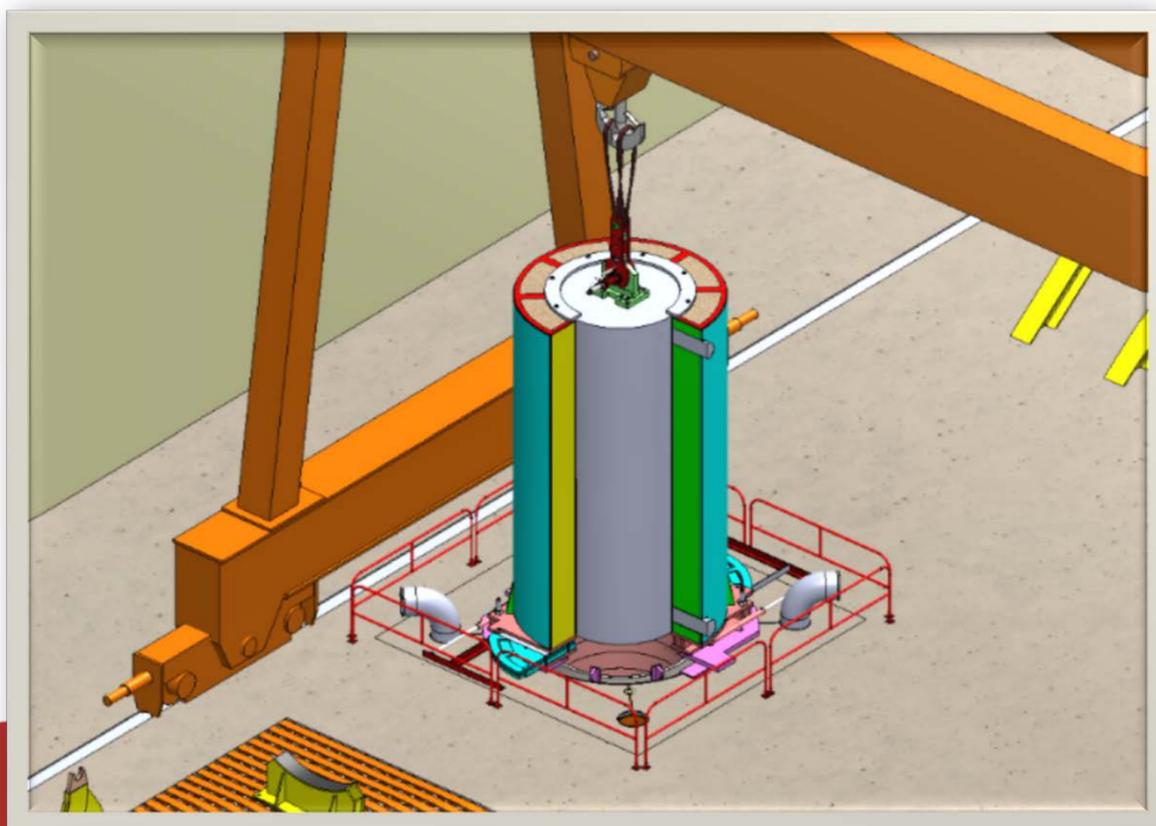
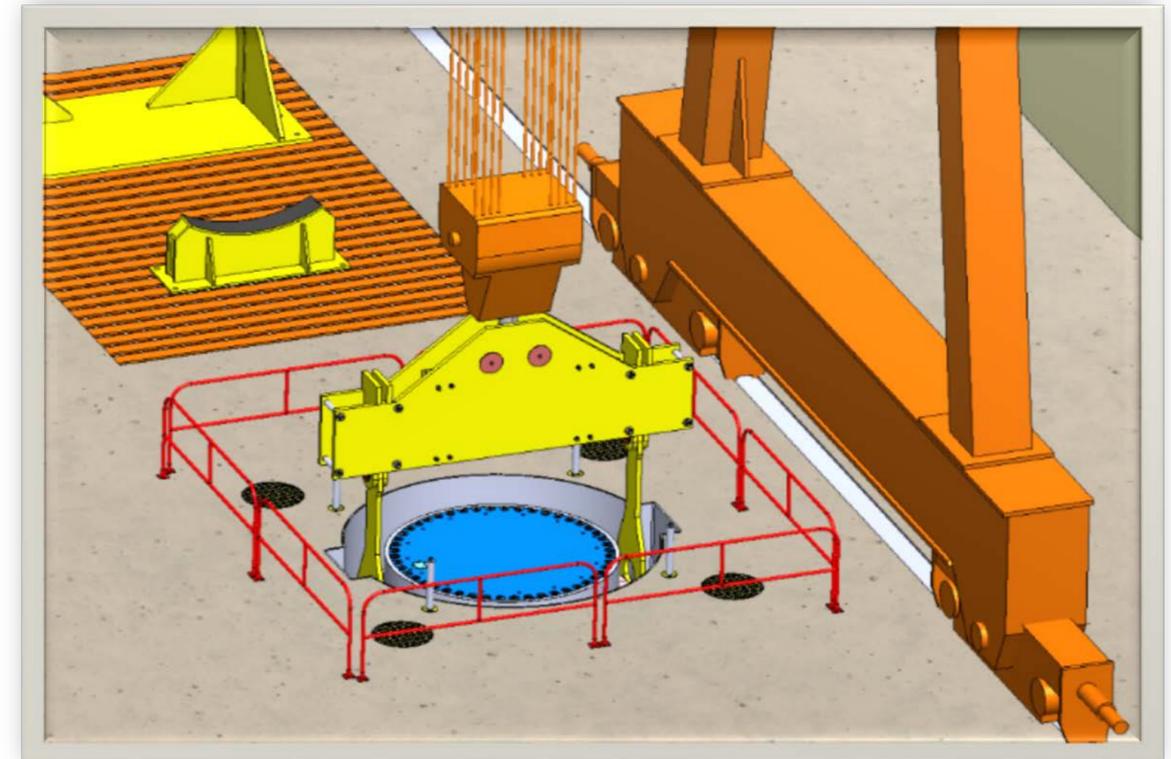
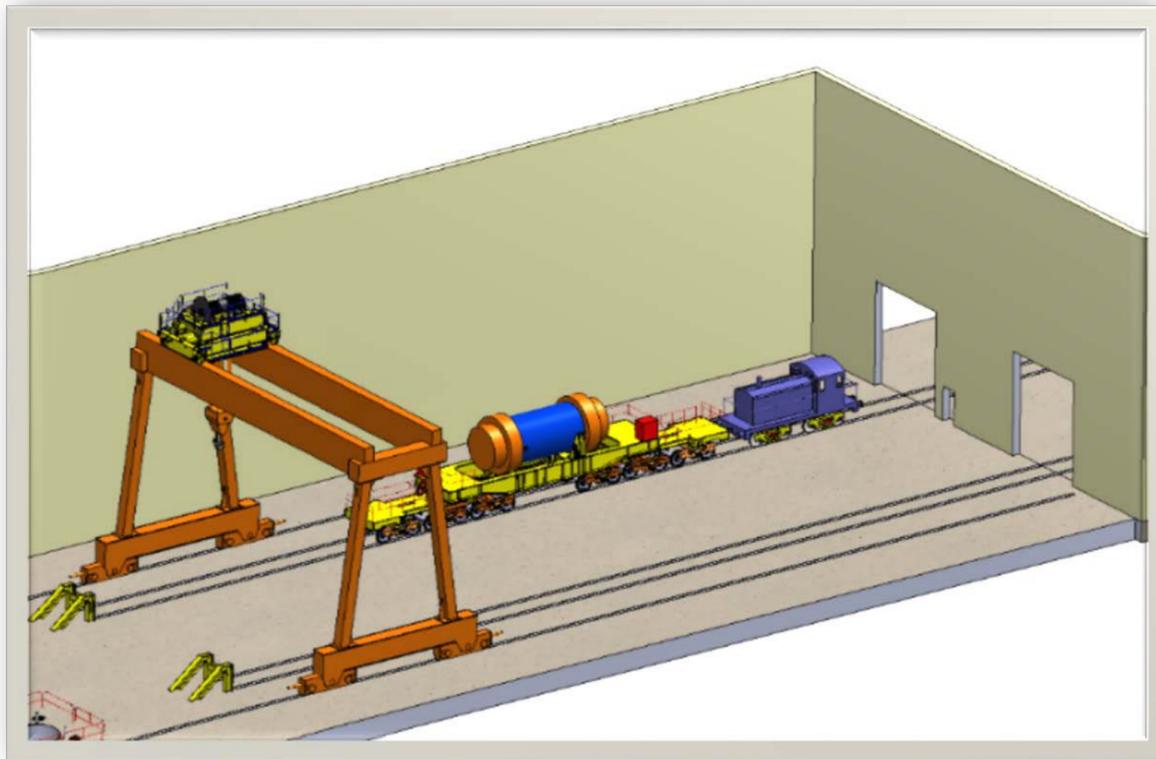


Site Layout



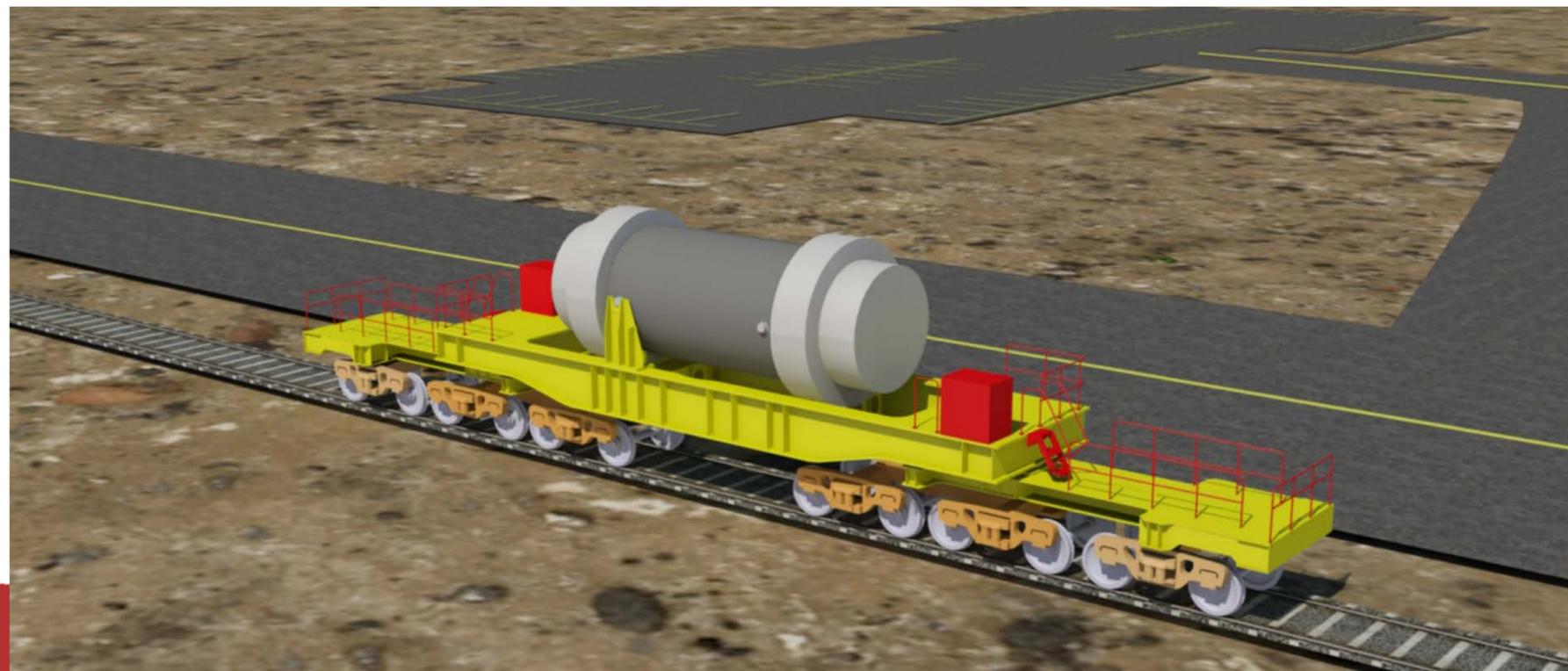
- Initial Storage Capacity = 500 canisters (8,680 MTU)
- Total Storage Capacity = 10,000 canisters (173,000 MTU)
- Facility utilizes 500 of the 1,000 acres available
- Operations could commence by 2023

Operations at the HI-STORE CISF



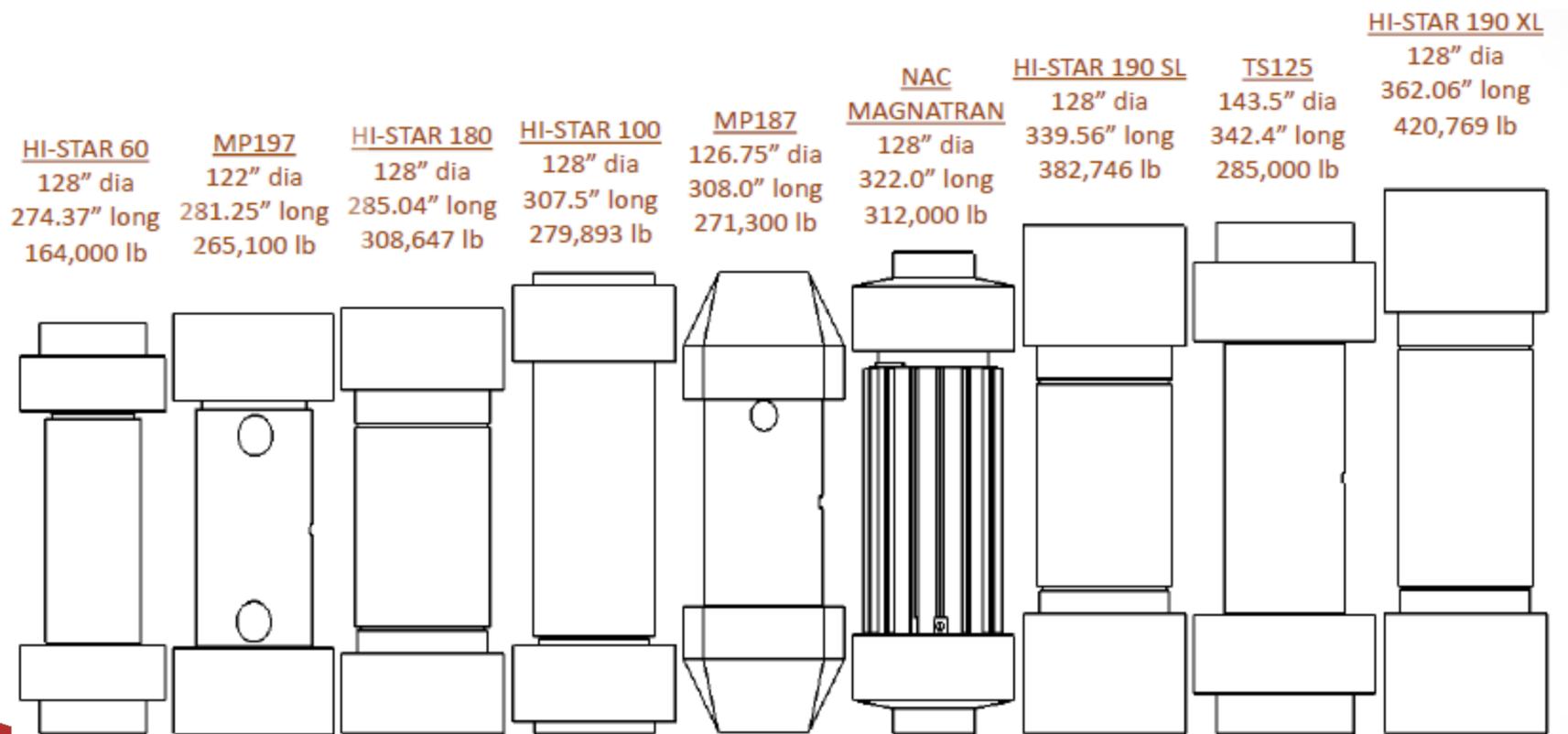
Transport to HI-STORE CISF

- Spent nuclear fuel will arrive at the HI-STORE CISF by rail
 - ✓ Robust and safe transport casks using specialty designed railcars
- Transportation of radioactive material including Spent Nuclear Fuel is strictly regulated
 - ✓ The Nuclear Regulatory Commission (NRC) and the U.S. Department of Transportation (DOT)
- Two transport casks designed and licensed with the NRC by Holtec International will be used
 - ✓ HI-STAR 190 (licensed) and HI-STAR 100MB (pending)



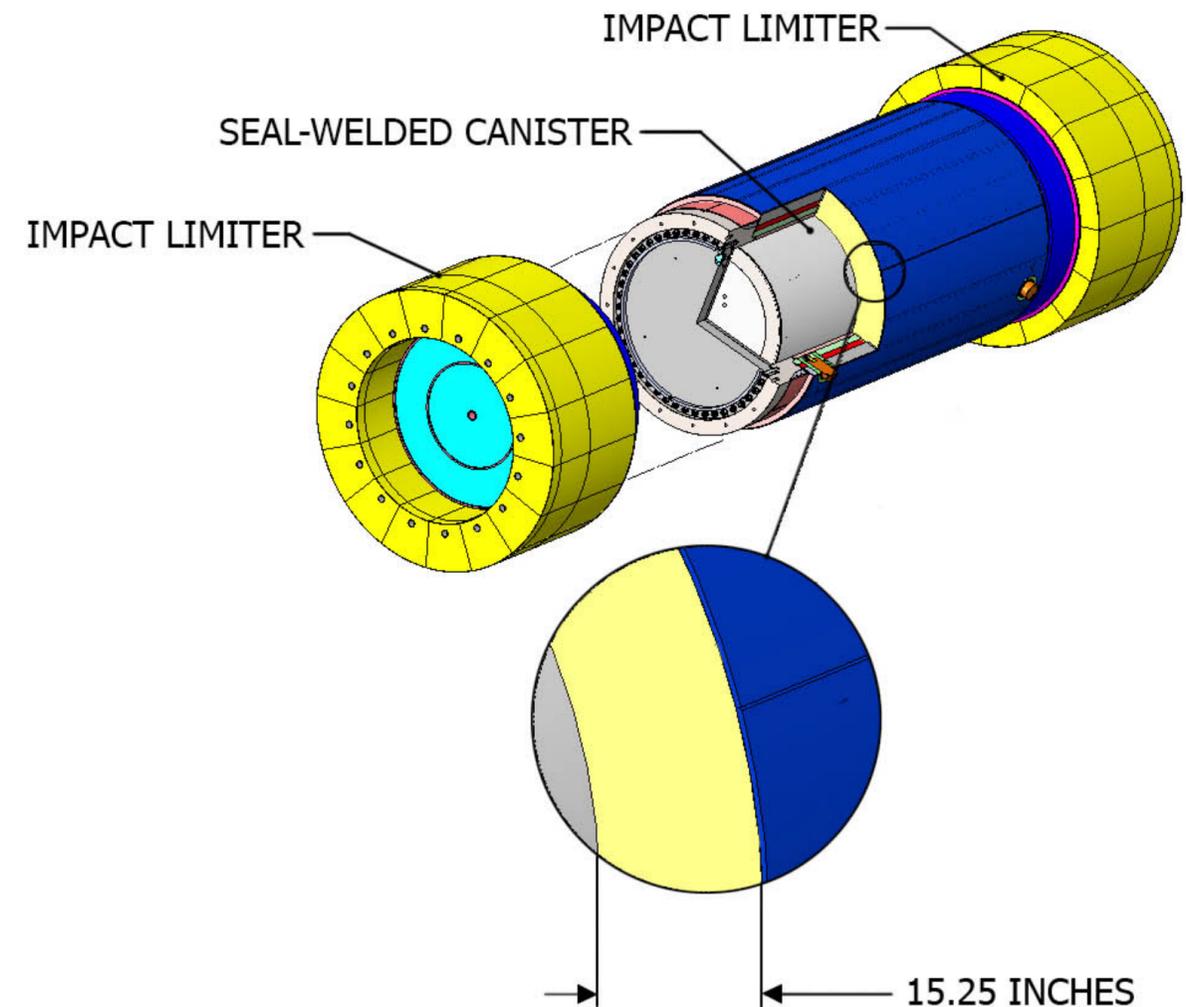
Transport to HI-STORE CISF

- There are two options for transporting the wide range of commercial SNF canister designs:
 - ✓ Utilize the original transport cask that was approved for the canister
 - ✓ Transport in a Holtec Transport Cask (HI-STAR 190 and HI-STAR 100MB)
- Licensing non-Holtec canisters is not a technical issue for HI-STORM UMAX
 - ✓ In process of licensing for MPC-37, MPC-89, and TN-24PT1
 - ✓ For transport the canister is not the containment boundary



Transport to HI-STORE CISF

- Transport casks are designed and fabricated to safely confine the fuel and shield workers and the public from radiation
 - ✓ Multiple layers of steel, lead, and other materials
- Inside the cask, the used fuel, in solid form, is contained in another sealed canister
- Fully loaded casks weigh 125 tons or more for rail shipments



Holtec Transport Cask

Rail Access to HI-STORE CISF

- Location (distance) of the existing rail terminal from the site
 - ✓ 3.8 miles west Southwestern Railroad (SWR)
 - ✓ 32 miles east Texas-New Mexico Railroad
- The local area has a well-developed rail road infrastructure. The length of additional rail spur required for the site is less than 10 miles.
- The transportation rail car is transferred to a newly constructed rail spur located along State Highway 243, where the transportation casks remain on the rail car and are transported approximately 5 miles east to the HI-STORE CISF.



Purple Line From Left Is Railroad Spur

Transport of Spent Nuclear Fuel is Proven and Safe



- According to a report prepared by Oak Ridge National Laboratory and Argonne National Laboratory (2016):
 - ✔ More than **25,000 shipments of used nuclear fuel** have been made worldwide, shipping more than **87,000 Metric Tons of Fuel**.
 - ✔ All shipments were undertaken without any injury or loss of life
- According to the NRC, more than **1,300 used fuel shipments** have been completed safely in the United States over the past 35 years
 - ✔ Most of the used fuel was shipped by rail
 - ✔ All shipments were completed with no release of radioactivity
- The U.S. Navy reports that, over the past 60 years, it has completed nearly **850 shipments of used fuel** from naval propulsion reactors, covering **1.6 million transportation miles**.
 - ✔ All shipments were also completed with no release of radioactivity

HI-STORE Site-Specific License Timeline



- Application submitted to USNRC: March 2017
- Application accepted by USNRC: March 2018
- RAI #1 Expected: Mar – Aug '18
- NRC Public Meetings in DC: April 25, 2018
- NRC Public Meetings in NM: April 30 – May 3 '18
- RAI #2 (if needed): February 2019
- NRC Completes Review: July 2020
- Pending Agreement w/DoE and/or Nuclear Utilities:
 - ✓ Construction Start: 2020
 - ✓ Construction Complete: 2023
 - ✓ Accept First Shipment: 2023

HI-STORM UMAX License Amendment Timeline

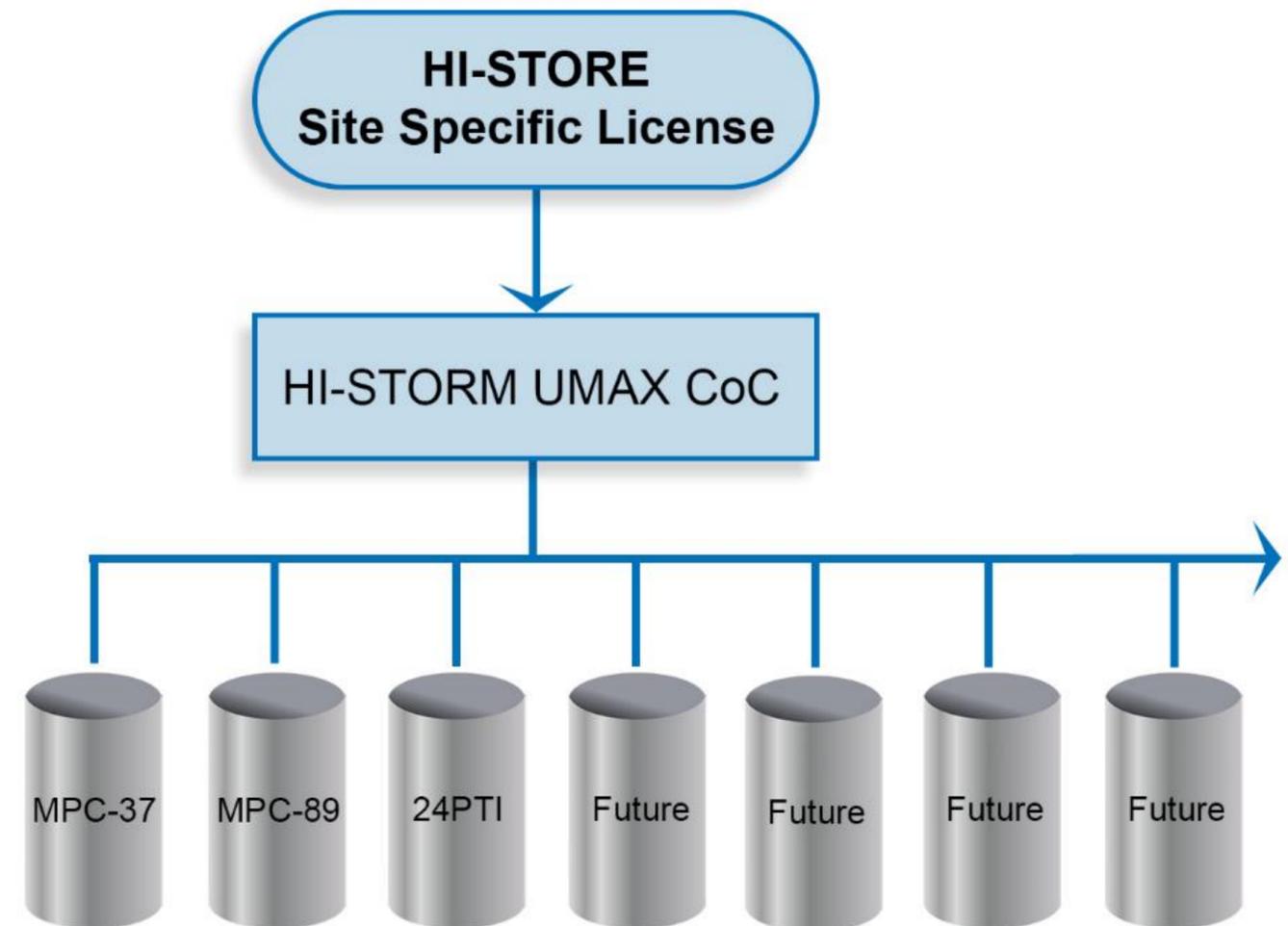
- Amd. #3 submitted to USNRC adding 24PT1 canister: Aug 2016
- Amd. #3 accepted by the USNRC : Jan 2018
- Early RAI #1 received: Jan 2018
- Full RAI package expected: May 2018
- Response to RAIs expected: July 2018
- NRC to issue the CoC/Safety Evaluation Report: Oct 2020



Integrated Planning and Path Forward

- Continue Licensing Effort
 - ✓ Holtec Funding Internally
 - ✓ Goal – License approval in 2020

- Federal Funds for Construction & Operation
 - ✓ Legislation to change NWPA
 - ✓ H.R. 474 (Issa / Conaway Bill)
 - CIS funding from Waste Fund
 - ✓ H.R. 3053 (Shimkus Bill)
 - Gives DOE full control of the public land
 - Expands the capacity limit on the Yucca Mountain repository from 70,000 to 110,000 metric tons
 - Authorizes the DOE to store SNF at an NRC-licensed interim storage facility owned by a nonfederal entity, and
 - Provides mandatory funding for specific stages of repository development



Questions?

