Storage of Spent Nuclear Fuel at Pilgrim Nuclear Power Station

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Topics

- About Holtec International
- History of Dry Storage at Pilgrim
- Nuclear Fuel and How it is Stored
- Holtec's HI-STORM 100 Systems Protection of Public Heath & Safety
- Safe and Low Dose Loading Process

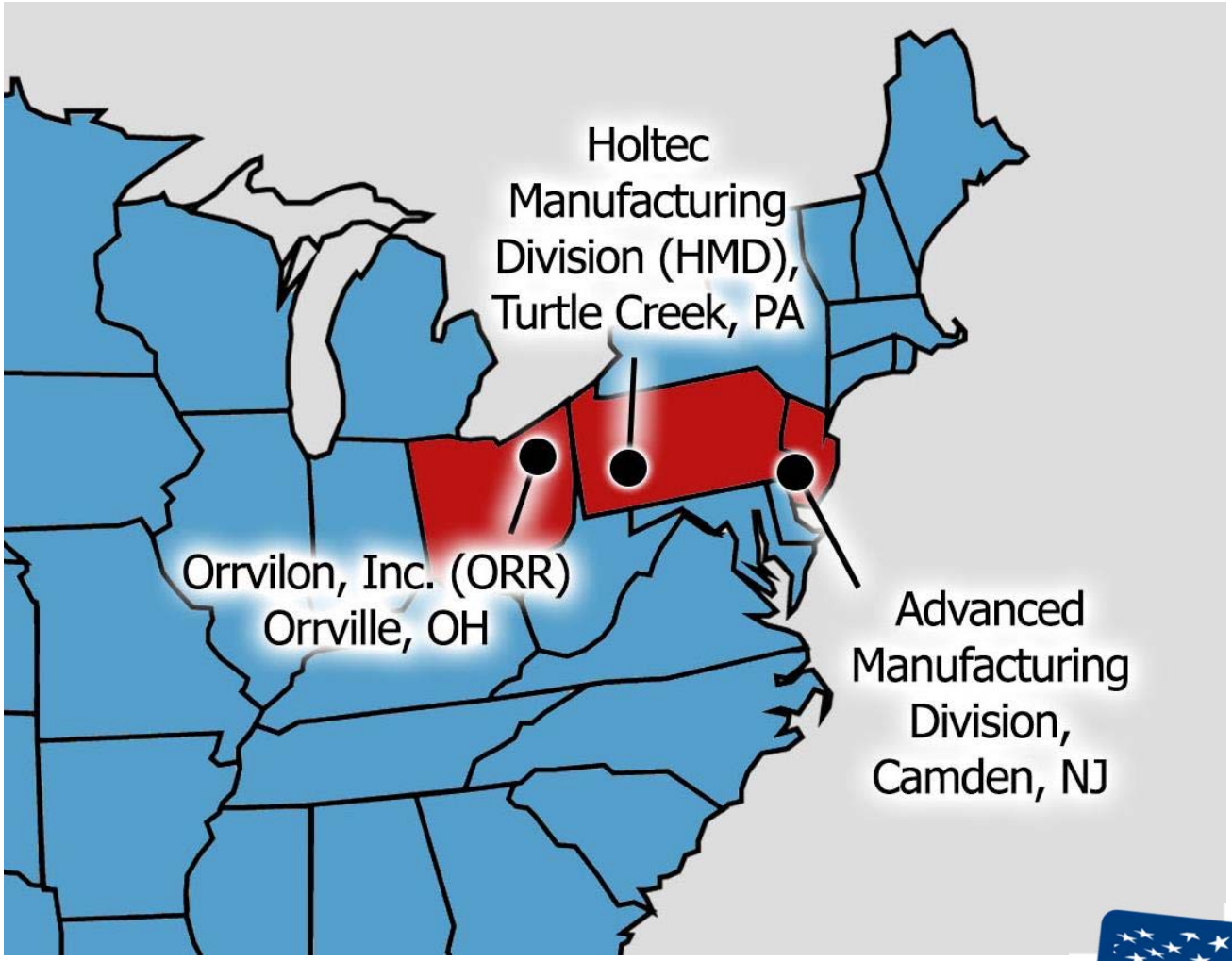
About Holtec International

A vertically integrated turnkey supplier of goods and services to the power generation industry established in 1986

- Technical Innovation
- Protection of the Environment
- Financially strong with self-financed R&D
- Impeccable Safety Record
- Ingrained Nuclear Safety Culture
- Robust Quality Assurance Program

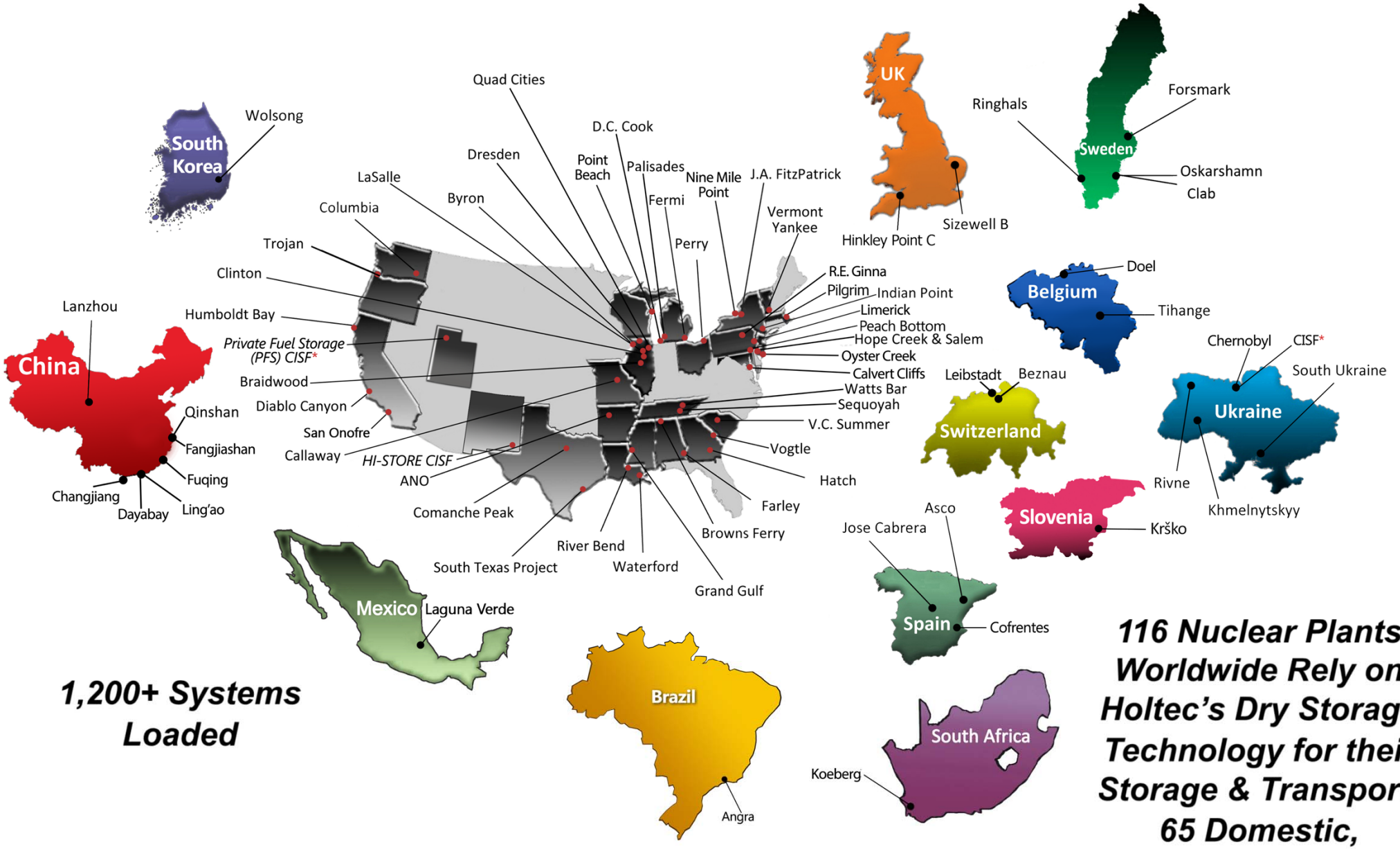
Committed to the Nuclear Industry

Holtec's Manufacturing Capabilities
Three Major U.S. Manufacturing Plants



1.4M ft^2 of Total Shop Space

Industry Acceptance of Holtec Systems



1,200+ Systems Loaded

116 Nuclear Plants Worldwide Rely on Holtec's Dry Storage Technology for their Storage & Transport; 65 Domestic, 51 International

History of Dry Storage at Pilgrim

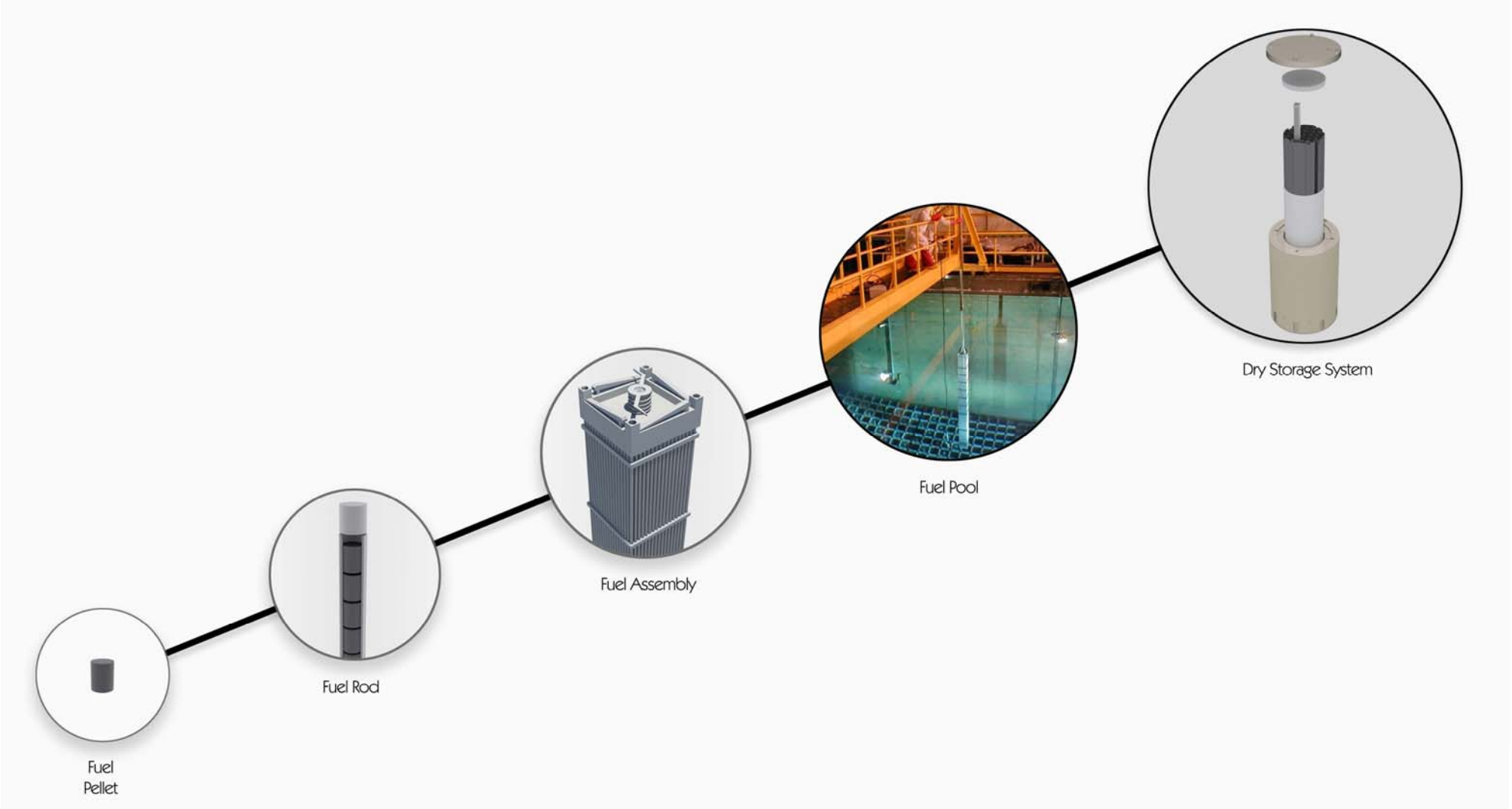
- **2009**: The HI-STORM System was selected by Entergy after a lengthy bid evaluation process that determined it was the best available technology
- **Today**: There are 17 HI-STORM Systems successfully loaded and safely stored at Pilgrim (over 1,200 Holtec systems are safely in use around the globe)

HI-STORMs at Pilgrim

Pilgrim Nuclear Station

Independent Spent Fuel Storage Installation (ISFSI)

Nuclear Fuel & How it is Stored



Technology Overview

HI-STORM 100 System

Protection of Public Health & Safety

- The HI-STORM System is the most robust system in the industry
  - The overpack consists of inner and outer steel shells where the space between is filled with concrete
  - The overpack provides physical protection & radiation shielding

Side View of HI-STORM Overpacks being prepared for Transport

Concrete Poured at Plant Site

Protection of Public Health & Safety

- External steel structure (no exposed concrete) ensures that the cask will not degrade under extreme environmental conditions
- No Rebar
  - So Easy to assemble
  - No cracking due to thermal expansion
  - No radiation streaming pathways
- Minimal maintenance
- Passive heat removal (natural convection)
- Requires no monitoring systems

HI-STORM 100 on-site at Pilgrim

Protection of Public Health & Safety

- **Steel exterior protects the cask against impacts**
- **Qualified to Withstand a Variety of Missiles**:

HI-STORM has been analyzed to withstand the impact of a variety of missiles; typical missiles and their incident velocity are listed in the table below (excerpted from the HI-STORM 100 Final Safety Analysis Report (FSAR))

Table 2.2.5

TORNADO-GENERATED MISSILES

Missile Description	Mass (kg)	Velocity (mph)
Automobile	1800	126
Rigid solid steel cylinder (8 in. diameter)	125	126
Solid sphere (1 in. diameter)	0.22	126

Protection of Public Health & Safety

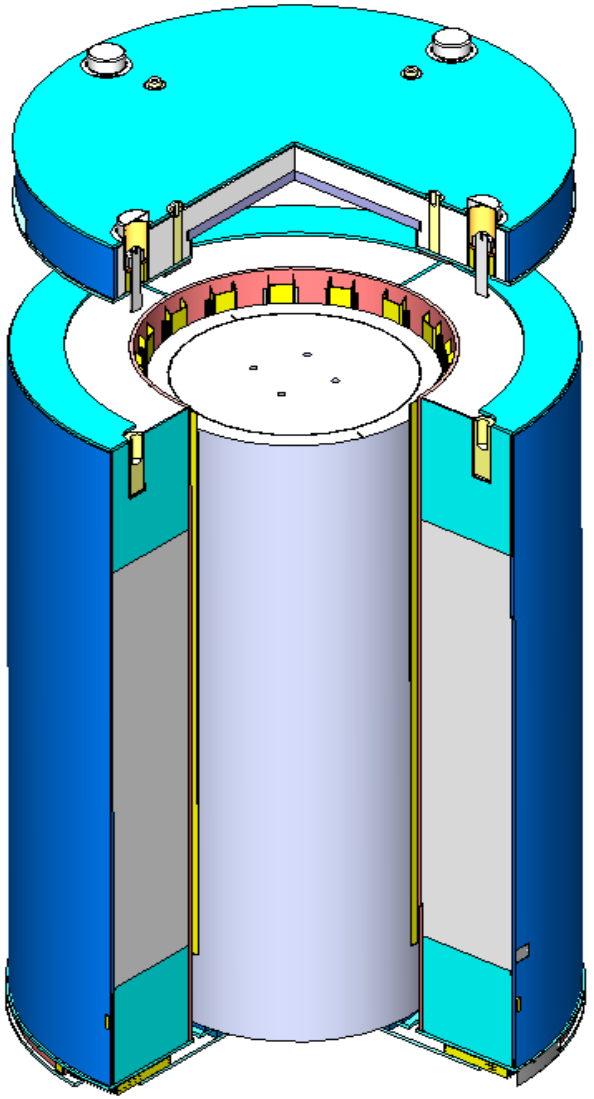
- The robustness of the HI-STORM System has been thoroughly evaluated and confirmed by industry organizations and in a licensing proceeding before the NRC's Atomic Safety & Licensing Board
- The ruling of the Board concluded that the HI-STORM can withstand:
  - Earthquakes stronger than any experienced in the history of the continental U.S. Over five times stronger than Fukushima
  - Crashing of an F-16 fighter plane laden with fuel
  - Raging brush fire around the storage facility
- The Electric Power Research Institute (EPRI), report validated a direct hit by a Boeing 767 aircraft engine at 350 miles per hour does not result in a release of radioactive material

Protection of Public Health & Safety

- Radiation dose from the HI-STORM systems at Pilgrim is anticipated to be less than 5 mrem/year
- This is the same exposure one would receive from a single roundtrip flight from NYC / Los Angeles
- The average annual radiation dose for an individual is 620 mrem

Protection of Public Health & Safety

- MPC: Multipurpose Canister
  - Fully-welded, stainless steel, cylindrical vessel that permanently encloses the spent fuel assemblies for storage and transport
  - The canister is licensed for storage and transport using specific overpacks during storage, onsite transfer, and offsite transport
  - Designed and manufactured to the highest levels of nuclear safety standards

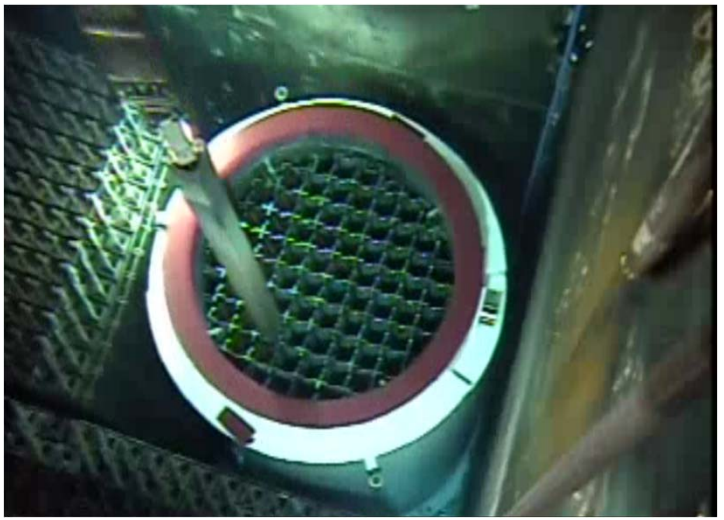


An MPC stored inside the HI-STORM Overpack

Protection of Public Health & Safety

- The *all-welded* MPC boundary provides an impregnable barrier against radioactivity release to the environment
- No loaded canister of Holtec's (or any other) has ever leaked in long term storage
- In contrast, bolted metal casks that feature thick steel sections have occasionally leaked at their gasket (seal) locations

An MPC Lid



An Fuel Assembly Being Lowered into an MPC

Protection of Public Health & Safety

- Tests performed on Holtec canisters at Diablo Canyon and Salem / Hope Creek
- Aging Management Plan is required by the NRC to monitor the condition of dry storage systems
- Manufacturing process reduces risk of Stress Corrosion Cracking
  - Reduced the amount of welding on the canister
  - Unique welding technique that minimizes the heat input
  - Designed and implemented fixtures to reduce the amount of handling of the canister

Protection of Public Health & Safety

- Basket is entirely made of Metamic-HT
  - Metamic-HT has nearly ten times the conductivity of stainless steel and over three times that of steel
  - Allows the transfer of spent fuel into storage to be complete within 3 years of the plant shut down

Dry Storage Loading Video at Plant Hatch

Questions