

# HI-STORM MPC STORAGE SYSTEM FOR VERMONT YANKEE

By

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a generation ahead by design



# History of Dry Storage at Vermont Yankee Nuclear Power Station



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- **1999:** The HI-STORM MPC System was selected by Vermont Yankee after a lengthy bid evaluation process that determined it was the best available technology
- **2006:** The Vermont Public Service Board issued a *Certificate of Public Good* (CPG) authorizing the construction of a dry fuel storage facility at Vermont Yankee

## Certificate of Public Good

STATE OF VERMONT  
PUBLIC SERVICE BOARD

Docket No. 7082

Petition of Entergy Nuclear Vermont Yankee, LLC and Entergy Nuclear Operations, Inc. for a certificate of public good to construct a dry fuel storage facility at the Vermont Yankee Nuclear Power Station, in Vernon, Vermont	)	Hearings at Montpelier, Vermont January 30-31, February 1-2, and February 6-10, 2006
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Order entered: 4/26/2006

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for Associated Industries of Vermont

# History of Dry Storage at Vermont Yankee Nuclear Power Station

- **Today:** There are 13 HI-STORM MPC Systems successfully loaded and safely stored at Vermont Yankee ( Five loaded systems shown in the photo below)



# Technology Overview

- The HI-STORM MPC System is the most robust system in the industry
  - The overpack is a double walled, steel buttressed cylinder with concrete providing shielding & missile protection
  - External steel structure (No exposed concrete) ensures that the cask will not degrade under extreme environmental conditions
  - Welded canister lid without any gaskets or seals. The *all-welded* MPC boundary provides an impregnable barrier against radioactivity release to the environment



**Side View of HI-STORM Overpacks  
being prepared for Transport**

# HI-STORM Qualified to Withstand a Variety of Missiles

- HI-STORM has been found 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 FSAR).

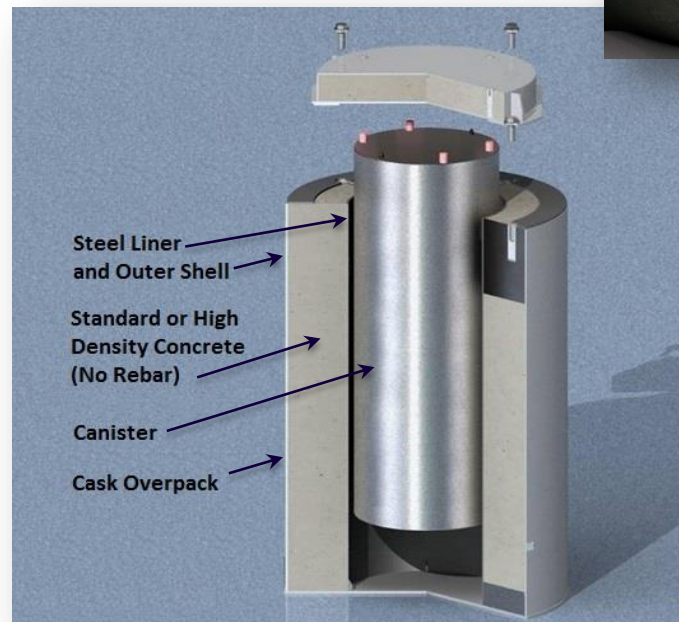
Table 2.2.5		
TORNADO-GENERATED MISSILES		
Missile Description	Mass (kg)	Velocity (mph)
Automobile	1800	126
Rigid solid steel cylinder (8 in. diameter)	125	126
Solid sphere (1 in. diameter)	0.22	126

# Technology Overview

- No rebar which eliminates path for radiation streaming
- Radiation dose from a HI-STORM is less than 5% of that emitted by any metal cask being used in the US or Europe.



**Holtec HI-STORM Overpacks**





# Protection of Public Health & Safety

- The robustness of the HI-STORM Systems has been thoroughly evaluated and confirmed in Licensing proceeding before the NRC's Atomic Safety & Licensing Board.
- After nearly 2 years of proceedings, including full evidentiary hearings, 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
- **These Board findings were affirmed by the Commission.**



# Protection of Public Health & Safety

- The HI-STORM System is widely recognized as the most structurally robust system for protecting public health and safety by both users and regulators around the globe.
- The structural ruggedness of HI-STORM has been evaluated and confirmed by the highest Board in the U.S., as well as the Sandia National Laboratories
- Use of high density concrete in VY's HI-STORMs imputes an even greater protection against hazards such as projectiles and missiles.





# Protection of Public Health & Safety

- The NRC has performed probabilistic risk analyses on HI-STORMS concluding that the system provides:



- A leak-tight confinement that renders the likelihood of radiation leakage in long term storage non-credible.
- An extremely robust process for fuel loading that essentially precludes the risk of a handling accident.



**HI-STORMs at a site in the US**

# Protection of Public Health & Safety



a generation ahead by design

- The multi-purpose canisters (MPC) used to store fuel are manufactured to the same ASME Codes that are employed to design and build a nuclear reactor vessel.
- Furthermore -
  - No loaded canister of Holtec's **has ever leaked in long term storage**
  - In contrast, metal casks that feature thick steel sections have occasionally leaked at their gasket (seal) locations
  - The user has the option to use high density concrete to lower the radiation dose to minuscule levels

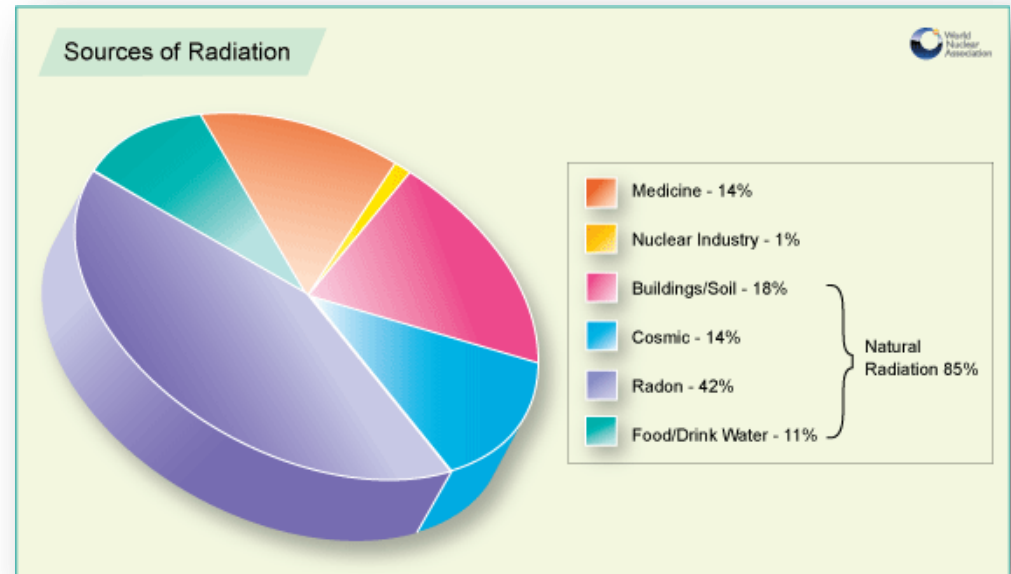


## **Conclusion**

**The all-welded canisters provide the highest level of safety to plant personnel and its surrounding communities**

# Protection of Public Health & Safety

- The maximum radiation dose from the HI-STORM systems at VY is anticipated to be less than 5mR/year. This is less than 20% of the federal limits.
- Thus, the dose from the storage facility at VY's site boundary will be far below the dose from terrestrial radiation that the citizens of the community routinely receive in the course of their daily lives.

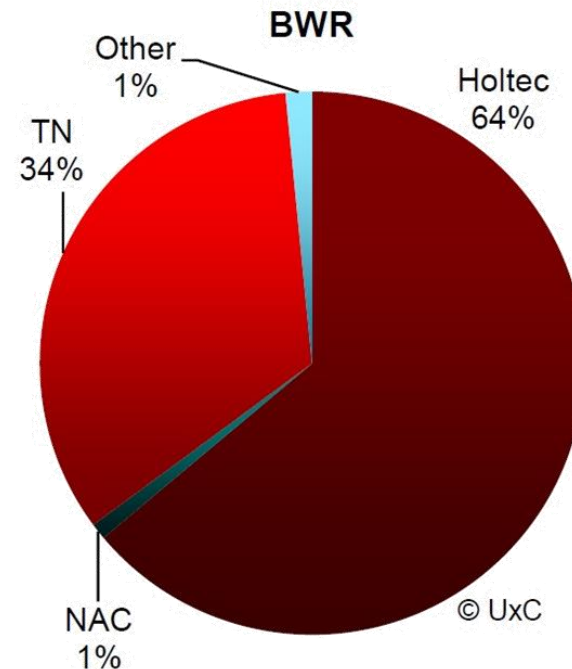


Sources of Radiation

# Industry Acceptance

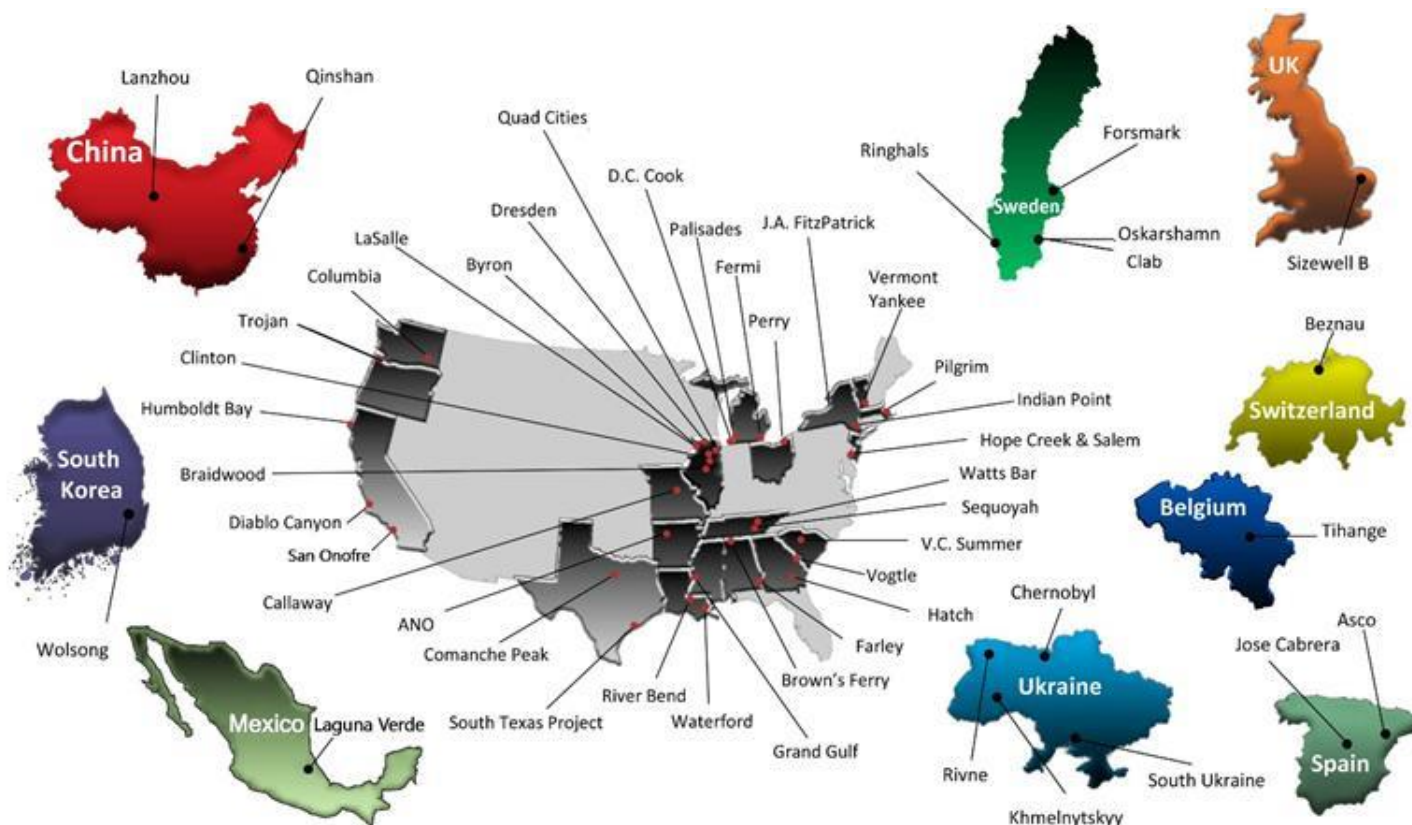
- As the pie chart shows, the HI-STORM MPC System is the most widely used canister system in the world
- In addition to the US, countries with active terrorist cells, such as Spain and Ukraine, have selected Holtec's HI-STORM for their spent fuel storage needs
- Between 100-200 HI-STORM MPC Systems are loaded each year

Dual Purpose Concrete Systems (Vendor Shares)



# Industry Acceptance

- Holtec presently has contracts with over 70 nuclear units around the world including the U.S., Belgium, China, Switzerland, South Korea, Spain, South Africa, Sweden, United Kingdom and Ukraine.



*Thank You for your Attention*

*Any Questions?*