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## HI-STORM UMAX Underground Storage Systems

Dr. Stefan Anton, Vice President of Engineering  
Holtec International  
INMM Spent Fuel Seminar 2015  
January 14, 2015

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## **Outline**

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- Holtec International Overview
- Holtec's Canister Based Spent Fuel Storage Systems
- Holtec's Humboldt Bay Underground Spent Fuel Storage Systems
- HI-STORM UMAX Overview
- HI-STORM UMAX at Callaway NPP

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## Holtec International Overview



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- Established in 1986
- Over 750 employees
- Eight operations centers in the US and overseas, including manufacturing facilities in Pittsburgh, PA and Orrville, Ohio
- Business Mix:
  - 72% Nuclear
  - 15% Coal, 10% Gas & Renewables, 3% Other
- Vertically Integrated
  - Design, Licensing, Engineering, Procurement, Manufacturing, Construction, Installation, Loading




**Corporate Technology Center located in Marlton, New Jersey U.S.A**

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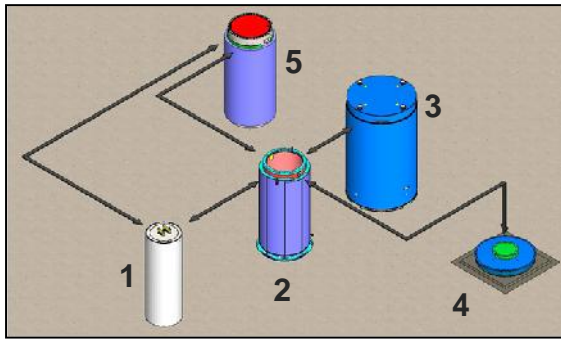
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## Canister Based Storage and Transport Systems



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#	Component
1	MPC Multi-Purpose Canister
2	HI-TRAC Transfer Cask (Onsite Transfer)
3	HI-STORM Storage Overpack (Aboveground Interim Storage)
4	HI-STORM UMAX Storage Cask (Underground Storage)
5	HI-STAR Transport Cask (Offsite Transport)

- Over 700 Storage Systems loaded to date
- About 100 being loaded per year
- Approximately half of Holtec's dry storage systems are loaded by Holtec's Site Services Division


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## Underground Storage Systems Humboldt Bay

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- Underground ISFSI at Humboldt Bay (California)
- Dual-purpose HI-STAR casks (Storage / Transport) with MPCs
- 6 casks (5 Fuel, 1 GTCC)
- 390 BWR assemblies, intact and damaged
- Site-Specific License
- Loaded 2008



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## Underground Storage Systems Principal Advantages

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- Safety
  - Highly Resistant to Seismic Loads
  - Highly Resistant against Aircraft and Missile Impacts
- Dose
  - Minimal contribution to the site boundary dose
  - Minimized dose to personnel in the vicinity of the ISFSI



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## Underground Storage Systems Principal Advantages

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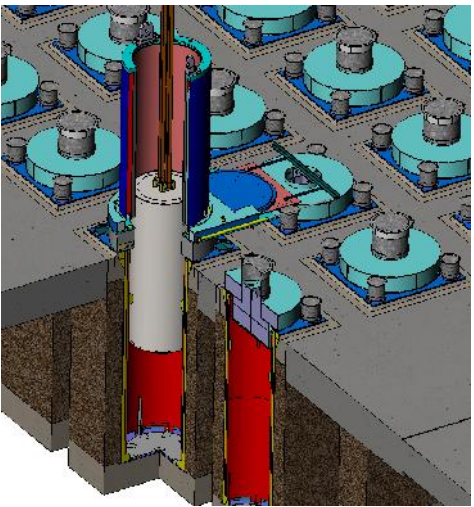
- Security
  - Low profile minimizes the target area
  - Low profile facilitates visual observation and precludes “hiding places”
- Aesthetics
  - Configured to be visually inconspicuous

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## Underground Storage Systems Principal Advantages


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- Operations and Accessibility
  - Easy to load
  - Dimensionally compact
- Loading is essentially the same as that for Holtec’s above-ground dry storage systems



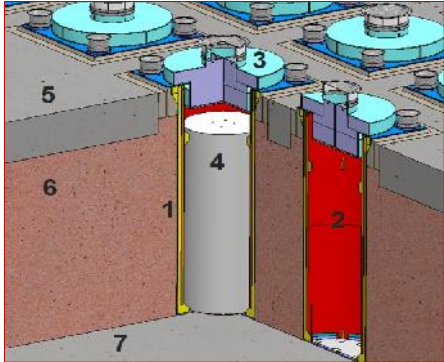
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## HI-STORM UMAX Design Features



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#	Component
1	Cavity Enclosure Container (CEC)
2	Divider Shell
3	Closure Lid
4	MPC-37 Multi-Purpose Canister
5	ISFSI Pad
6	Controlled Low-Strength Material (CLSM)
7	Support Foundation Pad (SFP)

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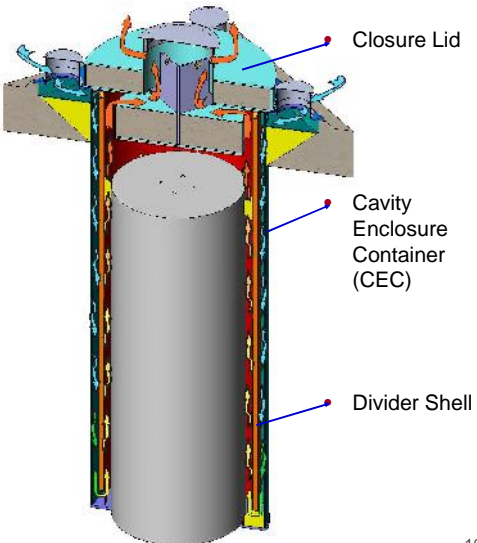
## HI-STORM UMAX Design Features



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- Air entrance and exit locations are at the top; no internal penetrations.
- Divider Shell separates air flow
- The closure lid is a massive steel/concrete structure locked in place to prevent movement during a seismic event.



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# HI-STORM UMAX Design Features



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- Basket in the MPC is made entirely of METAMIC-HT
- Capacity
  - 37 PWR assemblies
  - 89 BWR Assemblies



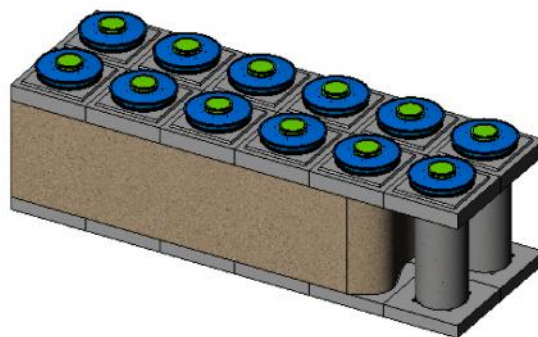
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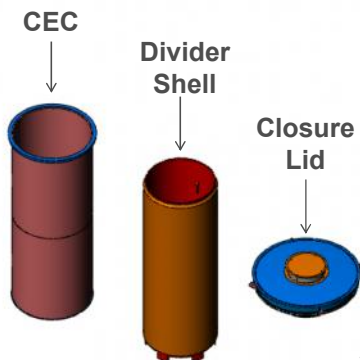
# HI-STORM UMAX Design Features



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Constituent Components of the Underground Storage System



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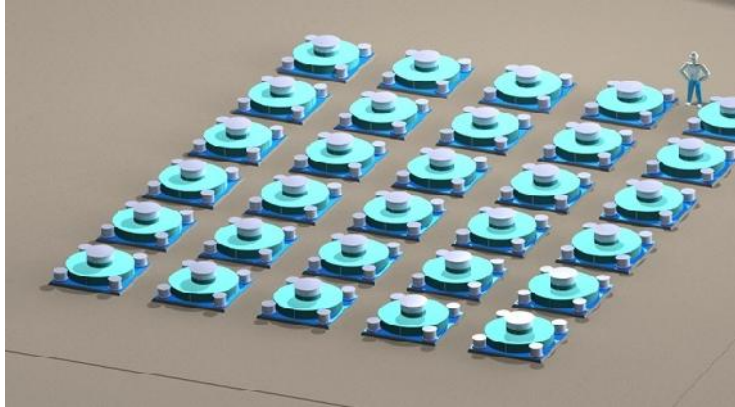
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# HI-STORM UMAX Design Features



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- A typical ISFSI can have any number of Vertical Modules.



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# HI-STORM UMAX Manufacturing



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- HI-STORM UMAX Components are fabricated at the Holtec Manufacturing Division (HMD) located in Pittsburgh, PA



HI-STORM UMAX CECs at HMD

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# HI-STORM UMAX Manufacturing



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Fabricated CECs at HMD

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# HI-STORM UMAX Construction at Callaway NPP



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HI-STORM UMAX Support Foundation Pad

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# HI-STORM UMAX Construction at Callaway NPP



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48 CECs placed on Support Foundation Pad

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# HI-STORM UMAX Construction at Callaway NPP



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CECs surrounded by Flowable Fill

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# HI-STORM UMAX Construction at Callaway NPP

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Preparation to pour ISFSI Pad

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# HI-STORM UMAX Construction at Callaway NPP

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Final Configuration with ISFSI Pad

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## Underground Storage Systems Summary



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- Underground Storage Systems provide significant advantages from a seismic, dose, security and operational perspective
- First underground system for 6 Canisters deployed at Humboldt Bay in 2008
- Large HI-STORM UMAX Underground ISFSI for 48 Canisters currently under construction at Callaway
- SONGS has selected the HI-STORM UMAX to defuel the spent fuel pools

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