



**Community Engagement Panel
ISFSI Location and Technology Option Update
July 17, 2014**

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- **Independent Spent Fuel Storage Installation (ISFSI) Location Evaluation**
- **Technologies Evaluated**
- **Technology Comparison**

Independent Spent Fuel Storage Installation Location

ISFSI Location Evaluation

Variety of Locations Considered and Evaluated
Fuel assemblies will remain at the location until collected by the DOE

Three Categories Of Locations

- 1. Within San Onofre (1-5)** Varying requirements for site investigation and most have substantial civil preparations
- 2. Surrounding area of Camp Pendleton (6-7)** Require a new “lease,” siting, civil preparations, relief to transport spent fuel on roads and security system
- 3. Offsite Areas (8-12)** Not currently licensed, or approved, for spent fuel shipments or additional spent fuel shipments

Criteria

- 1. Siting requirements**
- 2. State permits, geological analysis**
- 3. Ability to transport spent fuel to these locations**
- 4. NRC regulatory license requirements**
- 5. Length of time the spent fuel would be in wet storage before it could be transferred to dry storage at the ISFSI pad**

Independent Spent Fuel Storage Installation Location

	Location	Require Siting	State Permits	New Geology Analysis	License Action (10CFR Part 50)	Time to Offload (Years*)	Comment
1	Enlarge the existing site	No	Amendment	Minor	No	5 – 6 Years	+ Least risk, + Quickest offload + Most cost effective - Close to decomm activities
2	MUD Area (south bluff)	No	Yes	Yes	Minor	5 – 12 Years	+ Perceived tsunami benefit - More visible from roads + Out of the way of decomm - Bluff stability
3	Reservoir Parking Area	No	Yes	Yes	Minor	10 – 12 Years	- Extensive site prep + Perceived tsunami benefit - Extensive haul road
4	K-Building areas just south of Unit 3	No	Yes	Yes	Minor	10 – 12 Years	- No elevation benefit - Adversely Impacts area for decommissioning
5	South Yard	Yes	Yes	Yes	Minor	12 - 15 Years	- / + Similar to MUD - More extensive preps

Independent Spent Fuel Storage Installation “Location”

	Location	Require Siting	State Permit	New Geology Analysis	License Action (10CFR Part 72)	Time to Offload (Years*)	Comment
6	MESA	Yes	Yes	Yes	Yes – SCE New	24-33 Years	Requires NAVY / NRC / Public / License
7	Camp Pendleton	Yes	Yes	Yes	Yes – SCE New	24-33 Years	Same
8	DOE Repository	Yes	Yes	Yes	Unknown	40+ Years	No current US solution to Yucca
9	GE Morris	Yes	Yes	Yes	Unknown	40+ Years	Currently closed to future shipments
10	Private Fuel Storage	Yes	Yes	Yes	Unknown	40+ Years	No current US solution
11	DOD / DOE Such as INEL	Yes	Yes	Yes	Unknown	40+ Years	Currently closed to commercial
12	CA Local Storage	Yes	Yes	Yes	Unknown	40+ Years	No current CA solution

Proposed Locations

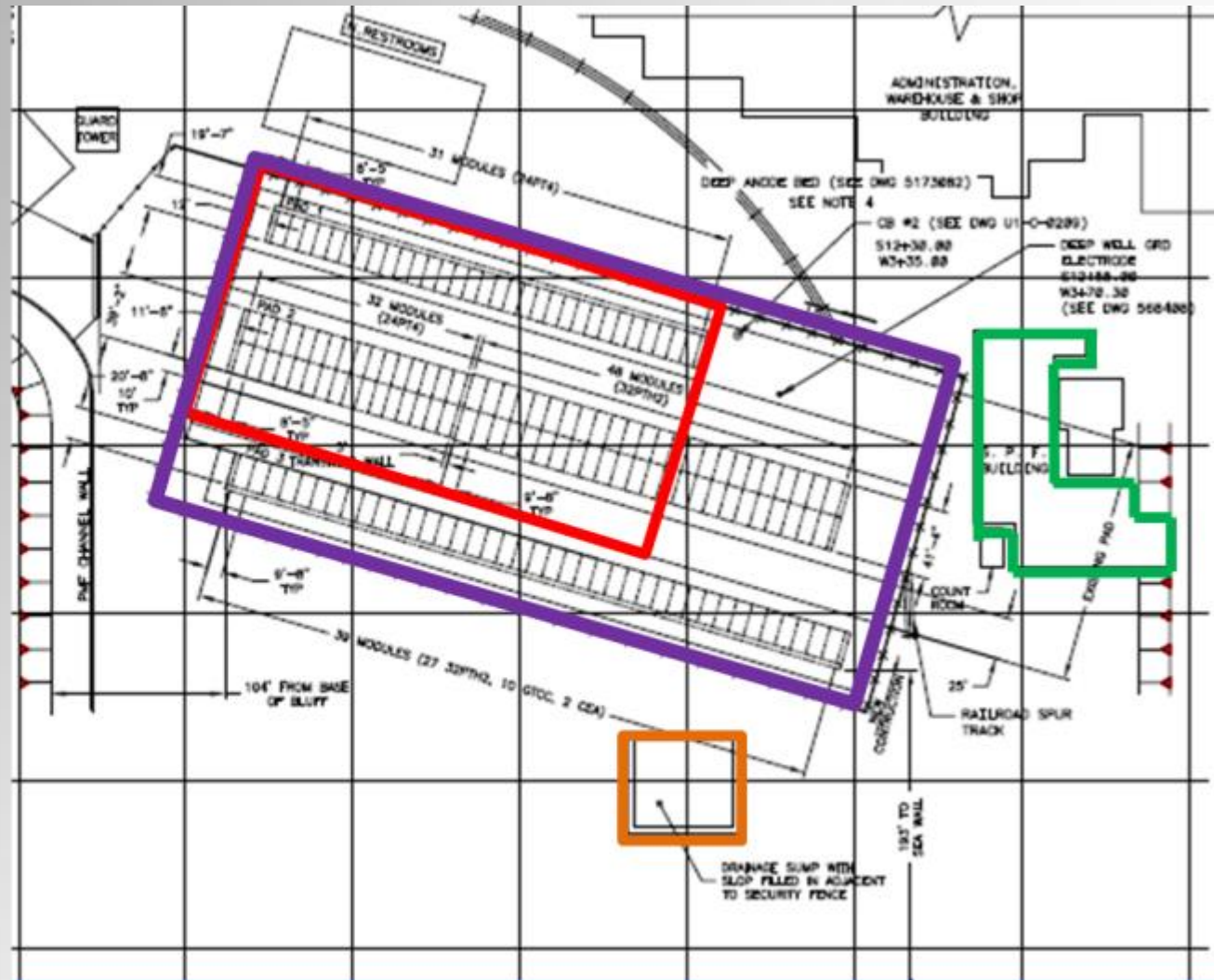


Site 1

AREVA NUHOMS®

One Phase:
Expand existing
ISFSI structure to
accommodate
new storage
modules

Existing ISFSI PAD
Expanded ISFSI PAD
Drainage Sump
Security Building
Sea Wall



SITE 1

HOLTEC HI-STORM UMAX®

Three Phases:

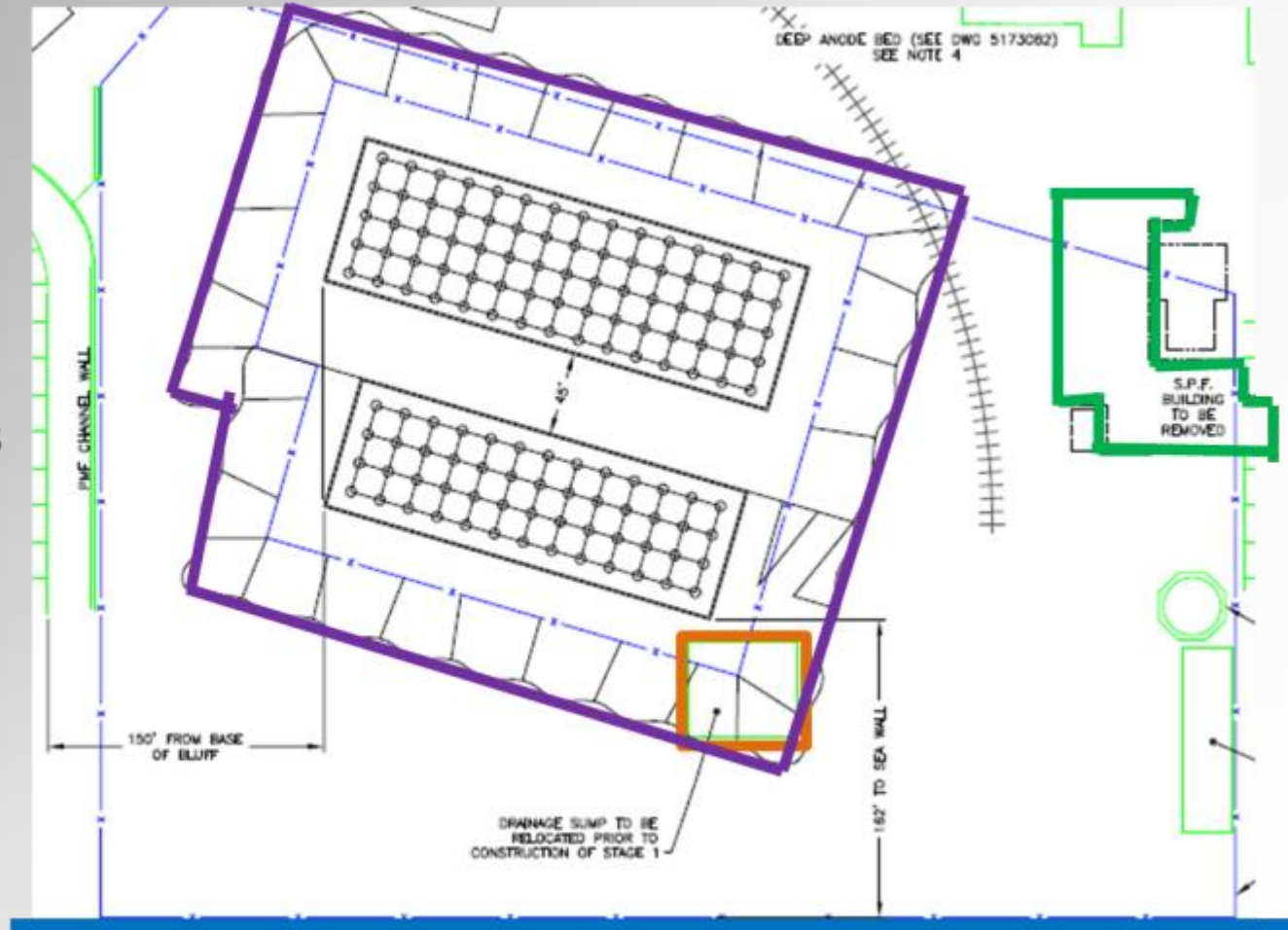
1. Construct, sloped base and new pad to add 51 UMAX vaults
2. Dismantle Existing Pad and store horizontal canisters vertically
3. Expand UMAX pad over existing ISFSI area

Expanded ISFSI PAD

Drainage Sump

Security Building

Sea Wall



Technologies Evaluated

Evaluated Technologies

AREVA NUHOMS®

Horizontal, steel-reinforced, concrete, above-ground structure



HOLTEC HI-STORM UMAX®

Vertical, ventilated, underground on-site storage



Evaluated Technologies



HOLTEC HI-STORM
UMAX®
ISFSI AT HUMBOLT
BAY

Evaluated Technologies

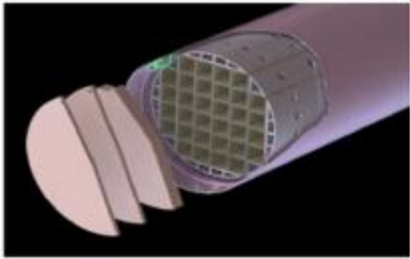
AREVA NUHOMS®
ISFSI
AT SONGS



Proposed Options

AREVA NUHOMS®

1



Dry Shielded Canister (DSC)

The primary criticality control and storage container for the used fuel assemblies

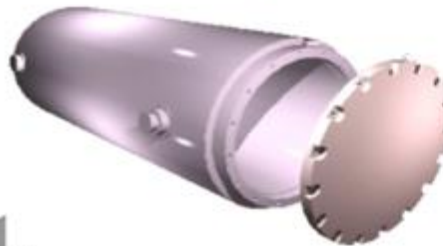
2



Horizontal Storage Module (HSM)

AHSM / AHSM-HS (Advanced/ Advanced High Seismic)
Provides the structural support, heat removal, shielding and environmental protection to the DSC

3



Transfer Cask (TC)

Assures safe loading and transfer of the DSC from the Spent Fuel Pool to the HSM

4

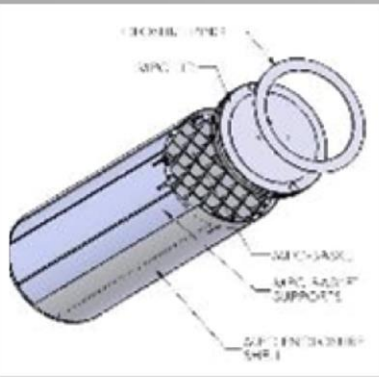


Transport Cask MP197HB

Licensed for high burnup fuel, the Transport Cask consists of a containment boundary, structural shell, gamma shielding material, and solid neutron shield

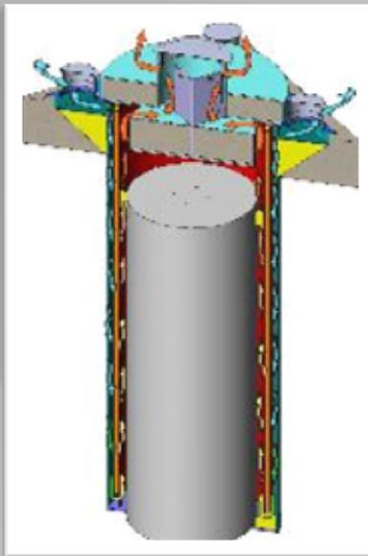
Proposed Options

HOLTEC HI-STORM UMAX[®]



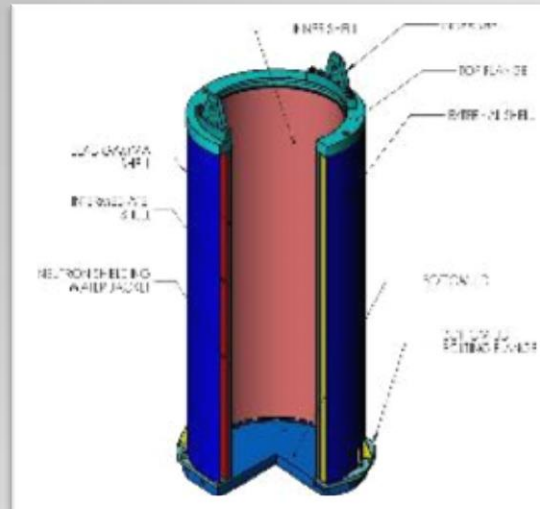
Multi-Purpose Canister (MPC-37)

The primary criticality control and storage container for used fuel assemblies. Licensed to store 37 used PWR fuel assemblies.



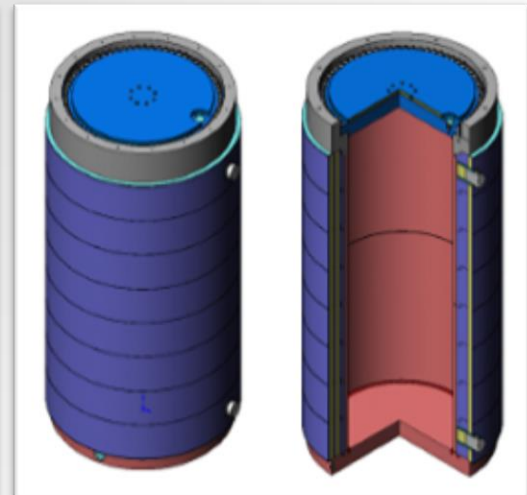
HI-STORM UMAX

Underground storage module provides structural, thermal, shielding and environmental protection to the MPC.



HI-TRAC VW On-Site Transfer Cask

Assures safe movement of the MPC during on-site loading and transfer operations from the spent fuel pool to the HI-STORM UMAX vault.



HI-STAR 190 Off-Site Transportation Cask

Undergoing licensing to transport the MPC off-site.

Technology Comparison

Technology Comparison Criteria

Developed from SONGS Decommissioning Principles

Safety

Stewardship

Engagement

- Licensing for Storage and Transport
- Transfer of Existing Fuel in ISFSI
- Permitting Issues
- Performance in a Seismic Conditions
- Performance in a Tsunami or Flooding Conditions
- Tornado or External Hazard Event
- Radiation Shielding Performance
- Permitting Issues
- Fuel Cooling Times
- Visual

Dry Cask Storage System Technology Comparison

Topic	AREVA NUHOMS®	HOLTEC UMAX®
Licensing for Storage and Transport	<p>Casks 24 PT1 and 24PT4 already licensed for storage and transport of unit 1, 2, and 3 fuel</p> <p>Cask 32PTH2 licensed at other sites, SONGS-specific Dry Storage Canisters (DSC) storage license expected mid-September 2014</p> <p>MP197HB High Burnup Transport Casks are licensed for transport of HBF assemblies stored in canister based systems</p>	<p>Storage and Transport of UMAX is licensed, incorporation of SONGS seismic has been submitted to NRC and approval expected soon</p> <p>Technical basis for similar approved transportation methods exists, transportation for proposed UMAX HISTAR 190 payload not yet under application but will be submitted September 2014</p> <p>Application under review for HBF Transport Casks</p>
Transfer of Existing Fuel	Keeps existing horizontal DSC stored in place	Transfers existing AREVA horizontal DSC to vertical UMAX storage may require UMAX license update

Dry Cask Storage System Technology Comparison

Topic	AREVA NUHOMS®	HOLTEC UMAX®
Permitting	<p>Site currently holds California Coastal Commission (CCC) permit for existing pad with AREVA technology</p> <p>Full expansion will require amendment to current permit</p>	<p>Will require new or amended CCC permit</p>
Seismic	<p>Designed to withstand extreme earthquake conditions (1.0g vertical acceleration, 1.5g horizontal acceleration)</p> <p>NRC approved methodology</p>	<p>Designed to withstand extreme earthquake conditions (1.0g vertical acceleration, 1.5g horizontal acceleration)</p> <p>Design meets acceleration requirements for SONGS and license update has been submitted and is reasonable to expect approval</p>

Dry Cask Storage System Technology Comparison

Topic	AREVA NUHOMS®	HOLTEC UMAX®
Tsunami and Flooding	<p>Designed to withstand beyond design basis tsunami impact</p> <p>Above ground system self drains and is more accessible for debris removal of blocked cooling paths</p>	<p>Designed to withstand beyond design basis tsunami impact</p> <p>Removal of water, mud and debris from the underground air flow path surrounding the canisters is accessible below ground system</p>
Tornado and External Hazards	<p>Above ground system analyzed for predefined site missile (airborne debris) requirements, but presents a larger profile for airborne debris</p> <p>Designed to withstand NRC requirements for tornado accelerated objects</p>	<p>Underground system analyzed for predefined site missile (airborne debris) requirements, but presents a smaller profile for airborne debris</p> <p>Designed to withstand NRC requirements for tornado accelerated objects</p>

Dry Cask Storage System Technology Comparison

Topic	AREVA NUHOMS®	HOLTEC UMAX®
Radiation Shielding	Designed for low radiation dose performance	Designed for low radiation dose performance
Aircraft Impact	Designed to not release any radioactive material under any external hazard, including aircraft impact	Designed to not release radioactive material under any external hazard, including aircraft impact (low profile)
Cooling Times	Minimum cooling time before fuel transferred to dry storage is five years	Minimum cooling time before fuel transferred to dry storage is three years
Visual	Higher sight line from beach	Lower sight line from beach