

# OVERVIEW OF THE DESIGN FEATURES OF HI-STORM UMAX STORAGE SYSTEM

USNRC Docket #72-1040

a generation ahead by design

A Pre-Submittal Briefing to the SFST

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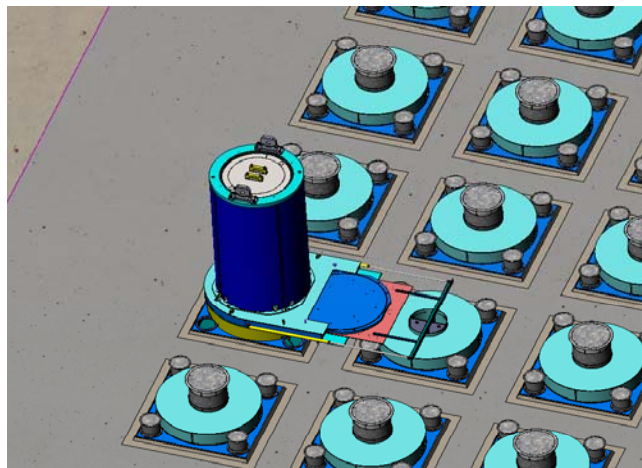
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## SYSTEM OVERVIEW

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- HI-STORM UMAX IS A VERTICAL VENTILATED MPC STORAGE MODULE.
- HI-STORM UMAX IS A LARGER VERSION OF (100 INCH CAVITY ID) HI-STORM 100U (84 INCH CAVITY ID) CERTIFIED IN DOCKET #72-1014.



HI-STORM UMAX ISFSI WITH  
TRANSFER CASK ARRAYED ON ONE  
STORAGE CAVITY

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## SYSTEM OVERVIEW

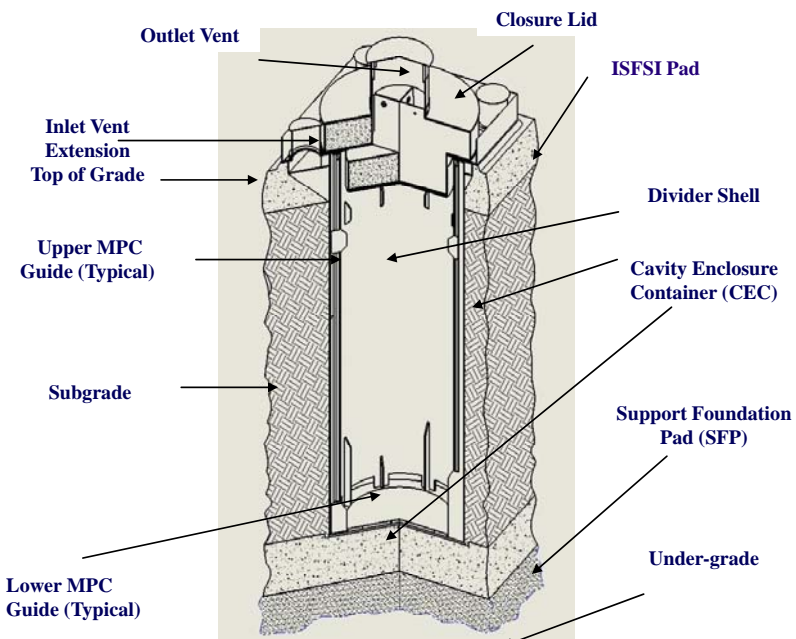
- HI-STORM UMAX IS PHYSICALLY SIZED TO STORE ALL OF THE USED NUCLEAR FUEL PRODUCED IN THE UNITED STATES AND ALL CANISTERS PRESENTLY LICENSED IN DRY STORAGE IN THE COUNTRY.
- IN ITS PHYSICAL EMBODIMENT, HI-STORM UMAX IS SIMILAR TO HI-STORM 100U, EXCEPT THAT THE AIR INLET AND OUTLET DUCTS HAVE BEEN MODIFIED TO MAKE THEM INSENSITIVE TO THE DIRECTION OF WIND.
- LIKE HI-STORM 100U, HI-STORM UMAX IS “SECURITY-FRIENDLY”, PROVIDING A CLEAR VIEW OF THE ENTIRE ISFSI FROM ANY LOCATION.

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## SYSTEM OVERVIEW

- DIVIDER SHELL THAT SEPARATES THE ANNULUS REGION (AIR DOWNCOMER SPACE) FROM THE CYLINDRICAL REGION THAT ENCLOSES THE MPC (UP FLOW REGION).
- THE MPC STANDS UPRIGHT AND IS LATERALLY RESTRAINED AT ITS BASEPLATE AND TOP LID ELEVATIONS AGAINST LATERAL LOADS, SUCH AS THOSE FROM EARTHQUAKES.
- THE CAVITY ENCLOSURE CANISTER (CEC) IS MADE OF A THICK CARBON STEEL SHELL WELDED TO A THICK BASEPLATE AT ITS BOTTOM AND A LARGE PLATE FLANGE AT THE TOP.
- THE CLOSURE LID IS A MASSIVE STEEL WELDMENT FILLED WITH CONCRETE.



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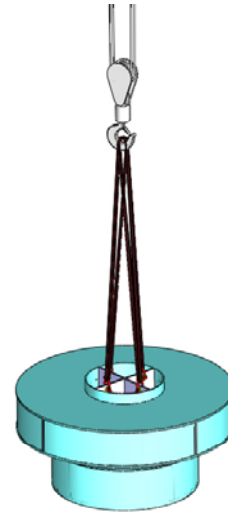
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## **SIMILARITIES BETWEEN HI-STORM UMAX AND HI-STORM 100U**



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- **THE CLOSURE LID CONTAINS THE AIR OUTLET.**
- **THE CLOSURE LID FEATURES A DEEP SKIRT THAT HELPS ALIGN IT IN THE CEC CAVITY AND ASSURES EFFICIENT RADIATION BLOCKAGE.**



**HI-STORM UMAX VVM LID WITH  
RIGGING FOR HANDLING**

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## **SIMILARITIES BETWEEN HI-STORM UMAX AND HI-STORM 100U (cont'd)**



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- **THE CLOSURE LID IS GEOMETRICALLY SIZED SUCH THAT IT CANNOT FALL INTO THE STORAGE CAVITY DUE TO A HANDLING MISHAP IN ANY ORIENTATION.**
- **THE DIVIDER SHELL IS READILY REMOVABLE TO FACILITATE DECOMMISSIONING.**
- **THE OUTSIDE SURFACES OF THE CEC ARE FORTIFIED AGAINST CORROSION BY A CEMENTITIOUS FILL.**
- **THERE IS NO DIRECT LINE OF SIGHT TO THE MPC FROM THE OUTSIDE.**

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## **SIMILARITIES BETWEEN HI-STORM UMAX AND HI-STORM 100U (cont'd)**



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- **THE VVM, INCLUDING THE CLOSURE LID, IS STRUCTURALLY QUALIFIED TO WITHSTAND ALL DESIGN BASIS MISSILES (DBMs) PREVIOUSLY USED IN THE CERTIFICATION OF ALL HOLTEC STORAGE SYSTEMS.**
- **THE STORAGE CAVITY IS MADE DEEPER TO DRIVE DOWN THE RADIATION DOSE FROM THE STORED MPC EVEN FURTHER.**

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## **ENHANCEMENTS IN HI-STORM UMAX OVER HI-STORM 100U**



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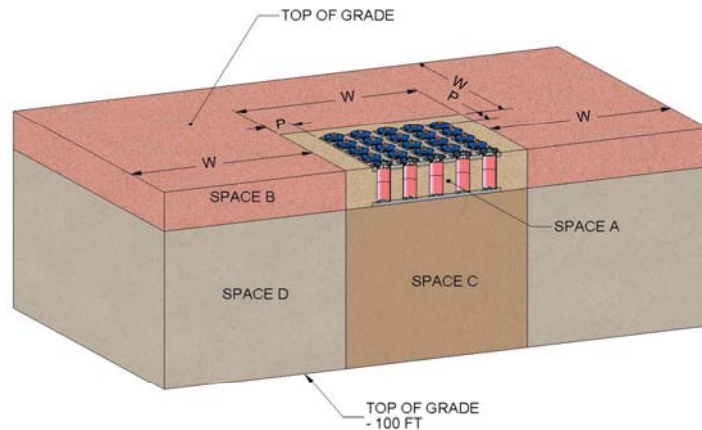
- **THE DESIGN REQUIRES THE OWNER TO INSTALL A RETAINING WALL TO ISOLATE THE OPERATING ISFSI FROM FUTURE EXCAVATION IN ANY OR ALL FOUR DIRECTIONS. A RETAINING WALL MUST EXIST TO SEPARATE THE ISFSI FROM A FUTURE PROXIMATE EXCAVATION PLANNED ADJACENT TO IT.**
- **THE RETAINING WALL IS SIZED TO WITHSTAND A DBM IN THE SCENARIO THAT THE ADJACENT SUBGRADE HAS BEEN EXCAVATED AND THE RETAINING WALL IS EXPOSED.**
- **THE HI-STORM CLOSURE LID IS SUBSTANTIALLY THICKER THAN THE HI-STORM 100U LID.**

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## ENHANCEMENTS IN HI-STORM UMAX OVER HI-STORM 100U (cont'd)

- THE SHEAR MODULUS OF THE SUBGRADE IN SPACE A IS SUBSTANTIALLY INCREASED TO PROVIDE A STIFFER RIDING SURFACE FOR THE CASK TRANSPORTER AND TO REDUCE THE LATERAL BEARING LOAD ON THE RETAINING WALL.
- THE THICKNESSES OF THE (REINFORCED CONCRETE) ISFSI STRUCTURES HAVE BEEN INCREASED TO IMPUTE GREATER STRUCTURAL MARGINS IN THE STORAGE SYSTEM.



ISFSI Subgrade Nomenclature

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## ENHANCEMENTS IN HI-STORM UMAX OVER HI-STORM 100U (Cont'd)

- THE BOTTOM EDGE OF THE RETAINING WALL HAS A MONOLITHIC CONSTRUCTION TO SIMULATE A BUILT-IN JOINT FOR ADDED STRENGTH AND FOR THE ESTABLISHMENT OF A WATER SEEPAGE BARRIER, IF DESIRED (FOR WATER-LOGGED SITES).
- THE AMOUNT OF SUBSTRATE SHIELDING AROUND EACH CAVITY ENCLOSURE CANISTER (CEC) HAS BEEN INCREASED FOR ENHANCED SHIELDING.

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## SCOPE OF THIS DOCKET

- APPROVAL OF NO MPCs OR TRANSFER CASKs IS SOUGHT IN THIS DOCKET.
- ONLY THOSE MPCs THAT ARE PRESENTLY APPROVED IN A HOLTEC DOCKET ARE ELIGIBLE FOR STORAGE IN THE HI-STORM UMAX.
- ONLY THOSE MPCs THAT SATISFY THE TECHNICAL SPECIFICATION IN ITS HOST DOCKET ARE PERMITTED TO BE STORED IN THE HI-STORM UMAX.

Multi-Purpose Canister Models Allowed for Storage in HI-STORM UMAX		
USNRC Docket #	MPC Model I.D.	
72-1014	MPC-32/32F	MPC-24
	MPC-24E/24EF	MPC-68/68FF
	MPC-68F	MPC-68M
72-1032	MPC-37	MPC-89

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## EXPEDITING CERTIFICATION BY DESIGN

- HI-STORM UMAX HAS GREATER STRUCTURAL MARGIN UNDER ALL APPLICABLE LOADINGS THAN THE CURRENTLY CERTIFIED HI-STORM 100U.
- THE MAXIMUM PEAK CLADDING TEMPERATURE IN THIS SUBMITTAL IS LESS THAN THE VALUES LICENSED IN PREVIOUS HOLTEC HI-STORM DOCKETS.

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## **EXPEDITING CERTIFICATION BY DESIGN**



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- **THE REFERENCE DOSE RATES IN HI-STORM UMAX ARE LOWER THAN THAT IN THE PRESENTLY CERTIFIED HI-STORM 100FW.**
- **ONLY PREVIOUSLY APPROVED MATERIALS ARE USED.**
- **THE OPERATIONAL STEPS, RADIATION PROTECTION PROGRAM, IN-SERVICE SURVEILLANCE PROGRAM, ETC., MIMIC THE HI-STORM 100U.**

***IN OTHER WORDS, MAKE THE POSITIVE SAFETY EVALUATION OF  
HI-STORM UMAX SELF-EVIDENT!***

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