Industry's First Large Rectangular Cask for Reactor-Related Waste Passes Successive 30 Foot "Free Drop" Tests Without Any Breach of Its Containment Boundary

To earn the USNRC (or IAEA's) certification, a transport cask must pass a series of "free drop" tests, in which a scaled replica of the loaded cask is required to be shown to maintain its radiation blockage capability substantially unimpaired, if dropped from a 30 foot elevation onto "an essentially unyielding surface." Under the USNRC and international regulations, the cask's orientation at impact with the target is required to be selected so as to induce maximum damage to the cask. For the HI-STAR ATB-1T cask (or HI-STAR 330), introduced to our readers in issue HH 30.16, the "free drop" tests were a particularly daunting challenge because, in contrast to a fuel-bearing transport cask which is cylindrical, HI-STAR ATB-1T has a large rectangular footprint (12 feet x 5.9 feet) with several corners, facets and edges that render it vulnerable to a crushing impact loading. Further, whereas cylindrical fuel transport casks are always outfitted with impact limiters, the HI-STAR ATB-1T cask (weighing 120 tons with its payload) has no impact limiter to cushion its impact upon its collision with the target. To minimize crew dose during loading and unloading evolutions, the HI-STAR ATB-1T cask is also equipped with an innovative quick connect/disconnect controlled cask locking system (CLS) in lieu of a conventional bolted lid.

A quarter scale model of the cask, fabricated by the Holtec Manufacturing Division and instrumented by the Sandia National Laboratory in Albuquerque, New Mexico was subjected to three successive punishing drops in three discrete orientations in accordance with the test plan reviewed by the USNRC and the Client. To the delight of the assembled engineers, the cask, although challenged by the three successive direct collisions that included a top down oblique drop, a center of gravity over corner (CG over corner) drop, and a puncture drop test, met the structural sufficiency criterion and sustained no damage to its containment boundary or dislodging of its closure lid.

Please see the video of the drop tests here and photos below.

According to Holtec's design team, the cask exhibited the physical deformation contours in line with those predicted by the computer simulations for these drop tests. The computer processing of the collected data in the coming weeks is expected to confirm the successful structural performance of the cask under the above qualifying accidental drop scenarios. The computer simulations will also provide a valuable benchmark for the computer code, validated under Holtec's QA program, which has been and is being routinely used to simulate impact phenomena in a variety of nuclear plant systems, structures, and components.

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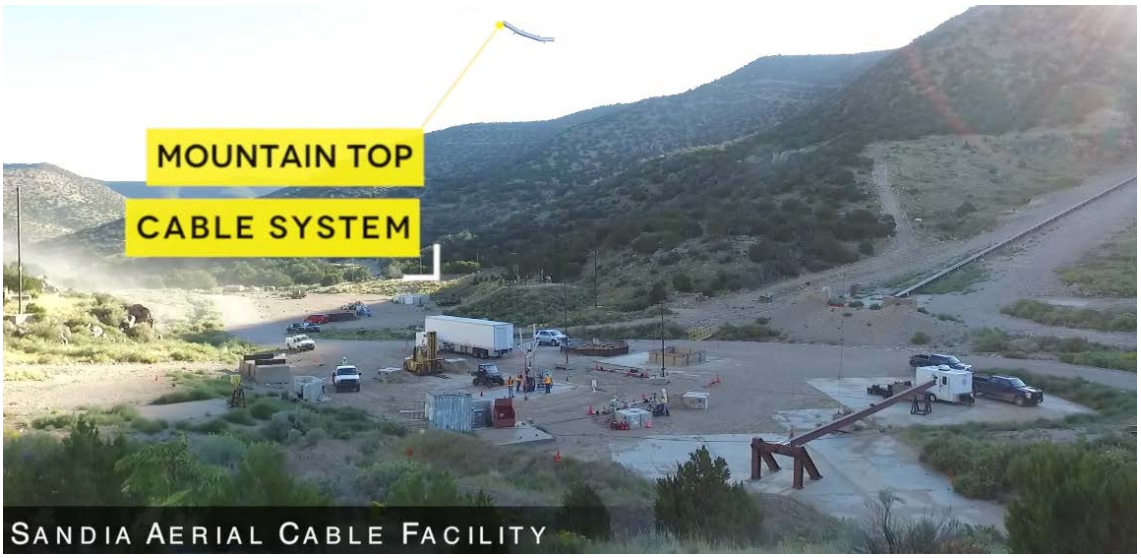
HI-STAR ATB-1T (HI-STAR 330) is likely to become a reliable workhorse for nuclear plants, especially those undergoing decommissioning, to haul away their highly activated metal waste efficiently and with minimum crew dose.



Aerial Cable Drop Test Facility at Sandia National Laboratories, Albuquerque, New Mexico

Crew Setting up the CG Over Corner Drop Test

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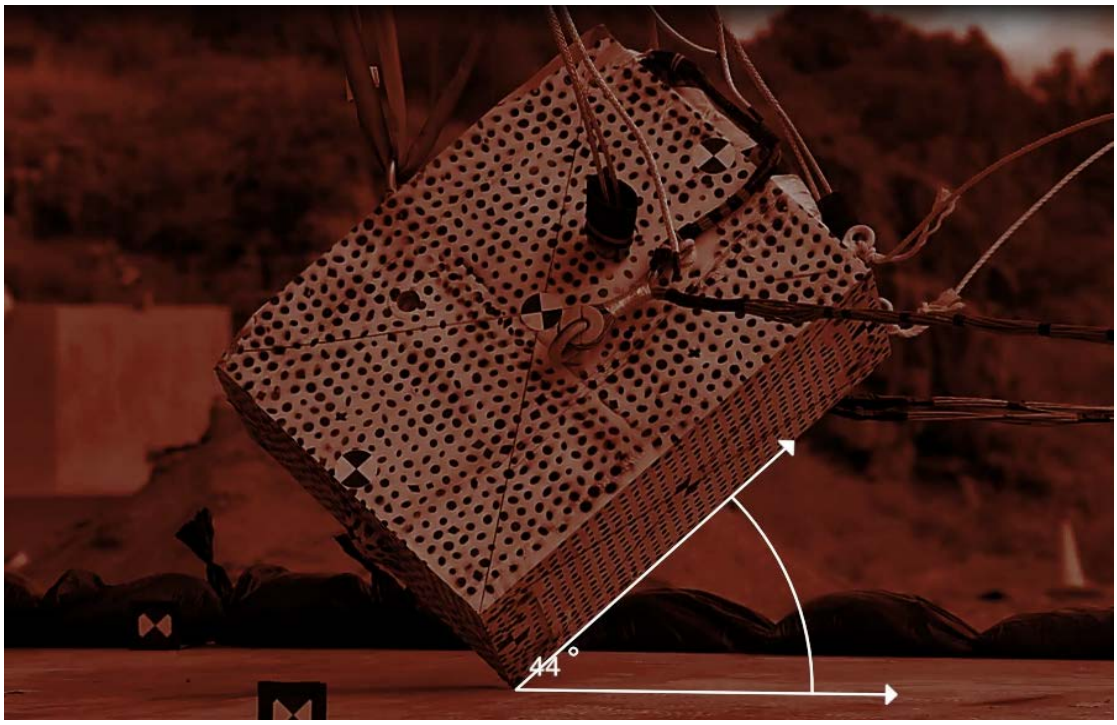
Set up for the Top Down Oblique Drop Test



Cask Approaching the Target in the CG Over Corner Drop Test

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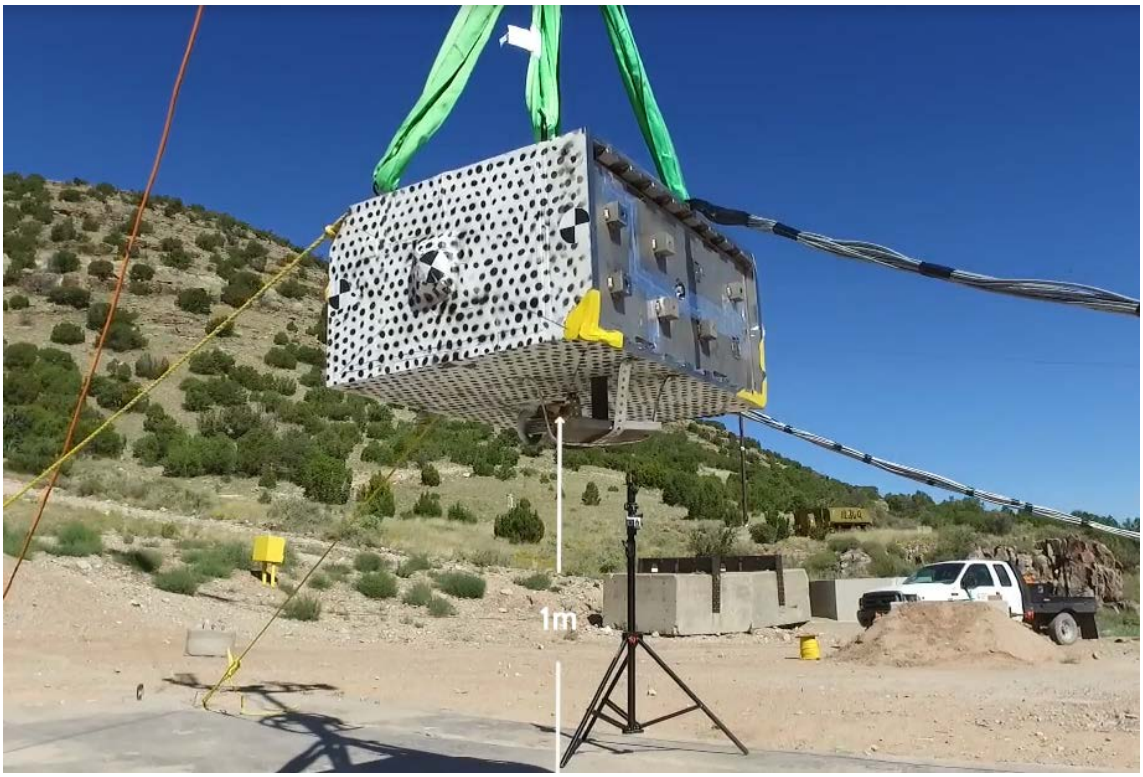

Test Set-up for the Puncture Drop

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