



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

February 9, 2016

MEMORANDUM TO: Bo Pham, Acting Deputy Director  
Division of Spent Fuel Management, NMSS

FROM: Pierre Saverot, Project Manager */RA/*  
Spent Fuel Licensing Branch  
Division of Spent Fuel Management, NMSS

SUBJECT: SUMMARY OF JANUARY 19, 2016, MEETING WITH HOLTEC  
INTERNATIONAL

Background

Holtec International (Holtec) submitted an application for the Model No. HI-STAR ATB 1T package, designed for the transport of up to 12 tons of Greater Than Class C (GTCC) waste, such as core grids, core shrouds, shroud heads, top guides, etc. The staff performed an acceptance review and issued a request for supplemental information letter dated November 10, 2015. On November 24, 2015, staff shared its concerns regarding the LS-DYNA benchmarking used for the modeling of the package, commented on the need for a “quality” model, and suggested the testing of some components as an effective “path forward.”

The meeting was noticed on December 16, 2016 (ML15350A398). The meeting attendance list and the presentation are provided as Enclosure Nos. 1 and 2, respectively.

Discussion

The Model No. HI-STAR ATB 1T package is a rectangular package, 3.7 m long, 1.8 m wide, and 2.9 m high, with a gross weight of 116 metric tons and no impact limiters. After the November 24, 2015, meeting with staff, Holtec decided to perform: (i) two drop tests, i.e., center of gravity (CG) over corner and a slap down with the top (lid) down, of a ¼ scale model cask in order to validate a numerical model, and (ii) sensitivity studies, as needed, to use the benchmarked numerical model for demonstration of compliance with 10 CFR Part 71.

Regarding the containment boundary made of stainless steel and nickel alloy, staff asked how the containment boundary will be analyzed since only stainless steel 304 and 316 can be used for strain-based acceptance criteria. Holtec responded that strain-based acceptance will not be applied for the wedge lock and that it will look at a combination of stresses and deformation.

Regarding physical testing, staff said that the cases considered by Holtec may not capture all potential failure modes for the package and that a puncture test might have to be added to the test sequence, unless a proper argument is made to show that it is not important. Staff noted the absence of trunnions in the ¼ scale model and said that the localized discontinuity at the location just outside the boundary of the trunnion may be a “weak” spot with regards to the penetration test. Holtec responded that the trunnion is off-centered and that the package will

rotate after a hit. Staff countered that rotation of the package depends on the center of gravity of the contents since it is not fixed relative to the package. Staff believes that both cases are of interest. Staff also said that the component with the lowest safety factor is the lid when the package is dropped in a horizontal configuration with the lid top side up. Staff is concerned that a gap may appear between the lid and the wedge lock mechanism. Holtec responded that the slap down scenario should be the most aggressive in this case since the contents will be bearing down on the lid. Holtec clarified that the contents of the package are to be partially fixed in the drop test. Specifically, the secondary packaging containers (BFA) tanks are free to move inside the package, but the contents of the BFA tanks themselves are fixed. Holtec has not yet decided which package orientation will be dropped first. Regardless of the drop sequence, staff indicated that damage from one orientation should be carried into the next drop orientation in LS-DYNA, so that model results could be compared to the performance of the actual prototype from one drop configuration to the next.

Staff stated that it is up to the applicant to: (i) identify the critical regions of the package design that give a minimal margin of safety, (ii) demonstrate, for example, that a bottom-corner drop is not worse than a top-corner drop, and that whatever mass is tested is the mass that will be used as an input to the LS-DYNA model.

Additional topics discussed include the following: (1) the leak test to be performed on the seal region plus the entire containment boundary, (2) the justification that American Society of Mechanical Engineers (ASME) minimums are conservative compared to as-built certified material test reports (CMTR) and need to be used with full scale benchmarking, (3) the use of CMTR data to develop stress-strain curves and the need to include such calculations in the application, (4) the location of the instrumentation used for actual package testing, (5) weld performance based on the welding process to be used, e.g., gas-tungsten arc welding vs submerged metal arc welding since inclusions due to flux may introduce unpredictability in the welds with respect to fracture, heat affected zones in base and weld metal as a result of manufacture, as described in ASME Boiler and Pressure Vessel Code Section III appendices EE and FF, coupon testing on welds critical to the containment boundary, the consideration of manufacturing strains greater than 5% as a result of fabrication per ASME Boiler and Pressure Vessel Code Section III appendix FF, (6) the evaluation of the package vibratory response by way of a modal survey to show that the vibratory characteristics of the prototype are representative of what has been modeled in LS-DYNA.

Staff will be present during the 1/4 scale testing of the Model No. HI-STAR ATB 1T package scheduled to take place in May 2016, at either Sandia or Oak Ridge National Laboratory. Staff made no regulatory commitments during the meeting.

Docket No. 71-9375

TAC No. L25077

Enclosures:

1. Meeting Attendees
2. Presentation

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Enclosure 1. Meeting Attendees

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Distribution: Attendees, S. Ruffin, M. Lombard

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**ADAMS Package No.: ML16040A181 Memo No.: ML16040A185 Presentation: ML16040A188**

<b>OFC</b>	SFM	E	SFM	C	SFM			
<b>NAME</b>	PSaverot		Dwalker		BWhite via e-mail			
<b>DATE</b>	01/25/2016		02/02/2016		02/09/2016			

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**Meeting Between HOLTEC and the  
Nuclear Regulatory Commission  
January 19, 2016  
Meeting Attendees**

**NRC/NMSS/SFM**

Pierre Saverot  
Antonio Rigato  
Steve Everard  
Christian Araguas  
Jason Piotter  
Young Kim  
David Tang

**HOLTEC**

Stefan Anton  
Royston Ngwayah  
Chuck Bullard  
Venkat Prabhala  
Stephen Horvath  
Nick Pirri

**SKB**

Henrik Algotsson  
Per Sunderlof  
Mats Tyrholm  
Miranda Restorick

**PNNL**

Harold Atkins