

December 8, 2015

MEMORANDUM TO: Michele Sampson, 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 NOVEMBER 24, 2015, MEETING WITH HOLTEC
INTERNATIONAL

Background

Holtec International (Holtec) submitted an application for the Model No. HI-STAR ATB 1T package, a rectangular package designed for the transport of up to 12 tons of 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 (RSI) letter dated November 10, 2015. This meeting was requested by Holtec to discuss staff's concerns regarding the LS-DYNA benchmarking used for the modeling of the package.

The meeting was noticed on November 12, 2015 (ML15316A582). 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. Key structural issues identified by staff in the RSI letter include the following: (i) the size, shape, and weight of the multi canister overpack (MCO) that was drop-tested at INL and used for LS-DYNA benchmarking are vastly different from the Model No. HI-STAR ATB 1T package, (ii) without physical testing of the Model No. ATB 1T package, the model must be one of "quality" and be able to capture bolt behavior, plate vs. shell behavior, and welds that are three dimensional in behavior, and (iii) the Model No. ATB 1T package lid closure mechanism has no physical counterpart in the MCO package.

Holtec has used strain-based acceptance criteria and attempted to qualify the package via numerical analysis using LS-DYNA, while following ASME draft guidance to demonstrate the predictive capabilities of LS-DYNA. No physical testing has been performed for the Model No. ATB 1T package. As a "path forward" to resolve staff's concerns, Holtec proposed to include additional justification for numerical benchmarking and perform additional benchmarking testing of LS-DYNA using a DOE sponsored drop test (SETU) at Sandia National Laboratories. Holtec also said that its aim is to predict an overall global conservative behavior, not a "real world" outcome, for a "reasonable assurance of safety."

Staff made several comments including the following: (i) without full scale testing, Holtec is pre-predicting the outcome of the model, (ii) there was numerical instability in the MCO test and INL had a pre- and post-test because the pre-test simulation model was not consistent with the physical arrangement, (iii) no code can predict the behavior of the model and staff is worried about the phenomena that LS-DYNA cannot capture, (iv) the weld material was not captured in the model and the strains could be higher than the minimums, and (v) the impulse load on the lid has to be “tracked” in addition to a pure strain analysis.

Staff also commented on the need for a “quality” model that has the predictive capability to capture failure events, not just predict what is “expected to happen.” Caution is required when using an ASME draft guidance, not endorsed yet by NRC staff, to make a safety case. Staff believes there are limitations in the Holtec benchmark study and that the LS-DYNA model does not have all the information necessary for a technical review, e.g., the energy dissipation going into specific locations of a rectangular package was not effectively modeled. Staff said that size, mass, and shape are not secondary in this structural evaluation and that a drop analysis does need a robust predictive capability that is not currently seen in the application. Staff cautioned also on the use of the SETU data, which does not really solve the problem of geometry and did not have any coupons to get any material data. Staff stated that the benchmarking, as done in this application, has its limitations and reminded Holtec that the licensing of the Model No. HI-STAR 180 package had been partly possible because of the test data from the Model No. HI-STAR 100 package.

Staff suggested to look at the design features that are important to the safety case and perform a “component study” as an effective “path forward” that could include the testing of some corner geometry, a limited testing of the wedge lock mechanism, the evaluation of a three dimensional weld structure, etc. This could allow Holtec to expand its capabilities to do predictive analysis. Staff also noted some inconsistencies between the licensing drawings and the figures of the application regarding containment boundaries as well as inconsistencies in input files that may have data, e.g., ductility and failure strain, potentially carried over from other unrelated Holtec work.

Management concluded the meeting by stating that one of the goals of an acceptance review is to identify significant issues, such as the one staff has with benchmarking, and stop allocating resources when other sections of the application are also impacted. Holtec will send a letter advising of their proposed licensing approach. Staff made no regulatory commitments during the meeting.

Docket No. 71-9375

TAC No. L25056

Enclosure 1: Meeting Attendees

Enclosure 2: Presentation

**Meeting Between HOLTEC and the
Nuclear Regulatory Commission
November 24, 2015
Meeting Attendees**

NRC/NMSS/SFM

Michele Sampson
Pierre Saverot
Antonio Rigato
Steve Everard
Steve Ruffin
Christian Araguas
Jason Piotter
Young Kim
Alexis Sotomayor

HOLTEC

Stefan Anton
Luis Hinojosa
Chuck Bullard
Stephen Horvath
Nick Pirri

SKB

Henrik Algotsson
Markus Wikman
Miranda Restorick