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

March 22, 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 MARCH 16, 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, and commented on the need for a "quality" model. On January 19, 2016, Holtec proposed a benchmark test program and staff provided input on the general acceptability of the test model and test sequences.

The meeting was noticed on February 10, 2016 (ML16041A460). 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.

Holtec has now decided to perform three drop tests in the following sequential order: (1) a 9-meter top-down drop/slap-down onto the closure lid, (2) a 9-meter center of gravity over corner drop on bottom corner, (3) a 1-meter puncture drop onto trunnion. The ¼ scale model cask will have identical fabrication materials and welding processes as the full scale package, albeit a few differences such as a simplified locking wedge/locking pin and the top flange being now machined as a single piece. Dimensional inspections of the ¼ scale model and visual inspections of all welds, with liquid penetrant (PT) examination planned for some welds, will be performed after each drop event.

Holtec believes that the top-down/slap-down drop might be the most challenging test for the locking mechanism while the 2nd test (9 m center of gravity over corner) will be significant for the welds and will allow to gain confidence in the weld geometry due to the significant strains and deformation expected on the side walls.

Since the puncture test creates a concentrated strain field, staff said that the instrumentation, e.g., strain gages, should be geared towards determining if inelastic deformation is taking place in those critical areas. Staff also asked to have accelerometers installed on the back side of the package, relative to the strike orientation, and that PT be also performed on the back side of the package.

Staff stated that the applicant should plan on installing redundant instrumentation (strain gages do fail at times; instrumentation software may not properly work) and have it also installed in places away from the impact locations, e.g., back side of the package to adequately "pick up" the potential damage and full response of the package from the drop tests. Staff discouraged the use of the Atlas of Stress-Strain curves, as proposed by Holtec to perform limiting drop orientations, and suggested that more realistic stress-strain curves can be used with the ASME minimums found in Appendix FF. However, it is to be noted that both data sets can be used to "bind" the results if the Atlas of Stress-Strain curves is more conservative in some instances.

Staff said that, since the package is ultimately qualified by analysis, Holtec needs to determine first, before testing is performed, what will be considered a "successful benchmarking", i.e., define if an agreement within 10% or 20% between measured results and analysis results is a "success", define which measurements must be correlated, determine if data discrepancies should be turned into a bias, if modeling should ultimately over-predict damages or if data must show a complete agreement between strains and deformation.

Additional topics discussed include the following: (1) the necessity of a leak test of the entire containment boundary on the full scale package to ensure there are no voids or flaws, (2) the volumetric testing of the package (specifically the welds) after the completion of the tests, (3) the potential evaluation of the package vibratory response by way of a modal survey that would add a level of confidence to the Holtec modeling.

Staff will be present during the ¼ scale testing of the Model No. HI-STAR ATB 1T package scheduled to take place in mid-July 2016, at either Sandia or Oak Ridge National Laboratory. Staff made no regulatory commitments during the meeting.

Docket No. 71-9375
CAC No. L25077

Enclosures:
1. Meeting Attendees
2. Presentation

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Enclosures:
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Distribution: Attendees, S. Ruffin, M. Lombard

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**ADAMS Package No.: ML16083A105 Memo No.: ML16083A120 Presentation: ML16083A124**

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| **NAME** | PSaverot | | WWheatley | | SRuffin | | | |
| **DATE** | 03/21/2016 | | 03/22/2016 | | 03/22/2016 | | | |

**OFFICIAL RECORD COPY**

**Meeting Between HOLTEC and the**
**Nuclear Regulatory Commission**
**March 16, 2016**
**Meeting Attendees**

**NRC/NMSS/SFM**

Pierre Saverot
Antonio Rigato
Steve Everard
Jason Piotter
Young Kim
David Tang
Bo Pham

**HOLTEC**

Stefan Anton
Royston Ngwayah
Chuck Bullard
Venkat Prabhala
Vishwas Mathur
Nick Pirri
Kishore Gangadharan
Luis Hinojosa
Rahul Jhaver

**SKB**

Henrik Algotsson
Per Sundlof
Jenny Holmstrom
Miranda Restorick

**SANDIA**

Doug Ammerman

**ORNL**

Oscar Martinez
Matt Feldman

Enclosure 1