



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

November 7, 2017

MEMORANDUM TO: Anthony H. Hsia, Deputy Director  
Division of Spent Fuel Management  
Office of Nuclear Material Safety  
and Safeguards

FROM: Pierre Saverot, Project Manager **/RA/**  
Spent Fuel Licensing Branch  
Division of Spent Fuel Management  
Office of Nuclear Material Safety  
and Safeguards

SUBJECT: SUMMARY OF OCTOBER 24, 2017, MEETING WITH DAHER  
NUCLEAR TECHNOLOGIES GMBH

Background

On October 24, 2017, a Category 1 public meeting was held at the U.S. Nuclear Regulatory Commission (NRC) headquarters in Rockville, MD, between the NRC staff and representatives from Daher Nuclear Technologies GmbH (DNT) to discuss the structural and thermal testing of the DN30 protective structural packaging for UF<sub>6</sub> cylinders.

This meeting was a continuation of the April 4, 2017; June 6, 2012; June 2 and November 2, 2011 meetings with Transport Logistics International (TLI) and Nuclear Cargo + Service GmbH (NCS) for which the respective meeting summaries can be accessed at the Agencywide Documents Access and Management System Accession Nos. ML17144A079, ML111801105, ML11325A105, and ML12170A114.

The meeting was noticed on September 5, 2017 (ML17240A053). The meeting attendance list and the presentation are provided as Enclosure Nos. 1 and 2, respectively.

Discussion

DNT performed LS-DYNA analyses to determine the drop orientations inflicting the maximum damage on the DN30 package and selected a number of sequences for the actual drop tests, including flat drops onto the valve side and onto the closure system, and a slap down drop onto the feet of the package.

Staff told DNT to include, in the application, a discussion on the sensors, accelerometers, and strain gages used to instrument the tests because controlling a flat drop is not an easy task due to some angular orientations happening during the drop. Staff also told DNT to clearly explain in the application (i) how the baseline model was established by using the five drop testing sequences, and (ii) the acceptance criteria for benchmarking in order to properly justify the validation of the model.

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Staff asked DNT to reconcile, in the application, the variations of decelerations in the valve area and to correctly describe the correlation of the model versus energy dissipation. Also, the applicant needs to: (i) clarify the meaning of the maximum and minimum angles noted for the solid elements and the shell elements regarding the quality of the finite element mesh, and (ii) provide a reference on the behavior of  $UF_6$  during transport ( $UF_6$  is actually a solid block in the lower part of the cylinder with a few rubbles on the top). Staff explained it might not be appropriate to use stress-strain relations at  $60^\circ C$  for material properties during the fire tests and that it is important to know if the strain rate performance of the foam was modeled.

Considering the acceleration time-history comparison plots, staff said that the experimental results cannot be used directly to interpret the simulation results and vice versa. This suggests that using the "validated" finite element analysis (FEA) models to quantify a physical attribute, such as contact between the valve and its protection device, may need to be addressed by the applicant from a sensitivity analysis perspective. In the case of the FEA for temperatures hot and cold at  $60^\circ C$  and  $-40^\circ C$ , respectively, a FEA analysis will need to be performed for some additional temperature conditions to allow the extrapolation of analytical results: this is needed to demonstrate there are sufficient margins and that the valve will not touch its protection device during free drops.

The applicant clarified that the 3D thermal model is indeed used for the licensing basis of the package, not the 2D model because it does not represent reality since it does not have an homogeneous distribution of the contents. Staff asked the applicant to describe how the code is used to model foam burning. Staff said that the applicant shall ensure that a complete description is provided in the application for the 3D thermal models (e.g. solar insolation, emissivity, absorptivity, materials properties, drop test damage, foam combustion, etc.) and that there is a clear justification for all these values. ANSYS input and output files shall also be provided as part of the application.

Staff reminded DNT that the application is submitted for compliance to 10 CFR Part 71 regulations and that any reference to IAEA regulations, or argument that IAEA regulations had a more stringent sequence of drop testing, will not be considered by staff.

DNT is currently contemplating a submittal to the NRC in December 2017. The application was already submitted to the French ASN in December 2016 and the French Certificate of Package Approval is expected for the 2nd quarter of 2018. Staff made no regulatory commitment during the meeting.

Docket No. 71-9362  
CAC No. L25194 and  
EPID L-2017-LRM-0008

Enclosures:

1. Meeting Attendees
2. Presentation - Proprietary

SUMMARY OF OCTOBER 24, 2017, MEETING WITH DAHER NUCLEAR TECHNOLOGIES GMBH, DOCUMENT DATE: November 7, 2017

Distribution: Attendees, M. Layton

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**ADAMS Package No.: ML17312A301 Memo No.: ML17312A303 Presentation: ML17312A302**

<b>OFC</b>	SFM	E	SFM	C	SFM			
<b>NAME</b>	PSaverot		SFiguroa		JMcKirgan			
<b>DATE</b>	10/31/2017		11/1/2017		11/7/17			

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**Meeting Between DNT and the  
Nuclear Regulatory Commission  
October 24, 2017  
Meeting Attendees**

**NRC/NMSS/DSFM**

Pierre Saverot  
JoAnn Ireland  
David Tang  
Yong Kim

**DNT**

Sebastian Fels  
Franz Hilbert

**DAHER TLI**

Phil Sewell