

July 27, 2016

MEMORANDUM TO: Antony H. Hsia, 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 JULY 12, 2016, MEETING WITH HOLTEC  
INTERNATIONAL, INC.

### Background

By letter dated August 7, 2015, Holtec International (Holtec) submitted an application for Certificate of Compliance No. 9373, Revision No. 0, for the Model No. HI-STAR 190 package. Staff issued a request for supplemental information letter dated October 1, 2015, and a request for additional information (RAI) letter dated April 8, 2016. Holtec requested this meeting to obtain clarifications on two Materials RAIs. The meeting notice was posted on June 29, 2016. The meeting attendance list is provided as Enclosure No.1.

### Discussion

Staff opened the public meeting and explained the rationale behind the Materials RAIs, i.e., necessity to account for the mechanical properties of M5® and the required justification that the hydrogen content, used to determine cladding mechanical properties for the fuel structural evaluation, is commensurate with the 68.2 GWd/MTU design basis fuel burnup.

Holtec said that the HI-STAR 190 application for high burnup fuel did combine elements of (i) the HI-STORM application (a non-high burn up fuel application, where no distinction is made between cladding types) and (ii) the HI-STAR 180 application which uses moderator exclusion for high burnup fuel, in combination with a defense in depth evaluation that showed no negative effect on reactivity. Staff responded that, while the HI-STAR 180 application had an acceptable licensing approach (with a double closure system, combined with a drop analysis and some fuel reconfiguration), the HI-STAR 190 application, on the other hand, uses moderator exclusion under hypothetical accident conditions but does not include a structural evaluation for the fuel under normal conditions of transport.

Staff clarified that that the 3% failed fuel criterion, consistent with the draft Regulatory Information Summary (RIS) for high-burnup fuel (ML14175A203), is to be used only if the cladding mechanical properties, used in the package design, correspond to the specific cladding-type of the contents. The 3% failed fuel criterion was not devised to account for any variability in mechanical properties from one cladding type to another. Staff said the applicant must present its safety case. Staff further offered that doing a fuel drop analysis with the M5® cladding mechanical properties would provide valuable information to the staff.

Staff also said that (i) the PNNL-17700 report does not include an assessment of the adequacy of the models for M5® cladding type, (ii) a structural analysis is not defense in depth and (iii) cladding integrity was an important factor in the acceptance of the HI-STAR 180 licensing approach. Staff reminded Holtec to incorporate the Young's modulus into the vibration analysis, which is not the case now.

Regarding the justification required for hydrogen content, staff noted that the range of applicability of mechanical property models includes excess hydrogen concentrations only up to 650 ppm, in Table 2 of the PNNL-17700 report. Since the staff's concern is the degradation of mechanical properties, Holtec has to make conservative assumptions, through a reduction of the mechanical properties, to justify that (i) the models can be used and (ii) the assumed neutron fluence is adequate for both the burnups and history of the fuel rods to be loaded in the Model No. HI-STAR 190 package.

Regarding some clarifications that may be required in the draft RIS, staff told Holtec that this meeting was not the appropriate venue to capture comments on the draft RIS. Although the public comment period is now officially closed, all comments could be considered before issuing the final RIS, most probably at the end of this year.

There was no question from the members of the public. Staff made no regulatory commitments during the meeting.

Docket No. 71-9373  
CAC No. L25046

Enclosure 1: Meeting Attendees

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Enclosure 1: Meeting Attendees

Distribution: Attendees

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**Meeting Between Holtec International, Inc. (Holtec) and the  
Nuclear Regulatory Commission  
July 12, 2016  
Meeting Attendees**

**NRC/NMSS/SFST**

Pierre Saverot

Meraj Rahimi

John McKirgan

Andrew Barto

Steve Everard

David Tang

Veronica Wilson

Gordon Bjorkmann

Ricardo Torres

Jason Piotter

**HOLTEC**

Stefan Anton

Debu Mitra-Majumdar

**MEMBERS OF THE PUBLIC**

Donna Gilmore

Marvin Lewis

Timothy Morrison

Enclosure 1