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72-1008



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October 15, 1997

Dr. Carl J. Paperiello
Director
Office of Nuclear Material Safety and Safeguards
United States Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Reference: HI-STAR Docket Nos. 72-1008 (Storage) and 71-9261 (Transport)
HI-STORM Docket No. 72-1014

Subject: Review of HI-STAR and HI-STORM Submittals

Dear Dr. Paperiello:

We thank you and your staff for investing an hour from your crowded schedule on September 30, 1997 to attend the Holtec/ComEd/NRC meeting concerning the Holtec HI-STAR 100 licensing reviews. The meeting was most productive, but it also heightened my personal awareness regarding your resources to support the ongoing review of old and mature submittals like our HI-STAR (August 1994) and HI-STORM (February 1995) applications. We are concerned that reviewers who are well versed in the salient details of the design and analytical models are liable to be reassigned, or if sufficient time elapses, their memories may fade. To support our shared objective of an efficient use of NRC resources, the Holtec staff has worked hard to respond to the Second Round RAIs, along with the TSAR/SAR text matter and calculation packages. As to the quality of the submittal, I invite your staff to hold them to the highest standards of accuracy - anything less is anathemic to me and should be rightfully unacceptable to you. Our submittal, I assure you, should validate to you that we have heeded your unrelenting call for inculcating quality in cask suppliers' organizations. Over the past year, our numerous submittals on our dry storage dockets appear to have met the NRC's quality expectations; the latest round of submittals should further reinforce our company's reputation of uncompromising commitment to quality.

The danger to our licensing schedule, Dr. Paperiello, is the potential for perceptual astigmatism which renders road bumps into vehicle wrecks. Our August 1997 impact limiter (AL-STAR) drop test event is a quintessential road bump which, to my utter astonishment, had ballooned into a technical setback by September 30. The record in this matter begs to be set straight.

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The AL-STAR quarter-scale drop tests were carried out to fulfill a key regulatory requirement (10CFR71.73). Evidently, the Commission fully understands the limitations of analysis based impact limiter prognostications and wisely requires the designer to submit the impact limiter to a set of proof tests. While the aluminum honeycomb design used in AL-STAR is far better characterized than other non-metallic forms such as redwood and balsa wood, it is nevertheless foolish to consider the state-of-the-art in impact limiter design to be accurate and predictive to the level of, say, the steel overpack. My in-house impact limiter historian informs me that not a single impact limiter drop test for heavy load casks *ever* passed in the first test campaign. In the context of things, ours was reasonably successful: two tests out of three were successful; one failed to meet the g-load limit. The impact limiter remained attached to the cask in *all* three tests. We have coaxed every morsel of technical information from these tests, redesigned our impact limiter, and are poised to test again in early December. Our chances for success are greatly enhanced this time.

Recognizing the potential for some iterative design work on the impact limiter, we took great pains to decouple its design effort from the balance of the cask. As a result, there is *no coupling* between the AL-STAR impact limiters and the HI-STAR 100 design parameters except for the former to limit the g-load to 60g's during the 9-meter drop events.

We have recognized from the very beginning that the impact limiter design and qualification will have to be an experiment-aided process. Other than the outer diameter of the impact limiter (set at 128 inches to meet railroad size constraints), and the use of aluminum honeycomb, other parameters such as honeycomb density and axial length are liable to be refined through feedback from drop test data. Accordingly, all discipline analyses have been performed to eliminate reliance on the details of the honeycomb geometry and properties. The state of total disconnect between the HI-STAR 100 and AL-STAR licensing process can be summarized for each discipline as follows:

- Structural: As noted above, the design and analyses of the HI-STAR overpack are essentially decoupled from the evaluation of the impact limiter, except for the number and location of impact limiter attachment bolting, and the maximum 60g performance requirements under all drop orientations. The number and location of the attachment bolting has essentially no impact on the structural evaluation of the overpack.
- Criticality: The impact limiter does not enter into the analyses at all.
- Shielding: *No* credit is taken for the honeycomb material in the shielding calculations. The verbiage in the shielding chapter of the SAR is being further clarified to state this conservative approach in a forceful and clear manner.
- Containment: The impact limiter does not enter the analyses.



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- Thermal Analysis: Under normal transport conditions the impact limiter is assumed to be a perfect insulator. Thus, the predicted fuel temperature is maximized and the actual impact limiter design becomes irrelevant to the thermal analysis. Under fire accident conditions, the opposite assumption is made; the impact limiter is assumed to be crushed to solid metal, thus providing the most pessimistic rate of heat injection to the cask. Again, the impact limiter geometry detail is irrelevant to the HI-STAR 100 fire accident analysis.

By utilizing these conservative models in shielding and thermal analyses, we eliminate the interdependence between the AL-STAR and HI-STAR 100 design processes. Of course, the HI-STAR 100 does not require the use of transport impact limiters for storage operations as addressed in the TSAR.

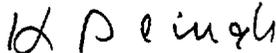
In summary, the review for HI-STAR, simply stated, is *not impeded* in any manner by the absence of a confirmed drop test data package on the AL-STAR impact limiters. The disconnection between the impact limiter and the cask analysis imperatives are repeatedly asserted throughout our Part 71 submittal.

The independence of the AL-STAR design, analyses, and testing from the remainder of the HI-STAR packaging has also been pursued to allow future improvements in the impact limiter design to be implemented without requiring a re-analysis of the HI-STAR. Therefore, in the future, with further developments in impact limiter materials and designs, changes to the HI-STAR impact limiter can be incorporated without requiring reanalysis of the HI-STAR overpack. This will greatly facilitate system improvements with minimal review efforts.

In conclusion, the August 1997 drop tests were a not unexpected road bump. We had taken all necessary measures to ensure that the impact limiter tests do not become an obstacle to your unfettered review. By running the next series of tests in early December, we hope to furnish the last item of data for HI-STAR's transport certification. In the interim, the SFPO can review Revision 6 of our TSAR and SAR, to be submitted shortly, without the slightest, slimmest potential of squandering of your technical resources.

If you view this letter as an earnest effort at clarification and a fair description of our state of progress, then I should hope that the HI-STAR/HI-STORM submittals will continue to get your management's engagement that they deserve.

Sincerely,


K.P. Singh, Ph.D., PE
President and CEO

cc: Mr. C. Haughney, Director, SFPO

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