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February 1, 2005

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Subject: Dry Storage Cask Annulus Air Flow Regime

Reference: USNRC Docket No. 72-1014, TAC No. L23657
SFPO Meeting with Holtec International on 19 January 2005
Holtec Letter 5014544 from E. Rosenbaum, dated 21 October 2005

Dear Sir:

On 21 October 2004, we transmitted a topical report to the NRC. This topical report (Holtec Report HI-2043258r0) evaluated the results of an EPRI/INEL test program on an actual ventilated storage cask loaded with spent fuel. The purpose of this evaluation was to determine if the airflow through the annular cooling passages of the cask was turbulent or laminar. It is our conclusion that this airflow is turbulent and that it is appropriate to model the airflow in the HI-STORM 100 System as turbulent.

This topical report was discussed in a meeting between the Spent Fuel Project Office and Holtec International on 19 January 2005. During the meeting, the SFPO Staff requested that we perform several additional analyses to confirm the results presented in our topical report. Specifically, it was requested that the sensitivity of the model to the effective thermal conductivity of the MSB, the size of the inlet vents, and the computational mesh density be examined. We agreed to perform such sensitivity studies.

The first sensitivity study, examining the impact of the MSB internals effective thermal conductivity assumption on the MSB surface temperature profile, has been completed. Although the EPRI test report stated that the condition within the MSB does not significantly affect the MSB surface temperatures, it was agreed to perform this study. This study evaluated a relatively wide range of effective thermal conductivity values (from 1 W/m-K to 4 W/m-K). The vacuum condition (Run #6 from the EPRI/INEL tests) was used for this study, as was suggested by the SFPO Staff in the January 19th meeting. These calculations indicate that the effective thermal conductivity assumed for the MSB internals has essentially no impact on the computed MSB or VSC-17 overpack temperatures. *Preliminary* results of these calculations are attached to this letter, in advance of their formal issuance in a future revision to the topical report, to allow the NRC to examine them as early as possible.

The remaining sensitivity studies committed to in the January 19th meeting, examining the impact of the inlet vent sizes and the computational mesh density, are expected to be completed by the end of this week (February 4th). Preliminary results of these remaining studies will be

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transmitted to the NRC as soon as possible, again to allow the NRC to examine them as early as possible, and will also be added to the topical report in a future revision.

We would appreciate the SFPO's expeditious review of the attached technical material to allow us to reach a consensus on this topic as quickly as possible. Please feel free to contact me if any questions arise or if you require any additional information.

Sincerely,

Evan Rosenbaum
Project Manager, LAR 1014-3

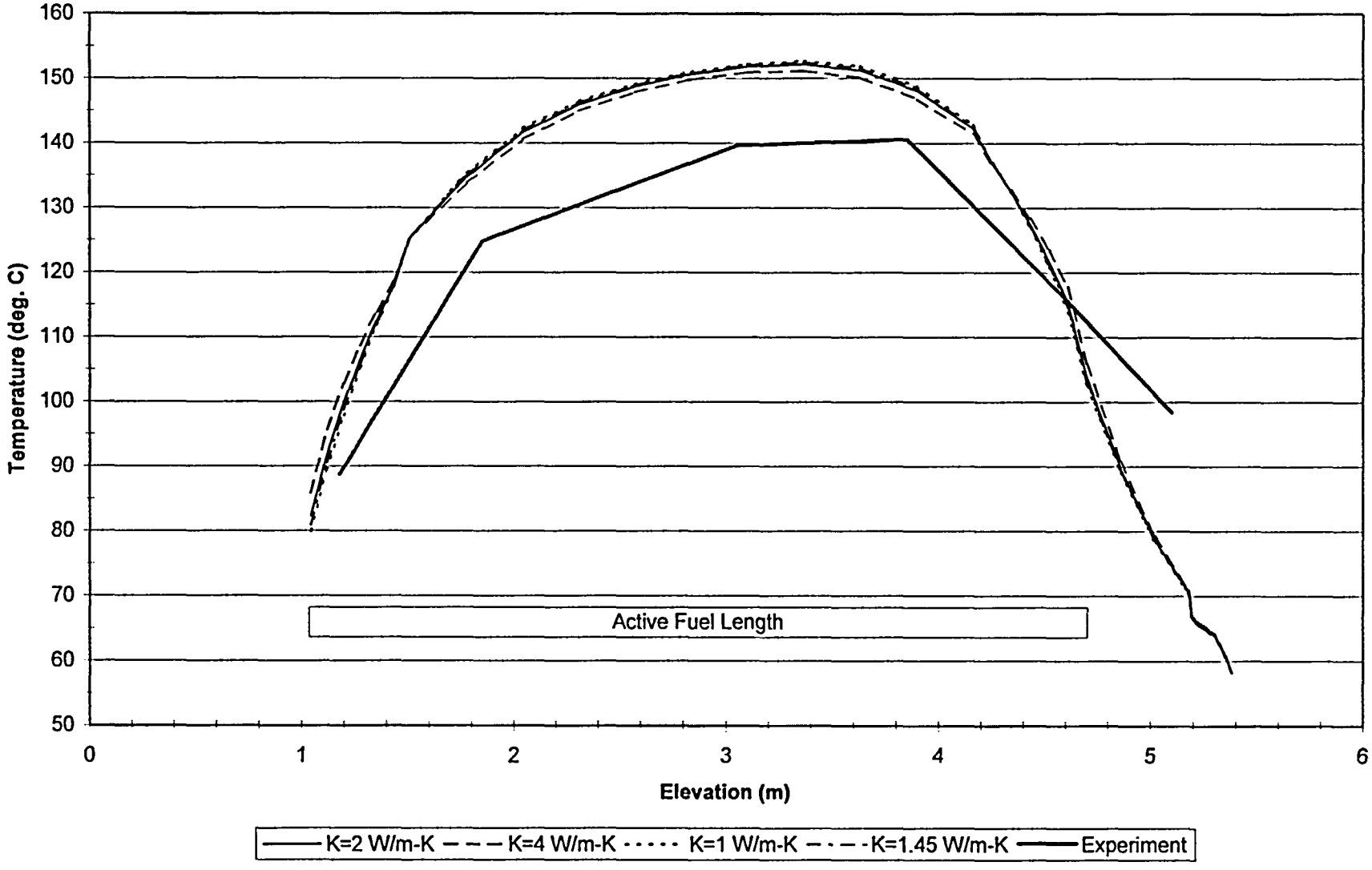
Technical Concurrence:

Dr. Debabrata Mitra-Majumdar
Principal Engineer

Attachments: Preliminary Effective Conductivity Study Results (2 pages total)

emcc: Mr. Larry Campbell, USNRC
Mr. Wayne Hodges, USNRC
Mr. John Monninger, USNRC
Mr. Christopher Regan, USNRC

MSB Outer Surface Temperature versus Effective Thermal Conductivity



	Experimentally Measured Values (see Note 1)	FLUENT Computed Results			
		Baseline Run (K = 2 W/m-°C)	Sensitivity Run 1 (K = 4 W/m-°C)	Sensitivity Run 2 (K = 1 W/m-°C)	Match T_{clad} Run (K = 1.45 W/m-°C)
Average Air Outlet Temperature (see Note 2)	66.0°C	65.8°C	65.8°C	65.8°C	65.8°C
Temperature of VSC-17 Side Surface at 5.1 m (see Note 3)	45.9°C	48.7°C	48.7°C	48.6°C	48.6°C
Maximum Weather Cover Temperature	52.8°C	49.9°C	50.0°C	49.8°C	49.8°C
Maximum Clad Temperature	384.1°C	319.1°C	234.2°C	487.5°C	383.1°C

Notes:

1. According to the EPRI report (TR-100305), the measurement uncertainty for the experimental values is +/- 4°C for clad temperature and +/- 4.5°C for all other temperatures reported in this table. Computed values agree with measured values within this level of accuracy.
2. The observed agreement between the measured and computed air temperatures indicates that the model is accurately predicting the air flow rate and heat transfer into the air stream.
3. The temperature at this elevation is compared because this is the elevation where the maximum measured side surface temperature occurs.
4. The first three rows of data account for the three heat transfer paths from the VSC-17 to the ambient (i.e., convection and radiation from cask top and side, and convection to flowing annulus air). These results indicate that that distribution of heat rejection among the three pathways predicted by the computer model agrees with experimental results.
5. The data demonstrates that while the condition within the MSB has a significant impact on the computed temperatures within the MSB, it does not have any impact on temperatures from the surface of the MSB outward.