Witness: Shawn Morris

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Question:

EFSB-S-4 Refer to Exh. MS-F at 17. The Fire Protection Engineering Analysis report states that during the module level testing the forced thermal runaway of two cells led to all cells in the module experiencing thermal runaway. In the unit level test, the forced thermal runaway of six cells led to only one additional cell entering thermal runaway. Please explain what design mechanisms in the unit level prevented the thermal runaway seen in the module level testing.

Response:

In the module-level UL 9540A testing, the battery module is evaluated largely in isolation, without the full enclosure, structural integration, and system-level design features present in the complete Megapack unit. Under those conditions, forcing two cells into thermal runaway results in significant localized heat transfer within the module, allowing thermal energy to propagate to adjacent cells and ultimately leading to full module involvement. By contrast, the unit-level UL 9540A test places the same battery modules within the complete Megapack enclosure and internal architecture, which introduces additional passive barriers to propagation that are not present at the module-only level.

At the unit level, the Megapack design incorporates physical separation, structural materials, and enclosure geometry that reduce conductive and radiative heat transfer beyond the immediately affected area. In addition, the enclosure provides controlled pathways for the release of hot gases and pressure generated during thermal runaway, limiting internal heat and pressure buildup that could otherwise accelerate multi-cell propagation. Importantly, the unit-level test is conducted under worst-case conditions with active battery management and thermal management functions disabled, meaning the reduced propagation observed may be attributable to passive, system-level design features rather than active controls.