United States EV Fire Incident Field Data Review

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Objective:

- Several OICA members have already presented in-house knowledge about thermal propagation events related to internal short circuit at previous EVS GTR IWG meetings.
- In order to gain a more comprehensive view, an independent research organization (JP Research, Inc.) was contracted to perform a structured, formal data search to identify and document field incident data on EV fires in the United States from publically available data.

Methods:

- Search was primarily focused on incidents in the United States, with additional North American incidents included when identified.
- Limited to those involving production vehicles (no experimental/homebuilt) equipped with lithium ion chemistry propulsion batteries (no lead-acid or nickel-metal hydride).
- Data sources searched:
  - Fatality Analysis Reporting System (FARS)
  - National Automotive Sampling system – General Estimates System (NASS/GES)
  - National Automotive Sampling system – Crashworthiness Data System (NASS/CDS)
  - NHTSA Special Crash Investigations (SCI)
  - US State Data Files
  - NHTSA Office of Defects Investigation (ODI) Consumer Complaint Data
  - National Fire Incident Reporting System (NFIRS)
  - Literature/Social/Media Reports
- Where possible, follow-up calls to the vehicle owner were made to confirm details.

What the Research Shows:

20 incidents (13 EV, 7 EHV) associated with vehicle crashes (post crash)

1 incidents (1 vehicle) where crash status was uncertain

18 incidents with no vehicle crash damage reported

- 1 incident (19 vehicles) involving water submersion (Hurricane Sandy), although subsequent analysis (NHTSA) indicated it was not caused by lithium ion battery
- 3 incidents (3 vehicles) associated with charging
- 2 incidents (5 vehicles) associated with arson
- 4 incidents (4 vehicles) non-vehicle related
- 4 incidents (4 vehicles) non-Li-ion battery related
- 1 incident (# vehicles unknown) inappropriate battery repair procedures
- 3 incidents (3 vehicles) unknown – cause not specified

Internal Short Circuit was not directly implicated in any of the cases. However, for three of the cases there is insufficient information to rule it out

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Conclusions:

- In North America, EV fires remain rare events, especially for non-collision events.
- Excluding the Hurricane Sandy events, arson and events where EV was exposed to an external fire, there were 11 incidents (11 vehicles) involved in non-collision fires over an 8 year span. This averages to a rate of just over 1.4 incidents/year.
- When examining the last three years the rate drops to 1 case per year, even though the number of vehicle registrations and miles driven (exposure) by EV's has increased substantially.

Thermal Propagation due to internal short circuit only has no demonstrated field relevance.

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