

Response to EV and Lithium-Ion Battery Incidents

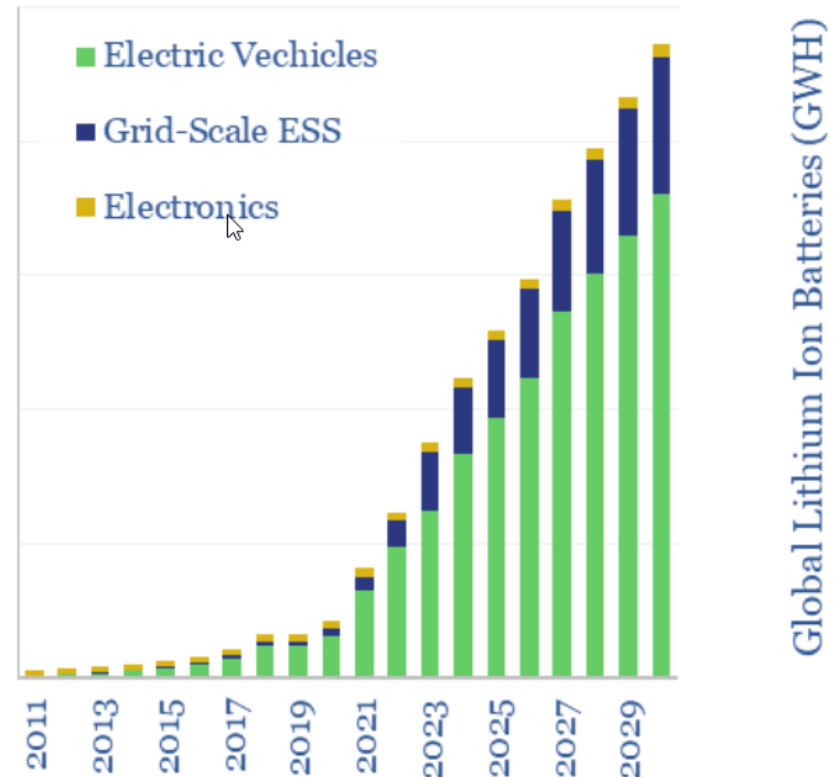
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Why This Topic Matters

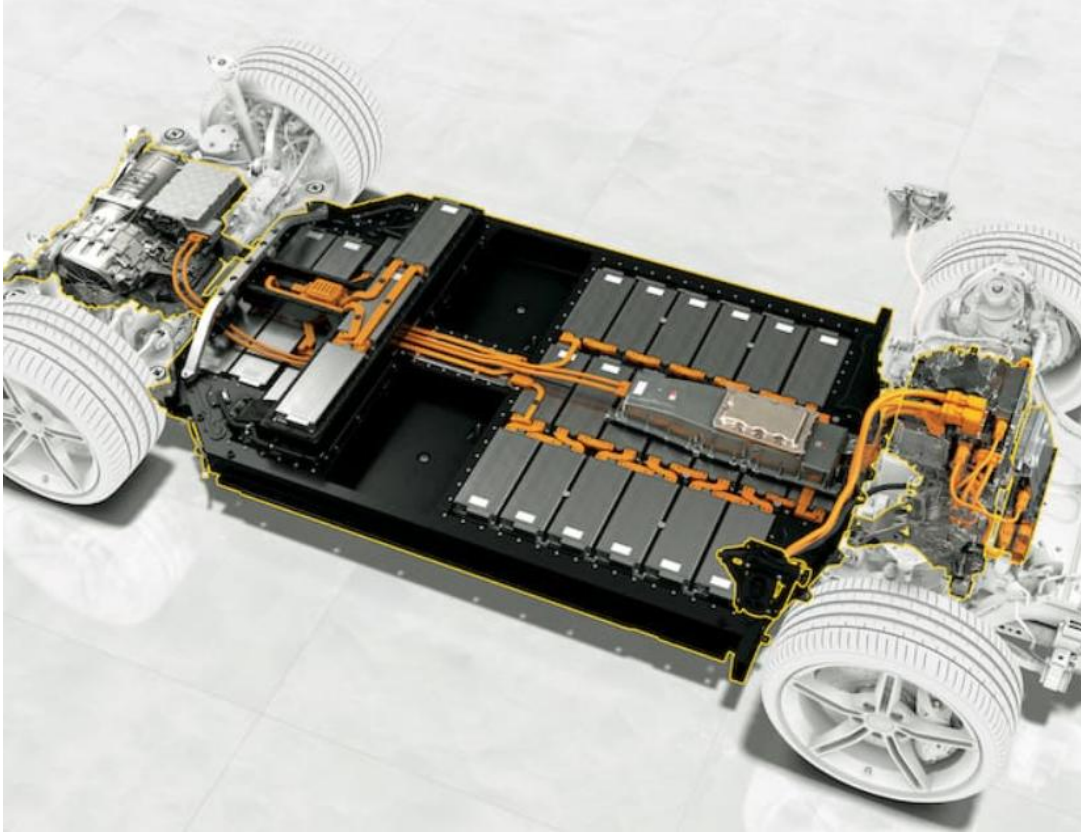
- EVs and Lithium-Ion devices are increasing across Michigan
- Fire Behavior is different from conventional vehicle or structure fires
- Environmental consequences are significant
- Proper management continues long after flames are out



Objectives of Today's Session

- Recognize EV & Li-Ion battery involvement
- Make safe tactical decisions during incidents
- Understand Environmental risks & EPA expectations
- Manage the scene after suppression
- Coordinate effectively with tow operators

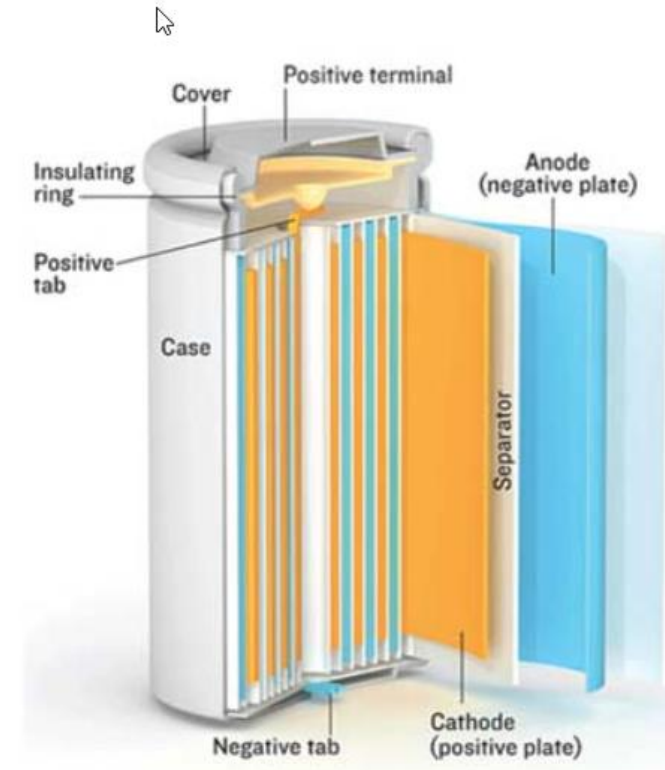
EV Basics: What's Under the Skin?



- “Skateboard” battery platform
- High-voltage cables and components
- BMS & shut-down systems
- Variations in SUVs, trucks, and vans

Lithium-Ion Battery Overview

- Common Chemistries
 - NMC – Nickel Manganese Cobalt
 - NCA – Nickel Cobalt Aluminum Oxide
 - LFP – Lithium Iron Phosphate
- Differences in thermal behavior
- Energy Density and failure modes



What Causes Thermal Runaway

- Mechanical damage
- Electrical abuse
- Thermal exposure
- Internal defects (Jeep)
- Off-gassing, jets, flame spread

Recognizing an EV or LIB Incident

- Early indicators
 - Hissing, popping, crackling
 - Off-gassing vapor clouds
 - Battery casing deformation
 - Undercarriage smoke
 - Heat signatures on TIC



Hidden Lithium-Ion Involvement

- Residential garages
- E-bikes, Scooter, power tools
- Home ESS units (Tesla Powerwall)
- Vehicles plugged in during charging
- Warehouse packages storing hidden Li-Ion Devices (GOO Smoke Shop)



Tactical Priorities for Responders

- Life Safety first
- Establish 360
- Protect exposures
- Avoid HF components
- Consider environmental receptors (drains, water, air)

Fire Suppression Strategy



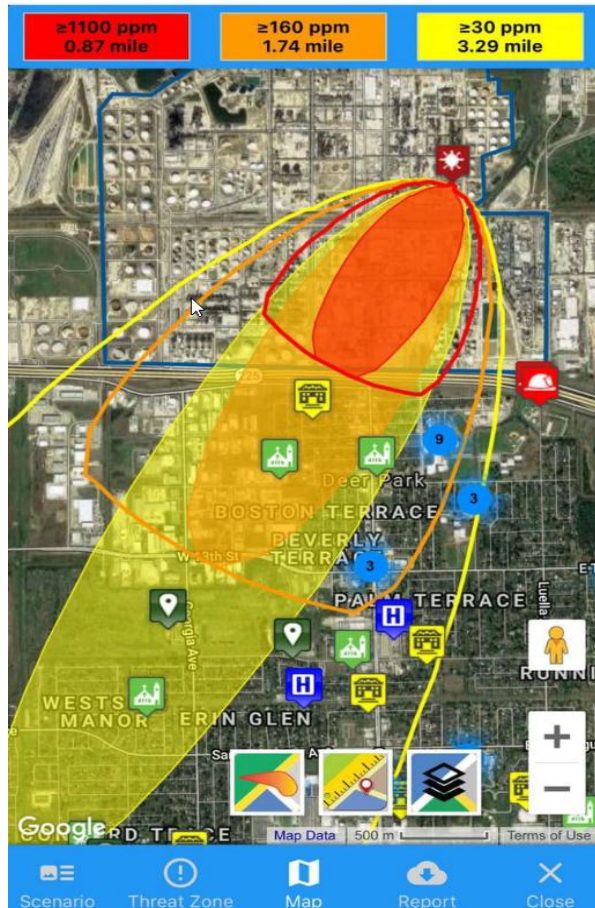
- Water is the most effective agent
- Use large volumes for cooling
- “Let it burn” isn’t always safe
- Foam & Dry chem are ineffective
- Expect delayed re-ignition

Underbody & Hard-to-Reach Battery Fires

- Under car cooling (Underbody sprayers)
- Piercing nozzles (IF I EVER CATCH YOU DOING THIS!!!)
- Direct access challenges
- When to go defensive



Air & Off-Gas Hazards



- HF, CO, and Hydrocarbons
- Treat as hazardous atmospheric release
- Maintain appropriate standoff
- Ventilation matters
- Firefighters are not expected to sample air on-scene

Extrication Considerations in EVs

- Avoid orange cables
- Don't cut into battery enclosures
- Know cut zones
- Disable LV 12v system if possible

Scene Management with Damaged Packs

- Exposed battery
- Crash without fire
- Structure fire at home/warehouse
- Multi-vehicle EV yard

“Fires Out...Now What?”



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EPA Expectations After Extinguishment

- Damaged Battery = High-risk waste stream
- Air, soil, and water exposure considerations
- Isolation and cooling remain important
- Structural contamination concerns

Re-Ignition Monitoring

- Re-ignition possible for hours or days
- Recommend isolation & monitoring
- Thermal Checks before moving vehicle
- Safe distance from structures (mainly tow yard)

Tow & Transport Rules

- Damaged Li-ion battery transport rules
- Proper trailer types
- Avoid sealed/closed spaces
- Documentation for chain of custody
- For responders – when does EGLE/EPA need to be notified.

Runoff & Environmental Contamination

- Cooling water is acceptable but must be managed
- Prevent entry into drains, waterways, or soils
- Contaminated debris may require special handling
- For responders – Consider EGLS notification

Commercial & Industrial Sites

- Risks:
 - Large fleet yards
 - Charging depots
 - Warehouses with ESS
 - Multi-vehicle ignition potential



Residential Hazards

- EV in garages
- ESS in mechanical room
- Homeowner return-to-occupancy
- Place Damaged EV's Outside



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Key Takeaways

- EV/Li-ion incidents are predictable with proper recognition
- Water works
- Off-gassing is hazardous
- Re-ignition is common
- EPA gives critical post-incident guidance
- Environmental protection is part of the response
- Coordination with tow, EGLE, and responders is essential

Resources

- EPA OSC Lithium-Ion Battery Response Guide
- EPA ESS/BESS Fact sheets
- NFPA Electric vehicle fire/rescue response operations
- Michigan EGLE resources
- DOT damaged LIB Transport rules

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