BULLETIN

NO.: 25-213

DATE: December 4, 2025

TO: All Personnel

FROM: Kyle Smith, Battalion Chief, Health and Safety Officer

SUBJECT: **Tailboard Safety** - Hazards of Lithium-Ion Battery Fires

This Tailboard Safety message addresses the challenges of lithium-ion fires.

The Occupational Health & Safety Committee's (OHSC) aim is to make these messages easily accessible to the crews and relevant to the time of year and individual safety concerns identified by training, administration, and current events.

- All Tailboards can be found
  - Vector Solutions
    - Logged in:
      - Use the following link: Tailboard Safety Folder
        - Or file path: Vector Solutions SDFD files > Safety Communications > Tailboard Safety
  - Health and Safety SharePoint

Supervisors of all Fire-Rescue Divisions *select a Tailboard Safety Message and discuss it with their personnel.*

- *Fire Operations:*
  - *During the morning meeting of the division's 'first-day' back (twice monthly)*
- *All other divisions*
  - *One topic monthly to review with staff*
  - *One (different topic) monthly to post at all site locations*
- *Please review this as a crew*
  - *Supervisors can add their crew members for assignment completion on all Health & Safety material*

Any questions should be directed through the chain of command.

- **Refer to SDFD Operations Manual**
  - **SI 10 Section 04 Safety Communications**

Don't hesitate to contact the Health and Safety Office at SDFDHealth&Safety@sandiego.gov with comments or areas of improvement. For all other questions, contact HSO/Battalion Chief Kyle Smith at 619.792.9634 or kasmith@sandiego.gov

San Diego Fire-Rescue Department
Health & Safety Office
Tailboard Safety

Topic: Hazards of Lithium-Ion Battery Fires

BACKGROUND:

Lithium-ion batteries are ubiquitous in modern technology, powering everything from smartphones, electric scooters, electric vehicles, and energy storage systems. However, their energy density also poses unique challenges in emergency scenarios. Identifying potential hazards, including thermal runaway and toxic atmospheres, requires implementing proactive risk assessment and mitigation strategies. Key aspects such as scene assessment, establishment of safe perimeters, and implementation of specialized equipment and PPE are needed to ensure public and responder safety.

- **HAZARDS**
  - Batteries may rupture and vent toxic flammable gases and/or explode violently when the gases ignite when subject to the following:
    - Thermal – Hot or Cold temperatures
    - Physical – Impacted, crushed, pierced, etc.
    - Electrical – Overcharging or forced discharge, including internal manufacturing defects or internal short-circuiting
    - Moisture impacting electrical components or during drying after being wet
  - It may be difficult to discern if a lithium-ion battery pack or cell is compromised; a Thermal Imaging Camera (TIC) may not pick up the resulting heat signatures.
    - **Note:** A thermal imaging camera shall not be relied upon to determine if a Lithium-Ion battery pack or cell is compromised
  - *Thermal Runaway*:
    - When the stable state of batteries/cells rapidly fails due to mechanical (impact, trauma, etc.), electrical (overcharge, over-discharge, internal short, etc.), or thermal (temperature extremes) insult, the cell transitions from a stable state to an unstable state and then to catastrophic failure of the cell. Once thermal runaway begins, it will propagate (spread, domino effect) to the adjacent battery cells. It may only take seconds for this dangerous event to take place.
    - Usually, a "pop" or rupture sound is heard preceding Thermal Runaway with pressurized white gas (flammable/toxic gases) venting moments before ignition.
    - Water may not prevent a battery from entering thermal runaway. If it penetrates the battery case, water may provide a cooling effect on the adjacent battery cells. This cooling may reduce propagation to other cells.
    - Dry Chemical is ineffective for any type of lithium-ion-related extinguishment

Robert Logan
Fire Chief

Daniel Eddy
Assistant Chief, Emergency Operations

James Gaboury
Assistant Chief, Business Operations

Kyle Smith
Battalion Chief, Health & Safety Officer

New Safety Tailboards, Messages, Feedback, Suggestions and/or Reporting to the OHSC – SDFDHEALTH&SAFETY@SANDIEGO.GOV

"Promoting Safe and Healthy Lives"

- *Flammable and Toxic Gases*:
  - Lithium-Ion batteries in thermal runaway produce many different gases. These gases combine to form a flammable, explosive, and toxic atmosphere. Toxicity and flammability levels vary depending on specific battery technology and manufacturer.
- *Unexpected Reignition*:
  - Lithium-Ion Batteries are known to unexpectedly re-ignite (with no warning) minutes, hours, or even days after all visible fire has been extinguished. Reignition is a common occurrence and should be expected.
- *Explosive force.* As noted in several incidents across the nation, lithium-ion batteries have ruptured and ignited with such force that walls were blown down, resulting in structural damage and extensive fire spread.

Safety Resources

- **FSRI: Science of Fire and Explosion Hazards from Lithium-Ion Batteries** ***(course)***
- **FSRI: Fire Service Considerations with Lithium-Ion Battery ESS** ***(course)***
- **USFA: Battery Fires: Before, During, and After the Incidents** ***(webinar)***
- **Tactical Considerations: Battery Energy Storage Systems** ***(worksheet)***
- **Tactical Considerations: Battery Electric Vehicles** ***(worksheet)***
- **Tactical Considerations: Micro Mobility Devices** ***(worksheet)***
- **SDFD Public Safety Awareness: Lithium-Ion Safety** ***(video)***