LITHIUM-ION HAZARDS FOR RESCUERS, FIREFIGHTERS AND THE PUBLIC

Presentation by:
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(FDNY SFM Retired)

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Banned from Fire Department HQ

EFFECTIVE DECEMBER 20, 2021

“Personal mobility devices” powered by **lithium-ion battery technology**, E-Bikes, E-Scooters, E-Skateboards, and devices alike will be **prohibited** inside FDNY Headquarters.

This is in direct response to the recent increase of fires connected to these devices. Ensuring the safety of all employees and visitors remains a top priority.

This policy excludes wheelchairs or similar devices to assist individuals with functional or access needs.

By Order of the Fire Commissioner

RECOGNITION OF A NEW HAZARD

Early Investigations

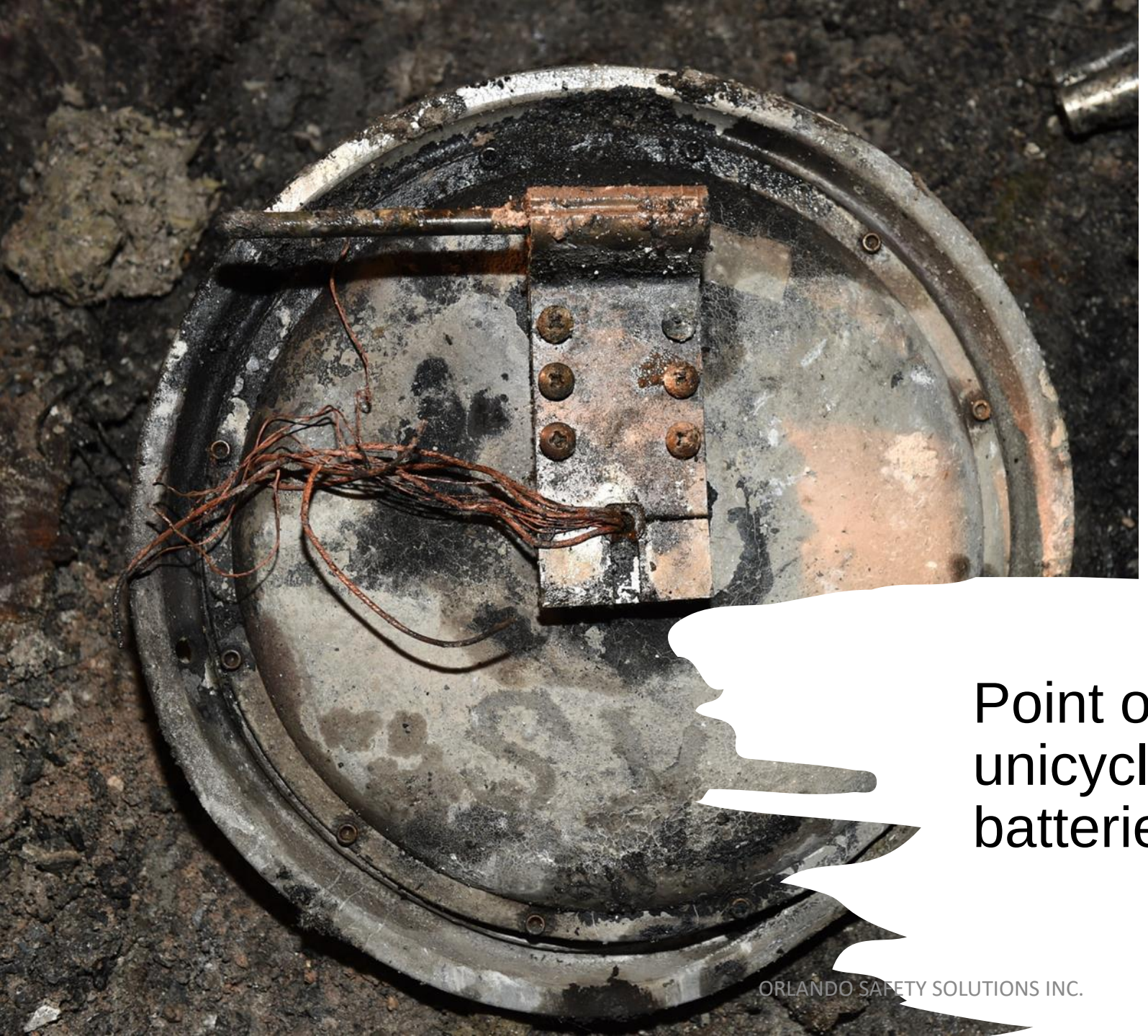
JUNE 21, 2013
Brooklyn, NY
E-Bike rental in rear of print shop

OVERVIEW OF BIKE SHOWROOM

- CHARGING STATION WAS LOCATED IN THE REAR OF THE SHOWROOM
- 2 CHARGERS

MAY 8, 2019
Manhattan, NY
Unicycle in 10 story shared office building

POINT OF ORIGIN TRACES OF UNICYCLE AND LITHIUM-ION BATTERIES DISCOVERED IN DEBRIS



Point of origin remnants of unicycle and lithium-ion batteries found in debris

Excellent Partner

At least 7 recalls and warnings associated with fires in NYC

CPSC Warns Consumers to Immediately Stop Using King Song Electric Unicycles Due to Fire Hazard; Fire and Injuries Reported

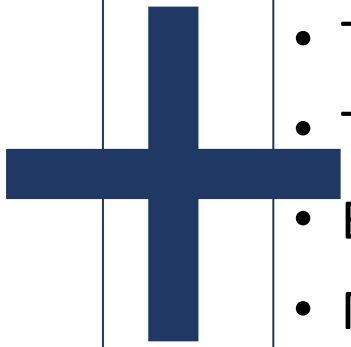
Release Date: July 12, 2022

FAILURE REASONS discovered through Investigations

Why Do Lithium-Ion Batteries Fail

REASONS

- Overcharge – Undercharge
- Overtemperature – Undertemperature
- Overcurrent – Undercurrent



CAUSES

- Environmental Factors
- Physical Damage
- Tampering / DIY
- Thermal Abuses
- Electrical Abuses
- Mechanical Abuses
- Manufacturing defects
- Low Quality products

increased stress on batteries from mechanical and electrical abuses
Uncertified products more susceptible to failure

INVESTIGATIONS AND DATA COLLECTION

Bureau of Fire Investigation

Lithium Ion Fire Stats

As of January 12, 2026 @ 07:00

	Investigations	Injuries	Deaths	Structural	Non-Structural	NYCHA Prop
2019	30	13	0	23	7	N/A
2020	44	23	0	37	7	N/A
2021	104	79	4	77	27	17
2022	219	147	6	162	57	16
2023	268	150	18	178	90	10
2024	279	99	6	144	135	13
2025	292	51	1	167	125	18
YTD						
2022	7	0	0	4	3	0
2023	6	0	0	4	3	0
2024	8	7	0	4	4	0
2025	5	0	0	3	2	0
2026	4	0	0	2	2	0

2023

LITHIUM-ION BATTERY FIRES WERE THE 3RD HIGHEST ACCIDENTAL CAUSE OF FIRES IN NYC IN 2023

ELECTRICAL WIRING—557

SMOKING—444

LITHIUM-ION--268

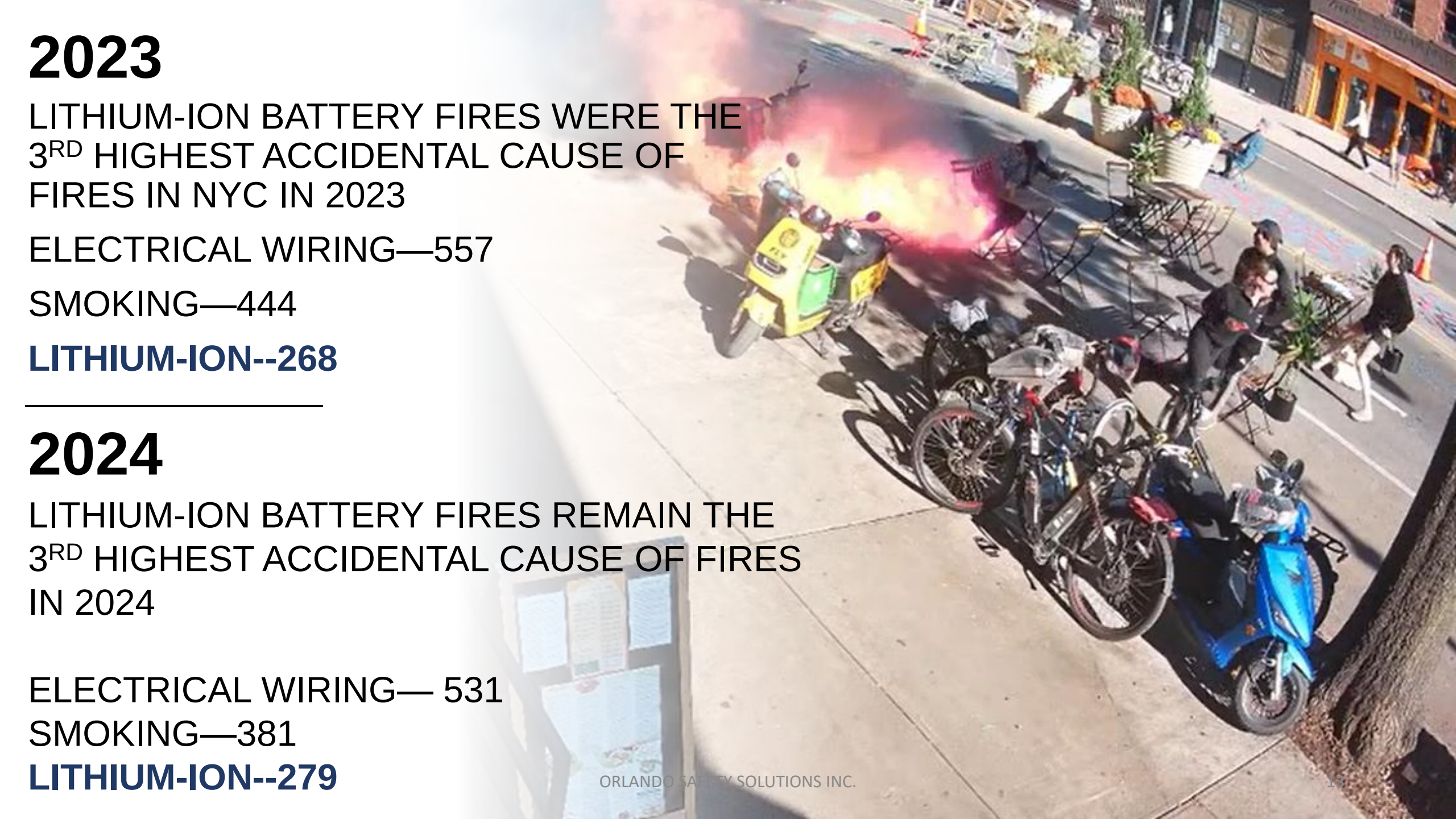
2024

LITHIUM-ION BATTERY FIRES REMAIN THE 3RD HIGHEST ACCIDENTAL CAUSE OF FIRES IN 2024

ELECTRICAL WIRING— 531

SMOKING—381

LITHIUM-ION--279



2023

- Actively Charging (34%)
- Not charging at time (50%)
- Unable to confirm if actively charging at time (16%)

TOTAL 268 fires

2024

- Actively Charging (26%)
- Not charging at time (53%)
- Unable to confirm if actively charging at time (21%)

TOTAL 279 fires

DATA FINDINGS
Consumer Products

2023 - 2024 NON-MOBILITY DEVICE FIRES
8 – 10 % of Lithium-Ion Fires
19 – 21% of Lithium-Ion Fires unable to determine device

Electrostatic Handheld Sprayer	Cell Phone battery	Leaf Blower (Ryobi)	Power Tool (#'s Increasing)	Portable power bank/charger (Counterfeit items)
Homemade Solar Power Bank/Inverter	Vape Pens *Underreported	Solar Carport (Video)	Hybrid Vehicle Batteries Discarded Recycled	Head Lamp
Robotic and Handheld Vacuums	Electric Golf Caddy	Snow Blower	Fan	Noco Boost Jump Starter (Video)
	DOC BodyCam	iPad/Tablet Laptop		

2023 - 2024 RESIDENTIAL

- Multiple Dwellings

34% – 38%

- Private Dwellings

8% – 15 %

- Garage / Shed / Driveway

5% – 12%

28th August 2024 Queens, New York

www.Waste360.com/waste-recycling-april-fire-report

Waste Recycling

April Fire Report: Fires on the Rise in Q1; Time to Sound the Alarm

Every major or catastrophic fire in our industry makes it harder for responsible operators to convince insurers these fire risks can be effectively mitigated. With the continued uptick in improperly disposed batteries in our waste and recycling streams, as well as the lack of convenient drop-off locations for devices like vapes, this problem is unfortunately not going away anytime soon.

Ryan Fogelman, Vice President of Strategic Partnerships, Fire Rover
April 16, 2025

5 Min Read

Bringing Specialist Markets to Life

FIRE FATALATIES

LITHIUM-ION BATTERY FIRES WERE THE #2 CAUSE OF FIRE FATALITIES IN NYC IN 2023

June 20th 2023
Tragic turning point

Fire in e-bike store at 80 Madison St in Manhattan

- 4 died in apartments above the store
  - 2 females (74 yrs, 82 yrs)
  - 2 males (71 yrs, 82 yrs)
- Aftermath = heightened public attention
  - Li-ion battery safety prioritized by city hall
- Firefighting hazards also illustrated
  - Focus on firefighter safety and best practices


11-12-23
BROOKLYN NY

PRIVATE DWELLING
BROOKLYN NY
NOVEMBER 12, 2023

- **1 Female 81 yrs**
- **2 Males 58 yrs / 33 yrs**

WHY DOES FDNY RECOMMEND NOT STORING OR CHARGING INSIDE

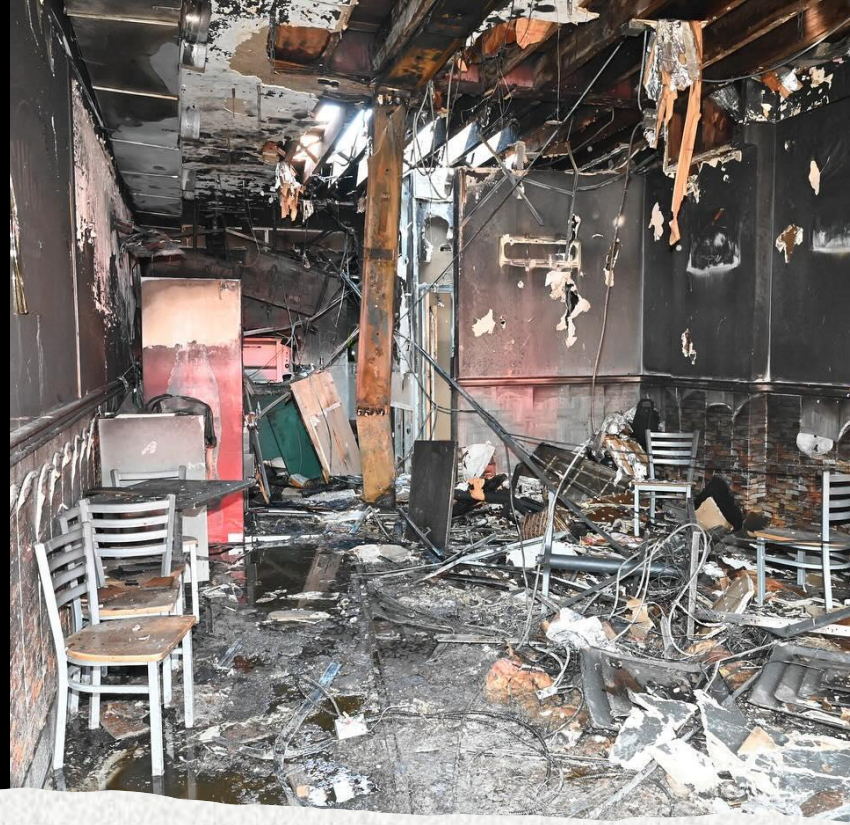
MIXED USE DWELLING

BROOKLYN NY June 2024

1 Male victim

2nd Fatal of 2024

Died 2 months after fire



July 4, 2025

- Pizzeria Queens, NY
- Female 76 yrs old trapped in bathroom
- *1st NYC Fire Fatality in 2025

TOXICITY OF LITHIUM-ION BATTERY FIRES

Study Objectives (summary)

-Aim is to characterize the human health impacts of inhaled TR emissions
-Evaluate state of charge (SOC) on particulate emissions of from lithium iron phosphate (LFP) & Nickel-Manganese-Cobalt (NMC) batteries after TR
-Assess inhalation risks & toxicological profiles of emissions

Preliminary Highlights

- 2 battery cathode chemistries evaluated nickel manganese cobalt (NMC) & lithium iron phosphate (LFP)
- TR particulate emission consist of heavy metals, dependent on battery chemistry.
- TR particulate emission exposure induces DNA damage and EMT in small airway epithelial cells
- Implications of TR particulate emission exposure may be dependent on battery chemistry
- Authors conclude further testing and continued research needs to be conducted into harmful effects of PM exposure
- www.sciencedirect.com/science/article/pii/S016041202500217X

ELSEVIER

Environment International

Volume 199, May 2025, 109466

Full length article

Evaluating inhalation risks and toxicological impacts of lithium-ion battery thermal runaway emissions

Maureen Meister [a 1], Shaligram Sharma [a 1], Xiaojia He [a], Patrick S. Chepaitis [a], Taryn Waddey [a], Mark Wilson [a], Vinay Premnath [b], Judith Jeevarajan [b], Marilyn Black [a], Christa Wright [a]

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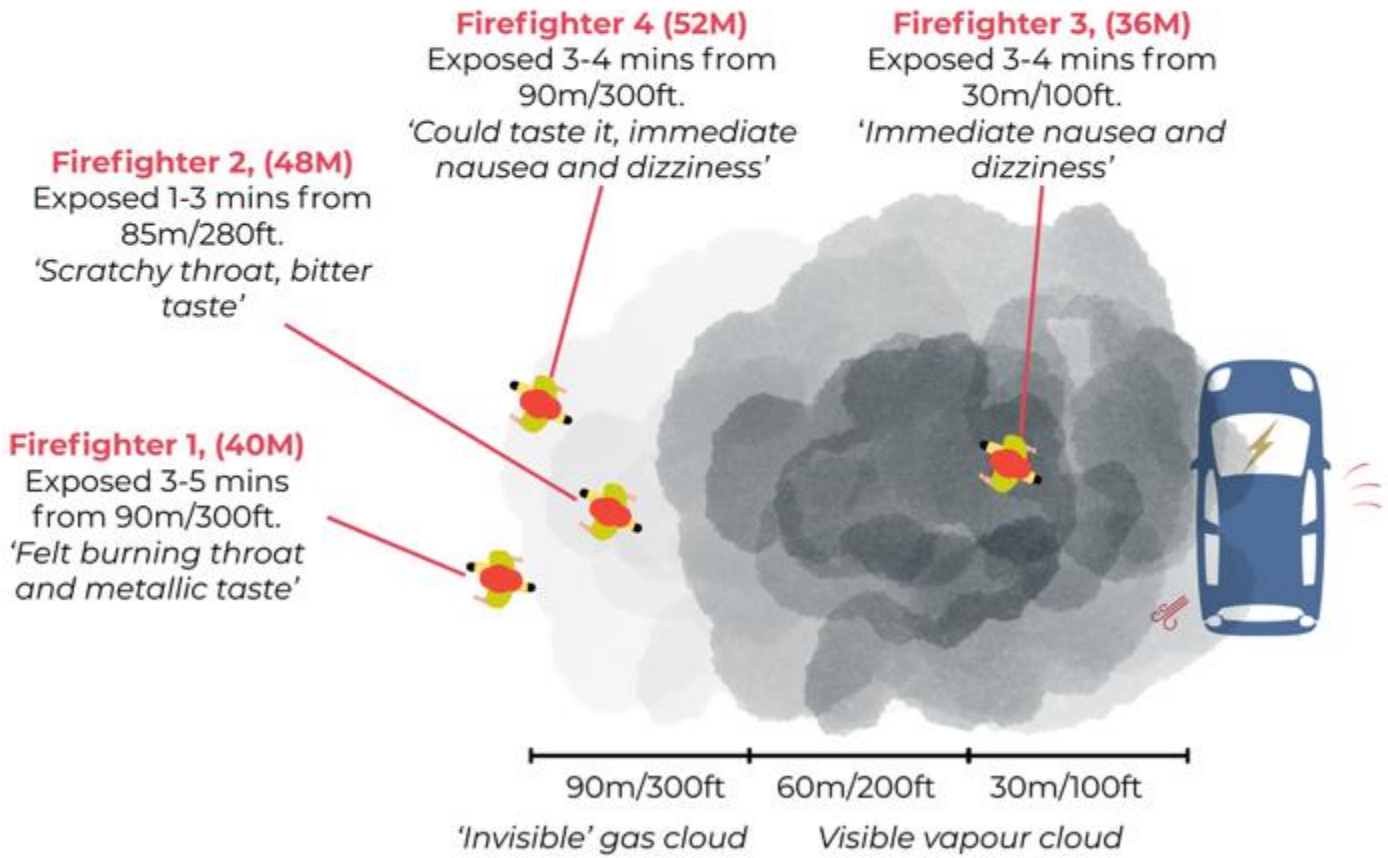
[b] Electrochemical Safety Research Institute of UL Research Institutes, Houston, TX 77204, United States

ELECTRIC VEHICLE COLLISION AND OFF-GASSING CAUSING RESPIRATORY INJURIES TO FIREFIGHTERS

Electric vehicle high speed collision with tree, no thermal runaway at time of incident, battery began off-gassing quickly and unexpectedly during recovery operations while being loaded onto tow truck. Five firefighters were exposed to vapours; all were hospitalised, with only one back on duty.



Incident occurred on 11th April 2025, all firefighters showed symptoms immediately and were hospitalised within 1 hour of exposure.

As of 28th September 2025, firefighter ongoing symptoms include:

- Reduced lung function (<82%)
- Sinus infection
- Elevated heart rate & tachycardia
- Mouth blisters turned into lesions
- Renal problems
- High concentrations of sulfur, phosphorus & lithium in blood tests

Source: Sacramento Fire Department
Prepared by evfiresafe.com and evfiresafe.training

Overpack of Lithium-Ion Batteries

Consequences of Improper Packaging

Madison St. fire battery disposal

- Company did not have proper training
- Used uncertified drums and wrong packaging
- Drums were sealed with no ventilation

Improper packaging did NOT work

- One drum exploded on flatbed in front of fire building
- One drum exploded on the Long Island Expressway
- One drum ignited at storage yard in Suffolk county

THE SIGNIFICANCE OF PROPER MANAGEMENT OF LITHIUM-ION BATTERIES

STORED ENERGY

STRANDED ENERGY

END OF LIFE

No standards for lithium-ion firefighting products

Joint Notice Highlights Potential Risk With Electric Vehicle Firefighting Tactic Involving Fire Blankets

30-May-2025

Key Takeaways:

- Experiments conducted by both organizations have demonstrated a potential explosion hazard when fire blankets are used during electric vehicle (EV) fire suppression efforts when there is battery involvement.
- When flaming is eliminated by the fire blanket, the ongoing accumulation of flammable gases released by continued thermal runaway in the battery pack presents a potential explosion risk.
- The experiments reinforce the need for continued research on EV firefighting tactics.
- The Fire Protection Research Foundation (FPRF), the research affiliate of NFPA, and The Fire Safety Research Institute (FSRI), part of UL Research Institutes, today issued a notice about a potential explosion hazard when fire blankets are used during electric vehicle fire suppression efforts with battery involvement.

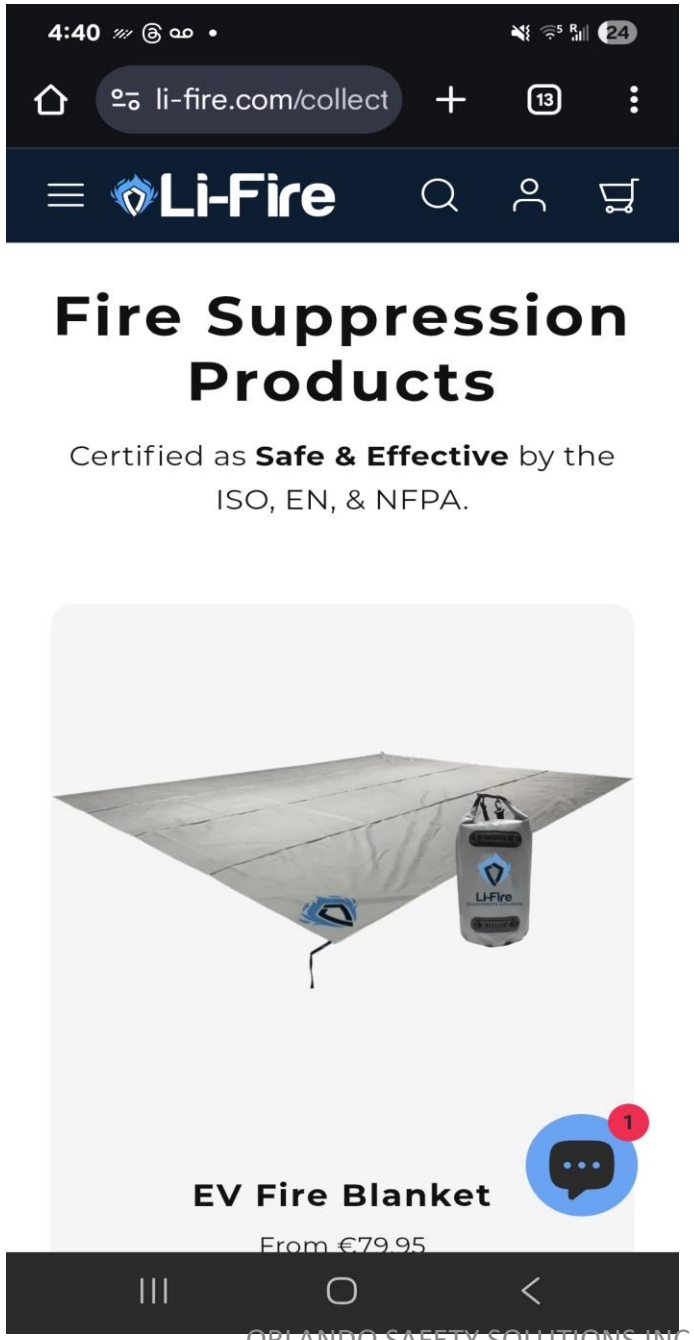
CREATIVE ADVERTISING

NO UL STANDARDS OR NFPA GUIDES EXIST SPECIFICALLY FOR LITHIUM-ION BATTERY FIRE SUPPRESSION

ASTM F15.46 Fire Suppression Blankets for cooking fires

NFPA 701 for curtains and fabrics used commercially (not combustible)

NFPA DOESN'T CERTIFY PRODUCTS



IS THIS A LOCAL NYC PROBLEM

Deflagration & Explosions

Since 2015 FAA had a +456% increase in Lithium-ion incidents
2 TR incidents per week

United States Department of Transportation

Federal Aviation Administration

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Lithium Battery Incidents

Lithium Battery Air Incidents
involving smoke, fire, or extreme heat

Click on any metric or the line icon to filter charts — Details

641 Total Verified Incidents between 03-Mar-06 and 10-Jul-25

43 Year-to-Date Verified Incidents Through July 30, 2025

4* Incidents Pending Verification

Category

Battery Pack/Battery	250
e-Cigarette/Vape Device	136
Cellular Phone	95
Other Electronic Device	81
Laptop	76
Medical Device	3

Carrier Type

479 Passenger

136 Cargo

Lithium Battery Incidents (Past 10 Years)

2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
32	47	50	45	39	54	75	77	89	43

Source: Federal Aviation Administration, Security and Hazardous Materials Safety — Last updated July 30, 2025

TRIP SUMMIT 2025
(Thermal Runaway Incident Program)

- Incidents are second highest since 2019, averaging 2 per week
- Nearly 1 in 5 incidents result in significant passenger disruption
- Vapes and power banks top list of devices TR incidents in passenger travel
  1) Vape/Cigarette 2)Power Bank 3)Cell phone 4)Laptop
- Almost 2 in 5 passengers are packing rechargeable devices in checked luggage – where they cannot be accessed during flight
- Passengers more worried about other's devices than their own
- 15% increase between 2019 and 2024
- 50% of Americans know nothing about lithium-ion batteries
- Average traveler brings four lithium-ion devices on board

Professionals in public safety have a duty to safeguard lives and property.

“The technology and desire for green energy is simply outpacing the safety standards and fire suppression tactics necessary to mitigate worst case scenarios.”

John R Orlando

Founder

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