Webinar for Tribes: Lithium-ion Battery Response Guide

US Environmental Protection Agency (EPA)

June 2026

Intro

In October 2025, The Environmental Protection Agency (EPA) published an On-Scene Coordinator Lithium-Ion Battery Response Guide.

This two-hour webinar will cover key components of the Guide, highlighting what can be translated to tribal emergency responders and environmental programs. During the last hour of the webinar, participants will get the opportunity to sketch an outline for their own guide that meets their needs and programming.

EPA On-Scene Coordinator Lithium-Ion Battery (LIB) Response Guide

Bryan Vasser, US EPA On-Scene Coordinator, Region 4

Superfund and On-Scene Coordinators (OSCs)

Division within EPA tasked with ensuring the cleanup of contaminated sites – hazmat and oil

OSCs are the federal employees who oversee a cleanup when state and local resources are exceeded

Emerging Hazards of Lithium-Ion Batteries

- First site in 2021
  - Warehouse Fires
  - Fires in Transport
  - Wildfire Aftermath
  - Hurricane Aftermath
- Unknown Exposures
- Reignition
- Shipping Complications
- Disposal Complications

Lithium-ion Battery Taskforce

Makeup

- OSCs from all 10 regions
- HQ Research and RCRA personnel

Objectives

- Guidance
- Training
- Research
- To develop proficiency for OSCs and increase external responder capabilities

Routine Response Approach

- Determine hazards
- Determine potential exposures
- Segregate hazards
- Establish an Exit Plan
- Eliminate hazards
  - Neutralization or solidification
  - Off-site disposal
- Identify bottlenecks

Overview of Guidance Document

- Lithium-ion battery background and health and safety considerations
- Presents both the why and how of the decision making process
- Operational guidance that is flexible based on site conditions
- Goal: Education, Risk Reduction, Response Proficiency

Educational Modules

- Battery Basics
- Characteristics of Failure
- Responder Health and Safety
- Air Monitoring
- Firefighting Considerations

Lithium-Ion Battery (LIB) Types

18650
18 x 65 mm

2170
21 x 70 mm

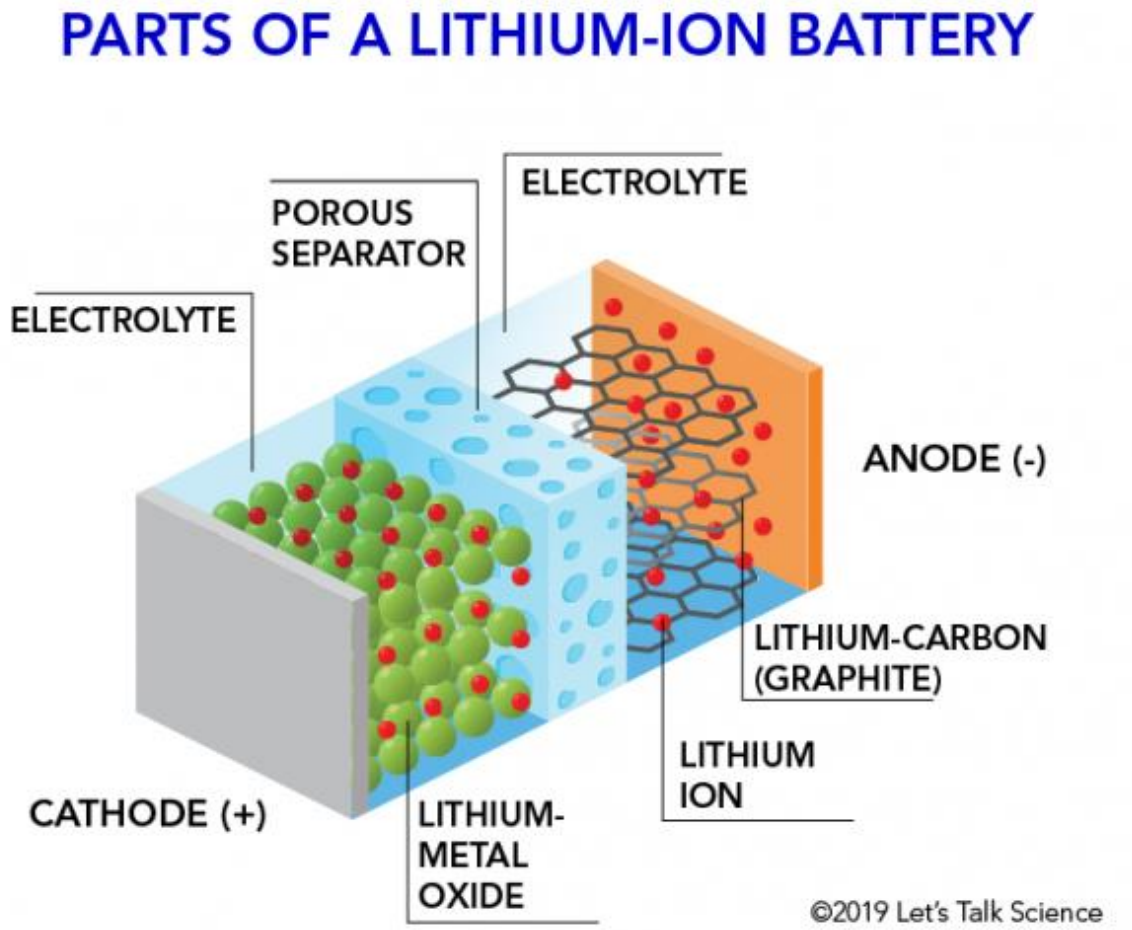
Cylindrical cells (18650) are the most common cell in mobility devices (bikes, scooters, etc.) and are used by electric vehicles with 3,000 to 7,000 cells

Prismatic Cell

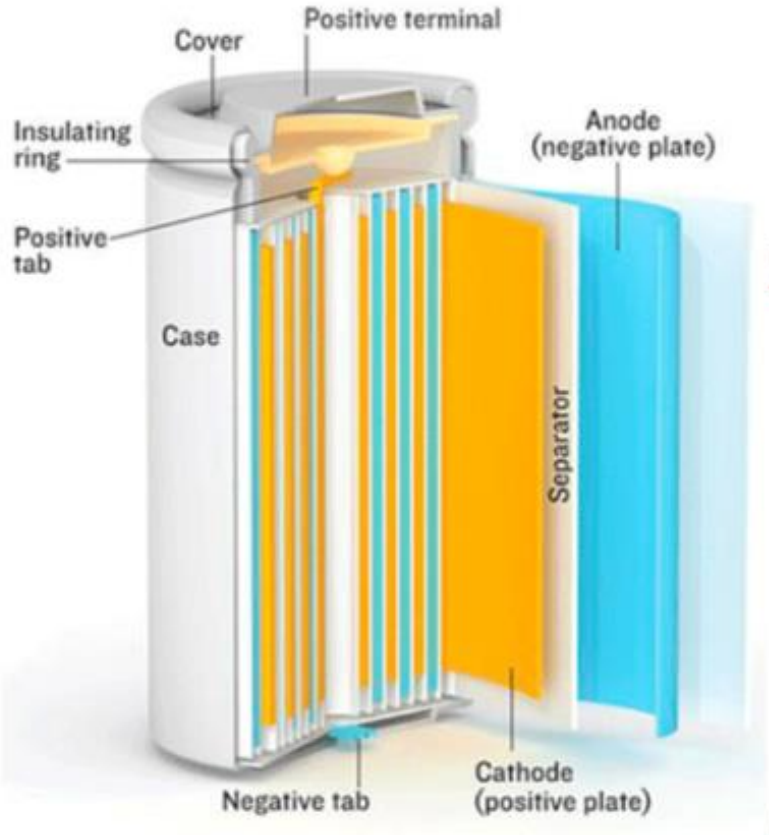
Pouch Cell

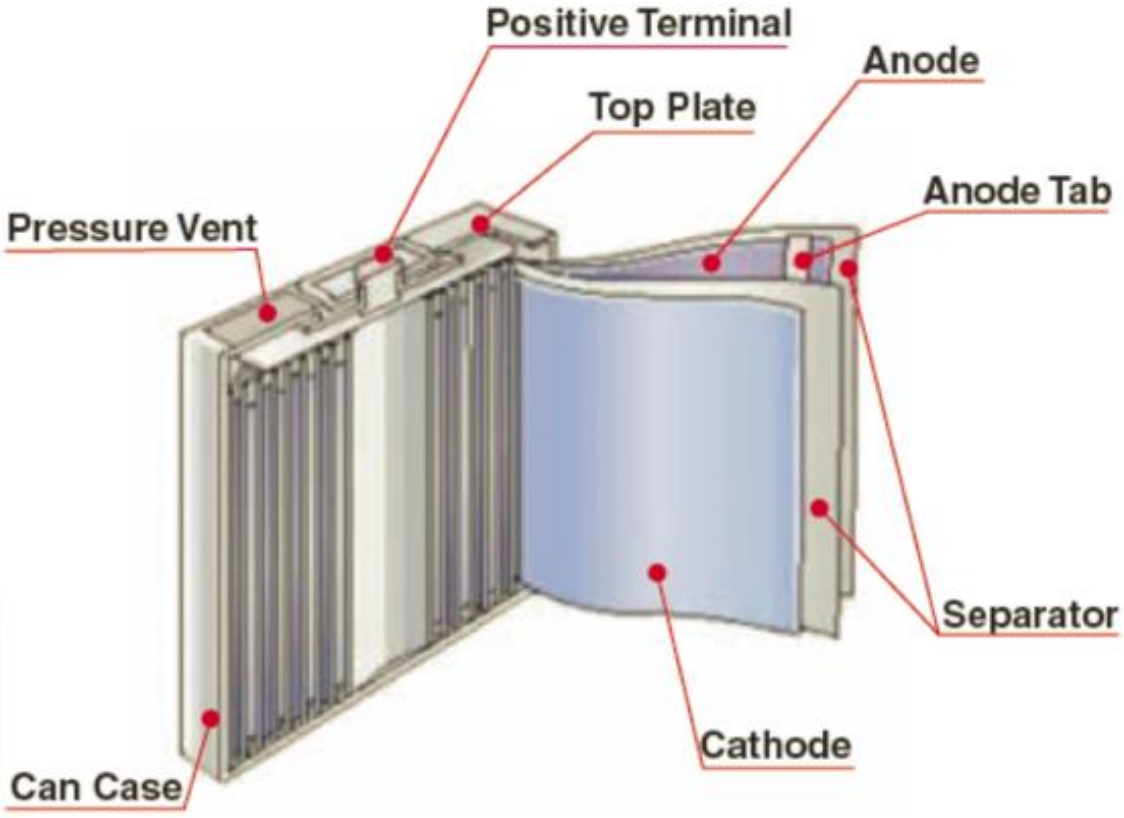
Prismatic and Pouch Cells are found in industrial and consumer electronics, respectively; both are used in electric and hybrid vehicles

Lithium-Ion Battery (LIB) Construction



Cylindrical vs Prismatic



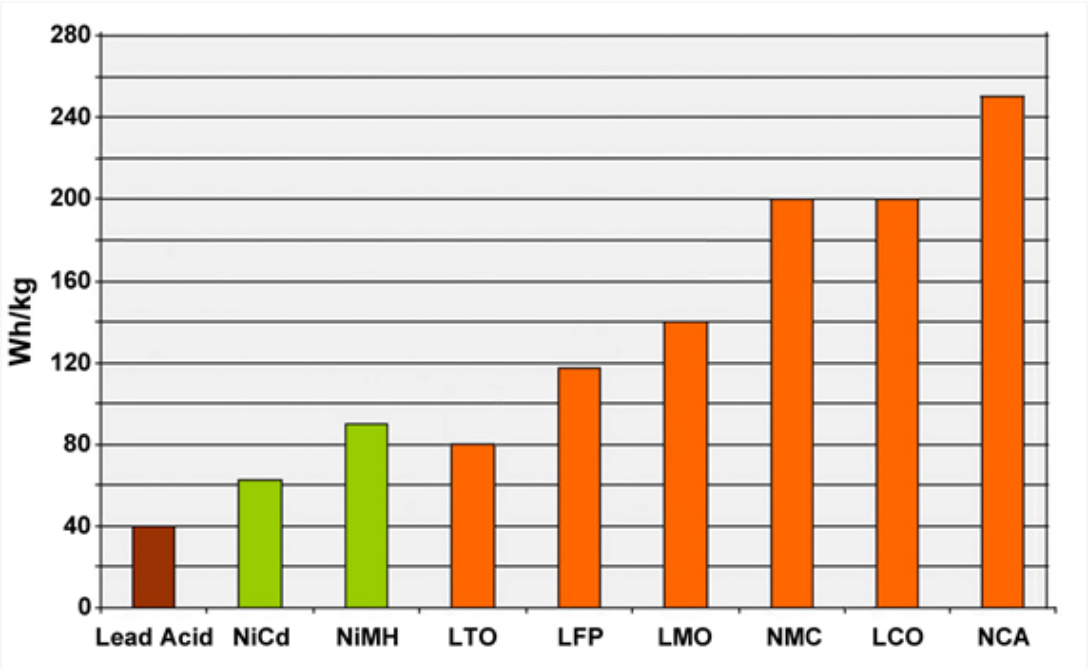


LIB Chemistries

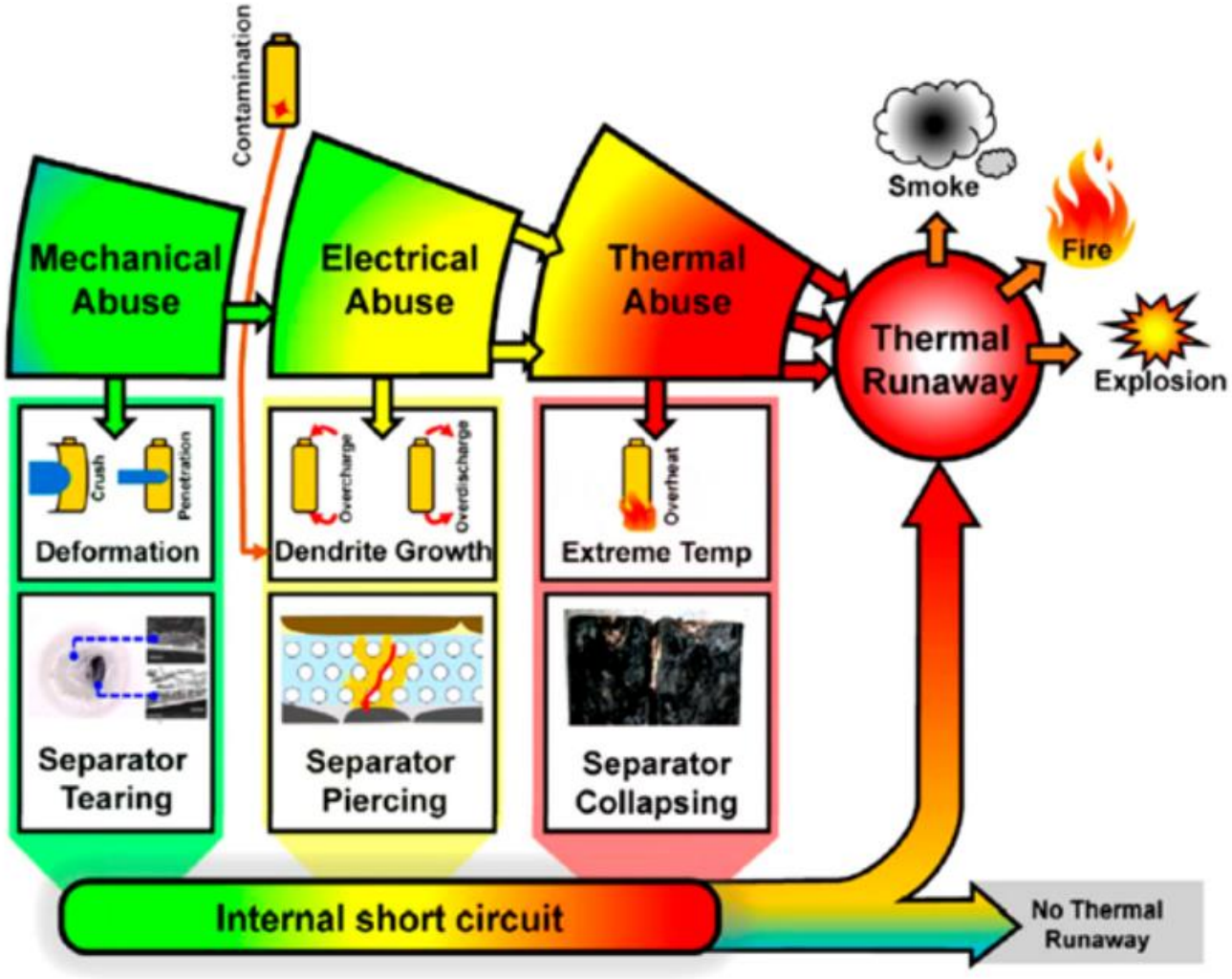
Acronym	Name	Formula
LCO	Lithium Cobalt Oxide	$LiCoO_2$
NCA	Lithium Nickel Cobalt Aluminum Oxide	$LiNiCoAlO_2$
NMC	Lithium Nickel Manganese Cobalt Oxide	$LiNiMnCoO_2$
LMO	Lithium Manganese Oxide	$LiMn_2O_4$
LFP	Lithium Iron Phosphate	$LiFePO_4$
LTO	Lithium Titanate	Li_2TiO_3

Chemistries cannot always be mixed in recycling

Energy Density by Chemistry



Characteristics of Failures



Additive Mechanism

LIB Toxic/Flammable Vapors

Flammable and Toxic Vapors:

- Hydrogen (30%-50%)
- Carbon Monoxide
- Carbon Dioxide
- Hydrogen Fluoride
- Hydrogen Chloride
- Hydrogen Cyanide
- Phosphoryl Fluoride
- Organic Solvent Droplets
- Ethane, methane, and other hydrocarbons

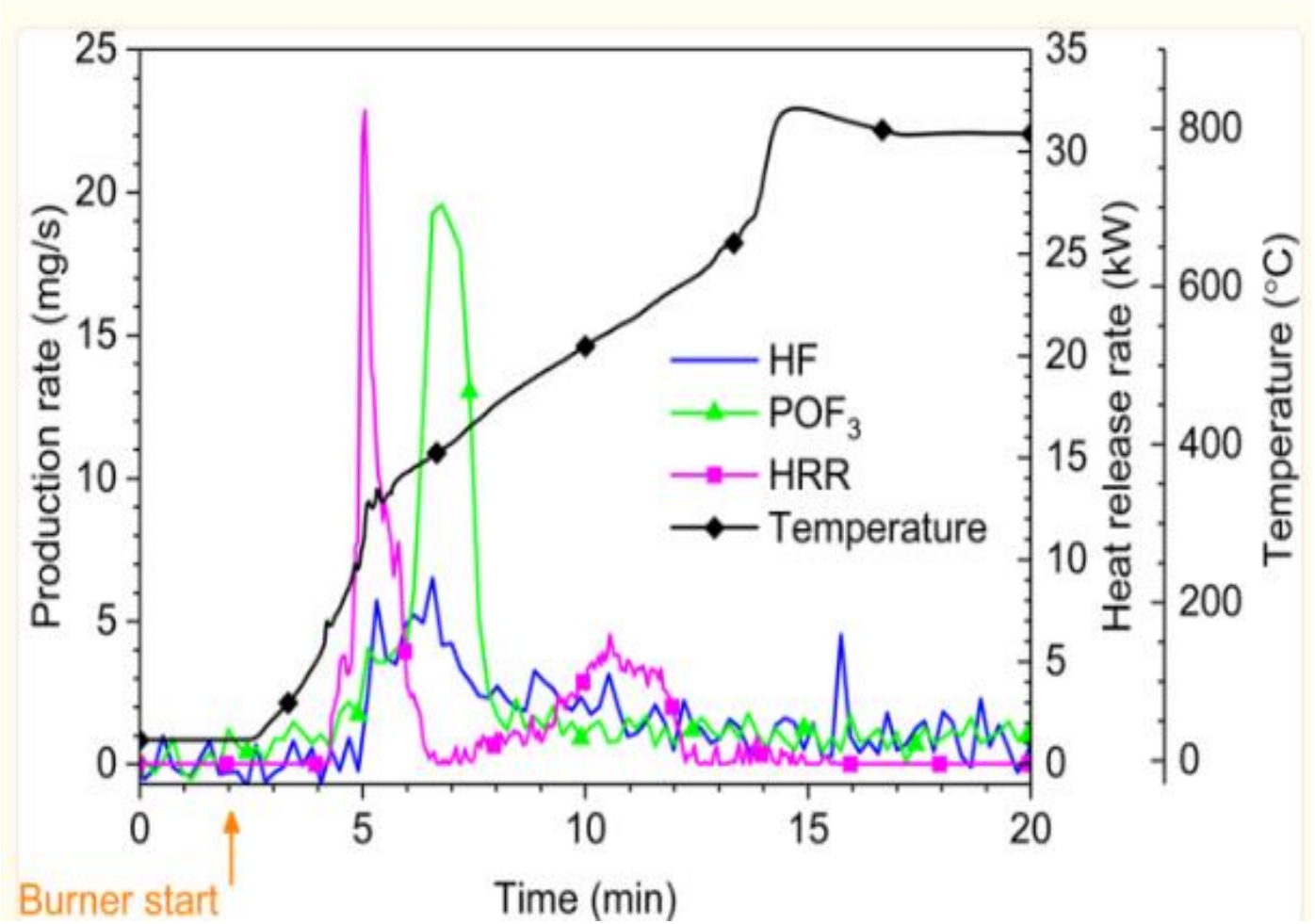


Image Source: Larsson et. al, 2017.

Health and Safety Concerns

Routine Hazards

- Slips/trips/falls
- Crushing/striking
- Lacerations
- Lifting injuries

Battery Specific Hazards

- Electrocution
- Thermal Burns
- Explosions/Fires
- Chemical Hazards from Vapor

Vapor Production highly variable

Vapor contents poorly characterized and heavily battery chemistry dependent

Uses all available data, including unpublished data

SAN DIEGO LITHIUM-ION BATTERY FIELD STUDY DATA SUMMARY:

AIR SAMPLING

Sampling Method	Media	Target Analytes
ASTM-D-1945	Tedlar Bag, vacuum box, pump	H2, CO, O2 ppm (v/v) and (m/m)
NIOSH 6010	Colorimetric tubes, pump	HCN
NIOSH 7902	Filter cassette, pump	HF (vapor and soluble particulate)
NIOSH 7303	Filter cassette, pump	Ag, As, Ba, Be, Cd, Co, Cr, Cu, Mo, Ni, Pb, Sb, Se, Tl, V, Zn Expanded list: Al, Fe, Mn, Sr, Sn, Ti

Run #	Test Media	Air Sampling Data									
3	8 LiFePO4 18500 "Low SOC"		H2	CO	O2	HCN	HF (vapor)	HF (particulate, mg/m3)			
		ppm	260	<100	277k	ND	25	0.23			
			Cu	Ni	Sb	Zn					
		µg/m3	350	7	130	60					
7	8 NMC Mollicel ISS 21700 <100% SOC		H2	CO	O2	HCN	HF (vapor)	HF (particulate, mg/m3)			
		ppm	230	740	265K	ND	0.58	43			
			Ag	Ba	Co	Cu	Ni	Pb	Sb	Tl	Zn
		µg/m3	6	19	18000	29000	190k	30	570	130	9500
			Al	Fe	Mn	Sr	Ti				
		mg/m3	2500	140	21	1.1	64				
9	18 NMC Mollicel ISS 21700 100% SOC		H2	CO	O2	HCN	HF (vapor)	HF (particulate, mg/m3)			
		ppm	400	790	255k	2.5	0.94	1.3			
			Ba	Co	Cu	Ni	Sb	Tl	Zn		
		µg/m3	3	2800	650	26000	210	20	350		
			Al	Mn	Sr	Ti					
		mg/m3	2400	6.6	0.76	2.9					
11	48 NMC Zheijang Skateboard 21700 <40V SOC		H2	CO	O2	HCN	HF (vapor)	HF (particulate, mg/m3)			
		ppm	230	740	265k	ND	0.58	43			
			Co	Cu	Ni	Sb	Zn				
		µg/m3	220	43	1900	120	70				
			Al	Mn							
		mg/m3	70	0.24							
12	48 NMC Zheijang Skateboard 21700 100% SOC (49.6V)		H2	CO	O2	HCN	HF (vapor)	HF (particulate, mg/m3)			
		ppm	240	1480	247k	0.87	0.77	24			
			Ba	Co	Cu	Ni	Pb	Sb	Tl	Zn	
		µg/m3	21	7600	7500	70000	430	1400	60	1100	
			Al	Fe	Mn	Sr	Sn	Ti			
		mg/m3	1000	12	6.9	0.83	21	4.2			
13	3 x NMC Zheijang Skateboard in Akkugrain Box (144 cells total) 100% SOC		H2	CO	O2	HCN	HF (vapor)	HF (particulate, mg/m3)			
		ppm	14400	16720	264k	ND	0.56	17			
			Ba	Co	Cu	Ni	Pb	Sb	Zn		
		µg/m3	46	3600	2300	33000	220	240	470		
			Al	Fe	Mn	Sr	Sn	Ti			
		mg/m3	650	13	0.54	0.15	21	1.8			

Yellow = over OSHA PEL, Green = H2 over MIE 4% LEL

Occupational/Industrial Limits for Metals of Concern (µg/m³)

Metal	Carcinogen?	IDLH	NIOSH REL (10-hr TWA)	OSHA PEL (8-hr TWA)
Aluminum	No	-	10,000	15,000
Antimony [a]	No	50,000	500	500
Arsenic [a,b]	Yes	500	2b	10
Barium	No	50,000	500	500
Beryllium [a,c]	Yes	400	0.5	2
Cadmium [a]	Yes	900	N.E.	0.005
Chromium [a]	No	250,000	0.5	1
Cobalt [a]	No	20,000	0.05	0.1
Copper [d]	No	100,000	1	1
Iron	Yes	2,500,000	5,000	10,000
Lead [a,e]	No	100,000	50	50
Manganese [a,f]	No	500,000	1,000	5,000
Mercury [a,g]	No	10,000	0.1	100
Molybdenum	No	1,000,000	5,000	5,000
Nickel [a,h]	Yes	10,000	15	1000
Selenium [a,i]	No	100	200	200
Silver	No	10,000	10	10
Strontium	No	-	-	-
Thallium	No	15,000	100	100
Titanium	No	-	-	15,000
Tin	No	25,000	2,000	2,000
Vanadium [j]	No	35,000	50	50
Zinc	No	500,000	5,000	15,000

IDLH = Immediately Detrimental to Life and Health

NIOSH = National Institute of Occupational Safety and Health REL= Recommended Exposure Limit

OSHA = Occupational Safety and Health Administration PEL= Permissible Exposure Limit

a Metals designated as Hazardous Air Pollutants by the EPA.

b NIOSH REL for arsenic is a 15-minute ceiling

c OSHA PEL for beryllium has a 30-minute ceiling of 5 µg/m3

d Additional REL of 0.1 and PEL of 0.1 for copper fume

e NIOSH REL for lead is an 8-hour TWA standard

f NIOSH short term exposure limit (STEL) for manganese is 3,000 µg/m3 and the PEL is a

g NIOSH REL for mercury for skin is 50 µg/m3 and the REL is a ceiling

h Nickel as Ni(CO)4 has an IDLH of 14,000 µg/m3 and an REL and PEL of 7 µg/m3

i Selenium as SeF6 has an IDLH of 2000 µg/m3 and an REL and PEL of 400 µg/m3

j NIOSH REL for vanadium is a 15-minute limit

PPE reasoning: beyond just guidance

Personal Protective Equipment (PPE) considerations:

- Flame Resistant Coveralls
- Hydrofluoric acid (HF) Dermal Protection (gloves and boots)
- Self Contained Breathing Apparatus (SCBA) or Supplied Air Respirator (SAR)
- Respirator Cartridges and Particle Size (P100)
- Use best reasoning per incident

HazMat Suits: Levels of Protection (HAZWOPER-OSHA.com)

Level A	Level B	Level C*	Level D
positive pressure, **full-facepiece SCBA**/ positive pressure supplied-air respirator with escape SCBA, totally encapsulated chemical- and vapor-protective suit, inner **chemical-resistant gloves, chemical-resistant safety boots,** and two-way radio communication system.	Positive pressure**, full-facepiece SCBA** or positive pressure supplied-air respirator with escape SCBA; liquid splash-protective suit; inner chemical-resistant gloves; **chemical-resistant safety boots;** two-way radio communication system; and hard hat.	Full-facepiece, air-purifying, canister-equipped respirator; **chemical-resistant gloves and safety boots;** a two-way communication system; and a hard hat. (Face-shield and escape SCBA optional) **Most commonly used by EPA for LIB response, but with modifications to include flame-resistant overalls.*	Coveralls, Safety boots/shoes, Prescription safety Glasses or chemical Splash goggles (Gloves optional)

Firefighting Strategies and Tactics

- Not intended as direct guide for fire department, but is included to inform secondary response partners
- BESS Firefighting Strategies
  - Residential
  - Commercial
- EV Firefighting Strategies
  - Firefighting
  - Extrication
- Micro-mobility

Battery Energy Storage Systems (BESS)

Electric vehicles/Personal vehicles

Any rechargeable personal devices and/or appliances

Operational Modules

- Site Setup and Stabilization
- Battery Pack Disassembly
- De-energizing and Brining
- Battery Deconstruction
- Packaging and Transportation
- Disposal

Overview of LIB Response

- Lithium-ion battery sites vary in size and scope
- Cleanup approach is site-specific
- Operational Modules are flexible—apply as needed
- Goal: Safe, cost-effective operations

Every Site We Work

Triage

- Determine hazards
- Determine potential exposures
- Segregate hazards
- Eliminate hazards
  - Through neutralization or solidification
  - Off-site disposal
  - Containment on-site

Establish an Exit Plan

- Identify bottlenecks
  - Shipping and disposal are most common bottlenecks

Operations Modules

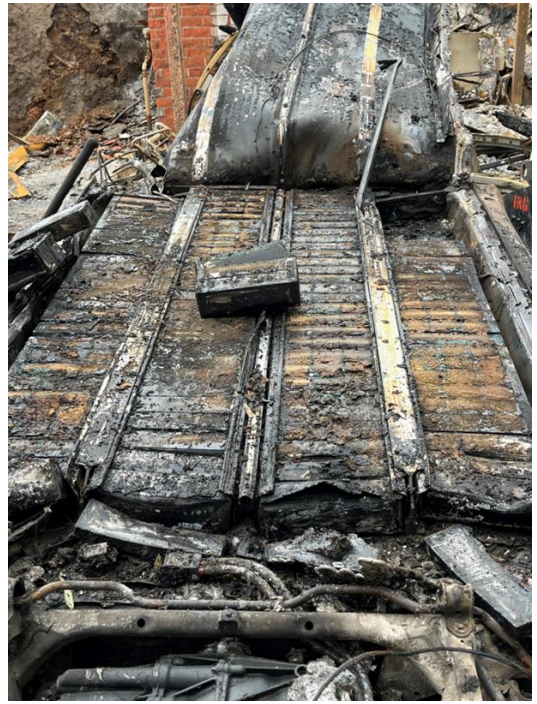
- Site Set-up and Stabilization
- Battery Pack Disassembly
- De-energizing and Brining
- Battery Deconstruction
- Packaging and Transportation
- Disposal

Site Set-up and Stabilization

- Site Footprint
- Fire Preparedness
- Air Monitoring Considerations
  - Suspended Particulate Matter (SPM), AreaRae, and potentially DustTrak
- PPE
- Decontamination

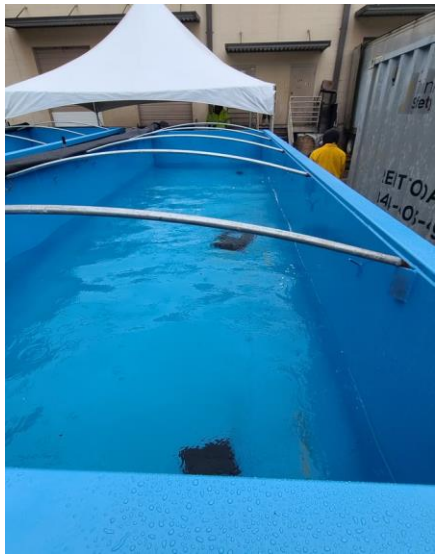
Battery Pack Disassembly

- Optional step based on site needs
- Conduct when:
  - Pack is waterproof and prevents de-energizing
  - Cell evaluation is required
  - Shipment requires deconstruction
  - Not always necessary for small/intact packs



De-energizing & Brining

- For energized, damaged DDR batteries
- Not needed if batteries are clearly undamaged
- NEVER assume all batteries are safe
- De-energizing Methods
  - Resistive Discharge
  - Brining



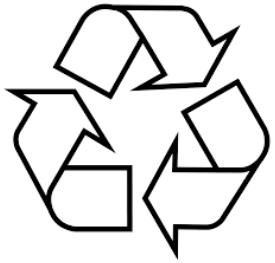
Battery Destruction

- Consider when DDR shipping costs are excessive or shipment is impossible
- Must follow RCRA and hazardous waste rules
- Deconstruction makes batteries "not batteries", speaking regulatorily, but still a waste that needs to be characterized/profiled

Packaging and Transportation

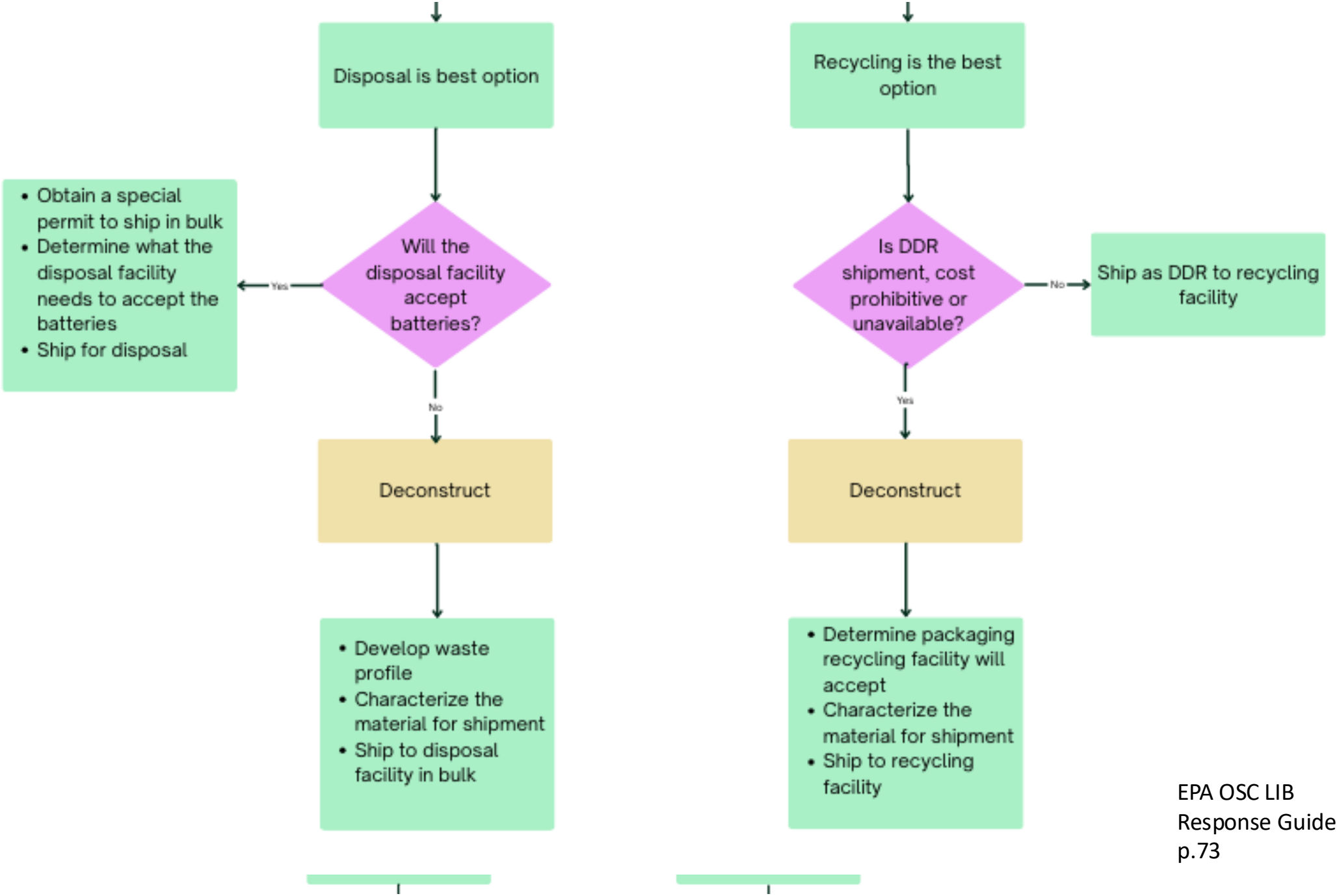
- Department of Transportation (DOT) regulations:
  - applies to nearly all lithium-ion battery sites
  - DOT regs vary based on battery condition
- **Deconstructed** = "not batteries" → shipping regs based on waste characteristics
- **Intact** = subject to full battery shipping regulations
  - Regardless of state of charge
  - Likely DDR shipping regs

Disposal



- Recycling is preferred
  - More expensive
  - More restrictive

- Disposal/Landfilling is more complicated than normal waste
  - Due to newness
  - May require testing outside of normal waste profiling testing (e.g. leachate reactivity testing in SoCal)



EPA OSC LIB Response Guide p.73

Want to Learn More?

OSC On-Scene Coordinator

Profile Documents Login

Region 4 Lithium Ion Battery Outreach

Site Contact:
Bryan Vasser
On-Scene Coordinator
(vasser.bryan@epa.gov)

Site Location:
Atlanta, GA 30303
response.epa.gov/R4LithiumIonBatteryOutreach

Resources

Documents

- The EPA OSC Lithium-Ion Batter...
- First powerpoint of the two da...
- Battery construction and expla...
- Firefighting strategies, tacti...
- All Documents

This website will serve as the primary location for EPA Region 4 Superfund and Emergency Management Division to share information and presentations regarding lithium ion battery fires with state and local agencies within Region 4.

The document section contains multiple powerpoint presentations regarding lithium ion battery fires.

A link to a google drive with SOPs and information from the San Diego Fire Department is here.

A link to a google drive with a presentation and response worksheets developed by TEMA is here.

A link to a google drive with SOPs and information from The HazMat Guys is here.

A link to a google drive with SOPs and information from the New York Fire Department is here.

Users of this site and the contents therein are prohibited from engaging in any form of selling, commercializing, and/or profiting from the materials provided.

https://response.epa.gov/site/site_profile.aspx?site_id=16141

Questions?


UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
EPA
EMERGENCY
RESPONSE

A Guide to Your Guide

Developing and/or Enhancing Your Own Lithium-ion Battery Response Guide

1. Source of LIBs

- What are the most likely source(s) of Lithium-ion Batteries (LIBs) in your community and where might they be located?

2. Potential Exposures

- Who could potentially be exposed during a LIB fire?
- If runoff occurs, are there potential environmental exposures?
- Are there potential fire exposures (dry brush, surrounding buildings, etc.)?
- Who are the main responders?
- What are the main exposure routes. (Air route, dermal route, eating, injection etc.)

3. Response Limitations

- Based on the geographic dimensions of your community, what personnel and other resources could be deployed to respond to a lithium-ion battery fire in the first hour? The first five hours? The first 24 hours?

- How would those personnel and other resources be deployed? Who is paying for them? What other challenges might they face in transit to the response, and when they arrive on site?

- What other training or equipment challenges might your community be facing?

- Are there knowledge gaps in your community about the risks and dangers of lithium-ion battery fires that would cause challenges if evacuation orders were necessary?

4. Potential Response Plan

- Identify primary responders for the identified sources.
- Identify appropriate mitigation strategies/tactics considering the potential exposures and known limitations.
- Knowing the risks of LIB fires, how would you keep personal protective equipment (PPE) ready to be deployed? How would a LIB response effect response capabilities for other incidents?
- Are there other stakeholders or other supporting agencies that could support a response in your community?

5. Remediation Plan

- Do you have a waste facility in your community capable of disposing LIBs?
- If you do not have a waste facility in your community capable of disposing LIBs, where would you be sending them?
- Do you have vehicles capable of transporting LIB waste? Will you need to contract them from outside your community?
- See the *Lithium-ion Battery EPA Site Management Decision Tree* on page 66 of the OSC Guide. What changes would you make to the tree to match your needs?

6. Flip the Script

- In a scenario where thermal runoff, smoke, or other risks from a LIB fire are emanating from a source that is not on your community but may still impact it, what would you do?

Stay in Touch!

Email:

Tribal-Emergency-Preparedness@epa.gov

Sign Up for the Listserv:

https://www.epa.gov/tribal-lands/forms/tribal-emergency-preparedness-and-response-webinars#notifications