

LiB Fires & the "ST[🔥]TIC" Cleanup Phase

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Supervising Hazmat Specialist
LACoFD – Health Hazmat



County of Los Angeles
FIRE
DEPARTMENT

Define a *STATIC* Incident?



Malibu Incident

Overview

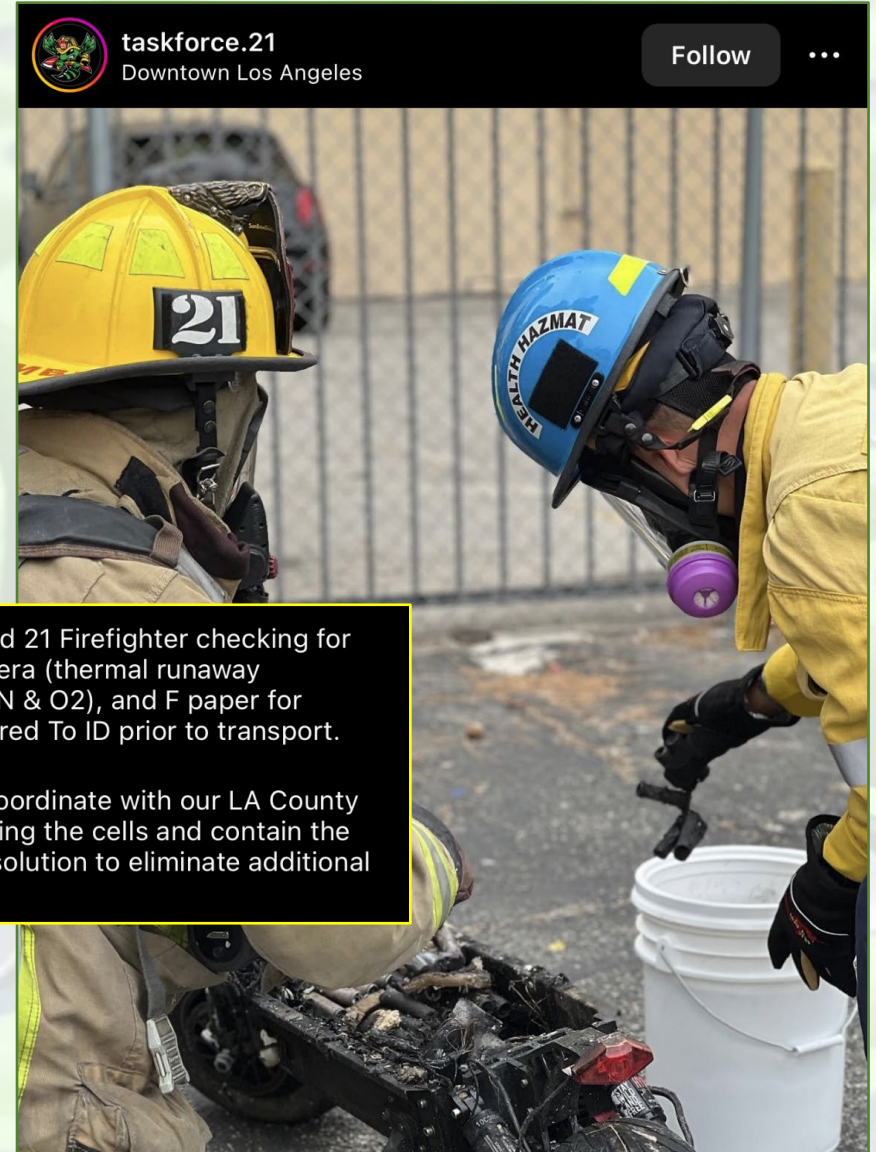
- **Health Hazmat's Role**

- Support (air monitoring)
- Mitigation (re-ignitions)
- Oversight (disposal)

- **Response Guidelines**

- Battery Assessment
- De-energization
- Follow-up
- Disposal

- **Incident Reviews**

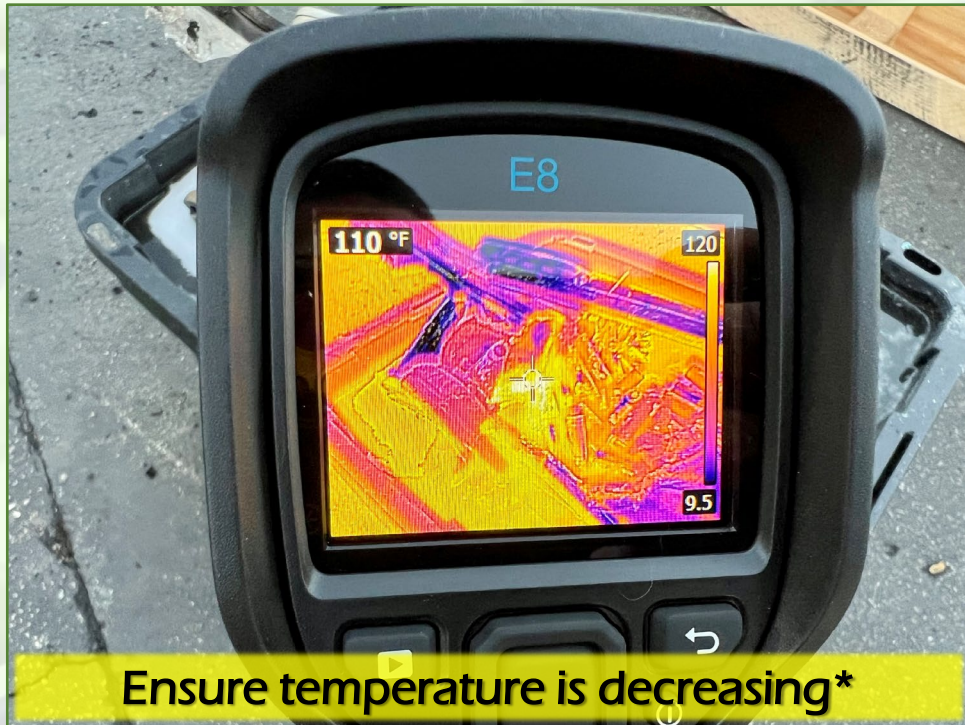


Sylmar Incident

- LA City Fire Jurisdiction
- Business used battery pack to power mfg. equipment.
- Li-ion (NMC) battery pack
 - 7 modules (840 cells)
 - 9 kWh total energy



Battery Assessment

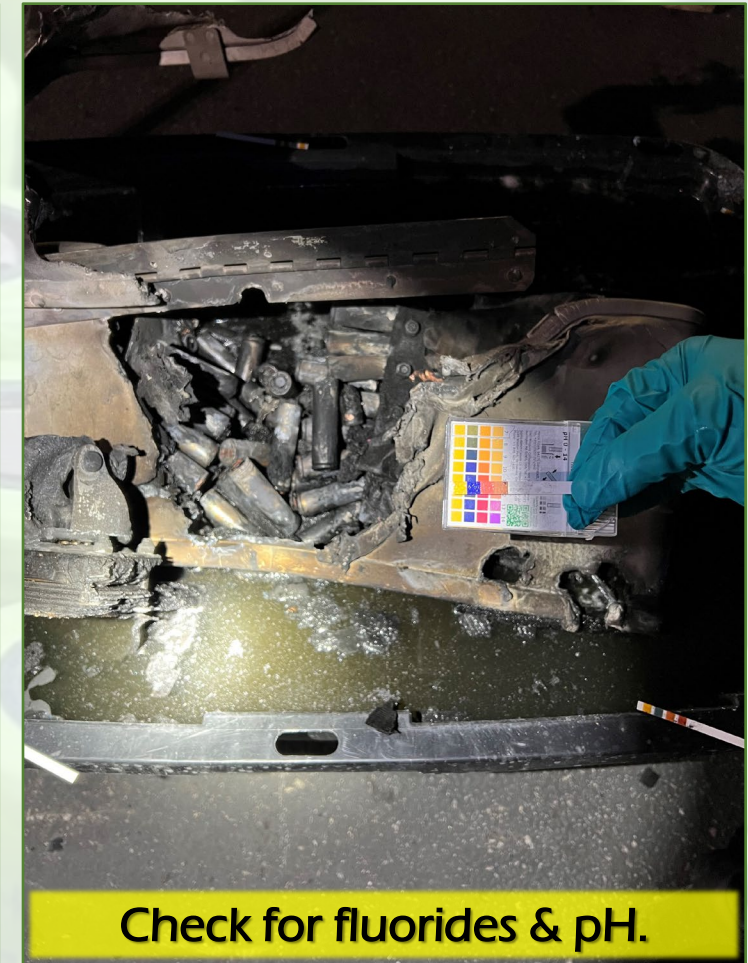


Ensure temperature is decreasing*

*NOT indicative of reignition potential.



Monitor for LEL, HCs, CO, HF...



Check for fluorides & pH.

Air Monitoring - Combustion

THERMAL RUNAWAY

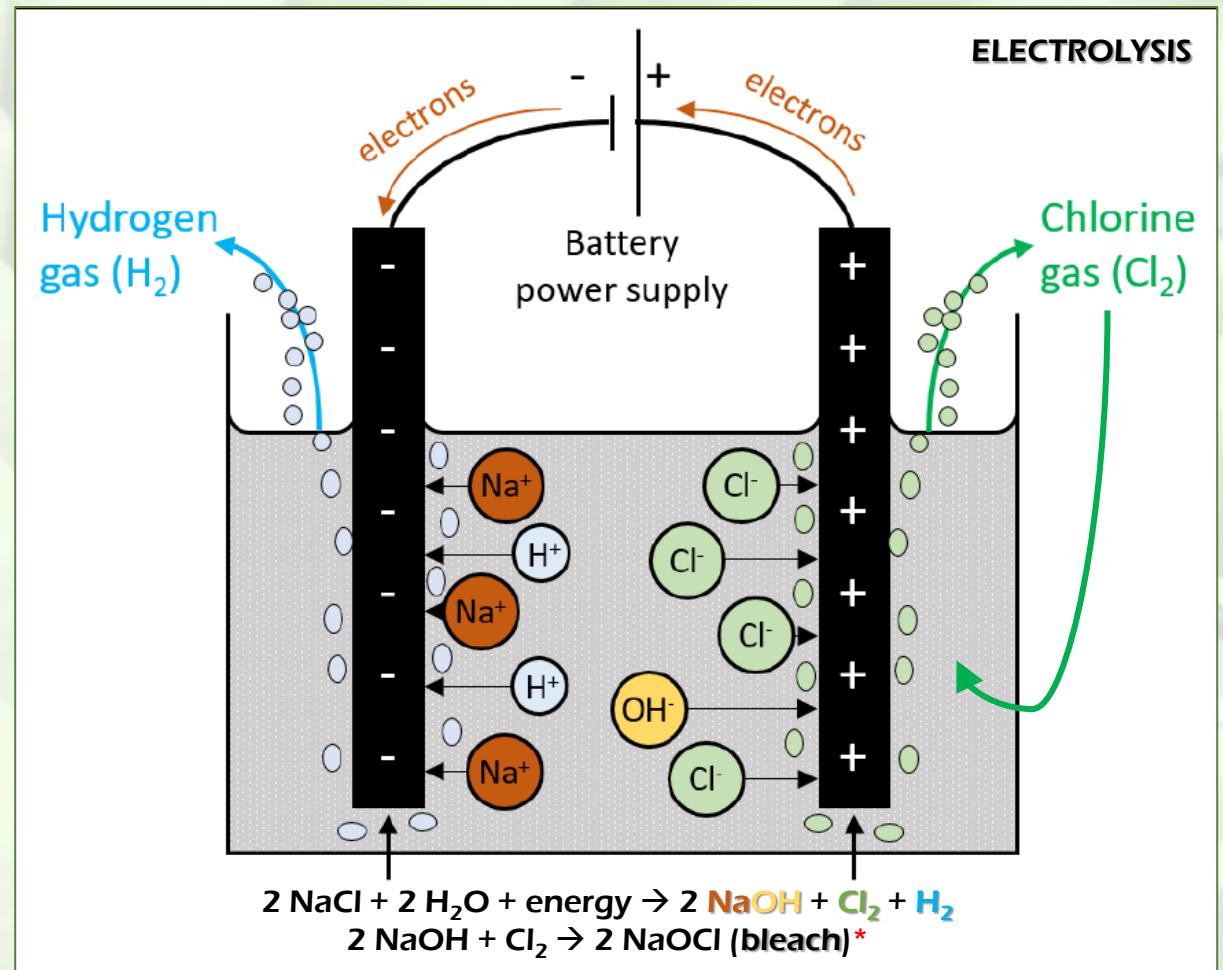
- Flammable gases:
 - Methane, ethane, ethylene, H₂.
- Carbon monoxide (CO)
- Hydrofluoric acid (HF)
 - From electrolyte
- Hydrogen cyanide (HCN)
 - From plastics/adhesives.
- Particulates (smoke)



Air Monitoring - Electrolysis

DE-ENERGIZATION

- Hydrogen gas (H₂)
 1. H₂ sensor
 2. LEL, or
 3. CO (cross sensitivity)
- Chlorine (Cl₂)
 - Cl₂ converts to bleach*
 - Higher energy LiBs can liberate Cl₂ gas.
- Volatile organics compounds (VOCs)
 - need more data.



De-energization & Follow-up



10% NaCl solution



De-energizing time – 3 weeks.



Monitor for LEL, H₂, Cl₂, VOCs.

Transportation & Disposal

Form Approved, OMB No. 2050-0029

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: 1
2. Page 1 of 2
3. Emergency Response Phone: 800.624.9736
4. Manifest Number: 167-BLCC-08-10486

5. Generator's Name and Address:
Crosby and Overton
1630 W. 17th Street
Long Beach, Ca 90812 562.432.5445

6. Designated Facility Name and Site Address:
UN 3480 Waste Lithium Ion Battery 9. PA11

10. Containers	11. Total Quantity	12. U.S. DOT Hazard Class	13. Waste Codes
No.	Type	UN/PL	
001	DF	9B	P

14. Special Handling Instructions and Additional Information:
96.1) Burnt Lithium Ion battery
Local Proper DPE value handling

15. Generator's Signature: L NITA SENGUPTA, Date: 7/27/23

16. International Shipments: Import to U.S. Export from U.S.

17. Transporter's Signature: JOSE TOPAS, Date: 7/27/23

18. Discrepancy: Quantity Type Residue Partial Rejection Full Rejection

19. Alternate Facility (or Generator):

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a.

EPA Form 1700-22 (Rev. 3-20) DESTINATED FACILITY STATE (IF REQUIRED)

Hazardous waste?

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CONTAINS HAZARDOUS MATERIALS

STRAIGHT BILL OF LADING - ORIGINAL - NOT NEGOTIABLE

Carrier RECEIVED: 24

TO: Consignee Lighting Resources Inc, Street 805 E. Francis, Destination Ontario, Ca, Zip 91761

FROM: Shipper, Street, Origin

Route Best possible, Delivering Carrier, Vehicle Number GT-198, U.S. DOT Hazmat Reg. No.

Number and Type of Packages	HM	I.D. Number	Description of Articles	Hazard Class	Pkg. Grp.	Total Quantity (net wt, volume, or activity)	Weight (net wt, volume, or activity)	Class or Rate
01	X	UN3480	Lithium Ion battery	9	11	200		

18. Discrepancy: Quantity Type Residue Partial Rejection Full Rejection

19. Alternate Facility (or Generator):

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a.

EMERGENCY RESPONSE TELEPHONE NUMBER

Universal waste?



DOT Approved?

DOT Packaging

- **Damaged, Defective or Recalled (DDRs) LiBs.**
 - 49 CFR 173.185(f) or via DOT Special Permit
- **Summary:**
 - Individual, non-metallic inner packaging that completely encloses the cell or battery.
 - Cushioning material that is non-combustible, electrically non-conductive, and absorbent surrounding the inner packaging.
 - One lithium-ion battery per inner packaging, and only one inner packaging per outer group 1 performance packaging.
 - Forbidden for transportation by aircraft.
- **DOT Special Permit**
 - Vented container.
 - Inner liner filled with fire suppressant material (e.g. CellBlockEX, Extover, roofing insulation).
 - Multiple batteries with cushioning.
 - Watt-hour ratings.



Lessons Learned – Sylmar

- Fire Agency Coordination
 - LAFD JHAT
 - Incident briefings
- Containers
 - Appropriate sizes
 - Safe storage location
- Air Monitoring
 - Thermal runaway (combustion) **vs.** De-energization (electrolysis)
- DOT Approved Packaging
 - Damaged, Defective or Recalled (DDRs) lithium-ion batteries.

Nissan Leaf Incident

- LA City Fire Jurisdiction
- Resident used LiBs to power backhouse rental.
- 7 x Li-ion (NMC) modules
 - 56 total pouches
 - 12 kWh total energy



Assessment & De-energization



LAFD Engine 64

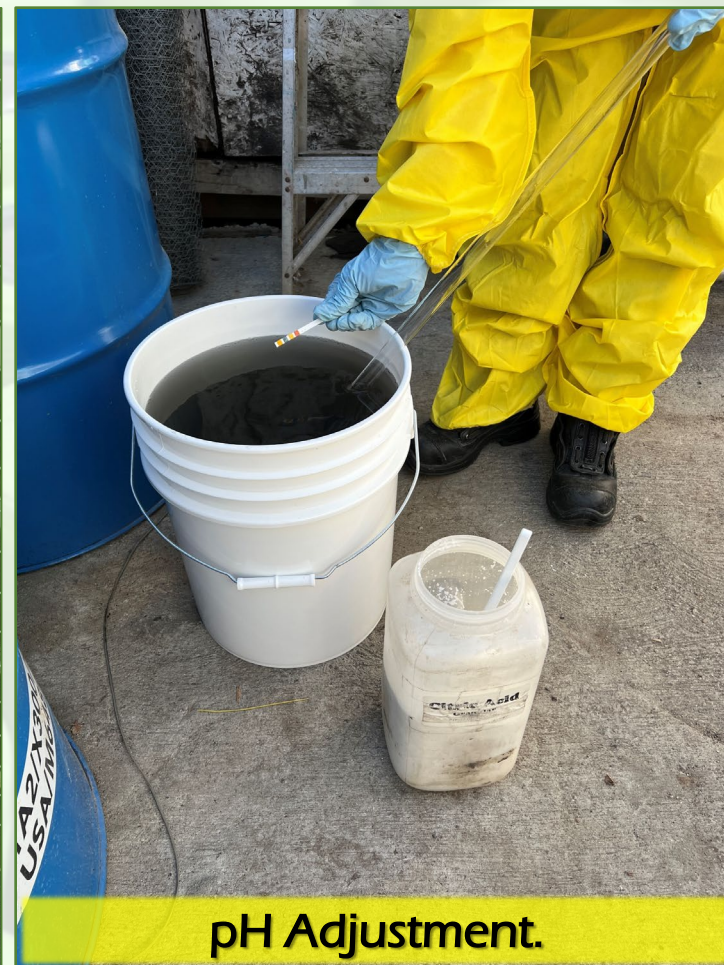


CellSafe MAX 55-gal. drum



Electrolysis

Follow-up & Disposal



Disposal



Verifying energy dissipation.



Note - smelled like Juicy Fruit.



PW coordination to HHWs.

Lessons Learned – Nissan Leaf

- **Verifying De-energization Process**
 - 10% NaCl solution worked
 - Terminals corroded but de-energization still occurred.
 - Visible sign of gas formation (i.e., bubbling, fizzing).
 - Poly drums/containers with bungs for venting.
 - Continued air monitoring for LEL/CO (head space vs. vented).
 - Use multimeter to check voltage, if possible.
- **Coordination with Public Works/Sanitation to dispose of residential LiBs at HHWs.**
- **Lab Analyses of De-energizing Solution**
 - Multiple data sets – All below CA HW thresholds for heavy metals, fluorides, pH, and fish bioassay.

E-Bike Incident

- LA County Fire jurisdiction.
- E-Bike retail store.
- Customer returned LiBs in storage awaiting shipment back to manufacturer.
- Li-ion (LFP) battery packs.
 - 600-800 Wh / modules.
 - 40-60 modules in total.



Lessons Learned – E-Bike

- Coordination with LACoFD
- De-energization Issues:
 - Re-ignition occurred for 3 days.
 - Terminals need to be exposed but protected from contact
 - Arcing/re-ignition occurred due to contact with each other and/or with the metal drum.
 - LiBs packed too tight/overcrowded in drum.
 - Radiant heat possible source of reignition.
 - Metal drums corroded during de-energizing.
 - Poly drums recommended w/ bungs for venting.



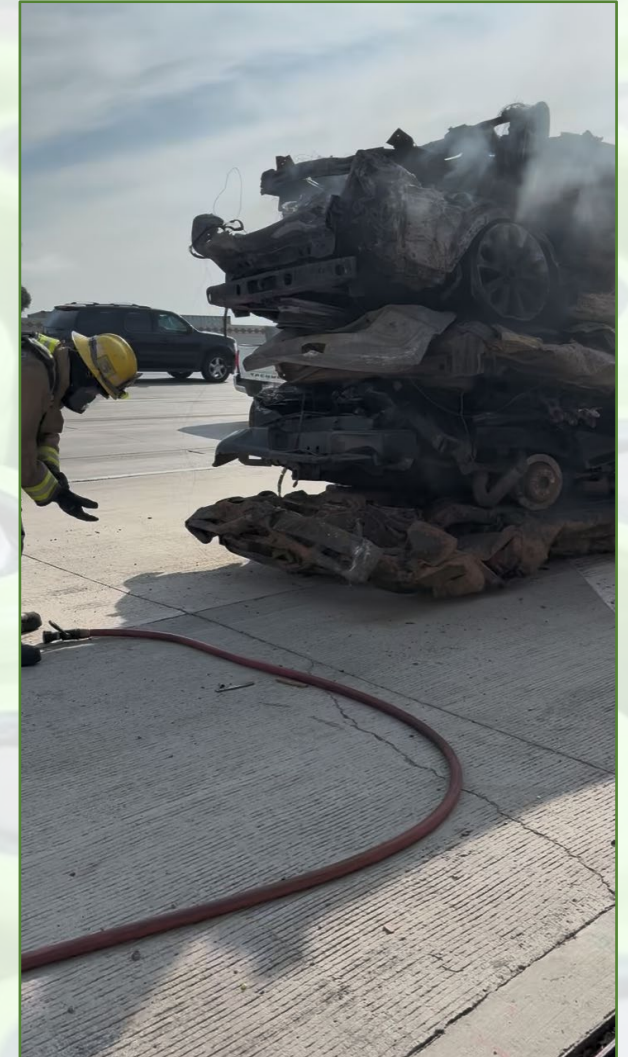
Resources

- 8-hour paid training
- Multiple in-service trainings
- SOG development
- Equipment purchases
 - SPM Flex, POLI, FLIR TIC...
- PPE upgrades
 - DuraChem[®] 200 Suits, structure gloves
- DDR containers
- De-energizing supplies
 - Containers, salt, power tools, material handling, fire safety.



Issues

- Awareness
 - Public, fire, sanitation, PW, metal salvage co.
- Standardized Protocols
- Safety Concerns
- Contractor Oversight
- **FUNDING!**
- Larger Incidents:
 - BESS
 - EVs - No solution for public.

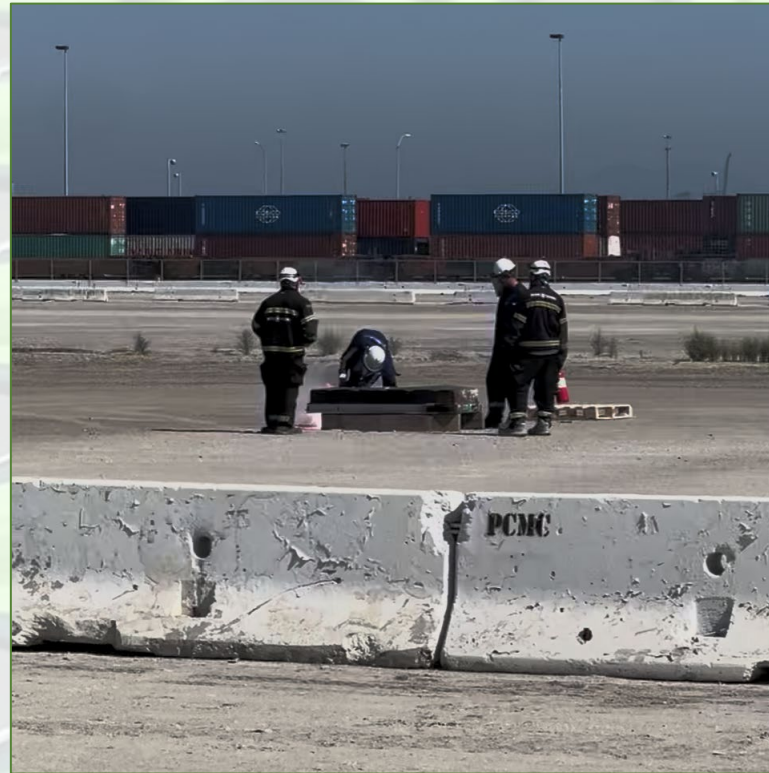


Maersk Incident





Bridge BESS Incident



BYD Incident



BYD Incident - Oversight

- HAZWOPER Certified
- Staffed electrician
- Fire-rated PPE
- Respiratory protection
- Air monitoring
- Fire watch
- DOT Packaging

Experience is key!



Lessons Learned – Malibu

- Situational awareness
 - A/Vs, sights & sounds
- Remember your training/SOPs
 - ~175 LiB incidents in past 3 yrs.
 - **~20 have re-ignited in the field.**
- Still a HM Incident
 - Site control, PPE, etc.
- Fire suppression
 - Extinguisher, blanket, etc.



Any Questions?

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LACoFD Health Hazmat

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(323) 890-4086



⚠ WARNING
Damaged Lithium-ion Batteries



CARE OF
Los Angeles Co. Fire Dept.
Health Hazmat Division

Date: 3/26/25

**For your safety, please DO NOT DISTURB this container
under Quarantine Order pursuant to HSC 25187.6.**

For more information, please call (323) 890-4317.

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