SAN DIEGO
HAZARDOUS INCIDENT RESPONSE TEAM

STANDARD OPERATING GUIDELINES

Lithium Ion Battery Fire: Battery Energy Storage System

	ITEM	DESCRIPTION
☐	**FIRST REPONDER GUIDANCE**	All personnel working in proximity to the BESS shall don turnouts and SCBAs. Structures shall only be entered for life rescue. Reacting batteries produce hydrogen which may accumulate within the structure causing an explosive atmosphere. Secure all possible ignition sources and power. Ventilate structure if possible. Fire response should focus on protection of nearby exposures while letting the batteries burn. Addition of water may cause electrical arcing and thermal runaway of non-impacted batteries. A fire at a Battery Energy Storage System may not involve the batteries. Determine if batteries are involved prior to making entry or a response plan. If batteries are involved, the incident may span several operational periods. Notify Supervisor so additional responders can be requested as needed.
☐	**INITIAL SIZE UP**	▪ Identify if batteries are reacting or involved in a fire ▪ Obtain Emergency Response Plan and facility contact information. If possible, have a facility representative available for IC. Review Emergency Response Plan. ▪ If batteries are reacting but no fire is observed, explosive atmosphere is likely present ▪ Only approach building if explosive gases have been vented or mitigated ▪ Use 4-gas or combustible gas indicators to percentage in air. CO sensor is cross sensitive to H2 ▪ Don proper PPE- Fire Turnouts with SCBA for suppression, overhaul, mitigation ▪ Avoid contact with gasses generated from reacting battery
☐	**CHEMICAL INFORMATION (if available)**	▪ UN 3480 or 3481 DOT 9 Dangerous Goods ▪ Lithium Ferrous Phosphate ▪ Lithium Nickel Manganese Cobalt Oxide or similar ▪ Non LIB- Lead Acid, Zinc Bromide, Other if present in addition to LIBs
☐	**PROTECTIVE MEASURES**	ERG Guide 147 ▪ Initial 75’ for fire at LIB with no LIB impact. ▪ LIB impact- ISOLATE for 500 meters (1/3 mile) in all directions; also, consider initial evacuations for 500 meters (1/3 mile) ▪ Consider wind direction changes
☐	**TACTICAL ACTIONS**	▪ Request Facility SME, Operations Director, etc. as needed. ▪ Request air monitoring and/or temperature information from business representative. ▪ Request access to cameras or other useful information available. ▪ Don proper PPE- Fire Turnouts with SCBA for suppression, overhaul, mitigation. Other PPE to be considered as needed, such as high temperature gloves or gloves to shield from battery charges. ▪ Prepare monitoring equipment- TIC for reaction temps, 4-gas with CO and CGI for H2/flamm, ExplorIR, pH paper, Fl paper for HF. For smoke consider also RAE for Cl2 vapors, RAE or Draeger for HCl vapors ▪ If facility is safe to approach, Area Raes shall be set up to cover all sides of the facility. If all sides cannot be accessed, air monitors shall be staged to cover populated areas, the Incident

		Command Post and any other vulnerable areas. Note: Monitors do not have sensors for all possible gases emitted during a battery fire. If monitors alarm or detect any gases, it should be assumed that other gases are present. ▪ Use ERG, ALOHA or PEAK to model smoke plume. Provide model to IC and LE for possible evacuations or shelter in place guidance. Larger or more detailed Plume Modeling can be requested from IMAAC. Note: Sheltering in place with closed windows should be the recommendation for all impacted individuals not at risk of fire. ▪ If water is being used on burning batteries, attempts should be made to maintain water on site and not allow it to enter storm drains or waterways. Collect a sample for testing. Conduct field test for VOCs and pH. Heavy metal testing will be conducted by a laboratory if needed. Complete chain of custody. ▪ Issue an Official Notice to the Facility for the incident. Report should include details of the incident and request for facility to conduct continuous air monitoring and water sampling ASAP and not to exceed within 24 hours. Provide links to useful resources, such as Industrial Hygienists, hazardous waste contractors, etc. ▪ A large scale incident may require State or Federal resources. Contact Supervisor to discuss response needs. Additional air monitoring equipment (Draeger X Sites) and communication equipment can be provided by the EPA. EPA has capabilities to continuously monitor acid gases, particulates and other support. ▪ Work with facility representative to make Cal OES and CUPA notifications. ▪ Notify APCD for particulate monitoring
☐	**MITIGATION AND CONTAINMENT**	▪ Protect exposures ▪ Slow or prevent propagation ▪ Work with facility to protect stormwater conveyance from anything other than firewater.
☐	**TECHNICAL REFERENCES**	▪ ERG Book or App ▪ CAMEO/ALOHA/Marplot & EPA AEGLs ▪ PEAC ▪ NIOSH/CalOSHA – for IDLH and/or PELs ▪ Safer Mobile ▪ CERES ▪ WISER
☐	**ADDITIONAL RESOURCES**	▪ Fire ▪ EMS ▪ SDGE ▪ EPA
☐	**NOTIFICATIONS**	▪ CAL OES, County OES, City OES as needed ▪ CUPA ▪ Fire Prevention ▪ Code Enforcement- Building ▪ Stormwater Agency ▪ Fish and Wildlife ▪ National Response Center if EPA resources are going to be requested. ▪ APCD ▪ Health Officer- if impacts to populations
☐	**USEFUL CONTACTS**	EPA- additional monitoring equipment, oversight, communication equipment, aerial resources Private Resources- Firewatch and Energy Support Specialists See EPA list of companies that provide remote air monitoring below
☐	**PERSONAL PROTECTIVE EQUIPMENT**	▪ Turnouts with SCBA
☐	**MONITORING & DETECTION**	▪ CGI – LEL can be compared to CO sensor. CO not maxing with LEL indicates non H2 flams ▪ Thermal Imaging Camera – above 250F may indicate thermal runaway/propagation potential ▪ Explor IR – carbonates/carbonic esters indicate battery electrolyte vapors. ▪ PID – An air sample can be captured for later use on GasMet to assist decon/exposures ▪ Area Raes – Remove H2S sensor if HCN used. VOC an indicator of failing batteries. ▪ pH paper – Acid or Base can indicate failed batteries

		▪ HF paper – Instructions say to use HCl, however these can be wetted with water if worn on PPE
☐	**Plume Modeling**	▪ For a large scale or ongoing incident, plume model will be required to determined impacted populated areas. Evacuation or shelter in place orders may need to be issued by IC. Refer to Plume Modeling SOG for options on resources. ▪ https://sdcountycagov.sharepoint.com/:w:/r/sites/DEH_MARS/HMD/HIRT/ERDocs/0.%20Guidance.After%20Hours/Tab%2014%20SOG%27s,%20PPE/Plume%20Modeling%20SOG.docx?d=wbc2380120e6a45d4a557baded711df65&csf=1&web=1
☐	**DECONTAMINATION**	▪ Launder turnouts following NFPA 1851 Standards ▪ Liquid CO2 for heavily soiled turnouts (inside structure or in smoke plume) ▪ Disposal at expense of Responsible Party should be considered.
☐	**CLEAN UP & DISPOSAL**	▪ Responsible Party expense ▪ Work with DTSC ER and/or EPA as needed ▪ Trained and Licensed/Registered clean up contractors https://hwts.dtsc.ca.gov/transporters/ ▪ Properly Managed Waste- manifests/ Receipts ▪ Photographs / Sampling ▪ Monitoring ▪ Develop Unified Command structure for cleanup- Fire, Building Dept, EPA/State/Local OSC, HIRT
☐	**INCIDENT TERMINATION**	▪ Batteries are no longer reacting. TIC shows stable or decreasing temperatures. ▪ Enforcement ▪ ICS forms ▪ Inspection forms

Remote Area Air Monitoring Capabilitie