SOUTHERN CALIFORNIA EDISON®

FOR QUALIFIED FIRST RESPONDERS

LARGE COMMERCIAL/INDUSTRIAL AND UTILITY-OWNED BATTERY ENERGY STORAGE SYSTEMS (BESS) INCIDENT CHECKLIST

LITHIUM ION TECHNOLOGY

Upon Dispatch:

- Access preplan data while responding. (Preplanning is essential for effective BESS incident response.)
- Initiate contact with the BESS owner (whether the local property owner or a third-party technology vendor) through your dispatch center.
- Request that a qualified facility SME meet the incident commander on-site. The SME should understand system configuration and battery chemistry under adverse conditions.

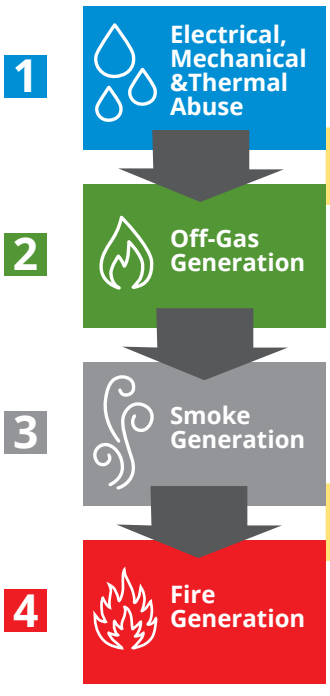
Upon Arrival:

- Conduct a comprehensive scene size-up, including a 360-degree circle check of the facility.
- Assume command and coordinate resources.
- Review and interpret all data sources with the on-site SME to form an operational picture for data-driven incident management.
- Verify automated electrical charge/discharge system disconnect if you can do so remotely.
- Maintain a standoff distance of 100 feet for any SCE BESS facility unless instructed otherwise by a qualified on-site facility SME. Also maintain a 300 foot perimeter free of all unnecessary people. **Do NOT proceed beyond the fenceline of any facility or structure without SME guidance.**
- Remember that batteries contain stored energy despite system disconnection/discharge.

Initiating Operations:

- **Prioritize life safety over property conservation. If components are on fire, recognize that the system is not salvageable and, if possible, let it burn. In most cases, a free-burning condition will prevent buildup of explosive gas.**
- Protect personnel operating on the incident scene through distance, shielding and appropriate PPE.
- Evacuate occupants per the Emergency Response Guidebook (ERG) Guide 111, Mixed Load/Unidentified Cargo, and Guide 147, **Lithium Ion Batteries**. Consider sheltering adjacent occupants in place if they are not in immediate danger.
- Once ignition occurs, the event may propagate to multiple battery banks and require long-term, resource-intensive mitigation.

FOUR STAGES OF BATTERY FAILURE



Stages 1 and 2: De-Escalation Tactics

- Cool compromised battery cells with water.
- Monitor off-gassing. The off-gassing phase is considered the best time to act.
- Remotely verify automated ventilation to reduce gas accumulation.
- Consider where the gas is venting and may accumulate. Evacuate accordingly.
- Consider the potential for ignition and explosion and establish defensive operations as the incident progresses from off-gassing (Stage 2) to smoke generation (Stage 3). Remember that conventional gas detection such as multi-gas meters cannot provide sufficient warning of the transition to smoke generation. (Specialty detection equipment for early warning is currently under development.)

Stages 3 and 4: Operational Safety and Containment Strategy

When off-gassing gives way to smoke generation, you are at the tipping point. You must transition to a containment strategy and defensive operations. Prepare for a long-term incident with high-volume toxic and explosive gas production, persistent shock hazards, the potential for re-ignition hours or even days after initial extinguishing, and the need for a sustained high-volume water supply. Pursue slow and methodical containment actions and consider the tactics on the reverse as appropriate.

FIRE ALARM/FIRE SUPPRESSION – TACTICAL CONSIDERATIONS

The activation of protective system sensors in a BESS environment is not a typical automatic fire alarm activation, and a fire involving a BESS is not a typical fire. Pursue slow and methodical actions and consider the following additional tactics as appropriate:

1. Evaluate dual-agent suppression systems activation and remotely support these systems as needed.
2. Consider the need for a hazmat team response.
3. Determine appropriate evacuation distance per the ERG Guides 111 and 147 or on-site hazmat team.
4. Establish water supply for potential extended high-volume operations.
5. Deploy hose lines at the standoff distance and ensure sufficient length to advance.
6. Prepare for sprinkler system activation and provide additional water supply at a remote fire department connection.
7. Protect interior exposures with unmanned streams and exterior adjacent exposures from a shielded position.
8. Develop an incident action plan (IAP) to guide further tactical action.
9. Post a fire watch, and do not turn the property back to the owner until thermal propagation has stopped and cells are no longer in thermal runaway or off-gassing. For extended event monitoring, a qualified facility SME may fulfill the role of a fire watch after visible flaming and smoke generation have subsided.

THERMAL RUNAWAY – TACTICAL CONSIDERATIONS

Thermal runaway is the overheating of battery modules to the point of compromise. It is more dangerous than actual ignition, as it results in off-gassing and has the potential to spread to adjacent modules and produce a toxic and explosive atmosphere. Expect a long-term event with high-volume toxic and explosive gas production and potential re-ignition. Pursue slow and methodical actions, and consider the following additional tactics as appropriate:

1. Identify the number and location of modules involved.
2. Access safety data sheets.
3. Evaluate thermal propagation potential.
4. Be prepared for a deflagration to occur at some point in the incident as vapors enter the flammable range. (Deflagration involves rapid burning that may create a significant pressure wave, similar to an explosion.) This may occur as vapors build, or as their concentration is reduced through ventilation.
5. Continually monitor gas levels outside of the enclosure, maintaining standoff distance per SME guidance.
6. Evaluate dual-agent suppression systems activation and remotely support these systems as needed.
7. Establish water supply for extended high-volume operations.
8. Deploy hose lines at the standoff distance and ensure sufficient length to advance.
9. Prepare for sprinkler system activation, and provide additional water supply at a remote fire department connection.
10. Protect exposures if possible.
11. Develop an incident action plan (IAP) to guide further tactical action.

AIR MONITORING/VENTILATION SYSTEM ACTIVATION

If gases are above the Upper Explosive Limit (UEL), exhaust venting may result in an explosion as the concentration falls within the flammable range and is subject to ignition sources. Consider the following tactics, as appropriate:

1. Utilize available battery management system data to determine system status and the need for ventilation.
2. Verify that ventilation is occurring; only activate an exhaust ventilation system if you can do so remotely.
3. Continually monitor gas levels and plume direction to guide evacuation decisions.
4. Be prepared for a deflagration to develop and position resources accordingly.
5. Consider where the gas is venting and potentially accumulating, and evacuate accordingly. Keep in mind gas may be flammable or produce highly corrosive byproducts.

Electrolyte Release

Treat electrolyte release as a hazmat event and follow your department's SOPs for metering, monitoring, containment and decontamination.