



## 2023 Maui Wildfires

U.S. Environmental Protection Agency, Region 9

Emergency Response Section

### JOB HAZARD ANALYSIS #8: EV Battery Removal and Transport

JHA		
JHA #: 008	Name of Task: EV Batteries	Location: 2023 Maui Wildfires
Task Description: Managing EV batteries		Task Duration: Daily

Physical Hazards – EV Battery Removal								
Hazard	Source	Control Measures	Exposure Potential					
			H	M	L	Unk	N/A	
Overhead Hazards	Burned out structure debris	Situational awareness. Hard hat						
Trip Hazards	Burned out structure debris	Situational awareness, test footing prior to stepping on unknown area						
Electrocution	Energized power lines. Charged EV battery.	Assume all electric lines and appliances are energized. Evaluate EV battery prior to handling.						
Traffic	Vehicles traveling in work areas	Situational Awareness. High visibility vests						
Fall Hazard	Open septic field or tree root burnout	Situational Awareness. Mark deep fall hazards with caution tape and orange spray paint						
Falling Trees	Burned out trees	Situational Awareness. Observe Arborist markings trees. Avoid hazardous tree fall zones. Cease work with wind speeds of 20mph.						
Puncture Risk	Sharp objects in debris	Situational Awareness. Leather work gloves.						
Heavy Equipment	Crush zones during vehicle rotation	Situational Awareness. Spotter usage.						
Pinch Points	Cutting metal/Jaws of life	Situational Awareness. Use leather work gloves.						
Heat Stress	Working in protective suits	Follow Work/Rest schedules. Stay Hydrated						
Lifting Injuries	Lift heavy batteries and equipment	Use propped lifting techniques. Use two man lift for heavy objects Do not carry heavy objects far distances						

Physical Hazards – EV Batteries							
Hazard	Source	Control Measures	Exposure Potential				
			H	M	L	Unk	N/A
Stored Energy (Electricity) / Fire and Explosion	1. Electric/Power supply lines 2. EV high-voltage and low-voltage batteries	1. Ensure all electrical power has been shut off/disconnected from EV vehicle: <ul style="list-style-type: none"> <li>a. Licensed/certified electrician to verify power status.</li> </ul> 2. Ensure no backfeeding to the EV vehicle (i.e., solar panels or any other device that could potentially be feeding energy to or drawing energy from EV vehicle). 3. Isolate the energy storage system (i.e., EV battery) after verification that all					

		<p>energy to the vehicle has been shut off or disconnected.</p> <p>4. Remove EV battery from vehicle using methods identified in the SOP; methods may include rotating vehicle (on side or completely flipped over) using heavy equipment, cutting metal using “Jaws of Life”, removing bolts or other metal fasteners (see physical hazards above).</p> <p>5. Prepare EV battery for transportation:</p> <ul style="list-style-type: none"> <li>Active thermal event or poorly ventilated area - SCBA required for respiratory protection along with Flame-Resistant (FR) clothing OR Standard EV battery removal - organic gas/acid gas filters required for respiratory protection along with Flame-Resistant (FR) clothing.</li> <li>Wrap EV battery in fireblankets (e.g., Bridgehill) or place loose material in drum with bung off.</li> <li>If any reaction occurs during handling, immediately drop the EV battery and vacate the area to a safe place (upwind).</li> <li>Place in transport vehicle and secure in place using straps or other equipment.</li> <li>Ensure fire extinguisher and pressurized water sprayers are available during transport.</li> </ul> <p>6. Transport EV battery to secure staging area for further processing:</p> <ul style="list-style-type: none"> <li>Notify local fire department if thermal or other event occurs that requires a response.</li> <li>If reaction occurs during transport, park vehicle immediately in a location with minimal fire risk (to the extent possible); call fire department (dial 911) immediately for assistance.</li> <li>Maintain fire readiness (fire extinguishers and pressurized water sprayers to cool container during transport in the event of reaction/fire situation).</li> </ul>				
Chemical Exposure	By-product of fires involving lithium batteries	See Chemical Hazards section below				

Biological Hazards						
Hazard	Source	Control Measures	Exposure Potential			N/A
			H	M	L	
COVID-19 Exposure	Unknown	Follow COVID-19 protocols				

Chemical & Radiological Hazards						
Hazard	Source	Control Measures	Exposure Potential			N/A
			H	M	L	
Alkaline Ash and Battery	Remnants of burned out	Personal Data Ram worn by perimeter personnel. MultiRae monitoring by screening team. P100 respirators on EV				

Materials	structures and battery materials	battery removal crew						
Asbestos	Remnants of burned out structures	Personal Data Ram worn by perimeter personnel. MultiRae monitoring by screening team. P100 respirators on EV battery removal crew						
Flamable and Combustible gases	Batteries	Well ventilated area. P100 respirators and proper eye protection (i.e., goggles). If ventilation concerns, switch to SCBA.						
Acid gases	Batteries	P-100 respirators, acid-proof gloves						
Lead acid	Batteries	Tyvek suits, acid-proof gloves						
Hydrogen Fluoride	By-product of fires involving lithium batteries	<ol style="list-style-type: none"> <li>Active thermal event or poorly ventilated area - SCBA required for respiratory protection OR Standard EV battery removal - organic gas/acid gas filters required for respiratory protection.</li> <li>FR clothing required for potential fires.</li> <li>In the event a reaction occurs during handling, immediately drop the EV battery and vacate the area to safety.</li> <li>Notify the fire department (dial 911).</li> </ol>						

PPE				
Level A	Level B	Level C	Level D Mod	Level D
	Active thermal event or poorly ventilated area. (SCBA for respiratory protection combined with FR clothing)	Completely charred or completely charred and bulged EV battery: (Organic gas/acid gas filters required for respiratory protection combined with FR clothing.)		

Other
None

**NOTES:**

From draft SOP on EV Reconnaissance – Hazards and required PPE are listed as: Many hazards exist when performing reconnaissance of burned vehicles. Some of these hazards include sharp edges, broken glass, puncture hazards, structurally unsafe walls, beams, and roofs, high voltage hazards, toxic dust, compromised trees, heat/cold stress, and many more. The recommended PPE for this task is: long sleeve pants and shirts, hardhat, safety toe boots with steel shank, cut resistant gloves, eye protection, high visibility vests, and a dust mask or respirator. Higher level PPE such as Tyvek and boot covers is recommended when conditions require entry into ash footprints.

From draft SOP on EV Battery Removal – Hazards and required PPE are listed as: Numerous chemical and physical hazards are present during vehicle battery recovery. Chemical hazards include acid gases and occasional lead-acid. Physical hazards are heavy lifting of responder tools, sharp metal, fire, heat, ash and dehydration. The PPE level utilized is Level C with half-face respirator utilizing acid gas/P100 dual cartridge, flame retardant clothing (FRC), cut resistant gloves, hard hat and safety glasses. Tyvek suits are only utilized during lead acid battery removal.