10.29 Electric Vehicle Incidents SOP

Section 1 - Purpose and Objectives

(1) To provide information, hazards and tactics when undertaking operational activities involving electric vehicles including cars buses and trucks.

Section 2 - Scope

(2) This procedure applies to all CFA members.

Types of Electric Vehicles

(3) The term 'Electric Vehicle' includes:

HEV – Hybrid Electric Vehicle	These vehicles are self-charging and have an internal combustion engine (ICE) along with electric motors. Traction batteries are usually small in size.
PHEV – Plug-in Hybrid Electric Vehicle	Are the same as a HEV however the traction battery can be charged by a secondary and external source e.g. plugged in to a power supply.
BEV – Battery Electric Vehicle	A vehicle which is solely powered/driven by an electric motor(s). Traction batteries are the largest in the EV range and are powered by external sources.
FCEV – Fuel Cell Electric Vehicle	These vehicles are powered by hydrogen. Hydrogen is converted in to electricity in the fuel cell, which in turn powers the electric drive motors.

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Section 3 - Procedure

Identify if the vehicle is electric

(4) Electric vehicles are commonly identified in the following ways:

a. Blue triangle EV badge on front and rear number plates (mandatory in Victoria);
b. External badges such as 'EV', 'low emissions', 'electric', 'plug in hybrid' or 'dual motor';
c. Emergency response QR code located on windscreen or door jam; or
d. Blue border around car manufacturer emblem.

Actions to undertake

(5) Apply the principles RECEO. Covered in SOP 9.28 Strategy and Tactics.

(6) Do not park directly behind or in front of the EV.

(7) CFA members should approach the vehicle from a 45° angle.

(8) Deploy appropriate suppression line.

(9) All crew to continually look out (monitor) for signs of thermal runaway (refer to SOP 10.28 Lithium-Ion Batteries Undergoing Thermal Runaway SOP).

(10) Ventilate the cabin as a precaution to avoid build up of explosive gas.

(11) Isolate the vehicle from any external power supplies (charger).

(12) Incident Controllers should consider the use of CFA Warning Alterative Energy tape on the outside of any vehicles.

Immobilise the vehicle to prevent unexpected movement

(13) Secure the vehicle (e.g. wheel chocks, handbrake). As the parking brake is usually electronically controlled in electric vehicles, the brake should be engaged (where possible) before the 12V battery is disabled.

(14) Where practicable switch off vehicle and remove keys/Fob.

(15) Where the vehicle is unable to be immobilised or unsure consider an exclusion Zone around the vehicle for crew safety.

Isolate/disable the vehicles high/low voltage systems

(16) If the vehicle is on charge, isolate the 240-volt power supply to the charger. There may be an isolation switch at the unit, but it is good practice to find the distribution board to shut off power to EV charging upstream.

(17) EV's have both a high voltage (greater than 60V DC) and a low voltage (commonly 12 volts DC for accessories) systems.

(18) Open doors/windows/boot/bonnet and adjust seats as required in preparation for isolation as it may not be possible after disconnecting the 12v battery.

(19) Isolate (if possible) the high voltage traction battery and low voltage accessory systems.

(20) Avoid contact with orange HV cabling. Do not cut or pierce, damaged batteries. If unsure how to isolate seek advice from your District Duty Officer or State Duty Officer.

(21) Do not remove the Manual Service Disconnect, also known as a 'service plug' due to an increased risk of high voltage electrocution. This is used by qualified vehicle mechanics to disable the traction battery.

> Note: some makes of vehicles do not have a manual way to isolate the traction battery. Extra precaution needs to be taken for these types of vehicles.

Actions to undertake if involved in fire or thermal runaway

(22) Refer to SOP 10.28 Lithium-Ion Batteries Undergoing Thermal Runaway SOP for control options.

Actions for Rescue Brigades undertaking extraction

(23) CFA members should utilise standard extraction techniques but must ensure that they do not damage or cut into the underside of the vehicle where a battery may be located.

(24) Utilise the 'Moditech' app to know how to apply park brakes, turn off the car, locations of cut loops, 12-volt battery location, HV fuses and safety systems for all types of EV vehicles.

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(25) Follow the principles for ‘peel and reveal’ when cutting.

(26) Prior to undertaking any dash techniques, check for the location of the HV cable as it is sometimes not visible or located inside the dash pillar or just behind it in the quarter panel area.

Fuel Cell Electric Vehicles (FCEV) – Hydrogen

(27) Fuel Cell Electric Vehicles contain hydrogen as well as a lithium-ion battery. Hydrogen is:

a. Flammable;
b. Lighter than air;
c. Flame is hard to see;
d. Colourless; and
e. Odourless.

(28) If the vehicle is hydrogen powered, visible fire may be difficult to detect as hydrogen fires produce almost no visible flame and no smoke.

(29) If the vehicle has been identified as hydrogen powered, Incident Controllers should consider the following procedures for fire and gas venting:

a. Look and listen for signs of hydrogen.
b. Establish operations for a potential BLEVE.
c. Once venting the pressure relief value cannot be closed. Control any ignition sources (protect exposures) to avoid BLEVE. Do not approach a hydrogen powered vehicle if the cylinder is venting.
d. Utilise a thermal imaging camera (TIC) to detect the heat of hydrogen flames or cold compressed hydrogen gas.

> Note: Venting is usually automatic and complete within 90 seconds, meaning for most incidents, venting is completed by the time CFA members are on scene.

(30) If the FCEV cylinder is NOT venting:

a. If the vehicle is on fire but not venting the incident establish operations for potential gas venting or Boiling Liquid Expanding Vapour Explosion (BLEVE).

(31) Refer to the 2021 Australian and New Zealand Emergency Response Guide Book for further information.

Scene Handover

(32) The Incident Controller is to ensure where reasonably practicable information on potential hazards (e.g. secondary ignition) and how to identify signs of thermal runaway are provided. Refer to 10.28 Lithium-Ion Batteries Undergoing Thermal Runaway SOP.

Safety Notes

(33) Battery cells may still contain voltage even if damaged.

(34) Do not forcibly open a battery casing to access burning cells as this may expose firefighters to high voltage DC electricity and toxic chemicals.

(35) Follow the basic precautions of ‘DANGER’ – refer to SOP 10.09 Hazmat Response.

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Environmental Notes

(36) Nil.

Section 4 - Definitions

(37) Commonly defined terms are located in the CFA centralised glossary. Document-specific definitions are listed below.

(38) Traction battery – The traction battery supplies power for vehicle momentum & is usually located beneath the vehicle, along the floor pan.

Section 5 - Related Documents

(39) SOP 10.28 Lithium Ion Batteries Undergoing Thermal Runaway

(40) SOP 9.28 Strategy and Tactics

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Status and Details

Status	Not Yet Approved
Effective Date	To Be Advised
Review Date	To Be Advised
Approval Authority	
Approval Date	To Be Advised
Expiry Date	Not Applicable
Accountable Officer	Jason Heffernan Chief Officer
Responsible Officer	Garry Cook Deputy Chief Officer Operational Response & Coordination
Author	Tracey Parkhill
Enquiries Contact	Justin Dally Commander Safety Compliance --- Safety Compliance

Glossary Terms and Definitions

"CFA member" - Refers to all CFA volunteers, volunteer auxiliary workers, officers, employees and secondees.

"Incident Controller" - The individual designated by the control agency to have overall management of the incident and who is responsible for all incident activities.

"RECEO" - Rescue, Exposures, Containment, Extinguishment and Overhaul.

"BLEVE" - Boiling liquid expanding vapour explosion

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