



# BULLETIN » Submerged Hybrid / Electric Vehicles



Courtesy of joeynick/Stock/Thinkstock

Emergency responders face many hazards when working with vehicles that have been submerged in water, particularly with a hybrid or electric vehicle. Understanding common safety issues with these vehicles can help keep responders safe.

## Emergency Responder Safety Guidance

Hybrid, electric, and fuel cell vehicles are designed to be safe in water, even when fully submerged. The High Voltage (HV) system is isolated from the chassis and is designed to NOT pose a shock and NOT energize the surrounding water.

### WARNINGS

- ▶ Never remove a submerged service disconnect.
- ▶ Submersion in water (especially salt water) can damage low and high voltage components. Although not a common occurrence, this could result in an electrical short and potential fire once the vehicle is no longer submerged.
- ▶ Damaged HV batteries can produce flammable gas. Venting the passenger compartment is recommended once the vehicle is out of the water. Do not store vehicle indoors.

### TIPS FOR SAFE RESPONSE PRACTICES

#### Submerged Vehicles

- ▶ Avoid contact with HV components, cabling, or service disconnects on a submerged vehicle.
- ▶ If possible, turn the ignition off in a submerged vehicle, but do not attempt any other disabling activities.
- ▶ If ignition cannot be turned off, wait until the vehicle is no longer submerged and is drained of water before attempting to disable it.
- ▶ In some instances, small bubbles may be seen coming from an immersed HV battery. This is referred to as micro-bubbling. This DOES NOT indicate a shock hazard and DOES NOT energize the surrounding water.

#### Previously Submerged Vehicles

- ▶ Fire personnel should don full firefighting personal protective equipment (PPE) and self-contained breathing apparatus (SCBA) when working with previously submerged and damaged vehicles.
- ▶ Disable vehicle by chocking the wheels, placing the gearshift in park, and removing the ignition key and/or disconnecting the 12V battery.
- ▶ Avoid contact with a damaged HV battery; a significant shock hazard may exist. An HV battery should always be considered to contain a charge and should never be touched or pried open.
- ▶ Do not interact with vehicles exhibiting signs of damaged or overheating HV batteries including leaking fluids, sparks, smoke, bubbling noises, and/or unusual odors. If you detect any of these signs, immediately contact fire personnel.

#### Additional Resources

- ▶ Visit [www.evsaftytraining.org](http://www.evsaftytraining.org) for resources to help first responders safely handle emergencies involving alternative fuel vehicles including videos, training, and model-specific guidance for submerged vehicles.
- ▶ Learn how to address potential hazards and challenges with NFPA's *Emergency Field Guide*, available free of charge at [www.nfpa.org/efv](http://www.nfpa.org/efv).



**ALTERNATIVE  
FUEL VEHICLES**  
SAFETY TRAINING PROGRAM

This Bulletin contains some basic information about submerged hybrid/electric vehicles in order to advance first responder safety. It does not represent the official position of the NFPA or its Technical Committees. The NFPA makes no warranty or guaranty of the completeness of the information in this Bulletin. The NFPA disclaims liability for any personal injury, property, or other damages of any nature whatsoever resulting from the use of this information. In using this information, you should rely on your independent judgment and, when appropriate, consult a competent professional and your local authority having jurisdiction.