



Policy Procedure Guideline - Bristol Fire Department

Subject: Vehicle Fires

Section: Deployment and Safety

Date Authorized: 03/17/2021

Date Reviewed/Updated:

Authorized by: Chief J. Brett LaRose

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1.0 PURPOSE:

To establish an operational guideline for maximizing firefighter safety for safe handling of motor vehicle fires.

2.0 SCOPE:

It is the responsibility of all Bristol Fire Department (BFD) personnel to know and implement as appropriate this operational guideline. Authority to deviate rests solely with the Incident Commander (IC), who bears full responsibility for any deviation.

3.0 DEFINITIONS/ACRONYMS:

- EVO - Emergency Vehicle Operator
- IC - Incident Commander
- TIC - Thermal Imaging Camera
- TIMA - Traffic Incident Management Area

4.0 REFERENCES: None

5.0 POLICY

- 5.1 All BFD personnel shall wear the appropriate level of PPE for their assigned job function to include a traffic safety vest.
- 5.2 Firefighters engaged in suppression operations shall utilize Self-Contained Breathing Apparatus (SCBA).
- 5.3 Traffic safety vests shall not be utilized by personnel actively engaged in fire suppression.

6.0 PROCEDURE: None

7.0 GUIDELINE

7.1 **General strategy** - at most vehicle fires that require a hose line is to save cargo with commensurate risk and to prevent the fire from involving other property (exposures) or harming persons. Well involved vehicles are generally not "savable."

7.2 Response:

- 7.2.1 Upon receipt of a reported vehicle fire the following apparatus should respond emergency mode with the following minimum staffing:
 - 7.2.1.1 Engine 1 - PAD/O and two (2) firefighters (qualified to don SCBA)
 - 7.2.1.2 Engine 2 - PAD/O and two (2) firefighters (qualified to don SCBA)
 - 7.2.1.3 Heavy Rescue - EVO and two (2) personnel qualified in vehicle extrication.
Note: The EVO can fill one of the two qualified extrication positions.
- 7.2.2 For larger trucks and machinery fires, a reinforced response should be considered and requested when appropriate.



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7.3 Positioning of apparatus and Initial Tasks - The following recommendations are intended for initial apparatus placement and task assignments at the scene of a vehicle fire.

7.3.1 Engine 1:

- 7.3.1.1 Position upwind and uphill of the incident if possible
- 7.3.1.2 Position at least 100' feet from the burning vehicle
- 7.3.1.3 Utilize the apparatus as a barrier, to shield the incident scene and the PAD/O and firefighters from traffic hazards.
- 7.3.1.4 Position the apparatus so not directly in line with the front or rear of the burning vehicle.
- 7.3.1.5 Deploy/charge 1 ¾" bumper hose line for fire suppression and exposure protection.
- 7.3.1.6 Deploy traffic cones as best able to support the initial safe work area.

7.3.2 Engine 2:

- 7.3.2.1 Position and establish block upstream of Engine 1.
- 7.3.2.2 Establish nursing operation with Engine 1
- 7.3.2.3 Backup suppression crew
- 7.3.2.4 Establish TIMA (if in roadway)

7.3.3 Heavy Rescue:

- 7.3.3.1 Position in the Buffer Space upwind of the vehicle fire.
- 7.3.3.2 Assist Engine 2 crew setting up the TIMA

7.3.4 Other responding emergency vehicles (e.g. ambulance, law enforcement, etc.):

- 7.3.4.1 All other vehicles (other emergency vehicles, media, bystanders, etc.), if not absolutely needed to aid or provide information to law enforcement, should be directed to leave the scene.
- 7.3.4.2 If these other vehicles/people are needed at the scene, their vehicles should be positioned beyond the Incident Space and at the end of the downstream Buffer Space within the Termination Area.
- 7.3.4.3 When possible, these additional vehicles should be parked off the roadway.

7.4 Approach:

- 7.4.1 Fire personnel should stay clear of the following areas when approaching burning vehicles:
 - Directly facing the front or rear of the vehicle.
 - Directly facing the vehicle's underside when vehicle is on its side.
- 7.4.2 On non-burning vehicles the IC or suppression group supervisor should approach and investigate.

7.5 Hazard and Safety considerations Firefighters should anticipate:

- 7.5.1 Energy Absorbing Bumpers - Consist of gas and fluid filled cylinders that, when heated during a fire, will develop high pressures which may result in the sudden release of the bumper assembly. This could result in serious injury to anyone in its path. Bumper assemblies have been known to travel 25 feet.



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- 7.5.2 Batteries - Explosion hazard due to presence of hydrogen vapors. Avoid contact with battery acid. When the situation is stable, disconnect battery cables (ground cable first).
- 7.5.3 Combustible Metals - Some vehicles have various parts made of combustible metals, such as engine blocks, heads, wheels, etc. When these metals are burning, attempts to extinguish them with water will usually add to the intensity of the fire. Large quantities of water, however, will cool the metal below its ignition temperature. After some initial intensification, the fire should go out. Dry chemical extinguishers can also be effective.
- 7.5.4 Trunk/Rear Hatch/Engine Hoods - Hold-open devices may employ, along or in any combination with any of the following: springs, gas cylinders, extending arms, etc. When gas cylinders are exposed to heat, failure or rupture of these devices should be expected. Excessive pressure may develop in lift assists causing a trunk, hatch, or hood to fly open with explosive force when the latch mechanism is released. To ensure personal safety, be sure to allow sufficient clearance when releasing latches.
- 7.5.5 Fires involving the trunk/cargo area should be approached with extreme caution. Contents may include toxic, flammable, or other hazardous materials. Expect the worst!
- 7.5.6 Fuel Tanks - May be constructed of sheet metal or plastic. A rupture or burn-through may occur with these tanks causing a rapid flash fire of the fuel. Do not remove gas cap, as tank may have become pressurized. Do not direct hose stream into tank, as this will cause pressurization of tank, with a possible result of burning fuel spewing from the tank fill opening.
- 7.5.7 Vehicle Stability - Tires or split rims exposed to fire may explode, causing the vehicle to drop suddenly. Expect exploding rim parts or tire debris to be expelled outward from the sides. Approach from the front or rear of the vehicle for maximum protection from potential flying debris. Some larger vehicles, such as buses, employ an air suspension system. When these systems are exposed to heat or flame, they may fail, causing the vehicle to SUDDENLY drop several inches.
- 7.5.8 Airbags - To avoid injury, firefighters should follow the 5-10-20 rule (airbags can deploy even after the key has been removed and the battery disconnected) for undeployed airbags:
- ✓ Maintain a minimum of 5 inches from side impact airbags
 - ✓ Maintain a minimum of 10 inches from frontal airbags
 - ✓ Maintain a minimum of 20 inches from passenger side frontal airbags.
- 7.5.9 Under no condition should the cap to the fuel tank be removed. This may permit heated fuel vapors to escape thus increasing the danger to personnel.



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7.6 Fire attack:

- 7.6.1 When the vehicle is involved with fire a minimum of one (1), preferably two (2), 1 ¾"-inch hose lines should be deployed.
- 7.6.2 Line 1 should be set on straight stream and used to apply water knocking down the fire from as far away as possible.
- 7.6.3 As Line 1 knocks down the fire the crew should advance while continually widening its nozzle pattern so that as water is applied to the burning vehicle fire personnel have protection in front of them.
- 7.6.4 As soon as the fire is knocked down Line 1 crew should concentrate on extinguishing the fire in the auto space nearest any hazard such as the fuel tank or bumpers.
- 7.6.5 When possible a second line should be deployed. Line 2 should be deployed and applied using a straight stream from as far away as possible to first cool the fuel tank or other hazardous component of the auto.
- 7.6.6 Line 2 can advance toward the auto once the fire is knocked down with line 1 and can then be used to assist with extinguishment.
- 7.6.7 Whether one or two lines are deployed, one line should continue to cool any component of the auto which may have been made hazardous by the fire. Do not release the vehicle to the police or tow company until such time as all parts of the vehicle have been cooled to the ambient or safe temperature as to not reignite.
- 7.6.8 Open trunk area to inspect for fire extension (be cautious of flash or backdraft).
- 7.6.9 Personnel should be cautious when opening the hood, trunk, or other enclosed area as fire may flash outward. A bar should be used to prop open the hood, hatch, or upward lifting door since springs or struts may be weakened or have failed.
- 7.6.10 TIC should be used to obtain temperature/heat level of vehicle components.

7.7 Special considerations for hybrid and electric vehicle fires.

- 7.7.1 After the knock down of visible flames, re-ignition is to be expected. This is caused by the thermal runaway at the individual cell level internal to the battery packs. While visible flames from the batteries may be clearly extinguished, temperatures within the batteries may be high enough for thermal runaway of internal cells to occur. Subsequent re-ignition is characterized by “whooshing” or “popping” sounds, followed by off gassing of white smoke and/or electrical arcs/sparks that reignited with visible flames/fire. Typically, this will result in visible flames that can be quickly knocked down by a single hose line. This re-ignition process will repeat until enough water has flowed to sufficiently reduce the internal battery temperatures to the point where thermal runaway will not proceed.



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- 7.7.2 **The continuous application of water on a localized area of the battery for a prolonged period before moving onto another area of the battery can provide faster total extinguishment.** In addition, once the main battery fire has been controlled, continuous application of water to the battery with the nozzle set on fog could further cool the exterior of the battery, thereby helping to reduce the temperatures of the internal cells. This will reduce the likelihood of additional off gassing of electrolyte and re-ignition of internal battery cells.
- 7.7.3 Based on research from the Fire Protection Research Foundation, **water (not foam) is the recommended suppressant agent for hybrid vehicle fires.**
- 7.7.4 This type of fire will require a large volume of water. Consideration should be given to obtaining a secure water supply or a tanker response.
- 7.7.5 Caution should be taken when operating near the battery as thermal runaway may cause a violent reaction.
- 7.7.6 Batteries may be harbored in a high strength steel battery box impermeable to the fire stream.
- 7.7.7 TIC should be used to obtain temperature/heat level of the battery area.
- 7.7.8 Do not release vehicle to PD or tow company until all parts of vehicle have been cooled to ambient or a safe temperature as to not reignite.

8.0 APPENDIX: None

9.0 FORMS: None

Approved: J. Brett LaRose, Fire Chief