



Fire Protection Training

Procedures Handbook 4300

SPECIAL FIRES

TOPIC: Vehicle Fires

TIME FRAME: 1 Hour

LEVEL OF INSTRUCTION:

BEHAVIORAL OBJECTIVE:

Condition: A written quiz

Behavior: The student will list and describe the proper fire control tactics, hazards, and safety measures associated with vehicle fires.

Standard: With a minimum of 70% accuracy

MATERIALS NEEDED:

- Appropriate visual aids
- Audio visual equipment

REFERENCES:

- ISFSI, The "Not So Routine, Routine Fires"
- NFPA, Fire Protection Handbook, 17th Edition

PREPARATION:

The vehicle fire is viewed by many firefighters as routine and unchallenging. Unfortunately, it can be a "killer". Too often, personnel are lulled into a false sense of security. They attack a fully involved vehicle fire with a single booster line, don't wear full protective clothing, or don't wear breathing apparatus. Because of its mechanical complexity a vehicle fire can create explosions, toxic gases, flying projectiles, and many other safety hazards.



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VEHICLE FIRES

PRESENTATION

APPLICATION

I. VEHICLE FIRES (GENERAL)

- A. Motor Vehicle Fires Represent About 17% of All Reported Fires
 - 1. A national figure estimates about 200,000 vehicle fire responses a year
- B. Most Vehicle Fires Result from Causes Other than Crashes
 - 1. Crash-related fires occur at a rate of approximately 1 per 1,000 crashes
 - 2. On television everything blows up to create excitement
- C. Under Present Government Standards (1977) All Vehicles Having a Gross Vehicle Weight Rating (GVWR) of 10,000 lbs. or Less Must Pass Prescribed Front, Rear, and Side Barrier Tests and a Rollover Test
 - 1. Fuel leakage is assessed during these tests to reduce fire hazard during crashes
 - 2. Vehicle upholstery is also tested for flammability limits

II. VEHICLE FIRE CAUSES (IGNITION SOURCES)

- A. Traffic Collision

QUESTION: (Show of hands) How many students have fought a vehicle fire?

CALL ON 3

STUDENTS: Discuss vehicle type and how the fire was controlled.

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<ul style="list-style-type: none">1. Friction generated sparks or2. Metal scraping against pavementB. Mechanical Failure<ul style="list-style-type: none">1. Overheating brakes2. Overheating bearings3. Engine backfireC. Electrical Failure<ul style="list-style-type: none">1. Short circuitsD. Arson<ul style="list-style-type: none">1. Various motives<ul style="list-style-type: none">a. Insurance fraudb. Revenge/spitec. Vandalismd. Social unreste. Conceal a crimeE. Smoking Materials<ul style="list-style-type: none">1. Cigarettes2. MatchesF. Exhaust System<ul style="list-style-type: none">1. Design flaws2. Catalytic converters	

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<p>3. Parts failure</p> <p>III. AREA OF ORIGIN</p> <p>A. Non-collision</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Area of Origin</th> <th style="text-align: right;">#Fires</th> <th style="text-align: right;">%</th> </tr> </thead> <tbody> <tr> <td>Engine</td> <td style="text-align: right;">1085</td> <td style="text-align: right;">59</td> </tr> <tr> <td>Passenger</td> <td style="text-align: right;">647</td> <td style="text-align: right;">35</td> </tr> <tr> <td>Fuel tank</td> <td style="text-align: right;">59</td> <td style="text-align: right;">3</td> </tr> <tr> <td>Trunk</td> <td style="text-align: right;">31</td> <td style="text-align: right;">2</td> </tr> <tr> <td><u>Tire/Brakes</u></td> <td style="text-align: right;"><u>29</u></td> <td style="text-align: right;"><u>2</u></td> </tr> <tr> <td>TOTALS</td> <td style="text-align: right;">1851</td> <td style="text-align: right;">100</td> </tr> </tbody> </table> <p>B. Collision</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Area of Origin</th> <th style="text-align: right;">#Fire</th> <th style="text-align: right;">%</th> </tr> </thead> <tbody> <tr> <td>Engine</td> <td style="text-align: right;">39</td> <td style="text-align: right;">54</td> </tr> <tr> <td>Passenger</td> <td style="text-align: right;">3</td> <td style="text-align: right;">4</td> </tr> <tr> <td>Fuel tank</td> <td style="text-align: right;">24</td> <td style="text-align: right;">33</td> </tr> <tr> <td>Trunk</td> <td style="text-align: right;">3</td> <td style="text-align: right;">4</td> </tr> <tr> <td><u>Tire/Brakes</u></td> <td style="text-align: right;"><u>29</u></td> <td style="text-align: right;"><u>4</u></td> </tr> <tr> <td>TOTALS</td> <td style="text-align: right;">72</td> <td style="text-align: right;">100</td> </tr> </tbody> </table> <p>IV. HAZARDS</p> <p>A. Smoke and flame</p>	Area of Origin	#Fires	%	Engine	1085	59	Passenger	647	35	Fuel tank	59	3	Trunk	31	2	<u>Tire/Brakes</u>	<u>29</u>	<u>2</u>	TOTALS	1851	100	Area of Origin	#Fire	%	Engine	39	54	Passenger	3	4	Fuel tank	24	33	Trunk	3	4	<u>Tire/Brakes</u>	<u>29</u>	<u>4</u>	TOTALS	72	100	<p>Information sheet #1</p> <p>NOTE: * Non-collision - the number of engine and passenger area.</p> <p>Collision - the number of engine and fuel tank area. (relates back to ignition sources.)</p> <p>Information Sheet #2</p>
Area of Origin	#Fires	%																																									
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<ul style="list-style-type: none">1. Heat and visibility problems2. Potential backdraft3. Other problems common with exposureB. Toxic Gases<ul style="list-style-type: none">1. More hydrogen cyanide than any other fire<ul style="list-style-type: none">a. Causes illness or deathC. Fuel Spills<ul style="list-style-type: none">1. Treat as hazmat incident2. Guidelines:<ul style="list-style-type: none">a. Do not wash down!!b. Isolate and deny entryc. Eliminate ignition sourcesd. Contain spill run off3. Make legal notificationsD. Fuel Tanks<ul style="list-style-type: none">1. Nonvented<ul style="list-style-type: none">a. Potential BLEVE2. Thin gauge steel and plastic construction<ul style="list-style-type: none">a. Will burn/melt and dump contents3. Auxiliary tanks could be 50 gallons or more fuel on board4. Consider liquid petroleum gas (LPG) or compressed natural gas (CNG) hazards	

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<ul style="list-style-type: none">5. Danger zone - minimum of 100 feet in all directionsE. Shock-absorbing Bumpers<ul style="list-style-type: none">1. Piston/cylinder assembly filled with fluid2. When heated can launch bumper3. DANGER ZONE - 100' to rear of frontF. Batteries<ul style="list-style-type: none">1. May explode and spray battery acid2. Vehicle may have several batteries3. DANGER ZONE<ul style="list-style-type: none">a. Direction depends on location of batteriesb. 100' minimum diameterG. Drive Lines<ul style="list-style-type: none">1. Potential explosion<ul style="list-style-type: none">a. Hollow tube when heated may explode throwing shrapnel in all directions2. DANGER ZONE<ul style="list-style-type: none">a. Both sidesb. Up through passenger compartmentc. 100' minimum diameterH. Trunks<ul style="list-style-type: none">1. What is carried in trunks?2. Everything	

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<ul style="list-style-type: none">a. Extra gas cansb. Fire extinguisherc. Animals, etc. <p>3. DANGER ZONE</p> <ul style="list-style-type: none">a. All directions <p>I. Burning Metals</p> <ul style="list-style-type: none">1. Magnesium or melted aluminum, used in:<ul style="list-style-type: none">a. Engine parts andb. Wheels2. DANGER ZONE<ul style="list-style-type: none">a. All directions <p>J. Tires</p> <ul style="list-style-type: none">1. Explode when heated2. DANGER ZONE<ul style="list-style-type: none">a. All directions <p>K. Exhaust System</p> <ul style="list-style-type: none">1. Catalytic converter skin temperature 660° - 2000°2. Potential ignition source <p>L. MacPherson Struts</p> <ul style="list-style-type: none">1. Used on small and mid-size cars2. DANGER ZONE<ul style="list-style-type: none">a. BLEVE potential	

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<ul style="list-style-type: none"><ul style="list-style-type: none">b. Hot oil out of wheel wells or front fender areaM. Mobility<ul style="list-style-type: none">1. May roll in any direction wheels are turned <p>V. FIREFIGHTING TACTICS</p> <ul style="list-style-type: none">A. Engine Position<ul style="list-style-type: none">1. Upslope2. Upwind3. Front of fire vehicle<ul style="list-style-type: none">a. Fuel tanks generally to rear4. 100' away from fire vehicleB. Establish Safety Zone<ul style="list-style-type: none">1. 100' radius2. Deny entry<ul style="list-style-type: none">a. All apparatusb. All unassigned personnel3. Traffic control<ul style="list-style-type: none">a. Vehicleb. PedestrianC. Size Up Incident Considering<ul style="list-style-type: none">1. Rescue<ul style="list-style-type: none">a. Occupants<ul style="list-style-type: none">(1) First consideration at all incidents	

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<ul style="list-style-type: none"><ul style="list-style-type: none">(2) Move to safe area, give first-aidb. Firefighters within danger zone2. Exposures<ul style="list-style-type: none">a. Towed vehicles<ul style="list-style-type: none">(1) Disconnect if possible (trailers, boats, etc.)b. Vegetationc. Structuresd. Other vehiclese. Fire vehicle contents (the great unknown)3. Confinement<ul style="list-style-type: none">a. Attack lines<ul style="list-style-type: none">(1) 1 1/2" hose with combination nozzle minimum(2) Minimum hose length 150'(3) 100 GPM nozzle pressureb. Safety line to back up primary attack linec. Protective clothing<ul style="list-style-type: none">(1) Properly donned complete set structural turnoutsd. Self-contained breathing apparatuse. Confinement guidelines<ul style="list-style-type: none">(1) From upwind/upslope, if possible	

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<ul style="list-style-type: none">(2) Approach fire vehicle at a 45° angle towards a corner(3) Line fully charged prior to advancement<ul style="list-style-type: none">(a) Nozzle pattern(b) Adequate flow(c) Air removed from hose(4) Push fire away from hazards or exposures <p>4. Extinguishment</p> <ul style="list-style-type: none">a. Cool hazards<ul style="list-style-type: none">(1) Fuel tanks<ul style="list-style-type: none">(a) Main tank(b) Auxiliary tanks(c) LPG tank on motorhomes(2) Shock-absorbing bumpers(3) Drivelines(4) Batteries(5) Sealed beam headlightsb. Fully knock down<ul style="list-style-type: none">(1) Concentrate on base of fire(2) Extinguish fire(3) Do not remove gas caps(4) Do not flow water into the gas tank	

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<ul style="list-style-type: none">5. Overhaul<ul style="list-style-type: none">a. Extinguish all remaining fire or hot spots<ul style="list-style-type: none">(1) Do not allow vehicle to be towed away until it is fully out(2) May have to dump entire cargo to do thisb. Conduct fire investigation<ul style="list-style-type: none">(1) If suspicious, call for arson investigator(2) Complete a preliminary fire investigation report (CDF LE-66)6. Ventilation<ul style="list-style-type: none">a. If backdraft or BLEVE conditions suspected<ul style="list-style-type: none">(1) Increase radius of safety zone(2) Ventilate or(3) Let burn until hazardous condition passes7. Salvage<ul style="list-style-type: none">a. Limit primary or fire caused damageb. Limit secondary or firefighter caused damagec. Return valuables to owner unless otherwise directed<ul style="list-style-type: none">(1) Evidence(2) Contraband	

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<p>VI. GAINING ACCESS TO FIRE</p> <p>A. Engine Compartment (hood down)</p> <ol style="list-style-type: none">1. Use proper attack angle<ol style="list-style-type: none">a. Upslope/upwindb. 45° to corner2. Leave hood closed3. Cool bumpers4. Spray through grill5. Cool battery6. Open hood<ol style="list-style-type: none">a. Release latchb. Forced entry7. Prop hood after opening (weak hinge springs) <p>B. Engine Compartment (hood open)</p> <ol style="list-style-type: none">1. Approach at angle<ol style="list-style-type: none">a. Upslope/upwindb. 45o to cornerc. Use 1 1/2" hoseline with back- up <p>C. Trunk</p> <ol style="list-style-type: none">1. Use proper attack angle<ol style="list-style-type: none">a. Upslope/upwindb. 45° to corner	

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<ul style="list-style-type: none">2. Cool fuel tank<ul style="list-style-type: none">a. Usually located lower rear3. Punch holes through tail lights4. Spray water through holes5. What is in the trunk?<ul style="list-style-type: none">a. Be alertb. Exercise cautionD. Electrical System<ul style="list-style-type: none">1. Disconnect battery<ul style="list-style-type: none">a. Negative terminal firstb. Prevents sparks2. Full turnout protection with facepiece down3. Wear SCBAE. Upholstery<ul style="list-style-type: none">1. Use hoseline to extinguish2. Confine fire during rescue3. Remove seat if necessary	
<p>VII. SAFETY - DO'S AND DON'TS</p> <ul style="list-style-type: none">A. DO Chock the Fire EngineB. DO Chock the Fire Vehicle if a Rolling Hazard ExistsC. DO Wear Full Protective Clothing and S.C.B.A.D. DO Use 2 - 1 1/2" Hoselines, or Larger	



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<ul style="list-style-type: none">E. DO Approach from Upslope/UpwindF. DO Establish Danger Zone and Keep All Unnecessary Personnel OutG. DO Set Up Traffic ControlH. DON'T Remove Fuel CapsI. DON'T Flow Water into Fuel TankJ. DON'T Wash Down FuelK. DON'T Forget a Catalytic Converter is an Ignition SourceL. DON'T Underestimate a Vehicle Fire	



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VEHICLE FIRES

SUMMARY:

There is no such thing as a routine vehicle fire. There are many built-in hazards and unlimited collateral hazards that the owner may have stored in the passenger or cargo areas. Be alert and exercise caution.

EVALUATION:

A written quiz.

ASSIGNMENT:

To be determined by instructor(s).