



FIRE PROTECTION TRAINING

Procedures Handbook 4300

SPECIAL FIRES

TOPIC: Other Fires—The Basics

TIME FRAME: 1:00

LEVEL OF INSTRUCTION: Level I

BEHAVIORAL OBJECTIVE:

Condition: Given a written quiz

Behavior: The student will list and describe the basic fire control tactics, hazards, and safety measures associated with non-structural or vegetation fires involving other or special fires.

Standard: With a minimum of 80% accuracy

MATERIALS NEEDED:

- Appropriate visual aids
- Audio visual equipment

REFERENCES:

- IFSTA, 5th Edition, Essentials of Fire Fighting, Chapter 15
- Delmar, Firefighter's Handbook, Chapter 19, 2000
- ISFSI, The "Not So Routine, Routine Fires"

PREPARATION: Other, non structural fire incidents involving Class A, B, C and D combustibles are often viewed by many firefighters as routine and unchallenging. Unfortunately, these fires can be extremely dangerous if complacent. Too often, personnel are lulled into a false sense of security. They attack a fully involved vehicle fire or dumpster fire with a single booster line, don't wear full protective clothing, or don't wear breathing apparatus. These "other" fires have their own unique dangers which can create explosions, toxic gases, flying projectiles, electrocution, and many other life safety hazards.



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Procedures Handbook 4300

SPECIAL FIRES

PRESENTATION	APPLICATION
<p>I. VEHICLE FIRES (GENERAL)</p> <p>A. Motor vehicle fires represent about 17% of all reported fires</p> <ol style="list-style-type: none">1. One national figure estimates about 200,000 vehicle fire responses a year <p>B. Most vehicle fires result from causes other than crashes</p> <ol style="list-style-type: none">1. Crash-related fires occur at a rate of approximately 1 per 1,000 crashes <p>C. Under present government standards 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</p> <ol style="list-style-type: none">1. Fuel leakage is assessed during these tests to reduce fire hazard during crashes2. Vehicle upholstery is also tested for flammability limits <p>II. VEHICLE FIRE CAUSES (IGNITION SOURCES)</p> <p>A. Traffic collision</p> <ol style="list-style-type: none">1. Friction generated sparks2. Metal scraping against pavement <p>B. Mechanical failure</p>	<p>How many students have fought a vehicle fire?</p> <p>What was the vehicle type and how was the fire was controlled?</p>



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SPECIAL FIRES

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<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. Crime concealmentE. Discarded smoking materials<ul style="list-style-type: none">1. Cigarettes2. MatchesF. Exhaust system<ul style="list-style-type: none">1. Design flaws2. Catalytic converters and mufflers	



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Procedures Handbook 4300

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<p>3. Parts failure</p> <p>4. Illegal modifications</p> <p>Note: Per NFPA Fire Protection Handbook eighteenth edition, passenger road transport vehicles by area of origin, 1989-1993 Annual averages</p> <p>III. AREA OF ORIGIN</p> <p>A.</p> <table border="1"> <thead> <tr> <th>Area of Origin</th> <th>#Fires</th> <th>%</th> </tr> </thead> <tbody> <tr> <td>Engine & wheel area</td> <td>216,650</td> <td>67.4</td> </tr> <tr> <td>Passenger area</td> <td>61,480</td> <td>19.1</td> </tr> <tr> <td>Fuel tank</td> <td>5,790</td> <td>1.8</td> </tr> <tr> <td>Trunk</td> <td>4,960</td> <td>1.5</td> </tr> <tr> <td><u>Other</u></td> <td><u>32,690</u></td> <td><u>10.2</u></td> </tr> <tr> <td>TOTALS</td> <td>321,570</td> <td>100</td> </tr> </tbody> </table> <p>IV. HAZARDS</p> <p>A. Smoke and flame</p> <ol style="list-style-type: none"> 1. Heat and visibility problems 2. Potential backdraft 3. Other problems common with exposure <p>B. Toxic gases</p> <ol style="list-style-type: none"> 1. More hydrogen cyanide than any other fire type <ol style="list-style-type: none"> a. Causes illness and/or death <p>C. Fuel spills</p> <ol style="list-style-type: none"> 1. Treat as hazmat incident when situation dictates 2. Guidelines: 	Area of Origin	#Fires	%	Engine & wheel area	216,650	67.4	Passenger area	61,480	19.1	Fuel tank	5,790	1.8	Trunk	4,960	1.5	<u>Other</u>	<u>32,690</u>	<u>10.2</u>	TOTALS	321,570	100	
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<ul style="list-style-type: none">a. Do not wash down!!-b. Isolate and deny entryc. Eliminate ignition sourcesd. Use absorbentse. Contain spill run off <p>3. Make legal notifications</p> <p>D. Fuel tanks</p> <ul style="list-style-type: none">1. Non-vented<ul style="list-style-type: none">a. Potential BLEVE2. Thin gauge steel and plastic construction<ul style="list-style-type: none">a. May burn/melt and dump contentsb. If it does non melt, heated contents may pressurize and be forced through fuel lines at location other than fuel tank3. Vehicles may have more than one fuel tank<ul style="list-style-type: none">a. Auxiliary tanks may be 50 gallons or more4. Consider liquid petroleum gas (LPG) or compressed natural gas (CNG) hazards5. New generation "hybrid vehicles" incorporate high-voltage cables and electrical systems<ul style="list-style-type: none">a. Orange colored cables = high voltage up to 500 volts6. DANGER ZONE - minimum of 100 radius around any vehicle <p>E. Piston/cylinder assemblies</p>	



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SPECIAL FIRES

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<ul style="list-style-type: none">1. When heated can fly apart with great force<ul style="list-style-type: none">a. Front and rear bumpersb. Hoods/Hatchbacks 2. DANGER ZONE - 100' minimum diameter around the vehicle F. Batteries<ul style="list-style-type: none">1. May explode and spray battery sulfuric acid and/or produce flammable hydrogen gas fumes2. Vehicle may have several batteries3. DANGER ZONE<ul style="list-style-type: none">a. Direction depends on location of batteriesb. 100' minimum diameter G. 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 diameter H. Trunks and cargo boxes<ul style="list-style-type: none">1. What is carried in trunks?<ul style="list-style-type: none">a. Extra gas cans	<p>Information Sheet #1</p>



FIRE PROTECTION TRAINING

Procedures Handbook 4300

SPECIAL FIRES

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<ul style="list-style-type: none">b. Fire extinguisherc. Expect anything and everything!2. DANGER ZONE<ul style="list-style-type: none">a. All directionsI. Burning metals<ul style="list-style-type: none">1. Magnesium or aluminum, used in:<ul style="list-style-type: none">a. Engine partsb. Interior componentsc. Exterior and suspension componentsd. Wheelse. May be found anywhere2. DANGER ZONE<ul style="list-style-type: none">a. All directionsJ. Tires<ul style="list-style-type: none">1. Explode when heated<ul style="list-style-type: none">a. Brake fires2. DANGER ZONE<ul style="list-style-type: none">a. All directionsK. Exhaust system<ul style="list-style-type: none">1. Catalytic converter skin temperature 660° - 2000°2. Potential ignition source to dry grass or other ground fuel sources	



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Procedures Handbook 4300

SPECIAL FIRES

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<p>L. Bumper, trunk, and hood struts</p> <ol style="list-style-type: none">1. Very common on many different late model vehicles2. DANGER ZONE<ol style="list-style-type: none">a. BLEVE potentialb. Hot oil out of wheel wells or front fender areac. Compressed gas or hydraulic fluid-filled projectiles <p>M. Air Bags</p> <ol style="list-style-type: none">1. Steering wheel, dash, door, side, post, or headliner located.2. Some inflated by compressed air or nitrogen gas canisters3. Designed to deploy air bag at 300°F in event of fire4. Activation prevents canister explosion due to heat5. Pyrotechnic inflators used in some air bag systems when heated above 310°F react with violent decomposition6. Undeployed airbags have potential to activate unexpectedly whenever vehicle integrity has been compromised by fire or impact7. Some vehicles utilize a dual-stage air bag system which have the potential to activate an already deployed airbag a second time	



FIRE PROTECTION TRAINING

Procedures Handbook 4300

SPECIAL FIRES

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<ul style="list-style-type: none">8. DANGER ZONE<ul style="list-style-type: none">a. Anywhere in close proximity to airbagsN. Mobility<ul style="list-style-type: none">1. May roll in any direction wheels are turnedV. FIREFIGHTING TACTICS<ul style="list-style-type: none">A. Engine position<ul style="list-style-type: none">1. Upslope2. Upwind3. 100' away from fire vehicle4. If possible position engine to protect suppression crew from traffic-“fend off”B. 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. Secure and Stabilize the Scene<ul style="list-style-type: none">a. Chock the tires2. Rescue	



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Procedures Handbook 4300

SPECIAL FIRES

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<ul style="list-style-type: none">a. Occupants<ul style="list-style-type: none">(1) First consideration at all incidents(2) First fire attack should be aimed at protecting the occupants still in the vehicle.(3) Stabilize occupants(4) Move occupants to safe area for further medical aid needs,b. Firefighters within danger zone <p>3. Exposures</p> <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) <p>4. Confinement</p> <ul style="list-style-type: none">a. Attack lines<ul style="list-style-type: none">(1) 1-1/2" or 1-3/4" hose line with combination nozzle minimum<ul style="list-style-type: none">(a) Capable of 100 GPM(2) Minimum hose length 150'(3) Thirty (30) degree partial fog pattern initially	



FIRE PROTECTION TRAINING

Procedures Handbook 4300

SPECIAL FIRES

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<ul style="list-style-type: none">(4) Consider using foamb. Safety line to back up primary attack linec. Protective clothing<ul style="list-style-type: none">(1) Properly donned complete set structural turnout geard. Self-contained breathing apparatus on aire. Confinement guidelines<ul style="list-style-type: none">(1) From upwind/upslope, if possible(2) Approach fire vehicle at a 45° angle and towards a corner of the vehicle(3) Line fully charged prior to advancement<ul style="list-style-type: none">(a) Nozzle pattern(b) Adequate flow(c) Air removed from hose(d) Class A and B foams(4) Push fire away from hazards or exposures5. Extinguishment<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 motor homes	



FIRE PROTECTION TRAINING

Procedures Handbook 4300

SPECIAL FIRES

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<ul style="list-style-type: none">(2) Shock-absorbing bumpers, struts(3) Drivelines(4) Batteries<ul style="list-style-type: none">(a) Beware of leaking acid or splatterb. 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 tank6. 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 this(3) Use foamsb. Conduct fire investigation<ul style="list-style-type: none">(1) Consider calling for an investigator in unusual situations7. 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	



FIRE PROTECTION TRAINING

Procedures Handbook 4300

SPECIAL FIRES

PRESENTATION	APPLICATION
<ul style="list-style-type: none">(3) Let vehicle burn until hazardous condition passes8. Salvage<ul style="list-style-type: none">a. Limit primary or fire caused damageb. Limit secondary or firefighter caused damage <p>VI. GAINING ACCESS TO FIRE</p> <p>A. Engine compartment (hood down)</p> <ul style="list-style-type: none">1. Use proper attack angle<ul style="list-style-type: none">a. Upslope/upwind if possibleb. 45° to corner2. Leave the hood closed3. Cool bumpers from an angle4. Spray through grill<ul style="list-style-type: none">a. Water, water/foam or extinguishing agent5. Pry open access hole at rear of hood<ul style="list-style-type: none">a. Piercing nozzle through hood option6. Open hood<ul style="list-style-type: none">a. Release latchb. Force entry7. Prop hood after opening (weak hinge springs) <p>B. Engine compartment (hood open)</p> <ul style="list-style-type: none">1. Approach at angle	



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Procedures Handbook 4300

SPECIAL FIRES

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<ul style="list-style-type: none">a. Upslope/upwindb. 45° to corner <p>C. Trunk</p> <ul style="list-style-type: none">1. Use proper attack angle<ul style="list-style-type: none">a. Upslope/upwindb. 45° to corner2. Cool fuel tank<ul style="list-style-type: none">a. Usually located lower rear3. Punch access holes through tail lights4. Pry open access hole at front corner of truck lid5. What is in the trunk?<ul style="list-style-type: none">a. Anything!b. Be alertc. Exercise caution <p>D. Electrical system</p> <ul style="list-style-type: none">1. Disconnect battery or cut cables<ul style="list-style-type: none">a. Negative terminal firstb. Prevents sparks<ul style="list-style-type: none">(1) Will spark if something is on or in vehicle2. Secure connections or cut a gap in cable to prevent re-energization3. Do Not cut high-voltage orange cables	



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Procedures Handbook 4300

SPECIAL FIRES

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<p>E. Upholstery</p> <ol style="list-style-type: none">1. Use foam2. Confine fire during rescue3. Remove seats if necessary <p>VII. SAFETY - DO'S AND DON'TS</p> <p>A. DO chock the fire engine</p> <p>B. DO chock the fire vehicle if a rolling hazard exists</p> <p>C. DO wear full protective clothing and S.C.B.A.</p> <p>D. DO use 1-1/2" hoselines, or larger</p> <p>E. DO approach from upslope/upwind</p> <p>F. DO establish minimum 100 foot danger zone and keep all unnecessary personnel out</p> <p>G. DO set up traffic control</p> <p>H. DON'T remove fuel caps</p> <p>I. DON'T flow water into fuel tank</p> <p>J. DON'T wash down fuel</p> <p>K. DON'T forget a catalytic converter is an ignition source</p> <p>L. DON'T underestimate a vehicle fire</p> <p>VIII. CLASS B FIRES</p> <p>A. Flammable liquids are those having a flash point less than 100 F</p> <ol style="list-style-type: none">1. Gasoline, Acetone2. Can ignite without being pre heated	



FIRE PROTECTION TRAINING

Procedures Handbook 4300

SPECIAL FIRES

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<p>B. Combustible liquids are those having a flashpoint greater than 100° F</p> <ol style="list-style-type: none">1. e.g. Kerosene, heating oil2. Must be heated above their flashpoint before they ignite <p>C. Flammable and combustible liquids are either hydrocarbons or</p> <ol style="list-style-type: none">1. Do not mix with water polar solvents2. Do mix with water <p>D. Flammable gases</p> <ol style="list-style-type: none">1. Vapor Density = is gas lighter or heavier than air?<ol style="list-style-type: none">a. LPG = heavier than air (sinks)b. 2. NG = lighter than air (rises) <p>Flammable Range = fuel to rich or lean to burn Toxicity = Will the products kill people?</p> <p>IX. HAZARDS</p> <ol style="list-style-type: none">A. Carcinogen toxic productsB. Flash firesC. BLEVE potentialD. Skin absorbed irritants <p>X. FIREFIGHTING TACTICS</p> <ol style="list-style-type: none">A. Complete structure fire safety gear with S.C.B.A. on airB. Approach with extreme caution	



FIRE PROTECTION TRAINING

Procedures Handbook 4300

SPECIAL FIRES

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<ul style="list-style-type: none">1. Use DOT Emergency Response GuidebookC. Approach upslope, up windD. Shut-off the product flow feeding the fire if safe to do soE. Consider CO2 or dry chemical extinguisher on small firesF. Apply Class B foam as primary extinguishing agentG. Apply water<ul style="list-style-type: none">1. Cooling agent2. Mechanical agent: to move Class B fuels away from ignition sources or to areas to safely burn off3. Crew protection fog patternsH. Back off and let the fire burn itself out (Defensive)	
<p>XI. CLASS C FIRES</p> <ul style="list-style-type: none">A. Energized electrical equipment	
<p>XII. HAZARDS</p> <ul style="list-style-type: none">A. Electrical shockB. Secondary fire to electrical equipment or exposures	
<p>XIII. FIREFIGHTING TACTICS</p> <ul style="list-style-type: none">A. Complete structure fire safety gear with SCBAB. Turn power off first-may self extinguish fire<ul style="list-style-type: none">1. Lockout/tagout shut-off switch(s) if available2. Request local power company to respond	



FIRE PROTECTION TRAINING

Procedures Handbook 4300

SPECIAL FIRES

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<ul style="list-style-type: none">C. Multipurpose dry chemical extinguishing agents<ul style="list-style-type: none">1. Halotron extinguishing agents involving delicate electronics and computer equipmentD. Do not apply water unless instructed to do so by your Supervisor<ul style="list-style-type: none">1. Fog or spray streams (100 psi) from a distanceE. Use dry chemical or CO2 extinguishers on ground based transformer or underground vault electrical fires.<ul style="list-style-type: none">1. Assume that all electrical wires and devices are energized until proven otherwiseF. Electrical Emergency Guidelines<ul style="list-style-type: none">1. Establish an exclusion zone to one span in all directions of a downed power line of transmission pole/tower2. Be aware that other wires may have weakened by a short circuit and may fall at any time3. Let the power company cut any electrical transmission lines4. Be extremely careful raising and lowering ladders near power lines-avoid accidental electrocution5. Notify the your Supervisor immediately if you see downed power lines on the incident—warn others-use Life Safety flagging and notify the ECC	
<p>XIV. CLASS D FIRES:</p> <ul style="list-style-type: none">A. Class D or combustible metals<ul style="list-style-type: none">1. e.g. Magnesium,	



FIRE PROTECTION TRAINING

Procedures Handbook 4300

SPECIAL FIRES

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<p>2. Water reactive</p> <ul style="list-style-type: none">a. Water and hot metal may release hydrogen gasb. Burns extremely hot-splatters hot slag <p>XV. FIREFIGHTING TACTICS:</p> <ul style="list-style-type: none">A. Use Class D extinguishing agents (Purple K)B. Let metals burn outC. Protect exposures <p>XVI. SAFETY CONCERNS:</p> <ul style="list-style-type: none">A. Full structure fire PPE and S.C.B.A.B. Brilliant bright white light-avoid looking at flamesC. Ash cap forms over molten material. DO NOT assume that the fire is out even if no visible flames. <p>XVII. TRASH AND DUMPSTER FIRES:</p> <ul style="list-style-type: none">A. Expect the unexpected-anything and everything may be burning, exploding or releasing. <p>XVIII. FIREFIGHTING TACTICS:</p> <ul style="list-style-type: none">A. When applying water, approach a dumpster fire below the top edge of the container or from the side of the engine as a shield from flying projectilesB. Attack from a safe distance with a narrow fog or straight stream first then move in consider using Class A foam or other wetting agentsC. Use a pike pole or rubbish hook to stir and pull material as water is applied.	



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Procedures Handbook 4300

SPECIAL FIRES

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<p>D. Large burning trash pile or dumpster fire use an 1-1/2 line or greater</p> <ul style="list-style-type: none">1. Option-use applicator nozzle for reach if available <p>E. Consider using a dozer or backhoe to move large burning trash/debris fires</p> <p>XIX. SAFETY CONCERNS:</p> <ul style="list-style-type: none">A. Full structure fire PPE and S.C.B.A. on airB. Hazardous materials are commonly involvedC. Decontamination of personnel and equipment maybe necessaryD. When in doubt, back out and let it burn	



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Procedures Handbook 4300

OTHER FIRES – THE BASICS

SUMMARY:

There is no such thing as a routine vehicle or other special fire incidents. There are many built-in hazards and unlimited unknowns that are inherent with these type fires. Be alert and exercise extreme caution.

EVALUATION:

A written quiz.

ASSIGNMENT:

To be determined by instructor(s).