Arizona Peace Officer Standards and Training
Basic Curriculum Model Lesson Plan

LESSON TITLE: FIRES 3.12

SUBJECT: Fires

HOURS: 2

COURSE CONTENT: This course is designed to acquaint the student with knowledge and understanding of the dynamics of fires and how they relate to different materials. The student will further learn options and considerations of their responsibilities relating to fire related scenes. Officer and civilian safety is emphasized.

PERFORMANCE OBJECTIVES: Upon completion of this course of instruction, the students using notes, handouts and other support materials as references, will:

3.12.1 Identify the following indicators that a burning building is too unsafe to enter:

A. Placards, signs or other indicators of the presence of toxic or explosive materials.

B. Puffing smoke, rattling windows, heat transfer or other indicators that the building is charged with heat and smoke.

C. Minor explosions and the sounds of escaping gas.

D. Structural integrity.

E. Fire department tells you NOT to go in.

3.12.2 Identify the following four (4) major classes of fire and the special hazards associated with each:

A. Class A – ordinary combustibles.

B. Class B – flammable liquids.

C. Class C – electrical.

D. Class D – combustible metals.

3.12.3 Identify the following principles for conducting a safe and effective

search of a burning structure:

A. Stay close to the floor.

B. Leave windows closed as you go.

C. Remain calm and work at a deliberate pace.

D. Always work in pairs.

E. Considerations.

3.12.4 Identify the following with respect to extinguishing a vehicle engine fire:

A. Proper method of extinguishing.

B. Dangers associated with car fires.

C. Dangers associated with electric vehicles.

D. Liabilities associated with acting to extinguish.

3.12.5 Identify the following potential hazards associated with entering a burning structure:

A. Smoke inhalation.

B. Exposure to toxic fumes.

C. Presence of explosive materials.

D. Structural integrity.

E. Burns, puncture wounds, etc.

F. Opening windows fuels the fire.

G. Industrial exposure report.

3.12.6 Identify the following with respect to extinguishing a fire on a downed aircraft:

A. Civilian aircraft.

B. Military Aircraft.

C. Ordnance.

D. Material's construction.

E. Electromagnetic/radar emitting devices.

3.12.7 Identify the following as factors to be considered when securing a fire scene:

A. Access by fire vehicles/ambulances.

B. Access to fire hydrants, including placement of hoses across roadways.

C. Potential for explosions.

D. Spread of toxic vapors (i.e., wind direction).

E. Need to redirect traffic for extended periods of time.

F. Potential structure collapse.

G. Live utilities (e.g., electrical, natural gas, etc.).

3.12.8 Identify the following factors that should be noted upon arrival at the scene of a potential arson:

A. Any suspicious person and/or vehicle(s) in the area.

B. Volume and color of smoke.

C. Distinctive fumes.

D. Environmental conditions.

DATE FIRST PREPARED: December 2000

PREPARED BY: SME Committee

REVIEWED – **REVISED:**	SME Committee	Date: December 2000
REVIEWED – **REVISED:**	Detective J. Whitbede, Pima County S.O. and Deputy Chief W. Fleger	Date: January 2002
REVIEWED – **REVISED:**	SME Committee Chair	Date: October 2002
REVIEWED – **REVISED:**	AZ POST (Word)	Date: February 2003
REVIEWED – REVISED:	SME Committee	Date: July 2004
REVIEWED – **REVISED**:	Richard Watling	Date: November 2004
REVIEWED – **REVISED**:	Richard Watling	Date: October 2005

REVIEWED – **REVISED**:	SME Committee	Date: April 2008
REVIEWED – **REVISED**:	Lt. Dave Kelly, ALEA	Date: November 2009
REVIEWED – **REVISED**:	SME Committee	Date: May 2010
REVIEWED – REVISED:	SME Committee	Date: November 2011
REVIEWED – REVISED:	SME Committee	Date: November 2012
REVIEWED – REVISED:	SME Committee	Date: November 2014
REVIEWED – **REVISED**:	John Metha, Yuma Fire SSGt John Siebenaler, 633 CES/CEF USAF	Date:September 2021
REVIEWED - **REVISED**:	AZPOST(Docx)	Date:September 2021
AZ POST – APPROVAL:	Richard Watling	Date:November 2014
AZ POST – APPROVAL:	Lori Wait	Date: October 2021

INSTRUCTOR REFERENCES: ~~S.A.L.E.T.C. 3.12 lesson plan~~. Code of Federal Regulations (CFR), A.R.S Title 49, National Fire Protection Association, Guide to Hazardous Materials hand book 2020 edition. National Fire Academy, and FEMA.

CLASS LEVEL: Student.

TRAINING AIDS: http://www.azleg.gov/ArizonaRevisedStatutes.asp

INSTRUCTIONAL STRATEGY: Interactive lecture and class discussion.

LESSON PLAN SUCCESS CRITERIA: 70% or higher on a written, multiple choice examination.

DATE RELEASED TO THE SHARE FILE: May 27, 2022

I. INTRODUCTION

A. Instructor – (self) introduction.

B. Preview of performance objectives.

C. Upon completion of this course of instruction, the students using notes,handouts and other support materials as references, within the allotted time, will:

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E. Need to redirect traffic for extended periods of time.

F. Potential structure collapse.

G. Live utilities (e.g., electrical, natural gas, etc.).

3.12.8 Identify the following factors that should be noted upon arrival at the scene of a potential arson:

A. Any suspicious person and/or vehicle(s) in the area.

B. Volume and color of smoke.

C. Distinctive fumes.

D. Environmental conditions.

II. INDICATORS THAT A BURNING BUILDING IS TOO UNSAFE TO ENTER **P.O. 3.12.1**

A. Placards, signs or other indicators of the presence of toxic or explosive materials. Refer to the Hazardous materials guide handbook. **P.O. 3.12.1A**

B. Puffing smoke, rattling windows, heat transfer or other indicators that the building is charged with heat and smoke. Smoked out or soot covered windows are in indication of a potential backdraft. **P.O. 3.12.1B**

C. Minor explosions and the sounds of escaping gas. **P.O. 3.12.1C**

D. Structural integrity. **P.O. 3.12.1D**

E. Fire department tells you NOT to go in. **P.O. 3.12.1E**

III. THE FOUR (4) MAJOR CLASSES OF FIRE **P.O. 3.12.2**

A. Class A – ordinary combustibles. **P.O. 3.12.2A**

1. Ordinary combustible materials:

   a. Wood.

   b. Cloth.

   c. Paper.

   d. Rubber.

   e. Plastics.

2. Be very conscious of officer safety concerns regarding:

   a. Heat.

b. Carbon monoxide.

c. Toxic gasses.

d. Smoke-decreased visibility.

B. Class B – flammable liquids (includes greases and gasses). **P.O. 3.12.2B**

1. High heat.

2. Rapid spread/explosions.

3. Water alone may increase fire.

C. Class C – electrical. **P.O. 3.12.2C**

1. Electrocution.

2. Flash burn.

D. Class D – combustible metals. **P.O. 3.12.2D**

1. Includes: Magnesium, titanium and zirconium.

2. Extremely high heat.

3. Water application may cause rapid acceleration or explosion.

IV. PRINCIPLES FOR CONDUCTING A SAFE AND EFFECTIVE SEARCH OF A BURNING STRUCTURE

INSTRUCTOR NOTE: *Only do when absolutely necessary and safe to enter.*

P.O. 3.12.3

A. Can it be done without <u>you</u> becoming a victim?

B. When <u>not</u> to enter a burning structure:

1. Imminent structural collapse.

2. Firefighters tell you not to.

3. Total burning of all fuels/ the structure is fully engulfed.

C. "If you can safely enter", stay close to the floor; stay low. **P.O. 3.12.3A**

D. "If you can safely enter", Keep windows closed as you go. **P.O. 3.12.3B**

E. "If you can safely enter", Remain calm and work at a deliberate pace. **P.O. 3.12.3C**

F. "If you can safely enter", Always work in pairs. **P.O. 3.12.3D**

G. Considerations. **P.O. 3.12.3E**

1. Visibility due to smoke.

   a. Disorientation.

   b. You can get lost inside.

   c. The smoke can make it so your eyes will not want to open or tear over. This will make vision more difficult or impossible.

2. Gasses or poisonous fumes.

   a. Most homes have furniture made with synthetic materials. When those burn, they emit poisonous fumes that are not visible.

   b. The fumes/gasses can displace oxygen. If oxygen levels drop too low, you can pass out. There is no warning and it happens quickly. Anyone going in to save you will also become a victim without a Self-Contained Breathing Apparatus.

   INSTRUCTOR NOTE: *Similar in principle to confined space entry. Outside gasses can displace oxygen. Loss of consciousness is immediate. Filtration masks will not help. This is where a SCBA is required.*

V. FIRE CHEMISTRY AND FIRE BEHAVIOR

A. Fire chemistry.

1. Fire is a self-sustained, rapid oxidation process, accompanied by the evolution of heat and light in varying intensities.

2. Fire tetrahedron: Oxygen, heat fuel and an uninhibited chain reaction.
   INSTRUCTOR NOTE: *the combustion reaction of a fire.*

B. Fire behavior.

1. Fire burns up and out.
   INSTRUCTOR NOTE: *"V" pattern.*

2. Smoke and flame color can sometimes give an indication of what is burning.
   INSTRUCTOR NOTE: *Black = hydrocarbons (tires), green=copper.*

3. Three (3) types of heat transfer:

   a. Conduction: Direct contact.

   b. Convection: Changes in density of gasses.
   INSTRUCTOR NOTE: *Similar to a convection oven.*

   c. Radiation: Infrared radiation.
   INSTRUCTOR NOTE: *The sun.*

4. Three (3) stages of a fire:

   a. Incipient: Begins at time of ignition.
   INSTRUCTOR NOTE: *Oxygen content in the air is about 21%.*

   b. Freeburn: Fuel burning, temperature rising, gas and soot collection.
   INSTRUCTOR NOTE: *Flashover is possible.*

   c. Smoldering: Ambient oxygen is below 15%-16%, flame cannot exist.
   INSTRUCTOR NOTE: *Backdrafts are possible.*

5. Definitions:

   a. Flashover: Simultaneous ignition of all fuel in a room.

   b. Backdrafts: The ignition of accumulated soot/gases with the introduction of oxygen.

VI. EXTINGUISHING A VEHICLE ENGINE FIRE **P.O. 3.12.4**

A. Analyze the fire; can you put it out with a hand extinguisher? **P.O. 3.12.4A**
INSTRUCTOR NOTE: *Do not open the hood all the way- if safe, just enough to use the extinguisher.*

1. Use equipment available to you.

2. Consider wind/weather conditions – stay up wind.

3. Protect self and others from injury – officer safety.

4. Some cars have mounts or the engines made of magnesium. If this catches on fire, the addition of water will make it worse and burn hotter.

B. Beware of exploding parts. They can cause serious injury or death.

1. Bumper pistons.

2. Struts.

3. Airbags.

P.O. 3.12.4B

4. Tires.

5. Leaking or pools of gasoline.

C. Electric Vehicles. **P.O. 3.12.4C**

1. Can pass an electric current to the exterior surfaces of the car from a short.

2. Can electrify water or liquids surrounding the vehicle.

3. Multiple access points around the vehicle to cut off power from the batteries.

4. If you see a bright fire, the batteries have ignited.

D. Consider fire proximity to other potential hazards:

1. Gas station.

a. Emergency pump cut off located on the building or service area.

b. Gas tank storage access holes in the ground.

2. Propane tanks.

E. Attack the fire directly – source, at the base.

F. Liability issues: **P.O. 3.12.4D**

1. Increased damage to vehicles.

2. Carelessness, injury to persons.

VII. HAZARDS ASSOCIATED WITH ENTERING A BURNING STRUCTURE P.O. 3.12.5

A. As a police officer, you do not have protective equipment to safely enter most fire scenes.

1. Officer safety is a must.

2. Always search in pairs.
INSTRUCTOR NOTE: *Remember, you should be a part of the solution, not part of the*

problem.

B. Personal health hazards: **P.O. 3.12.5A**

1. Smoke inhalation – carbon monoxide has an affinity for hemoglobin (210x more than oxygen).

2. Exposure to toxic fumes – lung and skin damage. **P.O. 3.12.5B**

3. Presence of explosive materials. **P.O. 3.12.5C**

4. Structural integrity, possible collapse – walks and roof. **P.O. 3.12.5D**

   a. A sagging roof is an indication that the roof will eminently collapse. Metal pinging sound(s) indicated the metal truss supports are popping off. This is a a great indicator the roof is compromised and may imminently collapse.

   b. Smoke from under the roof is an indicator of fire in the attic and is spreading rapidly.

5. Burns, puncture wounds, etc. **P.O. 3.12.5E**

6. Opening a window fuels the fire. **P.O. 3.12.5F**

7. Industrial exposure report. **P.O. 3.12.5G**

   a. Consider an industrial exposure report for any instance of smoke inhalation, toxic fumes, skin/lung damage, burns or puncture wounds.

   b. What may not be affecting you today, may affect you tomorrow.

C. Additional hazards:

1. Flashover – the simultaneous ignition of all combustibles in a room.

2. Backdraft – the resulting explosion when oxygen is improperly introduced to a confined space.

3. Smoke is fuel. Where there is smoke, fire is there in some form.

4. Your uniform is polyester or synthetic – <u>uniforms are very flammable and can melt</u>. Melted materials will require medical scrubbing to be removed from your skin!

VIII. HAZARDS ASSOCIATED WITH A DOWNED AIRCRAFT P.O. 3.12.6

A. An aircraft incident, whether it is a mid-air collision or a crash landing, does not happen often. Aircraft present some different challenges.

1. A running engine may present propeller or jet intake issues. Stay clear of any moving parts or air intakes. For jet intake considerations 50 feet in front/ 250 to the rear. **P.O. 3.12.6A**

2. Aircraft tires run at much higher levels. Between 200 and 295 psi. This can present a danger of exploding tires. **P.O. 3.12.6B**

3. Aircraft brakes can overheat, explode or catch fire if they have been applied extremely hard.

4. Military aircraft. **P.O. 3.12.6C**

   a. Potential live ordnance. Explosives, flares, ammunition. If a rocket or flare is burning, let it burn. ****DO NOT ATTEMPT TO EXTINGUISH*****

   b. Larger external (potentially detachable) fuel pods.

   c. Military aircraft can have construction materials that burn and emit higher levels of toxic fumes than conventional aircraft. Modern fighter aircraft have unique construction materials that are hazardous when burned. Treat as HazMat. **P.O. 3.12.6D**

   d. Military aircraft will contain high power electromagnetic and radar emitting device(s). Caution and care should be taken to avoid or limit the exposure to these devices. **P.O. 3.12.6E**

   e. Depending on where the aircraft goes down, you may end up with a scene involving aircraft, vehicle, structure or all three.

   f. Most equipment of military aircraft is sensitive or classified in nature. Consider and extended perimeter when making your scene assessments.

IX. SECURING A FIRE SCENE

A. Safety. **P.O. 3.12.7**

1. Wind direction. **P.O. 3.12.7D**

   a. Smoke.

   b. Toxic vapors.

   c. Potential for explosions. **P.O. 3.12.7C**

2. Secure perimeter.

    a. Flares (not near fire hoses or liquid spills).

    b. Cones, barricades, etc.

    c. Crime scene tape.

3. Render aid.

4. Occupants/bystanders (evacuate).

B. Scene access by fire vehicles, ambulances, and other emergency personnel/vehicles, etc. Position your vehicle to allow enough space for fire equipment to have enough room to pass. If you are not by your vehicle and it needs to be moved, you can inadvertently prevent emergency equipment from getting to the scene. **P.O. 3.12.7A**

C. Access to fire hydrants, including placement of hoses across roadways. **P.O. 3.12.7B**

1. No one drives over fire hoses.

2. (Title 28 violation, A.R.S. §28-897).

D. Potential to redirect traffic for extended periods of time. **P.O. 3.12.7E**

1. Drinking water.

2. Relief.

3. Equipment.

E. Potential structure collapse. **P.O. 3.12.7F**

F. Live utilities (e.g., electrical, natural gas, etc.). **P.O. 3.12.7G**

1. Rotten egg smell for a gas leak.

    a. Explosion hazards from smoking, fire, electrical shorts.

    b. Stay upwind and uphill if the situation permits.

    c. No smoking around the area.

2. Downed power lines.

a. A safety zone no closer than “one power pole” span to the downed line.

b. Electricity can arc or jump from span to span or directly to you.

X. FACTORS THAT SHOULD BE NOTED UPON ARRIVAL AT THE SCENE OF A POTENTIAL ARSON

P.O. 3.12.8

The following factors should be noted upon arrival. Should the event be determined to be arson, this information should be relayed to the Fire Department when the situation is under control. This may assist them in determining suspects, point of fire origin and determine accelerants utilized. All fire scenes should be treated as a crime scene until determined otherwise. ***INSTRUCTOR NOTE:*** *Share with the fire department or arson investigator.*

A. Any suspicious person/vehicle in the area. **P.O. 3.12.8A**

B. Volume and color of smoke. **P.O. 3.12.8B**

C. Distinctive fumes. **P.O. 3.12.8C**

D. Environmental conditions. **P.O. 3.12.8D**

E. Origin or starting location of the fire if known or observed.

XI. CONCLUSION

A. Review of performance objectives.

B. Final questions and answers.

C. Instructor closing comment(s).