

# ***Criminal Investigation,***

Seventh Edition

Chapter Twenty

Arson and Explosives Investigations

# *Preliminary Investigation*

- Where and how did the fire start?
  - Two factors must be present for a fire to start:
    - Source of heat.
    - Ignited material.
  - Fires can start accidentally. Causes may include:
    1. Electrical system.
    2. Electrical appliances and equipment.
    3. Gas.

# *Preliminary Investigation*

- Fires can start accidentally. Causes may include:
  4. Heating units.
  5. Sunlight.
  6. Matches, (children playing with matches).
  7. Smoking.

# *Spontaneous Heating and Ignition*

- There are few fundamental causes of spontaneous heating, nearly all come from organic materials, (fermentation, oxidation or both).

# ***Burn Indicators***

- Alligatoring: checking of charred wood, giving it the appearance of alligator skin. Large, rolling blisters indicate rapid, intense heat; small flat alligatoring indicates long, low heat.
- Crazed and fractured glass: crazing refers to the cracking of glass into smaller segments or subdivisions in an irregular pattern.
- Depth of char: This is the depth of burning of wood – used to determine length of burn and thereby locate the point of origin of the fire.

# ***Burn Indicators***

- Distorted light bulbs: Incandescent light bulbs can sometimes show the direction of heat impingement. As the side of the bulb facing the source of heat is heated and softened, the gases inside a bulb greater than 25 watts can begin to expand and bubble out of the softened glass. The bulge or pulled portion of the bulb, will be in the direction of the source of heating.

## ***Burn Indicators***

- Line of demarcation: Boundary between charred and uncharred material. On floors or rugs, a puddle-shaped line of demarcation is believed to indicate a liquid fire accelerant. In cross section of wood, a sharp, distinct line of demarcation indicates a rapid, intense fire.

# ***Burn Indicators***

- Sagging furniture springs: Because of heat required for furniture springs collapse from their own weight. Because of the insulating effect of the upholstery, sagging springs are believed to be possible only in either a fire originating inside the cushions (as from a cigarette rolling between the cushions) or an external fire intensified by a fire accelerant.

# ***Burn Indicators***

- **Spalling:** A condition ordinarily associated with masonry and cement (concrete) building materials. It may appear as a distinctive discoloration of brick or concrete; in some cases, the surface of these building materials may be pitted or rough.
- **Freezing of leaves:** Drying of leaves in a forest fire into their position at the time of the fire. Because leaves turn during the day to face the sun, their position indicates the time of day the fire occurred.

# *Fire Setting and Related Mechanisms*

- Matches – usually a juvenile offender, others want some delay so they may leave the scene.
- Candles – through the use of candles arsonists are able to time the fire.
- Chemicals – Most chemical ignition units leave some residue. Watch for residue when investigating a scene.

# *Fire Setting and Related Mechanisms*

- Gas – the combination of gas and a pilot light will cause an explosion and a fire.
- Electrical Systems – Any wiring system, including a doorbell and telephone circuit can be used to ignite a fire.
- Mechanical devices – An alarm clock can be used to start a fire (or as the timer). Arsonists have moved away from the use of clocks because of the evidence left behind.

# *Fire Setting and Related Mechanisms*

- Plants – a plant is the material placed around the ignition device to feed the flame.
- Accelerants, or boosters, speed the progress of the fire. Kerosene and gasoline are favored. However any flammable fluid or compound may be used to accelerate the blaze.

# *Fire Setting and Related Mechanisms*

- Trailers – trailers are used to spread the flame. It is a liquid or other substance that spreads the flames. Rope, or toilet paper soaked in alcohol or similar fluid may be used.
- Missing items – look to see if the normal type of items that you would expect to see at the scene of a fire (in a normal home or business) are at the scene. The fact that items are missing may indicate that the fire was planned.

# *Fire Setting and Related Mechanisms*

- Speed of spread of fire – an experienced fire fighter generally has a good idea as to how fast a fire will spread. If the fire spreads quicker than expected then a deliberate fire is more of a possibility.

## ***Motives for Arson***

- Financial stress.
- Short term business problem.
- Desire to relocate or remodel.
- Buildup of slow moving inventory.
- Outmoded technology.
- Satisfaction of a legal or illegal debt.
- Building rehabilitation.
- Real estate scheme (destruction of property to get tenants to move).

## ***Motives for Arson***

- Elimination of competition.
- Extortion.
- Labor-Management grievances.
- Revenge, spite, or jealousy.
- Vandalism, malicious mischief.
- Crime concealment, diversionary tactics.

## *Motives for Arson*

- Pyromaniac and schizophrenic fire setter – this is referred to as a irresistible urge to set fires. The individual may have a psychosis, a severe form of personality disorganization. Such individuals may set fires out of some psychological reason.
- Vanity, Hero Fires – the person who “discovers” the fire is the one who set the fire in an attempt to be a hero.

# *Detection of Accelerants*

- Olfactory detection - smelling the accelerant.
- Chemical color test detector – used to detect both liquid accelerant residues and their vapors.
- Catalytic Combustion Detector – a sniffer or vapor detector – measures the resistance in the chamber as electrical resistance changes.
- Flame Ionization Detector – the sample gets mixed with hydrogen and the mixture is burned. The degree of ionization is measured.
- Gas liquid chromatograph – the sample gas is separated into components and based upon the speed of the gas passing through a tube the components are identified.

## *Detection of Accelerants*

- Infrared Spectrophotometer – can achieve high specificity to flammable liquids and high sensitivity.
- Ultraviolet Fluorescence – consists of illuminating the darkened fire scene with an ultraviolet lamp. Certain substances, including constituents of gasoline and its residue, absorb the ultraviolet light and release it as visible light.

# ***Bomb Threats***

- Officers/investigators should encourage people to obtain the following information:
  - The time the call was received.
  - The gender and age of the caller. Voice characteristics of the caller, such as accent, calm, stutter, giggling, stressed, disguised, slow, deep, nasal, sincere, crying, loud, angry, lisp, squeaky, slurred, broken, rapid excited, normal.
  - Background noises.

# ***Bomb Threats***

- If possible the person answering the call should seek:
  - The location of the bomb.
  - The caller's reason for placing the bomb.
  - When the bomb is going to explode.
  - What the bomb looks like.
  - What kind of bomb it is.
  - What will cause it to explode.
  - Whether the caller placed the bomb.

# ***Bomb Threats***

- Evacuation:
  - The decision to evacuate the scene is made by the organization, unless a device is found, then the law enforcement agency makes the decision.
  - Individuals familiar with the scene, office, house, etc. should participate in a search for the device since these individuals know what should be at the scene.
  - In case of a bomb threat:
    - Do not ignore the threat.
    - Do not touch suspected explosives.
    - Do not touch suspected bombs.
    - Do not move suspected bombs.

# ***Bomb Threats***

- In case of a bomb threat:
  - Do not move things if you do not know what they are.
  - Do not open things if you do not know that they are.
  - Allow individuals familiar with explosive devices to handle suspect devices.

***The End***