
Evidence, Part 2

GATHERING AND USING EVIDENCE

The following topics are designed to provide you with specific details about handling various forms of evidence. For example, you'll learn how evidence can be used to discover whether or not a fire was due to arson. You'll learn how to use evidence to reconstruct the scene of a violent crime. You'll also discover what kinds of evidence will provide answers to questions about vehicle thefts and fraud.

By law, people are protected against *unreasonable* searches and seizures. Law-enforcement officials must either have enough evidence to arrest a suspect or they must apply for a search warrant to avoid violating a suspect's constitutional rights. In the case of property searches, the search warrant must carefully detail what items the searcher intends to find.

As a private citizen, you might conduct an illegal search and seizure, but any evidence you find may be tossed out of court. You may even be jailed for breaking and entering as well as for theft if you remove the evidence from the premises. Usually, physical evidence can wait until the appropriate authorities arrive with a search warrant. Your information can provide the probable cause for conducting an official search. Only when the evidence is of a *transient* (temporary) nature will the courts be likely to accept it after it had been seized without a warrant.

Fires and Arson

Arson is the willful and malicious burning of property. The property may belong to others or it may belong to the arsonist, who probably envisions some gain in the destruction. In its frequency of occurrence, arson ranks near the top of crime-related incidents that result in loss of life and property. In the late 1960s and early 1970s—during the last years of America’s war with North Vietnam—some American cities were virtually torched during antiwar protests. Many communities were reduced to rubble. While no one doubted that the majority of the fires were deliberately set, very few arsonists were brought to justice. Even today, very little public attention is given to fires deliberately set. One reason for this negligence is the question of jurisdiction. The police may perceive a fire as the fire department’s problem. At the same time, fire officials may conclude that, as an obvious case of arson, the fire is a police matter. Many times the result is that neither agency commits very many resources to investigate a suspicious fire. Another reason involves the individuals who set the blazes. When fires are started by youths—as was suspected in the Canada Games fire in Regina, which caused tens of thousands of dollars of damage in 2005—the public tends to dismiss the crime as an act of delinquency rather than view it as a serious criminal offence. According to the National Fire Protection Association, the annual losses due to arson exceed two billion dollars. That figure would be even higher if the estimate included losses from all the fires that are suspicious but of *unproven* origin.

Determining the Origin

By their very nature, arson crime scenes are difficult to process. The fire will destroy evidence that otherwise would be easily recovered from most other crime scenes. Most arson scenes are guaranteed to be trampled by emergency personnel. Firefighters, for example, will have to chop, rearrange, and douse the scene with water or foam to put out the fire. Nevertheless, clues to the cause of the fire are available if you’re careful in your investigation. Evidence proving the origin and cause of a fire can be the *corpus delicti* (substantial fact proving a crime) for an arson. Coupled with establishing

a motive, such important evidence can lead to an arrest and conviction. Often, by eliminating the possible natural causes of a fire, you can determine that the fire must have been deliberately set.

Accidental fires. Accidental fires have many causes. The causes most routinely encountered are in the following list.

1. *Heating systems.* Faulty heating systems may allow overheating and can cause the combustion of nearby common household materials. Portable systems are often knocked over by children or through carelessness.
2. *Smoking.* Countless times, an accidental fire starts because a smoker falls asleep in bed with a lit cigarette. Also, smokers may discard cigarette butts or matches that are still lit and so a fire starts.
3. *Electrical shorts.* The cause of many fires, electrical shorts can result from overloaded circuits, faulty breakers or fuses, and poorly wired circuits. Rodents or pets have been known to chew through wires also leading to shorts and subsequent fires.
4. *Lightning.* Lightning has struck many dwellings with disastrous results.
5. *Spontaneous combustion.* Discarded oily rags may slowly build up heat until they spontaneously burst into flames.
6. *Grease fires.* When foods are being cooked, grease or oils are sometimes accidentally spilled, or pots may develop leaks that let flammable materials ignite and start a serious fire.

Arson fires. Deliberately set fires are also very common. The methods used to set a fire, however, can vary from the commonplace to the ingeniously contrived. Some of the most frequently used tools of the arsonist are listed here.

1. *Matches and lighters.* Fires set with matches and cigarette lighters may be started using available combustible materials such as newspapers.
2. *Flammable liquids.* Gasoline, kerosene, paint thinners, alcohols, and charcoal lighter fluid have all been used to start or spread fires.

3. *Flammable gases.* Propane, natural gas, and acetylene are examples of the gases that may be used.
4. *Various solids.* Certain elements and compounds—like sodium, potassium, and calcium carbide—react violently when placed in contact with water. *Oxidizers*—like chlorates, nitrates, and perchlorates—add oxygen to a combustible material and may be used to intensify a fire.

Often, an arsonist will somehow delay the start of a fire long enough to leave and establish an alibi for his or her whereabouts at the time of the destruction. The following list includes some examples of items that can be used as *delayed-ignition devices*.

- Streamers or wicks made of cloth or string can be saturated with a flammable liquid and strung out across the premises.
- Fuses can be made from firecrackers, gunpowder, and so on. Burning cigarettes are also often used as fuses.
- A household appliance can be plugged into a socket and left on with something combustible nearby. Common appliances such as irons and toasters are often used in this technique.
- Timers such as clocks are sometimes rigged to start a fire.
- Certain electrical devices that activate only periodically may also be altered to function as an energy source for starting a fire. For example, photosensitive devices that switch on an electric current in response to light or to the absence of light and even doorbells have been adapted to trigger fires.

Searching for a Motive

When not accidental, a fire is set with the intent to destroy. The motive can vary dramatically from one arson to the next, but reasons for the arson are usually limited to the following motives.

Monetary reward. Arsonists often destroy their own property to collect the insurance. Look for failing business ventures, other financial difficulties, and recently acquired fire-insurance policies. Look for evidence showing a desire to retire or to move to a new location. If the fire destroyed a business, check out the business's competitors. The arson may have been an attempt to eliminate the competition. Also, a contractor who needs the business may drum up repair work by committing arson.

Getting even. An arsonist may set a fire intentionally out of hatred or jealousy. Revenge for being fired from a job or kicked out of a building may also be a motive for arson.

Concealment. Fires are often set to conceal the evidence of some other crime such as murder or embezzlement. The burning of a crime scene can certainly make gathering evidence more difficult. However, new evidence will be created as the result of the arson.

Pyromania and other mental disorders. Sometimes the arsonist suffers from a mental disorder or craves the attention created by a large fire. A security guard or a member of the responding emergency unit may have set the fire just to feel heroic when reporting it or when helping to put it out. A drug or alcohol addiction can alter a person's mind and lead to arson. Certain mental disorders provoke sexual stimulation from watching a fire; thus the spectator fascinated by the blaze may turn out to be the arsonist who actually started it.

Investigating a Scene during the Fire

Observing a fire in progress may provide many clues about the origin and cause of the combustion. Gather any videos or still pictures taken of the fire, such as the photo shown in [Figure 1](#). Equally important are interviews of any witnesses at the scene including first responders and firefighters.

FIGURE 1—Collect any videos or pictures of a fire. Upon close observation, such images may provide clues to the fire’s origin. (Courtesy of John S. Tobin, Maryland State Police)



Observe the structure. Note how much of the structure is involved in the fire, how the fire is spreading, and in what direction the fire is spreading. The fire should be influenced by the wind and by the structure itself. Observe where the drafts are and note what doors and windows are open. Try to determine if the fire is traveling in an abnormal direction.

Observe the flames. The *color* of the flames is related to the fire’s temperature. Temperatures can range from a few hundred degrees to over two thousand. The specific material being burned and how much oxygen is available affect the temperature of the fire. The colors may range from the coolest (dull red) through yellow and up to the hottest (very white).

With some experience, you may be able to discern that the *volume* of flame and smoke is unusually large for a particular fire. The vigor of a fire, for example, may seem out of proportion given the nature of the burning structure. In such a case, some extra flammable materials had probably been added before the fire started. **Figure 2** shows how such additional flammable materials can affect the appearance of a fire.



FIGURE 2—When observing a fire in progress, you may note secondary explosions indicating the presence of additional flammable materials.

(Courtesy of Dr. Louis C. Portis)

Observe any smoke or fumes. Along with the flames, the smoke and vapors coming from a fire are also important. For example, red flames with black smoke indicate that aromatic compounds are being burned. *Aromatics* are found in petroleum products and in coal. White and gray smoke can come from the flying ash that results from burning a lot of loose material such as paper or hay. Odd colors, such as yellow or red-brown, can come from sulfur or from burning nitrated compounds. Several of these compounds are commonly found in incendiary devices.

Pay attention to any noticeable *odors*. Most chemicals give off somewhat distinctive odors, especially when heated to the combustion levels that vaporize most substances.

Caution: Many chemical vapors are extremely toxic to humans. Control your exposure.

Observe the spectators. Often, the arsonist will be present within the crowd of onlookers at the scene. Make it a habit to get distinguishing photographs of every one of the spectators. Look for the abnormally excited person or one who appears sexually aroused by the scene. At night, look at how the spectators are dressed. The culprit may look out of place by being fully clothed while others are dressed for bed.

Investigating a Scene after the Fire

The way you process the scene of an arson will be different from the ways you investigate most other crime scenes. You may need to wait up to a day or two for the rubble to cool down. During this time, the scene must be secured to protect the evidence. The crime scene will be messy and hazardous. When the conditions require it, wear the appropriate protective clothing such as boots, puncture-resistant coveralls, heavy gloves, a mask, and a hard hat. Once prepared, proceed as follows.

Inspect the area. Search the immediate perimeter of the fire scene. Examine any remaining doors and windows. Look for a possible point of entry that may be revealed by pry marks, forced locks, broken windows, and so on. Remember not to form an opinion at this stage of your search. After all, the firefighters may be responsible for any damage that you observe.

Search through the burned interior, observing any charred remains. Pay close attention to any areas onto which *accelerants* may have been poured. Use your nose to smell for an accelerant. If you encounter difficulty and have access to an arson-trained dog, consider using the animal in your investigation. Arson dogs are currently being used to detect trace elements of accelerants in at least three Canadian provinces.

As you would do at other crime scenes, concentrate on the points of entry or exit. Examine any fire-protection devices like extinguishers or smoke detectors left at the scene. Sometimes the arsonist will have disabled them or the telephone or power source before starting the fire. Often, the arsonist will have arranged the scene in an attempt to obtain as much destruction from the burning as possible before the fire could be extinguished. Examine the condition of any file cabinets, drawers, windows, doors, and so on for evidence of this type of tampering.

Study the fire's point of origin. The single area most likely to provide evidence is the point where the fire originated. For an investigation, this point is the *epicenter* of the crime scene. Use information gained from any photographs, video

footage, and witnesses to guide your search. Depending on the conditions of the scene, special equipment may be necessary to expose the epicenter. If the scene has caved in, you may need to remove a lot of material before you can locate and examine the point of origin in detail. Study the charred wooden beams left in the structure. The side away from the flame source will be rounded. Probe the charred wood with a sharp tool to determine the depth of the charring. Note that the charring will have a scaly appearance resembling alligator hide. Nearer to the point of origin, the scales become smaller and the charring becomes deeper.

Once located, the origin should be examined very carefully to determine if the fire was accidental or deliberate. Search for accelerants. Note what should normally be at this point or what things are out of place. Suspect any substance that's different from the surroundings. Differently colored ash, melted metals, parts of a device, and any liquids are examples of possible clues to an arson. Liquids run downhill, so look for these types of accelerants at the lowest areas in the scene. You may need to dig below the rubble near the fire's point of origin to reach this evidence.

Collecting the Physical Evidence

As with any other crime scene, a series of photographs and sketches should be used to document the setting. A common mistake when photographing the scene is to forget to include an *overall*, or *orientation*, shot before taking close-ups of evidence. Follow the photographic series with a rough sketch. Include on your sketch the appropriate notations and measurements showing the locations of any evidence you plan to collect.

Associative evidence. Carefully photograph any *documents* that you may discover at the scene. Before attempting to collect a charred document, transcribe any visible writing. More often than not, the charred paper will disintegrate before the evidence can be examined by a handwriting expert in the laboratory. After the photographing and sketching, the scene should be processed for *latent prints* (barely visible fingerprints left on objects). Pay careful attention to any containers that may have been used to transport flammables on the

scene. Sometimes the heat from the fire will *fix* prints permanently on the container. Soot from the combustion may also make latent prints visible. The container itself may be collected and secured in a box or paper bag for transport. However, any liquid inside the container should be transferred to a small (10-milliliter) glass jar with a tight-fitting lid.

Flammable evidence. The laboratory doesn't need much flammable liquid to confirm that an accelerant was used. In fact, a drop or two of liquid is more than enough. Sometimes, one or more containers at the crime scene may contain a lot of unburned, flammable liquid. Rather than risk an accident by transporting the entire quantity to a laboratory, you should remove the majority of the liquid and store it somewhere safe. The last thing you need is a second fire in an evidence locker or in the laboratory. Collect a separate sample from each container that you may find at the scene. It's not uncommon for an arsonist to use more than one type of flammable liquid to start a fire.

Of course, the majority of arson scenes won't yield liquid samples that could be packaged nicely into little jars. Rather, the flammables will have soaked into the charred debris that must then be collected and submitted to the laboratory. The most widely used container for this type of sample is a new, metal, one-gallon paint can. Make sure that the interiors of the cans are free of varnish. The cans can be filled with carefully collected charred debris from the fire's point of origin. Realize, however, that there can be multiple points of origin in a typical arson fire. Collect samples from each, but don't mix the samples. Also, remember to collect *controls* at the scene. In the case of a fire, control samples are pieces of charred material that are representative of the premises but show no signs of an accelerant. Don't forget to label each sample. Transport your samples as soon as possible because the debris may contain natural products that will rust the paint cans.

The Laboratory Analysis of Arson Debris

Once the debris is received in the laboratory, it's analyzed to determine what substances are present. The control samples are also analyzed to determine whether or not the substances are natural to the scene.