

Arson

Blazing, red-hot flames licking the windows of a burning building seem set on devouring everything. But fire investigators rely on the fact that they do not. Even in a seemingly gutted, charred ruin, some clues will remain intact, and they can prove arson—and even prove intent if the fire has claimed lives, so that manslaughter becomes murder.

When investigators arrive at a fire, their first job is to question any bystanders. Those who raised the alarm or arrived before the emergency services may be able to provide information about where and how the fire started. They may even have videotaped the developing fire.

Once the fire is under control and the temperature has fallen, making the building safe is a priority. Investigators face some obvious hazards, such as the risk that the building may collapse around them. But there are unseen dangers, too: asbestos, toxic beryllium oxide (used as electrical insulator), and carcinogenic combustion products.

INSURANCE FRAUD

One of the most common motives for arson is insurance fraud. Typically, an owner of a failing business removes stock, so that he can both sell it and make an insurance claim for it, before torching a warehouse or factory. Investigators sift the ashes for evidence that may contradict a claim. Even when fire consumes clothes in a warehouse, metal zippers and fastenings can survive the blaze, so the absence of any trace of the stock is itself suspicious.



Take a seat

Investigators first want to know where the fire started and how. Arsonists try to conceal their work, and often start fires in two or more places. By contrast, accidental fires usually start in just one place and, more often than not, the origin, or “seat,” of the fire is self-evident.

To the lay onlooker, finding the seat of a fire in a charred, steaming wreck may seem like an impossible task, but investigators are experienced in “reading” the crime scene. Fire travels upward, so they start at the lowest levels.

Signs that direct them to the seat of the fire include: residual heat; depth of charring; spalling (splintering or flaking off) of building materials such as plaster and concrete; smoke patterns; distortion of plastic, glass, and metal; ceiling damage; and patterns of structural collapse.

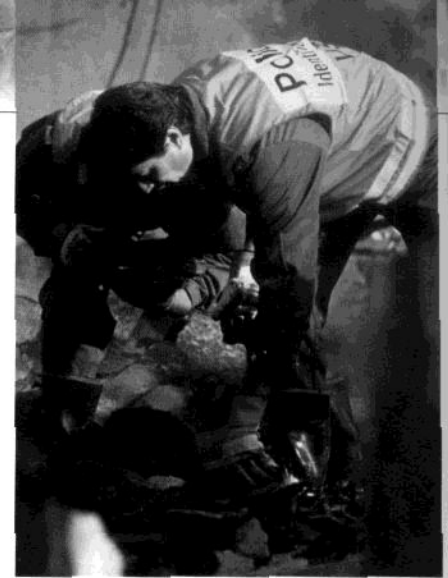
Once they have located the seat of the blaze, investigators comb the wreckage in search of what started it. The basic tools of the arsonist are an accelerant, such as gasoline, that ensures the fire starts quickly, and an incendiary device to light the flames. This can be as complex

FUEL SNIFFER ▶

Called hydrocarbon vapor detectors, they draw in air and feed the samples to a hydrogen flame. A hotter flame indicates the presence of an accelerant.



Glass evidence jars sealed with vapor barrier screw lids to contain volatile accelerants.



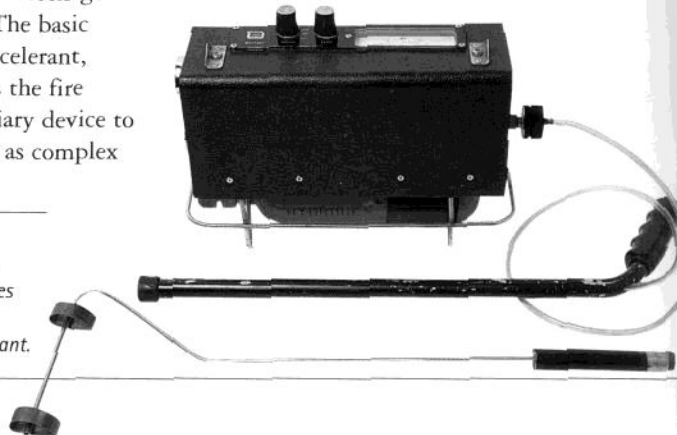
CULT FIRE ▲

Swiss investigators search for evidence in charred ruins after members of the Solar Temple Cult torched their headquarters in a bizarre 1994 suicide pact.

as an electronic timer, or as simple as a smoldering cigarette wedged in a matchbook. Amazingly, traces of both accelerant and incendiary device often survive the ferocious fires they are intended to start.

You don't need to be a fire expert to smell arson. Unburned hydrocarbon fuels, solvents, and paint thinners all have characteristic odors. Liquid accelerants leave visual clues such as sharply defined, irregular pool marks on the floor. There may also be a characteristic burn pattern along the edges of floorboards, indicating that burning liquid flowed between them.

If none of these indicators is present, investigators use sniffers (hydrocarbon detectors) to find concentrations of accelerants. When they find anything suspicious, they remove the contaminated item for laboratory analysis. The removed



items have to be treated with special care. Accelerants are volatile, and without proper storage the evidence can literally vanish into thin air. Storage containers need secure vapor seals, so screw-cap jars, metal drums similar to paint cans, and polyvinylidene bags ("oven bags") are usually used.

Conventional sleuthing

A general investigation of the crime scene can reinforce or refute suspicions of arson. Specifically, investigators check whether alarm or sprinkler systems were deliberately disabled. They look for tracks outside the building, and method of entry and exit.

Investigators use the usual grab-bag of tools—written notes, sketches, measurements, photography, and video. They pay particular attention to the position and orientation of unburned, part-burned objects such as furniture, because the pattern of burning shows which side faced the seat of the fire.

BRAZEN BLAZE

Not all arsonists rely on stealth. The Molotov cocktail this Seoul demonstrator hurled into the flames neatly combines accelerant and incendiary device in a handy package.

Instruments of detection

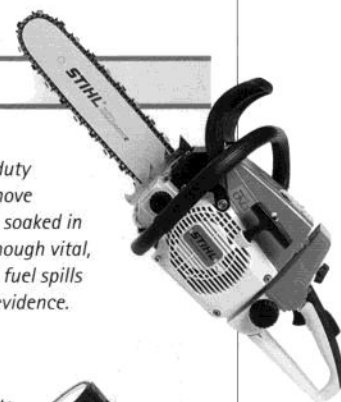
Back at the lab, technicians use gas chromatography/mass spectrometry (GC/MS—see p. 82) to identify the accelerants. They generally work not with the evidence itself, but with vapor that it emits when it's heated, which collects in the head-space—the air above the sample in the sealed container.

Volatile compounds in the vapor show up as characteristic peaks on the GC/MS trace, and are identified from a computer database. Infrared spectroscopy is sometimes used in a similar way, especially to identify burned plastics and synthetic materials. Lab work may also include microscopic examination of evidence to search for an incendiary device. If anybody died in the blaze, autopsy reports form part of the investigation (see p. 38). For example, if there is no sign of smoke inhalation, it is clear that the individual was dead when the fire started—suggesting a possible homicide.

FIRE TOOLS

CHAINSAW ▶

Investigators use heavy-duty cutting equipment to remove flooring that has become soaked in accelerant. Chainsaws, though vital, need careful use to avoid fuel spills that could contaminate evidence.



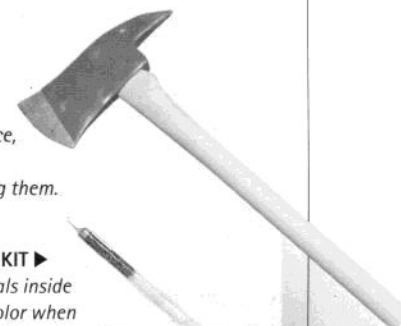
FLASHLIGHT ▶

Simple tools like flashlights are life-savers. Blackened buildings are unlikely to have maintained their electricity supply, and floors are often unsafe.



AX ▶

An ax is used to remove smaller pieces of evidence, without fear of contaminating them.



GAS ANALYSIS KIT ▶

Diagnostic crystals inside a tube change color when there are traces of accelerant in air drawn through it by a bellows.



MOTIVES FOR ARSON:

- 1 To kill, or to disguise an earlier homicide as an accidental death.
- 2 To make a fraudulent insurance claim possible.
- 3 To hide evidence of a different crime, such as fraud, by destroying business records.
- 4 To put a competitor out of business.
- 5 Revenge.
- 6 For kicks, or to satisfy a compulsive need to create and watch flames.