



### B80 Sources of Error in Fire Investigation

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After viewing this presentation, attendees will understand some of the influences that result in erroneous determinations of fire origin and cause. Most forensic scientists are familiar with the processes involved in chemical analysis of fire debris, but such testing represents only a small portion of the overall fire investigation.

This presentation will impact the forensic science community by making the attendees aware of the significant difficulties involved in making an accurate determination of the origin and cause of a fire. An analysis of the types of errors that have caused incorrect determinations will be presented.

These errors generally fall into one of the following categories:

1. Overlooking critical data
2. Misinterpreting critical data
3. Misinterpreting irrelevant data
4. Ignoring inconsistent data
5. Two-dimensional thinking
6. Poor communication
7. Faulty chemistry or engineering

Deciding what data is critical often depends on one's point of view. Data sometimes becomes critical only when a fire investigator declares it to be so. "Irrelevant data" refers to the persistent collection of arson investigation myths and misconceptions held by a significant cadre of the investigator's performing fire investigation today. These myths persist in spite of efforts by the community of scientific fire investigators to convey the results of experiments that have proved that the myths are false. Some investigators still insist on their right to tell a jury about interpretations that have no scientific basis, and, in fact, have been proven wrong through experiments with test fires.

The potential for a miscarriage of justice exists when the determinations (or divinations) of a fire investigator are at variance with the description of events provided by an eyewitness. The investigator believes his determination; therefore the eyewitness must be lying. The perception that sets in motion a chain of events that can be very difficult to stop, because the people who act on this perception are lawyers, judges, and juries, and none of them are likely to be aware of the high potential error rate in fire origin and cause determinations.

The mythology of arson investigation has been handed down through an oral tradition in a community where scientific education is the exception rather than the rule. The myths have been particularly long-lived; however, because of their promulgation by otherwise credible government agencies including the National Fire Academy and the National Bureau of Standards. Numerous fire investigation textbooks have cited these government documents, and remain in many fire investigators' libraries today. Individuals who were presented with misinformation at the National Fire Academy during the 1980s and 1990s are today in charge of the fire investigation profession. They are our State Fire Marshals and leading fire investigators. Many of these individuals have come to realize that what they "learned" at the Academy was erroneous, but neither the Academy nor the National Bureau of Standards (now NIST) have officially repudiated the misinformation to date.

In addition to the errors that are peculiar to fire investigation, the field is subject, like many forensic science fields to context effects, expectation bias, and confirmation bias. So-called "peer review" of fire investigations usually consists of one law enforcement officer signing off on another law enforcement officer's determination (or in the private sector, a senior investigator signing off on a subordinate's work). In this situation, the chances of any disagreement are miniscule. The incentives for the reviewer to "go along" are very strong, and the incentives against disagreement are equally strong. As with most forensic sciences, there is a need for actual critical analysis of reports and real peer-review.

**Fire Investigation, Arson Mythology, Expectation Bias**