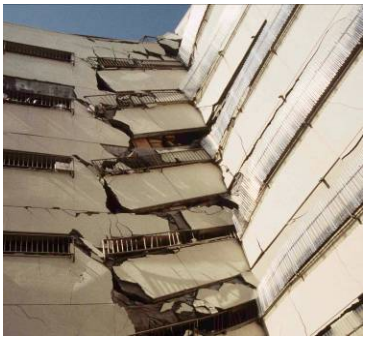
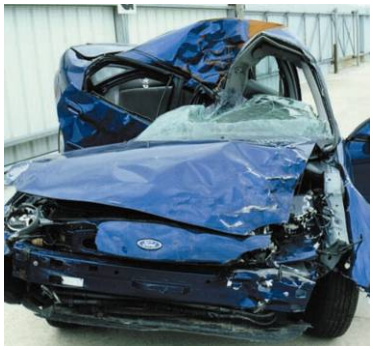


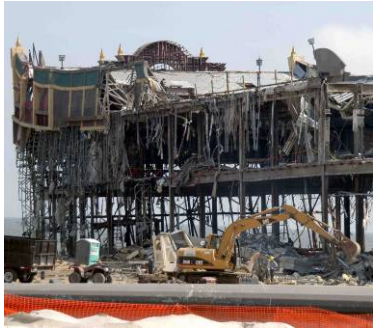
Engineering

Fire Investigations

Environmental Consulting



Specialty & Consulting



Catastrophe Response

The Proof is in the Pudding (or Evidence)

The Importance of Methodology during a Fire Investigation

Written by:

Joe Nowikowski, P.E.
Senior District Manager
Electrical Engineer
Phoenix Service Center
Tel: 480-350-9922

Technical Review by:

Paul Hansen, P.E.
Senior Forensic Engineer
Minneapolis Service Center
Tel: 952-942-9812

Corporate Headquarters:

EFI Global, Inc.
8811 FM 1960 Bypass Road West
Suite 400
Humble, TX 77338
Tel: 281-358-4441
Tel: 800-334-0200
Fax: 281-358-2517
24 Hours: 888.888.2467

www.efiglobal.com

EFI Global

Complex Issues • Solid Solutions

If you work in the insurance industry, especially around fire scenes, one thing becomes clear in a hurry: the cause of the fire is electrical. Why is that the case? It could be two reasons: the fire investigator doesn't know, or the fire investigator has systematically studied the fire scene and has eliminated all of the other possibilities.

Is not knowing a bad thing? Certainly not! What if all of the evidence isn't there, the hose stream from the fire department washed something away or the cause of the fire was lost in the fire. What if some warning signs for arson are present but there is not enough evidence to prove the fire was incendiary? Not knowing is not a bad thing, to the contrary, it is the only valid conclusion in the absence of facts. Not knowing what caused the fire can be a sure sign that your fire investigator is not willing to speculate about what caused the fire. The other alternative is that the fire investigator does know what caused the fire because he conducted a systematic investigation that led to a solid conclusion and in some cases, concluded the fire was the result of an electrical event. How does that take place?

There is a book that all fire investigators should be very familiar with and it is titled "*NPFA 921, Guide for Fire & Explosion Investigations*". This book is replete with information on how to conduct a fire investigation and the methodologies for that investigation. Let's face it, a fire scene is a mess and most of what we examine is not even recognizable without training. To sift through the remains of a burned out structure and determine an area of origin is a testimony to years of training and experience. Then, to refine that area to a point of origin which is defined by NFPA 921 as *"the exact physical location within the area of origin where a heat source and the fuel interact, resulting in a fire or explosion"* is a remarkable skill. Often that point is an electrical event.

Why electrical? Think about it. What items in your house have the potential to start a fire? Do you have your list? Now eliminate things like kids playing with matches and arson and you are left with precious few articles that are a heat source; the vast majority of what remains is electrical. So when you hear the fire department investigator or a private sector investigator report that the cause of the fire in an unknown electrical event, it should come as no surprise, probabilities are on their side. How they arrived at that conclusion is where the story gets fascinating.

In NFPA 921, there is a process called the "scientific method" and it is the recommended way a fire investigator should approach an investigation. The steps are not complicated, but they are extremely methodical. The steps are as follows:

- Recognize a Need (there was a fire)
- Define the Problem (determine the cause of the fire)
- Collect Data (identify fuels, identify ignition sources, etc)
- Analyze Data (information collected)
- Develop a Cause Hypotheses (create possible scenarios that explain what happened)
- Test the Hypotheses (play Devil's Advocate with your hypotheses)
- Select Final Hypotheses

According to NFPA 921, the hypotheses you select has to be probable and the word "probable" is defined in section 4.5.1 as "*this level of certainty corresponds to being more likely true than not. At this level of certainty, the likelihood of the hypothesis being true is greater than 50 percent*". For a fire investigator to use the word "probable," he needs to see something that leads him/her to believe his hypothesis is greater than 50% likely. There is another level of certainly defined in NFPA 921 and that level is "possible". Possible is defined as "*at this level of certainty, the hypothesis can be demonstrated to be feasible but cannot be declared probable*". As the fire investigator begins looking at all of the evidence, he begins to piece together scenarios or hypotheses of how the fire started. Of course an intentionally set fire must be considered in his reasoning as well as other ignition sources. Even if he finds a potential ignition source, an investigator must have a theory on how that ignition source came into contact with an initial fuel and what secondary fuel was ignited from this contact. Let's go back to the ignition source. Suppose the source is believed to be a relocatable power tap or as some call them, a multi-outlet power strip. Some sign of failure or misuse/abuse will need to be found in order for that source to win the prize and ultimately be the final hypothesis. Even if arcing were found on the internal conductors, that in and of itself is not enough to blame the power tap as the cause of the fire because this ignition source needs to be tied to the first fuel ignited.

Arcing is often called "electrical activity" and that activity is simply the result of energized conductors being burned in a fire. It is true that the arcing could have started the fire, so the engineer will have to create his own hypothesis of why this is a possible scenario. It is important to note that arcing is not the same as beading. To simply have an electrical item in the area of origin is not enough to assess blame and subrogate. A solid theory of how the electrical component or circuit failed will have to be formed, and this in turn must be linked to igniting a fuel load. Loose electrical connections, thermal cutout failure, capacitors rupture, any number of electrical mishaps can and do occur. Sometimes these events start a fire; sometimes the events don't ignite a fire. To have an electrical ignition source, the engineer will have to build a hypothesis, consistent with all known facts in the case that details what failed and why. The final, last-remaining hypothesis will explain the failure and how it ignited an initial fuel, and demonstrate the fact that that fuel was in position to be ignited. Generally, the engineer's job ends here and the origin investigator takes over explaining how the initial fuel ignited a larger fuel package to spread the fire. This hypothesis must pass scrutiny as it is unprofessional and unscientific (and not in accordance with NFPA 921) to accuse a manufacturer of a design or manufacturing defect based upon mere speculation. Failing to construct a single hypothesis that can withstand all challenges based upon the facts of the case should lead the engineer to conclude that the failure is an "unknown event, probably electrical," so long as other ignition sources can be eliminated.

At this point some folks have used the concept of Res Ipsa Loquitur as a fallback position. Res Ipsa Loquitur is a legal term meaning "the thing speaks for itself". It is used when all of the other potential ignition sources have been eliminated and yet, nobody can specifically point to a cause. Imagine an empty room with one outlet in the corner. One portable heater is plugged into the outlet and while nobody is looking the room catches fire. Continue to imagine that in the process of fire suppression activities, the heater receives a direct hit from the fire hose and most of the electrical components are now missing. A fire investigator can look at the outlet and conclude that there is not an electrical reason for the fire, but he or she will likely consult with a forensic electrical engineer. If the engineer also concludes that the cause of the fire was not related to the outlet, then the only thing it could be (assuming that an intentionally set fire can be ruled out) is the heater. However, there is no evidence to support that theory. Res Ipsa Loquitur is a legal maneuver to make that work. The problem with using Res Ipsa Loquitur is two-fold: proving the heater has not been damaged/misused and knowing the failure was internal. For Res Ipsa Loquitor to be successful, the offending product has to have been in the manufacturer's control from the beginning. In other words, the part that failed was not due to some action of the user. That restriction not only makes it tough for the doctrine to be used in subrogation, but makes it

even more important for the fire investigator and engineer to work as a team to determine what caused the fire. At the end of the day, it is what it is regarding the facts. A reputable expert goes with the facts and does not set off to create a winning theory for his client. Every client deserves no less.

The entire reason to find the cause of the fire is a financial one, and that is to subrogate. If the fire was caused by another insured party, then the homeowner's carrier has a chance to recover the money paid out on the loss. To correctly state that the loss is an electrical problem, there needs to be some “proof” of a defect or failure.

The Proof is in the Pudding (or Evidence): The Importance of Methodology during a Fire Investigation