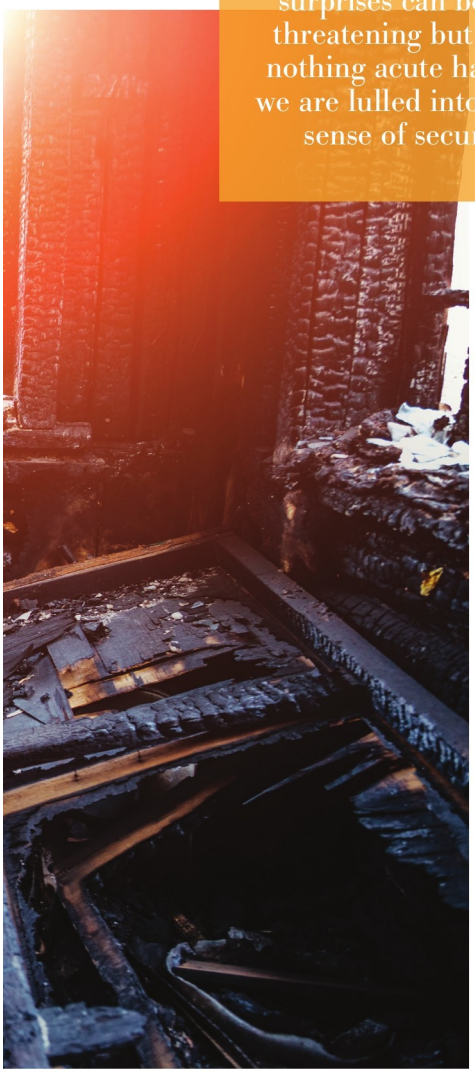
Fire Scene Health and Safety Considerations *in the Post-Fire Environment*

BY JEFF PAULEY IAAI-CFI, CFEI, MIFIREE



In our world of examining post-fire scenes, predictable surprises can be life-threatening but when nothing acute happens we are lulled into a false sense of security.

How many times have you rationalized taking a shortcut or skipping a procedure because you felt it wouldn't matter?

Many believe a cold fire scene is a safe fire scene, and that no personal protective equipment (PPE) is needed in most instances. Unfortunately, this is just not true. Whether you are there only occasionally or regularly, and whether you are a fire investigator, insurance adjuster, or attorney attending a joint scene exam, you are exposing yourself to respiratory and dermal absorption hazards, at the very least, upon entry to every post-fire scene.

American sociologist Diane Vaughn defined the normalization of deviance as when "people within the organization become so accustomed to a deviant behavior that they do not consider it to be deviant, although they far exceed their own rules for elementary safety." How many times have you rationalized taking a shortcut or skipping a procedure because you felt it wouldn't matter? How about a known safety precaution at a post-fire scene?

In a presentation at an annual meeting of the International Association of Fire Fighters a few years ago, American astronaut Mike Mullane discussed the normalization of deviance and the resulting predictable surprises as they pertained to the 1986 Challenger disaster (see https://www.youtube.com/watch?v=Ljzj9Msli5o for Part 1), and the natural human tendency to take shortcuts and accept a lower standard of performance when things don't go wrong. He also talked about the lethal consequences of the normalization of deviance and the courageous self-leadership needed to determine how safe a situation should be. This is a very compelling presentation and on point with the issues around the exposure hazards found by all who enter the post-fire environment. In our world of examining post-fire scenes, predictable surprises can be life-threatening, but when nothing acute happens, we are lulled into a false sense of security; the deviant behavior of not following recognized safety procedures is reinforced when nothing bad happens to us so it's then OK to rationalize continuing to do them. We have effectively lowered our standard of performance.

To prevent this, you need to know and understand the many potential hazards present in the post-fire scene.

Physical and environmental hazards include weather conditions, slip and fall issues, and structural stability. Biological hazards can include bug and animal bites, histoplasmosis from animal droppings, and mold. In any post-fire scene where there is moisture (in this case the water used by the fire department) and a food source (upholstery, carpet, clothing, sheetrock, etc.), after about 48 hours mold WILL be present. Fortunately, most of these hazards can be mitigated by using proper PPE.

But there's more. Over the last several decades the amount of man-made materials and products found in structures of all types has skyrocketed and these are the source of over 100 known cancer-causing gases and vapors produced during a fire. It is well known in the fire suppression world that these harmful substances are present during and just after a structure fire, which is why firefighters wear self-contained breathing apparatus (SCBA). Although research data is forthcoming, at present, we don't know how long these gases and vapors persist after the fire and whether they may be embedded in the fire debris, only to be released when the scene is walked through or dug out. The other part of the toxic hazard issue is the solid particulates produced during incomplete combustion and fire debris ash. These are also a health problem and are present at every post-fire scene. Particulates can be in the form of soot and ash that you can see or microscopic bits that you cannot see.

When inhaled, the larger particulates, generally five microns or bigger, can usually be expelled by the body's natural defense mechanisms. The smaller ones, what we now call nanoparticulates, are too small to be expelled. They work their way into the furthest depths of your lungs and just stay there. And possibly become cancer-causing. These particulates also attach themselves to your clothing and skin while you are in the post-fire scene where they can be absorbed into your bloodstream, and this also creates health hazards up to and including cancer.

Exposure to the gases, vapors, and particulates are affected by concentration, duration and entry route, with inhalation and absorption being the most common. And just to make things more interesting, as your skin's surface temperature increases from exertion or the ambient temperature, the rate of absorption also increases. The great variable in all of this is individual susceptibility. When something bad does happen, it can be acute, in which case you go to the doctor and have it treated, or it is a chronic problem that does not manifest for years. For example, leukemia can present in as little as three years whereas lung cancer may not present for thirty years or more.

Given these health hazards, there are just too many people entering the post-fire scene who are not properly protecting themselves. The incidence of cancers among fire investigators is increasing; exposures from long ago (and not so long ago) are now

> The incidence of cancers among fire investigators is increasing.

manifesting. We will likely continue to see the number of fire investigator cancer cases increase for the next ten to fifteen or more years before the use of better precautions (read effective and regular PPE use) starts to bring these numbers down.

But what about the many others who have been entering these scenes unprotected for years? What about the insurance adjusters, remediation and demolition crews, engineers and others who did not properly protect themselves and develop cancer years after but that's not attributed to their fire scene visits?

Earlier we discussed the normalization of deviance. What we need from everyone entering the post-fire scene for any reason is a normalization of compliance with the known health and safety best practices. Only in this way can we change the rising tide of cancer among those who work in the post-fire environment.

Our culture is resistant to change – we must work to overcome this resistance by recognizing the long-term effects of today's actions, knowing and understanding the dangers, and rising above the peer pressure. When we know better, we need to do better.

Going back to Astronaut Mullane's words, cancer is a predictable surprise! There is a strong likelihood that you could get it as a result of your time spent in post-fire environments unless you are properly protected. Why tempt the hand of fate?

In 2016, the International Association of Arson Investigators, through its Health and Safety Committee, issued a first of its kind, peer and technical reviewed white paper describing the health and safety best practices for the post-fire environment. These practices are not just for fire investigators but anyone entering the post-fire scene. The paper and its associated documents are available to everyone at www.iaaiwhitepaper.com. Here you can read detailed information regarding all the PPE protections you should be taking at most every fire scene.

While it is recognized that every fire scene is different, basic protections are needed at virtually every post-fire scene. The two universal precautions that should be taken by every person at every scene are respiratory and absorption. Everyone needs respiratory protection that is adequate and appropriate for the situation, which means right for the hazard, reducing exposure to the level required to protect the wearer's health, and also one that is right for the wearer, the task and the environment, such that the wearer can work freely and without additional risks due to the respiratory protection equipment.

OSHA requirements generally apply to every federal employee and private business, and some local and state government agencies. According to their regulations (see

29 CFR 1910.134), if respirators are necessary to protect the health of the employee and, as this article points out, they are, the employer MUST establish and implement a written respiratory protection program with worksite-specific procedures. While we will not delve into the full set of respiratory protection requirements here, know that there are OSHA and NIOSH requirements that need to be addressed and followed. However, based on these, the work to identify the appropriate respiratory protection needed in the post-fire environment has been done for you.

The IAAI-recommended minimum respirator assembly for anyone entering the post-fire environment is either a half facepiece air-purifying respirator (APR) with goggles to limit ocular absorption or a full facepiece APR with a P100/OV/AG/FM filter/cartridge assembly. This means a particulate filter (the P in P100 does NOT stand for particulate but rather oil proof) that eliminates 100% of the particulate matter (also known as a high-efficiency particulate air or HEPA filter), along with a multi-gas cartridge that protects against oily vapors, acid gases, and formaldehyde. Remember that regardless of the entry time post-fire, we don't know the gas levels or types in the post-fire environment, so adequate precautionary measures need to be taken.

Everyone also needs to cover as much of their body as possible with disposable or removable garments (see 29 CFR 1910.132 – .138 for additional information). Put them on when you get to the scene and take them off before reentering your vehicle, keeping them out of the passenger area including the trunk by either segregating them in the cargo area or securely packaging them. These garments ARE contaminated with nanoparticulates that can easily be spread to your office, your home, and beyond if precautions are not taken. And, depending on when you are at the fire scene, it is also possible that gas and vapor molecules are attached to the particulates that are on your clothing. This means that your outer clothing will be off-gassing for an indeterminate time after and this can also affect others around you.

This removable, protective clothing includes footwear, which needs to be steel-toed leather or rubber boots/shoes with a puncture-resistant sole. There are pros and cons to leather and rubber, so it's best to have a pair of each. They need to be put on when you arrive at the scene and removed and properly stored before re-entering your vehicle.

There are additional PPE precautions and cleaning/disposal procedures you may need to take. The IAAI white paper referenced above fully addresses these.

After removing these outer garments, use disinfectant wipes to clean all your exposed skin areas as well as the transition areas where sleeves meet gloves, etc. And speaking of gloves, if you are going to be

This adjuster will be tracking these particles back into his vehicle and beyond.

touching anything, your hands need to be protected with nitrile gloves under disposable leather-palm gloves or similar, again to keep dermal absorption to a minimum.

Now that you have protected your body as well as you can from these toxic hazards you're done, right? Not quite. As soon as possible after leaving you need to take a shower to more completely clean these toxins off you. The rule of thumb is: Shower Within the Hour.

Regardless of your company's or agency's policies or procedures, here are six ways to protect yourself, because at the end of the day, you are ultimately responsible for your health and safety:

- Have courageous self-leadership by having a personal safety culture and setting a positive example for others. When you get criticized for doing the right thing, it's still the right thing!
- Do not perpetuate the normalization of bad behaviors.
- Wear PPE suitable for the situation, including proper respiratory protection.
- Once you have properly removed and packaged your PPE, clean all exposed and transition skin areas before leaving the scene.
- Keep all contaminated items packaged and out of your vehicle, home, office, etc.
- Properly clean yourself and all contaminated, non-disposable gear.

NASP's Note:
Mr. Pauley will be presenting a webinar on fire safety on July 21, 2020 and at NASP's 2020 Annual Conference in San Diego. To register for the webinar and/or the conference, visit www.subrogation.org.

JEFF PAULEY is the chairman of the IAAI Health and Safety Committee, a private fire investigator with EFI Global, Inc. and the former fire marshal for Bedford County, Virginia. He has been researching, writing and speaking on this important subject since 2014.