



OPERATIONS
EMERGENCY

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Minimize risk by limiting exposure
to toxic carcinogens on scene, in transit
and during cleanup

Fire departments should conduct a risk/benefit analysis that takes into consideration the risk of fire fighters being unnecessarily exposed to carcinogens. It is important to limit toxic exposures to personnel on scene as much as possible. Additionally, Incident Commanders (IC) can minimize risks by cancelling units that are not needed.

- Upon arrival at the incident, units should stage uphill and upwind of the fire when practical. Keep apparatus windows closed and keep air conditioner and heat turned off to minimize airborne contaminants entering the cab and contaminating the interior. If you need to keep the air conditioner and heat on, we recommend using indoor air circulation mode to prevent airborne contaminants entering from the outside.
- If the apparatus is not involved in an integral process of fireground operations (pumping, supplying or aerial operations), turn off the motor to reduce the diesel exhaust on the scene.
- On-deck and Rapid Intervention Crews (RIC) can be readily available without standing in the smoke. Stay outside of the smoke envelope — the area surrounding the scene where airborne contaminants are present — and be aware of the greater picture. This envelope depends on atmospheric conditions. For example, on low-wind days with atmospheric inversion, the smoke envelope may surround a fire scene with a large spread of emissions in all directions.
- Responders, including the pump operator/engineer and IC, should wear appropriate PPE whenever the situation warrants. Some personnel may need to wear Self-Contained Breathing Apparatus (SCBA) when exposed to the products of combustion or hazardous materials.
- All personnel engaged in firefighting shall use SCBA from initial attack throughout overhaul. FCSN 2011 states that not wearing SCBA is the “single most dangerous voluntary activity” in today’s fire service. Such usage should include not only interior structural firefighting, but also for car fires and dumpster fires.



LEFT: RTI conducted a fluorescent aerosol test that found aerosol particles can penetrate a fire fighter’s hood and deposit on the skin. There were very heavy aerosol deposits on the neck, cheeks, ears and hair due to penetration through the hood. The dark bands below the ears were relatively clean areas that were covered by the mask straps.

Test conducted by RTI International, Research Triangle Park, N.C., and sponsored by the International Association of Fire Fighters.



Common Carcinogens in House Fires

and why following industry best practices is important to your health and safety

► **Benzene:** Highly toxic compound released during combustion of plastics, rubber and petroleum-based products. Linked to various cancers. Fire apparatus exhaust a common source of exposure for fire fighters.

► **Formaldehyde:** Colorless gas used in building materials, released during fires. Prolonged exposure linked to nasal and lung cancers. OSB boards in training burns are a frequent source of exposure.

► **Polycyclic aromatic hydrocarbons (PAHs):** Chemicals produced during incomplete combustion of organic materials. Potent carcinogen associated with various cancers, including lung, skin and bladder cancer.

► **Asbestos:** Present in older homes, released into air when ignited. Inhalation causes lung cancer, mesothelioma and respiratory diseases. Frequent exposure during overhaul stages of building fires.

► **Carbon monoxide:** Deadly gas produced during fires. High exposure levels in burning buildings can cause carbon monoxide poisoning, leading to neurological damage, heart problems and death. Continuous monitoring crucial during firefighting overhaul stage.

Fire fighters face a heightened risk from carcinogens for several reasons. They often work in enclosed spaces with concentrated smoke and toxins, leading to higher levels of exposure. Additionally, they encounter these cancer-causing agents repeatedly throughout their careers,

increasing their cumulative exposure. Despite the use of personal protective equipment (PPE), it is not entirely foolproof as small gaps or tears can still allow harmful substances to come into contact with the skin or be inhaled. Thus, ensuring proper fit of PPE is crucial to accurately safeguard fire fighters from potential exposures.

Fire fighters face an increased risk of developing various cancers due to exposure to carcinogens, including lung, skin, brain, kidney, bladder and blood cancers. The effects may not appear immediately, but can take years or decades to develop. Given the repeated exposure, potency of carcinogens, and inherent risks, fire fighters must take preventive measures. This includes proper decontamination procedures and regular health screenings. Ongoing research continues to develop better protective measures for fire fighters. It is crucial for fire fighters and fire service leadership to document exposures accurately to show the cumulative impact over their careers.

The Comparative Toxicogenomics Database (CTD) is a publicly available database that focuses on the molecular interactions between chemicals, genes, and diseases.

More information can be found on their website at ctdbase.org.