

The Threat That Burns On

Carcinogenic Exposure and the Importance of
Decontamination Procedures for Firefighters



FIREFIGHTING IS FULL OF INHERENT DANGERS.

While fighting fire is risky enough, it's the lurking unseen dangers that pose the long-term threat according to a study conducted using the ESO Data Collaborative.

Long after the flames are extinguished, fire personnel continue to be exposed to byproducts of combustion due to off-gassing, which can lead to contamination of skin and personal protective equipment (PPE) if appropriate decontamination procedures are not performed.^{1,2} This puts fire personnel at a higher risk than the general population for exposure to known or suspected carcinogens, increasing their likelihood of cancer diagnoses and death.³⁻⁵ **A**

multi-year study funded by the National Institute for Occupational Safety and Health has found that cancer is the leading cause of death for line-of-duty firefighters.

This risk was found to directly increase with increased time spent on scene and the number of fires attended.⁶

While this information is sobering, there are steps that departments can take to decrease exposure and protect their teams, including the proper decontamination procedures on and off the scene (outlined below) and empowering better tracking of these procedures to understand the gravity of the situation in their organization. By understanding the current practice of post-working fire decontamination, we can better guide future interventions to further protect firefighter health and safety.

THE ESO STUDY



31,281
PERSONNEL FROM
581 AGENCIES

10,274
INCIDENTS

In 2021, researchers at ESO studied the on-scene decontamination procedures of over 15,538 working fire incidents, that included 31,281 personnel from 581 different U.S. agencies. Any ESO records without personnel listed were excluded. The study examined if firefighters with prior exposure documented on-scene decontamination procedures and adhered to best practices. A full set of best practices is defined as selection of all of the following on-scene “Decontamination Procedures” data fields within ESO Fire RMS:

- Wet brushed gear with soap
- Use of wet wipes
- Cleaned exposed areas, including neck, face, and arms
- Bagged gear and placed outside of cab

According to the study, approximately 8% of the 31,281 firefighters included in ESO’s study documented a fire-related exposure. Of the 8%, 82% performed at least **one** on-scene decontamination procedure. Only 4% documented **all** procedures defined as best practices. The most common procedure reported was *cleaning exposed areas with wet wipes*.

1 in 5

FIRE PERSONNEL WITH DOCUMENTED EXPOSURE DID NOT DOCUMENT ANY ON-SCENE DECONTAMINATION PROCEDURES.

More concerning, almost one in five fire personnel with documented exposure didn’t document any on-scene decontamination procedures. It was also found that firefighters in rural areas were significantly less likely to document any procedures than those in urban areas. Since on-scene decontamination procedures were under-documented in this study, ESO researchers concluded that fire personnel may not be taking all the necessary recommended steps to reduce carcinogenic exposures or they may not be consistently documenting decontamination procedures.

THE RESULTS



8%
of fire personnel had at least one documented fire-related exposure.



82%
of fire personnel with previous exposure performed at least one on-scene procedure

WHERE DO WE GO FROM HERE?

Leadership should encourage fire personnel to always adhere to and document best practices and complete all decontamination procedures to reduce carcinogenic exposures. Data collected from these procedures can provide insight into how real-world decontamination practices align with published best practices. By consistently documenting all exposures and the steps taken to reduce risk, we can use these data to keep firefighters safe on an individual and on a national level.

CANCER PREVENTION BEST PRACTICES

To help combat the risks of carcinogenic exposures, the International Association of Fire Chiefs and the National Volunteer Fire Council recently updated the Lavender Ribbon Report for Preventing Firefighter Cancer⁷, outlining the 11 best practices for cancer prevention including:

1 Wear full personal PPE throughout the entire incident, including a self-contained breathing apparatus (SCBA) during salvage and overhaul.

2 Provide a second hood for all entry-certified personnel in the department.

4 Immediately use wipes, which must be carried on all apparatus, to remove soot from head, neck, jaw, throat, underarms, hands and any exposed areas.

6 Shower within an hour or as soon as possible after exposure.

9 Schedule an annual medical exam, as early detection and treatment are key to survival.

7 Prohibit PPE in areas outside the apparatus floor (i.e., kitchen, sleeping areas, etc.) and should never be stored in the household.

10 Avoid tobacco of any variety, including dip and e-cigarettes.

3 After exiting the immediately dangerous to life or health (IDLH), use soapy water and a brush as soon as possible to begin gross decontamination of PPE. Place PPE in a sealed plastic bag in an exterior compartment of the rig, or if in a personally owned vehicle (POV), place in a large storage tote and keep away from passengers.

5 Change and wash clothes immediately after exposure or isolate them in a trash bag until washing becomes available.

8 Regularly clean and decontaminate the apparatus seats, SCBA and interior crew areas with soap and water or wipes — especially after exposure.

11 Fully document all fire or chemical exposures on incident and personal exposure reports.

Field decontamination of skin and PPE is integral in protecting fire personnel against cancer.⁸ Gross decontamination with wet soap has been shown to reduce carcinogenic exposures by around 85% while using cleansing wipes used on the neck reduced exposures by around 54%.⁹



OUR PROMISE

At ESO, we are committed to firefighter safety and health. ESO works closely with the National Firefighter Cancer Registry to deliver critical exposure data that helps visualize the state of the industry, inform best practices, and improve standards.

As we move forward to a safer, healthier future that safeguards those who serve our communities, ESO pledges to continue to improve and update our software, making it even easier to document, track, report, and improve the use of industry best practices.

To request the research, you can head to <https://www.eso.com/data-and-research/> and request the publication reprint.

ESO INSIGHTS

Interested in seeing where your department stands when it comes to following fire decontamination procedures?

ESO Insights is the ultimate tool tailored for fire departments and EMS teams, offering a seamless reporting experience. With a single interface, teams can effortlessly explore, analyze, and construct custom dashboards like the Fire Safety - Working Fire Dashboard used for Fire Decontamination data. Empower your team with near real-time reporting capabilities and customizable dashboards to drive informed decisions and elevate performance.

To learn more, visit [eso.com](https://www.eso.com)

STUDY LIMITATIONS

The analysis included data from a fraction of registered U.S. fire departments, which may impact the generalizability of these findings. It was also a retrospective evaluation of records obtained from agencies who originally volunteered their de-identified data for documentation of fire suppression and related activities and not as part of a study. This study was only able to evaluate documented on-scene practices. It's possible that fire personnel completed undocumented practices on and off scene.

REFERENCES

1. LeMasters GK, Genaidy AM, Succop P, Deddens J, Sobeih T, Barriera-Viruet H, et al. Cancer risk among firefighters: a review and meta-analysis of 32 studies. *J Occup Environ Med* 48(11): 1189-1202 (2006).
2. Fabian TZ, Borgerson JL, Gandhi PD, Baxter CS, Ross CS, Lockey JE, et al. Characterization of Firefighter Smoke Exposure. *Fire Technology* 50(4): 993-1019 (2014).
3. Daniels RD., Kubale TL, Yiin JH, Dahm MM, Hales TR, Baris D, et al. Mortality and cancer incidence in a pooled cohort of US firefighters from San Francisco, Chicago and Philadelphia (1950-2009). *Occup Environ Med* 71(6): 388-397 (2014).
4. Pinkerton L, Bertke SJ, Yiin J, Dahm MM, Kubale TL, Hales TR, et al. Mortality in a cohort of US firefighters from San Francisco, Chicago and Philadelphia: an update. *Occup Environ Med* 77(2): 84-93 (2020).
5. Webber MP, Singh A, Zeig-Owens R, Salako J, Skerker M, Hall CB, et al. Cancer incidence in World Trade Center-exposed and non-exposed male firefighters, as compared with the US adult male population: 2001-2016. *Occup Environ Med* 78(10): 707-714 (2021).
6. Daniels RD, Bertke S, Dahm MM, Yiin JH, Kubale TL, Hales TR, et al. Exposure-response relationships for select cancer and non-cancer health outcomes in a cohort of U.S. firefighters from San Francisco, Chicago and Philadelphia (1950-2009). *Occup Environ Med* 72(10): 699-706 (2015).
7. Lavender Ribbon Report Update. [Online] Available at <https://www.nvfc.org/wp-content/uploads/2021/09/Lavender-Ribbon-Report-Update-online.pdf>, (2021).
8. Pinkerton L, Bertke SJ, Yiin J, Dahm MM, Kubale TL, Hales TR, et al. Mortality in a cohort of US firefighters from San Francisco, Chicago and Philadelphia: an update. *Occup Environ Med* 77(2): 84-93 (2020).
9. Fent KW, Alexander B, Roberts J, Robertson S, Toennis C, Sammons D, et al. Contamination of firefighter personal protective equipment and skin and the effectiveness of decontamination procedures. *J Occup Environ Hyg* 14(10): 801-814 (2017).