

The blood of firefighters, the first line of defence

Firefighters have been unaware of the toxicity of Per- and Polyfluoroalkyl (PFAS) chemicals: although the National Health and Nutrition Study (NHANES) has been testing Americans' blood for PFAS chemicals since 1999.¹ The programme of studies is designed by the US Centers for Disease Control (CDC).



Vicki Quint

Studies have historically focused on only two of the PFAS chemicals, PFOS and PFOA, even though there are 9,200 chemicals in the class.²

Firefighters are at higher risk of exposure of these chemicals occupationally than the general population.³

*'As early as 2004, NIOSH [National Institute for Occupational Safety and Health] began research on PFAS. Early studies included laboratory assessments of dermal PFOA absorption and immune function. However, recent research has expanded to include toxicological studies of immune response and evaluation of exposure and health in workers.'*⁴

Substitute PFAS chemicals have come with their own issues. GenX is also known as C6.⁵

*'DuPont introduced GenX almost 10 years ago as a chemical substitute for perfluorooctanoic acid (PFOA). Although GenX was intended to be less environmentally persistent than PFOA, it has turned out to be what is known as a "regrettable substitute", whose effects may be as bad as or even worse than the chemical it replaced.'*⁶

▼ Firefighting foam tote trailers are large-capacity storage on wheels. They are designed to move to incidents in response to mutual-aid requests. The containers range from 250 to 3,000 gallons. States are now dealing with the collection and disposal of toxic PFAS containing foams in tote trailers as well as the 5-gallon pails throughout the US.



Vicki Quint is Co-Chair of the Foam Exposure Committee.

Image courtesy of Vicki Quint

► Studies will need to be constructed to consider what PFAS-containing firefighting foam does when covering or coating Personal Protective Equipment (PPE). Independently tested PPE contained more PFAS in the PPE textiles than as required by National Fire Protection Association (NFPA) standards according to a recent study.

The 'short chain' PFAS are still problematic with toxicity issues:

1. All PFAS chemicals bio-accumulate in the human body whether long or short chain
2. An exemption is PFHxS (C6), which has a longer half-life in humans than PFOA and PFOS (C8).⁷

Through Congress, the bill, 'Protecting Military Firefighters from PFAS Act', was passed in March 2019.

*'This bill requires the Department of Defense (DOD) to provide blood testing, during annual physical examinations of DOD firefighters, to determine and document exposure to perfluoroalkyl and polyfluoroalkyl substances.'*⁸

US veterans who may need or want to know their PFAS blood levels are not offered this option through the Veterans Administration.

A report issued on Friday, 23 July 2021, finds fault with the Defense Department 'for not planning to track and analyze the blood results of firefighters who are being tested this year under requirements included in the 2020 National Defense Authorization Act' which goes against their own workplace exposure guidelines.⁹

'Thomas Constable, assistant secretary of defense for readiness, said firefighter blood testing data gathered this year would be shared with the National Institute for Occupational Safety and Health [NIOSH] to assist a study on cancer among firefighters. Additionally, the DoD will analyze PFAS serum lab results at the Navy and Marine Corps Public Health Center and develop exposure limits. That could take more than four years, Constable said.

'[Congressman] Kildee indicated Congress wants the DoD to pick up the pace.



Image courtesy of Corey Dutton

*"Due to the Defense Department's use of firefighting foam containing PFAS chemicals, many service members, military firefighters and their families are still at risk of exposure," Kildee said. "Supporting our brave men and women in uniform means transitioning more quickly away from using PFAS chemicals and ensuring service members have access to quality health care. It's long past time for the Defense Department to stop using dangerous PFAS chemicals."*¹⁰

PFAS have been used for over 70 years.¹¹ The bio-accumulative and persistent properties of these chemicals have been known for as long. In 1956, 'A study at Stanford found that "PFAS binds to proteins in human blood."' ¹²

EPA and 3M announced the phase out of PFOS on 16 May 2000.¹³ Then EPA Administrator, Carol Browner stated, 'Today's phaseout announcement by 3M will ensure that future exposure to these chemicals will be eliminated, and public health and the environment will be protected.'¹⁴

'The company also knew that its chemicals were not just present in human blood, but present at levels that presented danger. In the late 1990s, 3M came up with an estimate for the level of PFOS that it concluded would be "safe": 1.05 parts per billion (ppb). Unfortunately, around the same time, it learned that the average amount of the chemical in the blood of the general

*population in the U.S. was already way higher: 29.7 ppb.'*¹⁵

In 2019, the DoD reported their inventory still had over 500,000 gallons of Aqueous Film Forming Foam (AFFF) containing PFOS.¹⁶

Blood supplies, undoubtedly, contain blood contributions from firefighters. The Red Cross makes no mention of testing the blood in their blood banks for PFAS chemicals.

A US citizen, Sandy Wynn-Stelt, whose Michigan residence is across from a Wolverine PFAS dumping site, has been personally impacted by PFAS contamination through her well water. She credits her doctor for taking her PFAS blood results seriously. This information was used in her treatment for thyroid cancer. Her husband, Joel, had died from liver cancer four years earlier.¹⁷

In Australia, it was reported that Australian aviation firefighters have up to '10 to 20 times higher' amounts of PFOS in their blood as compared to the general population.¹⁸

Testing on humans is considered unethical but:

*'Some data on human exposures to chemicals may still be used. Reports from accidental poisonings, worker exposures and other unintentional dosing exist, and "EPA could incorporate a lot of that unfortunate, real-world data," according to Jennifer Sass, a senior scientist at the Natural Resources Defense Council.'*¹⁹

9/11

A pilot study of 1,384 people was conducted on New York State employees and National Guard personnel who worked in the aftermath of the World Trade Center (WTC) between 11 September and 23 December 2001. Eight kinds of PFCs, which are now called PFAS, were measured in 457 blood plasma samples and four PFCs were detected in almost all samples: PFOS, PFOA, PFHxS and PFNA.²⁰

'The results of this pilot study indicate that:

- No significant difference was observed in the concentrations of PFCs between groups with lower respiratory symptoms and groups without lower respiratory symptoms
- There were no significant differences found between exposure subgroups for PFOS
- Concentrations of PFHxS were significantly higher in the MDE (more dust exposure) group than in the LDE (less dust exposure) group
- Concentrations of PFNA were significantly higher in the MSE (more smoke exposure) group than in the LSE (less smoke exposure) group
- Significantly higher concentrations of PFOA and PFHxS were found in individuals exposed to smoke than in individuals exposed to dust

- PFOA and PFHxS concentrations were approximately twice as high in some subgroups of WTC responders than the concentrations reported for a U.S. general population

The results of this pilot study suggest that some WTC responders were potentially exposed to PFCs, especially PFOA, PFNA, and PFHxS, through inhalation of dust and smoke released during and after the collapse of the WTC.²¹

Recommendation

The Foam Exposure Committee recommends that firefighters obtain a PFAS blood test as soon as practical. Studies will be ongoing for some time. However, in the meantime, firefighters should know their own personal exposure levels. If you do not want your blood tested for PFAS personally, please still consider doing so for your own family and your community's benefit.

It is now being recognized that communities have had water sources contaminated with PFAS, usually by AFFF use. While waiting on the results of unending PFAS studies, the fire service can act to stop using AFFF immediately.

'Fire departments have an obligation to protect their community and their members. Eliminating the use of PFAS when safe alternatives exist, is another way we can protect our community and a socially responsible thing to do,' reports

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Image courtesy of Vicki Quint

◀ **This 9/11 Memorial mural was spotted on the back of a fire apparatus at FDIC2021 in Indianapolis, Indiana. September 11, 2021 will be the 20th anniversary of the 9/11 terrorist attack.**