Maryland Department of the Environment

PFAS in Firefighting Foams: Guidance for Firefighters

The purpose of this document is to provide information concerning occupational exposure to per- and polyfluoroalkyl substances (PFAS), specifically in their applications in firefighting operations.

What are PFAS compounds?

Per- and polyfluoroalkyl substances (aka PFAS) are a group of over 4,000 human-made compounds that have been used in a variety of industries since the 1940s. PFAS compounds have been reported as being found in food packaging materials, non-stick cookware, cleaning products, stain- and water repellent fabrics, and more.

Specifically within the firefighting profession, PFAS are commonly used in many Class-B firefighting foams and in personal protective equipment (PPE). Some PFAS compounds have the ability to accumulate within the body and typically do not break down. Their persistence in the environment and resistance to degradation combined with their toxicity may lead to adverse human health impacts (EPA 2021).

How can I be exposed to PFAS?

Individuals may be exposed to PFAS in a number of ways both occupationally and in the home and marketplace including, but not limited to (ATSDR, PFAS Chemical Exposure):

- Workers in certain occupations, such as firefighting and emergency response, may be exposed to the compounds during training, transport, testing, and emergency response while using PFAS-containing foams and PPE.
- Workers in other occupations which involve working in facilities manufacturing, using, or processing PFAS containing materials (e.g., certain manufacturing facilities, oil recovery, etc.) may be exposed in the workplace.
- Consumption of PFAS-containing drinking water and/or animal tissues such as some types of fish, or accidental swallowing of PFAS-containing soils or dust.
- Using other consumer products treated with PFAS (non-stick cookware, stain and water repellent fabrics, certain cleaning products) or eating food packaged in PFAS-treated containers.

How is PFAS used in the Firefighting Profession?

PFAS has historically been used in Class-B firefighting foams and personal protective equipment used in firefighting. Although some of the older PFAS compounds have been phased out of manufacturing of

these foams and personal protective equipment (PPE), older foams may still be stored at fire stations and PFAS-treated PPE may still be in use. Inhalation of PFAS-containing dust from PPE or inhalation and dermal exposure to PFAS during the use of PFAS-containing foam are additional potential exposure routes of concern that are unique to the firefighting profession (ITRC 2021) (Peaslee 2021). A senior scientist with the Center for Fire, Rescue & EMS Health Research at the National Development & Research Institute also noted that firefighters may be exposed to PFAS through the burning of PFAS containing products (e.g., stain resistant carpet, upholstery) during a fire response action on the fire ground (Jahnke).

For most of the general public (i.e., those without potential for workplace occupational exposure), the most likely routes of exposure would be through consumption of certain foods (such as certain types of fish) or drinking water containing PFAS because of their ubiquitous use in commerce, persistence in the environment, and ability to bioaccumulate. The general public may also be exposed to PFAS through the use of certain consumer products as previously mentioned.

Because of the potential for firefighters to be exposed dermally and through inhalation, some studies suggest that fire protection professionals may have higher rates of exposure to PFAS compounds than the general population (NIOSH 2021). More research is being conducted to better understand the occupational health risks of PFAS. For example, the National Institute for Occupational Safety and Health (NIOSH) has initiated the Firefighter Cancer Cohort Study (FFCCS) and has started working on understanding PFAS exposure in fire service and its potential impacts. Additional information on the FFCCS can be accessed at: https://www.ffccs.org/pfas.

How can firefighting professionals reduce their workplace exposure to PFAS?

MDE recognizes that certain fire suppression experts consider the use of PFAS-containing foams to be important for certain types of fires involving large amounts of flammable fluids in order to protect life and property (ITRC). MDE also recognizes that for other types of fires there may be other options that pose less risk of contamination of the environment. MDE encourages firefighting organizations to consider the risks and benefits of the use of PFAS-containing foams and to use these foams rather than other non-PFAS options only when necessary to protect life and property. The U.S. Fire Administration recommends the following for firefighters to reduce their occupational exposure to PFAS and to reduce impacts to the environment:

- Replace older PFAS-containing Class B firefighting foams with fluorine-free options whenever feasible

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- Properly contain and manage PFAS-containing Class B firefighting foams after use to minimize runoff into streams and other surface waters
- Only wear PPE when necessary during firefighting and training activities
- Use a self-contained breathing apparatus (SCBA) whenever working with PFAS-containing Class B firefighting foams
- Remove and pack PPE properly before transporting
- Clean face, neck, and hands with wipes immediately after exposure.
- Regularly clean turnout gear (i.e., PPE and SCBA), and in particular, after emergency responses involving PFAS-containing firefighting foams
- Keep turnout gear in their designated areas, and out of living areas
- Maintain suitable storage conditions for all unused foams, minimizing leaks and accidental releases.
- Regularly clean gear lockers.
- Shower as soon as possible after PFAS-containing Class B firefighting foam use

What are the health concerns associated with exposure to PFAS?

The U.S. Environmental Protection Agency and the U.S. Centers for Disease Control and Prevention's Agency for Toxic Substances and Disease Registry continue to investigate the human health impacts of chronic exposure to two particular PFAS compounds (PFOA and PFOS) that are commonly used in certain firefighting foams and may cause human health impacts. Studies have suggested that chronic exposure to these two PFAS may be linked to: increased cholesterol levels, increased risk of high blood pressure or pre-eclampsia in pregnant women, changes in liver enzymes, decreased vaccine response, and small decreases in infant birth weights. Additionally, the EPA has classified PFOA and PFOS as potential human carcinogens (i.e., they have the potential to cause cancer in humans). More information on the human health effects and routes of exposure to these compounds can be found through the following links:

ATSDR: .cdc.gov/TSP/ToxProfiles/ToxProfiles.aspx?id=1117&tid=237
.atsdr.cdc.gov/pfas/health-effects/exposure.html
EPA: .epa.gov/pfas/basic-information-pfas

Because of their widespread use in certain occupational scenarios as well as commercial and industrial products and the ability of certain PFAS to resist degradation, many Americans have low levels of PFAS in their blood.

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Questions

For more information on MDE's actions to address PFAS throughout the State, please contact Geoffrey Donahue at geoffrey.donahue@maryland.gov. Additional information on how MDE is managing PFAS risks can be found on the Department's PFAS Webpage: http://mde.maryland.gov/MDandPFAS.

Sources Considered

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