

Firefighting foams: Toward PFAS-free alternatives



PFAS-REACH

PFAS Research, Education,
and Action for Community Health

Millions of people living in the U.S. are exposed to PFAS (per- and polyfluoroalkyl substances) through their drinking water. PFAS are extremely persistent in the environment and have been linked to a range of harmful health effects. One major source of drinking water contamination is a type of firefighting foam called aqueous film-forming foam (AFFF).

Firefighters use AFFF to put out fuel fires in emergencies and in regular training exercises (1). Manufacturers add PFAS to AFFF to help spread the foam and suppress fuel fires quickly. As a result, high levels of PFAS have been found in groundwater near military bases, airports, municipal fire training areas, and other locations where AFFF has been used. Firefighters are exposed to PFAS when they spray the foam. Because of concerns about PFAS, fire departments around the U.S. and globally are switching to PFAS-free foams that provide similar levels of performance.

Types of Firefighting Foams

There are two main types of firefighting foams: Class A and Class B.



Class A foams are used to put out most types of fires, including structural fires, forest fires, and other fires that do not involve flammable fuels. Class A foams do not contain PFAS.



Class B foams are designed to fight fuel fires. There are 2 main types of Class B foams:



1. Fluorinated foams, which combine hydrocarbon foaming agents with PFAS. AFFF is the most common fluorinated foam, along with alcohol-resistant aqueous film-forming foam (AR-AFFF) (2).

AFFF is a fluorinated foam that has been produced since the late 1960s. Older formulations of AFFF contained long-chain PFAS, which were phased out of production in the U.S. starting in the early 2000s due to health concerns and their tendency to remain in the body for years. Newer formulations of AFFF contain short-chain and other alternative types of PFAS. While these newer PFAS are less long-lived in the human body, they are also highly mobile and persistent in the environment. In addition, there is growing evidence that newer PFAS may pose similar health concerns to legacy, long-chain PFAS (3-5).

2. Fluorine-free foams (F3), which include a variety of formulations with water additives and hydrocarbon surfactant mixtures (6, 7).

Fluorine-free foams (F3) are Class B foams that do not contain PFAS. Major airports in Europe and Australia, municipal fire departments in the U.S., and private companies such as BP, ExxonMobil,

Bayern Oil, and Pfizer, have already transitioned to fluorine-free foams (3). Many F3 formulations are able to meet the most international standards and certifications that are required for Class B foams. However, no F3 alternatives are currently able to meet the U.S. Department of Defense standard, called the MIL-SPEC standard, which requires firefighting foams to be able to put out a fuel fire within 30 seconds (8).

Federal Regulations

PFAS-containing firefighting foam was first formulated in 1963. The Department of Defense began using AFFF for firefighting activities related to aircraft fuel fire-fighting beginning in the 1970s (9, 10) and then introduced the MIL-SPEC in 1992, which mandated AFFF use (9). In response to the discovery of widespread drinking water contamination, in 2016 the Department of Defense restricted AFFF use during trainings (11). In 2018, the Federal Aviation Administration

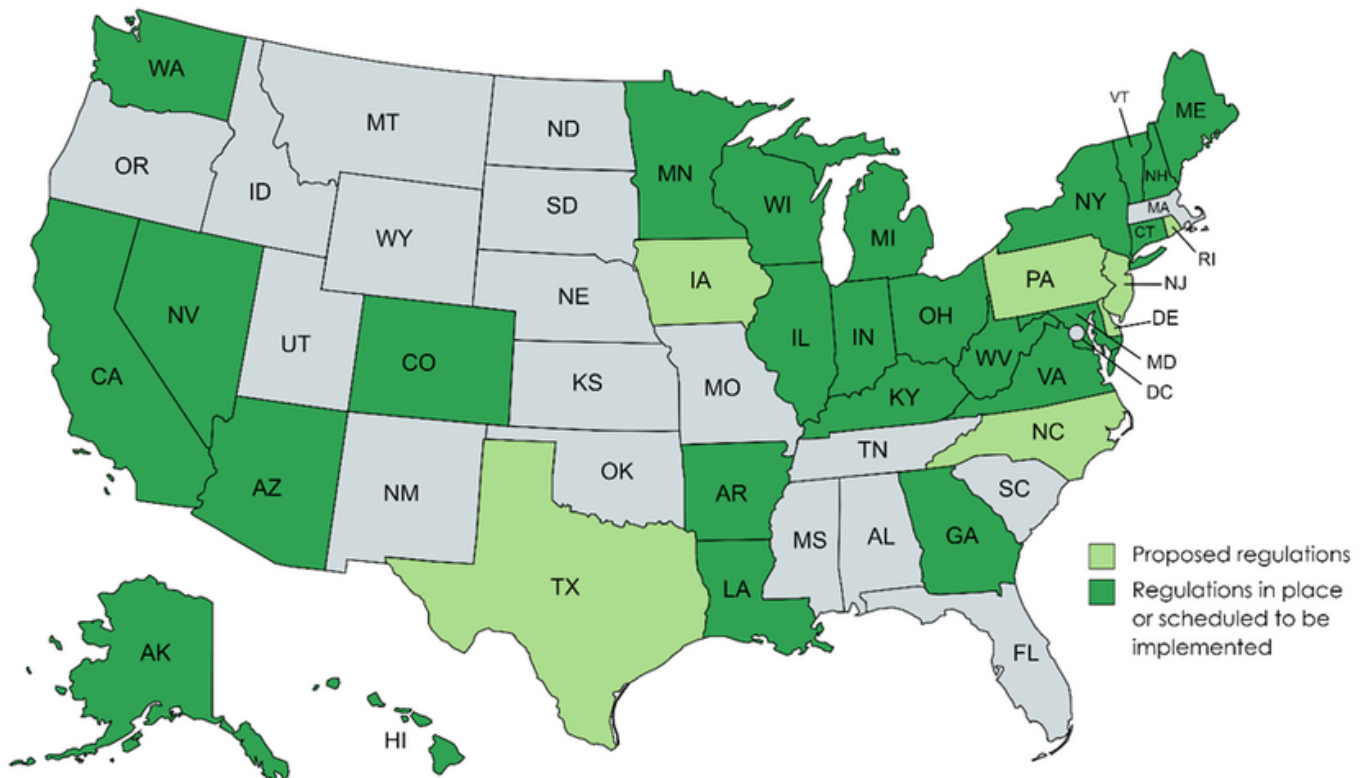
changed its requirements to allow major airports (Part 139 certified) to select fluorine-free foams (12). The 2020 National Defense Authorization Act ensures that AFFF will be phased out of most military operations by October 2024 (13).

State Action

As of May 2023, 32 states have proposed or adopted regulations on the use, sale, or manufacture of PFAS-containing firefighting foams (14). Examples include:

Washington: In 2018, the state of Washington passed a law that prohibited the sale of PFAS-containing firefighting foam and the use of these foams for training, except when required by federal law (15).

Michigan: In September 2020, Michigan established mandatory reporting to the state when PFAS-containing foams are discharged and a take-back program for PFAS foams. Michigan also has prohibited PFAS-containing firefighting foam for training, with some exceptions (16).



Moving Toward Safer Foam

A number of companies are developing new fluorine-free foam formulations and application techniques in order to improve performance. While more information is needed on the safety of F3 foams, they are not as environmentally persistent and have lower clean-up and remediation costs than fluorinated foams (3). PFAS-free foam manufacturers can become GreenScreen Certified through Clean Production Action. This third-party certification ensures that no PFAS were intentionally added to the foam, and that the product meets specific environmental and health criteria (17).

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