



FACT SHEET: Risks of Aqueous Film Forming Foam (AFFF)

November 2018

WHAT IS AFFF?

Aqueous Film Forming Foam (AFFF) is a fire suppressant used to extinguish flammable liquid fires such as fuel fires. AFFF is often used in shipboard and shore facility fire suppression systems, fire fighting vehicles, and at fire training facilities. AFFF is purchased as a concentrate, typically referred to as "3%" or "6%" (Type 3 or Type 6, respectively) depending on its mixture ratio with water.

WHAT ARE PFAS, PFOS, AND PFOA?

Per- and poly-fluoroalkyl substances (PFAS) are a large family of human-made chemicals that have been widely used in industry and



Photo courtesy of FOAMTECH Antifire Company

consumer products since the 1950s. Perfluorooctane sulfonate (PFOS) is a long-chain PFAS found in older stocks of AFFF and as a breakdown product of precursor compounds. Perfluorooctanoic acid (PFOA) is also a long-chain PFAS. PFOA is not an intended ingredient in AFFF, but is a side product created during the manufacturing process. Many AFFF formulations contain other unintended PFAS side products that have similar health and environmental concerns.

WHAT HAPPENS WHEN PFAS GET INTO THE ENVIRONMENT?

Because of their stable chemical structure, PFAS are persistent and do not break down easily. PFAS are highly mobile in the environment and migrate rapidly to groundwater where they migrate vertically and laterally through aquifers. PFAS tend to build up in the food chain and have been found throughout the Arctic, in both animals and plant life, and are suspected to have migrated there through the ocean and the air.

WHAT ARE THE RISKS TO HUMAN HEALTH?

PFOS, PFOA, and other PFAS are toxic and found to be widespread at low levels in humans and the environment. They are the subject of increasing regulations worldwide. Some but not all studies on PFAS, including PFOA and PFOS, have shown a positive association between exposure and thyroid disease, high cholesterol, pregnancy-induced hypertension, gestational diabetes, and fetal growth retardation resulting in low birth weights. Studies have also shown a link to certain types of cancer, including bladder, kidney, and testicular cancer. PFOS and PFOA are suspected endocrine disruptors and are not metabolized or easily excreted, with an estimated average half-life in humans



of 2.3 years for PFOA and 4.1-8.7 years for PFOS. Research on the health effects of other PFAS are in the early stages.

WHAT REGULATIONS APPLY TO PFAS IN AFFF?

ADEC has identified PFOS and PFOA and several other PFAS found in AFFF as hazardous substances. Any discharge of PFAS-based AFFF must be reported immediately to the State under 18 AAC 75. To report a new release or spill, contact:

Southeast (Juneau) --- (907) 465-5340
Central (Anchorage) --- (907) 269-3063
Northern (Fairbanks) --- (907) 451-2121

When AFFF is used, discharged or released to the environment, containment and cleanup may be required to prevent future adverse health or environmental impacts.

ADEC has established soil and groundwater cleanup levels for PFOS and PFOA at 18 AAC 75.341 (soil) and 18 AAC 75.345 (groundwater) and has proposed cleanup levels for additional PFAS. In addition, EPA has established a lifetime health advisory level for PFOS and PFOA – individually or combined – to protect people from PFOS and PFOA exposure in drinking water. PFOS and PFOA are not classified as hazardous wastes under the Resource Conservation and Recovery Act (RCRA); however, under the Toxic Substances Control Act, these compounds are regulated through Significant New Use Rules which give the EPA the authority to restrict the production and use of PFOS and PFOA containing products. AFFF constitutes a U.S. Occupational Safety and Health Administration hazardous material because of its physical hazards, such as skin and eye irritation. Discharge of wastewater and runoff containing AFFF on land, at sea, or to surface water bodies is also subject to regulation under the Clean Water Act. PFOS and PFOA may also qualify as pollutants or contaminants under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

ADEC strongly encourages all AFFF users to implement best management practices (BMPs) on selection, storage, use and disposal. Examples of BMPs are available in the reference section below.

HOW DO I DETERMINE IF I HAVE PFOS-BASED AFFF?

Due to their long shelf lives, older AFFF (including PFOS-based AFFF concentrate) may still be present in your inventory. Common product names or attributes include:

- 3M Light Water AFFF (PFOS-based)
- Long-chain PFAS containing C-8, 10, 12, or greater fluorochemicals

If the product name and/or purchase date cannot be determined, a sample can be sent to an analytical laboratory to determine the presence or absence of PFOS, using EPA Method 537. Users are advised to compare sampling costs and disposal costs, as it may be more cost-effective to properly dispose of limited quantities of unknown PFOS material rather than pay for sampling and analysis.



HOW DO I DISPOSE OF PFOS-BASED AFFF?

AFFF must be disposed of properly. Although it is not characteristic for hazardous waste, nor is it listed as a regulated hazardous waste under RCRA, ADEC recommends that it be solidified and shipped to a non-hazardous waste landfill out of state that will accept this waste, or thermally destructed at a RCRA Part B Subpart O incineration facility. When shipping PFOS-containing AFFF out of state, use a licensed waste transportation and disposal company. AFFF may not be disposed of at sea, or through septic, stormwater, or municipal sewer systems.

CAN STOCKPILES OF PFOS-BASED AFFF CONTINUE TO BE USED?

Older PFOS and long-chain PFAS AFFF should only be used in emergencies where insufficient amounts of newer short-chain AFFF or other foams are available and where there is an immediate risk to human life, public safety or property. ADEC strongly recommends these older products be removed from use and properly disposed. Newer formulations may still be hazardous to human health and the environment and should only be used when necessary to prevent immediate threat to life or health.

WHAT IS THE MANUFACTURING HISTORY OF AFFF?

Prior to 2002, many fluorosurfactants used in AFFF were PFOS-based, which resulted in AFFF that contained PFOS and precursors compounds that could form into PFOS, PFOA and other PFAS of concern. During that time, AFFFs based on long-chain fluorotelomers were also available. After 3M, Inc.'s announcement to phase out manufacturing of PFOS-based products in 2000, the primary supply of AFFF became fluorotelomer-based. Over the last several years, manufacturers of fluorotelomer AFFF have been replacing long-chain fluorosurfactants with short-chain fluorosurfactants. The PFAS in current fluorotelomer-based AFFF are shorter chain molecules and are suspected to be less toxic. Telomer-based AFFF does not contain PFOS, but may contain trace amounts of PFOA.

WHAT ABOUT HISTORIC USES AND RELEASES OF PFOS-BASED AFFF?

Throughout Alaska, ADEC has identified PFOS and PFOA contamination that is above cleanup levels and associated with releases of AFFF. Releases may have occurred at firefighting training locations, AFFF storage tanks and transport lines, accident/emergency response sites, and near facilities (e.g., aircraft hangars) with AFFF fire suppression systems.

If you or your agency would like to conduct groundwater sampling for these chemicals or if your records indicate your facility may have experienced AFFF leaks, spills, or releases to the environment, please contact the ADEC Contaminated Sites Program at (907) 465-5250.

DIVISION OF SPILL PREVENTION AND RESPONSE

Juneau: (907) 465-5250

Anchorage: (907) 269-7557

Fairbanks: (907) 451-2107

<http://dec.alaska.gov/spar>



REFERENCES

- Fire Fighting Foam Coalition Fact Sheet on AFFF Firefighting Agents (2017):
https://docs.wixstatic.com/ugd/331cad_fa5766eb867b4a5080330ce96db195fa.pdf
- EPA 2016 Health Effects Support Document for Perfluorooctanoic Acid:
https://www.epa.gov/sites/production/files/2016-05/documents/pfoa_hesd_final_508.pdf
- EPA 2016 Health Effects Support Document for Perfluorooctane Sulfonate:
https://www.epa.gov/sites/production/files/2016-05/documents/pfos_hesd_final_508.pdf
- EPA Fact Sheet --- PFOA and PFOS Drinking Water Health Advisories (May 2016):
https://www.epa.gov/sites/production/files/2016-06/documents/drinkingwaterhealthadvisories_pfoa_pfos_updated_5.31.16.pdf
- ITRC Fact Sheet on Aqueous Film Forming Foam (AFFF) (contains example BMPs):
https://pfas-1.itrcweb.org/wp-content/uploads/2018/10/pfas_fact_sheet_fff_10_3_18.pdf

