ADEC DIVISION OF SPILL PREVENTION AND RESPONSE

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

July 2017

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 IS PFAS, PFOS, AND PFOA?

Photo courtesy of FOAMTECH Antifire Company

Per- and poly-fluoroalkyl substances (PFAS) are a large family of man-made chemicals that have been widely used in industry and consumer products since the 1950s. PFOS is a long-chain PFAS found in legacy 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 long-chain precursor fluorotelomer-based AFFFs can break down to PFOA.

WHAT HAPPENS WHEN PFAS GET INTO THE ENVIRONMENT?

Because of its stable chemical structure, PFAS is persistent in the environment and resists degradation. It is highly mobile in the environment and migrates rapidly to groundwater where it migrates further, both vertically and laterally through aquifers. PFAS tends to bioaccumulate in the food chain and has been found throughout the Arctic, in both mammals and other biota, and are suspected to have migrated there through oceanic currents and atmospheric deposition.

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 long-chain PFASs, 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.

WHAT REGULATIONS APPLY TO PFOS AND PFOA?

State regulation has identified PFOS and PFOA as hazardous substances. Any discharge of PFAS-based AFFF must be reported immediately to the State under 18 AAC 75.300. To report a new release or spill, contact:

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

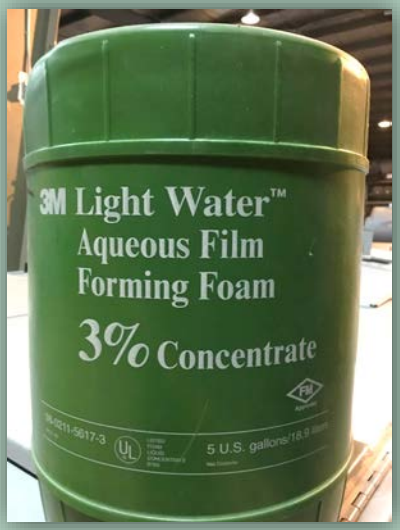
For contaminated soil and groundwater, DEC has established cleanup levels for PFOS and PFOA at 18 AAC 75.341 (soil) and 18 AAC 75.345 (groundwater). In addition, EPA has established a lifetime health advisory level for PFOS and PFOA – individually or combined – to protect people from PFOS and PFOA exposure in drinking water, particularly unborn babies and infants. PFOS and PFOA are not classified as hazardous wastes under the Resource Conservation and Recovery Act; 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.

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

Due to their long shelf lives, legacy 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 the Resource Conservation Recovery Act (RCRA), DEC 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. Alternatively it may be returned to the manufacturer if available. 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?

DEC strongly discourages the use of PFOS and long-chain PFAS AFFF, due to the risks posed to human health and the environment. We recommends these products be removed from use and properly disposed.

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 or PFOS precursor compounds. 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 bioaccumulative and 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, DEC has identified PFOS and PFOA contamination above cleanup levels and associated with repeated releases of AFFF. Releases may have occurred at live firefighting training locations, AFFF storage tanks and transport lines, accident/emergency response sites, and near facilities (e.g., aircraft hangers) with AFFF fire suppression systems. The locations of these activities have confirmed or suspected soil and groundwater contamination.

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 DEC Contaminated Sites Program at (907) 465-5390.

References

- Fire Fighting Foam Coalition Fact Sheet on AFFF Firefighting Agents (2017): http://www.fffc.org/images/AFFFfactsheet17.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

DIVISION OF SPILL PREVENTION AND RESPONSE

Juneau: (907) 465-5250 **Anchorage:** (907) 269-7557 **Fairbanks:** (907) 451-2107

http://dec.alaska.gov/spar