Per- and Polyfluoroalkyl Substances (PFAS) 101

What are PFAS?

- PFAS refers to the entire class of approximately 600 per- and polyfluoroalkyl substances in commerce, of which perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) were historically the most widely-used throughout the U.S.
- PFAS are man-made chemicals found in many industrial and consumer products because they increase resistance to heat, stains, water, and grease. PFAS are not uniquely attributable to Department of Defense (DoD) activities.
- Commercial and consumer use of PFAS started in the 1950s. Uses include keeping food from sticking to cookware, making sofas and carpets resistant to stains, and making clothes and mattresses more waterproof. PFAS are also found in food packaging and firefighting materials. A variety of other industries use PFAS because they help reduce friction, including the aerospace, automotive, building and construction, and electronics industries.
- In the 1970s, DoD began using aqueous film forming foam (AFFF) that contained PFOS and, in some formulations, PFOA. AFFF is mission critical because it quickly extinguishes petroleum-based fires.
- PFOS, PFOA, and other PFAS have been found in people, the environment, wildlife, and fish all over the world; do not break down easily in the environment; might affect people's health; and are the subject of increasing regulation worldwide.
- In 2016, the U.S. Environmental Protection Agency issued a lifetime Health Advisory (HA) for PFOS (perfluorooctane sulfonate) and PFOA (perfluorooctanoic acid) in drinking water of 70 parts per trillion. For context, one (1) ppt is equivalent to one (1) drop of water in 20 Olympic-sized swimming pools.

How are People Exposed to PFAS?

- Sources of PFAS in the environment may include industrial sources, areas with frequent use of products containing PFAS (e.g., airports, fire training areas), and consumer products. There are no natural sources of PFAS in the environment.
- Places where PFAS can be found include:
    - Public water systems and drinking water wells, soil, and outdoor air near industrial sources or areas with frequent PFAS use;
    - Indoor air in spaces that contain carpets, textiles, and other consumer products treated with PFAS to resist stains;
    - Consumer products including non-stick coatings on cookware, grease-resistant paper, and stain-resistant coatings on carpets, upholstery, and other fabrics;

    - Surface water (e.g., lakes, ponds) and runoff from areas where AFFF has been used, such as military or civilian airfields;
    - Locally caught fish from water containing PFAS;
    - Food items sold in the marketplace; and
- Although PFOS and PFOA use in the United States has declined dramatically since 2006, as a result of EPA's PFOA Stewardship Program, they are still produced internationally and can be imported into the United States in consumer goods. However, other PFAS are manufactured in the United States as replacements to PFOS and PFOA.
- Due to PFAS' ability to build up in the body, even small amounts consumed regularly can result in measurable levels in exposed people.
- Scientists are still studying the health effects of exposure to PFAS. Although more research is needed, some studies in people have shown that certain PFAS may affect health. Service members, family members, civilians, and veterans should see their healthcare provider if they have any concerns with PFAS exposure and possible health effects.
- Low levels of PFAS can be detected in most environmental media, including water, food and inside people's homes.

How has DoD Historically Used or Released PFAS to the Environment?

- DoD used AFFF containing PFOS and PFOA in firefighting and crash response vehicle testing, fire training exercises, crash crew training exercises, hangar system operations and testing, responses to fuel fires or spills, and emergency response actions. DoD also uses materials that can contain PFAS in the vapor suppression systems at plating shops.
- Releases to the environment can result from use, spills and leaks of these materials during handling or in storage, wastewater treatment, and disposal locations such as landfills.

How Does DoD Respond to PFAS Releases?

- Although EPA's HA is guidance and is not an enforceable drinking water standard, DoD proactively addressed drinking water impacted by DoD releases.
- DoD's priority is to quickly address PFOS and PFOA in drinking water from DoD activities under the federal cleanup law (i.e., the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)). DoD follows the CERCLA process to fully investigate releases, prioritize responses, and determine appropriate cleanup actions based on risk.
- No one is currently drinking water above the HA level, on or off base, where DoD is the known source.
- DoD is investigating and addressing all of its sites with a known or suspected release of PFAS. Under CERCLA, DoD investigates if a release occurred, takes short-term cleanup actions (called "removal actions") where there is an immediate need for action, and takes long-term cleanup actions (called "remedial

actions") to address any remaining unacceptable risks. The process from the initial assessment to the beginning of actual cleanup is a multi-year effort.

What is DoD Doing About AFFF?

- AFFF is mission critical because it quickly extinguishes petroleum-based fires.
- DoD is one of many users of AFFF, and other major users include commercial airports, the oil and gas industry, and local fire departments.
- DoD updated the Military Specification (MILSPEC) for AFFF, so that new supplies available for emergency firefighting responses, do not contain detectable levels of PFOS or PFOA.
- To prevent future releases to the environment, DoD prohibits using AFFF for maintenance, testing, and training on DoD installations world-wide and is actively researching fluorine-free alternatives to AFFF. AFFF is used during emergency responses and each use is treated as a spill response to limit environmental effects.
- No fluorine-free foam has proved it can meet military specifications to protect DoD Service members by rapidly extinguishing dangerous fuel fires. However, DoD is actively seeking an alternative that can meet this critical safety need.

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