



# Addressing PFAS Concerns

As concern from the presence of polyfluoroalkyl substances rises, actions are being taken to address the chemicals on military installations.

By Viraj deSilva, Ph.D., P.E., BCEE, Christina Finizio, and Dilrika Weerapperuma, Ph.D., P.E.

Chemically manufactured polyfluoroalkyl substances (PFAS) are a major environmental and biological concern. PFAS come in various forms, including perfluorooctanoic acid (PFOA) and perfluorosulfonates (PFOS). Due to their ability to reduce surface tension, they were widely used in many applications. Notably, as it affects the Department of Defense (DOD), they were used extensively as a fire extinguishing agent in the form of Aqueous Film Forming Foams (AFFFs).

AFFFs have been the standard for fighting petroleum fires and firefighting training exercises at military bases because they stop vaporization at the fuel surface, reducing the combustion zone.

AFFFs are so common at these sites that the watersheds surrounding military bases are 35 percent more likely to contain PFOS contamination.

Unfortunately, PFAS have created serious environmental consequences and human health risks. They are comprised of carbon and fluorine molecules, which create strong covalent bonds that are extremely resistant to chemical or physical changes. They persist in the environment and are resistant to degradation.

## FEDERAL INITIATIVES

Efforts have been made to reduce and replace halons such as AFFF since the Montreal Protocol (1987) and Kyoto Protocol (1997). Recent government

regulations have also bolstered progress. In May 2000, American manufacturers, acting in response to proposed regulations under the *Toxic Substances Control Act*, preemptively phased out products containing AFFFs. Then in 2016, the Environmental Protection Agency issued a drinking water health advisory for levels of PFOS or PFOA greater than 70-ppt. In February 2019, the agency unveiled a PFAS Action Plan in response to extensive public interest and input it received—the first time it has built a multi-media, multi-program, national communication and research plan to address an emerging environmental challenge like PFAS.

DOD has been addressing PFOS and PFOA through the Defense Environmental Restoration Program, and the Strategic Environmental Research & Development Program is working to develop a fluorine-free AFFF for the U.S. Navy. Based on policy issued in 2016, DOD also has stopped land-based use of AFFFs in training, testing, and maintenance. When

**AFFFs are so common at these sites that the watersheds surrounding military bases are 35 percent more likely to contain PFOS contamination.**

AFFFs must be used for emergencies, they are treated as a spill. Contaminated soil is contained to prevent further PFAS from seeping into the groundwater.

Additionally, DOD is investing heavily in researching fluorine-free alternatives as well as innovations to accelerate cleanup.

## IMPACTING INSTALLATIONS

Military installations nationwide have been impacted by PFAS, with instances of discovery in drinking water both on bases and in surrounding communities.

In 2016, for example, the U.S. Army Corps of Engineers investigated perfluorinated compounds at potential contamination zones at Peterson AFB, Colo., including fire training areas, fire stations, hangars, and other sites.

A total of five public drinking water systems and 39 private drinking water wells around the base were found to have PFOS or PFOA levels that exceeded the Lifetime Health Advisories issued by the Environmental Protection Agency. In 2016, the U.S. Air Force awarded a \$4.3 million rapid response contract to evaluate the affected potable water systems and develop short-term treatment solutions.

In another instance, concerns about potential PFAS contamination at Camp Grayling, Mich., began in 2016. Soon after, the Michigan Department of Military and Veteran Affairs (DMVA) tested groundwater at Grayling Army Airfield and found PFAS in a plume that was migrating toward the edge of the property.

Of the 188 off-installation drinking water systems tested for PFOS and PFOA, four tested above the Health Advisory Limit of 70-ppt. After considering various options, DMVA opted to implement a colloidal activated carbon treatment due to its expected rapid removal of PFAS from the dissolved mobile phase as well as its cost-effectiveness. After treatment, PFAS in downgradient wells were reduced to below target levels.

## MONITORING PROGRESS

In August 2019, DOD launched a PFAS Task Force to further address chemicals impacting military installations and surrounding communities. While specific actions vary according to circumstances at each location, the military is acting to address affected drinking water.

A number of states have also introduced regulations and programs to address the use of PFAS-containing foams, including take-back programs. Organizations should check for applicable regulations and programs in their state.

## TME

Viraj deSilva, Ph.D., P.E., BCEE, is Wastewater Treatment Director, and Christina Finizio is Associate Professional, SCS Engineers. They can be reached at vdesilva@scsengineers.com; and cfinizio@scsengineers.com.

Dilrika Weerapperuma, Ph.D., P.E., is President, Environmental Solutions; environmentalso@yahoo.com.