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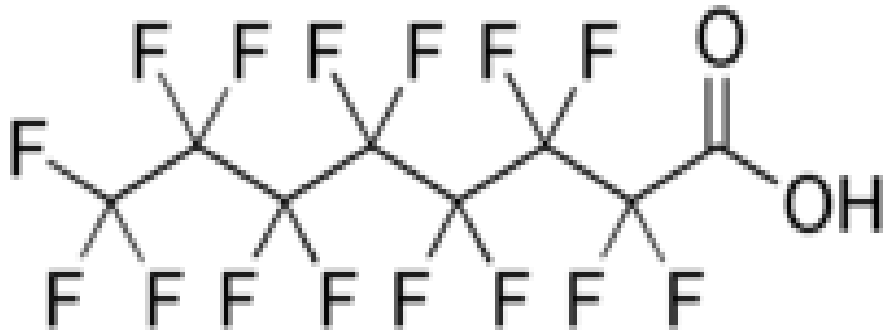
THE PREMIER PROVIDER OF ENVIRONMENTAL SOLUTIONS

PFAS ACTION TEAM – THOUGHTS FOR CONSIDERATION

November 30, 2018

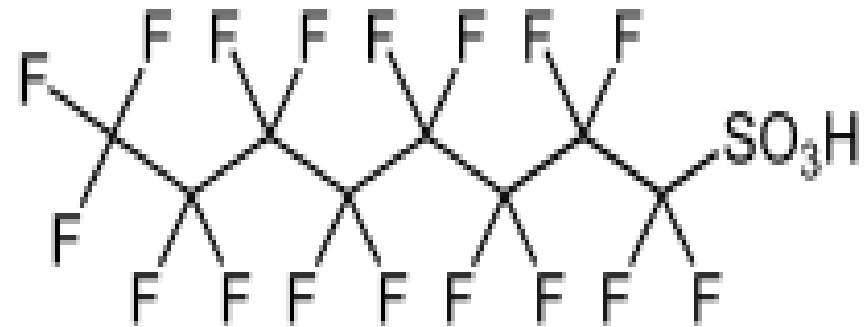
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Perfluorooctanoic acid (also known as PFOA)



- However, there are over 4,500 PFCs
- UCMR 3- Included 6 PFCs (PFOS, PFOA, PFNA, PFHxS, PFHpA & PFBS)

Perfluorooctane sulfonic acid (also known as PFOS)



- Federal Health Advisory Level (70 total for PFOS/PFOA)
- Many sites identifying 15-20 PFCs and the PFOA/PFOS is less than 50% of total PFCs

PFCs- Good Properties

PFOS

- Surfactant or emulsifier; used in fire-fighting foam, circuit board etching acids, alkaline cleaners, floor polish, and as a pesticide active ingredient for insect bait traps; U.S. manufacture of PFOS phased out in 2002; however, PFOS still generated incidentally

PFOA

- Per fluorinated aliphatic carboxylic acid; used for its emulsifier and surfactant properties in or as fluoropolymers (such as Teflon), fire-fighting foams, cleaners, cosmetics, greases and lubricants, paints, polishes, adhesives and photographic films

PFNA, PFHxS, PFHpA & PFBS

- Manmade chemical; used in products to make them stain, grease, heat and water resistant

Fire Fighting Foams AFFF vs FFF

<u>Category</u>	<u>Aqueous Fire Fighting Foam (AFFF)</u>	<u>Fluorine Free Foams (FFF)</u>
Fire Extinguishment Timeframe	18 seconds	40 second
Effectiveness on Petroleum	Good on petroleum fires, which is the primary use	Inherently oleophilic (fuel attractive) & can easily pick up fuel, degrades quickly and becomes flammable compromising the fire
Military and FAA Requirements	Meets both US military specification (milspec) and FAA requirements	Unable to pass the fire tests necessary to meet the requirements of the US military
Toxicity	One European study showed AFFFs are much less toxic to fish in the short term than FFFs because of high BOD	The same one European study showed FFF much more toxic to fish in the short term due to high BOD; only 38-110 ppm levels caused fish kill

- Carbon is a filter media
- Carbon Affinity is affected by
 - Compound characteristics,
 - Compound concentration,
 - Carbon bed contact time, and
 - Other competing contaminants
- Carbon adsorption
 - Better for longer chain PFCs (example PFOS, PFOA)
 - Poor for shorter chain PFCs (PFBS, PFHxS, etc.)
- Water and Wastewater Treatment Plants
 - Report only PFOA/PFOS (HAL 70 ppt)
 - PFCs not treated and escape



- Standards
 - Complicated
 - Getting them accurate
 - Importance
- Cleanup
 - Not Detect – Not Realistic
 - Enforcement
 - Media
 - Technology Selection

- Investigating vs Interim Remedial Measures vs Final Remedy
- Protection of Receptors
- Public Participation
- Interim Remedial Measures
 - Source Control
 - Control, Minimize & Eliminate Releases
 - Control, Contain & Separate Stormwater Runoff
 - Control Groundwater Plume Migration
 - Control Infiltration through Impacted Soils
 - Control Leaching from Impacted Sediments
- Remedial Options
 - Alternative Clean Water Supplies
 - Carbon vs Resins
 - Interceptor and Containment Barriers
 - Thermal and Oxidation and Plasma Technologies
 - Phytoremediation
 - Institutional Controls

