



THE HISTORY OF PFOS AND PFOA AND HOW WE'VE DETECTED IT IN PUBLIC WATER SYSTEMS UNDER THE UNREGULATED CONTAMINANT MONITORING RULE PROCESS

KAREN JOHNSON
US EPA REGION 3

BACKGROUND-CHEMICAL CHARACTERISTICS

- **PFOS and PFOA are two chemicals in a large group (hundreds) of manmade chemicals called perfluoroalkyl substances (PFAS).**
- **PFAS have varying carbon chain lengths and have many uses, including as surfactants and to make products more resistant to stains, grease, and water.**
- **PFOS and PFOA both have 8 carbon atoms and are resistant to biodegradation**
- **PFOS and PFOA are the end products formed from longer chain commercial, biodegradable precursors.**
- **Both chemicals have similar environmental fate and transport processes.**
 - **They are stable in the environment, including in water.**
 - **Low volatility, but adsorb to airborne particulates and can be transported long-range.**
 - **Mobile in water and soils.**
 - **Bioaccumulate across trophic levels**

PREVIOUS AND CURRENT USES: INDUSTRIAL AND CONSUMER PRODUCTS

PFOA

- Cooking surfaces (Teflon)
- **Fire fighting foams**
- Toothpaste, Shampoos, cosmetics
- Polishes and waxes
- Electronics
- **Lubricants/surfactants/emulsifiers**
- Pesticide
- Plumbing Tape
- Food containers and contact paper
- Textiles (Gore-Tex) and Leather
- Paints, varnishes, sealants
- Cleaning products
- And more...

PFOS

- **Metal plating and finishing**
- **Fire fighting foams**
- **Photograph Development**
- Semiconductor industry
- **Aviation Fluids**
- Flame repellants
- Packaging Papers
- Oil and Mining
- Stain repellants on carpets and upholstery (e.g. Stainmaster, ScotchGard)
- Cleaning products
- Paints, varnishes, sealants
- Leathers, textiles
- And more...

U.S. PRODUCTION

- in the U.S since 1950. Both PFOA and PFOS have been phased out of production in the U.S. and replaced by shorter chain PFAS or other compounds.
 - In 2000-2002, PFOS was voluntarily phased out of production in the U.S. by its primary manufacturer, 3M.
 - PFOS and PFOA are the two PFAS that have been produced in the largest amounts before any new future manufacturing, including importation of PFOS and its precursors. A limited set of existing uses are not subject to these regulations because they were ongoing at the time of the regulation.
 - In 2010, eight companies entered into a voluntary agreement to phase out production of PFOA and longer chain chemicals that degrade to PFOA by the end of 2015. There are notice requirements for use on imported carpets and some specialty uses are ongoing.
- Production is still ongoing in other countries, and thus, importation of products containing both compounds is possible.

UNREGULATED CONTAMINANTS-STATUTORY REQUIREMENTS – 1996 AMENDMENTS

- Identify and publish a Contaminant Candidate List (CCL) every 5 years
 - - unregulated contaminants which may require regulation and are known or anticipated to occur in public water supplies
- Every 5 years, promulgate Unregulated Contaminant Monitoring Rule (UCMR) to monitor for ≤ 30 unregulated contaminants

UNREGULATED CONTAMINANT MONITORING RULE (UCMR) TIME TABLE

- Final rule published May 2, 2012

<http://water.epa.gov/lawsregs/rulesregs/sdwa/ucmr/ucmr3/index.cfm>

- Monitoring Period: Jan 2013 – Dec 2015;
- reporting through ~mid-2016
- 28 chemicals and 2 viruses
- Chemical contaminants include hormones, perfluorinated compounds (e.g., PFOS/PFOA and six other PFA's), VOCs, metals (including Cr-6 and total Cr), 1,4-dioxane, chlorate
- EPA Provisional Health Advisory: PFOA (0.4 µg/L), PFOS (0.2 µg/L)

FREQUENCY OF MONITORING

- **Surface water and “ground water under the direct influence of surface water”**
 - **must monitor quarterly during their 12-month schedule (sample three months apart)**
- **Ground water**
 - **must monitor twice a year during their 12-month schedule (sample five to seven months apart)**

REGULATORY DETERMINATION PROCESS

- Every five years, make determination on whether or not to regulate
- A determination shall be based on specified criteria:
- - 1) The contaminant may have an adverse effect on the health of persons;
 - 2) The contaminant is known to occur or there is substantial likelihood that the contaminant will occur in public water systems with a frequency and at levels of public health concern; and
 - 3) In the sole judgment of the Administrator, regulation of such contaminant presents a meaningful opportunity for health risk reduction for persons served by public water systems.

PROVISIONAL HEALTH ADVISORY AND LIFE TIME HEALTH ADVISORY

- **EPA Office of Water developed a Provisional Health Advisory in February 2009 setting the short term consumption value at 0.4 ppb for PFOA and 0.2 ppb for PFOS. In effect until May 2016.**
- **A Peer reviewed risk assessment for a life time Health Advisory was completed in May 2016, setting a value of 0.07 ppb or 70 ppt as a value protective of all populations for a lifetime of exposure. It has numerous safety factors built in, including the assumption that 80% of the PFOS and PFOA comes from non drinking water sources of consumption.**

HEALTH ADVISORY CONTINUED

- EPA derived a relative source contribution of 20% for PFOA and PFOS for the national HA based on available occurrence information and considering the environmental persistence of these compounds
 - CDC data provide evidence of broad exposure to PFAS from multiple sources.
 - Currently, diet is the major source of PFOA and PFOS:
 - Food products including fish, snack foods, vegetables grown in contaminated soils, and meat and dairy products from exposed grazing animals
 - Food packaging products and use of Teflon cookware
 - Contaminated drinking water
 - Indoor dust is another major source (especially to children) from treated carpets and furniture/textiles in homes, offices, automobiles.
 - Other sources of legacy exposure or exposure to precursors: soils, air, clothing, cosmetics, cleaning materials, etc.

OPTIONS TO LIMIT EXPOSURE

- **Notification to consumers should include actions the water system is taking and identify options that consumers may consider to reduce risk such as seeking an alternative drinking water source, or in the case of parents of formula-fed infants, using formula that does not require adding water.**
- **In some cases, drinking water systems can reduce concentrations of PFOA and PFOS by closing contaminated wells or changing rates of blending of water sources.**
- **Alternatively, public water systems can treat source water with activated carbon or high pressure membrane systems (e.g., reverse osmosis) to remove PFOA and PFOS.**
- **In some communities, entities have provided bottled water to consumers while steps to reduce or remove PFOA or PFOS from drinking water or to establish a new water supply are completed**