

PFAS – An Emerging Concern for Solid Waste Facilities

By: Gina Wilming
Lead Environmental Scientist

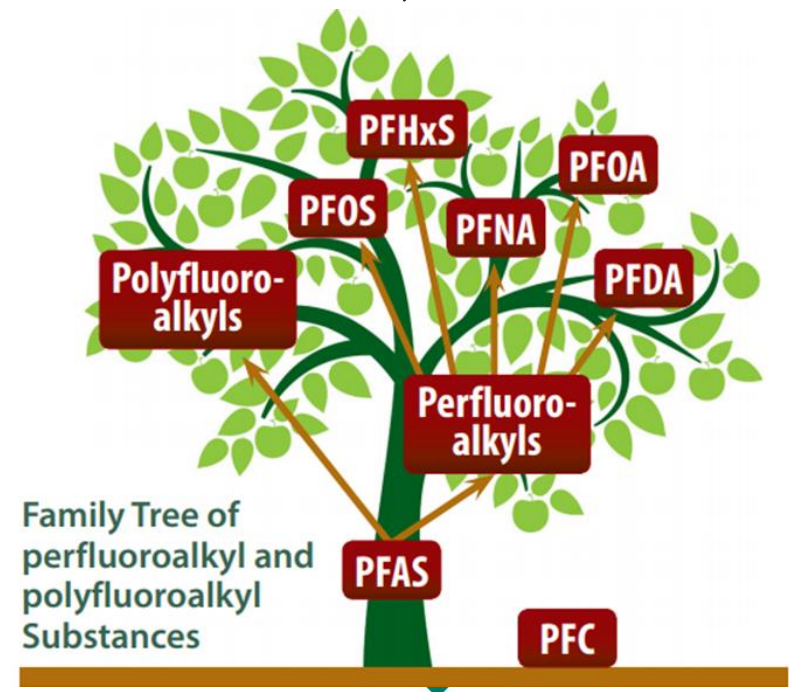
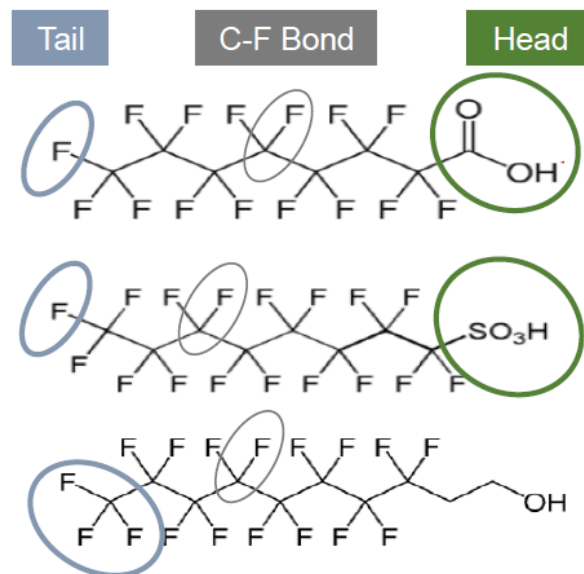


Outline

- ◆ What are PFAS?
- ◆ Potential Health Concerns
- ◆ Environmental Fate and Transport
- ◆ Federal Regulations and Drivers
- ◆ State Examples

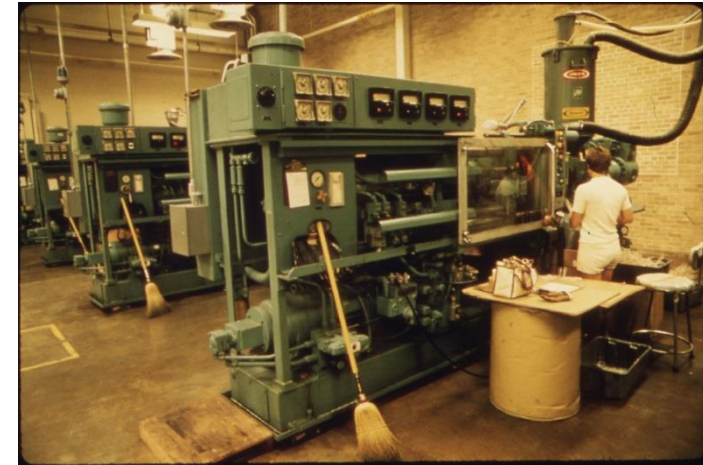
What are Per- and Polyfluoroalkyl Substances (PFAS) ?

- ◆ Family of 4000+ manmade, highly fluorinated chemicals
- ◆ Invented in 1930s; in use since the 1940s; U.S. production was voluntarily stopped in 2000s
- ◆ Unique chemistry yields unique physical properties: oil-, stain- and water-repellent, temperature resistant, flame-retardant, reduces friction, and is “ever-lasting”



PFAS - In Thousands of Products

- ◆ Industrial Raw Products:
 - ▶ chemical surfacing, plating, etching; coatings; films for process improvements; semiconductor manufacturing
- ◆ Government Market
 - ▶ firefighting foam (AFFF) at military facilities, airports, petroleum refineries, fire-fighting training areas



PFAS - In Thousands of Products



◆ Consumer Market



- ▶ Scotchgard, waterproofing, GORE-TEX, Teflon, paper products, wire coatings, shampoo, cosmetics, fabric softener, suntan lotion, bug spray, floss....
- ▶ In 2019, FDA announced that PFAS are in U.S. food supply

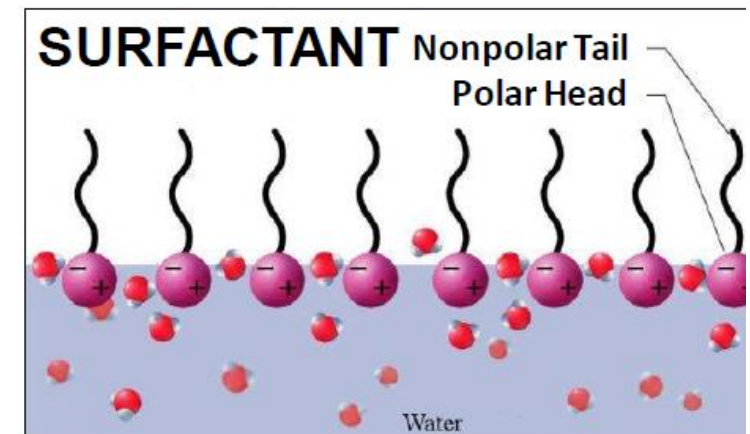
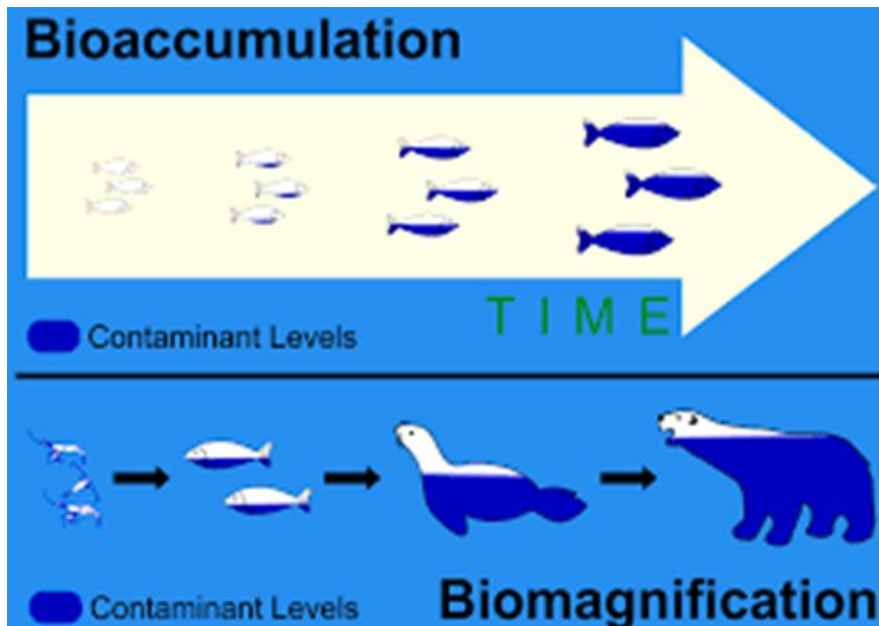


Potential Health Impacts

- ◆ Widely studied for PFOS, PFOA, PFHxS, and PFNA compounds, but limited research on remaining compounds
- ◆ Still learning – need more research
- ◆ PFAS exposure **MAY** cause:
 - ▶ Growth, learning, and behavior effects in infants and older children
 - ▶ Decreased female fertility, increased blood pressure in pregnant women, birth defects, and increased testicular cancer
 - ▶ Interfere with body's natural hormones
 - ▶ Increase cholesterol levels, abnormal fat metabolism, and cause liver damage
 - ▶ Immune system impacts
 - ▶ Increased risk of cancer
- ◆ PFOS or PFOA free may not be entirely accurate

Environmental Fate & Transport

- ◆ Act as Surfactant – accumulate on water surfaces and move far
- ◆ Mobile – move fast and generate larger plumes
- ◆ Degrade to more harmful compounds
- ◆ Bioaccumulate and Biomagnify



All the Hype for PFAS is the:

- ◆ **EXTENT:** Diverse market and product use, resulting in wide geographic and deep demographic exposure
- ◆ **NATURE:** It travels fast and far in nature, can transform from “bad” stuff to “worse” stuff, persistent, and can bioaccumulate and biomagnify
- ◆ **MAGNITUDE:**
 - ▶ Industrial and Government facilities have highest concentrations but finite facilities (USA ~200).
 - ▶ Municipal Waste facilities have low to moderate concentrations but “infinite” facilities (MN ~100 SWLF, ~100 WTP/WWTP)

Regulations and Drivers - Federal

- ◆ 2016 - EPA established a Health Advisory Limit (HAL) of 70 ppt for PFOA and PFOS in drinking water
- ◆ February 2019 – EPA Announces “PFAS Action Plan:”
 - ▶ Propose national drinking water standard (MCL)
 - ▶ List PFOA and PFOS as hazardous substances
 - ▶ Propose nation-wide drinking water monitoring for PFAS
 - ▶ Interim groundwater cleanup guidance
 - ▶ Develop risk communication toolbox to ensure clear and consistent messages to the public
 - ▶ Funding research
- ◆ July 2019 - Senate and House of Representatives approved separate PFAS bills

PFAS in Waste Streams Research Funding through EPA STAR Program

- ◆ EPA awarded ~\$6 million in PFAS research grants to 8 universities through the Science to Achieve Results (STAR) program. Research to be conducted 2019-2022. Includes:
 - ▶ Identify and quantify PFAS in landfill leachate
 - ▶ Investigate fate of PFAS passing through typical landfill liner systems
 - ▶ Identify and quantify PFAS in landfill gas and release into atmosphere
 - ▶ Identify PFAS sources in current U.S. domestic waste stream
 - ▶ Evaluate adsorption, desorption and biodegradation of PFAS and precursor compounds in landfills
 - ▶ Evaluate various treatment methods for reduction or destruction of PFAS in leachate and groundwater

EPA Awards \$6M to Research Impacts of PFAS in Waste Streams. (2019, September 19). Retrieved from <https://www.waste360.com/public-agencies/epa-awards-6m-research-impacts-pfas-waste-streams>.



Minnesota



- ◆ Solid waste facilities have been sampling PFAS compounds in leachate (treated ponds) and in groundwater/soil (land application sites) for the past ~10 years
- ◆ 100's – 1000's ppt in leachate
 - ▶ Confirming what we suspected – PFAS in waste stream are being detected at minimal to moderate concentrations in landfill leachate
- ◆ Minimal concentrations in groundwater and soil at land application sites
 - ▶ Land application suitable??

Wisconsin



- ◆ Several PFAS bills have been introduced but none have received hearings to date
 - ▶ LRB-2297/2 (May 23, 2019): would require DNR to establish, by rule, acceptable levels and standards, monitoring requirements, and required response actions for any PFAS.
- ◆ DNR established Technical Advisory Group for PFAS; includes wastewater and solid waste subgroups
- ◆ DHS recommended groundwater standard of 20 ppt for two PFAS compounds.
- ◆ DNR sent out letters to 125 WWTPs to voluntarily sample for PFOA/PFOS

Wisconsin (Continued)

- ◆ Currently, the prevailing guidance from non-regulatory wastewater and solid waste organizational groups in Wisconsin is to NOT comply with WDNR requests for sampling of PFAs until a clear method, standard, and path forward is identified
- ◆ Meleesa Johnson, Director for Solid Waste Management at UW Stevens Point Institute for Sustainable Technology, has been outreaching to wastewater, solid waste, recycling, and compost professionals around the state to create “one voice” to approach PFAS; noting that the division of WW and SW subgroups on this topic “creates unhelpful silos and stands in the way of systems thinking outcomes”

Michigan



- ◆ March 2019 - Statewide study by Michigan Waste & Recycling Association (MWRA) in collaboration with Michigan DEQ:
 - ▶ PFOA/PFOS compounds present at varying levels in leachate at the 35 landfills tested
 - ▶ Leachate was a relatively minor contribution to overall PFOA/PFOS concentration in most WRRF influent due to relatively low leachate discharge volumes
 - ▶ Non-leachate sources of PFOA and PFOS significantly contribute to WRRF influent and at higher volumes.
- ◆ Study highlighted that landfills and WRRFs have mutually-beneficial relationship (leachate disposal vs biosolids management) and that these two infrastructure components would benefit from enhanced cooperation to manage PFAS to serve the needs of both industries and protect the environment

Michigan Waste & Recycling Association “Michigan Waste & Recycling Association Statewide Study on Landfill Leachate PFOA and PFOS Impact on Water Resource Recovery Facility Influent.” March 1, 2019.

https://docs.wixstatic.com/ugd/6f7f77_9b845fefde8b4fd3b42e6a7bd321e21f.pdf. Accessed September 1 – 24, 2019.

What Does the Future Hold?

- ◆ In the next 2-3 years, EPA will identify PFAS treatment technologies and MCLs
- ◆ Policy decisions will follow, likely including NPDES
 - ▶ May prompt POTW treatment upgrades
 - ▶ May result in pretreatment requirements
 - ▶ Possible cost increases to users
- ◆ ISOSWO would benefit from engaging a single technical group composed of solid waste and waste water entities to track and advocate for clear methods and policy in regards to PFAS

Mobile App Question

Which consumer product has NOT tested positive for PFAS?

- a) Ski Wax
- b) Microwave Popcorn Bags
- c) Stain- or Water-Repellent Clothing
- d) Dental Floss
- e) Nonstick Cookware
- f) Laboratory Provided HDPE Plastic Bottles

Correct Response

- f) **Laboratory Provided HDPE Plastic Bottles**
- May seem like an obvious answer, but it is very difficult to find a consumer product that is “PFAS-free” – which speaks to the ubiquitous nature of this contaminant



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