

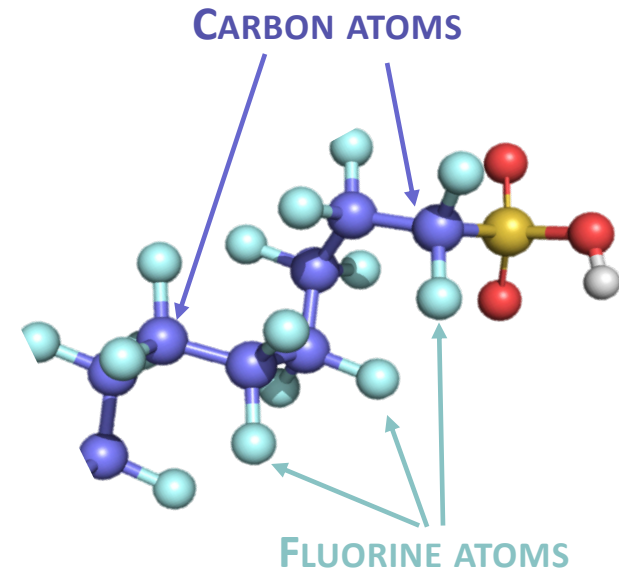
Dan Groher's Presentation

- What are PFAS?
 - Their uses
 - Types of releases
 - Status as emerging contaminant
- What happens to PFAS in the environment?
- What can we do about them once in the environment?

- Then turn it over to Sandra...

What are PFAS?

- Perfluoroalky and Polyfluoroalkyl Substances (PFAS)
 - *Thousands* of different (but very similar) chemicals
 - Includes Perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) – most commonly discussed and regulated
- In recent years, experts have become concerned by potential PFAS health effects
- We have learned a lot about PFAS in the last 5+ years. But so much more to learn ...



“Carbon-Fluorine bond, one of the strongest bonds in nature”

→ ***Consequently, US EPA and many States have varying health standards***

Some of the Many Uses of PFAS



Aerospace



Apparel



**Building and
Construction**



**Chemicals and
Pharmaceuticals**



Electronics



Oil & Gas



Energy



**Healthcare and
Hospitals**

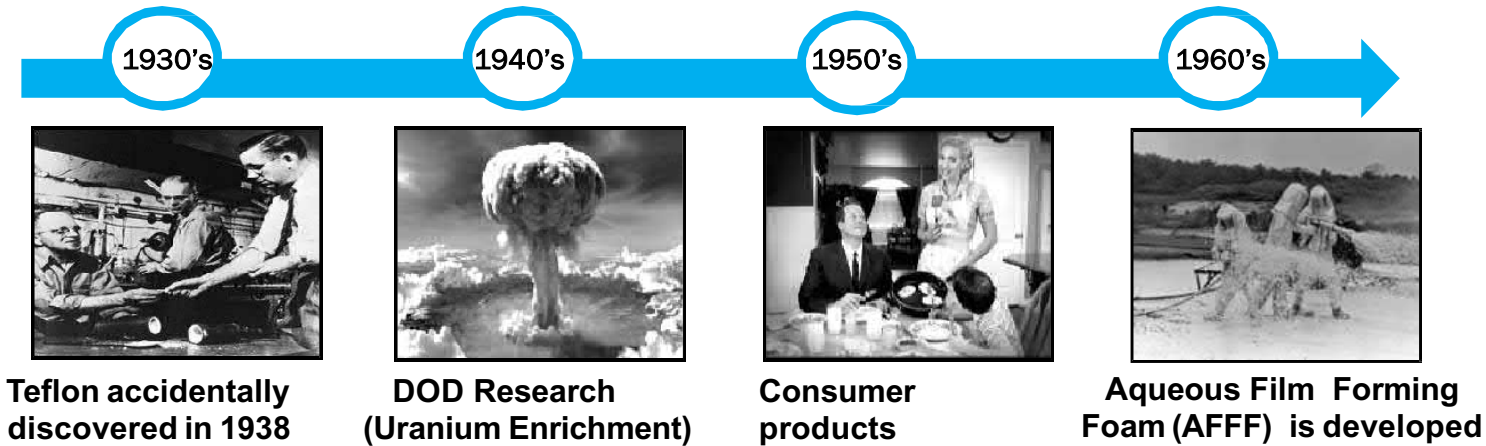


**Aqueous Film
Forming Foam**

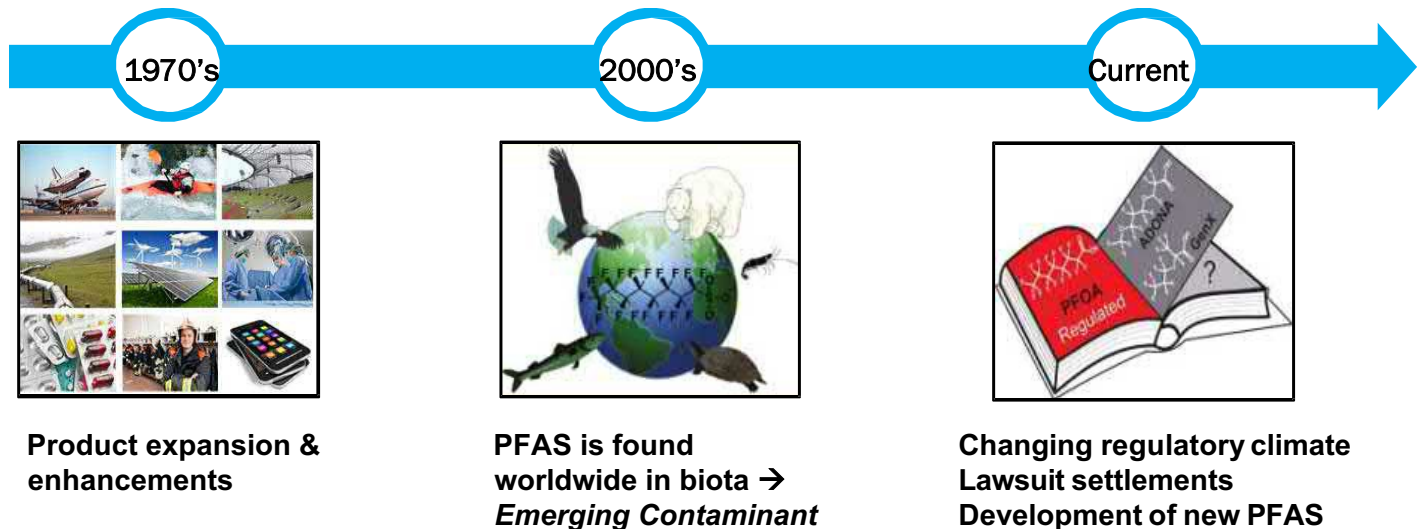


Semiconductors

PFAS Development....



... and Evolution



What is an Emerging Contaminant?

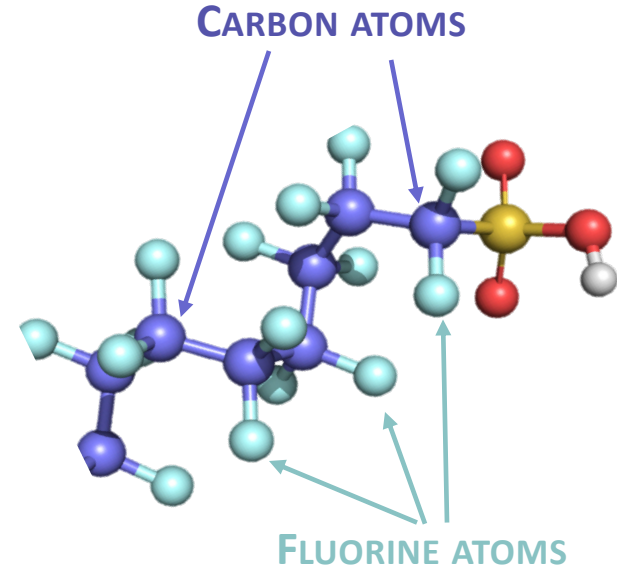
Chemicals that can enter the environment and present real or potential human health or environmental concern...

and either

Do not have peer-reviewed human health standards;

or

Standards/regulations are evolving due to new science, detection capabilities or pathways.



Large Scale Potential PFAS Sources



Refineries



Pump & Paper



**Wastewater
Treatment Plants**



Military Sites



Metal Plating



**Various
Manufacturing**

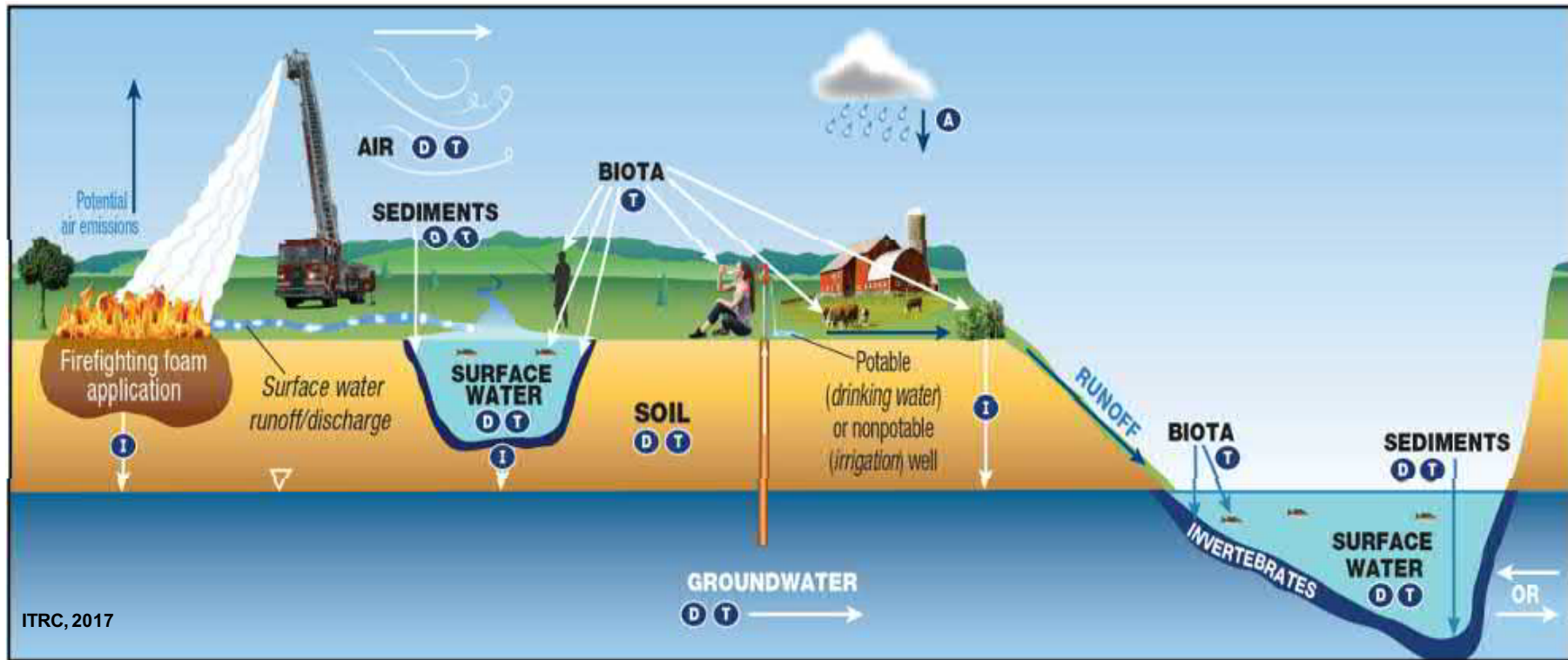


**Landfills & Waste
Disposal Areas**



Airports

Conceptual Site Model – AFFF Site



KEY **A** Atmospheric Deposition **D** Diffusion/Dispersion/Advection **I** Infiltration **T** Transformation of precursors (abiotic/biotic)

How Can We Protect Drinking Water from PFAS?

1. Locate the source and intercept the dissolved PFAS
 - a) Install an interceptor well
 - b) Install a “barrier” to prevent dissolved PFAS from reaching water well(s)
 - c) Requires remedial investigation to find source and/or plume
2. Destroy the PFAS *in-situ* (in the ground) – we do NOT really know how to do this yet because PFAS are SO stable
3. Treat the drinking water pumped from wells

Typical Options for Treating Drinking Water Containing PFAS



Granular Activated Carbon (GAC) – *most familiar*



Anion Exchange Resin (AIX) – *likely most cost effective*



Membrane Filter – *not common*

Sorption Media

- ✓ Very commonly applied – towns are familiar
- ✓ Depends on water quality (e.g., low organic or metals)
- ✓ No liquid waste stream of concern
- ✓ Comparatively lower cost (vs. membrane)
- ✓ BUT, high media replacement costs

NEWS > TODAY'S HEADLINES

Ayer DPW completes first PFAS treatment plant in state

Public water wells near Grove Pond will have system removing chemical compounds



Ayer DPW Superintendent Mark Wetzel gives a tour of the Grove Pond Water Treatment Plant's new wing containing an ionic exchange treatment plant to remove PFAS, the first in Massachusetts. (SUN/Julia Malakie)

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New PFAS Treatment Facilities – Ayer Example

- AIX for PFAS Removal
- Media selected by lab studies
- ~ \$3 Million and 1 year to build
- Treat up to 2 million gals/day

