

# Perfluoro and PolyfluoroAlkyl Substances (PFAS): Regulatory Overview (California)

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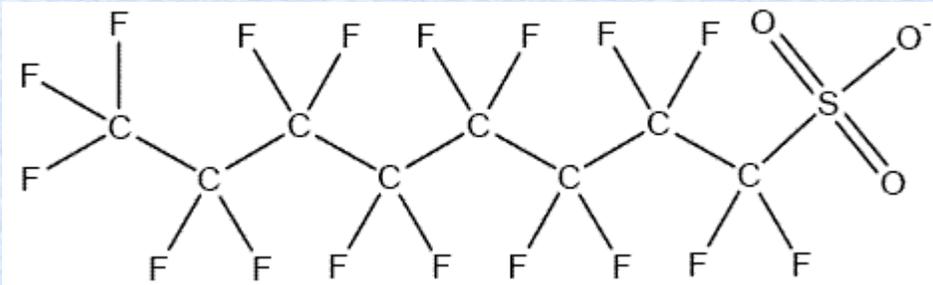


# Perfluoro and Polyfluoroalkyl Substances (PFAS)

**PFAS: Synthetic chemicals characterized by fluorine atoms attached to a carbon chain. They are valued for their chemical stability and their oil, water and stain repellent properties**



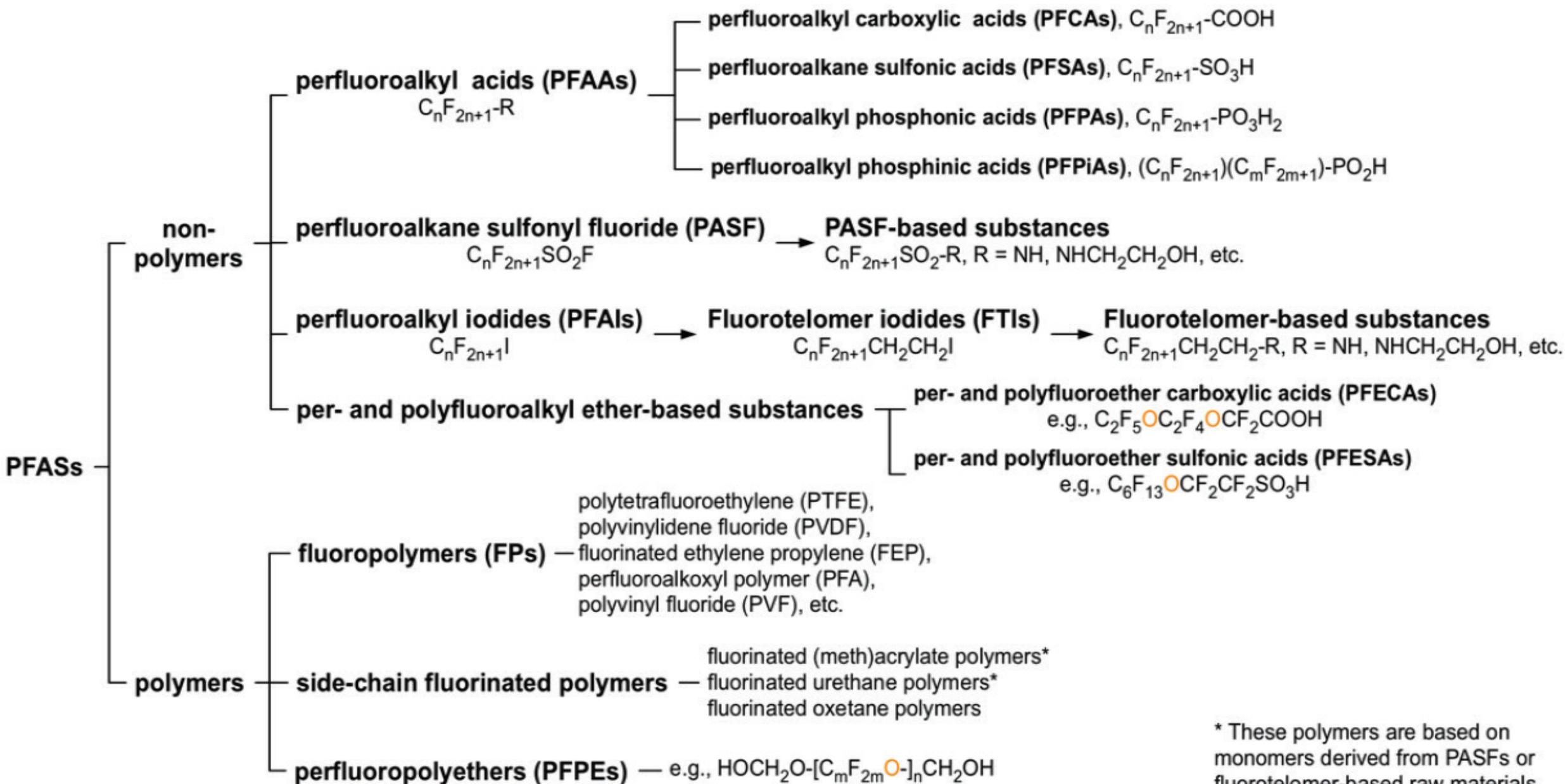
PFOS (C<sub>8</sub>HF<sub>17</sub>O<sub>3</sub>S)



- Industrial uses:
  - Automotive, aerospace, construction, electronics
- Found in many products
  - Class B firefighting foams
  - Non-stick cookware
  - Food containers
  - Consumer products (stain-proof fabrics and carpets, rain gear, personal care products, detergents)



# Per- and polyfluoroalkyl substances (PFASs)

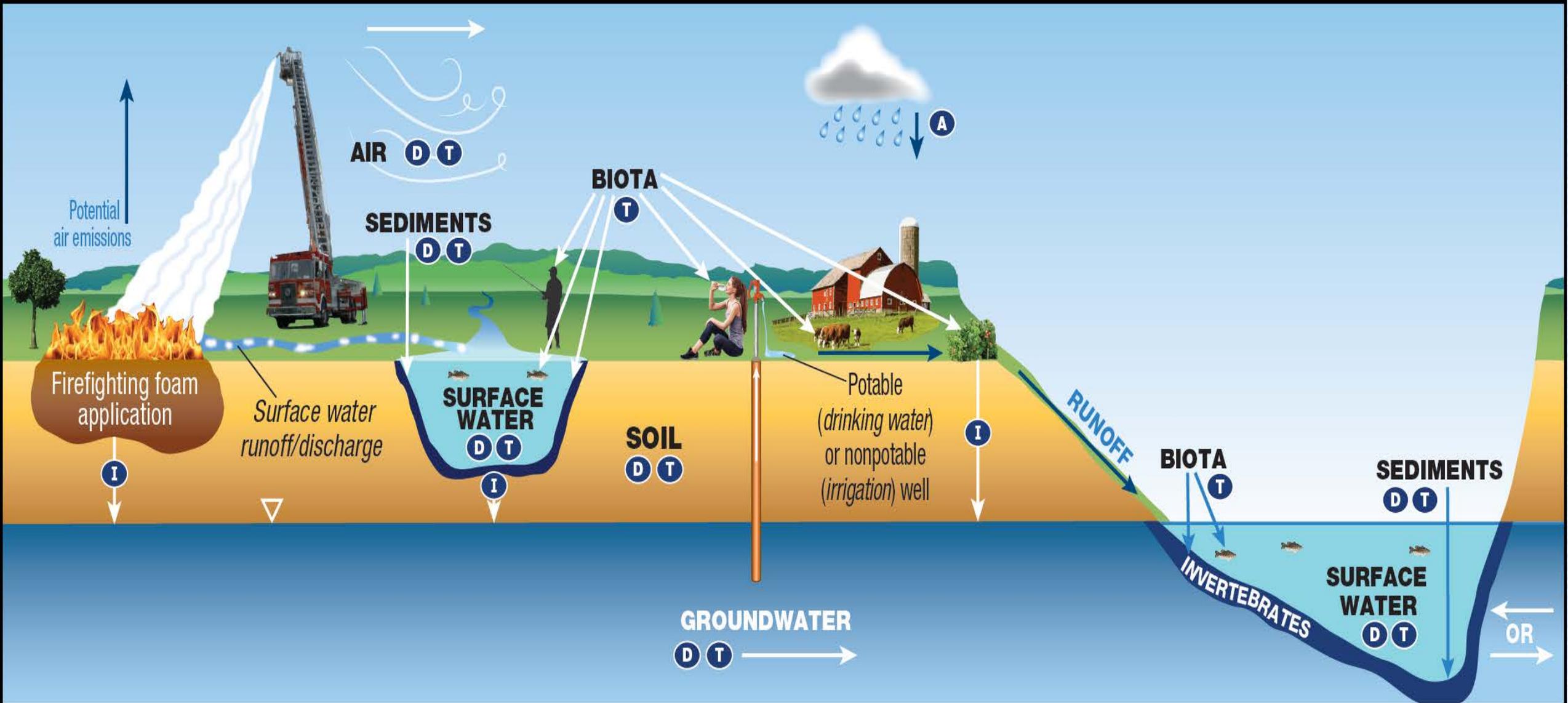


\* These polymers are based on monomers derived from PASFs or fluorotelomer-based raw materials.

# Why are PFAS compounds of concern?

- **Widespread use:** Industry and consumer products
- **Persistent:** Does not break down easily in the environment
- **Bioaccumulates in humans and animals:** Found in more than 90% of the US population sampled (NHANES studies)
- **Ground water contamination:** Found in public drinking water sources
- **Concerns about health effects:**
  - affect growth, learning, and behavior of infants and older children
  - interfere with the body's natural hormones
  - increase cholesterol levels
  - affect the immune system and
  - increase the risk of cancer





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

(Source: ITRC Fact sheet "Environmental Fate and Transport of Per- and Polyfluoroalkyl Substances". Adapted from figure by L. Trozzolo, TRC, used with permission)



# Perfluoro and Polyfluoroalkyl Substances (PFAS): Environmental Investigations (Cleanup Program)

- Federal Facility Sites (DoD)
  - Reviewed Work Plans for 12 current or former bases (14 PFASs were measured)
  - Received initial sampling results
  - Reviewing Site Inspection reports
  - PFASs detected in groundwater, wastewater treatment plant influent/effluent, and soil
- Industrial facilities
- Expanding the focus to other sites
  - Wastewater treatment plants
  - Major industrial sites
  - AFFF-certified airports
  - Tanneries
  - Landfills
  - Plating Facilities



# DTSC – Environmental Investigations (Cleanup Program)

## Current Recommended DTSC Screening Levels (SLs)

Table 1. Health-Based Drinking Water <sup>1</sup>		Table 2. DTSC Risk-Based Residential SLs <sup>2</sup>	
EPA Health Advisory (HA) (µg/L)		Soil (mg/kg)	
PFOA	PFOS	PFOA	PFOS
0.07	0.07	1.3	1.3
PFOA + PFOS = 0.07			

<sup>1</sup>USEPA lifetime drinking water health advisory level issued May 2016.

<sup>2</sup>DTSC-SLs calculated using DTSC recommended default exposure parameters and the RfD from the USEPA PFOA and PFOS HA.

## Tapwater Risk-Based SL

For risk assessment purposes, the tapwater risk-based DTSC-SL

Table 3. DTSC Risk-Based Residential SLs <sup>2</sup>	
Tapwater (µg/L)	
PFOA	PFOS
0.4	0.4



# DTSC – Environmental Investigations (Cleanup Program)

- Next Steps for Risk Assessment

- DoD finishing site investigations – Is there PFAS contamination?
- Discussions with DoD on how to conduct a risk assessment at sites with known PFAS contamination in soil, groundwater and wastewater treatment plants
  - USEPA's RSL table does not list soils/water screening levels for PFOS/PFOA
  - Toxicity values for two other PFASs are listed on RSL table (Perfluorobutane sulfonic acid, Perfluorobutanesulfonate)
- One base installed activated carbon at wastewater treatment plant



# Challenges and Ongoing Research

- Address the lack of toxicity criteria for all PFASs:
  - Responsive Evaluation and Assessment of Chemical Toxicity (REACT) – Collaborative program between NTP and USEPA to screen as many as 75 PFASs (identified by grouping similar compounds) through high throughput screening assays- initial *in vitro* and *in silico* methods, followed by select *in vivo* methods to generate information.
- How to perform risk assessments:
  - A relative potency factor approach, similar to dioxin evaluation (proposed by RIVM of the Netherlands)
- How to pinpoint the source of contamination - Found in almost everything



QUESTIONS?

