PFAS Overview

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26th California Unified Program Annual Training Conference
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Introduction

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- *PFAS identification at industrial facilities*
  - *Chemicals/composites*
  - *Semiconductor*
  - *Transportation equipment*
- *Environmental reporting*
  - *TRI with new de minimis removal*
  - *TSCA PFAS One-Time Reporting Rule*
- *Facility-specific PFAS compliance assistance*
  - *Sources of information*
  - *Implications of analytical testing*
  - *Project management*

Agenda

1. Brief PFAS Introduction
2. EPA Initiatives Brief Update
3. California Initiatives
4. Facility Approach Experiences

Slido #1

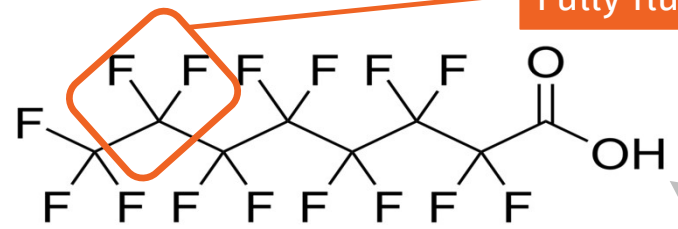
- How well do you know what PFAS are?
  - They are a funny sounding thing that some people are worried about
  - I've seen stuff on the news about firefighting foam
  - You're spelling it wrong, I thought it was PFAs or PFOS or PFOA
  - I know a little bit of chemistry such that the term "fluorinated organic compound" makes sense to me
  - I am familiar with various regulatory definitions of PFAS
  - I can say the TSCA Section 8(a)(7) definition right now by memory

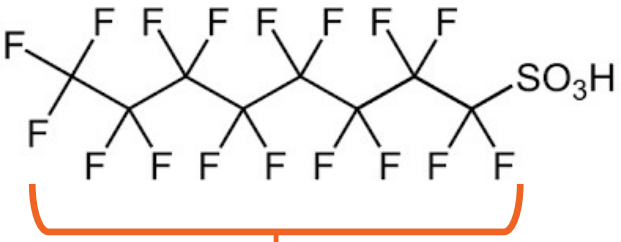
What are Per- and Polyfluoroalkyl Substances (PFAS)?

Two common examples

PFOA:
Perfluorooctanoic acid

PFOS:
Perfluorooctanesulfonic acid



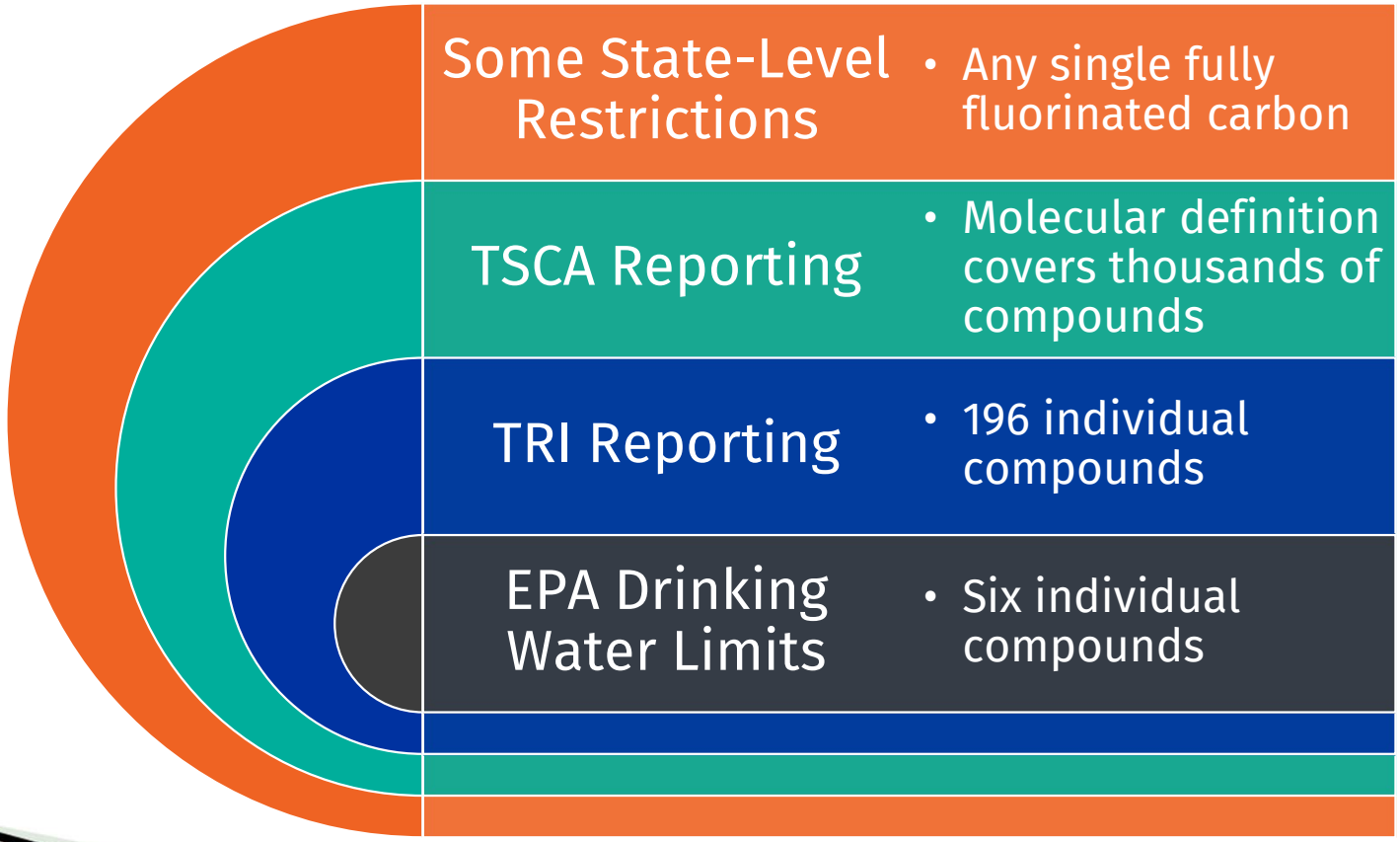


Fully fluorinated carbon

Functional groups:
- Typically hydrophilic

Fluorocarbon tail:
- Array of highly electronegative fluorine atoms = tail is hydrophobic and has weak dispersion forces
- C-F bond is very strong = tail is largely unreactive
- Provides distinctive surfactant properties

PFAS Definitions Vary



Many more PFAS definitions exist

First step to regulatory compliance assessment is to know what PFAS definition applies

PFAS Usage

- **Everywhere**
  - **Paints, coatings, adhesives, sealants**
  - **Rubber and plastic parts**
  - **Materials with non-stick, water resistance, chemical resistance properties**
  - **Fire suppression systems**
- Industry specific
  - Paper products coatings for water and grease resistance
  - Semiconductor photolithography and etch
  - Chrome plating wetting agent/fume suppressant
  - Pesticides and herbicides
  - Carpet, textiles, and upholstery
  - Froth flotation in mining

Release Pathways

- Process waste streams
  - Water, solid, air
- Off-spec product or materials
- Discarded packaging that held PFAS-containing materials
- Control technology media
  - Activated carbon, ion exchange resin, scrubber media, etc.
- Used PPE, cleaning materials, rinse water, dust
- Contained in saleable product
- Spills

Hidden Sources

- **Byproduct formation**
  - Highly reactive environments (heat, energy, chemistry)
    - Increase or decrease in molecule size
  - Long residence time aqueous solution
    - Typically degradation by breaking of non- C-F bonds
- **Entrainment in equipment**
  - “Forever chemicals”
  - From historic PFAS presence
  - Observed in many industries
  - Leaching out over time

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EPA Initiatives Update

Toxic Release Inventory (TRI) Reporting

- Covers 196 individual PFAS compounds
- Reports due July 1 each year
- Manufacturing, processing, otherwise use threshold of 100 lbs for each individual PFAS
- ~~De minimis concentrations:~~
  - ~~0.1% for PFOA (CAS 3335-67-1)~~
  - ~~1% for all other PFAS~~
- **Enhanced PFAS reporting under TRI for activities in calendar year 2024 and beyond**
  - **Removal of de minimis exemption**
  - **PFAS supplier notifications**

Toxic Substances Control Act (TSCA) PFAS One-Time Reporting Rule

- Manufacture or import of PFAS in 2011 – 2022
  - Includes byproducts and impurities
  - Includes articles
  - No small concentration or low activity exemptions
- Reporting is due May 2025 for most
- Use of "reasonably ascertainable" information
- Hardest hit by rule:
  - Importers of PFAS in articles
  - Importers of small concentrations of PFAS
  - PFAS manufactured as a byproduct

Other EPA Regulatory Updates

Platform	Keywords	Action	Priority description
NPDES & ELGs	Wastewater and stormwater	Industry-specific actions to limit water discharge	May require sampling and BMPs such as: • Product elimination or substitution • Accidental discharge minimization • Equipment decontamination or replacement where there is legacy PFAS contamination
Drinking Water	Contaminated wells and waterways	EPA Maximum Contaminant Levels (MCLs) for 6 PFAS	Municipalities looking for sources of PFAS. Also require resources for: • Analytical testing • Water treatment • Public notification
RCRA	Waste	Potential future classification of PFAS as hazardous	Waste stream characterization
CERCLA, Phase I	Land contamination	PFOA and PFOS deemed hazardous	Due diligence and land contamination

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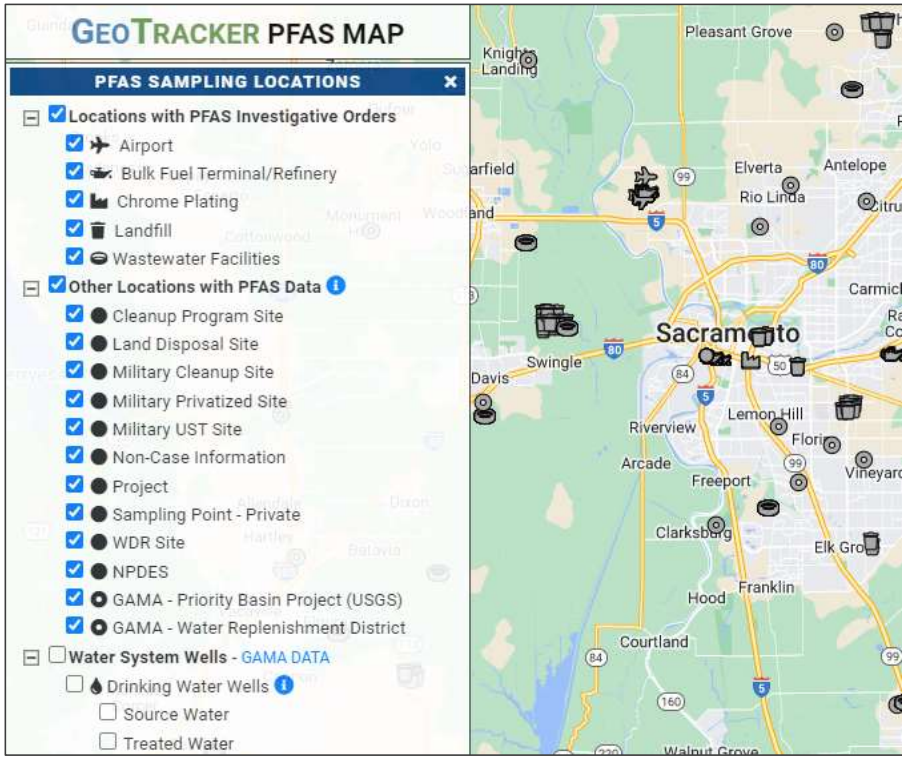
California Regulatory Initiatives

California Actions

- **Industry-wide data gathering requirements**
  - California Water Board mandate April 2019
  - Airports, MSW landfills, chrome plating facilities, bulk fuel terminals/refineries, wastewater treatment facilities.
  - Identify known PFAS onsite and potential discharge.
  - Sample for PFAS in soil, groundwater, stormwater, wastewater.



*"The Water Boards are charged with the **protection of** the beneficial uses of water in California, including water used or that **could potentially be used as drinking water**...The State Water Board and the Regional Water Boards **will evaluate the data collected** to make informed decisions in **implementing appropriate regulatory action**, in anticipation of emerging regulatory standards for PFAS."*

→ **Resulted in a cleanup order at San Luis Obispo airport.**

California Actions

- **San Francisco Regional Water Quality Control Board Environmental Screening Levels (ESLs) – June 2020**
  - PFOA and PFOS in groundwater and soil.
  - Part of regulatory approach to PFAS testing, investigation, and cleanup.
  - Priority sites for testing include state waterboard sites (prior slide) and:
    - Firefighting practice training areas;
    - Semiconductor facilities;
    - Electronics manufacturers;
    - Former chrome plating facilities and non-chrome metal plating and finishing facilities;
    - Mining industry (copper, gold, aluminum, vanadium, and uranium);
    - Textile manufacturers and processors;
    - Furniture manufacturers and upholsterers;
    - Carpet manufacturers;
    - Manufacturers of known PFAS-containing products, such as dental floss, non-stick cookware, food packaging materials, waterproof textiles, medical garments, and personal care products,
    - Cardboard/paper packaging manufacturers; and
    - Surface coatings/paints/varnish manufacturers and high-volume users.

California Actions

State water board drinking water sampling and limits

- State-wide quarterly sampling of ~1,300 public water sources with elevated risk – Order issued October 2022.
- Reporting/notification levels for 25 PFAS compounds.
- Response levels for 4 PFAS.
  - If detection above a response level the water system must either
    - Take the source out of service immediately;
    - Utilize treatment or blending; or
    - Provide public notification of the response level exceedance.

California Actions

Proposition 65

- Requires warnings for exposure and prohibits knowingly discharging to sources of drinking water.
- Included PFAS:
  - Perfluorononanoic acid (PFNA) and its salts,
  - Perfluorooctane sulfonate (PFOS),
  - Perfluorooctane Sulfonic Acid (PFOS) and Its Salts and Transformation and Degradation Precursors,
  - Perfluorooctanoic Acid (PFOA).
- No safe harbor levels for PFAS.
  - Safe harbor levels allow exemption from compliance requirements.

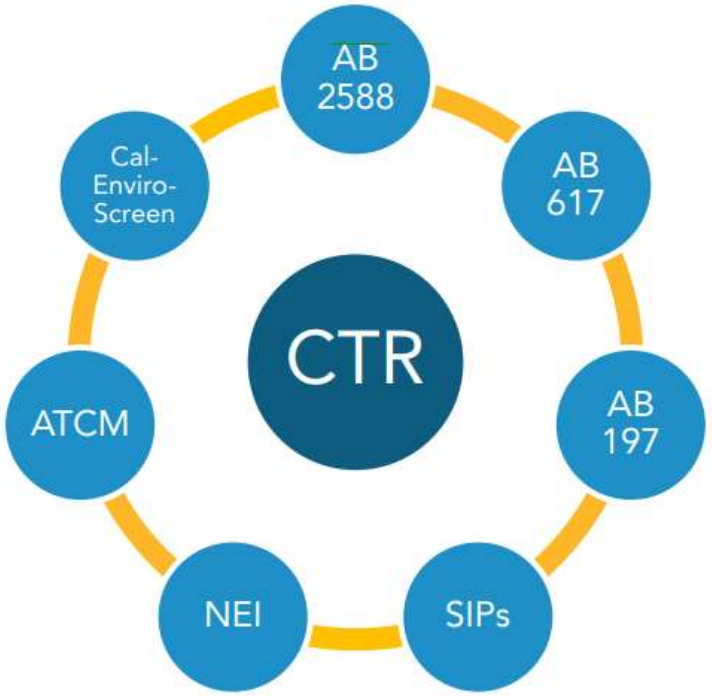
California Actions

Consumer Product PFAS Bans

- Generally define PFAS as anything with a fully fluorinated carbon
- “Intentionally added” PFAS or PFAS above concentration limits.
- Restrictions promulgated:
  - Food packaging,
  - Textiles,
  - Cosmetics,
  - Childrens products, and
  - Firefighting foam.
- Restrictions proposed:
  - Selected personal care products,
  - Cleaning products, and
  - Artificial turf.

California Actions

- **Criteria Air Pollutants and Toxic Air Contaminants (CTR) and AB 2588 Air Toxics "Hot Spots" Program**
  - Requires emissions quantification and reporting.
  - Over 200 explicit PFAS compounds added in November 2022.
    - Also includes PFAS functional groups that broaden PFAS definition.
  - Phase in period through 2028 based on PFAS compound, industrial sector, and air district.



Slido #2

- Word cloud:
  - What regulatory developments catch your attention the most?

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Facility Approach Experiences

Lessons from the trenches

Why be Proactive?

- New regulations will require a lot of data
- Get an early start on changes to materials, equipment, procedures
- Understand potential liabilities

Value of SDS Reviews

- SDS content is the responsibility of the supplier
- Declare any constituents that carry hazards or regulatory considerations
- Can point to SDS as *best available information*
- SDS revision date is important considering pace of new PFAS regulations

Example of SDS review finding:

Chemical Name	SDS Revision Date	SDS Revised after PFAS added to TRI?	Potential fluoridated compound name	CAS#	Constituents	Weight Percent	Fluorinated?	PFAS?	Other PFAS Notes
DURASTAR POLYMER MN631 NATURAL	10/24/2011	No	Modifiers/additives	N/A	Copolyester	>90%	No	No	Main component of plastics is usually a polymer. PFAS would more likely be in modifiers and additives.
				N/A	Modifiers/Additives	<10%	Potentially, need more information	Unknown	The additive identity is unknown and could be PFAS. PFAS have been documented as part of plastic components and resins.

To Test or Not to Test?

- Analytical testing isn't always the easy answer
  - Limited number of analytes
  - Test methods in developmental phases
- When might you test?
  - Supplier won't disclose PFAS presence
  - Need to handle material of unknown composition (e.g. old equipment)
  - Investigate historic soil/water contamination
- EPA Method 1633 is best available test for water and soil
- EPA Methods in early stages for air testing

Facilities Face Difficult Questions

- **Do we manage as a hazardous waste?**
  - PFAS not currently a RCRA hazardous waste
  - Limited knowledge of adequate waste management techniques
  - Want to do better than just regular landfill
- **Selecting control technologies**
  - Effectiveness, scalability, cost all in limbo
- **How to navigate limited information from suppliers**
  - SDS has only TRI PFAS
  - Vendor-supplier-manufacturer game of telephone
  - Offshore manufacturing
- **Is it worth it to make physical changes to facility?**
  - Business decision based on resource availability and risk tolerance

Conclusion: Examples of Proactive Strategies

Action	Connected Regulations *Not an exhaustive list*
Develop material balance to quantify waste streams of PFAS to wastewater, solid disposal, air emissions.	TRI reporting, CTR reporting, CERCLA, TSCA 8(a)(7) reporting.
Records review to understand historic manufacture and import.	TSCA 8(a)(7) reporting.
Evaluate process changes to isolate PFAS waste streams for separate management.	NPDES, RCRA, drinking water, Proposition 65, CERCLA.
Retrieve updated SDS in light of removal of de minimis exemption in TRI.	TRI reporting, CTR reporting, NPDES, RCRA, drinking water, Proposition 65.
Outreach to suppliers and review of industry-specific literature to determine PFAS in process inputs.	All of the above, plus consumer product bans.

Questions?

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