PFAS Overview

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Tu-F4

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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 do you feel the new EPA Administration will change PFAS regulations and enforcement?
  - Reduced level of scrutiny for industrial facilities
  - Increased level of scrutiny for industrial facilities
  - No change, my state/locality is still the main driver regardless of EPA actions
  - My state/locality will follow the lead of EPA
  - Who even knows what will happen!?

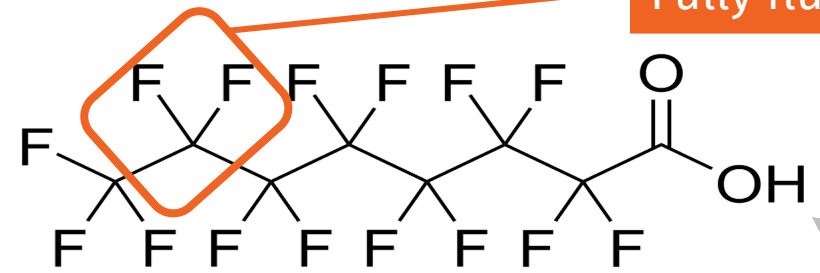
What are Per- and Polyfluoroalkyl Substances (PFAS)?

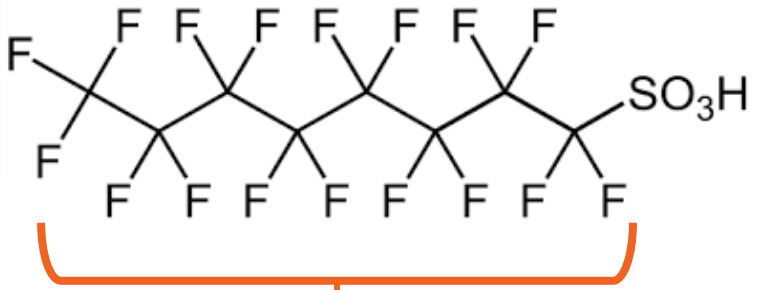
Two common examples

PFOA:
Perfluorooctanoic acid

PFOS:
Perfluorooctanesulfonic acid

Fully fluorinated carbon

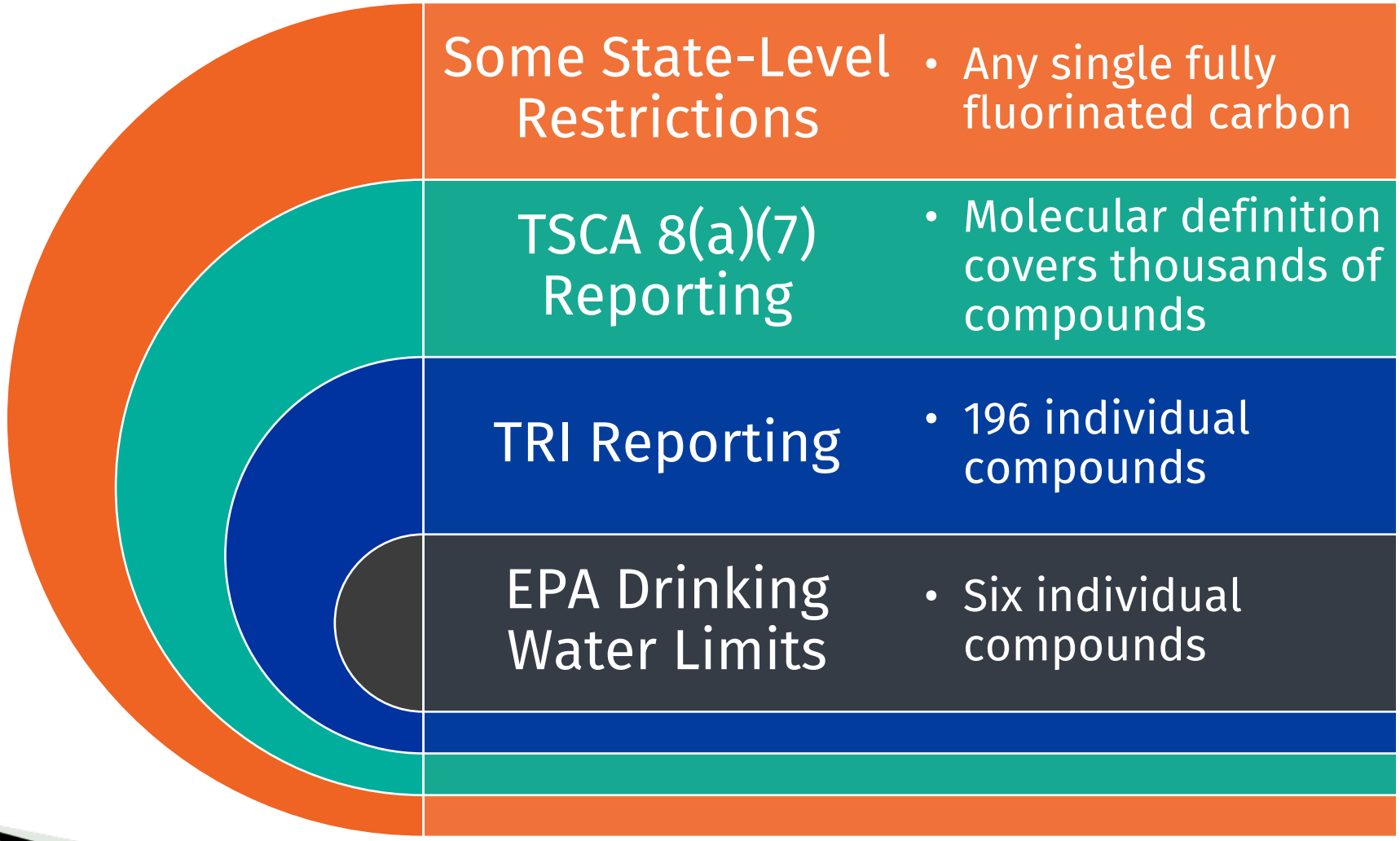




Functional groups:
- Typically hydrophilic

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**
  - **Coolants**
  - **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

Highest priority industry categories known or suspected to discharge PFAS by EPA include:

- organic chemicals;
- plastics & synthetic fibers (OCPSF);
- metal finishing;
- electroplating;
- electric and electronic components;
- landfills;
- pulp, paper & paperboard;
- leather tanning & finishing;
- plastics molding & forming;
- textile mills;
- paint formulating, and
- airports.

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

EPA Initiatives Update

Toxic Release Inventory (TRI) Reporting

- Covers 196 individual PFAS compounds for RY2024
- 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 on SDS**
  - **Article exemption still intact**

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 January 2026 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

CERCLA

- Effective July 2024: hazardous substance designation PFOA and PFOS and their salts and structural isomers
  - Many other PFAS can degrade to PFOA or PFOS
- Requires release reporting if > RQ (1 lb per 24-hrs)
- PFAS must be considered in Phase I Environmental Site Assessments

CERCLA

- Concurrent EPA memo: *PFAS Enforcement Discretion and Settlement Policy Under CERCLA*
  - EPA will **focus its enforcement efforts** on entities who significantly contribute to the release of PFAS contamination, namely, parties which **manufacture PFAS or use PFAS in the manufacturing process, federal facilities, and other industrial parties**.
    - EPA intends to pursue major Potentially Responsible Parties (PRPs) and federal agencies to conduct investigations and cleanup to protect communities from high-risk, high-concentration PFOA and PFOS exposures.
  - However, based on equitable factors, EPA will exercise its enforcement discretion to **not pursue PFAS response** actions or costs against the following parties because they are **passive receivers of PFAS, provide a municipal public service, or do not directly manufacture PFAS or use PFAS in an industrial process**:
    - Community water systems and publicly owned treatment works (POTWs)
    - Municipal separate storm sewer systems (MS4s)
    - Publicly owned/operated municipal solid waste landfills
    - Publicly owned airports and local fire departments
    - Farms where biosolids are applied to the land

EPA Regional Screening Levels (RSLs)

- RSLs reflect chemical-specific concentrations for individual contaminants in air, drinking water, and soils that, if exceeded, may warrant further investigation.
- RSLs for PFAS continue to change as new toxicity values are used to refine existing RSLs or develop new RSLs for additional PFAS.
- *Currently RSLs for 37 PFAS covering soil, tap water, and groundwater.*

Contaminant		Screening Levels						Protection of Groundwater SSLs	
Analyte	CAS No.	Resident Soil (mg/kg)	Industrial Soil (mg/kg)	Resident Air (ug/m^3)	Industrial Air (ug/m^3)	Tap Water (ug/L)	MCL (ug/L)	Risk-based SSL (mg/kg)	MCL-based SSL (mg/kg)
Per- and Polyfluoroalkyl Substances (PFAS)									
~Ammonium perfluoro-2-methyl-3-oxahexanoate	62037-80-3	1.9E-02	2.5E-01			2.1E-03		2.2E-06	
~Ammonium perfluorobutanoate	10495-86-0	7.8E+00	1.2E+02			1.9E+00		6.8E-04	
~Ammonium perfluorodecanoate	3108-42-7	1.3E-05	1.7E-04			4.2E-06		4.1E-09	
~Ammonium perfluorohexanoate	21615-47-4	3.2E+00	4.1E+01			7.2E-01		1.7E-04	
~Ammonium perfluorooctanoate	3825-26-1	1.9E-05	7.8E-05			2.7E-06		4.0E-08	
~Bis(trifluoromethylsulfonyl)amine (TFSI)	82113-65-3	2.3E+00	3.5E+01			5.9E-01		1.9E-04	
~Hexafluoropropylene oxide dimer acid (HFPO-DA)	13252-13-6	2.3E-02	3.5E-01			1.5E-03	1.0E-02(G)	1.5E-06	1.0E-05

EPA Multi-Sector General Permit (MSGP)

- The Clean Water Act requires a National Pollutant Discharge Elimination System (NPDES) permit for stormwater discharges from certain industrial activities.
- Most states (including CA) have delegated authority and their own permitting.
- EPA's MSGP can provide a basis for states to use in their permitting
- Draft 2026 MSGP includes PFAS monitoring.
  - "Report-only" indicator analytical monitoring
  - Quarterly monitoring using EPA Method 1633 (40 analytes)
  - Applies to:

- A – Timber Products
- B – Paper and Allied Products
- C – Chemicals and Allied products
- D – Asphalt paving and Roofing Materials and Lubricants
- F - Primary Metals
- I – Oil and Gas Extraction
- K – Hazardous Waste Treatment, Storage, or Disposal Facilities
- L – Landfills, Land Application Sites, and Open Dumps
- M – Automobile Savage Yards
- N – Scrap Recycling Facilities
- P – Land Transportation and Warehousing
- R – Ship and Boat Building and Repairing Yards
- S – Air Transportation Facilities
- T – Treatment Works
- U – Food and Kindred Product
- V - Textile Mills, Apparel, and Other Fabric Product Manufacturing; Leather and Leather Products
- W – Furniture and Fixtures
- X – Printing
- Y – Rubber, Miscellaneous Plastic Products, and Miscellaneous Manufacturing Industries
- Z – Leather Tanning and Finishing
- AA – Fabricated Metal Products
- AB – Transportation Equipment, Industrial or Commercial Machinery
- AC – Electronic, Electrical, Photographic, and Optical Goods

Other EPA Regulatory Updates

Platform	Keywords	Action	Priority description
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 5 PFAS and a mixture class based on hazard index	Municipalities looking for sources of PFAS. Also require resources for: • Analytical testing • Water treatment • Public notification
RCRA	Waste	Potential future classification of PFAS as listed hazardous waste	Waste stream characterization and special handling/disposal

Drinking Water Litigation

U.S. District Courts

- Settlements from cases involving Tyco, BASF, Chemguard, 3M, Dupont
- Funds available to public water system providers for PFAS testing and remedial action

California Regulatory Initiatives

California Actions

State water board drinking water sampling and limits

- PFAS General Order DW-2022-0001-DDW – October 31, 2022
  - State-wide quarterly sampling of ~1,400 public water sources with elevated risk
- PFAS General Order DW-2024-0002-DDW – March 4, 2024
  - State-wide sampling of ~4,000 public water sources in disadvantaged communities
  - One-time sample on or before August 31, 2026
- For both General Orders:
  - 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

California adopts Public Health Goals for PFOA and PFOS

- California has not formally adopted statewide drinking water maximum limits for PFAS chemicals (i.e., PFOA or PFOS)
- However, on April 5, 2024, OEHHA adopted and published Public Health Goals (PHGs) for PFOA and PFOS
- Public Health Goal for **PFOA = 0.007 parts per trillion (ppt)**
- Public Health Goal for **PFOS = 1 parts per trillion (ppt)**
- These PHGs are far lower than federal drinking water standards for PFOA and PFOS, which are currently set at 4 ppt
- These PHGs are health standards based on risk of 1 in 1 million of excess cancer case
- PHGs are considered by the State Water Resources Control Board in setting California drinking water regulatory standards (Maximum Contaminant Levels, or MCLs)

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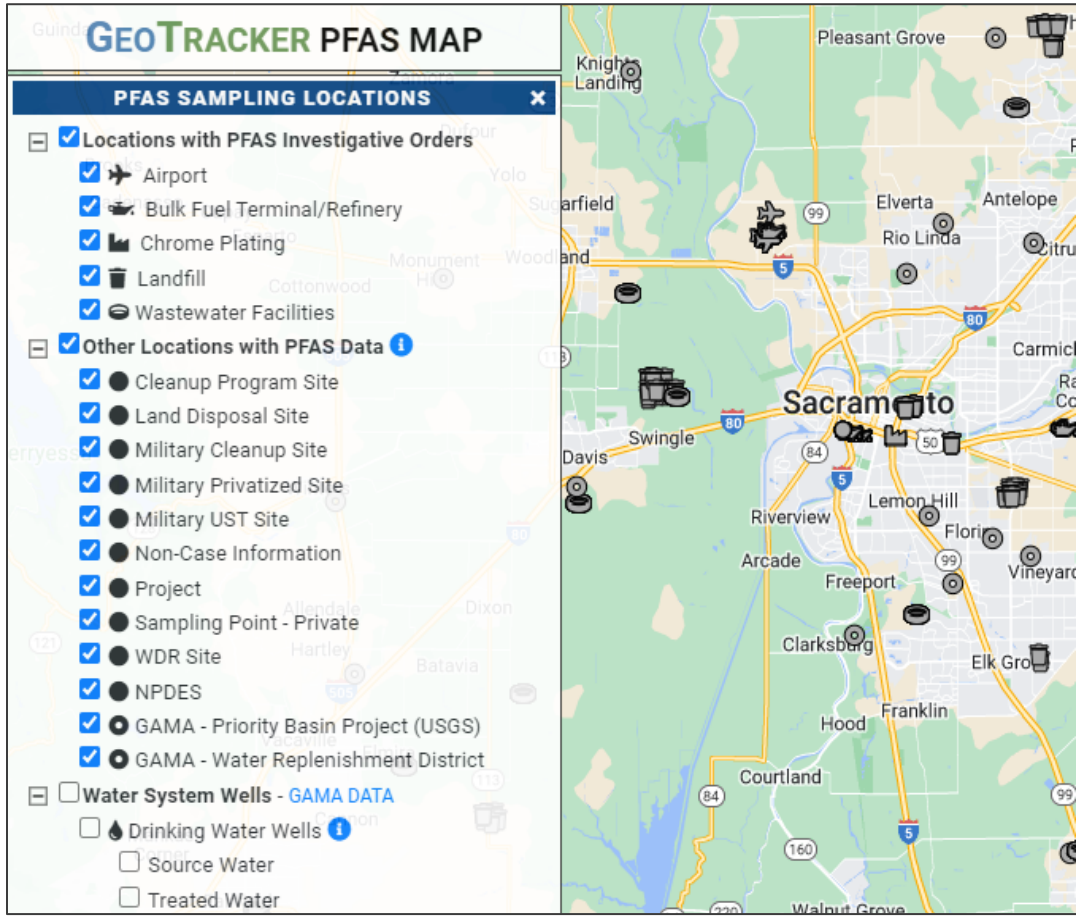
California Actions

- **Industry-wide data gathering requirements**
  - California Water Board mandates 2019-2021
  - 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

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.

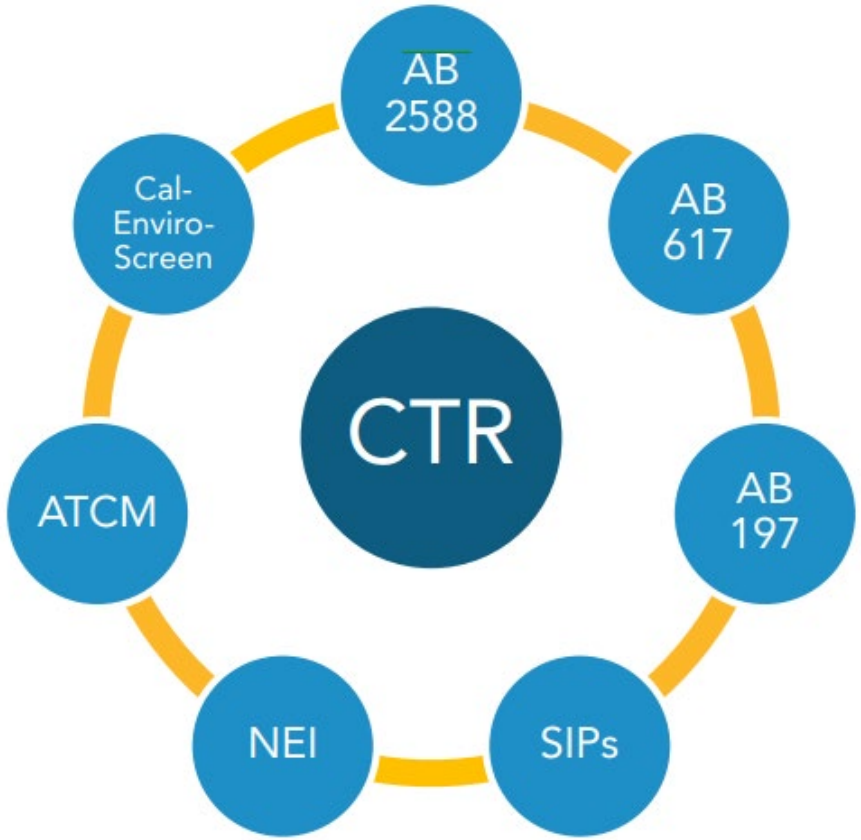
California Actions

Consumer Product PFAS Bans and Registrations

- Generally define PFAS as anything with a fully fluorinated carbon
- “Intentionally added” PFAS or PFAS above concentration limits.
- Restrictions promulgated:
  - Food packaging,
  - Cookware,
  - Textiles,
  - Cosmetics,
  - Menstrual products,
  - Childrens products, and
  - Firefighting foam.
- Restrictions proposed for additional materials.

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.
    - The PFAS definition includes "Perfluoro and Polyfluoro compounds including but not limited to"
  - Phase in period through 2028 based on PFAS compound, industrial sector, and air district.



Slido #2

- Word cloud:
  - What is your biggest worry with complying with new PFAS regulations?

Facility Approach Experiences

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 but could be CA haz 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

Regulations and Their Activities of Focus

	Import	Manufacture	Process	Otherwise Use	Discharge	Distribute
TSCA One-Time PFAS Reporting	**Triggers Reporting**	**Triggers Reporting**			Applicable if Reporting	Applicable if Reporting
TRI		**May Trigger Reporting**	**May Trigger Reporting**	**May Trigger Reporting**	Applicable if Reporting	
Water/Air/ Waste Discharge		Relevant to understanding discharge	Relevant to understanding discharge	Relevant to understanding discharge	**Applicable**	
Global Trade						**Potentially Regulated**
State-Specific Bans and/or Reporting					**Potentially Regulated**	**Potentially Regulated**

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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