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Ports & PFAS

Navigating International Regulation of PFAS in Pacific Trade

Presenters

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Anya assists cities and water districts and monitors which chemicals are likely to become emerging contaminants before regulations are implemented. In addition, Anya is also involved with water supply planning for clients.

What are PFAS?

- Per- and polyfluoroalkyl substances
- Large group of > 12,000 manufactured chemicals used in products that resist oils, stains, and water, and is found in fire-suppression foam.
- KEY FACTS
  - "Forever Chemical" – high thermal and chemical stability
  - Linked to various health effects
  - Detected in drinking water

Source: American Chemical Society; Shutterstock

Where Can PFAS Be Found?

- Manufacturing or chemical production facilities
- Firefighting foam (aqueous film-forming foams, or AFFFs)
- Food packaging (grease-resistant), household products (stain and water-repellent), personal care products (e.g., dental floss, cosmetics, shampoo), fertilizers
- Food and drinking water

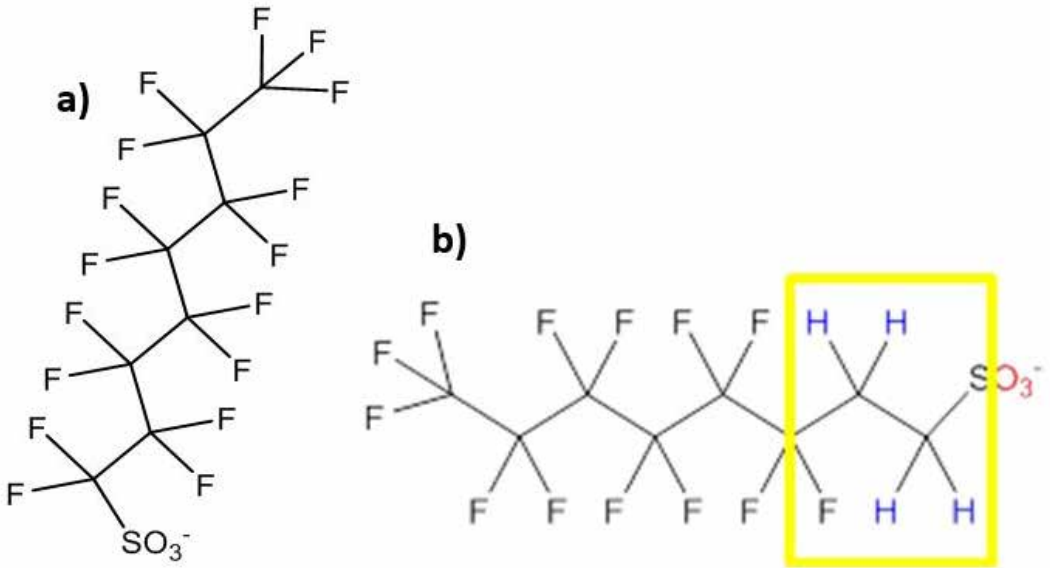
Source: City of Riverside, CA

What are PFAS Potential Health Effects?

- Varies based on specific substance but includes:
  - Increase in cholesterol levels
  - Reproductive effects: decreased fertility, hypertension during pregnancy, preeclampsia
  - Developmental effects: decrease in birth weight, bone variations
  - Changes in hormones and liver enzymes
  - Lower vaccine response
  - Cancers: prostate, kidney, testicular

Types of non-polymer PFAS

- *Per*fluoroalkyl substances: all carbon atoms in fully fluorinated (C-F bonds)
  - PFOS
  - Long-chain perfluorocarboxylic acid (LC-PFCA) such as PFOA
- *Poly*fluoroalkyl substances: not all carbon atoms fully fluorinated
  - 6:2 FTSA



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Trade Considerations

- **Manufacture**
- **Import**
- **Export**
- **Use**

Trade Considerations

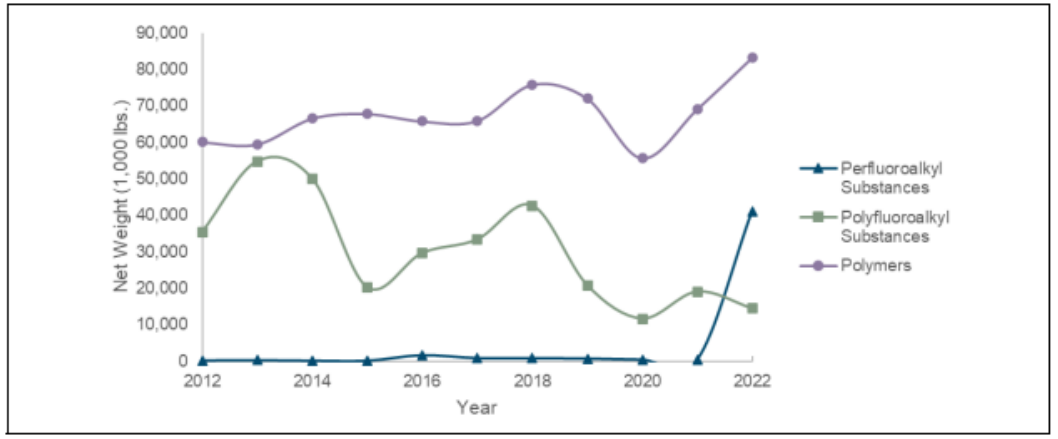
- **Manufacture** (United States)
  - Perfluoroalkyl substances
    - 2016: 28.68 million lbs.
    - 2020: 0 lbs.
  - Polyfluoroalkyl substances
    - 2016: 218.27 million lbs.
    - 2020: 1.54 million lbs.
  - **Net decrease: 245.41 million lbs. in total PFAS production from 2016–2020**
  - **2025: PFAS progressively being phased out of U.S. manufacturing**

Source: U.S. CPSC; Environmental Council of the States

Trade Considerations – Import (Update)

- *Poly*fluoroalkyl Substances
  - § U.S. Total (2022): approximately 15 million lbs.
  - § U.S. Total (2024): approximately 14 million lbs.
- *Per*fluoroalkyl Substances
  - § U.S. Total (2022): approximately 40 million lbs.
  - § U.S. Total (2024): approximately 60.5 million lbs.

Figure 4-10. Net Weight (1,000 lbs.) Imported by PFAS Category



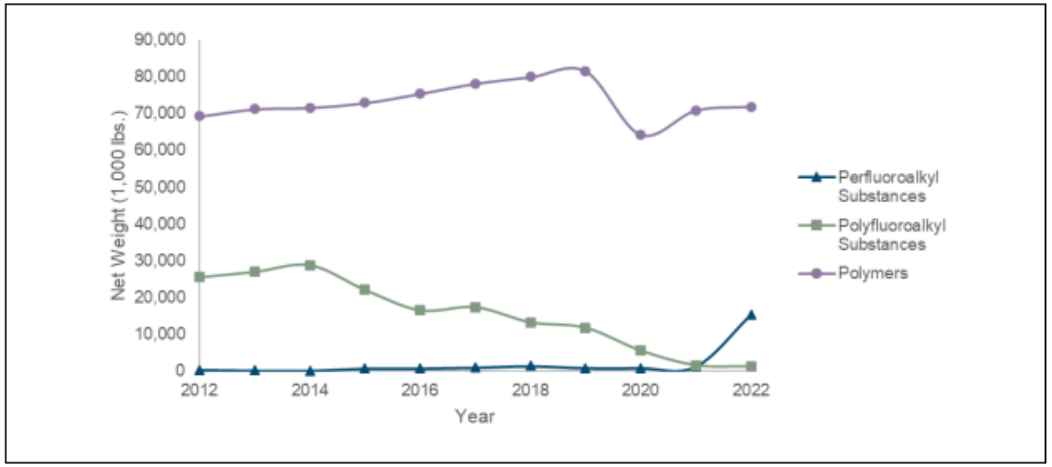
Data Source: UN Comtrade.

Source: U.S. CPSC; UN Comtrade

Trade Considerations – Export (Update)

- *Poly*fluoroalkyl Substances
  - § U.S. Total (2022): approximately 2 million lbs.
  - § U.S. Total (2024): approximately 1.1 million lbs.
- *Per*fluoroalkyl Substances
  - § U.S. Total (2022): approximately 15 million lbs.
  - § U.S. Total (2024): approximately 8.2 million lbs.

Figure 4-11. Net Weight (1,000 lbs.) Exported by PFAS Category



Data Source: UN Comtrade

Source: U.S. CPSC; UN Comtrade

Trade Considerations

2023/2024 PFAS Imports and Exports, with Trade Values (World Trade Partners)

Country	Imports		Exports		Totals	
	M kg	USD	M kg	USD	M kg	USD
China (2023)	17.82	$561.25M	289.40	$1.43B	307.22	$1.99B
China (2024)	24.46	$550.60M	182.83	$1.15B	207.29	$1.70B
USA (2023)	79.20	$1.08B	36.50	$821.78M	115.70	$1.90B
USA (2024)	61.64	$819.08M	34.03	$785.75M	95.67	$1.60B
Japan (2023)	51.70	$476.40M	24.96	$699.92M	76.66	$1.18B
Japan (2024)	38.88	$349.80M	23.47	$633.58M	62.35	$983.38M
India (2023)	24.60	$181.04M	40.41	$393.67M	65.01	$574.71M
India (2024)	26.45	$178.21M	42.30	$334.53M	68.75 (↑)	$512.74M

Source: UN Comtrade

Trade Considerations

2023/2024 PFAS Imports and Exports, with Trade Values (World Trade Partners)

Country	Imports		Exports		Totals	
	M kg	USD	M kg	USD	M kg	USD
Mexico (2023)	7.20	$126.06M	0.14	$3.53M	7.34	$129.59M
Mexico (2024)	7.14	$126.25M	.09	$1.91M	7.23	$128.16M
Malaysia (2023)	7.08	$44.47M	3.70	$12.55M	10.78	$57.02M
Malaysia (2024)	8.86	$41.80M	3.17	$12.39M	12.03 (↑)	$54.19M
Canada (2023)	3.12	$39.38M	0.35	$6.20M	3.47	$45.58M
Canada (2024)	3.77	$40.42M	0.59	$7.07M	4.36 (↑)	$47.49M (↑)
Australia (2023)	0.99	$12.34M	0.18	$1.62M	1.17	$13.96M
Australia (2024)	1.46	$9.95M	0.16	$1.64M	1.62 (↑)	$11.59M

Source: UN Comtrade

Trade Considerations

- **Use** (United States, 2023)
  - Intermediate goods
    - **46%** of PFAS production purchased by **other chemical sectors**
    - **80%** of PFAS production purchased by **manufacturing sectors**
    - Example: textiles
  - Final goods
    - **14%** of PFAS production purchased by **final users and consumers**
    - Example: technical applications
  - **2025: PFAS progressively being phased out of U.S. use**

Source: U.S. CPSC; Environmental Council of the States

Trade Considerations

- Takeaways
  - § Decreased but continued PFAS production in the U.S.
  - § Continued PFAS trade worldwide
    - Ø Slight increase in imports, slight decrease in exports
    - Ø Unknown maritime and waterborne PFAS trade values for non-reporters
  - § PFAS use and consumption primarily through intermediate goods containing PFAS
- In general, international PFAS trade appears to have decreased slightly over the past 2 years

The Stockholm Convention - General

- Global treaty under United Nations auspices regulating persistent organic pollutants (POPs) since 2001
- Just under 190 signatory nations, not all fully ratified members
  - Brunei Darussalam, Haiti, Israel, Malaysia, United States did not enter into the Stockholm Convention
- Restrictions
  - Annex A: **eliminate** production and use of POP
  - Annex B: **restrict** production and use of POP

Source: UN Environment Programme (UNEP)

The Stockholm Convention – Restricted PFAS Uses

- **Restrict** production and use of POP
  - **PFOS**
    - Production: only for uses below
    - Use: firefighting foam, photo imaging, photographic coating, semiconductor etching, aviation hydraulic fluids, certain metal plating applications, certain medical devices, certain ant pesticides

- **Eliminate** production and use of POP
  - **PFOA**
    - Use: e.g., some firefighting foams, semiconductor etching, certain photographic applications
  - **PFHxS**
    - Use: fire-fighting foams; metal plating; textiles, leather and upholstery; polishing agents and cleaning/washing agents; coatings, impregnation/proofing; and manufacturing of electronics and semiconductors

Source: UNEP

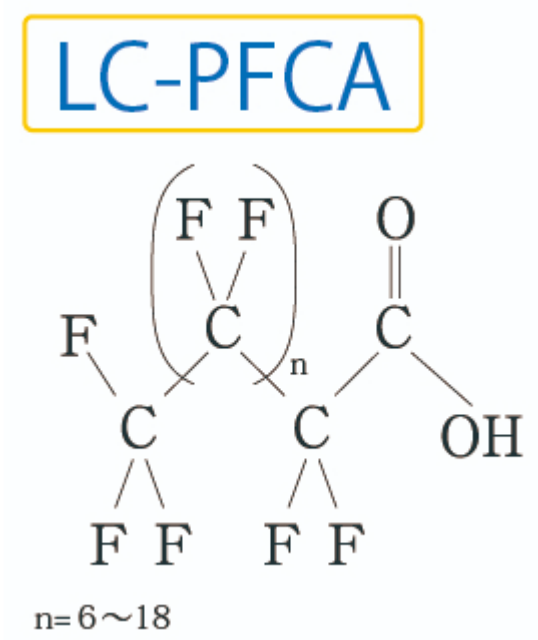
Other Treaties

- Basel Convention
  - § Requires exporters of hazardous waste to notify every country involved in transboundary movement of the waste
  - § Prior informed consent (PIC)
- Rotterdam Convention
  - § Requires labeling on exported chemicals that conveys health and environmental risks
  - § Annex III regulated chemicals: **PFOS**, **PFOA**

Source: UNEP

2025 Update to International Conventions

- Conference of the Parties (COP) to Basel, Rotterdam, and Stockholm Conventions voted to eliminate worldwide use of long-chain perfluorocarboxylic acids (LC-PFCAs) in May 2025
- LC-PFCAs are PFAS generated in manufacture and incineration of other PFAS; harmful to liver and reproductive, endocrine, and immune systems



Source: Chemical & Engineering News

PFAS Regulation Across the Pacific

- Australia, China, Russia, Japan, and Korea have had no significant updates to their PFAS regulations since 2023
- Canada proposed order to add the class of PFAS, excluding fluoropolymers, to Part 2 of Schedule 1 of the Canadian Environmental Protection Act of 1999 (CEPA) in March 2025

PFAS Regulation in the United States

- Primarily domestic regulatory framework
  - Largely overseen by the U.S. Environmental Protection Agency (EPA)
  - Statutes
    - Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
    - Resource Conservation and Recovery Act (RCRA)
    - Toxic Substances Control Act (TSCA)
  - EPA Regulations
    - Implementation guidelines, requirements, and procedures
- Observer status only for Stockholm, Basel, and Rotterdam Conventions (none ratified)

Source: U.S. EPA

What is CERCLA?

CERCLA (Superfund)

§ 102(a) – Permits EPA to designate new hazardous substances

§ 107 - Defines the four categories for Liability

- Current Owners/Operators
- Former Owners/Operators
- Arrangers or Generators
- Transporters

Liability = strict, joint and several liability

CERCLA

- May 8, 2024: EPA issues final rule designating PFOA and PFOS as hazardous substances
- June 10, 2024: U.S. Chamber of Commerce petitions for review of rule (pending in D.C. Circuit)
- April 28, 2025: EPA under second Trump administration expresses intent to protect passive receivers (e.g., non-manufacturers) from CERCLA liability
- September 17, 2025: EPA informs D.C. Circuit that it will continue to implement the 2024 rule

Source: U.S. EPA

Resource Conservation and Recovery Act (RCRA)

- Regulates full life cycle of **hazardous waste** under Subtitle C
  - Generation, transportation, treatment, storage, and disposal
- Complements CERCLA regulation of hazardous substances releases
- Citizens may file suit against alleged violators under specific conditions
- **February 2024**: EPA proposed to add 9 PFAS to RCRA list of hazardous constituents: PFOA, PFOS, PFBS, GenX, PFNA, PFHxS, PFDA, PFHxA, PFBA. EPA has not provided a timeline for finalization.
- **April 2024**: EPA released updated interim guidance on the destruction and disposal of PFAS-containing materials, building on earlier guidance from 2020.

Source: U.S. EPA

Toxic Substances Control Act (TSCA)

- Provides requirements for reporting, record-keeping, testing, and pre-production notification
- Citizens may file suit against alleged violators under specific conditions
- 2024: **Prohibited manufacture or processing** of **inactive PFAS** without EPA review
- November 2025: EPA proposed exemptions for PFAS manufactured/imported in “mixtures or products at concentration 0.1% or lower; imported articles; certain byproducts; impurities; research and development chemicals; and non-isolated intermediates”

Source: U.S. EPA

TSCA – Reporting

- October 11, 2023: EPA finalized rule requiring any person that has manufactured or imported PFAS or PFAS-containing since January 1, 2011 to “electronically report information on PFAS uses, production volumes, disposal exposures, and hazards,” starting November 12, 2024
- September 2024: EPA delays reporting period to July 2025
- May 2025: EPA delays reporting period to October 13, 2026; reporting for imported small business PFAS-containing articles delayed to April 13, 2027

Source: U.S. EPA

Other EPA Actions

- Safe Drinking Water Act
  - May 14, 2025: EPA maintaining maximum contaminant levels for PFOA and PFOS, but intends to rescind regulations for PFHxS, PFNA, HFPO-DA (GenX)
- Clean Water Act
  - EPA has been developing water quality criteria and informational benchmarks, but no express effluent limits
- Agency rulemaking, orders, and guidance
  - Guidance on PFAS destruction and disposal
  - Required PFAS reporting to purchasers as chemical of special concern
  - PFAS non-production order to manufacturer

Source: U.S. EPA

Key Takeaways – 2025 Update

- As PFAS and their impacts become better understood, regulation is becoming more nuanced
  - World: regulation of more PFAS classes
  - US: inclusion of PFAS in more regulatory regimes but deregulation of some PFAS classes; liability exemption for passive receivers and less involved parties

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Questions?

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PFAS Regulation Across the Pacific - Australia

- Party bound to Stockholm Convention (2004); Basel & Rotterdam Conventions (1992 & 2004)
- Industrial Chemicals Act and General Rules (2019)
  - Imposed legal obligations for PFAS importers and manufacturers, such as business registration, new PFAS chemical categorization, compliance with regulatory requirements
  - Includes import and export controls
- PFAS National Environmental Management Plan
  - part of nationwide agreement between national, state, and territory governments on how to investigate and manage PFAS contamination

Source: UN Treaty Collection; Organisation for Economic Co-Operation and Development (OECD)

PFAS Regulation Across the Pacific - China

- Party bound to Stockholm Convention (2004); Basel & Rotterdam Conventions (1991 & 2005)
- Ministry of Environmental Protection (MEP) guidance
  - Restricted PFOS and PFOA production, promoted R&D for alternatives (2011)
  - Banned PFOS “production, transportation, application, imports[,] and exports . . . Except for specific exemptions and acceptable use” (2014)

Source: UN Treaty Collection; OECD

PFAS Regulation Across the Pacific - Canada

- Party bound to Stockholm Convention (2001); Basel & Rotterdam Conventions (1992 & 2002)
- Canadian Environmental Protection Act (CEPA) (1999)
  - Some PFAS considered environmentally toxic under the statute, including PFOS and PFOA
- Prohibition of Certain Toxic Substances Regulations (2012)
  - Bans PFOS, PFOA manufacture, use, sale, and import, but with several exceptions
  - Proposed 2022 update would remove or limit most exceptions
- State of PFAS Report (draft updated 2024)
  - "[Q]ualitative assessment of the fate, sources, occurrence, and potential impacts of PFAS on the environment and human health to inform decision-making on PFAS in Canada."
- March 2025: proposed order to add the class of PFAS, excluding fluoropolymers, to Part 2 of Schedule 1 of the Canadian Environmental Protection Act of 1999 (CEPA)
  - December 2025: Not yet on updated CEPA toxic substances list

Source: UN Treaty Collection; OECD; Environment and Climate Change Canada

PFAS Regulation Across the Pacific - Russia

- Party bound to Stockholm Convention (2011); Basel & Rotterdam Conventions (1995 & 2011)
- Persistent Organic Pollutions Control Act
  - Restricts production, import, export, and use of PFOS, except Stockholm Convention specific exemptions and acceptable purposes

Source: UN Treaty Collection; OECD

PFAS Regulation Across the Pacific - Japan

- Party bound to Stockholm Convention (2002); Basel & Rotterdam Conventions (1993 & 2004)
- Chemical Substances Control Law (CSCL)
  - § PFOS listed as Class I substance
  - § Manages PFOS manufacture, import, export, and use; strict regulation and reporting
- PFOS environmental monitoring since 2009

Source: UN Treaty Collection; OECD

PFAS Regulation Across the Pacific - Republic of Korea

- Party bound to Stockholm Convention (2007); Basel & Rotterdam Conventions (1994 & 2003)
- Persistent Organic Pollutions Control Act
  - Restricts production, import, export, and use of PFOS, except Stockholm Convention specific exemptions and acceptable purposes
- PFOS environmental monitoring since 2013
- PFOA environmental monitoring since 2015

Source: UN Treaty Collection; OECD