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Ports & PFAS

Navigating International Regulation of PFAS in Pacific Trade

Presenters

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Agenda

1. Introduction
2. What are PFAS?
3. Trade Considerations
4. The Stockholm Convention
5. Regulation Across the Pacific
6. Regulation in the United States
7. Key Takeaways
8. Q&A

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

What are PFAS?

- Where It Can 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: U.S. Environmental Protection Agency (EPA)

Source: City of Riverside, CA

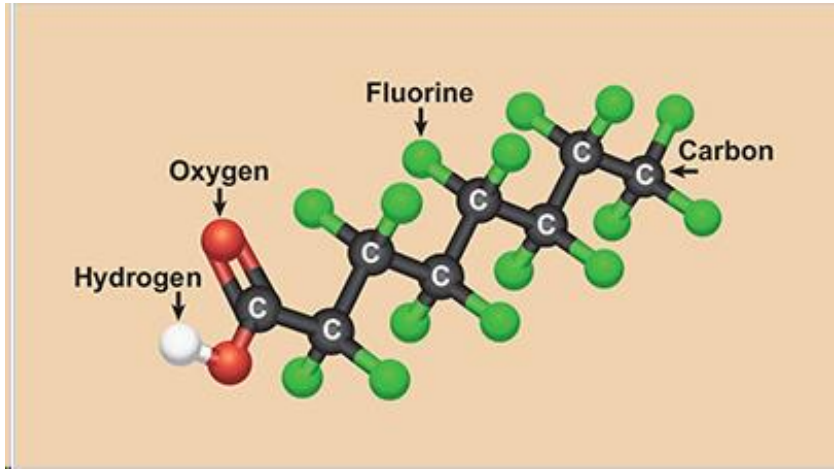
What are PFAS?

- 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

Source: U.S. Centers for Disease Control and Prevention/U.S. EPA

What are PFAS?

- **PFOA & PFOS**:
  - used to make Teflon, nonstick cookware
  - Scotchgard, carpet stain & clothing protection
  - firefighting foams (i.e. military bases, fire training sites, refineries, wildfires?)
  - Food packaging
  - Ski wax
  - Plumbing thread seal tape & valves
  - Dust suppressant in chrome plating
- Others:
  - GenX (replacement for PFOA), PFBS (replacement for PFOS)
  - PFHxA, **PFHxS**, PFNA, PFDA, Short Chain vs. Long Chain



PFOA. Source: NIH

What are PFAS?

- Detection
  - High-resolution mass spectrometry: reliable detection at low concentrations (< 10 ppt)
  - Total fluorine analysis: can be cost-effective, but less reliable detection
- Disposal
  - Underground injection: deep below ground and away from water sources
  - Authorized hazardous waste landfills
  - Thermal treatment by authorized hazardous waste combustors
    - Includes granular activated carbon (GAC)

Source: U.S. Government Accountability Office/U.S. EPA

Trade Considerations

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

Trade Considerations

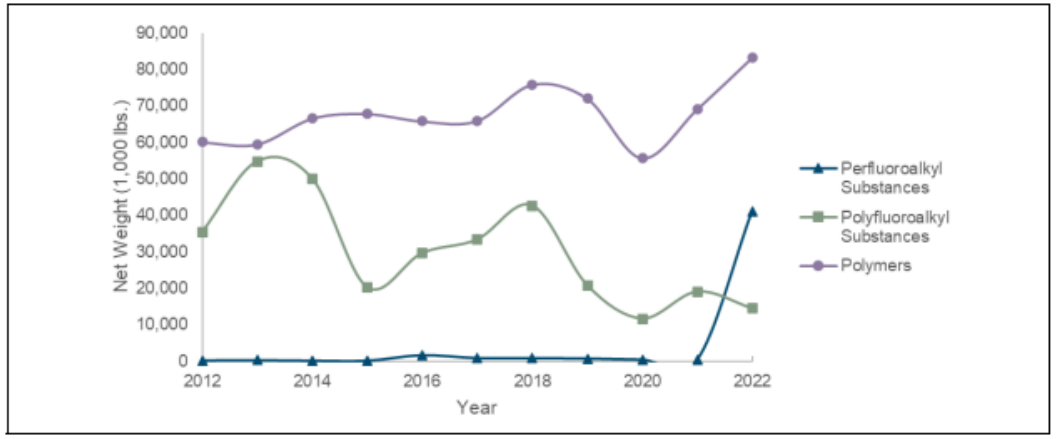
- **Manufacture** (United States)
  - Perfluoroalkyl substances
    - 2016: 28.68 million lbs.
    - 2020: 0 lbs.
  - Polyfluoroalkyl substances
    - 2016: 218.27 million lbs.
    - 2020: 1.54 million lbs.
  - **Net decrease: 245.41 million lbs. in total PFAS production from 2016–2020**

Source: U.S. Consumer Product Safety Commission (CPSC)

Trade Considerations - Import

- *Poly*fluoroalkyl Substances
  - U.S. Total (2022): approximately 15 million lbs.
    - Notable Partners:
      - Mexico: ~10 million lbs.
      - China: ~5 million lbs.
- *Per*fluoroalkyl Substances
  - U.S. Total (2022): approximately 40 million lbs.
  - Notable Partners:
    - China: ~30 million lbs.
    - India: ~10 million lbs

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



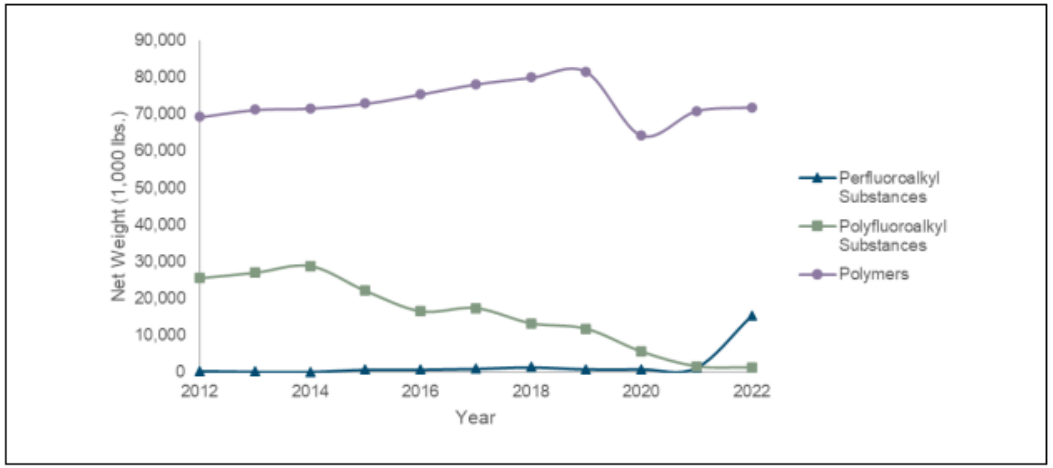
Data Source: UN Comtrade.

Source: U.S. CPSC/UN Comtrade

Trade Considerations - Export

- *Poly*fluoroalkyl Substances
  - U.S. Total (2022): less than 2 million lbs.
- *Per*fluoroalkyl Substances
  - U.S. Total (2022): approximately 15 million lbs.
    - Notable Partners:
      - Mexico: ~6 million lbs.
      - Canada: ~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 PFAS Imports and Exports, with Trade Values (World Trade Partners)

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Country	Imports		Exports		Totals	
	mkg	USD	mkg	USD	mkg	USD
China	17.82	$561.25 m	289.40	$1.43 b	**307.22**	**$1.99 b**
USA	79.20	$1.08 b	36.50	$821.78 m	**115.70**	**$1.90 b**
Japan	51.70	$476.40 m	24.96	$699.92 m	**76.66**	**$1.18 b**
India	24.60	$181.04 m	40.41	$393.67 m	**65.01**	**$574.71 m**
Mexico	7.20	$126.06 m	0.14	$3.53 m	**7.34**	**$129.59 m**
Malaysia	7.08	$44.47 m	3.70	$12.55 m	**10.78**	**$57.02 m**
Canada	3.12	$39.38 m	0.35	$6.20 m	**3.47**	**$45.58 m**
Australia	0.99	$12.34 m	0.18	$1.62 m	**1.17**	**$13.96 m**

Source: UN Comtrade

Trade Considerations

Maritime or Waterborne Trade (2023)

- Reported PFAS Imports:
  - Germany: 12.57 million kg / $236.37 million
  - Brazil: 17.10 million kg / $161.23 million
  - Türkiye: 8.90 million kg / $ 47.56 million
  - United Kingdom: 7.72 million kg / $43.19 million
  - Malaysia: 6.89 million kg / $37.27 million
  - Mexico: 1.31 million kg / $12.96 million
  - Malta: .28 million kg / $12.70 million
  - Hungary: .44 million kg / $11.81 million
  - Australia: 1.42 million kg / $11.49 million
  - South Africa: 1.95 million kg / $7.75 million
- Reported PFAS Exports:
  - Germany: 5.56 million kg / $149.57 million
  - United Kingdom: 2.20 million kg / $64.61 million
  - Türkiye: 2.80 million kg / $13.95 million
  - Malaysia: 3.60 million kg / $11.60 million
  - Brazil: .12 million kg / $1.76 million
  - Canada: .07 million kg / $1.17 million

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

Source: U.S. CPSC

Trade Considerations

- Takeaways
  - Decreased but continued PFAS production in the U.S.
  - Continued PFAS trade worldwide
    - Slight increase in imports, slight decrease in exports
    - Unknown maritime and waterborne PFAS trade values for non-reporters
  - PFAS use and consumption primarily through intermediate goods containing PFAS

The Stockholm Convention - General

- Global treaty under United Nations auspices regulating persistent organic pollutants (POPs) since 2001
- Over 150 signatory nations, not all fully ratified members
- Restrictions
  - Annex A: **eliminate** production and use of POP
  - Annex B: **restrict** production and use of POP

Source: UN Environment Programme

The Stockholm Convention - General

- Article 3 paragraph 1: each country shall take “legal and administrative measures” to eliminate import and export of Annex A chemicals
- Import of Annex or Annex B chemicals limited to:
  - **“Environmentally sound disposal”**
  - **Special permitted use (“specific exemptions” and “acceptable purposes”)**
- Article 15: reporting responsibilities for countries that produce, import, or export listed chemicals

Source: UN Environment Programme

The Stockholm Convention - PFAS

- Annex A: **eliminate** use and production
  - **PFOA** (2019)
  - **PFHxS** (2022)
- Annex B: **restrict** use and production
  - **PFOS** (2009)

Source: UN Environment Programme

The Stockholm Convention – Restricted PFAS Uses

- Acceptable purposes
  - **PFOS** (Annex B)
    - 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

- Permitted production and use
  - **PFOA** (Annex A)
    - Production: some firefighting foams
    - Use: e.g., some firefighting foams, semiconductor etching, certain photographic applications
  - **PFOS** (Annex B)
    - Production: none
    - Use: some firefighting foams, certain metal plating applications

Source: UN Environment Programme

The Stockholm Convention – 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: UN Environment Programme

PFAS Regulation Across the Pacific

- Stockholm Convention obligations
- Domestic regulation
  - National legislation
  - Administrative rules
  - Policy statements

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.”

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

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

Comprehensive Environmental Response, Compensation, and Liability Act

- Enables government response to **hazardous substance** release into the environment
- Assigns liability on transporters or disposers of hazardous substances
- Response is either “removal” or “remedial”
- Dedicated trust fund finances response, costs recovered from polluters post-response
- Citizens may file suit against alleged violators under specific conditions

Source: U.S. EPA

Designation of PFOA & PFOS as Hazardous Substances under the Comprehensive Environmental Response, Compensation, and Liability Act – CERCLA

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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 Listing & Cleanup Steps

PFOA & PFOS under CERCLA: What's in the final rule?

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First time EPA has designated a new hazardous substance with rulemaking process directly under CERCLA

Added PFOA and PFOS including their salts and structural isomers to the list of Hazardous Substances under CERCLA

EPA Identified Five Categories of Entities Potentially Affected:

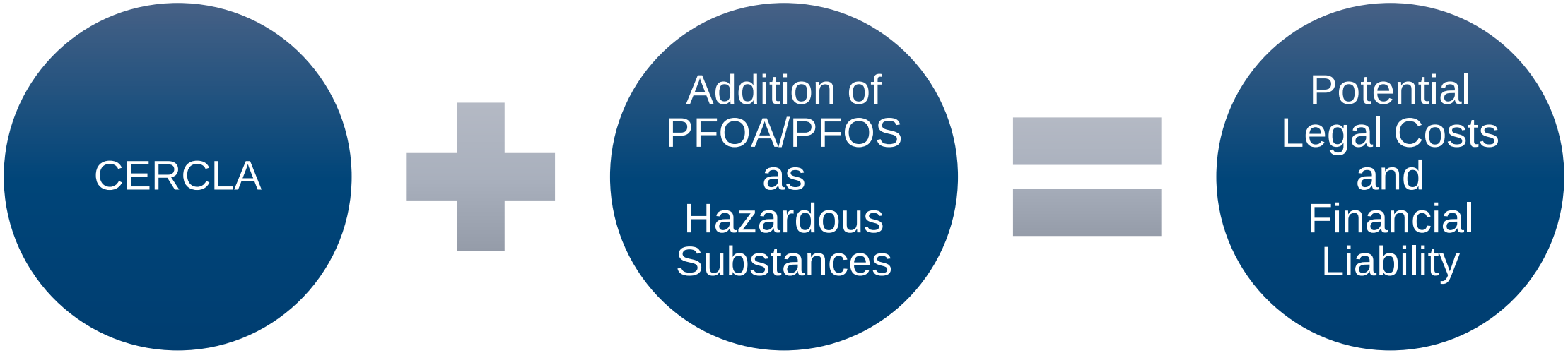
- PFOA and/or PFOS manufacturers (including importers and importers of articles);
- PFOA and/or PFOS processors;
- Manufacturers of products containing PFOA and/or PFOS;
- Manufacturers of products containing PFOA and/or PFOS;
- Waste management and wastewater treatment facilities.

Reportable Quantity: 1 pound release in a 24-hour period

The Rule has a goal of ensuring taxpayers are not the ones who bear the cleanup cost

Economic Assessment found "direct costs" are low and stated that the indirect costs are "impractical…to quantitatively assess…because of the uncertainty about such costs at this early stage in the process."

PFOA & PFOS under CERCLA: So what does this all mean?



PFOA & PFOS Under CERCLA: Why worry?

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- CERCLA is a strict, retroactive, & joint and several liability statute
- CERCLA can be enforced by citizen suits and extended through contribution actions by parties who have paid for cleanup
- EPA is not the only actor or decisionmaker in CERCLA cleanups -- states and other parties play a role
- Clean-up levels site-specific but generally start with health advisories -- now lower than what detection limits (PFOA HA = 0.004 ppt, detection limit 4 ppt)
- Equitable factors (volume, toxicity, care, cooperation w/ govt) generally help after years of litigation and process of determining the response

Resource Conservation and Recovery Act

- Regulates full life cycle of **hazardous waste** under Subtitle C
  - Generation, transportation, treatment, storage, and disposal
  - Involves standards, restrictions, and permit system
- Complements CERCLA regulation of hazardous substances releases
- Identification and listing of hazardous waste under Part 261
- Citizens may file suit against alleged violators under specific conditions

Source: U.S. EPA

RCRA Proposed Designation, Clean Water Act, Guidance on Destruction and Disposal

- **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.
- **December 2022**: EPA guidance memo to states on how to use the Clean Water Act's National Pollutant Discharge Elimination System (NPDES) permitting program to reduce PFAS pollution:
  - For all Publicly Owned Treatment Works:
    - Effluent, influent, and biosolids monitoring for PFAS;
    - Update Industrial User Inventory
    - Require quarterly monitoring of Industrial Users
    - Where authority exists, develop Industrial User BMPs or local limits
  - States to work with their POTWs to reduce the amount of PFAS chemicals in biosolids
- **April 2024**: EPA released updated interim guidance on the destruction and disposal of PFAS-containing materials, building on earlier guidance from 2020.

Toxic Substances Control Act

- Provides requirements for reporting, record-keeping, testing, and pre-production notification
  - Covers manufacture, import, processing, and distribution (including export)
- EPA issues **Significant New Use Rules (SNURs)** when chemicals are used in a new way that could lead to exposure or release of a substance of concern
  - Applicable parties **must** then **notify EPA before use** of the relevant chemical
- Inventory of over 83,000 chemicals; new chemicals added to the list upon new production or import
- Citizens may file suit against alleged violators under specific conditions

Source: U.S. EPA

Toxic Substances Control Act - Significant New Use Rules

- 2002: First SNUR requiring pre-production notification of **13 PFAS chemicals (including PFOS)**
- 2013: Required notification of new uses of **PFOA in carpets**
- 2015: Required notification of new uses of **PFOA in any products**
- 2020: Required notification of new uses of **long-chain PFAS**; **prohibited import** of products with **long-chain PFAS surface coating** and **carpets with PFOS** without EPA review
- 2024: **Prohibited manufacture or processing** of **inactive PFAS** without EPA review

Source: U.S. EPA

Other EPA Actions

- 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
- Agency dialogue
  - Manufacturer 3M voluntarily **phased out PFOS production** in early 2000s after EPA talks
  - Global stewardship program with industry leaders to **eliminate PFOA emission and production by 2015**
  - **Coordination with Canadian agencies** on significant new uses/activities **(SNUR/SNAc)**

Source: U.S. EPA

Key Takeaways

- PFAS awareness is developing internationally
- PFAS regulation is increasing, affecting trends in international trade
  - Continued international PFAS trade in recent years; slight increase in imports, slight decrease in exports
- Substantial amount of international PFAS trade affects ports and harbors
- Many nations bound to obligations under the Stockholm Convention and other treaties
- Regulatory regimes differ across the Pacific, but strive to adhere to the Stockholm Convention
- The United States maintains a robust domestic regulatory framework governed by complementary statutes and administered by the U.S. Environmental Protection Agency
  - Promotes public-private and international cooperation on PFAS policy

Sources

- American Chemical Society
- City of Riverside, CA
- Environment and Climate Change Canada
- Organisation for Economic Co-Operation and Development
- Shutterstock
- United Nations Treaty Collection
- UN Comtrade
- UN Environment Programme
- U.S. Centers for Disease Control and Prevention
- U.S. Consumer Product Safety Commission
- U.S. Environmental Protection Agency
- U.S. Government Accountability Office
- U.S. National Institutes of Health PubChem

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Questions?

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