Global NIP Update Webinar “Activity Options for Action Plans for Stockholm Convention NIPs: Unintentional POPs and POP-PFASs”, 20. January 2026, 14:00 -16:30 CET, UTC+1

Options for Action Plan Activities to Control, Manage and Phase out POP-PFASs and Synergy with GFC’s Issue of Concern for all PFASs

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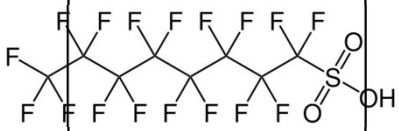
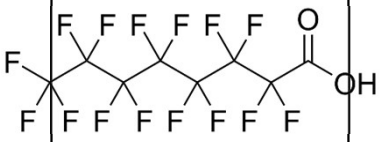
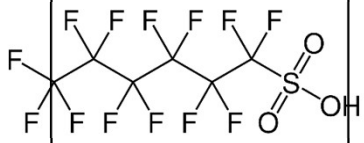
25 POPs were newly listed in the Stockholm Convention 2009-2025

Chemical	Pesticides	Industrial chemicals	Unintentional production	Annex
Chlordecone, Endosulfan, Dicofol	+			A
α-/β-HCH, Lindane, Methoxychlor	+			A
PCP its salts & ester; Chlorpyrifos	+	+		A
Commercial PentaBDE		+		A
Commercial OctaBDE (hexa/hepta)		+		A
DecaBDE		+		A
Hexabromobiphenyl (HBB)		+		A
Hexabromocyclododecane (HBCD)		+		A
PFOS, its salts and PFOSF	+	+		B
PFOA and related compounds				
PFHxS and related compounds		+		A
Long-chain PFCAs		+		A
SCCPs (C10-C13; ≥48%)		+		A
MCCPs (C14-C17; ≥45%)		+		A
Dechlorane Plus		+		A
UV-328		+		A
Hexachlorobutadiene (HCBD)		+	+	A/C
Pentachlorobenzene (PeCBz)		+	+	A/C
Polychlorinated Naphtalene (PCN)		+	+	A/C







Meanwhile **four groups of PFAS** are listed in the Stockholm Convention

- PFOS, its salt and PFOSF
- PFOA and related compounds
- PFHxS and related compounds

Long-chain perfluorocarboxylic acids (C_9-C_{21} PFCAs) were **listed at COP12 in 05/2025**.

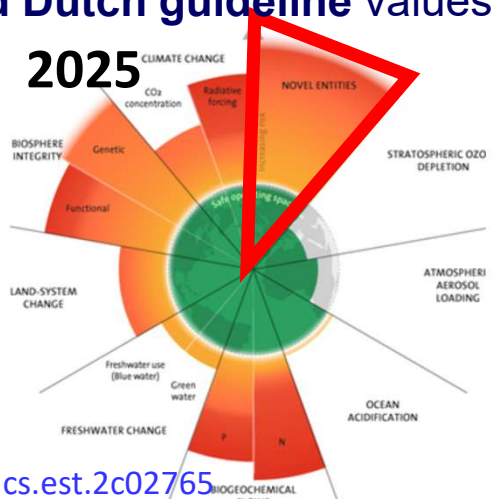
Therefore PFASs became an even more important working area for the implementation of the Convention.

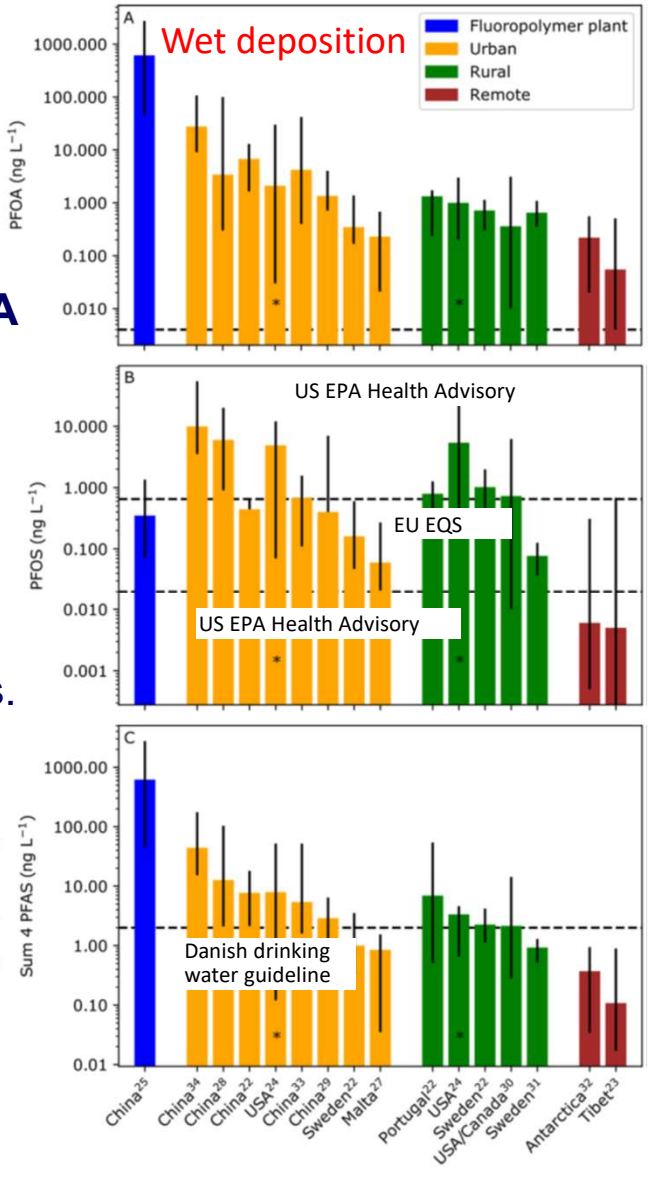
PFAS pollution crossed Planetary Boundaries

For four PFASs (PFOS, PFOA, PFHxS, PFNA), it has been concluded that the global spread of these PFASs has led to **planetary boundary exceedance for PFAS pollution because**:

1) **Levels of PFOA and PFOS in rainwater often greatly exceed US EPA Lifetime Drinking Water Health Advisory levels (0.004 ng/L PFOA) and the Σ4 PFAS in rainwater is often above Danish drinking water limit values also based on Σ4 PFAS (2 ng/L);**
2) **Levels of PFOS** in **rainwater** are often **above Environmental Quality Standard for European Union Surface Water** (**0.65 ng/L PFOS**);
3) Atmospheric deposition also leads to **global soils** being **ubiquitously contaminated** and to be often **above proposed Dutch guideline** values.

PFOS has been **substituted the last 20 years** and **PFHxS production stopped in 2022**. Also **PFOA** and **related compounds** have **largely been substituted** in different regions in many uses**. But due to their very high persistence, most are still present in the environment and in reservoirs like landfills**.



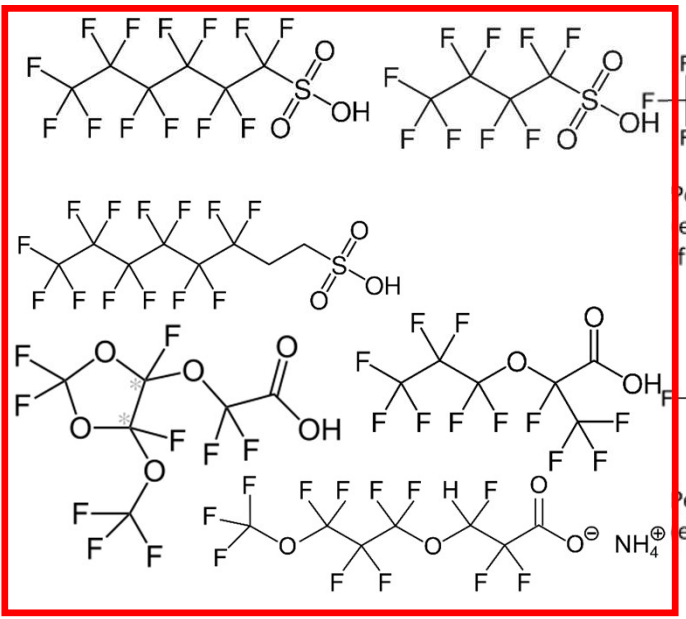


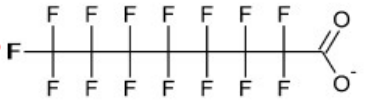
Cousins et al. (2022) Environ. Sci. Technol. https://doi.org/10.1021/acs.est.2c02765

Other PFASs have often substituted POP-PFASs

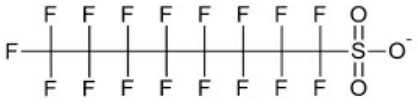
Industry moved to short-chain PFAS & PFAS ethers

Today more than 10,000 PFASs are on the market

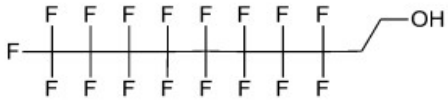




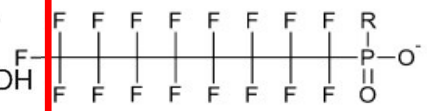
Perfluorocarboxylic acids
(ex. PFOA)



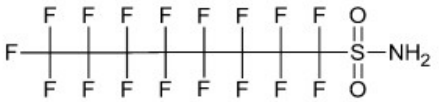
Perfluorosulfonic acids
(ex. PFOS)



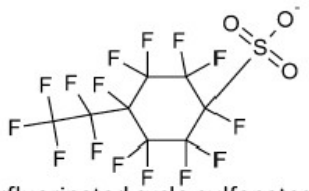
Fluorotelomer alcohol
(ex. 8:2 FTOH)



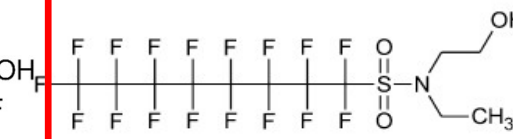
Perfluorophosphonic/phosphinic acids
ex. If R=OH then PFOPA
f R=C8 perfluoroalkane then 8:8 PFPi)



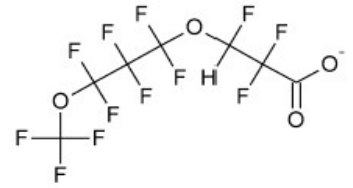
Perfluorosulfonamide
(ex. FOSA)



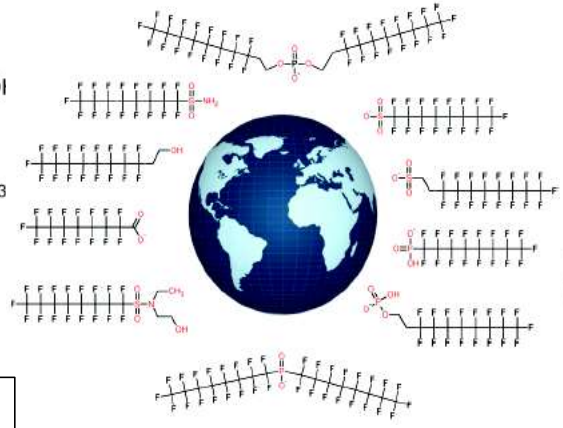
Perfluorinated cyclo sulfonates
(ex. PFECHS)

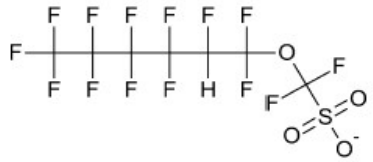


erfluorosulfonamidoethanol
ex. N-EtFOSE)



Polyfluorinated ether carboxylates
(ex. 4,8-dioxa-3H-perfluorononanoat





Polyfluorinated ether sulfonates

Per- and Polyfluoroalkyl Substances (PFAS) in PubChem: 7 Million and Growing https://doi.org/10.1021/es2011622

Emma L. Schymanski*, Jian Zhang, Paul A. Thiessen, Parviel Chirsir, Todor Kondic, and Evan E. Bolton*

Environmental Science & Technology

https://echo.epa.gov/tools/data-downloads/national-pfas-datasets and more than 7 million PFAS are in PubChem according to OECD definition

Lindstrom et al. ES&T dx.doi.org/10.1021/es2011622 (2011)

Integrated approach of POPs management: Stockholm Convention and synergies with the Global Framework on Chemicals (GFC/SAICM)

There are close links between POPs and GFC (former SAICM) **"issues of concern":**

- **Perfluorinated and polyfluorinated (as precursors) alkylated substances (PFAS) and the transition to safer alternatives.**
- **Chemicals in products**
- Highly Hazardous Pesticides (HHPs) (see GGKP Webinar on action plans HHPs including **PFAS pesticides** https://www.youtube.com/watch?v=Ar6TYGXRTVg&t=3140s)
- Hazardous substance within the life cycle of electrical and electronic products.
- **Endocrine-disrupting chemicals**
- **Environmentally persistent pharmaceutical pollutants (PFOI/PFOB)**
- Lead in paints
- Nanotechnology and manufactured nanomaterials

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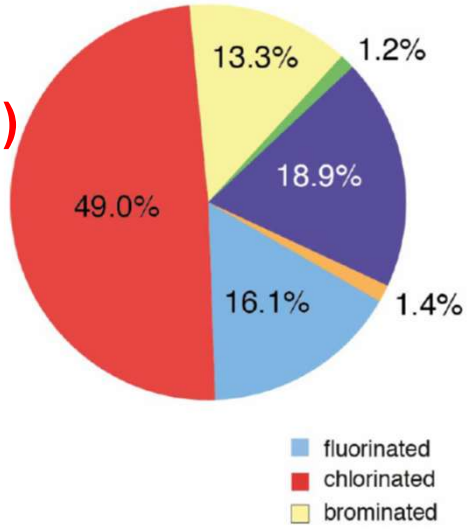

Here the specific POPs issue can/should be addressed within the larger frame of managing an entire group of substances (all PFASs) with a science-based approach.

http://www.saicm.org/Implementation/EmergingPolicyIssues/tabid/5524/language/en-US/Default.aspx

Synergies of addressing POP-PFAS and other PFASs

The **Global Framework on Chemicals (GFC) considers all PFASs** as an **"Issue of Concern".**

- **Reason: also concern on short-chain PFAS due to persistence, high mobility, accumulation in plants/vegetables/fruits and difficulty to eliminated short-chain PFAS in drinking water**.
  - **All short-chain PFASs are highly persistent or have highly persistent degradation products which are water soluble and are a risk to water and plants/vegetables/fruits**.
  - **Their presence in environment is irreversible** (Eschauzier 2012 ES&T 46, 1708-15)
  - **Insufficient data on structures**, **toxicity**, **volumes, use** (e.g. Madrid Statement Blum et al. (2014) EHP 123, A107; Brunn et al. (2023) ESEU, 35, 1-50).
- Considering the need for **synergies between the Stockholm Convention and the Global Framework for Chemicals (GFC)**, **the action plan for POP-PFASs could also address all PFASs as appropriate** (best based on the OECD definition of PFAS).

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OECD Definition: "*PFASs are defined as fluorinated substances that contain at least one* **fully fluorinated methyl or methylene carbon atom (without any H/Cl/Br/I atom attached to it).** https://doi.org/10.1021/acs.est.1c06896

1. Regulatory framework for listed POP-PFASs and other PFASs (GFC/SAICM Synergy)

Objective: Established policy and regulatory frame for the use, management and substitution of POP-PFASs and possibly other PFASs (GFC synergy) along the life cycle.

Recommended activity options:

- Assessment of established regulatory frames for controlling PFOS, PFOA, PFHxS, LC-PFCAs and related compounds and other PFASs (e.g., EU, or Australia).
- Amend existing laws, or develop new laws related to the restriction, control and management of **PFOS, PFOA, PFHxS, LC-PFCAs and related compounds and possibly regulate all PFAS.**
- **Consider in the regulatory frame** the **exemptions needed for PFOS, PFOA or LC-PFCAA.**
- Improvement **of the traceability of chemicals and chemicals in products and** custom control (GHS; GFC synergy). Option to require labelling of PFAS in products.
- **Establish extended producer responsibility (EPR) and polluter pays principle (PPP) for** PFOS, PFOA, PFHxS, LC-PFCA & related compounds and also for other **PFAS as a group (GFC synergy)**

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The Madrid Statement on PFASs for science based policy making

The Madrid Science Statement on PFASs (2015):

- **Documents the scientific consensus regarding the persistence and potential for harm of PFASs and lays out a roadmap to gather needed information and prevent further harm.**
- **Recommendations to policy makers, industry, science…**
- **Regulate and manage PFAS as a group.**

Madrid Statement signed by >200 scientist and coordinated by Green Science Policy Institute
https://greensciencepolicy.org/our-work/science-policy/madrid-statement/

- **Public dialogue between industry (Fluorocouncil) and authors of the Madrid Statement in EHP.**

http://ehp.niehs.nih.gov/1509910/
http://ehp.niehs.nih.gov/1510207/

Please note: Currently the DOIs of EHP articles do not function since Environmental Health Perspective was closed due to budget cuts of the Trump administration and formally transferred to ACS at the close of 2025.

2015: Environmental Health Perspectives

Perspectives | Brief Communication

The Madrid Statement on Poly- and Perfluoroalkyl Substances (PFASs)

http://dx.doi.org/10.1289/ehp.1509934

Arlene Blum,[1,2] Simona A. Balan,[2] Martin Scheringer,[3,4] Xenia Trier,[5] Gretta Goldenman,[6] Ian T. Cousins,[7] Miriam Diamond,[8] Tony Fletcher,[9] Christopher Higgins,[10] Avery E. Lindeman,[2] Graham Peaslee,[11] Pim de Voogt,[12] Zhanyun Wang,[4] and Roland Weber[13]

Environmental Science & Technology Letters

pubs.acs.org/journal/estlcu

Global Perspective

Science: Regulate PFAS as a group

Environ. Sci. Technol. Lett. 2020, 7, 532–543

https://doi.org/10.1021/acs.estlett.0c00255

Scientific Basis for Managing PFAS as a Chemical Class

Carol F. Kwiatkowski,* David Q. Andrews, Linda S. Birnbaum, Thomas A. Bruton, Jamie C. DeWitt, Detlef R. U. Knappe, Maricel V. Maffini, Mark F. Miller, Katherine E. Pelch, Anna Reade, Anna Soehl, Xenia Trier, Marta Venier, Charlotte C. Wagner, Zhanyun Wang, and Arlene Blum

Regulate PFAS as a group and allow only essential use

Madrid Statement: Governments/policy makers:

http://ehp.niehs.nih.gov/1509934/

The Madrid Statement on Poly- and Perfluoroalkyl Substances (PFASs)

http://dx.doi.org/10.1289/ehp.1509934

- **Enact legislation to require only essential uses of PFASs and enforce labelling to indicate uses.**
- The **EU Commission in its chemicals strategy** (2020) for sustainability towards a toxic-free environment suggests to **address PFAS as a group**. **With the following action: phasing out the use of PFAS in the EU, unless their use is essential.**

https://ec.europa.eu/environment/strategy/chemicals-strategy_en#ecl-inpage-238
PFAS: https://ec.europa.eu/environment/chemicals/pfas/index_en.htm

EUROPEAN COMMISSION

Brussels, 14.10.2020
COM(2020) 667 final

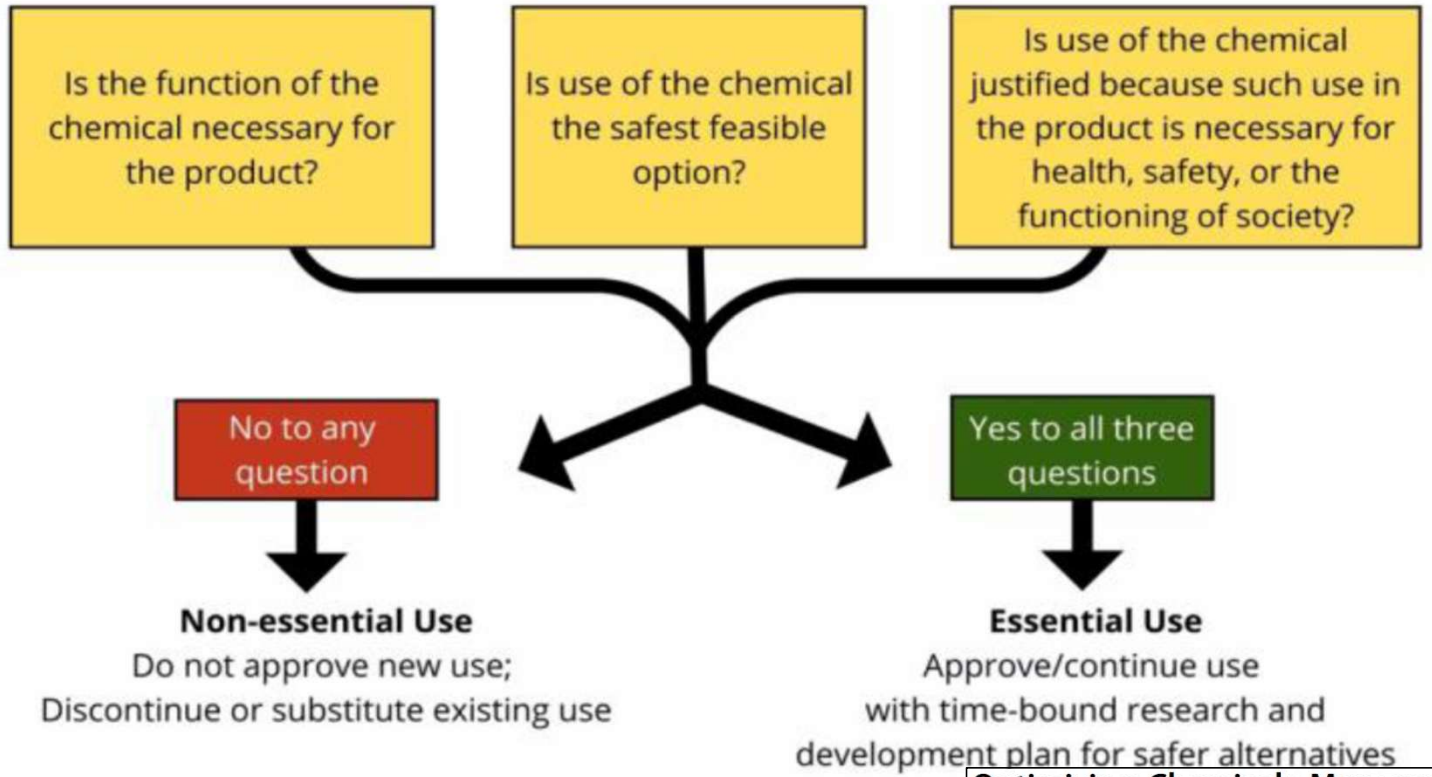
COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

Chemicals Strategy for Sustainability
Towards a Toxic-Free Environment

- February 2023: ECHA published details of a **proposed restriction of around 10,000 PFASs!** Available on ECHA's website https://echa.europa.eu/-/echa-publishes-pfas-restriction-proposal
- **Received 5600 comments**. ECHA updated the restriction proposal based on the comments 08/2025: https://echa.europa.eu/de/-/echa-publishes-updated-pfas-restriction-proposal **Ongoing assessment.**

Do we need it at all? - Essential use concept

- Many chemicals and rather products are not needed at all if they are not essential.
- Suggestion of a strategy to identify non-essential uses:



Balan et al. (2023) Environ. Sci. Technol. 2023, 57, 4, 1568–1575

Optimizing Chemicals Management in the United States and Canada through the Essential-Use Approach

Simona A. Bălan, David Q. Andrews, Arlene Blum, Miriam L. Diamond, Seth Rojello Fernández, Elizabeth Harriman, Andrew B. Lindstrom, Anna Reade, Lauren Richter, Rebecca Sutton, Zhanyun Wang, and Carol F. Kwiatkowski* https://doi.org/10.1021/acs.est.2c05932

2. Refining of the inventory for POP-PFAS and developing an inventory for other PFASs and their uses

Objective: Updated and **refined inventory** of **POP-PFAS and other PFAS** uses, PFAS-containing products, and PFAS-waste including databases for information management.

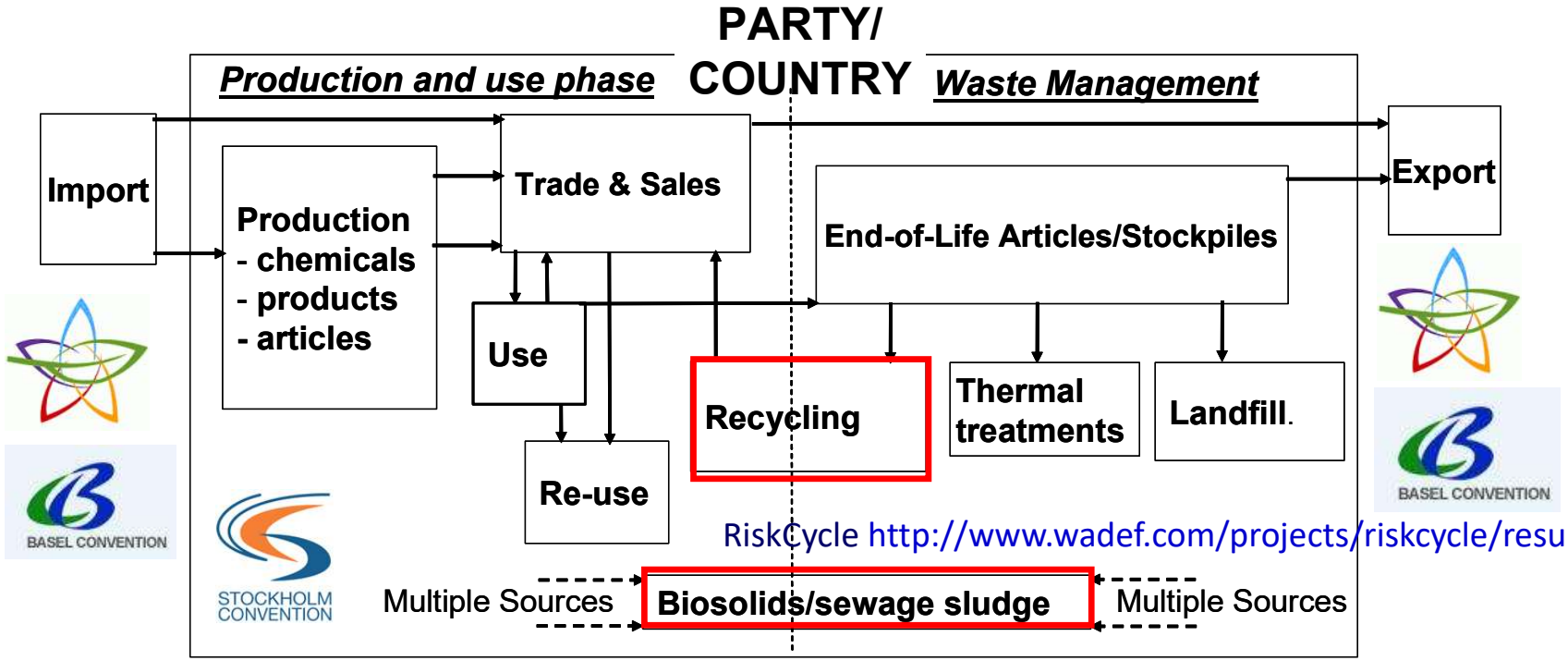
Recommended activity options:

- **Developing or refining inventories of POP-PFASs and other PFASs in firefighting foams**.
- Developing or refining **inventories of POP-PFAS and other PFASs in consumer products** (e.g. treated synthetic carpets, textiles, furniture, paper, transport sector).
- Developing or refining **inventories of POP-PFASs** and other PFAS uses **in industry**.
- Refining the inventory of **stocks & waste** of **POP-PFASs** and other PFASs (including landfills).
- Refining **inventory of historic use and release of POP-PFASs** and other PFAS (see contaminated site action plan).
- Material and substance flow analysis of POP-PFASs and other PFASs.

https://www.greenpolicyplatform.org/webinar/introduction-sccpmccp-and-pfas-and-inventory-development

Action plan consideration: PFASs need to be controlled **along the life cycle**

- Regulatory frame and action plans should address POP-PFASs (option all PFASs) **in the life cycle**.
- Control of recycling becomes increasingly relevant as countries move towards a more circular economy and POPs (including PFASs) are frequently in products. **PFASs also end-up in sewage sludge which is applied in to agricultural soil in many countries, posing a pollution risk**!



RiskCycle http://www.wadef.com/projects/riskcycle/results.php

3. **Life cycle management** of products, stockpiles, and waste containing POP-PFASs (and other PFASs)

Objective: Knowledge and capacity built for the management of products and waste categories containing POP-PFAS, and other PFAS (GFC), as well as ESM of PFASs implemented.

Recommended activity options:

- Compilation of information of the management situation of products and waste containing POP-PFASs and other PFAS.
- Assessment of the management and destruction option of products/stocks and waste containing POP-PFAS and other PFAS.
- Environmentally safe storage of wastes containing POP-PFASs.
- Assessment and control of POP-PFAS in affected recycling cycles including sewage sludge.
- Destruction or export of POP-PFAS-containing waste; Environmental Sound Management of other PFAS-containing products. (**Contemporary challenge even in high income countries!)**

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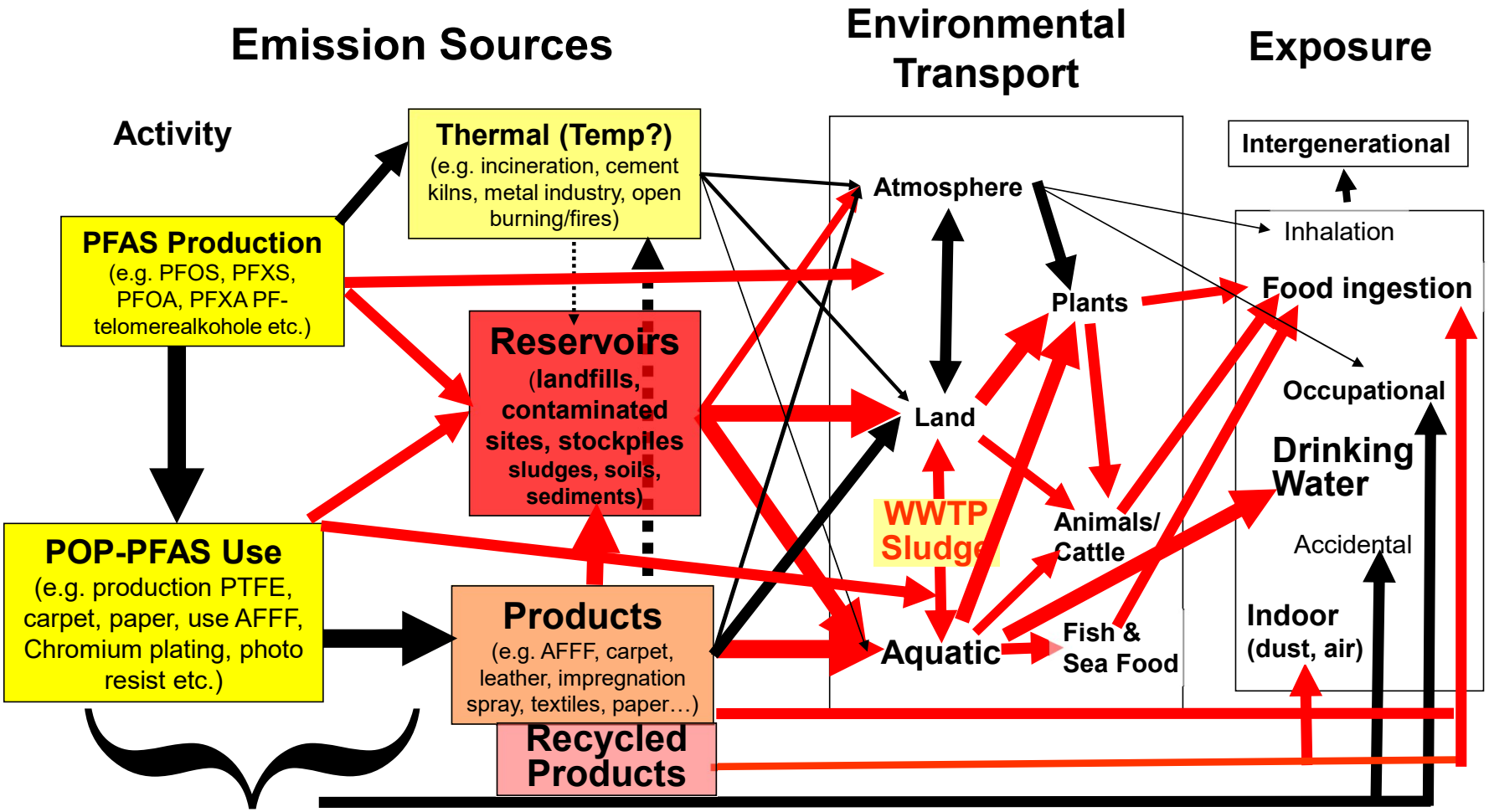
How can the world destroy PFAS-containing waste in an ESM?

- POP-PFAS cannot be disposed to landfills since they are water soluble and are released in leachates
- Municipal waste incinerators operating mostly **below 900ºC** can currently not be considered proven for destruction of PFAS. The US Department of Defense stopped the incineration of PFAS-containing AFFF from military in 2022 and requested USEPA to develop a guidance for PFAS destruction.
- Hazardous waste incinerators demonstrated that a temperatures of 1100ºC is sufficient to destroy POP-PFAS to 99.999% (Basel Convention TG). However, still some uncertainty of CF_4 formation and release which is destroyed only at 1400ºC and might be partly formed in the destruction of PFASs.
- However hazardous waste incinerators are quite expensive and mainly available in industrial countries. Since they are rare, also in these countries **the transport cost are high** for the **huge amount of PFAS wastes** like **carpets**, **textiles**, **automotive** shredder residues (ASR), **impregnated furniture and paper and the overall capacity is limited.**
- One **alternative facility for thermal destruction are cement kilns** destroying POP-PFAS >99.999% (Basel Convention TG) which should be considered for destruction of PFAS potentially also in low-/middle-income countries.

Life-Cycle of POP-PFAS, other PFASs and related products

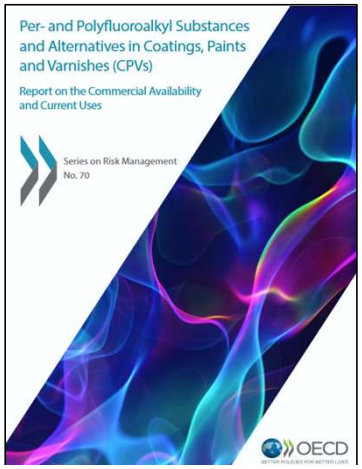


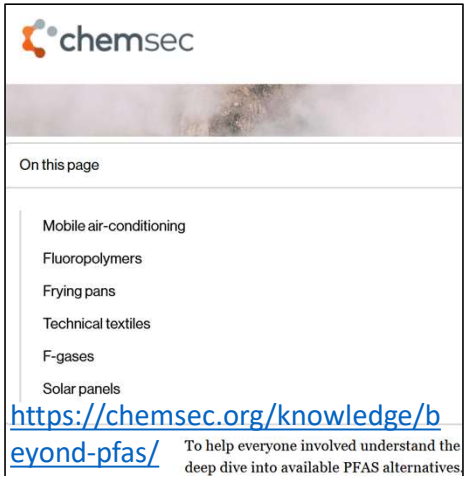
4. Assessment and selection of alternatives to POP-PFASs (1)

Objective: POP-PFAS alternatives in exempted/all uses are assessed by a science-based approach and POP-PFASs are substituted by the most sustainable chemical and non-chemical solution.

Recommended activity options:

- Compilation of information on alternatives to PFOS, PFOA, LC-PFCA and related compounds **including fluorinated and non-fluorinated alternatives**. (Consider that the BRS Secretariat and POPRC compiled information on alternatives to POP-PFAS; OECD, the ChemSec, and EU ZeroPM project are compiling information on alternatives to PFASs in major uses.)
- **Education and capacity building on alternatives assessment.**
- **Selection** of the most **sustainable alternative** chemicals and non-chemical solutions in the current used applications and implementation of substitution.





4. Assessment and selection of alternatives to POP-PFASs (2)

Objective: POP-PFAS alternatives in exempted/all uses are assessed by a science-based approach and POP-PFASs are substituted by the most sustainable chemical and non-chemical solution.

Recommended activity options:

- **Assessment of alternatives to POP-PFAS firefighting foams.**
- **Phase out of POP-PFAS firefighting foams and possibly phase-out all PFAS firefighting foam.** (see EU Guidance)
- **Cleaning firefighting equipment including fixed installations** when substituting with short-chain PFAS or fluorine-free foams.
- Assessment of destruction option of POP-PFAS and other PFAS containing firefighting foam and ESM and destruction.

https://echa.europa.eu/documents/10162/6956102/EU_guidance_for_transitioning_to_fluorine-free_firefighting_foams_en.pdf/24d79e79-a1af-dd0c-0b31-bdc2f78f08fe

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4. Assessment and selection of alternatives to POP-PFASs (3)

Objective: POP-PFAS alternatives in exempted/all uses are assessed by a science-based approach and POP-PFASs are substituted by the most sustainable chemical and non-chemical solution.

Recommended activity option:

- **Science based assessment** if any **exemptions of POP-PFAS production or use is needed**.
- **Notification of the BRS Secretariat /COP** on the **needed of exemption** with the **appropriate information** (What exemption(s), estimated quantity of production/use, Purpose of production / use, reason for exemption).
- **Periodic review** to **assess the need for continued exemptions and assess alternatives**. **Stop exemption and use by more sustainable alternatives as soon as feasible**.

https://www.pops.int/Implementation/Exemptions/AcceptablePurposes/AcceptablePurposesPFOSandPFOSF/tabid/794/Default.aspx
https://www.pops.int/Implementation/Exemptions/SpecificExemptions/PFOARoSE/tabid/8363/Default.aspx

5. Application of BAT/BEP in needed exempted production/uses

Background: **If POP-PFASs are produced or used in exempted uses, then BAT/BEP need to be applied for controlled production and use, and to prevent releases. Also to ensure the environmentally sound management along the life cycle of POP-PFASs.**

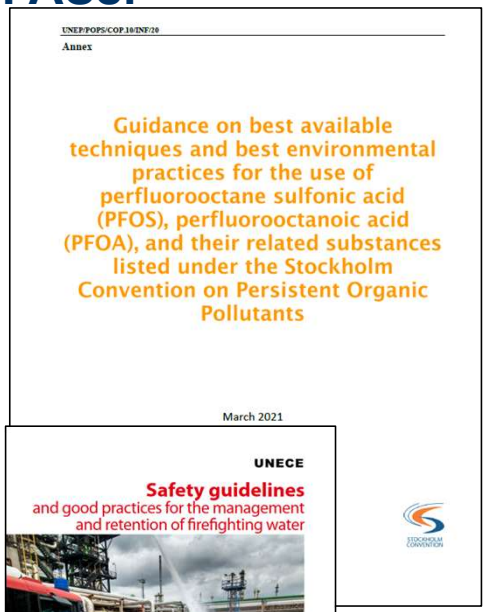
Objective: BAT/BEP is applied in exempted production and uses.

Recommended activity options:

- Define and implement **BAT/BEP for production** of **PFAS** including release limits and develop related control of production, releases and waste.
- Define and implement **BAT/BEP for the use of PFAS** in industries including release limits and develop related control of uses, releases and waste.
- Require the retention of firefighting water considering the UNECE guideline & environmentally sound management of the PFAS containing waste water.

https://unece.org/environment/documents/2025/09/working-documents/safety-guidelines-and-good-practices-management-and

- Labelling of products containing (POP-)PFAS (e.g. textiles, firefighting foam).
- Capacity building of industries and firefighters on BAT/BEP and how to minimize PFAS use and release.

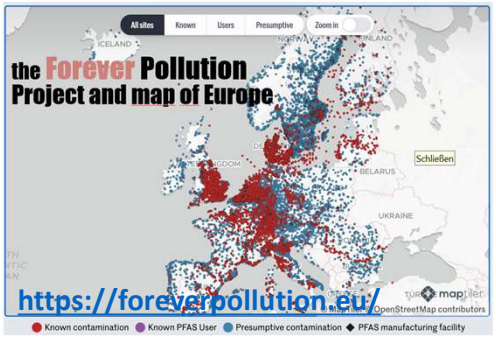


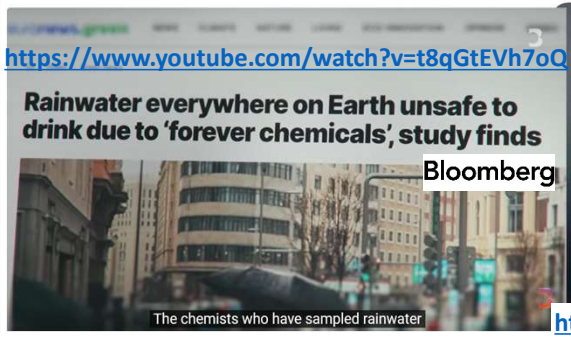
6. Education, training and awareness raising for stakeholder groups on POP-PFAS & other PFAS and establishing information exchange

Objective: Stakeholders (policy makers; workers, industries, customs, NGOs and the public) **are aware on the risks and problems of POP-PFASs** and other PFASs (GFC synergy).

Recommendation activity options:

- **Inform and sensitize policy makers on health hazards** of PFASs and the related risk for humans, the environment and for drinking water & food security and the need for management.
- **Awareness of industries** on the health risks and on potential cost of future remediation.
- **Awareness of the public on health impacts and environmental pollution** as well as on alternatives of consumer products without POP-PFAS and other PFASs.
- **Development** of **related education** & **awareness materials** (considering available materials).
- Dissemination of information on POP-PFAS and other PFASs (including alternatives).





https://www.youtube.com/watch?v=lVcOxZZGrBc

https://en.wikipedia.org/wiki/Dark_Waters_(2019_film)

6. Education, training and awareness raising for stakeholder groups on POP-PFAS & other PFAS and establishing information exchange

Objective: Education and awareness of stakeholders (policy makers; workers, industries, customs, NGOs and the public) on POP-PFASs and other PFASs as an issue of concern.

Recommendation activity options:

- **Inform and sensitize policy makers on health hazards** of PFASs and the related **risk for** humans, the environment and for **drinking water**/food security & related **need for management**.
- **Awareness of industries on the health risks and on potential cost of future remediation.**

The high external cost of PFAS:

- **The upgrade of drinking water works in the United States to comply with the suggested drinking water limits is estimated at 47.3 billion USD** (Mische 2025)
- The **cost to remediate legacy PFAS and ongoing emissions in Europe** is estimated to a cost of over **100 billion euros per year** if PFAS emissions are not restricted (Horel & Aubert 2025).

Original article

The Forever Pollution Project: Exposing the real cost of per- and polyfluoroalkyl substances (PFAS) pollution on the environment, science, and politics with cross-border investigation

Stéphane Horel*, Raphëlle Aubert

https://foreverpollution.eu/lobbying/
https://foreverpollution.eu/lobbying/the-cost-methodology/

Colorado Law Home Print Forum Archive About

THE COST OF PFAS CLEAN UP IN WATERWAYS: WHO PAYS AND HOW?

by Sarah E. Mische / in Issue 3, Volume 96 / on March 17, 2025

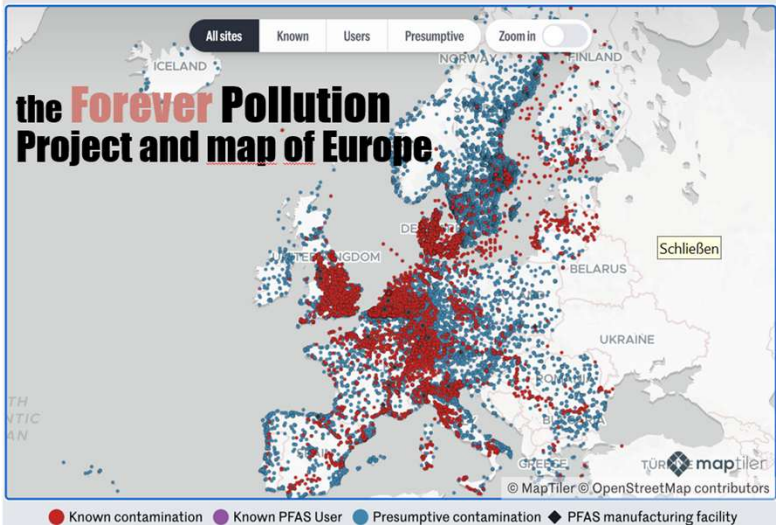
https://lawreview.colorado.edu/print/volume-96/the-cost-of-pfas-clean-up-in-waterways-who-pays-and-how-sarah-e-mische/

Awareness: Cost of POP-PFAS & short-chain PFAS management in Europe

A consortium of PFAS researchers and investigative journalists estimated the management costs of POP-PFAS and short-chain PFAS for Europe in two scenarios:

- **In the 'legacy' scenario, where emissions cease immediately and only legacy PFAS – long-chain PFAS that received the first regulatory attention for restriction and phase out (such as PFOS and PFOA) – are remediated, then the cost is about €95 billion over 20 years.**
- **In the 'emerging' scenario**, where emissions continue and remediation efforts **include short-chain PFAS,** which are difficult to deal with, then costs rise to around €2 trillion over the next 20 years. **A phase out of these difficult to remediate, emerging PFAS would be needed to lower this 20-year estimate, otherwise remediation could cost over 100 billion euros per year in perpetuity.**

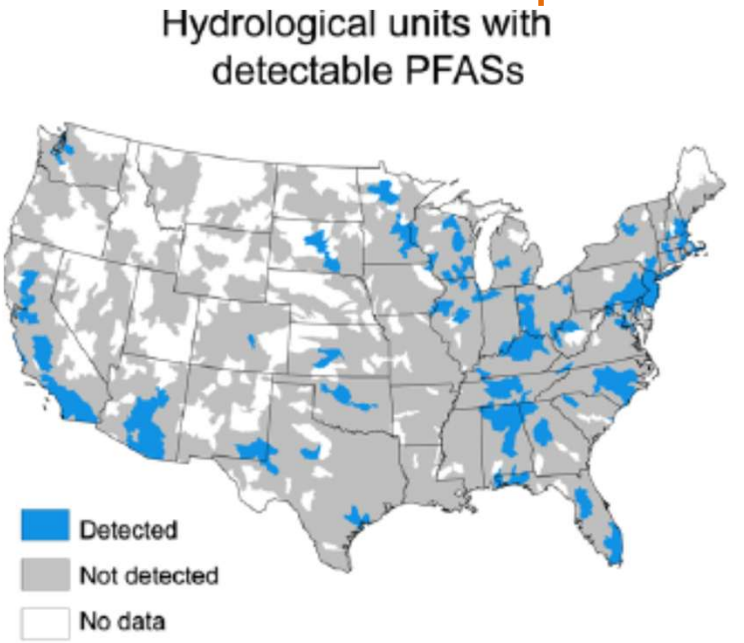
- **These calculations do not include a variety of unknown costs** due to a lack of knowledge and data sources, **meaning they are underestimated**.



https://foreverpollution.eu/lobbying/the-cost-of-remediation/
https://foreverpollution.eu/lobbying/the-cost-methodology/

Awareness: PFAS contaminated drinking water in US and human exposure

- Based on more than 36,000 water samples collected by the U.S. EPA (2013–2015), the drinking water supplies for 6 million U.S. residents exceeded US EPA's lifetime health advisory (70 ng/L) for PFOS and PFOA at that time.
- Considering EFSA & CDC assessment, this was still 10-100 times too high (CDC 2017; EFSA 2020; Grandjean & Budtz-Jørgensen 2013).
- **Danish EPA dw limit: 2 ng/L** ΣPFOS, PFOA, PFHxS and PFNA.
- US EPA updated interim Health Advisory 2022: PFOA 0.004 ng/L.




The Washington Post

Energy and Environment

Researchers find unsafe levels of industrial chemicals in drinking water of 6 million Americans

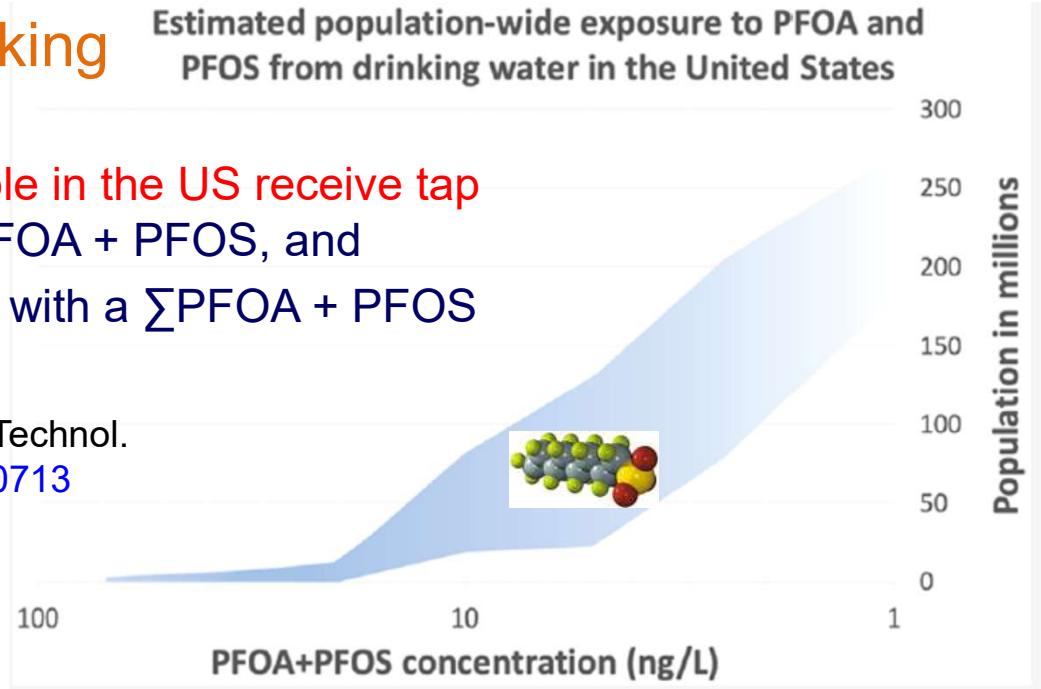
Detection of Poly- and Perfluoroalkyl Substances (PFASs) in U.S. Drinking Water Linked to Industrial Sites, Military Fire Training Areas, and Wastewater Treatment Plants

Xindi C. Hu,[*,†,‡] David Q. Andrews,[§] Andrew B. Lindstrom,[∥] Thomas A. Bruton,[⊥] Laurel A. Schaider,[#] Philippe Grandjean,[†] Rainer Lohmann,[@] Courtney C. Carignan,[†] Arlene Blum,[⊥,▽] Simona A. Balan,[●] Christopher P. Higgins,[○] and Elsie M. Sunderland[†,‡]

Hu et al. Environ. Sci. Technol. Lett., DOI:10.1021/acs.estlett.6b00260; August 9, 2016

Awareness: PFAS contaminated drinking water in US and human exposure

- A study estimated in 2020 that 18−80 million people in the US receive tap water with 10 ng/L or greater concentration of ∑PFOA + PFOS, and
- Over 200 million people in US likely receive water with a ∑PFOA + PFOS concentration at or above 1 ng/L.



Andrews & Naidenko (2020) Environ. Sci. Technol. Lett https://doi.org/10.1021/acs.estlett.0c00713

pubs.acs.org/journal/estlcu Letter

Population-Wide Exposure to Per- and Polyfluoroalkyl Substances from Drinking Water in the United States

David Q. Andrews* and Olga V. Naidenko

USEPA set Individual Maximum Contaminant Levels (MCLs) drinking water limits 4/24 and estimates that between **6% and 10% of the 66,000 public drinking water systems have** to **take action to reduce PFAS** to meet the new standard (PFOS 4 ng/L; PFOA 4 ng/L; PFNA 10 ng/L; PFHxS 10 ng/L; GenX 10 ng/L).

All public water systems have three years to complete their initial monitoring. They must inform the public of the level of PFAS measured in their drinking water. Where PFAS is found at levels that exceed these standards, systems must implement solutions to reduce PFAS in drinking water within 5 years (update 7yr).

https://www.epa.gov/newsreleases/biden-harris-administration-finalizes-first-ever-national-drinking-water-standard

https://www.epa.gov/newsreleases/epa-announces-it-will-keep-maximum-contaminant-levels-pfoa-pfos

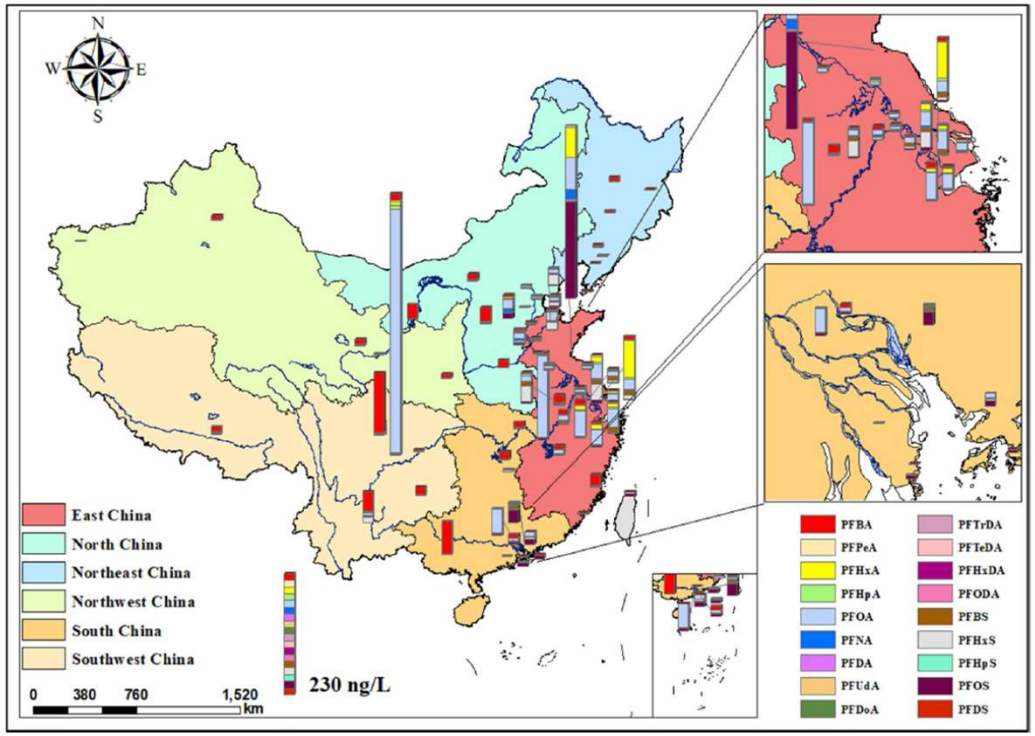
US states are estimating that for all public water systems in the US to comply with the proposed maximum levels, for PFOA and PFOS alone, it would cost ~$47.3 billion (Mische (2025) Univ. of Colorado Law Review 96, 906-954).

Awareness: Review of PFAS Contamination in Drinking Water in China

- With colleagues from Tsinghua University (Prof. Jun Huang) we **reviewed PFAS** data from 526 drinking water samples across 66 cities in China with a total of approx. 452 million inhabitants.
- The PFAS concentrations of >20% of the studied cities, were above the maximum contaminant level issued by the state Vermont in 2019 (**20 ng/L ∑5 PFAS**) **likely affecting 98.5 million people**, https://dec.vermont.gov/water/drinking-water/water-quality-monitoring/pfas

- Likely **several 100 million people in China** are above the **Danish DW limit of 2 ng/L based on EFSA TWI for ∑4 PFAS.**

Large number of people are affected by PFAS contaminated drinking water. But there is a lack of monitoring in some regions (other Asian countries, Africa, GRULAC region).



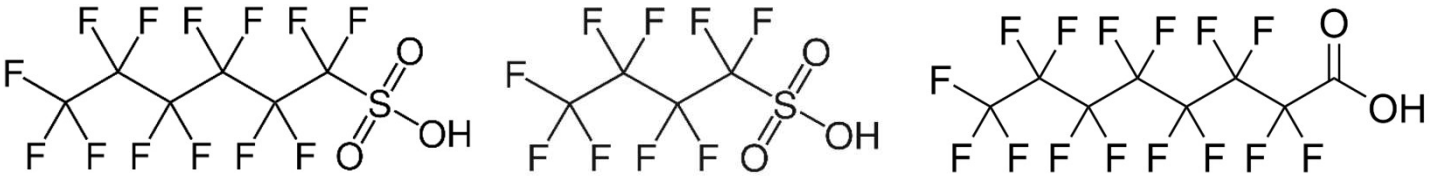
Liu L, Qu Y, Huang J, Weber R (2021) Environ Sci Eur. 33, 6
https://doi.org/10.1186/s12302-020-00425-3

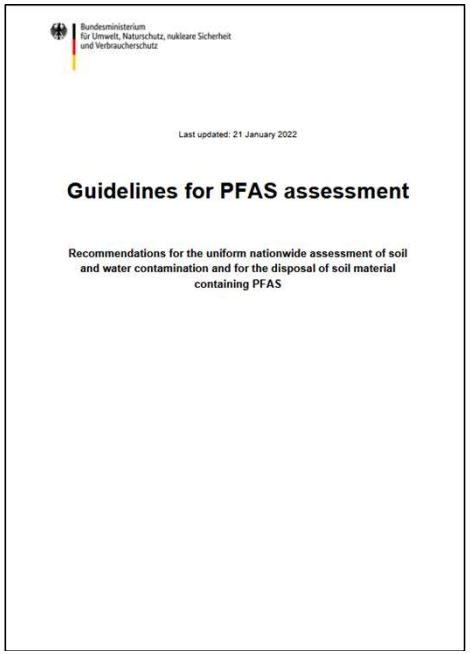
7. Assessment, management, and database of sites potentially contaminated with POP-PFAS and other PFAS (1)

Objective: Established assessment and management of sites potentially contaminated with POP-PFASs and other PFASs to reduce exposure.

Recommended activity options

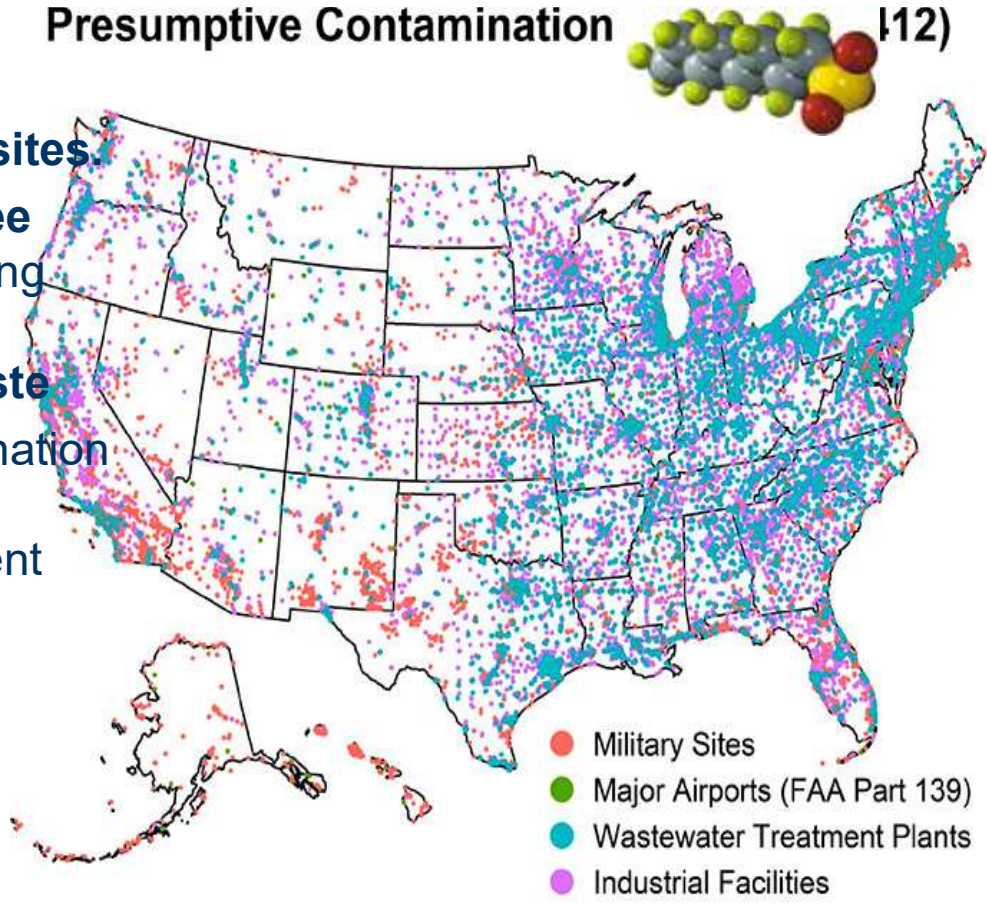
- Develop/update legislation to set criteria for determining contaminated sites and legislation on liability related to contaminated sites and clean-up (general activity on contaminated site framework).
- Develop guidelines for identification and assessment of sites contaminated with POP-PFASs and other PFASs.
- Training in identification and management of PFAS contaminated sites.
- Development of a database/map of potentially PFAS contaminated sites.
- Prioritization of the sites (risks) for further assessment and clean-up.





Developing a national map of (potentially) PFAS contaminated sites

- A methodology has been **developed to establish a national inventory of presumptive contaminated sites.**
- **PFAS contamination** can be presumed **around three types of facilities**: (1) fluorinated aqueous film-forming foam (AFFF) discharge sites, (2) certain industrial facilities, & **(3) sites related to PFAS-containing waste**
- For the United States a map of presumptive contamination sites has been developed and identified 57,412 sites: 49,145 industrial facilities, 4,255 waste-water treatment plants, 3,493 current or former military sites, and 519 major airports.



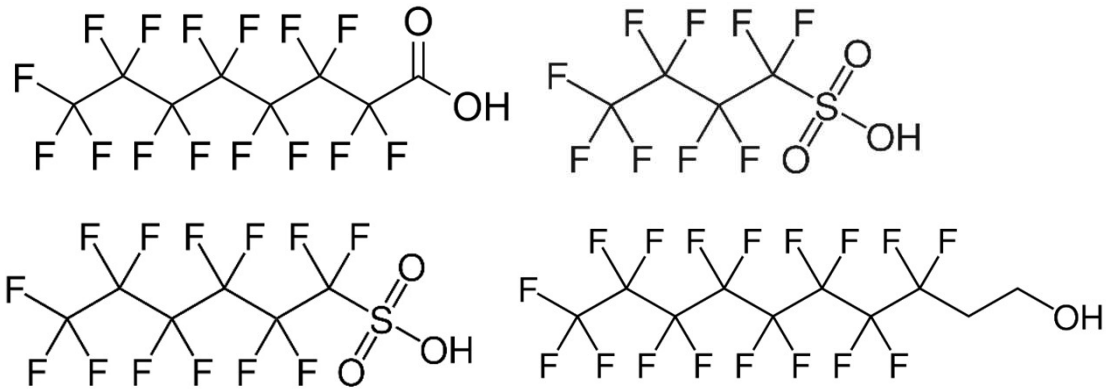
Salvatore et al. Environ. Sci. Technol. Lett. 2022, 9, 11, 983-990; https://doi.org/10.1021/acs.estlett.2c00502

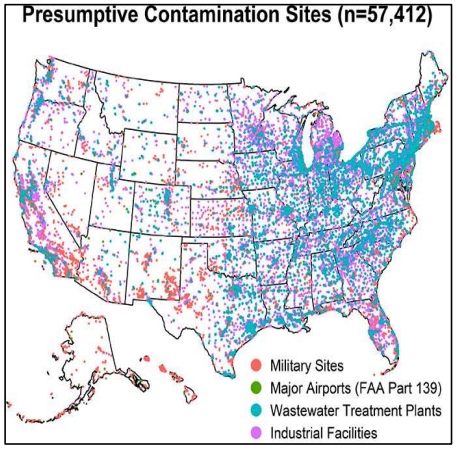
7. Assessment, management, and database of sites potentially contaminated with POP-PFAS and other PFAS (2)

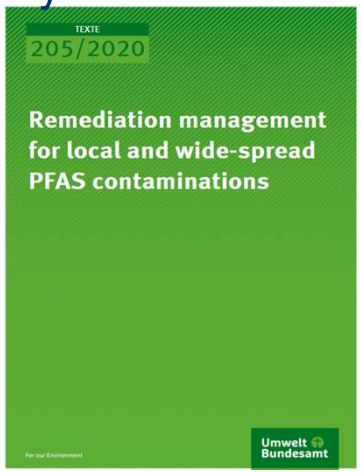
Objective: Established assessment and management of sites potentially contaminated with POP-PFASs and other PFASs to reduce exposure.

Recommended activity options:

- Monitoring of POP-PFAS (and other PFAS) contamination for the identified locations (according to a prioritization list).
- Develop guidelines and strategies for the **environmentally sound management** of POP-PFAS (GFC synergy: all PFAS) contaminated sites.
- Take measures to secure the contaminated sites to stop human exposure & environmental releases.
- Identification of clean-up measures and initiate clean-up starting with high priority sites.

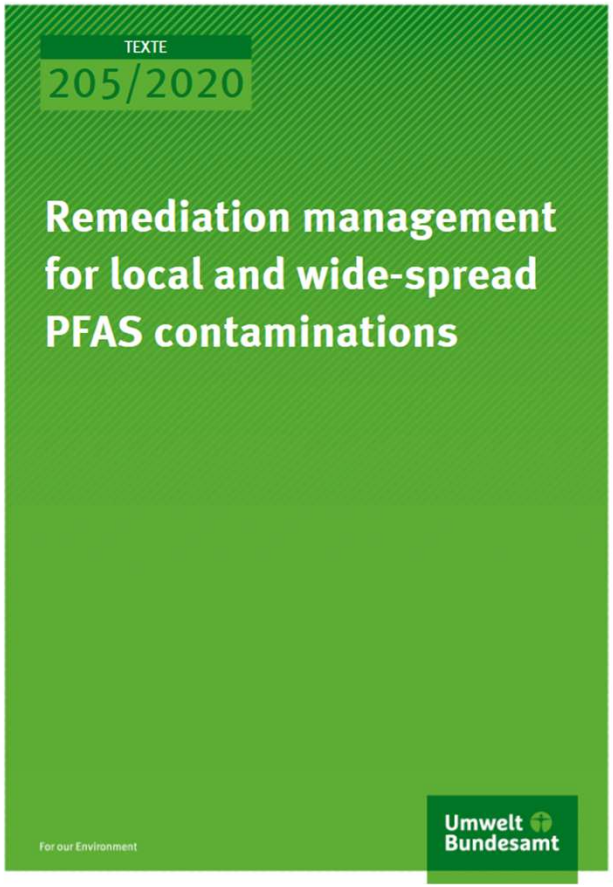


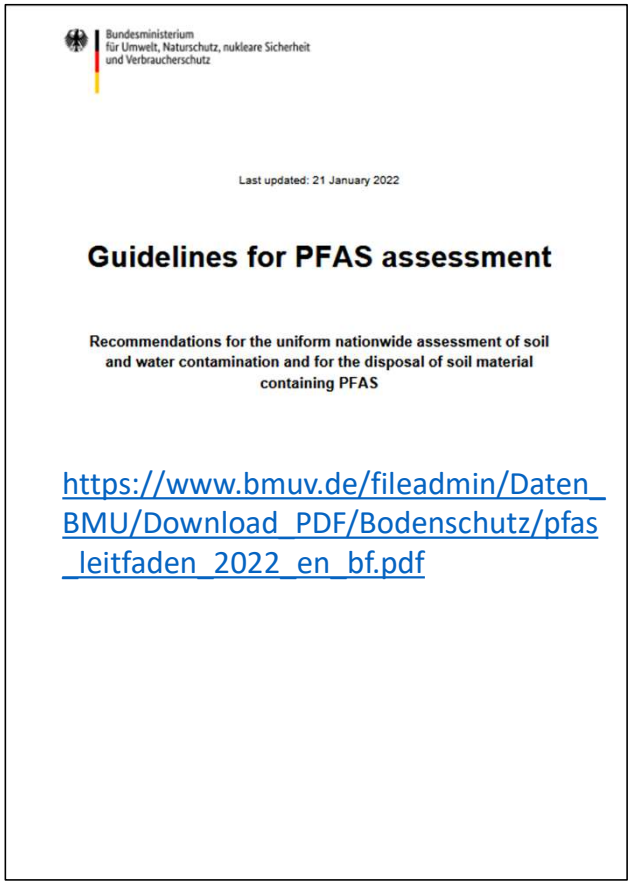




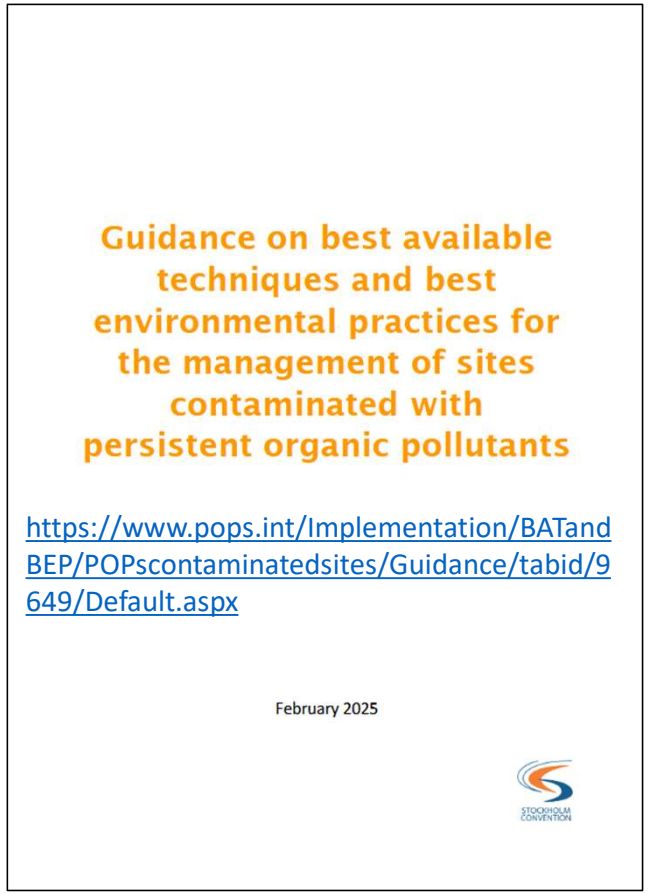
National and international guidance documents on PFAS site management

- Some governments developed guidance documents to assess & manage PFAS contaminated sites.
- Recently also a SC guidance on BAT/BEP for POP contaminated sites has been published by UNEP.





https://www.bmuv.de/fileadmin/Daten_BMU/Download_PDF/Bodenschutz/pfas_leitfaden_2022_en_bf.pdf



https://www.pops.int/Implementation/BATandBEP/POPscontaminatedsites/Guidance/tabid/9649/Default.aspx

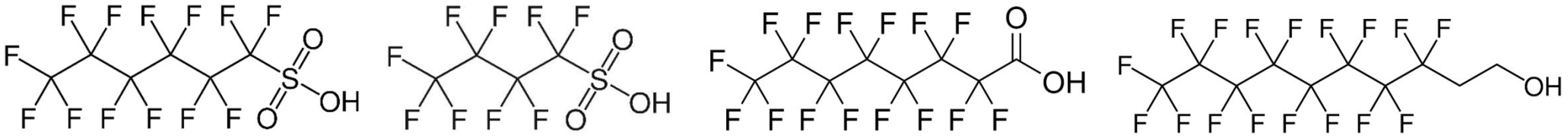
https://www.umweltbundesamt.de/en/publikationen/remediation-management-for-local-wide-spread-pfas

8. Analysis and monitoring of PFOS, PFOA, PFHxS and other PFAS in priority areas

Objective: Established monitoring approach for POP-PFASs and other PFASs in priority areas.

Recommended activity options:

- **Assessment of options for monitoring of POP-PFAS and other PFAS (international collaboration or development of own capacity?)**
- Establishing a monitoring frame for POP-PFAS and other PFASs (own capacity or cooperation)
- **Monitoring of major drinking water supplies.**
- **Improvement of the inventory** by monitoring where **knowledge gaps** have been found (Tier 3).
  - Monitoring of products, articles and waste suspected to contain POP-PFAS or other PFAS.
  - Monitoring biota and soils for POP-PFAS and other PFAS especially at potentially contaminated sites (see contaminated site action plan).

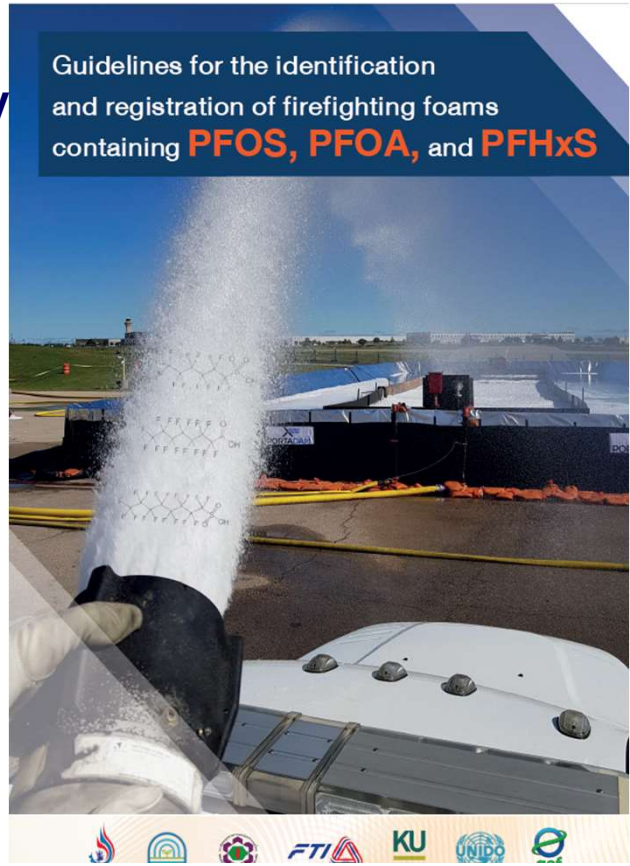


Some monitoring is necessary for the PFAS inventory

Some monitoring is necessary for a **robust POP-PFASs inventory (Tier 3)**.

- For example for **many AFFF/other suspected firefighting foams, no information** on the **type of PFAS is available**. Within a UNIDO/GEF project, **Thailand developed** a **guidance for monitoring PFAS in firefighting foams** and developed the analytical capacity.

- **PFAS measurements of water are also necessary for the inventory of contaminated water reservoirs and drinking water**:
  - South Africa developed PFAS monitoring capacity in the country (Tswane Univ.) and monitored major drinking water for PFAS.



Distribution pattern, source apportionment, and health risk assessment of per- and polyfluoroalkyl substances in drinking water treatment plants in South Africa

Seth M. Rapoo[1], Mathoto L. Thaoge-Zwane[1], and Jonathan O. Okonkwo[2,*]

Environ. Toxicol. Chem. 2025, 44(8), 2133–2142
https://doi.org/10.1093/etojnl/vgaf136

OXFORD

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Thank you for your attention ! Questions?

More Information https://www.thegef.org/; https://en.wikipedia.org/wiki/Triple_planetary_crisis

Basel Convention: www.basel.int

Rotterdam Convention: www.pic.int

Stockholm Convention: http://chm.pops.int/;

Montreal Protocol/Vienna Convention: http://ozone.unep.org

GFC: https://www.chemicalsframework.org/ **FAO:** www.fao.org **WHO** www.who.int/

Climate Convention https://unfccc.int/ **Biodiversity Convention:** https://www.cbd.int/

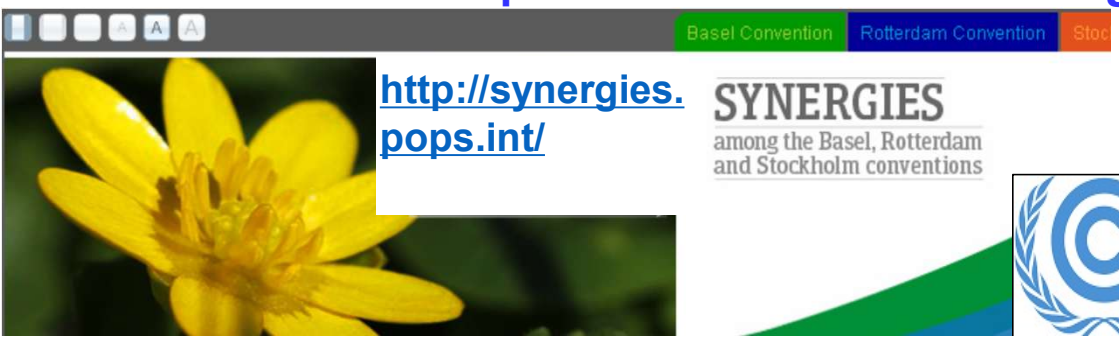
OECD/IOMC: http://www.oecd.org/chemicalsafety/

Science:; https://www.ipcc.ch/; https://www.ipbes.net/; https://www.unep.org/isp-cwp; https://www.ipcp.ch/

Industry: http://www.suschem.org/; https://icca-chem.org/; https://cefic.org/

NGO: www.ipcp.ch; www.ipen.org; www.ciel.org/; www.ban.org; www.chemsec.org; www.wecf.org

Better-world-links: http://www.betterworldlinks.org/



http://synergies.pops.int/

SYNERGIES
among the Basel, Rotterdam and Stockholm conventions

UN environment programme
Global Framework on Chemicals

GREEN GROWTH Knowledge Partnership

United Nations Framework Convention on Climate Change

Convention on Biological Diversity