

PFAS

REGULATORY STATUS

2023

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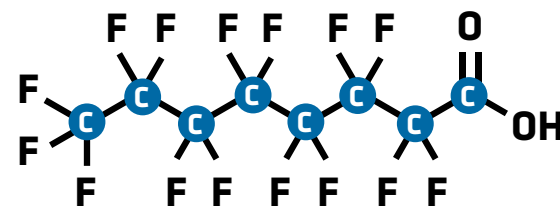
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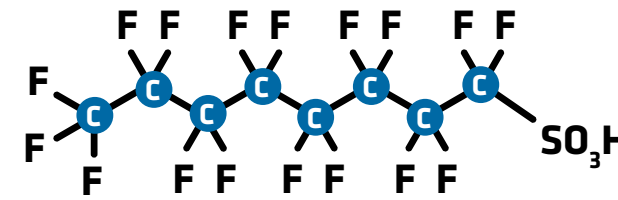
DESCRIPTION AND USES

There is no universally accepted definition of per- and polyfluoroalkyl substances (PFAS), which encompasses thousands of synthetic substances that have been used in industry and consumer products since the 1940s. This complicates how they are regulated and affect the scope under each regulation.

However, in general, PFAS are characterized as having carbon atoms linked to each other and bonded to fluorine atoms at most (per-) or all (poly-) of the available carbon bonding sites.



PFOA - Perfluorooctanoic Acid



PFOS - Perfluorooctane Sulfonic Acid

The carbon-fluorine bond is one of the strongest single bonds in chemistry, which is why many PFAS are persistent and break down very slowly in the environment. The Organization for Economic Co-operation and Development (OECD) has published CAS Numbers for more than 4,700 PFAS.

PFAS DEVELOPMENT TIMELINE

1930

1940

DuPont chemist discovers Teflon and PTFE

1950

3M invents PFOA and other C8 compounds

1960

DuPont enters market with Teflon

1960

Navy works with 3M to develop Aqueous film forming foam (AFFF)

1970

3M patents Lightwater AFFF

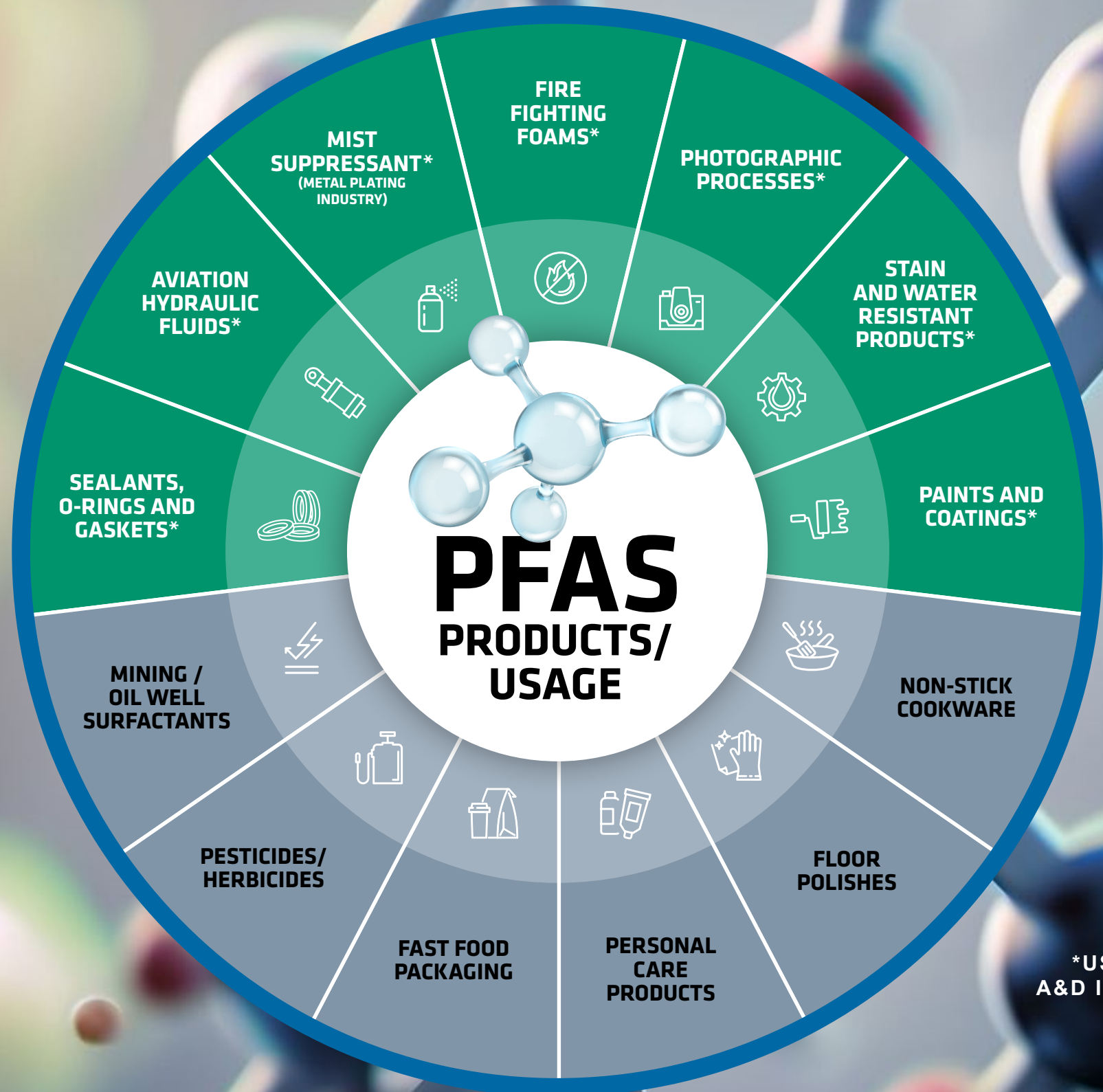
1970

First US Military specifications for AFFF

DESCRIPTION AND USES

PFAS have been gaining global public and regulatory attention for several years. Their widespread use across various sectors, coupled with regulatory and public concerns about PFAS potential effects on human health and the environment, has prompted action to significantly decrease or eliminate PFAS manufacture and use.

Manufacture and use of certain PFAS have been stopped. By 2002, the primary United States manufacturer of PFOS voluntarily phased out production of PFOS. In 2006, eight major companies voluntarily agreed to phase out production of PFOA and PFOA-related chemicals. There are efforts now to replace fire-fighting foam with fluorine-free foam alternatives. 3M recently announced that it will end manufacturing PFAS and discontinue their use in its products by the end of 2025. Sunset of products is an ongoing effort with priority phase out focused on the most problematic PFAS materials.



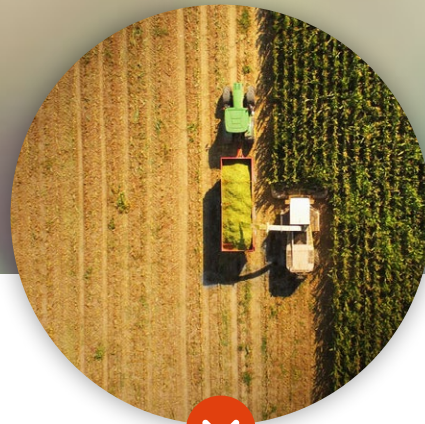
*USED IN A&D INDUSTRY

POTENTIAL EXPOSURE PATHWAYS

Exposure to PFAS may occur through various mechanisms since they are used in a variety of products and applications. However, ingestion is the most common route, including:



DRINKING
contaminated
municipal water or
private well water



FOOD GROWN
or raised near
places that used
or made PFAS



EATING FISH
caught from water
contaminated
by PFAS



SWALLOWING
contaminated
soil or dust




EATING FOOD
packaged in
material that
contains PFAS



INGESTING
dust or particles
from a textile
containing PFAS

EXISTING AND EMERGING REGULATIONS:

MAP GUIDE

 EXISTING REGULATIONS

 EMERGING REGULATIONS

  NORTH AMERICA

 MEXICO

UNITED KINGDOM

EUROPEAN UNION

 ASIA

CLICK A LOCATION FOR MORE INFORMATION



AUSTRALIA 

NEW ZEALAND 

NORTH AMERICA



EXISTING REGULATIONS

Existing USA federal regulations on PFAS have primarily fallen under the oversight of the U. S. Environmental Protection Agency (EPA) and the Food and Drug Administration (FDA), while actions specific to defense personnel, operations, installations, and their immediate surroundings are administered by the Department of Defense (DoD). Various states have promulgated independent regulatory actions. Canadian regulations are overseen by Environment and Climate Change Canada (ECCC) and its provincial offices. Mexico's Ministry of Environment has not yet regulated PFAS.

EMERGING >



AFFF USE

- 2020: The National Defense Authorization Act (NDAA) of 2020 enacted a series of congressional mandates regarding the transition from aqueous film forming foam (AFFF) to a fluorine-free foam (F3) alternative.
- 1 October 2023: Products meeting the new military specifications (MILSPEC) must be made available to all Department of Defense (DoD) bases.
- 1 October 2024: AFFF foam use will be prohibited.
- The Federal Aviation Administration has signaled that F3 products approved by the DoD will be similarly acceptable for use in commercial aviation applications.
- Multiple states have already instituted bans on the use of AFFF for training and non-emergency purposes, or strictly control the use, storage, and disposal of AFFF.
- Canada's ECCC has banned the use of AFFF with a few exemptions allowing for overseas military operational considerations and to accommodate efforts to transition to F3.



DRINKING WATER

- No current federally regulated drinking water standards in the USA.
- EPA established a series of groundwater Regional Screening Levels (RSLs) applicable to groundwater, for PFOA, PFOS, perfluorononanoic acid (PFNA), perfluorobutane sulfonic acid (PFBS), perfluorohexane-1-sulphonic acid (PFHxS), and HFPO-DA. RSLs are not promulgated rules and not legally enforceable limits under statute.
- A number of states have independently adopted regulatory standards for drinking water.
- Typically targeting PFOA and PFOS, limits are equal to or less than 70 parts per trillion (ppt) or nanograms per liter (with some exceptions).
- Canada has not promulgated a national drinking water standard for PFAS. Alberta, however, has promulgated a set of maximum allowable concentrations for PFOA and PFOS of 200 ppt and 600 ppt respectively as an ambient water quality guideline for drinking water sources.



CONSUMER PRODUCTS

- Beginning in 2016, the FDA banned the use of long-chain PFAS in food contact materials (FCMs).
- A review of short-chain substitutes is underway for other consumer product applications under the New Chemicals Program of EPA's Toxic Substances Control Act (TSCA).
- Several states, including California, Maine, Maryland, Minnesota, Oregon, and Washington, have banned the use of PFAS in specific consumer goods. State bans most commonly reference FCM and carpet treatments.

HAZARDOUS SUBSTANCES



At present, the EPA has not listed any PFAS chemical as a hazardous substance under a federal program.

HOWEVER, the NDAA of 2020 included a directive to list 172 PFAS to the Toxics Release Inventory. As a result, suppliers of products containing listed PFAS are required to update the Safety Data Sheets accordingly. Since 2020, EPA has been updating the list of PFAS subject to TRI reporting by facilities, as required by NDAA.

Alaska, Massachusetts, New Jersey, New York, Vermont, and Washington have independently listed PFOS and PFOA, and possibly additional PFAS, as hazardous under state programs. The inclusion of PFOS, PFOA, and other PFAS as hazardous chemicals triggers numerous other regulatory actions promulgated within the given jurisdiction, specifically waste management and disposal practices.





NORTH AMERICA



EMERGING REGULATIONS



PFAS STRATEGIC ROADMAP

In October 2021, the USA EPA published the [PFAS Strategic Roadmap: EPA's Commitments to Action 2021-2024](#). The document outlines a series of 31 specific actions spanning EPA's regulatory purview. These actions were designed to be implemented at varied timelines representing both finite and ongoing activities. Key unresolved action items include the following:

- **ESTABLISH a national primary drinking water regulation for PFOA and PFOS:** Under the Safe Drinking Water Act, the EPA announced a series of draft Maximum Contaminant Levels (MCLs) on 14 March 2023 for the following PFAS: PFOA at 4.0 ppt, PFOS at 4.0 ppt, and a mixture of PFNA, PFHxS, PFBS, and HFPO-DA with a combined Hazard Index of 1.0. The MCL represents the maximum allowable concentration of these analytes in public drinking water. These proposed values have entered into a public comment period.
- **RESTRICT PFAS discharges from industrial sources and leverage the National Pollutant Discharge Elimination System (a.k.a. NPDES) permits to reduce PFAS discharges to waterways:** In December of 2022, the EPA issued a guidance memo to states permitting sections with recommendations on permit restrictions and monitoring requirements. It remains unclear as to the extent to which the state programs will implement EPA's guidance.
- **DESIGNATE PFOA and PFOS as hazardous substances under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA):** In August 2022, the EPA formally proposed the designation of PFOA and PFOS as CERCLA hazardous substances. If listed, a variety of regulatory triggers would follow, including: due diligence during real estate transactions would require evaluation for PFOA and/or PFOS, regulatory agencies could seek cost recovery from potentially responsible parties that contribute to PFOA and/or PFOS, and the National Priority List (Superfund) program would be expanded to include sites contaminated by PFOA and/or PFOS.



U.S.A.

An extensive list of 199 legislative actions is pending in 33 states as of March 2023. These regulations include:

BANS on firefighting substances containing PFAS.

BANS on PFAS in commercial products, food contact materials, menstrual products, cosmetics, stain and water-resistant treatments, and pesticides.

MANDATES to remove and replace AFFF systems from fire departments.

MANDATES to monitor and/or treat wastewater system and landfill leachate for PFAS.



MEXICO

In July 2022, the Mexican Ministry of Environment proposed to restrict the import and export of PFOA and PFOS. Opinions have been submitted but the current status of the regulation is unknown.

EPA-TOXIC SUBSTANCES CONTROL ACT (TSCA)



EPA is proposing reporting and record keeping requirements for PFAS under the Toxic Substance Control Act (TSCA). Under this rule, EPA would require persons that manufacture or have manufactured PFAS in any year since 1 January 2011 to electronically report information regarding PFAS uses, production volumes, disposal, exposure, and hazards. This proposed rule will enable EPA to better characterize the sources and quantities of manufactured PFAS in the USA.

The reporting and record keeping requirement under TSCA is expected to be finalized in 2023. EPA is proposing to keep inactive PFAS uses out of commerce via Significant New Use Rules (SNURs).

Due to the evolving nature of these programs, verifying the regulatory status in a given jurisdiction at regular intervals is highly recommended.

< EXISTING

EUROPEAN UNION



EXISTING REGULATIONS

The European Union (EU) has several existing PFAS regulations:

- EU Persistent Organic Pollutants (POPs);
- Classification, Labelling and Packaging (CLP);
- Drinking Water Directive;
- Prior Informed Consent (PIC);
- REACH; and
- Member state specific regulations.

EMERGING >



EU PERSISTENT ORGANIC POLLUTANTS REGULATION

- 2009: PFOS, its salts, and perfluorooctane sulfonyl fluoride were the first set of PFAS restricted for use through listing in Annex I of the EU POPs regulation imposing limits in substances and articles.
- 2020: Annex I amendments removed all exemptions for PFOS use in the EU (e.g., metal plating and photoimaging).
- 2020: PFOA, its salts, and related compounds use has been banned under (EU) 2020/784 amendment of the EU POPs regulation after they were added in 2019 to Annex A of the Stockholm Convention.



CLASSIFICATION, LABELLING, AND PACKAGING

The following PFAS- are included in the Classification and Labelling Inventory:

- PFOA,
- ammonium pentadecafluorooctanoate,
- PFNA, and its sodium and ammonium salts,
- nonadecafluorodecanoic acid and its sodium and ammonium salts, and
- PFHpA.



DRINKING WATER DIRECTIVE

- The revised Drinking Water Directive (2020) established a 'new group limit' value for 'PFAS Total' of 0.5 µg/L or the limit for the 'Sum of PFAS' of 0.1 µg/L in drinking water.
- The Directive entered into force in 2021 and permitted Member States a two-year transition period for incorporation into national legislation.
- EU countries are exempt if water use is intended exclusively for purposes for which authorities are satisfied that quality has no influence, either directly or indirectly, on consumer health.



PRIOR INFORMED CONSENT

PFOA (and its salts and derivatives) and PFOS (and its salts and derivatives) were listed in Annex I of EU PIC regulation as substances under export notifications under limitation categories of "sr-b" (severe restriction ban) and "sr" (severe restriction), respectively.



MEMBER STATE SPECIFIC REGULATIONS



NORWAY became the first country to ban the use of PFOA in consumer products in 2014.



DENMARK promulgated Order No. 681 to prohibit PFAS use in food contact materials in 2020.



REACH

Under REACH, PFAS are restricted or prohibited through inclusions in the Substance of Very High Concern (SVHC) Candidate List as substances meeting criteria laid out by Article 57 of REACH or through listing on Annex XVII.

> SVHC CANDIDATE LIST:

- Three groups of PFAS have been added to the SVHC Candidate List in June 2019, January 2020, and January 2023:
- Group 1 includes 2,3,3,3- tetrafluoro-2- (heptafluoropropoxy) propionic acid, its salts, and its acyl halides (HFPO-DA, also known as GenX chemicals);
 - Group 2 includes PFBS and its salts; and
 - Group 3 includes perfluoroheptanoic acid (PFHpA) and its salts.

> ANNEX XVII RESTRICTED SUBSTANCES LIST:

- 2021: Perfluorocarboxylic acids, their salts and related substances added to the list.
- Since 25 February 2023, manufacture, use, and sale of these substances banned except if the concentration in the substance, the mixture, or the article is < 25 parts per billion (ppb) for the sum of C9-C14 PFCAs and their salts or 260 ppb for the sum of C9-C14 PFCA-related substances.

EUROPEAN UNION



EMERGING REGULATIONS



REACH PFAS RESTRICTION PROPOSAL

On 7 February 2023, the European Chemicals Agency (ECHA) published the EU REACH PFAS restriction proposal (“wide-use restriction”). This restriction, which will cover all PFAS uses, except firefighting foams, will work in tandem with the EU PFAS restriction for firefighting foams. The wide-use restriction may become effective as early as 2026 with the eventual view of banning all PFAS uses. The following highlights the key features of the wide-use restriction:

➤ **RESTRICTS** the manufacture, sale, and use of PFAS, either as themselves, or as constituents in other substances, mixtures, or articles.

➤ **COVERS** over 10,000 PFAS in scope of the Organization for Economic Cooperation and Development (OECD) PFAS definition.

➤ **APPLIES** to certain concentration limits for non-polymeric and polymeric PFAS:

Non-polymeric PFAS	Polymeric PFAS
<ul style="list-style-type: none"> • 25 ppb for any individual PFAS.* • 250 ppb for the sum of PFAS, optionally with prior degradation of precursors.* 	<ul style="list-style-type: none"> • 50 ppm for PFAS with polymeric PFAS included.**

➤ **IDENTIFIES** time-unlimited and time-limited derogations with reporting to ECHA every 2 years or 1 year, respectively. *(A public consultation period was opened on 22 March 2023 for the Annex XV report. The consultation is due to conclude on 25 September 2023).*



*Polymeric PFAS excluded from quantification. **If total fluorine exceeds 50 milligrams fluorine per kilogram (mg F/kg), the manufacturer, importer, or downstream user may be requested to provide proof.



PFAS RESTRICTION PROPOSAL FOR AFFF

The PFAS restriction proposal for firefighting foams will restrict the formulation, marketing, and use of all PFAS-containing firefighting foams following any derogation periods (use- or sector-specific). The firefighting foam proposal is likely to enter into force in 2025.



REACH, POPs, AND CLP REGULATIONS

- REACH restriction proposals for PFHxS, its salts and related substances, and undecafluorohexanoic acid, its salts and related substances.
- Inclusion of PFHxS, its salts and related compounds under the POPs Regulation in line with the Stockholm Convention.
- 6:2 FTOH consideration for inclusion into the CLP Regulation.

Despite the focus on regulating certain PFAS, PFAS groups, and/or uses, the EU has proposed a broad restriction of all PFAS across a wide range of uses (“EU PFAS Restriction Proposal”). This approach varies to the general approach taken by the USA at the Federal level that focuses on regulating certain PFAS, PFAS groups, and/or uses. At State level, the USA has some alignment to the EU’s approach, although in many cases, the definition for PFAS is different.

< EXISTING

FRANCE published an action plan on 17 January 2023 for protecting its people and the environment from PFAS risks.

BELGIUM has proposed to prohibit the placing on the market of packaging containing PFAS from 1 January 2024.

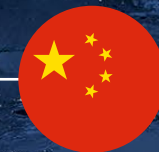
DENMARK is preparing for a ban on PFAS contained in firefighting foams used in training sites from 1 January 2024.



REGULATIONS IN OTHER COUNTRIES

UNITED KINGDOM

Following the UK's exit from the EU, the UK has implemented several EU regulations such as the POPs, REACH, CLP, and PIC regulations. Recently, the Health and Safety Executive (HSE) published a report on the regulatory management options. This is the first step towards the UK PFAS restriction proposal, which will fall under the UK REACH regulation and is expected to be closely aligned with the EU proposal.



ASIA

- Several countries in Asia are moving to restrict and manage use of PFAS (mostly PFOA, PFOS, and PFHxS) in accordance with the Stockholm Convention on POPs, including, but not limited to, South Korea, Japan, and China.
- January 2021 - South Korea announced its 3rd Basic Plan (2021-2025) for management of POPs that includes developing standards and analytical procedures and elimination technologies for PFAS.
- October 2022 - Japan and South Korea enacted new export requirements for PFOA.
- March 2023 - China added PFOA and PFOS to its List of New Pollutants for Priority Management to manage/restrict their production, use, import, and export.



AUSTRALIA

- Importers and manufacturers of PFAS must comply with the obligations of the Industrial Chemicals Act 2019 (IC Act) that came into force on 1 July 2020. Obligations include registering the business with the Australian Industrial Chemicals Introduction Scheme (AICIS) and categorizing new PFAS before they can lawfully introduce these chemicals into Australia. AICIS also enforces import and export controls on PFOS and specified PFOS precursors that are subject to the PIC procedure under the Rotterdam Convention.
- Three jurisdictions (South Australia, Queensland, and New South Wales) have restricted the use of certain PFAS in firefighting foams.
- The January 2020 PFAS National Environmental Management Plan (NEMP) sets out standards and guidance, which includes investigation guideline values. The PFAS NEMP is a practical how-to guide for the investigation and management of PFAS contamination, including waste management, storage, and disposal.



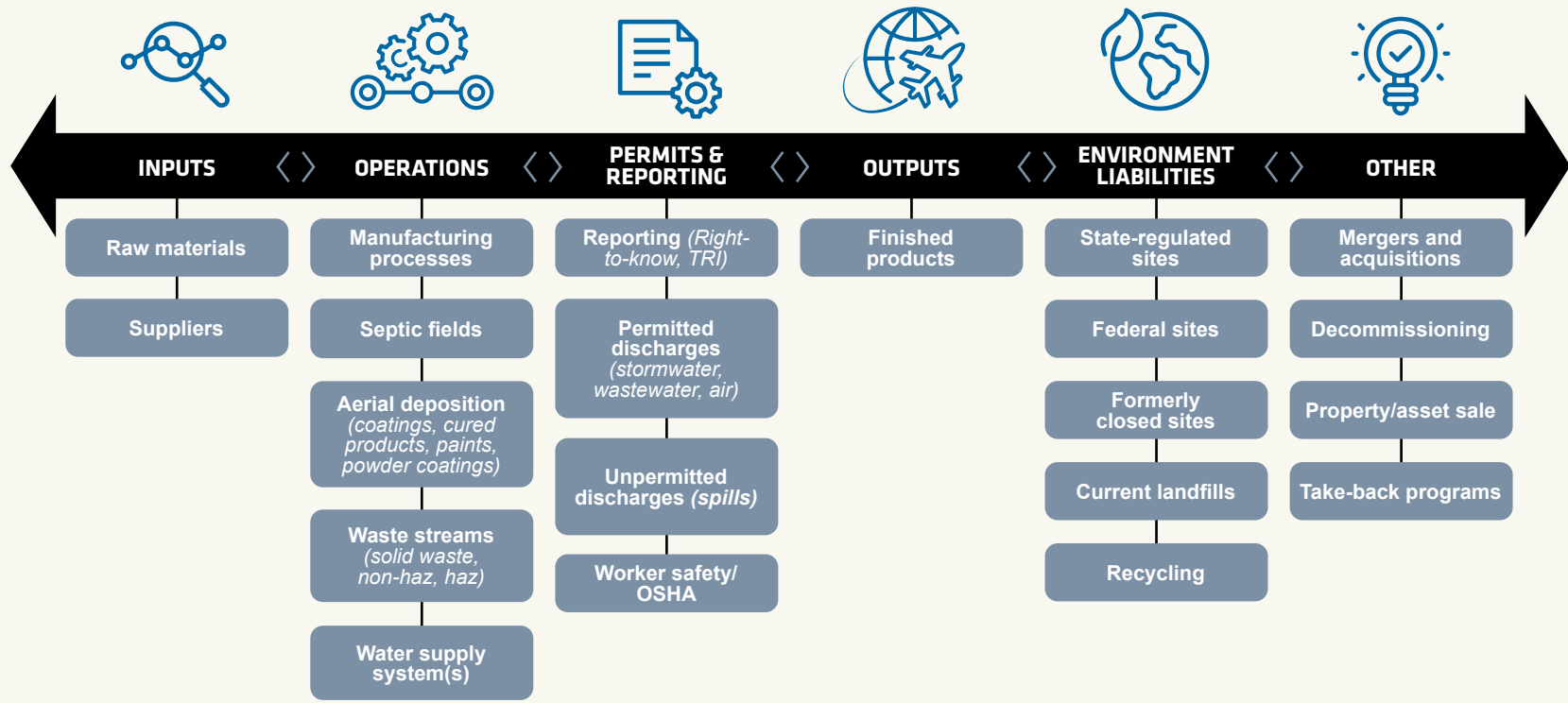
NEW ZEALAND

- On December 21, 2022, New Zealand's Environmental Protection Authority published new restrictions for AFFF.
- Effective from 1 January 2023, prohibited use of firefighting foams containing PFAS in uncontained systems (applies to AFFF that contain PFOA-related compounds)
- Complete ban on PFAS-containing firefighting foams planned after 3 December 2025



RISKS AND PREPARATION

Regulations related to PFAS are impacting the entire manufacturing lifecycle and you will need to consider the whole PFAS ecosystem.



WHAT CAN YOU DO TO PREPARE?

STRATEGY

- Monitor state & federal regulations or pending legislation
- Identify operations risks related to PFAS (*remediation, compliance, insurance, public relations, health and safety, etc.*)
- Develop internal communication plan for corporate/environmental
- Create decision matrix/flow-chart for consistency across facilities and programs

INPUT

- Develop questionnaire/survey for suppliers
- Issue supplier certification (*PFAS-free*)
- Evaluate whether existing systems and data sources can be utilized for information gathering
- Identify timelines for response and compliance
- Understand and clarify owner/tenant requirements

OPERATIONS

- Identify potential materials or unique operation/process that may trigger a deeper dive (*current or former plating operations, septic, water supply, etc.*)
- Interface with facility/plant staff
- Review available permits
- Inspect fire suppression systems (*insurance inspections, AFFF, etc.*)

OUTPUT

- Identify facility operational waste streams (*solid, non-hazardous, hazardous waste streams, etc.*)
- Finish product disclosure requirements (*consumer protection*)
- Product declarations
- Evaluate process, timeline on product declarations/certifications

DIFFICULTY IN IDENTIFYING PFAS IN ARTICLES

PFAS remain difficult to identify in articles. This is due to the number of chemicals in the PFAS class (in the thousands), to challenges in detecting and quantifying the different PFAS, and to lack of information and regulations on which PFAS are produced, where they are used, and in what quantities.

To address the challenge in identifying PFAS in articles, IAEG is in the process of obtaining data on PFAS content in articles. Note that PFAS are often not recognized as hazardous materials in some jurisdictions and therefore are not listed on SDS, or are included as "fluorinated substance" or other generic names.



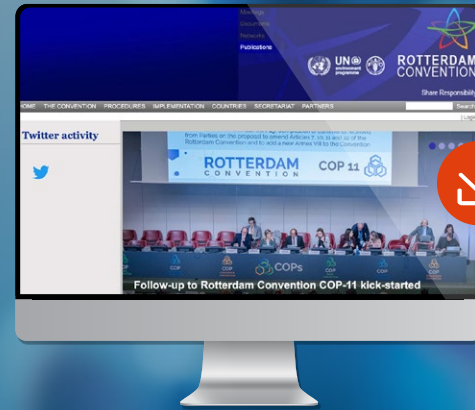
RESOURCES



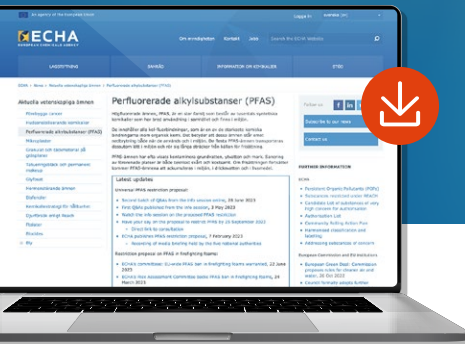
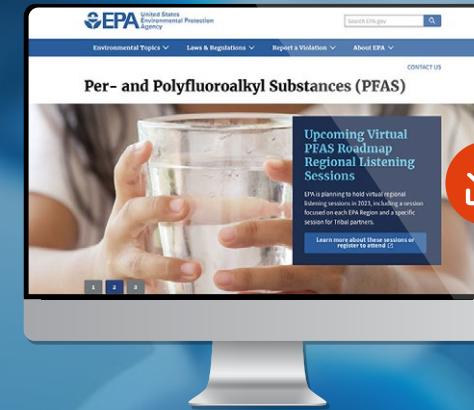
Stockholm Convention



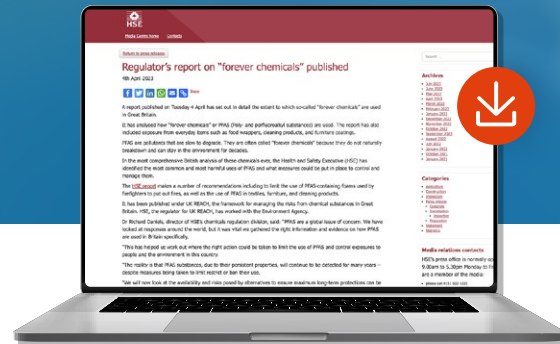
Rotterdam Convention



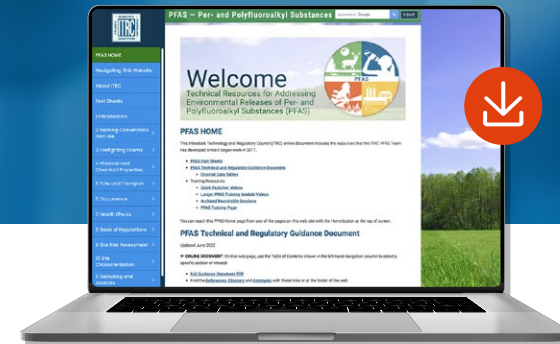
USA EPA PFAS Homepage



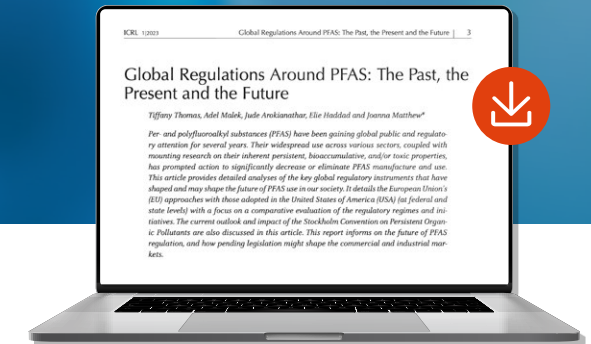
EU PFAS Homepage



UK HSE regulator's report on "forever chemicals"



PFAS Information from ITRC



Haley & Aldrich/Yordas Article in Lexion



LEADING EDGE
SOLUTIONS
ACROSS THE
VALUE CHAIN



RESPONSIBLE &
SUSTAINABLE
AEROSPACE
INDUSTRY

A RECOGNIZED GLOBAL BODY FOR AEROSPACE & DEFENSE

55 MEMBER COMPANIES

72% OF GLOBAL AEROSPACE & DEFENSE INDUSTRY ARE IAEG MEMBERS

\$514B COMBINED ANNUAL 2021 REVENUES FOR IAEG (FULL) MEMBERS

\$712B TOTAL GLOBAL AEROSPACE INDUSTRY 2021 REVENUES

IAEG Full Members

Airbus SAS
ATR
BAE Systems
Boeing
Bombardier
CAE
Dassault Aviation
De Havilland Aircraft of Canada Limited
Diehl Aviation Holding

Embraer
GE Aviation
General Atomics
GKN Aerospace
Gulfstream
Hexcel Corporation
Honda Aircraft Company, LLC
Honeywell
Howmet Aerospace

Huntsman Advanced Materials
Israel Aerospace Industry
L3Harris Technologies, Inc.
Leonardo Company
Lockheed Martin
MTU
Northrop Grumman
ONTIC
Praxair Inc

Rolls-Royce
RTX
SAAB
SAFRAN
Spirit AeroSystems
Textron Inc.
Thales
3M Deutschland GmbH

IAEG Liaison Members

Aero Montreal
Airbus Canada
Airbus Defence and Space GmbH
Airbus Helicopters (Salamander)
Assent Compliance Inc.
BSI Group
CapgeminiSopra Steria
Dassault Systemes Enovia
DXC Technology
Granta Design Ltd

Haley & Aldrich
Hangsterfer's Laboratories, Inc.
Noblis
Ramboll Environment & Health
Risk & Policy Analysts Ltd
SAFECHM Europe GmbH
Sopra Steria
Souriau SAS
Tetra Tech
Yordas Group