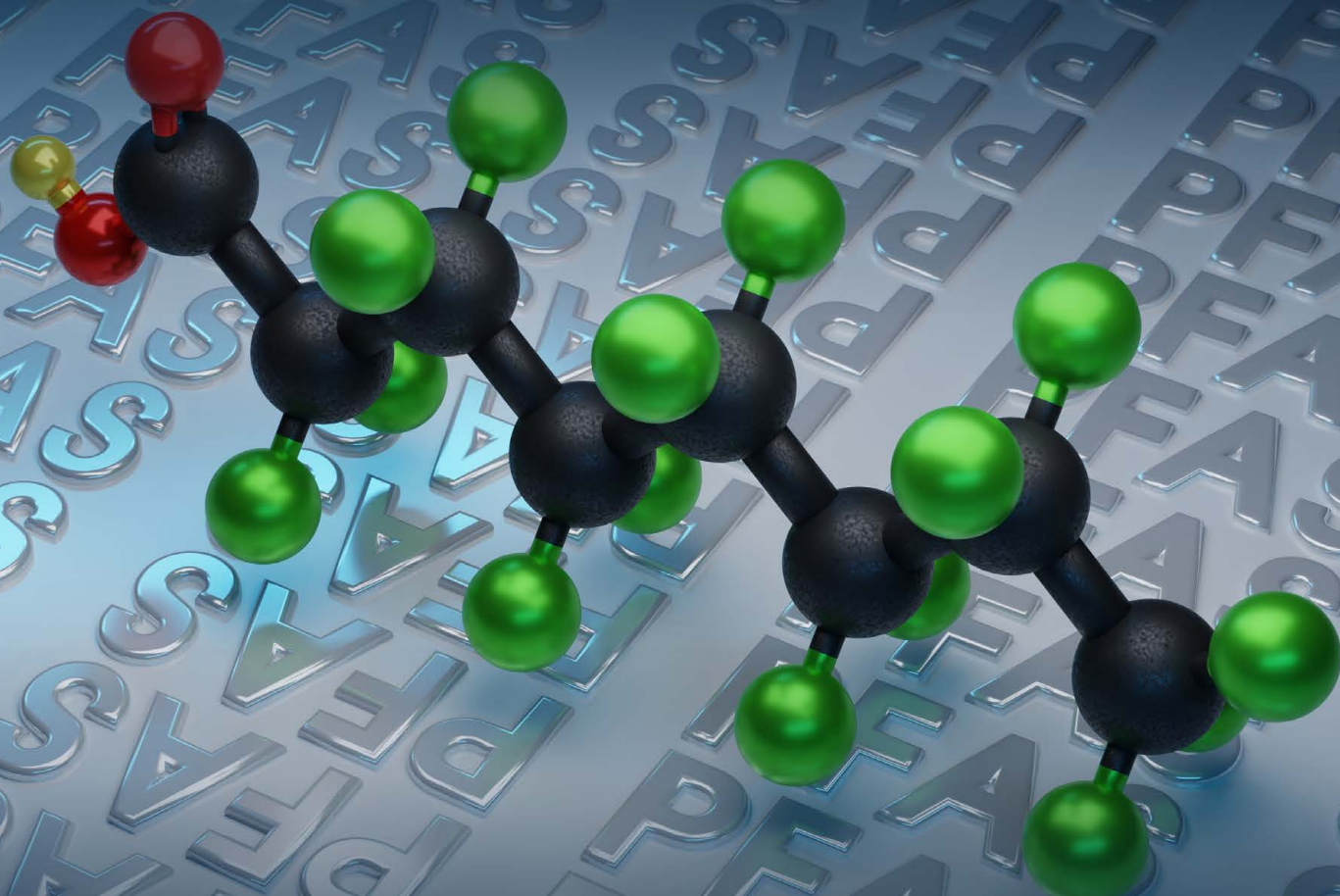


Forever Chemicals



Forever chemicals, called PFAS (per- and polyfluoroalkyl substances) are ubiquitous and long lived.

PFAS molecules, of which there are many types, are formed by artificially connecting carbon

and fluorine atoms to create a fluorinated hydrocarbon. The chemical bond of carbon-

fluorine is one of the strongest single bonds in organic chemistry, which means PFAS do not degrade once in the environment. In addition, PFAS are soluble in water, so can travel long distances.

PFAS are found in rainwater, surface water, wastewater, groundwater, and soils.

As a result, PFAS chemicals end up in our food supply. In terms of prevalence, Dimitrakopoulou et al. (2024) found that drinking water, fish and seafood had the most samples with detected PFAS. The fish and seafood samples had the highest concentrations, sometimes many times higher than regulatory limits.

PFAS concentrations depend on geographic location.

Specific sites such as military bases, fire training grounds, waste management facilities, and former industrial areas where PFAS products were used or exist in large amounts emit high levels of PFAS. Around such areas, risk of harmful levels of contamination is high.

There is a growing understanding of the health effects of PFAS exposure.

The two most common PFAS (PFOA and PFOS, see p.3) are restricted under the Stockholm Convention on Persistent Organic Pollutants due to human toxicity impacting the liver, kidney, thyroid, fecundity, and specifically for PFAO, kidney cancer, testicular cancer, thyroid disease, pregnancy-induced hypertension, and high cholesterol.

While some health impacts are clear, the science is evolving.

Safe human toxicity levels have yet to be established, which makes the modes of action through which PFAS effect human biology an important area of research. Isolating the specific biological mechanisms within humans will enable a clear discussion around what levels of toxicity can be tolerated.

Regulatory responses vary across the globe.

The World Health Organisation (WHO) is presently deciding concentration guidelines, the US has guidelines for the most common PFAS, Australia has guidelines for four PFAS types, and the EU is currently discussing legislation for a wide range of PFAS.

There is a potential legal risk for producers of PFAS products.

Total awarded damages to date for settled PFAS cases are ~US\$15.5 billion, 95% of which were awarded in the US, with the remainder in Europe. In some jurisdictions, PFAS concentrations are legally enforceable.

Technology exists for both PFAS monitoring and clean-up.

Existing technology is well developed and can remove PFAS to within limits required by the strictest regulators. Start-ups exist with modular technology that can be moved direct to site.





PFAS (Per- and polyfluoroalkyl substances)

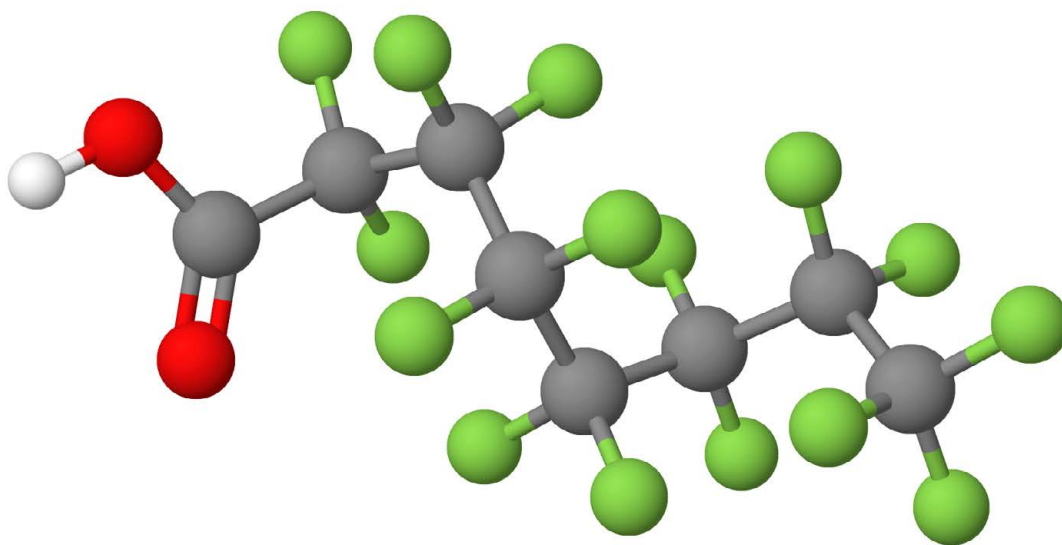
Definition and types

PFAS are a group of anthropogenic chemicals that are resistant to heat, water, stains and grease, and have non-stick qualities. Depending on the definition of the chemical structure used, the Organisation for Economic Co-operation and Development (OECD) lists more than 4,700 distinct PFAS, the US EPA's toxicity database lists more than 14,000, and PubChem lists ~6 million.

First manufactured during the 1940s, PFAS molecules are formed by artificially connecting carbon and fluorine atoms to create a fluorinated hydrocarbon. Within organic chemistry, carbon-fluorine is one of the strongest single bonds, meaning PFAS do not degrade easily in the environment. This characteristic has earned PFAS molecules the nickname 'forever chemicals'.

Perfluorooctanoic acid (or PFOA) is an example PFAS chemical (Exhibit 1). PFOA consists of eight carbon atoms in a chain, with a carboxylic acid¹ group at one end of the molecule. The chain is both water and oil-repelling while the carboxylic acid group is water-loving, resulting in a molecule that decreases the surface tension between two liquids (called a surfactant). As a result, PFOA can make surfaces non-stick, water-repellent and stain-resistant, leading it to be used (historically) in the manufacture of materials such as Teflon and Gore-Tex.

Exhibit 1: Perfluorooctanoic acid (PFOA) representation. Carbon (grey) atoms are bonded to fluorine atoms (green), the carboxylic acid group formed with oxygen (red), hydrogen (white), and a single carbon atom is situated at the end of the molecule.



Source: molview.org, using Jmol model

¹ A carboxylic acid is an organic compound in which a carbon (C) atom is bonded to an oxygen (O) atom by a double bond and to a hydroxyl group (-OH) by a single bond.

Exhibit 2: PFAS examples with uses and human half-life.

PFAS Type	Common Uses	Human half-life
PFOS (Perfluorooctane sulfonic acid)	Stain, oil, and water repellents, firefighting foams	3.3-5.7 years
PFOA (Perfluorooctanoic acid)	Fluoropolymer manufacturing aid, non-stick cookware	1.48-5.1 years
PFHxS (Perfluorohexane sulfonic acid)	Firefighting foams, stain repellents, textiles	2.84-8.5 years
PFBS (Perfluorobutane sulfonic acid)	Food packaging, textiles, specialty cleaners, polishes	665 hours
PFNA (Perfluorononanoic acid)	Wire and cable coatings, gaskets	2.5-4.3 years
PFDA (Perfluorodecanoic acid)	Food contact papers, repellents	4.5-12 years
PFCA (Perfluoroalkyl carboxylic acid)	Stain resistant coatings for textiles, non-stick, coatings for food packaging	0.5-90 years depending on chain length
PFUnDA (Perfluoroundecanoic acid)	Waterproof textiles, industrial uses	up to 9.7 years
PFHxA (Perfluorohexanoic acid)	Water-resistant clothing, food wrappers	14-49 days
PFHpA (Perfluoroheptanoic acid)	Fluoropolymer production, coatings	62 days to 1.5 years
GenX chemicals (e.g. HFPO-DA)	Newer non-stick cookware, waterproof gear	32-70 days
FTOHs (Fluorotelomer alcohols)	Precursors to PFAS, degrades into stable PFAS; coatings and repellents	Unknown
Polymeric² PFAS (e.g. PTFE, PVDF)	Teflon™, some Gore-Tex™, solar panel backing, wire coatings	Unknown

Source: Russell et al. (2013), Russell et al. (2015), Rosato et al. (2024), Tsai et al. (2018), Wang et al. (2025), Centre for Disease Control.

PFOA and perfluorooctane sulfonic acid (PFOS) are the most widely used PFAS.

PFAS enter the body through ingestion of contaminated food and water, using products made with PFAS, or breathing air containing PFAS.

PFAS are often split into short chain (generally containing less than 7 carbon atoms) and long chain. Short chain PFAS generally have higher mobility in soil and water, and are extremely persistent. Scientific understanding of the environmental and health impacts of different chain lengths are evolving.

Environmental impacts

In addition to the strength of the carbon-fluorine bond, PFAS are soluble in water, which leads to a high level of mobility in the environment. So, PFAS both last a long time and travel a long distance. Dimitrakopoulou et al. (2024) analysed over 150,000 entries from food safety authorities and scientific publications from 2017 onwards on PFAS concentrations. To determine PFAS presence, the authors use 'limit of quantification' (or LOQ), defined as the lowest concentration that can be measured reliably.

² Polymeric PFAS can degrade into non-polymeric PFAS, potentially acting as a source of PFAS in the environment.



Exhibit 3: Presence of PFAS in various environmental samples. LOQ refers to 'limit of quantification'.

Category	Surface water	Rain-water	Waste water	Biota	Particulate matter	Ground Water	Soil
Total samples	17,212	33,500	186	2559	65	12,216	283
Number with PFAS greater than limit of quantification (LOQ)	17,013	33,500	79	1,175	33	12,017	152
Percentage with PFAS > LOQ	99%	100%	42%	46%	51%	98%	54%

Source: Dimitrakopoulou et al. (2024)

The results highlight the prevalence of PFAS in the environment, not unexpected in light of the strength of the chemical bonds. As a consequence, PFAS chemicals end up on our plates through various foods (Exhibit 4).

Drinking water and fish and seafood had the most samples with amounts greater than LOQ. In terms of concentrations, some fish and seafood samples had as much as 0.28 mg/kg. For context, the Australian Government proposed trigger points for investigation of PFAS levels specifically for PFOS or PFOS and PFHxS combined for finfish is 0.0052 mg/kg.

Exhibit 4: Presence of PFAS in various foods.

Category	Total samples	Percentage of samples > LOQ	Max concentration (mg/kg)	Mean concentration (mg/kg)
Drinking water	2973	24%	1.00E-04	3.28E-06
Poultry & products	4285	2%	0.012	2.00E-04
Fish & Seafood	9015	15%	0.28	0.014
Fruits	11548	0%	2.00E-06	2.00E-06
Meat & products	9103	2%	0.035	3.00E-04
Vegetables	21896	0%	2.00E-05	6.07E-06

Source: Dimitrakopoulou et al. (2024)

Specific sites where PFAS were used directly have higher concentrations than found in the broader environment. These include military bases, fire training grounds, waste management facilities, and former industrial areas.

Note that people who live near manufacturing plants generally have PFAS concentrations up to 10x higher than the general population, while workers at manufacturing plants can have up to 1000x more. There are no PFAS manufacturing plants in Australia.

Health risks

The health impacts of PFAS are still being understood. Most of the research to date has focused primarily on PFOS and PFOA, which are forever chemicals that are already restricted internationally under the Stockholm Convention on Persistent Organic Pollutants. Given both the long-lived nature of PFAS and the large number of different chemicals that qualify as PFAS, in our view it is important that health effects continue to be investigated.

The Centre for Disease Control and Prevention (CDC) in the United States lists the following health impacts:

- Increases in cholesterol levels (PFOA, PFOS, PFNA, PFDA),
- Lower antibody response to some vaccines (PFOA, PFOS, PFHxS, PFDA),
- Changes in liver enzymes (PFOA, PFOS, PFHxS),
- Pregnancy-induced hypertension and preeclampsia (PFOA, PFOS),
- Small decreases in birth weight (PFOA, PFOS),
- Kidney and testicular cancer (PFOA).

As with other health risks, increased effects associated with PFAS depend on exposure, individual factors, access to safe water, and healthcare.

In addition to those highlighted by the CDC, the Department of Health, Disability and Ageing (DHDA) of the Australian government notes that some studies have found associations between PFAS exposure and later starting age for menstruation and earlier menopause, altered levels of thyroid and sex hormones, reduced liver function, and increased uric acid levels. The DHDA note that most of the evidence relates to PFOA, less common in Australia, and that the studies focus on areas where PFOA are manufactured.

In 2018, the Australian Government convened an expert health panel to investigate the health impacts of PFAS exposure. The members of the Expert Health Panel were Professor Nick Buckley (University of Sydney), Professor Malcolm Sim (Monash University), Dr Ki Douglas (Douglas Consulting Australia) and Professor Helen Håkansson (International Representative, Karolinska Institutet). After examining twenty reports and academic publications, the panel concluded that the health differences between people who have the highest exposure to PFAS and those who had low exposure are generally small. The panel stated that:

‘there is no current evidence that supports a large impact on a person’s health as a result of high levels of PFAS exposure. However, the Panel noted that ... health effects for individuals exposed to PFAS cannot be ruled out based on the current evidence.’

We find this conclusion interesting in light of the large body of research on PFAS toxicity, both in animals and humans. Responding to public pressure, in November 2024, the Australian government established a select committee to inquire into the extent, regulation, and management of PFAS. The select committee published their final report³ in November 2025 that contained 47 recommendations. These included establishing PFAS concentration guidelines in drinking water, to introducing subsidies for monitoring health effects, and establishing a national biomonitoring program. The federal government is yet to respond.

For a summary of current research that details the health impacts referenced above, see the Lancet editorial titled ‘Forever chemicals: the persistent effects of perfluoroalkyl and polyfluoroalkyl substances on human health’ and Fenten et al. (2021). We understand that correlation is not causation, making the understanding of the modes of action through which PFAS effect human biology an important area of research.

As evidence continues to build around PFAS toxicity and the impacts of the broader group of PFAS chemicals are better understood, we support a cautious approach from both companies and regulators.

³ See https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/PFAS_per_and_polyfluoroalkyl_substances_48P/PFAS48P/Final_report

Regulatory environment

As the science evolves, different regulatory bodies are taking different approaches. Under the Stockholm Convention on Persistent Organic Pollutants (POPs), effective from May 2024, PFAS compounds listed as POPs are:

- PFOS (2009),
- PFOA (2019),
- PFHxS (2022).

Signatories to the convention are required to take measures to eliminate or reduce the release of POPs into the environment.

World Health Organisation (WHO)

The International Agency for Research on Cancer, part of WHO, reviewed the literature, and as a result classified PFOA as carcinogenic to humans and PFOS as possibly carcinogenic to humans.

For drinking water, WHO is in the process of developing guidelines for safe use. In the interim, its advice to member states is as follows:

- To strive to achieve concentrations in drinking-water that are as low as reasonably practical,
- Contamination of water sources should be minimized, including preventing new sources of contamination,
- Non-essential uses of PFAS should be stopped, and
- Risks from PFAS need to be balanced with other risks in the water supply including not having adequate supplies of drinking-water.

Europe

The following PFAS are banned or restricted under the Persistent Organic Pollutants (POP) Regulation in the EU:

- PFOS has been restricted since 2009,
- PFOA has been banned since July 2020, and
- PFHxS has been banned since 2023.

The POP regulation shares the same objective as the Registration, Evaluation, Authorisation, and Restriction of Chemicals (REACH) regulation: the protection of human health and the environment. Restrictions under REACH are as follows:

- C9-C14 PFCAs have been restricted since 2023, and
- PFHxA will face restrictions starting in April 2026.

Germany, Denmark, the Netherlands, Norway, and Sweden are proposing additional restrictions covering a wide range of PFAS. In a summary of the PFAS restriction dossier submitted to the European Chemicals Agency, they state that an estimated amount of 186,000 – 340,000 tonnes of PFAS are introduced each year into the European Economic Area. They are proposing a ban with time-limited derogations (6.5 or 13.5 years in duration) for uses with low substitution potential that they estimate will reduce PFAS emissions by 83%. More or less restrictive outcomes are possible – the proposal is currently under evaluation with more news expected towards the end of 2026.

Taking a grouping approach, for drinking water the current limit is for 0.5 µg per litre for all PFAS, and for food a tolerable weekly intake is 4.4 ng per kg of body weight (set in 2021 and 2020 respectively).



United States

At present, the Environmental Protection Agency (EPA) has established legally enforced limits.

Exhibit 5: US EPS PFAS drinking water limits.

PFAS Type	Maximum Contaminant Level Goals	Maximum Contaminant Level (enforceable)
PFOA	Zero	4 ng/L
PFOS	Zero	4 ng/L
PFHxS	10 ng/L	10 ng/L
PFNA	10 ng/L	10 ng/L
GenX	10 ng/L	10 ng/L
Mixtures containing two or more of PFHxS, PFNA, HFPO-DA, and PFBS	Dependent on mixture	Dependent on mixture

Source: US EPA

The EPA rules require:

- Public water systems to complete initial monitoring by 2027, followed by ongoing compliance monitoring. The public must be provided with information on PFAS levels beginning in 2027.
- Public water systems have to implement solutions that reduce these PFAS by 2029 if monitoring shows that drinking water levels exceed maximum concentration limits (MCLs).
- From 2029, public water systems with PFAS that violate these MCLs must reduce levels of these PFAS in their drinking water and must provide notification to the public of the violation.

The regulatory landscape is made more complicated by individual state legislation that varies across the US. At the time of writing, in general, EPA restrictions are tighter than most state level restrictions. Different to the EU, other PFAS chemicals are not regulated at the Federal level.

UK

After leaving the EU, the UK did not continue to evolve domestic PFAS legislation.

Australia

The advice from the National Health and Medical Research Council (NHMRC) is not legally enforceable, and applies only to four types of PFAS.

Exhibit 7: NHMRC guidelines for drinking water.

PFAS Type	Guideline value
PFOA	200 ng/L
PFOS	8 ng/L
PFHxS	30 ng/L
PFBS	1000 ng/L

Source: NHMRC

The Department of Climate Change, Energy, the Environment and Water (DCCEEW) has implemented a PFAS National Environmental Management Plan. The plan takes a risk based approach to PFAS contamination and provides guidelines for tolerable weekly intake at 1.12 µg per kg of body weight for PFOA and 0.14 µg per kg of body weight for the sum of PFOS and PFHxS.

One ng = 0.001 µg, so in the EU tolerable food intake per week is 0.0044 µg per kg of body weight, compared to tolerable total intake of 0.14 µg per kg per week estimated by the DCCEEW. The difference could result from the DCCEEW considering all environmental PFAS sources, not just food intake.

Japan

From April 2026, combined concentrations of PFOS and PFOA in drinking water cannot exceed 50 ng per litre. From January 2025, in terms of manufacture, import and use, Japan has banned 138 different PFAS.

Legal impacts

There have been a number of settlements resulting from legal action taken against companies that have not adequately accounted for PFAS emissions from their operations. These have been settled for large amounts – for a non-exhaustive list see Exhibit 8. PFAS litigation remains ongoing globally, with the consultancy HKA estimating that over 6,400 PFAS related lawsuits have been filed globally between July 2005 and March 2022.

Legislation remains an ongoing risk for PFAS manufacturers and outcomes can involve both financial penalties and clean up requirements.

Exhibit 8: Settled PFAS legal cases.

Company	Jurisdiction	Description	Amount
3M	US	Settlement for a number of lawsuits from communities that had PFAS contaminated water. Amount pays for detection and clean up.	US\$12.5 billion
DuPont, Chemours, Corteva	US	PFAS claims from ~300 drinking water providers	US\$1.18 billion
3M	Alabama, US	Tennessee River PFAS pollution	US\$98.4 million
3M and Wolverine Worldwide	Michigan, US	Wolverine discarded tannery sludge containing PFAS	US\$55 million
3M	Minnesota, US	Harm caused to Hennepin County from PFAS-contaminated ground water	US\$850 million
3M	Alabama, US	PFAS contaminated ground water in West Morgan-East Lawrence Water Authority	US \$35 million
3M	Belgium	PFAS contamination from 3M facility in Zwijndrecht	EUR571 million
Miteni and Mitsubishi	Italy	Pollution of river Agno	EUR137 million

Source: ConsumerNotice, ICLG



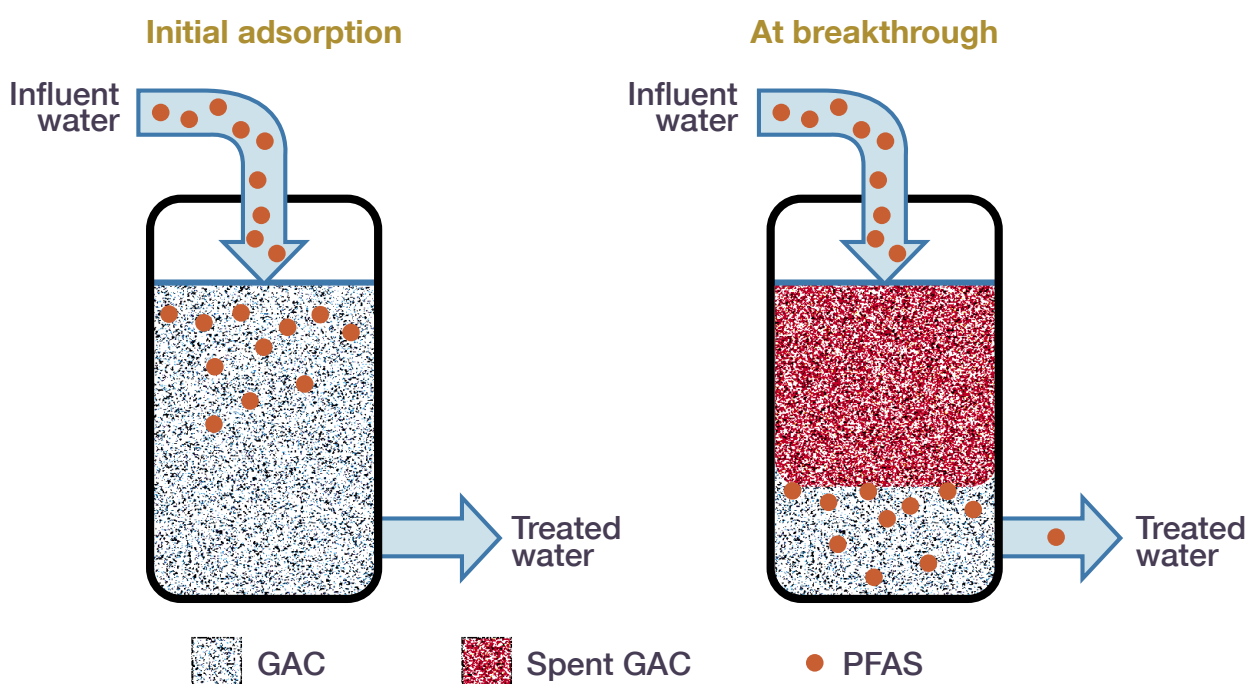
Solutions

As the global legislative and legal environment continues to evolve, the opportunity for testing, filtration, and other clean up technologies increases. We list four technologies highlighted by the EPA that can effectively remove PFAS from drinking water.

Granular Activated Carbon (GAC)

Water passes through treatment columns or beds containing GAC. The GAC has a porous structure with a large surface area per unit mass, so the contaminants in the water attach to the carbon via both hydrophobic and electrostatic interactions. The contaminants are absorbed until the carbon no longer removes as much as required - the time taken to reach this point is known as the 'bed-life'. At this point, called 'breakthrough', the carbon needs replacing or reactivating. The process for reactivation most commonly involves high temperature thermal treatment in a specialised facility.

Exhibit 9: Conceptual diagram of granular activated treatment process.



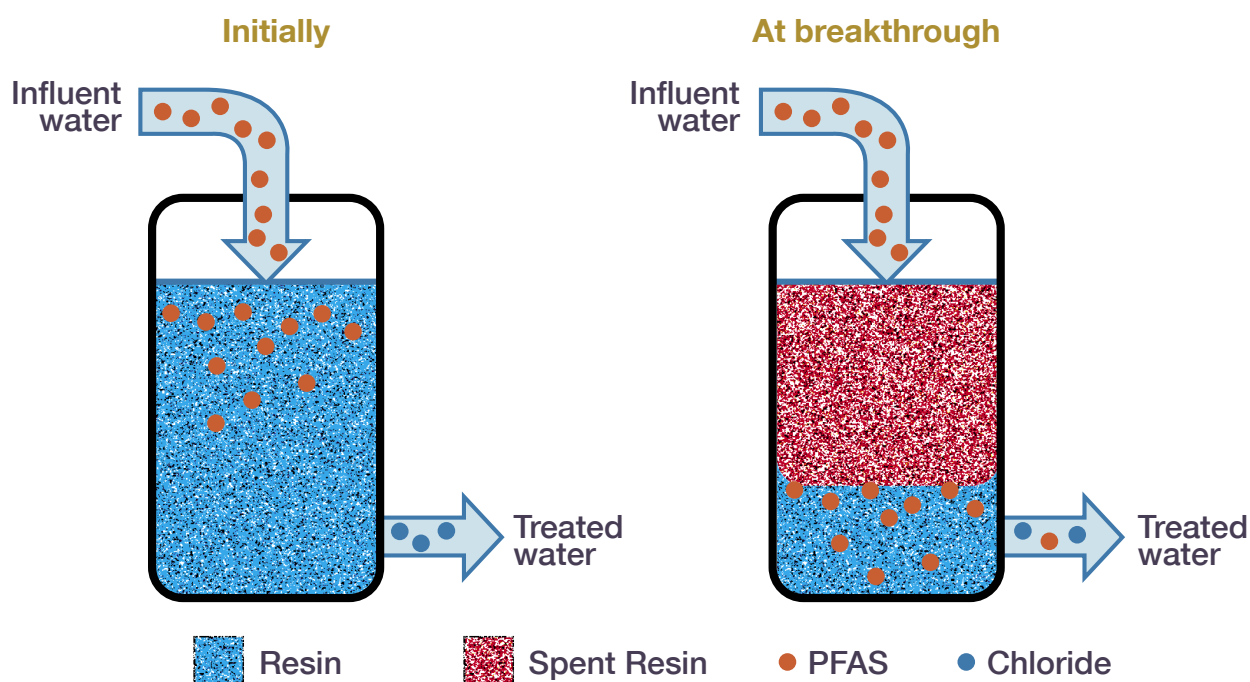
Source: US EPA

About 90% of all PFAS compounds can be removed via GAC. For PFOA and PFOS, removal efficiencies > 99%, resulting in drinking water that achieves the legal concentrations required by US regulation. The US EPA estimates that there are more than 30 full-scale GAC facilities targeting the removal of PFAS from drinking water currently operating in the US. Note that GAC exhibits greater capacity for long-chain PFAS than short-chain.

Ion exchange (IX)

IX is a physical and chemical separation process in which PFAS are exchanged for weaker binding ions (typically chloride) on a resin. For PFAS, the IX process is categorised as anion exchange, because the ions involved (PFAS compounds and chloride) are negatively charged. The resins for PFAS are generally single use.

Exhibit 10: Conceptual diagram of ion exchange treatment process.



Source: US EPA

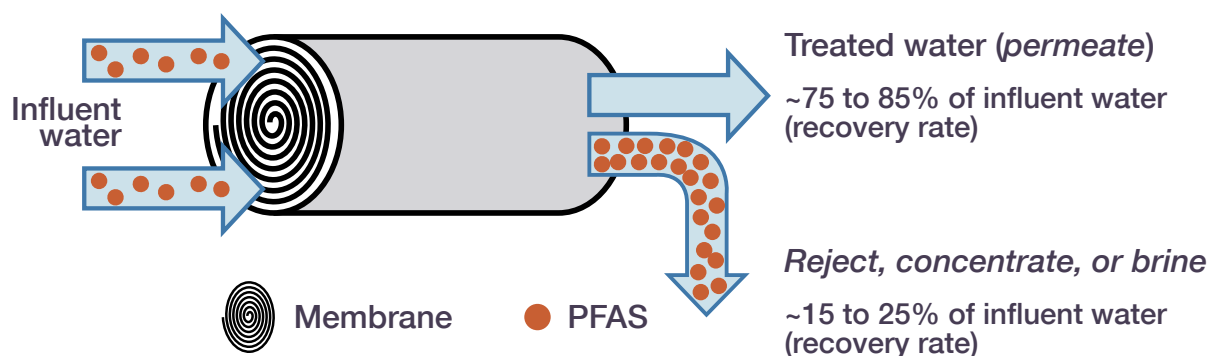
Removal efficiencies are > 99%, meeting regulatory thresholds in the US. Industrial applications are newer in the US than for GAC, with the first IX system commencing operations in 2017.

Reverse Osmosis and Nanofiltration (RO/NF)

These are membrane processes that separate contaminants from drinking water. They separate out the PFAS compounds by forcing the liquid through a membrane at a pressure greater than the normal osmotic pressure. For drinking water, these membranes are generally used in a spiral-wound configuration that consists of several membrane envelopes, wound together in around a central collection tube.

The membrane is semi-permeable, transporting different molecular species at different rates and the application of pressure splits the water passing over the membrane into two streams: treated water or 'permeate' that passes through the membrane layers and water containing higher molecular weight solutes that remains outside the membrane layers, called 'reject'. Recovery rate and rejection rate are the percentages of influent water that are recovered as permeate and lost as reject, respectively.

Exhibit 11: Conceptual diagram of reverse osmosis treatment process.



Source: US EPA



The minimum effective range for contaminant size for reverse osmosis is 0.0001 to 0.0015 microns and for nanofiltration is 0.001 to 0.006 microns. For PFOA and PFOS, maximum removal efficiencies are > 99% to levels lower than the regulatory thresholds in the US. Unlike granular activated carbon and ion exchange, RO and NF do not exhibit breakthrough behaviour with removal efficiency that remains constant over time. RO and NF are newer technologies, with the first two plants constructed at the beginning of the decade.

Point-of-use treatment

These are small treatment processing devices that enable water quality standards to be met at the household level. Designed to treat water where the service enters the house, for the US market these are certified to remove PFOA and PFOS to below 70 ng/L. This is above the values shown in Exhibit 5, so are not EPA compliant at present.





Costs

The US EPA has estimated the costs (using market values from 2022) for building and operating the different treatment processes within the US. They use various realistic assumptions around recovery rates and replacement cycle of the equipment.

Exhibit 12: Costs estimates for PFAS removal technologies. For GAC, costs are for groundwater using pressure. For gravity, costs are similar.

Method	Million gallons per day	Capex (US\$m)	Opex (US\$m)
GAC	0.1	0.4	0.011
	1	1.1	0.11
	10	10	1
	100	80	10
IX	0.1	0.2	0.011
	1	1	0.11
	10	7	1.1
	100	60	11
RO	0.1	2	0.1
	1	3	0.6
	10	10.5	3
	100	80	11

Source: US EPA

For the EPA analysis, costs increased approximately in line with throughput.

Companies

There are a number of companies that provide PFAS cleaning or testing services. We highlight three listed on the ASX and three startups.

SciDev

SciDev focuses on environmental solutions for water-intensive industries and operates globally. The company consists of two divisions: Chemical Services and Water Technologies (which includes PFAS treatment). Total revenue for FY2025 was \$103 million, with \$85 million from Chemical Services and \$17 million from Water Technologies. Expected gross margins across the business range from 20-40%. SciDev uses IX technology via its patented FluorofIX and RegenIX solutions to remove both short and long chain PFAS.

SciDev sees PFAS remediation as a \$US250 billion market globally, and are focusing on the US Department of Defence and the Nordic markets in the first instance. They estimate there are >7000 contaminated sites in the US and Canada, >22,000 in the EU, and >1000 in Australia.

ALS Global

ALS provides environmental testing, laboratory services, and scientific solutions across multiple industries. Revenue of \$3 billion is split across three divisions: Life Sciences (27%), Commodities (36%), and Environmental (37%). In the Chairman's message in the FY2025 annual report, he highlighted that PFAS-related work (at 5% of Environmental revenue) is growing more than twice as fast as the Environmental business as a whole.

ALS are allocating more capex to PFAS related infrastructure and capabilities relative to the rest of the Environmental division, which speaks to the implied opportunity.

Cleanaway

While Cleanaway offers PFAS removal and treatment, PFAS is not mentioned in either the FY2025 annual or sustainability report.

Startups

[Revive Environmental](#) – Removes PFAS to undetectable levels without creating hazardous by products. They have two parts to their business: one that renews GAC on site and one that uses supercritical water oxidation to break down the carbon fluoride bond using temperature and pressure in the presence of an oxidant.

[Aclarity](#) – The technology destroys PFAS using an electrochemical process. The process is as follows:

- 1) The PFAS are absorbed onto an anode surface,
- 2) free electrons break the carbon fluoride bond, resulting in carbon dioxide, hydrogen fluoride, and fluoride ions,
- 3) oxidant radicals are then generated through an electrochemical process, and
- 4) the PFAS are then destroyed. The technology is modular and can be moved to site.

[EPOC Envrio](#) – Manufacturer of PFAS remediation technology called surface active foam fractionation. Presently on 45 sites globally, the technology can remove PFAS with > C5 chain lengths. The technology generates zero waste.

ESG considerations

Risks There are a number of risks from both historical and present emissions of PFAS.

- There is the legal risk for historical emissions from PFAS manufacturers (see Exhibit 8 for awarded damages). In our view, this risk is global.
- There is a current and historical risk for landfill owners and operators: high PFAS concentrations have been found at landfill sites, making this an important ESG consideration.
- Product manufacturers: PFAS are used in multiple products across numerous industries. Governance around PFAS emissions should be embedded in manufacturing processes.

Opportunity The legal and regulatory backdrop provides opportunity for solutions:

- Businesses that can remove PFAS from contaminated sites are positioned well. Processes that can add value additionally to clean up will be at an advantage, given PFAS clean up can be seen primarily as a cost.
- We think there is space in the market for a consumer product that can remove PFAS from household water. We are unaware at present of a solution that provides this to an adequate removal level.
- From a consumer perspective, household products without PFAS could command a premium.
- Businesses that provide products to higher end consumers (e.g., purchasers of GORE-TEX outdoor wear) have an opportunity to innovate with non-PFAS solutions, and possibly command a premium.



Bibliography

About PFAS. (2025, Oct 7). Queensland Government.

<https://www.qld.gov.au/environment/management/environmental/pfas/about>

Brendel, S., Fetter, E., Staude, C., Vierke, L., & Biegel_Engler, A. (2018). Short-chain perfluoroalkyl acids: environmental concerns and a regulatory strategy under REACH. *Environmental Sciences Europe*, 30(9).

<https://doi.org/10.1186/s12302-018-0134-4>

Dimitrakopoulou, M.E., Karvounis, M., Marinos, G., Theodorakopoulou, Z., Aloizou, E., Petsangourakis, G., Papakonstantinou, M., & Stoitsis, G. (2024). Comprehensive analysis of PFAS presence from environment to plate. *NPJ Science of Food*. 8(1), 80.

<https://doi.org/10.1038/s41538-024-00319-1>

Fenton, S.E., Ducatman, A., Boobis, A., DeWitt, J.C., Lau, C., Ng, C., Smith, J.S., & Roberts, S.M. (2021). Per- and Polyfluoroalkyl Substance Toxicity and Human Health Review: Current State of Knowledge and Strategies for Informing Future Research. *Environ Toxicol Chem*. 40(3):606-630.

<https://onlinelibrary.wiley.com/doi/epdf/10.1002/etc.4890>

Forever chemicals: the persistent effects of perfluoroalkyl and polyfluoroalkyl substances on human health. (2023). *eBioMedicine*, 95, 104806.

[https://www.thelancet.com/journals/ebiom/article/PIIS2352-3964\(23\)00372-9/fulltext](https://www.thelancet.com/journals/ebiom/article/PIIS2352-3964(23)00372-9/fulltext)

IARC Monographs evaluate the carcinogenicity of perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS). (2025, Nov 5). International Agency for Research on Cancer, World Health Organisation.

<https://www.iarc.who.int/news-events/iarc-monographs-evaluate-the-carcinogenicity-of-perfluorooctanoic-acid-pfoa-and-perfluorooctanesulfonic-acid-pfos/>

PFAS drinking water standards: state-by-state regulations. (2025, Nov 6). BCLP.

<https://www.bclplaw.com/en-US/events-insights-news/pfas-drinking-water-standards-state-by-state-regulations.html>

Per- and Polyfluoroalkyl Substances (PFAS). (2025, Nov 5). Australian Government Department of Health, Disability and Ageing.

<https://www.health.gov.au/topics/environmental-health/about/environmental-toxins-and-contaminants/pfas>

Per- and Polyfluoroalkyl Substances (PFAS) and Your Health. (2025, Nov 5). Centre for Disease Control and Prevention.

<https://www.atsdr.cdc.gov/pfas/about/health-effects.html>

Perfluorinated chemicals in food. (2025, Oct 31). Australian Government.

<https://www.health.gov.au/sites/default/files/documents/2022/07/perfluorinated-chemicals-in-food-consolidated-report.pdf>

PFOS and PFOA in Drinking-water: Background document for development of WHO Guidelines for Drinking-water Quality. (2025, Nov 5). World Health Organisation.

<https://www.who.int/teams/environment-climate-change-and-health/water-sanitation-and-health/chemical-hazards-in-drinking-water/per-and-polyfluoroalkyl-substances>

Rosato, I., Bonato, T., Fletcher, T., Batzella, E., & Canova, C. (2024). Estimation of per- and polyfluoroalkyl substances (PFAS) half-lives in human studies: a systematic review and meta-analysis. *Environmental Research*, 242, 117743.

<https://doi.org/10.1016/j.envres.2023.117743>

Russell, M. H., Himmelstein, M. W., & Buck, R. C. (2015). Inhalation and oral toxicokinetics of 6:2 FTOH and its metabolites in mammals. *Chemosphere*, 120, 328-335.

<https://doi.org/10.1016/j.chemosphere.2014.07.092>



Russell, M. H., Nilsson, H., & Buck, R. C. (2013). Elimination kinetics of perfluorohexanoic acid in humans and comparison with mouse, rat and monkey. *Chemosphere*, 93(10), 2419-2425.

<https://doi.org/10.1016/j.chemosphere.2013.08.060>

Technologies and Cost for Removing Per- and Polyfluoroalkyl Substances (PFAS) from Drinking Water. (2025, Nov 7). United States Environmental Protection Agency.

https://www.epa.gov/system/files/documents/2024-04/2024-pfas-tech-cost_final-508.pdf

Tsai, M.-S., Miyashita, C., Araki, A., Itoh, S., Bamai, Y. A., Goudarzi, H., Okada, E., Kashino, I., Matsuura, H., & Kishi, R. (2018). Determinants and Temporal Trends of Perfluoroalkyl Substances in Pregnant Women: The Hokkaido Study on Environment and Children's Health. *International Journal of Environmental Research and Public Health*, 15(5), 989.

<https://doi.org/10.3390/ijerph15050989>

Wang, C., Wan Jaafar, W. Z., Hin Lai, S., & Li, J. (2025). Emerging contaminants of perfluoroalkyl carboxylic acids (PFCAs): a review of sources, occurrence, and accumulation in plants. *Environmental Geochemistry and Health*, 47, 456.

<https://doi.org/10.1007/s10653-025-02766-5>

What you need to know about the updated PFAS restriction dossier. (Nov 6, 2025).

<https://www.kemi.se/download/18.43415f2e19a0f60356220f8/1761224887540/What%20you%20need%20to%20know%20about%20the%20updated%20PFAS%20restriction%20dossier-Updated-2025-10-23-2.pdf>

Zhang, Y., Beesoon, S., Zhu, L., & Martin, J. W. (2013). Biomonitoring of perfluoroalkyl acids in human urine and estimates of biological half-life. *Environmental Science & Technology*, 47(18), 10619-10627.

<https://doi.org/10.1021/es401905e>

Disclaimer: Wholesale Clients Only. The information contained in this presentation is made available only to persons who are wholesale clients for the purposes of section 761G of the Corporations Act 2001 (Cth) (Wholesale Clients), and this information is only intended for Wholesale Clients. It may not be distributed or replicated in any form, to anyone who is not a Wholesale Client. The information contained in this presentation is intended for recipients in Australia only. **General Advice.** As the information has been prepared without considering your objectives, financial situation, or needs, you should, before acting on the information, consider its appropriateness to your circumstances. Prior to investing in any financial product, an investor should determine, based on its own independent review and such professional advice as it deems appropriate, the nature and extent of economic risks and merits, the legal, tax accounting characteristics and risk, and the consequences of an investment in the financial product. **No Reliance.** This document is produced by Platypus Asset Management Pty Limited (Platypus) ABN 33 118 016 087, AFS Licence No 301294 and based on information available at the time of the first presentation. The information herein is believed to be accurate as at the time of the first presentation and any opinions, conclusions or recommendations are reasonably held or made but no warranty is made as to accuracy, reliability or completeness. To the extent permitted by law neither Platypus, or any of its related parties, or any of their respective employees or any other person accept any liability for any claim in respect of anything stated herein, and of the consequences of anything, done or omitted to be done by any person acting in reliance, whether wholly or partially, upon the contents of this presentation. No person shall act or omit to act on the basis of any information presented during the course of this presentation without considering and if necessary, taking appropriate professional advice upon his or her own particular circumstances. **Illustrative information only.** This presentation is not, and is not intended to be, an offer or invitation for subscription or sale, or a recommendation, with respect to any financial product discussed herein, nor is it to form the basis of any contract or commitment. Such an offer would only be made by distribution of an offering memorandum relating to any such financial products offering recipients of this presentation should therefore place no reliance on the content of this presentation when making any decision to invest. Any examples or information provided in this document are for illustrative and discussion purposes only and do not represent a recommendation or Platypus' view on future events and in no way bind Platypus. The presentation and this document do not purport to be a complete statement or summary. Past performance is not a reliable indicator of future performance. **Third Party Data.** Where this presentation contains, refers to or relies upon, whether wholly or partially, third party data, third party collative or comparative methodologies or third party data constructs (Third Party Data), Platypus does not and cannot confirm, warrant or guarantee the accuracy, completeness or reliability of such Third Party Data or any contents of this presentation prepared in reliance, whether wholly or partially, upon such Third Party Data, and accept no responsibility or liability whatsoever in respect of such Third Party Data or any contents of this presentation prepared in reliance, whether wholly or partially, upon same.