SUBMISSION

Submission to Select Committee on PFAS

Submission to the Inquiry into PFAS (per- and polyfluoroalkyl substances)

22 November 2024

The Australian Academy of Technological Sciences and Engineering (ATSE) is a Learned Academy of independent, non-political experts helping Australians understand and use technology to solve complex problems. Bringing together Australia's leading thinkers in applied science, technology and engineering, ATSE provides impartial, practical and evidence-based advice on how to achieve sustainable solutions and advance prosperity.

There has been increasing recognition of the environmental and potential health impacts of per- and polyfluoroalkyl substances (PFAS). PFAS are a group of synthetic chemicals with carbon-fluorine (C-F) bonds, giving them high resistance to heat, water, and oil. These properties have led to their use in applications like firefighting foams, non-stick cookware, food packaging, textiles, and medical devices. The stability of the C-F bond, recognised as one of the strongest in organic chemistry, contributes to the persistence of PFAS in the environment and human body. In addition to PFAS contamination at military or industrial sites, PFAS has also been introduced into soil and potentially into the food chain due to agricultural practices.

Health risks associated with PFAS exposure include immune system disruption, reproductive issues, and increased risk of certain cancers. While the Australian Expert Health Panel has indicated that these effects are relatively minor, there is ongoing concern about the long-term impacts on public health. Current guidelines for drinking water are inherently conservative but based primarily on animal studies with significant uncertainty factors when extrapolating to human health risks. For example, perfluorooctanoic acid (PFOA) guidelines assume it accounts for only 10% of an individual's daily intake from water, leaving gaps in actual exposure assessments (NHMRC, 2019). Australia's approach, while evolving, still lags behind some of the more stringent international standards. The national guidelines set in 2023, recommending a combined limit of 70 ng/L for perfluorooctane acid (PFOS) and perfluorohexanesulfonic acid (PFHxS), and 560 ng/L for perfluooctanoic acid (PFOA) in drinking water, are significantly less restrictive than those proposed by the U.S. Environmental Protection Agency, which has suggested enforceable limits of 4 ng/L for both PFOA and PFOS (Braun, 2023). This submission addresses PFAS contamination challenges in Australia, and advocates for comprehensive monitoring and regulatory improvements to safeguard public health and the environment.

ATSE makes the following recommendations:

Recommendation 1: Develop a standardised national framework for monitoring PFAS levels across all states and territories based on legally binding guidelines.

Recommendation 2: Leverage appropriate water technologies to support drinking water monitoring and management, particularly in remote communities.

Recommendation 3: Require utilities to use additional wastewater treatment technologies specifically designed to capture and degrade PFAS, as required.

Recommendation 4: Create a renewed National Water Commission to drive water reform.

Improving PFAS data collection for drinking water

Data collection of PFAS in drinking water supply is relatively new. The first known instance of PFAS monitoring in a drinking water catchment by an Australian water authority was carried out by Melbourne Water in January 2011, with PFOA detected in the Sugarloaf Reservoir offtake on the Yarra River (Friends of the Earth Australia, 2024). While there is ongoing research and monitoring efforts, significant gaps remain in comprehensive data collection, which hinders effective management and remediation strategies. A notable case is the delayed identification of PFAS contamination in the Blue Mountains by Water NSW (WaterNSW, 2024).

To improve oversight of PFAS levels, the Australian government, in collaboration with states and territories, previously launched some PFAS monitoring initiatives, including the PFAS National Environmental Management Plan, the PFAS Investigation and Management Program and other state specific efforts. These programs aim to assess PFAS concentrations across diverse environmental matrices, such as drinking water, soil, and biosolids. However, these programs are often inconsistent and lack the comprehensive scope needed to fully understand the extent of PFAS contamination across the country. A standardised national framework with consistent data requirements for PFAS monitoring would enable better oversight.

The Australian Drinking Water Guidelines (ADWG), established by the National Health and Medical Research (NHMRC), provide a comprehensive and regularly updated framework for maintaining the quality and safety of drinking water across Australia. Though not legally binding, they guide regulators, suppliers, and health authorities in assessing and managing water quality risks to protect public health. Reported breaches in regions like Victoria highlight inconsistencies in meeting the ADWG, indicating variability in enforcement across regions (Victoria State Government, 2024). ATSE's explainer on Closing the water gap also points to a lack of baseline water quality and regular testing in remote communities to meet drinking water guidelines. The ADWG's capacity to address the complex microbial communities in diverse water systems - especially in remote regions with unique geological conditions - may be limited. Implementation challenges are particularly pronounced in rural and remote locations, where resources and infrastructure are often constrained (Clifford et al., 2015). These guidelines could form a starting point from which to standardise PFAS monitoring nationally. ATSE agrees with the proposed inclusion of PFAS in these guidelines and encourages improvements in monitoring activities to support consistent adherence to the guidelines. As highlighted by ATSE's explainer, fit-for-context water treatment technologies can improve access to safe drinking water in remote Aboriginal and Torres Strait Islander communities.

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Mitigating widespread PFAS contamination in consumer products and agriculture

PFAS are not only found in water but are also found in a range of consumer products, including non-stick cookware, food packaging, stain-resistant fabrics, and cosmetics (NHMRC, 2024). These chemicals are used to enhance non-stick, water-resistant, and stain-repellent properties. Investigations have identified approximately 90 sites across Australia with elevated PFAS levels, particularly at military bases and airports where firefighting foams were heavily used (PFAS Project Lab, 2018). Additionally, biosolids applied to agricultural soils contribute significantly to PFAS contamination. Environmental concerns include the "time bomb effect", which describes the delayed, yet potentially harmful, impact of using biosolids (treated sewage sludge) as fertilisers. Over time, this can lead to the gradual release of toxic heavy metals like cadmium and lead into the soil, which may accumulate and eventually contaminate the food chain. PFAS compounds also interact with soil through hydrophobic adsorption and can be taken up by plants, especially in soils with low organic carbon.

Conventional sewage treatment methods are ineffective at removing these compounds, leading to their presence in effluents and sludge from wastewater treatment plants. When biosolids containing PFAS are applied to soil, these substances can leach into groundwater (Johnson, 2022). The transfer of PFAS from biosolids to soil and subsequently into crops poses serious risks to human health. Crops grown in PFAS-contaminated soils can accumulate these chemicals, leading to direct human exposure through dietary consumption. Root vegetables and leafy greens are prone to absorbing higher levels of these substances. Livestock grazing on contaminated pastures or fed with PFAS-affected crops can also accumulate these substances, potentially resulting in contaminated meat, milk, and eggs entering the human food supply. Given the persistence of PFAS in the environment, once they enter the food chain, they can continue to affect human health over time.

Standard water treatments (such as chlorination) often fail to remove PFAS. Additional treatments such as granular activated carbon, anion exchange, and reverse osmosis are more effective at reducing PFAS. Emerging technologies such as foam fractionation require further development but may prove effective in future for water treatment and for remediation of contaminated sites. Water utilities and the overseeing state-based environmental departments can lead in the reduction of PFAS contamination by implementing these additional water treatment methods.

Recommendation 3: Require utilities to use additional wastewater treatment technologies specifically designed to capture and degrade PFAS, as required.

Strengthening Australia's PFAS standards

There are currently no enforceable guidelines for protecting aquatic ecosystems from PFAS contamination. The Australian and New Zealand Guidelines for Fresh and Marine Water Quality, which provide trigger values for PFOS in freshwater (0.13 µg/L) and marine water (0.00023 µg/L), demonstrate an attempt to address PFAS contamination holistically across various aquatic environments. Converting these into enforceable standards would uplift Australia's regulatory approach.

The absence of a functioning Ministerial Council for Water Ministers has hindered effective governance and oversight of water quality management strategies in Australia. To strengthen governance around water management more generally, ATSE has recommended re-establishing an evolved National Water Commission (ATSE, 2024). While this has been raised in the broader context of National Water Reform, this approach would provide a mechanism to manage environmental impacts of PFAS in Australia's waterways and agricultural communities.

Recommendation 4: Create a renewed National Water Commission to drive water reform.

ATSE thanks the Select Committee for the opportunity to respond to the Select Committee on PFAS. For further information, please contact academypolicyteam@atse.org.au.

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References

ATSE. (2024). *Submission to the National Water Reform 2024 consultation*. https://atse.org.au/what-we-do/strategic-advice/submission-to-the-national-water-reform-2024-consultation/

NHMRC. (2024). Per- and poly-fluoroalkyl substances (PFAS), Public Consultation Draft. *Australian Government, National Health and Medical Research Council (NHMRC)*. https://consultations.nhmrc.gov.au/environmental-health/australian-drinking-water-guidelines-2024-pfas/supporting_documents/Draft%20Fact%20Sheet%20%20PFAS%20Public%20Consultation.pdf

Braun, J. M. (2023). Enhancing Regulations to Reduce Exposure to PFAS — Federal Action on "Forever Chemicals." *New England Journal of Medicine*, *388*(21), 1924–1926. https://doi.org/10.1056/NEJMP2303333/SUPPL_FILE/NEJMP2303333_DISCLOSURES.PDF

Clifford, H., Pearson, G., Franklin, P., Walker, R., & Zosky, G. (2015). Environmental health challenges in remote Aboriginal Australian communities: clean air, clean water and safe housing. *Australian Indigenous Health Bulletin*, *Vol 15 No 2*. https://healthbulletin.org.au/articles/environmental-health-challenges-in-remote-aboriginal-australian-communities-clean-air-clean-water-and-safe-housing/#Contaminationofdrinkingwater

Friends of the Earth Australia. (2024, May 3). *PFAS Chemicals in Australian Drinking Water. A Summary*. https://www.foe.org.au/pfas_chemicals_in_australian_drinking_water_a_summary

Johnson, G. R. (2022). PFAS in soil and groundwater following historical land application of biosolids. *Water Research*, *211*, 118035. https://doi.org/10.1016/J.WATRES.2021.118035

NHMRC. (2019). Guidance on Per and Polyfluoroalkyl (PFAS) in Recreational WateR. *Australian Government, National Health and Medical Research Council (NHMRC)*. https://www.nhmrc.gov.au/sites/default/files/documents/attachments/guidance-on-PFAS-in-recreational-water.pdf

PFAS Project Lab. (2018, June 18). *Dangers on doorstep: 90 sites in Australia investigated for elevated PFAS levels*. https://pfasproject.com/2018/06/18/dangers-on-doorstep-90-sites-in-australia-investigated-for-elevated-pfas-levels/

Victoria State Government. (2024, January 25). *Water Compliance Report 2022-23*. https://www.water.vic.gov.au/for-agriculture-and-industry/taking-and-using-water/non-urban-water-compliance-and-enforcement/water-compliance-reports/water-compliance-report-2022-23

WaterNSW. (2024). *Blue Mountains - PFAS investigation and raw water testing results*. https://www.waternsw.com.au/water-services/water-quality/pfas/blue-mountains-investigations