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Australian Academy of Science submission to the
Select Committee on PFAS (per and polyfluoroalkyl substances)

Per and polyfluoroalkyl substances (PFAS) are a group of manufactured chemicals.

PFAS have been widely used in products such as stain-resistant fabrics, nonstick cookware and firefighting foams due to their desirable chemical properties, including oil and water repellence, temperature resistance, and friction reduction. Because of their carbon-fluorine bonds, the majority of PFAS are highly stable – they can persist in the environment for years, and potentially contaminate water sources and accumulate in the bodies of humans and animals.

There is growing recognition of the potential environmental and health impacts of PFAS, with PFAS concentrations detected in drinking water, soils, biosolids, and plant and animal life.

There is an imperative for Australia to enhance its coordination and monitoring efforts and utilise and expand the scientific evidence base on PFAS to inform robust policy responses to address legitimate concerns.

The Australian Academy of Science (the Academy) recommends:

- Establishing a coordinated national monitoring program to determine the extent of environmental PFAS contamination across Australia, which should inform enforceable standards to strengthen the regulation of PFAS.
- Creating a national human biomonitoring program to monitor bioaccumulation of PFAS and other Contaminants of Emerging Concern (CECs) to further understanding of the health risks associated with PFAS and sources of exposure.
- Expanding our understanding of PFAS and the concentrations that require clinical care, developing methods to detect and monitor PFAS contamination, and developing replacements for PFAS in current industrial processes and products by strengthening the scientific evidence base.
- Transparent, up-to-date and reliable risk communication to the Australian public on PFAS contamination and its potential risks.

A nationally coordinated monitoring program to determine the extent of PFAS contamination across Australia

The extent and distribution of PFAS in the Australian environment are not known. This is a significant knowledge gap that needs to be filled. While there has been rapid growth in the amount of data available on PFAS contamination, there is no nationally consistent methodology and protocols, meaning direct comparisons and useful conclusions from different inputs are sub-optimal.

Detailed assessments of PFAS locations and concentrations will improve understanding of the extent of contamination across Australia and allow assessment of environmental and human health risks. The present piecemeal approach is inadequate.

A coordinated national monitoring program is essential to increase environmental monitoring, bring together existing datasets, provide consistent monitoring methods to ensure comparability of data, and inform decision-making for effective management and remediation of PFAS. Such a program should also be used to develop enforceable standards to strengthen national regulation of PFAS.

A nationally coordinated monitoring program to determine the extent of PFAS contamination levels across Australia should be established to allow for assessments of environmental and human risk, and inform effective management and remediation efforts.

Australia's PFAS regulatory approaches should be strengthened to address PFAS contamination.

There are currently no enforceable standards on a national scale to protect our natural environments from PFAS contamination. This requires regulation of the import, use, and manufacture of PFAS, as well as standards for monitoring and remediation of contamination.

Enforceable standards should be built upon the guidance framework presented in the PFAS National Environmental Management Plan, which would strengthen Australia's regulatory approach to monitoring and remediation of PFAS contamination. The standards should focus on the main emission points of PFAS into the environment, including wastewater treatment plants, landfills, and biosolids.

The scheduling of the three main PFAS chemicals perfluorooctanesulfonic acid (PFOS), perfluorooctanoic acid (PFOA), and perfluorohexanesulphonic acid (PFHxS) under the Industrial Chemicals Environmental Management Standard scheme by July 2025 is an important step toward prohibiting and regulating the import, manufacture, and use of these three PFAS. This regulatory approach would be strengthened by Australia ratifying the listing of PFOS, PFOA, and PFHxS under the Stockholm Convention on Persistent Organic Pollutants.

Regulatory approaches must also consider the many PFAS other than PFOS, PFOA, and PFHxS have been developed as replacements. Understanding of the environmental persistence and human health impacts of many of these replacement PFAS is lacking. Regulatory frameworks should assess and monitor the impacts of types of PFAS beyond PFOS, PFOA and PFHxS.

A national human biomonitoring program to monitor health impacts

Adverse health impacts from exposure to PFAS have been reported, such as immune system suppression, increased risk of cancer and metabolic disorders. This has led to global concern about exposure to PFAS from environmental contamination, particularly from contaminated drinking water.

However, further work is required to determine PFAS concentrations that should inform clinical care. This would be aided by establishing a national human biomonitoring program to measure PFAS exposure among Australia's population. Biomonitoring would improve understanding of bioaccumulation of a range of PFAS and other contaminants of concern, where concentrations within a person's body can be higher than is measured in their surrounding environment and may increase their risk of adverse health effects.

Such a program will provide evidence to improve understanding of the health risks of PFAS exposure, inform public health responses and identify at-risk communities. An example is the National Biomonitoring Program in the United States, which played a role in showing key exposure pathways of Bisphenol A (BPA), leading to the removal of BPA from food packaging.

The creation of a national human biomonitoring program to monitor bioaccumulation levels of PFAS and other contaminants of concern is required to further our understanding of health risks associated with PFAS and sources of exposure.

Creating a robust policy response to PFAS requires strengthening our scientific understanding

Creating a robust policy response to PFAS requires strengthening the scientific evidence base to address gaps in knowledge. Several issues require effort to inform Australia's PFAS response, including:

- Developing effective and scalable detection and remediation techniques. Remediation methods must ensure that other harmful products are not formed from partial degradation of PFAS.
- Solutions to replace PFAS in current industrial processes and products. Such replacements should be made sustainably, have thoroughly assessed toxicology, and a planned life-cycle pathway that does not generate harmful contamination.
- Assessing the primary sources of human exposure to PFAS in Australia.
- Toxicological assessments of the main PFAS contaminants are needed to determine the concentrations of PFAS that lead to adverse health effects and require clinical care.
- Determining anthropogenic baseline levels of PFAS in Australia and the mechanisms of PFAS transport through the atmosphere, soils, and surface and groundwaters will provide the necessary scope to effectively understand and remediate PFAS exposure across Australia.

- Understanding the direct and indirect impacts of PFAS on the environment, including the long-term effects of PFAS concentrations of organisms and wildlife and the uptake of PFAS through soils into plants.

Expanding our understanding of PFAS and the concentrations that require clinical care, developing methods to detect and monitor PFAS contamination, and developing replacements for PFAS in current industrial processes and products by strengthening the scientific evidence base.

Effective risk communication and community engagement

The evidence of the effects of PFAS on human and environmental health is evolving. This necessitates transparent, up-to-date and reliable communication of any risk to the Australian public and particular advice to affected communities on minimising exposure to PFAS. Effective communication and community engagement, including with Traditional Owners, will be vital when undertaking monitoring and remediation efforts to support local communities' responses and involvement in decision-making.

Important concepts to communicate include the difference between the presence of contamination in a source, such as drinking water, and the concentration of contamination that is directly related to an increased health risk. There is a difference in health risk between someone exposed to drinking water contaminated with one nanogram per litre of PFAS and someone exposed to far greater levels through working directly with firefighting foams.

In addition, it will be important to communicate that remediation efforts will not be able to completely remove a PFAS contaminant but will be able to reduce it to a level considered safe, or below the limit of detection.

Transparent, up-to-date and reliable risk communication to the Australian public on PFAS contamination and its potential risks will be critical in Australia's PFAS response.

To discuss or clarify any aspect of this submission, please contact Mr Chris Anderson, Director Science Policy at Chris.Anderson@science.org.au.