

PFAS IN FOOD PACKAGING

A SUMMARY, MARCH 2022

The Packaging Forum established the PFAS Technical Advisory Group in 2021 comprised of representation from our members, other industry associations, Crown Research Institute Scion, Ministry for Primary Industries, Environmental Protection Authority, and Ministry for the Environment. The PFAS TAG is tasked with investigating PFAS in food packaging and providing advice to the Packaging Forum board on options for phasing PFAS out of food packaging.

This document is a summary of a recently commissioned report on the latest research and information on PFAS in food packaging.

This summary includes:

- What are PFAS?
- Why are PFAS used in food packaging?
- Why are PFAS a problem?
- What are other countries doing about PFAS in food packaging?
- PFAS levels in food packaging?
- Is there a way to test for PFAS in packaging?
- What are the alternatives to PFAS in food packaging?
- What comes next?
- Where to find out more?

What are PFAS?

Per- and poly-fluoroalkyl substances, also sometimes referred to as fluorine or fluorinated substances, are referred to as PFAS (pronounced pea-fass), a family of more than 4,700 chemicals used in a range of applications and consumer products, including packaging.

PFAS are generally categorised as either short-chain (six or fewer carbon atoms) or long-chain (eight or more carbon atoms) compounds.

In addition to packaging, PFAS can be found in beauty products, waterproofing agents, non-stick cookware, in waterproof outerwear and shoes, in carpets, fabrics and upholstery marketed as stain-proof, in fresh and processed food, and many other applications.

SOURCES OF PFAS



Why are PFAS used in food packaging?

PFAS are lipophobic and hydrophobic, meaning they repel oil and moisture. Long-chain PFAS have been used in fibre packaging for many decades to provide a functional barrier against oil and moisture. Short-chain PFAS are now more commonly used in food packaging, due to phasing out of some long-chain PFAS chemicals.

PFAS may also be present during the manufacturing process of food packaging materials and make its way into packaging in very low levels, as non-intentionally added substances (NIAS).

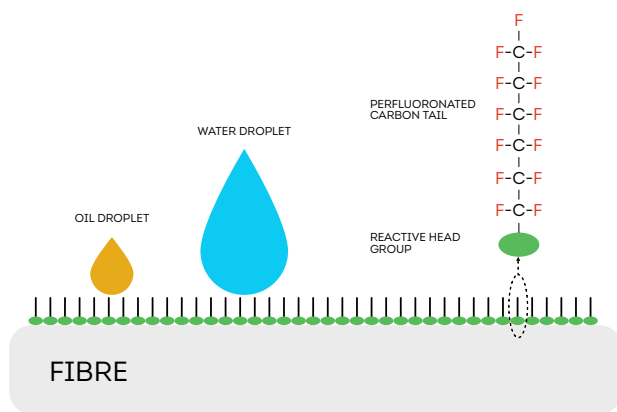


Figure 2: Glenn, G. et al. (2021). Per- and polyfluoroalkyl substances and their alternatives in paper food packaging. *Compr Rev Food Sci Food Saf.*, 20, 2596-2625

Why are PFAS a problem?

PFAS are robust and persistent and do not readily degrade. PFAS are also generally considered to be bioaccumulative, which means they build up in the environment and mammals.

When PFAS build up in humans and animals, they can cause health problems such as liver damage, immune dysfunction, fertility problems and cancer. They also bio-magnify, which means they concentrate higher up the food chain.

Specific PFAS have been detected in more than 90% of European rivers, and it was recently discovered that the New Zealand common dolphin had similar levels of PFAS as those tested in other countries' waters near where PFAS are manufactured.

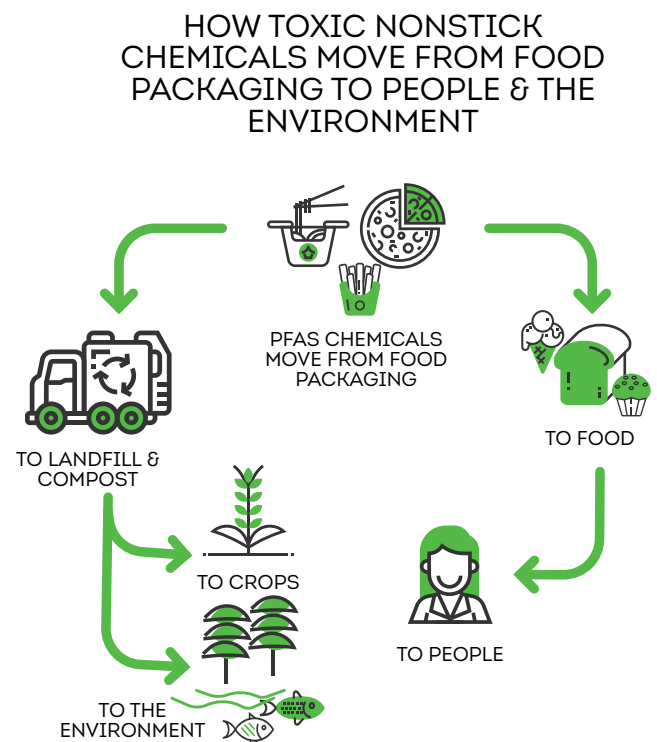
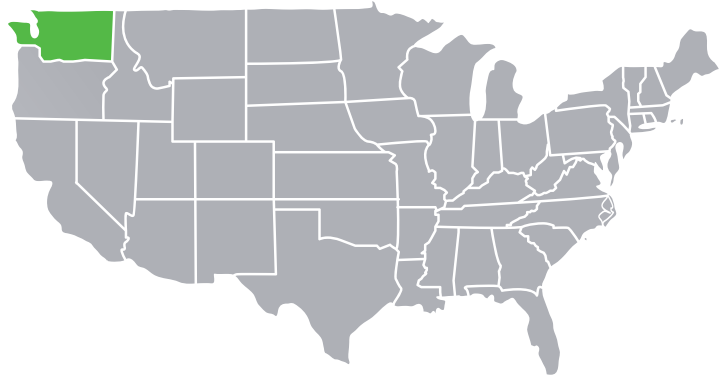
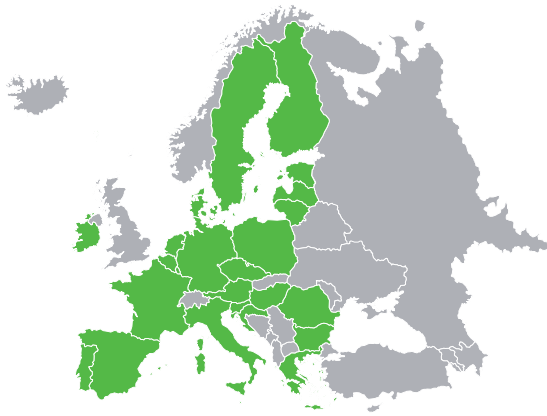


Figure 3. PFAS migration

What are other countries doing about PFAS in food packaging?



The Stockholm Convention on Persistent Organic Pollutants is an international treaty which aims to protect the environment and human health from persistent organic pollutants (POPs). A number of harmful POPs, including long-chain PFAS's Perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS), are on the list of chemicals which 179 countries (including New Zealand) have agreed to restrict.

Many countries have limits in place for the manufacturing of PFAS and for drinking water and food – but there is no universal limit, and not all countries have limits. The USA phased out production of some long-chain PFAS in the early 2000s, but they are still manufactured globally.

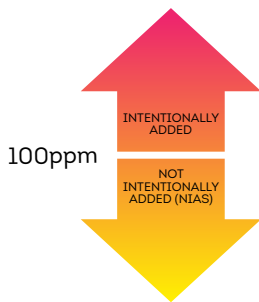
In Europe the European Commission (EC) has an action in their European Chemicals Strategy for Sustainability to phase out all non-essential PFAS use in the EU. Denmark, Germany, Netherlands, Sweden, and Norway have all proposed that the EU adopt a Europe-wide ban on PFAS and is currently being consulted on. The EC continues to tighten restrictions on subgroups of PFAS with no exceptions for food packaging.

In the United States of America (USA) the Food and Drug Administration (FDA) regulates PFAS in food contact materials, and since 2016 no long-chain PFAS have been permitted to be used in food contact applications. There is a current bill being considered by the House Committee on Energy and Commerce to amend Federal legislation to prohibit food packaging with intentionally added PFAS from being sold in the USA.

Additionally, in the USA, state-wide legislation has been introduced to ban PFAS in food packaging in seven states. These commence as early as 2022 in Washington state.

Australia's National PFAS Position Statement uses a precautionary approach to phasing out PFAS where possible. Industry and government in Australia are developing an action plan to phase PFAS out of fibre-based, food contact packaging.

PFAS levels in food packaging?



It is generally agreed a level of above 100 parts per million (ppm) indicates PFAS has been intentionally added to food packaging.

Food packaging may have PFAS already in the starter material prior to manufacturing or be in recycled fibre as a NIAS. Globally the recommended action is to remove intentionally added PFAS from food packaging.

PFAS has been found in food. However, it's often unclear whether PFAS entered the food through the production process (through PFAS contaminated soil, air, water or fertiliser application), or whether they migrated from the packaging into food. Global regulations focus on restricting PFAS from use in any non-essential applications, of which food packaging would be considered.

Is there a way to test for PFAS in packaging?

A common way to test for specific PFAS is an analytical technique called liquid chromatography - tandem mass spectrometry (LC-MS-MS). This technique can measure specific PFAS compounds (~50 of ~4700) down to the number of parts per trillion (ppt). When measuring food and water, even levels of PFAS at ppt can be problematic. With so many PFAS in the market, this method is not the best way of determining whether PFAS are present.

Many studies measuring PFAS in packaging prefer to measure Total Fluorine (TF) or Total Organic Fluorine (TOF) rather than those ~50 specific PFAS. Measuring Fluorine indicates whether there are any PFAS or PFAS precursors, which indicates the presence of intentionally added PFAS when greater than 100 ppm.

TF can be measured using many techniques, but more recently Particle Induced Gamma Emission (PIGE) and Combustion Ion Chromatography (CIC) are being used to measure TF in food packaging. PIGE is a form of nuclear reaction analysis and CIC is a combustion technique at very high heats, both can test to ppm or sometimes ppb - sufficient measurement to identify intentionally added PFAS.

Both PIGE and CIC techniques to test for TF/TOF can be done in Australasia and we are currently working with providers to pursue a commercially available test for industry.

What are the alternatives to PFAS in food packaging?

The global packaging supply chain is working to establish scalable, cost-effective and safe alternatives to PFAS, and packaging manufacturers are conducting trials.

Companies have reported finding potential separate barrier alternatives for each oil and moisture; solutions exist but at a cost of functionality, format or price. No one combined, scalable and proven safe solution that functions as well as PFAS is available currently.

Some are measuring the performance of materials with no barrier additives at all, for certain applications. Some materials can be woven in such a way they do not require additives to improve their resistance to oil and moisture.

The Packaging Forum is currently investigating alternatives to PFAS in food packaging.

What comes next?

- 1 We need to better understand the impact and prevalence of PFAS in the New Zealand packaging supply chain to determine the size of the problem.

The Packaging Forum recommends the following for those who suspect they may be affected by PFAS in their supply chain:

- Approach your manufacturer and ask them to:
 - confirm whether any PFAS are used as ingredients in your packaging material in any concentration, as well as whether any are used on processing machinery; and
 - whether any PFAS or Fluorine testing has been undertaken, and for a copy of the results including the testing methods used.
 - If you don't have direct access to your manufacturer, ask your distributor to provide you with the same information.
 - If you are happy to, please contribute your findings to our research (confidentially), to help us understand the scope of the problem in New Zealand, and determine a potential future phase-out date.
- 2 Investigate alternatives: our next piece of work is to identify safe, scalable, and cost-effective solutions - critical to the success of any phase-out.
 - 3 Identify a target date to phase intentionally added PFAS out of food packaging.
 - 4 Investigate how best to communicate if food packaging has no intentionally added PFAS.

Where to find out more?

Packaging Forum members can access the full report on PFAS in food packaging on our member portal.

If you'd like more information on testing your products, or the work the PFAS TAG is doing, please get in touch with us
packagingforum.org.nz/contact-us

There, you can also sign up to our PFAS newsletter, or send us a message for direct contact with our TAG project manager.



NOT A MEMBER OF THE PACKAGING FORUM?

Contact info@packagingforum.org.nz OR
visit packagingforum.org.nz to find out how to
become a member.

