# Perfluoroalkyl (or polyfluoroalkyl) substances (PFAS) and Human Health

# Health FAQs

(Guidance initially developed in February 2018, updated in November 2023)

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| **In late 2017, the Ministry for the Environment – Manatū Mō Te Taiao – began an all-of-Government programme to help councils and landowners to investigate the extent of PFAS contamination in New Zealand, and to guide them on managing this emerging contaminant. The Ministry of Health – Manatū Hauora – supported this work.** **Crown sites, such as New Zealand Defence Force – Te Ope Kātua o Aotearoa – bases that have historically used fluorinated firefighting foams, undertook investigations. Regional councils around the country also undertook their own investigations into PFAS to understand the sites that may pose a risk to their communities, alongside other contaminated land issues.****More information about this work is available at:** <https://environment.govt.nz/publications/pfas-per-and-polyfluoroalkyl-substances/>**The following summary information is adapted from the information provided to GPs in 2018.** |

**Summary**

Perfluoroalkyl or polyfluoroalkyl substances (PFAS) are manmade compounds produced since the 1950s. Most of what is known about the health effects of PFAS comes from studies of two compounds, perfluorooctane sulphonic acid (PFOS) and perfluorooctanoic acid (PFOA).

Based on available information at the time, the 2018 advice from health officials was that there is no acute health risk to people in the impacted areas, but in specific instances more detailed local advice may be required.

There is no consistent evidence that environmental exposures at the low levels New Zealanders are generally exposed to will cause harmful health effects. The long-term accumulation of these chemicals in the body has prompted concerns about possible health effects.  Long-term the best way to avoid exposure to PFOS and PFOA is to limit their use in New Zealand.

Manatū Hauora worked closely with the New Zealand Defence Force (NZDF) and the Ministry for the Environment to provide appropriate advice and support for actions by those agencies. The Ministry for Primary Industries – Manatū Ahu Matua – also conducted tests for PFOS and PFOA on milk produced from dairy farms neighbouring the Ohakea air base and none were detected above the laboratory’s reporting limits.

Three of the tests had PFAS detections at extremely low levels. These levels were so low that the laboratory would not in the normal course of events report them at all. These levels posed no food safety risk. To put it in context – an 82kg adult would have to drink, per day, every day, over their entire lifetime, more than 15 litres of milk containing PFOS or more than 100 litres of milk containing PFOA at the laboratory’s reporting limits, to exceed health-based guidance values.

Milk is a useful signpost to see if any contamination of productive land had occurred. These results mean there is highly unlikely to be a risk of PFAS transferring into other food and drink sources such as wine grapes grown near Woodbourne base, or home grown fruit and vegetables in the regions around both sites.

When the programme commenced Manatū Hauora used the Australian drinking-water quality values for PFOS and PFOA as interim guidance levels – as neither New Zealand, nor the World Health Organization had set maximum acceptable values for these chemicals in drinking-water in 2018. In 2022 New Zealand updated its Drinking Water Standards to include maximum acceptable values for PFOS and PFOA. The new Standards are consistent with the interim levels used in the programme and are the same as Australian levels (see FAQs 1 and 2, below).

**Questions and answers**

**1. What guidance levels for drinking water were used in the programme?**

During the programme, interim guidance levels for PFOS and PFOA in drinking water were developed by Manatū Hauora. These were derived from effects found at certain doses in animal studies. The calculation of the guidance levels included appropriate uncertainty factors to take account of issues like differences between humans and animals.

The guidance levels are based on a person weighing 70 kg drinking 2 litres of water every day over a lifetime without any significant risk to health. Although there is no consistent evidence that the effects in animals also occur in humans, Manatū Hauora recommended that an alternative drinking water source was used to protect health if the interim guidance levels were exceeded.

In addition, because the levels being analysed in the programme were ultra-trace amounts, and because there is uncertainty in the analysis and seasonal variation in the contamination levels, Manatū Hauora recommended that an alternative drinking water sources were used to protect health, until sufficient sampling had been undertaken to establish that the PFAS concentration did not exceed the interim guidance level.

**2. Have the interim guidance levels for drinking water changed since 2018?**

No, the interim levels used when the programme started were confirmed in regulations made in 2022. The Water Services (Drinking Water Standards for New Zealand) Regulations 2022 updated New Zealand’s Drinking Water Standards. The Standards set maximum acceptable values for substances in drinking water – including microbiological (eg, *E. Coli*), inorganic (eg, chlorine and lead), inorganic (eg, PFOA and PFOS), and radiological determinands. The maximum acceptable value for PFHxS + PFOS is 0.00007 mg/L, while PFOA is 0.00056 mg/L.[[1]](#footnote-1) These are the same as the Australian levels.[[2]](#footnote-2)

**3. Was an alternative water supply available to affected people?**

Yes. Bottled water was available to households in the affected areas whose drinking water source was a bore until such time that the bore water was known to meet the interim drinking-water guideline values for PFOS and PFOA. This approach was a precautionary health measure and not based on a known health risk.

**4. If PFOS and PFOA compounds were suspected in the water what were people advised to do?**

While people were waiting for test results for drinking water sourced from bores in the area identified by NZDF as potentially affected, as a precaution they were advised to drink bottled water that was made available. This advice applied to water used for drinking, food preparation, cooking, brushing teeth, or any activity that involved in ingestion of water.

**5. Is it safe to swim and shower in potentially affected water?**

Yes. The risks to health come from the ingestion of PFOS and PFOA compounds. Any water ingested in any activities not listed above would be minimal.

**6. What health support was provided if the results showed levels of PFOS and PFOA above guidelines in the water?**

The form of health support depended on what the tests results showed. If residents were concerned about their health, they were advised to seek advice from their GP. Residents in the affected areas were also able to talk with their local Medical Officer of Health.

**7. What is meant by “no acute health risk”?**

No acute health risk means that exposure to PFOS and/or PFOA will not pose any significant health effects today. Our approach was a pre-cautionary one because we knew these compounds accumulate in the body but we don’t fully understand the effects this could have on human health in the long-term. Therefore, limiting any further exposure is the best course of action for reducing any long-term health risk.

**8. Are there any health effects linked to PFOS and PFOA compounds in humans?**

The potential effects of exposure to PFOS and PFOA to human health continue to be studied. These studies involve laboratory animal studies, as well as occupationally exposed workers, residents in communities with higher exposure, and studies of the general population in the USA and other countries.

Adverse health effects have been demonstrated in animals exposed to much higher levels of PFOS and PFOA than are known to occur in people. Changes in the liver, thyroid, and pancreatic function, and some changes in hormone levels have been reported.  However, the results of these animal studies and their relevance to humans are not always clear.

Potential adverse health effects in humans cannot be excluded but further research is needed to understand whether the adverse effects seen in animals have any implications for human health.

Researchers have studied people who were occupationally exposed to relatively high levels of PFAS, and communities exposed to PFOS, including through drinking water, for 50 years from a US manufacturing plant. Studies have looked for effects on cholesterol levels, male hormones, heart disease, liver changes, cancer risk and other effects.

These studies have not consistently shown that PFAS exposure is linked to adverse health effects. However, many of these studies reportedly have significant methodological issues that limit the conclusions that can be drawn from their findings.

**9. How can I be exposed to PFOS and PFOA compounds?**

PFOS and PFOA are found in the blood of people and animals all over the world and are present at low levels in a variety of food products and in the environment (air, water, soil, etc.). Therefore, completely preventing exposure to PFOS and PFOA is unlikely, and no effective recommendations can be made for reducing individual exposures in the general population.

A variety of consumer products such as surface-protective coatings on clothing, carpets, and paper packaging have contained different types of PFAS in the past. Recent efforts to remove PFAS in many of these products have reduced the likelihood of PFOS and PFOA exposure. In addition, research has suggested that exposure from consumer products is usually low.

**10. Could my existing health problems be caused by PFOS and PFOA exposure?**

If you are unwell for any reason see your doctor.

**11. Are there future health problems which may occur because of PFOS and PFOA exposure?**

There is no conclusive evidence that PFOS and PFOA exposure will result in future health problems.  The evidence of health effects is not clear, and some effects may not be clinically significant. Talk to Healthline on 0800 611 116 about your concerns.

**12. Were people in affected areas recommended to get blood tests?**

Tests for measuring PFAS levels in people are not routinely available. Individual blood testing is not recommended. The results only indicate if you have been exposed to PFOS and PFOA, but everyone will have had some exposure.  It cannot tell you if you will develop health effects because of the exposure.

Repeat serum PFAS tests were not recommended as PFAS in the body decreases slowly over years if significant exposure to PFAS ceases. In addition, as PFAS is widely used and persistent in the environment, people will still have other exposures even after they have stopped drinking water with PFAS above the interim guidance level. The interim guideline for drinking water set during the programme was conservative as it anticipated that there are other sources of PFAS in our diet. Studies suggest that the half-life (the time it takes for the amount to be reduced by half) of PFAS  could be as long as nine years, so repeating serum PFAS testing after a year or two would not show whether a person’s levels were decreasing.

**13. How could exposure to PFOS and PFOA compounds affect my pregnancy?**

There is no consistent evidence of effects in pregnancy. For specific advice talk to your doctor.

**14. Should I continue to breastfeed?**

Yes. While some PFOS and PFOA compounds have been detected in breast milk overseas, the proven health benefits associated with breastfeeding outweigh any potential health risk to an infant from the transfer of PFOS and PFOA compounds through breast milk.  For specific advice talk to your doctor.

**15. How long does it take for PFOS and PFOA to leave my system?**

In humans, studies suggest that the half-life (the time it takes for the amount to be reduced by half) of PFOS and PFOA compounds could range from two to nine years. The time it takes for PFOS and PFOA compounds to be excreted from the body is the same for adults and children.

**16. The advice about health risks from PFOS and PFOA exposure is uncertain.  How do I deal with this?**

People were advised to keep informed and use the resources offered.  They were encouraged to contact Healthline on 0800 611 116 if they had concerns.

**17. What about the health of NZDF staff who had direct contact with PFOS/PFOA foam?**

Direct exposure through skin contact carries low risk to human health. Additionally, staff wear protective clothing during training exercises, further limiting their exposure to PFOS or PFOA. The greatest risk to human health from PFOS and PFOA is from ingesting contaminated food and drink. Therefore, NZDF staff on the affected sites were considered to be at the same level of risk as neighbouring residents.

**18. Are there health risks to firefighters?**

We believe the risk of harmful effects to firefighters is low, as 95 percent of foam historically used by Fire and Emergency NZ does not contain PFOS or PFOA. In terms of historic use of foam containing PFOS or PFOA, health officials advise the greatest risk they present to human health is from ingesting contaminated food and drink. Direct exposure through skin contact carries low risk to human health.

Safety of people – both the community and firefighters – is Fire and Emergency NZ’s number one priority. Fire and Emergency NZ  worked closely with its people, stakeholders, and government partners to monitor progress during the programme on investigations into the potential effects of PFOS and PFOA, and offers assistance if any of its people are concerned.

**19. How will I know if the advice changes?**

Government agencies will continue to assess the situation, undertake comprehensive health risk assessments and testing of water to update this advice.

**Updated November 2023**

1. Refer to Table 3 of the Water Services (Drinking Water Standards for New Zealand) Regulations 2022, available at: <https://www.legislation.govt.nz/regulation/public/2022/0168/latest/whole.html>

 [↑](#footnote-ref-1)
2. Australian Department of Health website has information about their health based guidance for PFAS: <https://www.health.gov.au/resources/publications/health-based-guidance-values-for-pfas-for-use-in-site-investigations-in-australia?utm_source=health.gov.au&utm_medium=callout-auto-custom&utm_campaign=digital_transformation> [↑](#footnote-ref-2)