



Inspectie Leefomgeving en Transport
Ministerie van Infrastructuur en Waterstaat

Risks posed by TFA to our drinking water quality





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Colophon

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Summary

In 2024, some 456,000 kilogrammes of PFAS-containing pesticides were used in the Netherlands to protect crops. In the soil, these pesticides break down partly into trifluoroacetic acid (TFA, an ultra-short-chain PFAS). TFA is toxic, hardly breaks down at all and moves easily through the environment. Because it is not yet technically or economically feasible to remove the substance effectively from water, TFA ends up in our drinking water. Because it also does not break down, its concentration in our environment continues to rise. There are also indications that TFA accumulates in certain crops.

Calculations by the ILT show that at least 21,000 kilogrammes of TFA are released each year as a result of the use of PFAS pesticides. This makes pesticides one of the largest known sources of PFAS pollution in the Netherlands.

TFA from pesticides ends up in the groundwater, in surface water or in crops. Surface water shows very high levels of TFA. Drinking water produced from surface water usually contains higher levels of PFAS than the recommended limit. This PFAS consists largely of TFA.

Shallow groundwater has now also been found to contain TFA levels that exceed the health-based value recommended by the RIVM for drinking water (the indicative drinking water guideline value). This pollution is making its way into the deeper groundwater layers, towards the depths from which we pump our drinking water. The ILT notes that TFA also poses a threat to drinking water produced from groundwater if we continue to add TFA to soil and water.

Introduction

The ILT considers a clean, safe and healthy environment to be important. Also when it comes to the development and use of chemical substances. With its 'Substances of High Concern' programme (abbreviated in Dutch as ZZS), the ILT has set itself the objective of reducing human and environmental exposure to the most hazardous chemicals.

One of the substances for which exposure levels are too high is PFAS. That is why the ILT is carrying out research and inspections focusing on this group of substances. The ILT is responsible for supervising the drinking water supply in the Netherlands and monitoring chemical substances.

One line of research showed that pesticides containing PFAS are a major source of TFA. PFAS pesticides break down, to varying degrees, into the ultra-short-chain PFAS TFA. TFA poses a threat to the quality of our drinking water. In this report, the ILT sets out the situation regarding TFA and outlines the conclusions it has drawn.

1. What do we know about TFA from pesticides?

TFA is part of the group of substances known as per- and polyfluoroalkyl substances (PFAS). It is 1 of the simplest PFAS compounds, with a very short chain. TFA is the end product of the breakdown of fluorinated hydrocarbons, such as PFAS pesticides.

1.1 Why is it urgent that the addition of TFA be stopped?

TFA does not break down in the environment. It washes out and moves around easily. As a result, it poses an ever-increasing risk to groundwater, surface water and drinking water, as well as to the soil and the crops grown on it.

Based on advice from the EFSA, the RIVM has drawn up indicative guideline values for PFAS intake via drinking water and food. In more than half of all cases, drinking water produced from **surface water** already contains higher levels of PFAS than the value recommended by the RIVM (the indicative drinking water guideline value)^{1,2}. Recent research shows that this PFAS consists largely of TFA^{3,4}.

If exposure to PFAS (through food and water) is too high, there is a risk that people may fall ill more easily or that the development of unborn babies may be affected. Babies could have lower birth weights, for instance. It is also possible that people's livers or endocrine systems may be damaged.

The World Health Organisation (WHO) is expected to issue guidance next year on (among other things) exposure to PFAS. In the meantime, the Minister for Infrastructure and Water Management has asked for the implications of stricter drinking water standards to be charted out⁵.

The annual **groundwater survey** also shows that, of all PFAS, TFA is the most commonly found. It is found in 73% of the samples taken from shallow groundwater. In 11% of the measurements, the level exceeds the indicative drinking water guideline value^{6,7}.

TFA penetrates deep groundwater more quickly than other PFAS⁸. If nothing changes, within 20 years the PFAS concentration in deep groundwater - from which we source our drinking water - will also exceed the indicative drinking water guideline value⁹.

This means that additional purification is required. This is because water companies are barely able to remove TFA from drinking water using standard technologies¹⁰. New technologies are complex, costly and energy-intensive¹¹. For drinking water treatment alone, these costs are estimated to run

into the billions¹². If TFA is removed, the drinking water company then discharges the TFA-containing waste stream back into surface water¹³. The water companies thus unwittingly circulate the substance throughout the Dutch environment, meaning that the environmental impact of TFA remains unchanged.

Finally, TFA poses a threat to our food chain. It can be absorbed by crops, for instance. There is not much data available on this. However, a recent survey by the Pesticide Action Network shows that European cereal products contain levels of TFA that are several times higher than the Maximum Residue Limit (MRL)¹⁴. Another survey by Örebro University reports high levels of TFA in juices and fruit purées.¹⁵

1.2 What is known about TFA volumes?

Research shows that some PFAS pesticides are converted into TFA in the environment^{16,17}. Sales of PFAS pesticides rose from 250,000 kilogrammes to 456,000 kilogrammes between 2022 and 2024¹⁸. A Danish study shows that at least 11% of the PFAS pesticides used in the Netherlands is converted into TFA¹⁹. Based on the TFA equivalents of these substances, the ILT has calculated that at least 21,000 kilogrammes of TFA are released annually.

By way of comparison: According to a rough estimate from 2021, Dutch companies discharge approximately 2,000 kilogrammes of various types of PFAS into water each year²⁰. And the total annual quantity of TFA transported from Germany via the Rhine is between 60,000 and 80,000 kilogrammes per year²¹.

There are also other sources of TFA, notably the breakdown of refrigerants in the atmosphere (F-gases). Various studies have found that the use of pesticides is 1 of the main sources of TFA^{22,23}.

1.3 How do we know that the TFA measured is related to crop protection?

Studies in Germany²⁴, Switzerland²⁵, Denmark²⁶, Sweden²⁷ and Norway²⁸ show that TFA concentrations in groundwater are significantly higher in areas with agricultural land than in areas where PFAS pesticides are not used. This is also evident in the Netherlands. The province of Utrecht measures TFA at various locations. In areas with crop production and orchards, the province has found significantly elevated concentrations of TFA in the upper groundwater layers; in 37% of cases, these are (far) above the indicative drinking water guideline value for TFA of 2,200 ng/l²⁹. Recent research commissioned by Vewin and 7 provinces also shows that there is a link between TFA concentrations in some deeper groundwater layers and the cultivation of crops on which large quantities of PFAS pesticides are used³⁰. The water company WMD (Drenthe) has found high concentrations of TFA in the shallow groundwater (up to 25 metres) at some locations in agricultural areas.

2. The authorisation system does not prevent TFA from accumulating further in the environment

In April 2025, the Board for the Authorisation of Plant Protection Products and Biocides (Ctgb) asked the minister to speed up the European assessment of pesticides that break down into TFA³¹. The European Commission sees no reason to speed up the process, but Member States are free to take measures at the national level.

On 18 December 2025, the Ctgb announced that it would itself reassess 46 products³². This decision follows a Danish study³³. The Ctgb aims to reach a decision on those 46 products by 30 April 2028 at the latest. The Ctgb is making a major effort in this regard. However, if we look at the volumes used in the Netherlands in 2024 (and based on the substances still permitted in

2026)³⁴, this concerns 64% of all PFAS pesticides. One third of the substances fall outside the scope of the Ctgb's assessment, even though these substances also break down, in part, into TFA. The Ctgb does not have the mandate to investigate these substances itself, as the Danish researchers have done.

The system used by the Ctgb is based on a European assessment framework. The protection of people, the environment and drinking water is important in this regard. This assessment has its limitations, however. The accumulation of the same degradation product from different sources (such as the breakdown of PFAS pesticides into TFA) cannot be taken into account in the Ctgb's assessment, for instance. Nor can the current levels of TFA in drinking water in the Netherlands and recent (shallow) groundwater measurements be taken into account^{35 36}. It could therefore be the case that the drinking water does not meet the health-based drinking water guideline value for PFAS recommended by the RIVM, whilst at the same time it is not possible to prevent the addition of further PFAS.

The ILT notes that the Ctgb is making efforts within its own remit, but currently lacks sufficient means to safeguard the quality of drinking water.

3. Lack of clarity concerning the duty to minimise

As described in the previous chapter, (re)assessments at European and national level are processes that take years. The ILT notes that the problem relating to drinking water extraction is too urgent to wait for this.

In addition, the ILT sees other ways of protecting drinking water at short notice. For example, through what is known as the specific duty of care, also referred to as the duty to minimise. In the Netherlands, PFAS (including TFA and PFAS pesticides) have been on the Dutch list of Substances of High Concern (ZZS) since the end of 2024. Companies are obliged to prevent emissions of these substances and, when this is impossible, to minimise these emissions as far as possible³⁷.

This specific duty of care also applies to the cultivation of crops. It is unclear how users of PFAS pesticides fulfil this duty of care, and whether they are in breach of it if they do not minimise their use.

The Environment and Planning Act may also offer opportunities to ban PFAS pesticides from drinking water protection areas.

4. Conclusion and recommendations

The risk posed by increasing exposure to TFA is not being managed adequately. The cost of removing substances from drinking water, from our food and from the environment is being passed on to future generations. From the perspective of drinking water protection, public health and tackling PFAS discharges, the rapid phasing out of PFAS-based pesticides is the logical course of action. The ILT wants to bring the parties together to resolve this issue jointly.

The ILT notes the following:

- The Ctgb currently lacks sufficient (legal) instruments for immediate phasing out. It is therefore important to collect data on TFA formation for all PFAS pesticides used in the Netherlands. This will make a rapid phase-out possible. The Ctgb cannot do this on its own.

- The authorisation and monitoring system currently fails to take sufficient account of the wider impact of PFAS pesticides, local levels of contamination and the accumulation of substances.
- It may be possible to bring an end to the use of TFA-forming pesticides in drinking water protection areas more quickly by introducing better regulations on their use.
- Under the Environment and Planning Act, it is possible to explicitly include a ban on the use of PFAS pesticides in drinking water protection areas³⁸.
- Lack of clarity concerning the specific duty of care hinders an effective approach to TFA contamination.
- There is insufficient data on TFA levels in crops and surface water.

Recommendations

The ILT recognises the dilemma faced by pesticide users and public authorities. PFAS-containing products form part of the range of measures used to protect crops; at the same time, we must reverse the trend of rising TFA levels in our drinking water. The ILT sees opportunities for this both on the authorisation side and on the user side.

Authorisation side

It is important to have a clear understanding of TFA formation for all PFAS pesticides used in the Netherlands. Then we will know which substances need to be phased out quickly. This requires collecting data on TFA formation; this data collection must be commissioned.

The Ctgb could also consider whether there are any options available under the precautionary principle whilst scientific uncertainty persists. Consideration could also be given to usage regulations to prevent the use of certain pesticides in drinking water protection areas.

From a societal perspective, it is important to review the system of authorisation and supervision. For example: is sufficient attention being paid to recent measurements, the accumulation of substances and other adverse effects on the environment? The NVWA and water authorities could carry out more monitoring to gain a better understanding of TFA levels in crops and surface water.

User side

The ILT sees opportunities on the user side, too, to turn the tide. Provinces can take direct action to protect drinking water sources within their own legal framework.

Users also have a duty to minimise and must reduce the emission of substances of high concern (ZZS) to zero or, failing that, limit them as much as possible. There appears to be some confusion regarding this specific duty of care in relation to outdoor cultivation. This hinders the effective tackling of TFA pollution. We need clarity on this as soon as possible. Public authorities, sectors and industry associations can play an important role in this regard.

The ILT will engage in discussions with the relevant parties regarding the findings in this report and the courses of action it envisages.

This is a publication by the

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Endnotes

¹ Measurement results from 2015 to 2021; see [PFAS in drinking water in the Netherlands. RIVM letter report 2022-0149 RIVM \(in Dutch\)](#)

² Drinking water complies with the current legal standard for PFAS. Based on new scientific findings, the RIVM has proposed a stricter drinking water guideline value for PFAS of 4.4 ng/l. Tap water sourced from groundwater usually meets these standards, but tap water sourced from surface water generally contains higher levels of PFAS than the RIVM's proposed drinking water guideline value. Besides in drinking water, people can also be exposed to PFAS in other ways, such as through food. The volume of PFAS that people can ingest from tap water alone is generally limited. The RIVM therefore considers it safe to continue drinking tap water. See also page 20 of the [ILT's Drinking Water Report from 2024 \(in Dutch\)](#).

³ The contribution of TFA ranges from 11% to 46%. See [Poly- and perfluoroalkyl substances in the Rhine, the Meuse and drinking water \(in Dutch\)](#), Jonker, M.T.O, Utrecht University, 2024.

⁴ [Risk assessment of exposure to PFAS through food and drinking water in the Netherlands](#), 2023

⁵ [PFAS Summary Letter \(in Dutch\) | Parliamentary Document | Rijksoverheid.nl](#)

⁶ [Groundwater in the Netherlands is unlikely to comply with the WFD due to PFAS \(in Dutch\)](#)

⁷ [Report on Groundwater Quality in the Netherlands \(in Dutch\) | The Water Quality Portal](#), October 2025, page 66 et al.

⁸ [Trifluoroacetic acid \(and other ultrashort-chain PFAS\) in abstracted groundwater for drinking water production](#), KWR, 2025

⁹ [Quick Scan impact of diffuse PFAS contamination on groundwater extraction sites](#), KWR, 2024

¹⁰ [Trifluoroacetate \(TFA\): Laying the foundations for effective mitigation | Umweltbundesamt](#)

¹¹ [PFAS in Drinking Water: A Technical and Societal Challenge \(in Dutch\)](#), Arcadis, June 2025

¹² [The cost of PFAS pollution for our society](#), European Commission, 2026

¹³ [Trifluoroacetic acid \(and other ultrashort-chain PFAS\) in abstracted groundwater for drinking water production](#), KWR, 2025

¹⁴ [High levels of 'forever chemical' TFA in everyday cereal products all across Europe | PAN Europe](#)

¹⁵ [High levels of PFAS in juice and fruit purée for children - Örebro University](#), 2024

¹⁶ [Pesticides can be a substantial source of trifluoroacetate \(TFA\) to water resources](#), Environment International, 2024

¹⁷ [Finding Fluorine: Photoproduct formation during the photolysis of Fluorinated pesticides](#), Bhat, A.P. et al. Environm. Sci Techn. Vol. 56 issue 17, 2022

¹⁸ See also the sales figures for pesticides from the RIVM for 2023.

¹⁹ Reported formation rates for TFA vary by pesticide and also depend on the medium (soil, surface water, groundwater, crops). For this signal, we use [a Danish study](#) which reports a conversion rate for 7 of the 27 PFAS pesticides used in the Netherlands. The Ctgb is investigating 6 of these pesticides (46 products in total) and these account for 64% of the PFAS-containing pesticides used in the Netherlands in 2022. The 7th substance, which is not being investigated by the Ctgb, accounts for a further 7%. The ILT has extrapolated the formation of TFA from these 7 pesticides to the total conversion of PFAS pesticides. According to the Danish researchers, these figures are an underestimate, as various other degradation products are highly likely to convert to TFA at a later stage as well.

²⁰ [PFAS in influent, effluent and sewage sludge: results of a measuring campaign at 8 wastewater treatment plants \(in Dutch\)](#), Stowa 2021. This estimate is based on the discharge from industrial and municipal wastewater treatment plants combined.

²¹ [Poly- and perfluoroalkyl substances in the Rhine, the Meuse and drinking water \(in Dutch\)](#), Jonker, M.T.O., Utrecht University, 2024.

²² [Reducing the input of chemicals into waters: trifluoroacetate \(TFA\) as a persistent and mobile substance with many sources | Umweltbundesamt](#), 2022

²³ [TriFluPest](#), 2025

²⁴ [Pesticides can be a substantial source of trifluoroacetate \(TFA\) to water resources - ScienceDirect](#)

²⁵ [TFA in groundwater](#), Federal Office for the Environment FOEN, 3003 Bern, 2026.

²⁶ [A 60-Year Increase in the Ultrashort-Chain PFAS Trifluoroacetate and Its Suitability as a Tracer for Groundwater Age](#). Environmental Science & Technology Letters, 11(10), 1090-1095, 2024.

²⁷ [Ny kunskap om PFAS i landets grundvatten](#), 2026.

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- ²⁸ [Innledende undersøkelse av trifluoreddiksyre i bekker og grunnvann i jordbruksområder - Norwegian Research Information Repository](#), 2025
- ²⁹ [Memo and report: Phreatic groundwater quality measurement campaign, Province of Utrecht](#), 2023
- ³⁰ [The use of PFAS pesticides and risks to groundwater and soil \(in Dutch\)](#), CLM, 2025
- ³¹ [Ctgb calls for swift action on substances that produce TFA \(in Dutch\) | Board for the Authorisation of Plant Protection Products and Biocides](#)
- ³² [Ctgb to reassess products containing PFAS \(in Dutch\) | Board for the Authorisation of Plant Protection Products and Biocides](#). These are the same substances that Denmark has banned, with the exception of Flonicamid. This active ingredient is banned in Denmark, but is not being assessed by the Ctgb. This substance constitutes approximately 9% of the PFAS pesticides in the Netherlands.
- ³³ The Danish Environmental Protection Agency has [banned 23 pesticides](#) because they can form TFA and leach into the groundwater. Other countries are also taking action. Sweden and Norway are currently carrying out a reassessment, and in Flanders [a plan is being drawn up](#) to phase out PFAS pesticides.
- ³⁴ This figure only includes the volumes of substances that are still permitted in 2026. As a result, the historical TFA volume in 2022 was at least 5 tonnes higher.
- ³⁵ See also [Advisory report 'Authorisation of pesticides and the quality of groundwater and drinking water' \(in Dutch\)](#)
- ³⁶ See also [5. Fate behaviour in water NL part EM2.9 | Board for the Authorisation of Plant Protection Products and Biocides](#) of the evaluation manual, which sets out the requirements that data must meet. According to the Ctgb, there is still too little data available on TFA, as targeted monitoring has only started recently. This is partly because, until fairly recently, TFA was regarded as an irrelevant metabolite and was therefore given lower priority in monitoring. Furthermore, the threshold for including data is high.
- ³⁷ [trifluoroacetic acid | Substance Risk Search System](#)
- ³⁸ See the Ctgb position paper, [From authorisation to balancing of interests \(in Dutch\)](#), 2025