

## TFA: The 'Forever Chemical' in European Mineral Waters

**What do mineral waters and a 'forever chemical' with a difficult-to-pronounce name like *trifluoroacetic acid* (TFA) have in common? Nothing, at least in an ideal world. Unfortunately, reality paints a different picture.**

**TFA** is a very small and highly mobile, water-soluble chemical that does not degrade in nature. Its extreme mobility enables it to penetrate and accumulate even in deep groundwater reserves. TFA is a so-called 'forever chemical' from the group of PFAS (per- and polyfluorinated alkyl substances) and is a common stable degradation product from a large number of other PFAS, above all PFAS pesticides from agriculture and F-gases from refrigeration technologies. Over the last three decades, the spread of this forever chemical in the environment has dramatically increased. Today, TFA is found everywhere: in rainwater, rivers, soil, plants, food, tap water and even human blood. The measured concentrations are orders of magnitude higher than those we know from other PFAS, pesticides or their degradation products. According to leading scientists, TFA is a planetary boundary threat *"because of increasing planetary-scale exposure, where potential irreversible disruptive impacts on vital earth system processes could occur."*<sup>1</sup>

**Mineral Water**, on the other hand, is defined by law as "originally pure". This means that it must originate from underground sources of water, which are assumed to be protected from all risks of pollution. This purity is not only a key quality feature but also a legal requirement. For consumers, mineral water symbolises pristine, natural purity. Mineral water should not be the subject of treatment. While springs should be protected against risks of pollution, mineral water companies may sometimes have limited influence on ensuring the protection of their water sources themselves. Moreover, they are reliant on the responsible authorities to consistently implement the water protection measures enshrined in EU water and pesticide legislation.

**Our analysis** shows with alarming clarity that the TFA contamination extends beyond surface and tap waters to groundwater and deep aquifers that supply mineral water and are trusted to be protected from human-made pollutants. In 7 out of 19 cases, the TFA contamination exceeds the drinking water limit value for relevant pesticide metabolites, which is 0.1 µg/l (100 ng/l). In one case, the upper limit for total PFAS ("total PFAS") of 0.5 µg/l (500 ng/l) proposed in the EU Drinking Water Directive is also exceeded. This limit is due to come into force in 2026, although it will not be implemented by all Member States.<sup>2</sup>

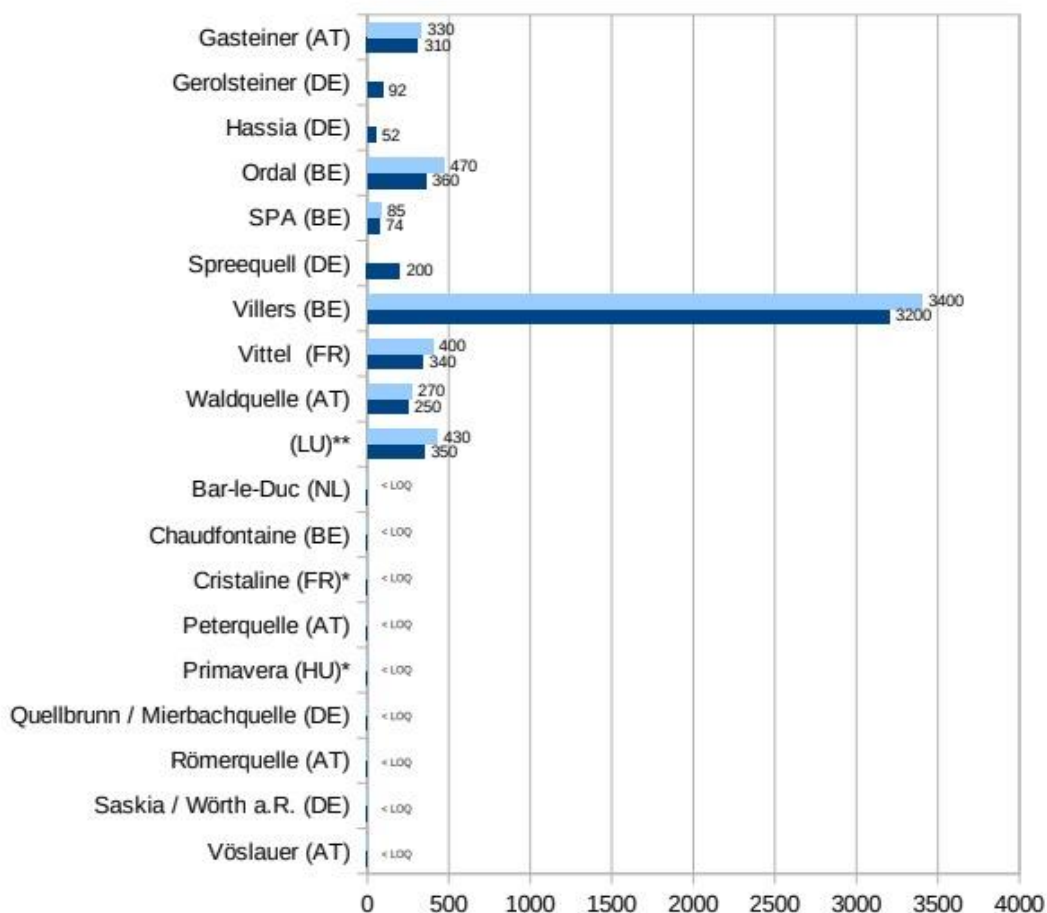
Nevertheless, each of the mineral waters tested - even the one with the highest measured contamination of 3,200 ng/l - complies with most of the current human health guideline values set by

<sup>1</sup> Arp HPH, Gredelj A, Glüge J, Scheringer M, Cousins IT. The Global Threat from the Irreversible Accumulation of Trifluoroacetic Acid (TFA). *Environ Sci Technol*. 2024 Nov 12;58(45):19925-19935. doi: 10.1021/acs.est.4c06189. Epub 2024 Oct 30. PMID: 39475534; PMCID: PMC11562725.

<sup>2</sup> The drinking water limit values for PFAS vary widely in the different EU states in terms of the level of protection for human health, as this [EEB report shows](#) (p. 16f)

various authorities in the EU, even with a high daily consumption of 2 litres - calculated for a 60 kg adult.<sup>3</sup> Additionally, mineral water is less contaminated with TFA than tap water on average.

This graph displays in alphabetical order the 10 mineral waters with quantifiable TFA residues, as well as the 7 mineral waters and 2 spring waters with no quantifiable TFA contamination. The **blue bars** represent the summer analysis results, while the **light blue bars** reflect the confirmatory analyses carried in autumn.



\* In these cases, it is not mineral water but spring water. According to [Directive 2009/54/EC](#), spring waters must fulfil less stringent requirements in terms of composition and purity than mineral waters.

\*\* The Luxembourg brand concerned was anonymised at the request of the Luxembourg environmental organisation *Mouvement Écologique*, which commissioned the analysis of the sample in question. Given the limited number of mineral water producers in Luxembourg, *Mouvement Écologique* believes that disclosing the brand name could draw undue attention to this one producer rather than to the general problem. The competent authorities in Luxembourg have been informed about the brand concerned. If you have any questions, please contact Claire Wolff: [claire.wolff@oeko.lu](mailto:claire.wolff@oeko.lu)

## Why did we investigate?

The mineral waters were tested for TFA as part of a broader drinking water testing campaign carried out by eleven member organisations of the Pesticide Action Network (PAN) Europe in the summer 2024 and published under [this link](#). While the primary focus was on tap water, mineral waters were included to complete the picture. This was done by including groundwater sources from protected aquifers, often several hundred metres deep, in the investigation.

<sup>3</sup> For more detailed information on the issue of assessing the potential health risks of TFA, see the PAN Europe report [TFA, the eternal chemical in the water we drink](#)

## What and how did we analyse?

A total of two mineral water brands from France, four from Belgium, one from the Netherlands, one from Luxembourg and one from Hungary as well as the five best-selling mineral water brands from Austria were purchased between May and June 2024 and sent (in their original packaging) by the respective PAN member organisations Générations Futures (FR), PAN Europe (Brussels), Mouvement Ecologique (LU), PAN Netherlands (NL), MTVSZ/Friends of the Earth Hungary (HU) and GLOBAL 2000 (AT) to the [Water Technology Centre](#) in Karlsruhe for analysis. The Bund für Umwelt und Naturschutz Deutschland (BUND) also provided us with the analysis results of five mineral and spring waters from Germany. These results had already been published by BUND in April 2024 and are marked with an asterisk (\*) in the graph.

All analyses for trifluoroacetic acid (TFA) were carried out using HPLC-MS-MS, with a limit of quantification (LOQ) of 50 nanograms per litre (ng/l). Signals below this limit of quantification were detected in three samples, indicating trace contamination in the range between 20 and 30 ng/l TFA. However, as these results are below the limit of quantification of the laboratory's accredited analysis method, a risk of false-positive results cannot be ruled out. Therefore, these possible trace contamination levels - which are also not shown in the laboratory's testing report - are not published here. However, affected companies have been informed.

## Why are we publishing (only now)?

When publishing the findings of the drinking water tests, we initially decided to keep the results of the mineral waters anonymous. Due to limited time and resources, it was not possible for us to comprehensively confirm the analysis results through repeat analyses. It was also important for us to seek dialogue with the companies behind the brands concerned before publication.

In the meantime, all mineral waters with quantifiable - and some without quantifiable - TFA residues were analysed a second time. In all cases, the results confirmed the initial analysis from the summer. In addition, we contacted all the companies whose water we tested, which often led to further discussions. We also engaged in discussions with individual national trade associations and the European umbrella organisation for the mineral water industry, Natural Mineral Waters Europe.

We recognise that mineral water companies affected by TFA contamination may have no or limited ability to prevent TFA contamination of their water sources. We can also understand that affected companies may find it unfair that their product of all products receives media attention in connection with TFA contamination as part of a random sample investigation, while the majority of their competitors were not investigated. In fact, our findings - as well as those of an earlier investigation by Swiss broadcaster SRF<sup>2</sup> - suggest that a comparatively high percentage of the more than 500 certified European mineral water sources may already have TFA contamination.

Despite these understandable and justified arguments put forward by some mineral water companies, which we discussed at length internally, we stood by our decision communicated in the summer to publish the results in full and transparently.

This decision is essentially based on three reasons:

- Firstly, we believe that consumers have the fundamental right to know whether their product is contaminated with potentially harmful substances - and if so, in what quantities. This right also applies even if, according to the current state of knowledge, no specific health risk can be identified.
- Secondly, as environmental NGOs, we see it as our duty to set a good example of the transparency that we repeatedly demand from public authorities.
- Thirdly, in the course of all our previous research on the TFA problem, we have come to the conclusion that the blatant lack of transparency - sometimes bordering on cover-up - on the part of all those who were involved in the development of the TFA problem in various roles as polluters, profiteers, sufferers or accomplices has contributed decisively to the fact that a global problem of this magnitude has been able to unfold unnoticed by the public and environmentalists.

## What are our takeaways?

**The urgent bans on PFAS pesticides, F-gases, and other TFA precursor substances** from the PFAS group will not be implemented without widespread public awareness of the TFA problem.

We therefore believe it is essential to break the silence surrounding TFA and make all information - even if it includes uncomfortable truths- publicly accessible. Collecting facts, critically evaluating them according to scientific principles, and transparently informing the public are the most significant contributions we, as independent environmental organizations, can make to addressing and reducing global TFA contamination.

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***Pesticide Action Network (PAN Europe)** is a network of NGOs working to reduce the use of hazardous pesticides and have them replaced with ecologically sound alternatives. We work to eliminate dependency on chemical pesticides and to support safe sustainable pest control methods. Our network brings together over 45 consumer, public health and environmental organisations and women's groups from across Europe.*



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