# New standards for PFAS in surface and groundwater

**Background**

In October 2022, the European Commission (EC) issued a [proposal](https://environment.ec.europa.eu/publications/proposal-amending-water-directives_en) for a Directive amending the Water Framework Directive, the Groundwater Directive, and the Environmental Quality Standards Directive. The EC included an environmental quality standard (EQS) of 0,0044 µg/l for 24 PFAS[[1]](#footnote-2) for surface waters and groundwaters expressed as PFOA equivalents. The proposed EQS is extremely low and, of note, the unavailability of analytical methods to measure such a level was not considered by the EC nor by the Joint Research Centre (JRC), which oversaw the scientific analysis to support the preparation of the proposal.

The European Parliament put forth several amendments to the proposal. One of these included the request to the EC to develop an EQS for total PFAS for surface waters and groundwaters.

The EC mandated the JRC to draft the dossier by end of 2023 and the JRC is currently exploring the methodology to derive a new EQS for Total PFAS. One of the methods proposed for deriving it is to use the existing value under the Drinking Water Directive (DWD)[[2]](#footnote-3) and extend it to surface and groundwater. In addition, JRC has been requested to explore whether an additional PFAS, Trifluoroacetic acid (TFA), can be included in the current EQS for 24 PFAS.

Cefic supports the review of the lists of pollutants affecting surface waters and groundwaters based on new scientific developments and a thorough effort for data collection involving relevant stakeholders.

There are five points where the proposed EQS for the 24 PFAS and the JRC potential EQS for total PFAS can be improved:

1. **The definition of ‘Total PFAS’ needs further clarification**: There are differences amongst pieces of legislation on the definition of PFAS. The Drinking Water Directive uses the OECD (Organisation for Economic Cooperation and Development) definition from 2018, whilst the JRC is now working based on a different definition (OECD 2021). It is widely understood that the PFAS group include thousands of substances with different chemical, physical and (eco-)toxicological properties. Legal certainty and coherence is needed in the legislation for the implementation on which substances are considered as PFAS, which ones are included in the concept of ‘PFAS total’ and how they are to be measured.
2. **Additional analytical methods are needed:** Currently no single analytical method is available to quantify very low concentrations of distinct groups of PFAS in water (or any other media). The 24 substances could be analyzed separately, but to our knowledge, no current technology[[3]](#footnote-4) is available to readily measure their total concentration at once, including at a level as low as 4.4 ng/l, and even at individual compound level the ability to measure this low is highly limited. The total organic fluorine (TOF) content is often referred to but is not sufficiently specific to quantitatively assess any specific group of PFAS. This analysis also measures chemicals that are NOT PFAS. As noted by the USEPA[[4]](#footnote-5), there are thousands of organofluorines that cover a broad class of chemicals and include pharmaceuticals, pesticides and PFAS that contain at least one carbon-fluorine bond, work is ongoing on these ‘screening tools’. The request to measure “Total PFAS“ not only meets the same analytical challenges but also suffers from the fact that total PFAS is not defined. In summary, the selection of analytical methods, the knowledge on their detection and quantification limits, plus their intrinsic uncertainties (which PFAS compounds are exactly measured) are prerequisites for any binding limit value to be implementable and enforceable.
3. **The impact on industrial permits**: There is a clear link between the EQS, and the permit conditions listed in the Industrial Emissions Directive (IED) in both the current and new recast version[[5]](#footnote-6). Permits ensure that environmental quality standards can be respected. In the case of PFAS, due to the persistence of some of them and past and present activities (including fire extinguishing exercises, industrial activities, consumer uses of PFAS), the proposed limit levels might be already exceeded in some water bodies. This means that many permits would not comply with emission levels. This will significantly complicate the required revision of thousands of operating permits by authorities. In addition, the absence of a clear set of reliable analytical methods will create uncertainty for companies and authorities who will need to monitor and measure in the absence of such methods. To add to the complexity, out of the 24 PFAS, PFHxA, PFBA, PFDA, 6:2 FTOH and 8:2 FTOH are broadly used in consumer products, such as cosmetics, impregnating agents, ski or floor wax, cleaning products, dishwashing products, car care and polishes and printing inks, commercial carpet care liquid and household carpet, fabric care liquid products and in foams and floor waxes and wood and stone sealants products[[6]](#footnote-7).
4. **TFA:** With regards specifically to TFA, although it could be included in the WFD (Water Framework Directive), as the list of 24 PFAS is dynamic, its inclusion and EQS should be based on its known properties, health and environmental effects, as well as on the available analytical monitoring method(s). It is recommended to first include TFA in the Watch list for substances in groundwater and surface water. If deemed necessary, a specific separate EQS should be then defined, considering its unique physico-chemical and (eco)toxicological properties. Further, considering that TFA is also a naturally occurring substance[[7]](#footnote-8), background sources of TFA at low levels may further complicate the clear quantitation of environmental background levels of PFAS. This would have to be resolved before inclusion in the legislation.
5. **Consequences on the Water Framework Directive:** the Water Framework Directive objective is to achieve good status water bodies by 2027. A substantial effort has been made by the MSs (Member States) to implement measures to progress towards this objective. However, with the new EQS proposed by the EC along with the application of the “one out all out principle”, the progress[[8]](#footnote-9) of the water bodies will be impacted, and reversed showing that most water bodies fail to achieve good status as the analytical methods for measuring a grouping of 24 PFAS or a Total PFAS value does not exist.

**Proposals for the way forward**

We would like to share the following proposals for the Member States consideration**:**

* Set an EQS for individual PFAS substances that have reliable analytical methods available today, considering that there are no analytical methods to measure the 24 PFAS and/or PFAS total.
* Focus on the most significant 10 PFAS substances which were detected by Member States in recent years, as they were placed on the Groundwater Directive watch list[[9]](#footnote-10). The EQS should apply substance by substance rather than a sum of PFAS, taking account their ecotoxicity. It could also include a note that the value should be revised whenever new scientific evidence becomes available.
* Add other PFAS substances to the Watch List for surface and groundwater to be monitored by Member States.
* New and more sensitive analytical methods should be developed in parallel. Cefic plans to start a comprehensive review of existing analytical methods to measure PFAS in different matrices, to identify gaps and define follow up to support effective legislation.

1. The EC proposal includes the following 24 PFAS in the EQS expressed as PFOA equivalent: Perfluorooctanoic acid (PFOA), Perfluorooctane sulfonic acid (PFOS), Perfluorohexane sulfonic acid (PFHxS), Perfluorononanoic acid (PFNA), Perfluorobutane sulfonic acid (PFBS); Perfluorohexanoic acid (PFHxA); Perfluorobutanoic acid (PFBA) ; Perfluoropentanoic acid (PFPeA); Perfluoropentane sulfonic acid (PFPeS); Perfluorodecanoic acid (PFDA) ; Perfluorododecanoic acid (PFDoDA or PFDoA); Perfluoroundecanoic acid (PFUnDA or PFUnA; Perfluoroheptanoic acid (PFHpA), Perfluorotridecanoic acid (PFTrDA); Perfluoroheptane sulfonic acid (PFHpS), Perfluorodecane sulfonic acid (PFDS); Perfluorotetradecanoic acid (PFTeDA), Perfluorohexadecanoic acid (PFHxDA); Perfluorooctadecanoic acid (PFODA) (CAS 16517-11-6, EU 240-582-5) (RPF 0,02), Ammonium perfluoro (2-methyl-3-oxahexanoate) (HFPO-DA or Gen X), Propanoic Acid / Ammonium 2,2,3-trifluoro-3-(1,1,2,2,3,3-hexafluoro-3-(trifluoromethoxy)propoxy)propanoate (ADONA), 2- (Perfluorohexyl)ethyl alcohol (6:2 FTOH), 2-(Perfluorooctyl)ethanol (8:2 FTOH) and Acetic acid / 2,2-difluoro-2-((2,2,4,5-tetrafluoro-5-(trifluoromethoxy)-1,3-dioxolan-4-yl)oxy)- (C6O4). [↑](#footnote-ref-2)
2. Under the DWD, the EC included a limit values on sum of PFAS and total PFAS and the MS have until Jan 2026 to implement them. Currently, the EC is now preparing technical guidelines -Methods for monitoring ‘Sum of PFAS’&‘PFAS Total’ in the DWD aiming to adopt them in summer 2024. It does not exist analytical methods to measure total PFAS in water [↑](#footnote-ref-3)
3. Limit Of Detection (LOD) and Limit Of Quantification (LOQ) are both measures of the sensitivity of an analytical method. LOD represents the lowest concentration of a substance that can be reliably identified, while LOQ represents the lowest concentration of a substance that can be accurately quantified. Whilst some laboratories can offer analysis of some PFAS compounds to a single digit concentration LOD – laboratories report significant challenges in PFAS analysis in providing such a low LOQ that gives repeatable consistent results at such low levels. [↑](#footnote-ref-4)
4. [Frequent Questions about PFAS Methods for NPDES Permits | US EPA](https://www.epa.gov/cwa-methods/frequent-questions-about-pfas-methods-npdes-permits) [↑](#footnote-ref-5)
5. The IED recast proposal mentions in Art 18 that ‘*where an environmental quality standard requires stricter conditions than those achievable by the use of the best available techniques, additional measures shall be included in the permit with a view to reducing the specific contribution of the installation to the pollution occurring in the relevant area’.* [↑](#footnote-ref-6)
6. Annex A ANNEX XV RESTRICTION REPORT PFAS (p.239-241) <https://echa.europa.eu/documents/10162/f71f3bed-e48d-5004-d195-e293c38d0602> & ANNEX XV RESTRICTION REPORT PFHxA restriction page 67. <https://echa.europa.eu/documents/10162/c4e04484-c989-733d-33ed-0f023e2a200e> [↑](#footnote-ref-7)
7. Lindley, A.A. (2023) ‘An inventory of fluorspar production, industrial use, and emissions of trifluoroacetic acid (TFA) in the period 1930 to 1999’, Journal of Geoscience and Environment Protection, 11(03), pp. 1–16. <https://doi.org/10.4236/gep.2023.113001.> [↑](#footnote-ref-8)
8. As an example a reported 75% of groundwaters met ‘good’ status in the 2nd RBMP reporting. [↑](#footnote-ref-9)
9. The MS have been monitoring 10 PFAS substances under Groundwater Watch list between 2010-2017, which were identified fulfilling the criteria to integrate the *“List Facilitating Annex I/II review process of the Groundwater Directive*” and have been communicated to the EC: Perfluorooctane Sulfonate (PFOS); Perfluorooctanoic Acid (PFOA); Perfluorohexanoic Acid (PFHxA); Perfluoroheptanoic Acid (PFHpA); Perfluorohexane Sulfonate (PFHxS); Perfluorobutane Sulfonate (PFBS); Perfluorodecanoic Acid (PFDA); Perfluorononanoic Acid (PFNA); Perfluoropentanoic Acid (PFPeA); Perfluorobutanoic Acid (PFBA); [↑](#footnote-ref-10)