TDE – WATER | PHOSPHONIC ACID

Non-exclusionary reference criterion | TDE assessment specifications

1. Purpose

To test for phosphonic acid (H_3PO_3) and its salts, reporting results as phosphonic acid, in waters relevant to TDE qualification. The aim is to identify a possible signature of current or past agricultural uses, without automatically treating a detection as evidence of an unlawful treatment or a health risk.

2. Proposed reference value

Indicator	TDE operational reference	Effect on assessment
Phosphonic acid and its salts, as H_3PO_3	0.5 µg/L	Attention value, NOT an exclusion threshold
Result ≤ 0.5 µg/L	Low level	No standalone concern; integrated assessment
Result > 0.5 µg/L	Further investigation with justification	Check source, recurrence, catchment and other markers; no automatic exclusion

The value of 0.5 µg/L is a conventional TDE screening proposal, selected within the 0.1–1 µg/L order-of-magnitude range discussed for groundwater. It is not a legal limit, is not derived from a validated distribution of mountain-water concentrations, and is not a toxicological threshold. The reference value may be reviewed in light of field monitoring data.

3. Integrated interpretation rule

- Under this specific rule, no phosphonic acid concentration, on its own, results in TDE exclusion; any applicable regulatory obligations and the overall suitability assessment remain in force.
- If the reference value is exceeded, consider land use and agricultural products used within the recharge catchment, any contribution from water imported for irrigation, and the reproducibility of the result.
- Assess pesticides and their metabolites, PFAS, phosphonic acid in sentinel leaves, and the other TDE markers already specified, together.
- Distinguish water representative of the local aquifer or catchment from externally sourced irrigation water; consider whether irrigation water is actually used on crops eligible for qualification.

4. Analytical specifications and precautions

Request a method validated for the water matrix, with separate determination of fosetyl and phosphonic acid (where useful), results expressed in µg/L as H_3PO_3, and a stated limit of quantification (LOQ). An indicative LOQ of ≤ 0.1 µg/L would allow meaningful interpretation of the proposed 0.5 µg/L reference value; confirm its availability and measurement uncertainty with the laboratory. LOQs must be specifically verified for the water matrix and cannot automatically be transferred from other matrices.

5. Scientific evidence and its limitations

EFSA (2018; updated in 2025) reports moderate to high persistence of phosphonic acid in soil and, for the representative uses assessed, modelled groundwater concentrations not exceeding 0.1 µg/L. These are regulatory predictions, NOT measurements of environmental background concentrations. EFSA documents LC-MS/MS methods for water with LOQs of approximately 0.1 µg/L [1–2].

Sigoña et al. (2025) measured 58–111 µg/L in nine surface-water samples from three agricultural catchments in Chile. These are rivers in settings different from TDE groundwater and do not represent a background reference for the Apennines [3].

The BIOFOSF project shows that phosphonic acid residues in plants may originate from different inputs and persist in woody plants: an isolated positive result does not prove spray drift or a recent treatment [4].

6. Key references

[1] EFSA et al. (2018). Peer review of the pesticide risk assessment of the active substance fosetyl. EFSA Journal 16(7), 5307. https://doi.org/10.2903/j.efsa.2018.5307

[2] EFSA et al. (2025). Updated peer review of the pesticide risk assessment of the active substance fosetyl. EFSA Journal. https://doi.org/10.2903/j.efsa.2025.9513

[3] Sigoña P., Panez-Pinto A., Lobos-Castro F. (2025). Pesticide Pollution of Surface Waters: Investigating Agricultural Transformations and Community Exposure in Chile's Central Valley. Sustainability 17(17), 7911. https://doi.org/10.3390/su17177911

[4] Trinchera A. et al. (2020). Assessing the Origin of Phosphonic Acid Residues in Organic Vegetable and Fruit Crops: The Biofosf Project Multi-Actor Approach. Agronomy 10(3), 421. https://doi.org/10.3390/agronomy10030421

Note: The TDE threshold and the treatment of results are project-specific choices; the references document environmental behaviour and analytical feasibility but do not validate the value of 0.5 µg/L.