TDE | Pesticide Metabolites in Water

Analytical Panel and Interpretation Criteria

Scope: groundwater, spring water and, where relevant, water used for irrigation. This document covers metabolites only; active substances, PFAS and phosphonic acid are addressed in separate sections.

1. Purpose and TDE Criterion

To identify possible evidence of current or historical agricultural use through the transformation products of plant protection products, which are often more mobile or persistent in groundwater than their parent substances. The panel is not an exhaustive list of all possible metabolites.

TDE decision: no general numerical qualification threshold is established for metabolites as a group. Every quantifiable finding requires a reasoned, case-by-case assessment, even where the metabolite is classified as non-relevant for regulatory purposes. Any statutory limits applicable to the specific water and substance remain in force.

2. Proposed Priority Panel

Active substance	Metabolites to be tested	Note
Atrazine	Desethylatrazine (DEA); deisopropylatrazine (DIA); 2-hydroxyatrazine; desethyl-deisopropylatrazine (DEDIA)	Indicators of historical agricultural use
Terbuthylazine	Desethylterbuthylazine	Indicator of agricultural pressure
S-metolachlor / metolachlor	Metolachlor ESA; metolachlor OXA	Mobile metabolites in groundwater
Glyphosate	AMPA	Source not always unambiguously attributable to glyphosate
Chlorothalonil	R471811; R417888; R419492	High priority due to persistence and detection in groundwater
Chloridazon	Desphenyl-chloridazon; methyl-desphenyl-chloridazon	Indicators of historical agricultural use

3. Secondary Panel, to Be Adapted to Cropping History

Active substance or possible precursors	Metabolite(s)

Dimethachlor	Dimethachlor ESA; dimethachlor OXA
Metazachlor	Metazachlor ESA; metazachlor OXA
Dimethenamid-P	Dimethenamid ESA
Flufenacet	Flufenacet ESA
Alachlor	Alachlor ESA
Dichlobenil / fluopicolide	2,6-dichlorobenzamide (BAM): potentially multiple sources
Tolylfluanid / dichlofluanid	N,N-dimethylsulfamide (DMS): potentially multiple sources

Analytical names, isomers and CAS numbers must be verified with the laboratory before testing. The priorities are TDE technical proposals, not official categories. Not all analytes are included in a standard multi-residue analysis: some require dedicated LC-MS/MS methods.

4. Case-by-Case Assessment: Information to Document

- Identity of the metabolite and its possible parent substances; regulatory relevance classification under applicable legislation.
- Measured concentration, LOQ, uncertainty, result confirmation and any temporal trend.
- Historical and current agricultural land use in the catchment area; potential transport from external catchments.
- Hydrogeology and representativeness of the sampling point (local aquifer, spring, irrigation canal, etc.).
- Consistency with the parent pesticides and other available TDE indicators; intended purpose and actual use of the water.
- Compliance with applicable statutory limits, regardless of the decision not to establish a universal TDE threshold.

5. Analytical Panel Specifications

Coverage of the analytical panel for water must be verified with the appointed laboratory. The analytes tested, matrix, methods used and corresponding limits of quantification (LOQs) must be confirmed and documented in writing. Panels developed for other matrices do not automatically provide the same analyte coverage or LOQs in water.

6. References and Monitoring Sources

1. UBA, Banning H. et al. (2022). Recommendation list for the monitoring of plant protection product metabolites in German groundwater. https://www.umweltbundesamt.de/sites/default/files/medien/3521/dokumente/2022_07_29_uba_recommendation_list_update2022_eng_0.pdf

2. FOEN/BAFU, NAQUA (updated 2026). Pesticides in groundwater; 2024 data. https://www.bafu.admin.ch/it/pesticidi-nelle-acque-sotterranee

3. FOEN/BAFU (2026). Chlorothalonil in groundwater: metabolites R471811, R417888, R419492 and others. https://www.bafu.admin.ch/en/chlorothalonil-in-groundwater

4. ARPAE Emilia-Romagna. Plant protection products in groundwater: indicator and monitoring results. https://webbook.arpae.it/indicatore/Fitofarmaci-in-acque-sotterranee-00001/?id=19a0fc0d-7558-11e4-8845-11c9866a0f33

The proposed panel is subject to practical verification based on cropping history and site characteristics. No general numerical TDE threshold is established for metabolites; sampling follows operational protocol TDE-C02.