TDE-P01 | Non-Dioxin-Like PCBs in Soil

Experimental qualification criterion · Chapter 4 · Version 0.1 · 7 November 2026

TrustyFood – Lands of Excellence. Technical document explaining and applying the voluntary threshold for non-dioxin-like PCBs in agricultural soil. The criterion is neither a health-based threshold nor a public certification.

1. TDE criterion: three bands

Σ non-DL PCBs (µg/kg dry matter)	TDE decision
X < 1.00	Soil criterion met; proceed to other TDE parameters.
1.00 ≤ X ≤ 4.00	Assessment suspended; results from relevant biological matrices, subject to their own thresholds still to be established, determine the decision.
X > 4.00	TDE criterion not met: area excluded under the protocol.

Results exactly equal to 1.00 or 4.00 fall in the investigation band. Application of the intermediate band will require specific bioindicator limits, rather than direct comparisons between concentrations in soil and tissues.

2. Regulatory reference and rationale

Ministerial Decree of 1 March 2019, No. 46, Annex 2, item 38, sets a CSC for non-DL PCBs in agricultural soil of 0.020 mg/kg dry matter, equivalent to 20 µg/kg or 20 ng/g. The TDE direct-acceptance threshold of 1 µg/kg is 20 times lower than this CSC, while the TDE maximum of 4 µg/kg is five times lower. These are more selective voluntary choices, not legal limits.

The TDE protocol seeks agricultural environments with a low anthropogenic footprint. The direct-acceptance threshold is therefore lower than the medians found in routine regional monitoring. The PCB result is one necessary criterion, not sufficient qualification of the whole area.

3. Quantitative evidence from the literature

Source / population	Median	Other data (µg/kg dry matter)
ARPAV Veneto, 2010–2016 regional monitoring, 128 samples	1.72	Mean 2.90; Q3 3.85; P90 5.97; P95 10.01; maximum ~16.09.
ARPA Piemonte, agricultural soils, n=19, surface horizon	1.20	Mean 2.20; range 0.1–16.0.
ARPA Piemonte, natural soils, n=24, surface horizon	2.20	Mean 3.50; range 0.2–14.0.
Switzerland, NABO network, 105 sites, Σ7 indicator PCBs	1.60	Range 0.5–12.0; 0–20 cm; different land uses.

Essential comparability note: Swiss data concern seven indicator PCBs; regional data use sums defined by their respective laboratory panels, which do not necessarily correspond to the 16 non-DL PCBs in Annex 2. These observations provide orders of magnitude and context for the choice, NOT direct statistical validation of the threshold for the 16 congeners.

In Veneto, the sample at approximately 16 µg/kg from the Asiago Plateau came from the upper 0–3 cm of coniferous forest soil. It cannot be compared without qualification with the cultivated horizon of agricultural soil: accumulation of deposition in litter and organic matter may increase surface concentrations even without a local industrial source.

4. Analytical panel and summation rule

Item 38 of Ministerial Decree 46/2019 specifies 16 non-DL congeners: PCB 28, 52, 95, 99, 101, 110, 128, 146, 149, 151, 153, 170, 177, 180, 183 and 187. The TDE sum will be defined using these 16 congeners, ensuring consistency with the regulatory reference.

An extended PCB analytical panel may provide a nominal LOQ of 0.04 ng/g per congener (0.04 µg/kg). This sensitivity is considered adequate provided it is confirmed in soil. Before implementation, verify exact coverage of the 16 congeners (especially 170 and 180), the summation approach for non-quantified results, and analytical uncertainty. An individual LOQ is not assumed to be the LOQ of the sum.

5. Applying the biological assessment band

Where 1.00 ≤ Σ non-DL PCBs ≤ 4.00 µg/kg, the assessment remains suspended until relevant biological matrices, such as earthworms and atmospheric-deposition bioindicators, have been characterised. The matrices and their respective limits must be specified in separate documents. A favourable outcome allows this TDE criterion to be met; a biological exceedance leads to non-compliance. Food production checks remain independent.

Comparison with ARPA medians does not guarantee that an area is excellent: background concentrations depend on depth, organic matter, exposure and environmental history. The voluntary decision nevertheless remains reproducible because a numerical threshold and predefined biological rule are used.

6. References and supporting documents

1. Ministerial Decree of 1 March 2019, No. 46, Annex 2, item 38 and note ***.
https://www.reteambiente.it/normativa/34835/dm-ambiente-1-marzo-2019-n-46/

2. ARPAV, Dioxins, furans, PCBs and PAHs in Veneto soils: first regional survey 2010–2016 (final report, polychlorinated biphenyls section). https://www.arpa.veneto.it/temi-ambientali/suolo/file-e-allegati/documenti/rete-di-monitoraggio/Microinquinanti_organici_suoli_2010-2016.pdf

3. ARPA Piemonte / University of Turin, 2008 State of the Environment Report, Ch. 16 – Soil, Table 16.3 (19 agricultural and 24 natural soils; 2002–2006 data).
https://relazione.ambiente.piemonte.it/2024/sites/default/files/doc/RSA2008/cap_16.pdf

4. Desaules A., Ammann S., Blum F., Brändli R.C., Bucheli T.D., Keller A. (2008). PAH and PCB in soils of Switzerland – status and critical review. Journal of Environmental Monitoring 10, 1265–1277. DOI 10.1039/B807206J.
https://pubmed.ncbi.nlm.nih.gov/18974895/

Implementation status: numerical criteria adopted; the exact congener list in the final report and bioindicator thresholds must be verified before definitive adoption.