

DDT and its degradation products

General sectors: Legacy pesticide

(CAS numbers: e.g. 789-02-6, 50-29-3, 72-55-9, 3424-82-6, 72-54-8, 53-19-0, 32-03-1, EC numbers: e.g. 212-332-5, 200-024-3, 200-784-6, 222-318-0, 200-166-6 / Entry number in HELCOM list of priority substances: 13)

DRIVERS

ACTIVITIES

PRESSURES

STATE

IMPACTS

Why a HELCOM priority?

Main evidence

S Concentrations of 2,4-DDT exceed the applied threshold value in **13** of the 20 examined areas (assessment units) of the Baltic Sea. The threshold is exceeded in both coastal and off-shore areas (7/7 assessed off-shore areas). In these 13 areas, on average **95%** of the assessable samples in **sediment** and/or **biota** exceed the threshold value. This is based on monitoring data for the period 2015-2024 available in national and international databases¹ as well as target screening data from the project PreEMPT². A total number of 781 data points were possible to evaluate for 2,4-DDT.

By further considering how much above or below the threshold each concentration is, and how often the substance is detected, 2,4-DDT scores **8.2/10** (confidence range: **7.9 – 8.4**) in the scale established when assessing the criticality/significance of current levels in the Baltic Sea pose, where 5 indicates concern and 10 extreme risk, and the range reflects the level of reliability and representativeness of concentrations and the thresholds.

Concentrations of 4,4-DDE, DDD (p,p'), 2,4-DDE, 2,4-DDD, and DDT (p,p') also frequently exceed their respective threshold value. The threshold values for all substances in the group, for sediment and biota, were acquired from the NORMAN Network ecotoxicology database³. It is noted that **high trophic magnification** has been reported, for instance a TMF value of 29 for p,p'-DDE⁴.

I Current levels in the Baltic Sea indicate potential negative impacts on sediment dwelling biota, pelagic biota, top predators such as mammals and birds, and humans via consumption of seafood.

Supporting evidence

P Approximately **0.2 – 1.5 tonnes of DDT and its degradation products** are estimated to enter the Baltic Sea every year, mainly via rivers (WATERBASE⁵). Historical inputs have been considerably higher. Given that the substance is **very persistent, very bioaccumulative, and very toxic**⁶, even current inputs are considered as likely significant, in terms of risk they pose for the Baltic Sea and its ecosystem services. As mentioned above, levels in Baltic Sea have already exceeded thresholds, due not only to current but also the historical inputs.

I DDT and its degradation products are considered of **especially concerning mode of toxicity**: for example 2,4-DDE is an endocrine disruptor⁷. Endocrine disruptors mimic or interfere with hormones and can cause developmental abnormalities, reproductive dysfunction, and population effects.

Overall assessment

When assessing current levels in the Baltic Sea, current inputs, and the severity of the relevant toxicity mechanism, DDT and its degradation products score **75-80/100** in the scale established for assessing the overall risk for impacts/threat for the Baltic Sea, where 50 indicates concern, 100 extreme risk, and the width of the span outlines the uncertainty in the assessment. Several isomers and degradation products of DDT have hazardous properties and exhibit concerning environmental occurrence profiles. This substance group entry aims to reflect all such relevant individual substances.

Facts relevant for management considerations

Causal chain and pathways

A No known on-going activities causing emissions.

P Its high persistence (as much as 50% can remain in the soil 10-15 years after application) and earlier widespread use have meant that DDT and its degradation products residues can be found everywhere⁸. That likely explains the measured riverine inputs. Beyond that, it is expected that sediment disturbing activities may release historical residues of DDT and its degradation products. However, deposition of dredged material appears to be a negligible source of inputs (only up to 2kg/y).

S ? *In order to further improve the evaluation of the magnitude of risk, one aspect that could be investigated in the future is a review of the available toxicity thresholds for sediment and biota.*

Relevant policies (existing or planned measures)

M (on A/P) • Listed under **Stockholm Convention** on POPs (signed by all HELCOM Contracting Parties) – Annex B (restriction for the production and use in light of any applicable acceptable purposes and/or specific exemptions) – accordingly **EU POPs**

Regulation. No acceptable purposes or exemptions reported by any HELCOM Contracting Party. Therefore considered as banned.

• Listed as a priority hazardous substance under the **EU WFD** update proposal. It appears that although under the current EU EQSD an EQS was provided, the group as such was not identified as a priority substance or priority hazardous substance. The EQSD update proposal also includes an EQS for total of active substances in pesticides, including their relevant metabolites, degradation and reaction products.

References:

1. 2. 3. 4. 5. 6. 7. 8.

[Note: Listing of detailed references will be provided in an upcoming update of the fact sheet – for a listing of the most common references among the different substances see the section at the end of the consolidated document which includes all the fact sheets]

* considering that there were also inconclusive non-detections (in terms of exceedance, due to a relatively high limit of detection), it is possible that the actual average frequency of exceedance in these areas is somewhat lower, but in any case >60%.