2,4,6-Tribromophenol (TBP)

(CAS numbers: e.g. 118-79-6, EC number: 204-278-6 / Entry number in HELCOM list of substances of concern: 2)

General sectors: Industry and commercial products

DRIVERS | ACTIVITIES | PRESSURES | STATE | IMPACTS

Why a HELCOM concern?

Main evidence

P Approximately **0.3-6 tonnes of TBP** are estimated to enter the Baltic Sea every year via rivers (Gustavsson et al, 2018[1]). Additional inputs may be expected from direct releases from WWTPs to coasts. Given that the substance is **suspect as persistent** and is **very toxic**[2], current inputs are possibly/likely significant, in terms of risk they pose for the Baltic Sea and its ecosystem services. The data used for the riverine inputs estimation concerns only measurements in the proximity of river mouths. They originate from one-grab samples from the 23 rivers covering the whole latitudinal range of Sweden. And they have been extrapolated to the total riverine flow to Baltic Sea.

I Current inputs to the Baltic Sea indicate potential negative impacts at least on pelagic biota.

Overall assessment

When assessing current levels in the Baltic Sea (no relevant measurement data), current inputs, and the severity of the relevant toxicity mechanism, TBP scores **26-89/100** 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.

Facts relevant for management considerations

Causal chain and pathways

A The REACH registered volume for TBP (manufacture+import in the EU) is 100 – 1,000 t/y plus confidential use as intermediate[3]. However, all registrations state to correspond to a chain ending agent in a polymer imported to the EU – i.e. not to a manufatured or imported substance or mixture in the EU. ECHA's ARN[4] states that there is a potential for exposure to TBP from widespread uses in polymer preparations as a flame retardant or chain ending agent.

At the same time, according to literature[5], TBP is an alternative flame retardant that has recently replaced legacy flame retardants such as PBDEs. It is not clear whether use as flame retardant may correspond to the amount manufactured or imported in the EU as such (in amounts <1t per year per company) by some of the 174 companies which have submitted Classification & Labelling notifications under the EU CLP Regulation[6] – or to uses of the polymers containing it. In the SPIN database TBP was reported until 2010 by Denmark. According to the literature[5], TBP is the most widely produced brominated phenol, it is used as intermediate during the synthesis of brominated flame retardants and it similarly represents a degradation product of these substances (including new flame retardants in the market). Moreover, it is also known to be a naturally occurring molecule in some marine organisms, which produce it as a defense against predators and biofouling[7]. The volume manufactured in the EU appears to have decreased dramatically over the last years (it used to be 10,000–100,000 t/y in 2012 and 1-10 t/y in 2016)[5].

S ? *In order to further improve the evaluation of the risk, relevant aspects to consider are information on marine levels and a review of the toxicity thresholds (expected relevant matrices – paying attention also on background levels). Information on the actual market, in the Contracting Parties, for uses of the substance as such and substances that may degrade to TBP would also be relevant. As well as a rough estimation of the likely fraction of anthropogenic inputs to the marine environment (vs natural ones).*

Relevant policies (existing or planned measures)

M (on A/P)

- TBP is covered by **two Assessments for Regulatory Needs prepared by ECHA** recently ('Regulatory strategy for flame retardants', 'brominated flame retardants: Brominated cycloalkanes, alcohols, phosphates, triazine triones, diphenyl ethers and diphenyl alkyls')[4].
- It is **under assessment for PBT properties** under the REACH Regulation (originally, the assessment had been postponed due to cease of manufacture in the EU, but it was reinitiated in 2024, under Substance Evaluation and after ECHA's ARN). In the same contet, it is also **under assessment for Endocrine Disruption and for PMT/vPvM properties**. According to REACH Substance Evaluation report[8], TBP is also a **likely toxic for reproduction** substance.

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]