Copper and its compounds

(CAS numbers: e.g. 7440-50-8, EC numbers: e.g. 231-159-6 / Entry number in HELCOM list of priority substances: 11)

General sectors: Industry and commercial products, off-shore (shipping, dredged material deposition, OWF), biocide

DRIVERS | ACTIVITIES | PRESSURES | STATE | IMPACTS

Why a HELCOM priority?

Main evidence

S Concentrations of Copper exceed the applied threshold value in **all the 15** examined areas (assessment units) of the Baltic Sea. The threshold is exceeded in both coastal and off-shore areas (**11**/11 assessed off-shore areas). In these 15 areas, on average **88%** of the assessible samples in **sediment** exceed the threshold value. This is based on regular monitoring data gathered by HELCOM Contracting Parties and reported to the HELCOM COMBINE database for the period 2016-2021, in the context of the Copper indicator[1].

By further considering how much above or below the threshold each concentration is, and how often the substance is detected, Copper scores **8.2/10** (confidence range: **8.2 – 8.2**) 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.

The threshold value for Copper, for sediment, was as agreed for the HELCOM indicator for HOLAS 3.

I Current levels in the Baltic Sea indicate potential negative impacts on sediment dwelling biota.

Supporting evidence

P Approximately **1,100 – 2,000 tonnes of Copper and its compounds** are estimated to enter the Baltic Sea every year, mainly via rivers and shipping, and secondly via atmospheric deposition and deposition of dredged material (PLC[2], EMERGE[3], HELCOM BSEFS[4]). Given that the substance is **very persistent (metals do not degrade) and toxic**[5], 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 historical inputs. Likely increased inputs in the near future are possible, due to it use in emerging setors, such as in batteries, shipping, and Offshore Wind Farms (OWF).

I Copper is considered to have a concerning **mode of toxicity**, as for example it is a photosynthesis inhibitor[6]. Photosynthesis inhibitors· disrupt energy production or utilization and can affect growth and overall fitness of primary producing marine organisms.

Overall assessment

When assessing current levels in the Baltic Sea, current inputs, and the severity of the relevant toxicity mechanism, Copper scores **75-84/100** 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 Copper and its compounds are manufactured/imported in the EU in quantities 1,000,000 - 10,000,000 tonnes/year[7]. The **REACH registered uses** cover many sectors including among others batteries, tyres, etc. Main sectors which officially reported releases to the Baltic Sea catchment in the context of E-PRTR[8] and the respective shares for the reported emissions are as following:

Releases to air (reported releases 30-35 t/y, in the period 2018-2022): mainly **Underground mining** (31%), **Production/smelting of non-ferrous metals** (20%), **Metal ore roasting or sintering** (19%). Releases to water/soil (avreage reported releases >21 t/y, in the period 2018-2022): **production of pulp, paper, board, wood products** (42%), **disposal or incineration of non-hazardous waste** (20%), production of fertilisers (8%).

Shipping and lesure boating is responsible for emissions from **antifouling paints**. Shipping contributes also via emissions from scrubber wash water, bilge water, grey water, and sewage, but to a much lower degree[9]. Several copper substances are used in Contracting Parties as biocides (function: disinfectants, wood preservatives, antifouling)[10]. Copper is also released from agriculture (pig farming – antibiotics' alternatve; fertilisers; biosolids). It is also released from natural sources (e.g. leaching from forest and other land areas), as well as from roofs and pipes.

P Based on available estimations, Copper appears to enter the Baltic Sea mainly via **rivers** (434-1,120 t/y, PLC), off-shore emissions (**shipping**: 518 t/y + **deposition of dredged material**: 53-148t/y, EMERGE, HELCOM BSEFS), and **atmospheric deposition** (83-149 t/y, EMERGE, PLC). Direct emissions from land-based activities appear to be relatively lower (estimation: 14-20 t/y, PLC, Undeman et al, 2002[11], E-PRTR).

Relevant policies (existing or planned measures)

M (on A/P)

- ECHA has developed an **Assessment of Regulatory needs (ARN) for complex inorganic substances**, including several substances containing Copper (ECHA[12]). Further relevant ARNs for Copper substances may exist (to be confirmed).
- There are provisions in **EU Best Available Techniques** Reference documents for this substance.
- Copper is a **HELCOM indicator**

References:

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12.

[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]