

Lead and its compounds

(CAS numbers: e.g. 7439-92-1, EC numbers: e.g. 231-100-4
/ Entry number in HELCOM list of priority substances: 22)

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

DRIVERS

ACTIVITIES

PRESSURES

STATE

IMPACTS

Why a HELCOM priority?

Main evidence

S Concentrations of Lead exceed the applied threshold value in **36** of the 41 examined areas (assessment units) of the Baltic Sea. The threshold is exceeded in both coastal and off-shore areas (**16/16** assessed off-shore areas). In these 36 areas, on average **92%** of the assessable samples in **sediment and/or biota** 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 Lead indicator¹.

By further considering how much above or below the threshold each concentration is, and how often the substance is detected, Lead scores **8.9/10** (confidence range: **8.9 – 8.9**) 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 values for Lead were as agreed for the HELCOM indicator for HOLAS 3.

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

Supporting evidence

P Approximately **180 – 400 tonnes of Lead and its compounds** are estimated to enter the Baltic Sea every year, mainly via rivers, depositing of dredged material, and atmospheric deposition (PLC², HELCOM BSEFS³). Given that the substance is **very persistent (metals do not degrade) and toxic⁴** (according to the EU WFD and its update proposal, it also tends to accumulate in sediment and/or biota⁵), 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 its use in emerging sectors, such as in batteries and perhaps Off-shore Wind Farms (latter to be confirmed).

I Lead is considered to have an especially **concerning mode of toxicity**: for example it is toxic for reproduction⁶.

Overall assessment

When assessing current levels in the Baltic Sea, current inputs, and the severity of the relevant toxicity mechanism, Lead scores **87-90/100** 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 Lead and its compounds are manufactured/imported in the EU in quantities 1,000,000 – 10,000,000 tonnes/year⁷. Sectors of the **REACH registered uses** include batteries, pigments/coatings/inks, plastics, rubber, lead articles or alloys, solder, galvanisation, heat transfer fluids or lubricants, aviation fuels, adsorbents, explosives, plating, construction materials etc. With article service life and emissions from waste being relevant. According to ECHA⁸, the apportionment of use of lead and its compounds in the EU is as follows: Automotive batteries (57%), Industrial batteries (32%), Rolled and extruded products (4%), Shot and ammunition (4%), Lead compounds (1%), Cable sheathing (1%), Alloys (including solders) (0.5 %).

Main sectors which officially reported releases to the Baltic Sea catchment in the context of E-PRTR⁹ and the respective shares for the reported emissions are as following:

Releases to air (reported releases 17-75 t/y, in the period 2018-2022): mainly **Thermal power / combustion** (35%), **Production/smelting of non-ferrous metals** (22%), **Metal ore roasting or sintering** (18%), **Production of pig iron or steel** (16%). Releases to water/soil (reported releases 4-25 t/y, in the period 2018-2022): **Underground mining and related operations** (69%), Pulp production (7%). Sectors reporting to E-PRTR with relatively lower emissions include for example landfills, glass manufacture, and disposal of non-hazardous waste.

Shipping emissions to the Baltic Sea have been estimated at 2 t/y and they correspond to scrubber wash water, bilge water, grey water, and sewage. Emissions from biosolids, from WWTPs, applied on land may also be expected.

P Based on available estimations, Lead appears to enter the Baltic Sea via **rivers** (78-153 t/y, PLC³), direct off-shore emissions (**depositing of dredged material** (41-143t/y, HELCOM BSEFS¹⁰) plus shipping (2 t/y, EMERGE)), **atmospheric deposition** (49-93 t/y, PLC, EMERGE), and direct emissions from land-based activities (1.5-5 t/y, PLC, Undeman et al, 2022, E-PRTR).

Relevant policies (existing or planned measures)

M (on A/P/I) • Many activities are restricted under EU REACH for lead compounds in general, as well as specifically for lead carbonates and lead sulphates – restrictions exist also for electrical and electronic devices (under EU RoHS). **33 Lead substances are listed as SVHC** (Substances of Very High Concern) under EU REACH (on the basis of CMR properties), a small number of which has further been included in **REACH Authorization list**. ECHA has recently developed an **Assessment of Regulatory needs (ARN) for slag substances (residues from processing of primary and secondary metal sources)**, including substances containing lead (ECHA¹²). Further relevant ARNs for Lead substances may exist (to be confirmed).

• Lead and its compounds are listed as a priority substances under the **EU WFD** and as priority hazardous substances under its update proposal. Lead is also a **HELCOM indicator**.

• **Lead is listed among contaminants with maximum levels in EU Regulation 2023/915, including seafood.**

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]