Nickel and its compounds

(CAS numbers: e.g. 7440-02-0, EC numbers: e.g. 231-111-4 / Entry number in HELCOM list of priority substances: 25)

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

DRIVERS | ACTIVITIES | PRESSURES | STATE | IMPACTS

Why a HELCOM priority?

Main evidence

S Concentrations of Nickel exceed the applied threshold value in **21** of the 37 examined areas (assessment units) of the Baltic Sea. The threshold is exceeded in both coastal and off-shore areas (**11**/15 assessed off-shore areas). In these 22 areas, on average **83%** of the assessible samples in **water and/or sediment and/or biota** exceed the threshold value. This is based on monitoring data for the period 2015-2024 available in national and international databases[1] and scientific articles/reports[2]. A total number of 2139 data points were possible to evaluate for Nickel.

By further considering how much above or below the threshold each concentration is, and how often the substance is detected, Nickel scores **7.9/10** (confidence range: **7.9 – 7.9**) 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 Nickel were acquired from the EC proposed Directive amending WFD and EQSD[3].

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

Supporting evidence

P Approximately **450 – 920 tonnes of Nickel and its compounds** are estimated to enter the Baltic Sea every year, mainly via rivers (PLC[4]) and secondly via deposition of dredged material (HELCOM BSEFS[5]). Additional inputs are expected from Off-shore Wind Farms. Given that the substance is **very persistent (metals do not degrade) and toxic**[6], 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 sectors, such as in batteries.

Overall assessment

When assessing current levels in the Baltic Sea, current inputs, and the severity of the relevant toxicity mechanism, Nickel scores **63-81/100** 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 Nickel and its compounds are manufactured/imported in the EU in quantities : ≥ 100,000 tonnes/year[7] (not complete calculation of EU REACH registered volume, as there are several substances containing Arsenic). 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 (a broader overview including REACH-registered uses with potential emissions has not been compiled here):
Releases to water/soil (average reported releases 12 t/y, in the period 2018-2022): **Industrial plants for the production of pulp from timber or similar fibrous materials** (21%), Installation for the production of non-ferrous crude metals from ore chemical or electrolytic processes (13%), Installations for the production of pig iron or steel including continuous casting (9%). Releases to air (average reported releases 20t/y, in the period 2018-2022): mainly **Thermal power / combustion** (52%), **Mineral oil and gas refineries** (14%), Installation for the production of non-ferrous crude metals by metallurgical, chemical or electrolytic processes (9%), Installations for the production of pig iron or steel including continuous casting (8%). Emissions from shipping (about 10 t/y, EMERGE) relate to scrubber wash water, bilge water, grey water, and sewage[9].

P Based on available estimations, Nickel appears to enter the Baltic Sea via **rivers** (362-757t/y, PLC), direct off-shore emissions (**depositing of dredged material** (44-115 t/y, HELCOM BSEFS) plus shipping (10 t/y, EMERGE) plus inputs are expected from Off-shore Wind Farms (unquantified)), atmospheric deposition (23-27 t/y, EMERGE), and direct inputs from land activities (9-13 t/y, PLC).

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 water toxicity threshold in the EC proposed Directive amending WFD and EQSD (compatibility in terms of form (soluble/total) between measured levels and the threshold).*

Relevant policies (existing or planned measures)

M (on A/P)

- **For Nickel, some activities are restricted under EU REACH** (use in piering assembly and articles intended to come into direct and prolonged contact with the skin, such as earrings, necklaces, bracelets and chains, etc.). There are **several Assessments for Regulatory Needs or Risk Management Options Analyses for individual nickel substances and some sub-groups**, prepared in the context of ECHA's Integrated Regulatory Strategy[10]**.**
- Nickel and its compounds are listed as a priority substances under the **EU WFD** and its update proposal.
- There are provisions in **EU Best Available Techniques** Reference Documents for nickel

References:

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

[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]