Irgarol (cybutryne)

(CAS number: e.g. 28159-98-0, EC number: 248-872-3 / Entry number in HELCOM list of priority substances: 21)

General sectors: Off-shore (shipping, OWF, aquaculture?), legacy biocide, legacy pesticide

DRIVERS | ACTIVITIES | PRESSURES | STATE | IMPACTS

Why a HELCOM priority?

Main evidence

S Concentrations of Irgarol exceed the applied threshold value in **10** of the 23 examined areas (assessment units) of the Baltic Sea. The threshold is exceeded in both coastal and off-shore areas (**1**/6 assessed off-shore areas). In these 10 areas, on average **77%*** of the assessible samples in **sediment** exceed the threshold value. This is based on monitoring data for the period 2015-2024 available in national and international databases[1]. As well as scientific articles/reports[2], and target screening data from the project PreEMPT[3]. A total number of 639 data points were possible to evaluate for Irgarol.

By further considering how much above or below the threshold each concentration is, and how often the substance is detected, Irgarol scores **7.2/10** (confidence range: **6.6 – 7.2**) 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.

The threshold value for Irgarol, for sediment, was acquired from the NORMAN Network ecotoxicology database[4].

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

Supporting evidence

P Approximately **35-140 kg of Irgarol** are estimated to enter the Baltic Sea every year, mainly via rivers (WATERBASE[5]). Additional inputs may be expected from off-shore activities (see under Activities below). Given that the substance is **very persistent and very toxic**[6], current inputs are considered as possibly 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 higher historical inputs.

I Irgarol is considered to have a concerning **mode of toxicity**, as for example it is a photosynthesis inhibitor[7]. Photosynthesis inhibitors disrupt energy production or utilization and can affect growth and overall fitness of primary producing marine organisms. Furthermore, an Effect-Directed-Analysis study in the North-East Atlantic has revealed this substance as one of the **drivers of inhibition of photosystem efficiency in marine microalgae**[8].

Overall assessment

When assessing current levels in the Baltic Sea, current inputs, and the severity of the relevant toxicity mechanism, Irgarol scores **62-72/100** in the scale established for assessing the overall risk for impacts/threat for the Baltic Sea, where 50 indicates concern and 100 extreme risk.

Facts relevant for management considerations

Causal chain and pathways

A At least in the past it is reported to have been widely used as a tin-free, copper-free booster biocide for antifouling paints, as well as in aquaculture, and a relevant substance for Off-shore Wind Farms (OWFs)[9]. In the EU it is not an approved active substance for use in antifouling or in general as biocide or pesticide. However, releases from surfaces where it has been previously applied or applied outside the EU are possible. In this context, it might also be used on structures, equipment and recreational craft in cases not already subject to the International Convention on antifouling. Regarding aquaculture, although use is plausible, it is not authorized for such use at least in Denmark, Finland, Germany, Latvia, Lithuania, or Poland[10].

P Quantified data is available only for the riverine pathway ot the Baltic Sea, as mentioned above. Even though emissions off-shore are expected. The source of the measured levels in rivers (in fact river mouths) is unknown. It is not clear if Its high persistence, and earlier widespread use, can explain this.

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 toxicity threshold (sediment). Another aspect could be confirming whether active use in some off-shore sectors could be the case.*

Relevant policies (existing or planned measures)

M (on A/P)

- Irgarol is **subject to the International Convention on the Control of Harmful Anti-fouling Systems on Ships**[11].
- Listed as a priority substance under the **EU WFD** (and its update proposal) – including respective national **Progammes of Measures for this**. 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. 9. 10. 11.

[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 >50%.