



Document title	Chemical risk assessment of contaminants in grey water from ships
Code	6-4
Category	INF
Agenda Item	6 – Other ship-generated wastes and port reception facilities (including marine litter)
Submission date	18.09.2018
Submitted by	Sweden
Reference	

Background

Sweden has financed a study on the chemical risk assessment of contaminants in grey water from ships. The study, performed by Lena Granhag/Martin Eriksson, Unit of Maritime Environmental Science, Department of Mechanics and Maritime Sciences, Chalmers University of Technology, will be finalized at the latest by March 2019. The aim of the study is to quantify the cumulative environmental risk from chemical contaminants, and the environmental impact from phosphorus and nitrogen, emitted with grey water from ships to the Baltic Sea. The areas for which risk analyses of contaminants have been performed are two shipping lanes in the Baltic Sea, one in Baltic Proper and one in Kattegat.

There are only some preliminary results so far concerning the risk from chemical contaminants. Mixtures of contaminants can have a larger negative impact than the individual mixture components (e.g. see Syberg et al. 2017). Furthermore, chemical contaminants are usually emitted to the environment as mixtures, and in the ecosystem, chemical contaminants are always present as mixtures. Hence, any risk assessment of a specific discharge of a chemical mixture needs to take the larger negative impact of mixtures into account, i.e. the cumulative risk of contaminants. Grey water onboard ships contains a multitude of different chemical contaminants. For example, preservatives and antimicrobial compounds in personal care products from shower and washing water, detergents and other chemicals in dish water, and metals in piping and from wastewater treatment. The work includes data mining for concentrations of contaminants in ship's grey water, volumes of grey water emissions from ships, estimation of ship traffic in the Baltic Sea based on AIS data, calculation of emission loads of contaminants and nutrients to water, modelling of contaminant concentrations in water, and calculations of Predicted Environmental Concentrations (PECs) of contaminants, Predicted No Effect Concentrations (PNEC) of contaminants and cumulative risk ratios of contaminants. PNEC is used extensively in Europe by the European Chemicals Agency, the Registration, Evaluation, Authorization and Restriction of Chemicals program and other toxicology agencies to assess environmental risk. They are not intended to predict the upper limit of concentration of a chemical that has a toxic effect. PNEC values are often used in environmental risk assessment as a tool in ecotoxicology.

The risk ratio for each contaminant is defined as PEC divided by PNEC, and the cumulative risk from the emitted shipping mixture of contaminants is defined as the summation of the risk ratios of all the emitted contaminants. If the sum of risk ratios is above one, there is an unacceptable environmental risk from the contaminant mixture.

Preliminary results

The preliminary results of the study, as far only focusing on chemical contaminants, concludes that zinc and copper dominates the cumulative chemical risk of grey water, bearing in mind that there only exists PNEC values for 14 of the 58 contaminants examined. It is evident that the emissions of these 14 contaminants in grey water does not pose an environmental risk on their own. However, if the available background concentrations of copper, dichlorobromomethane and zinc are included in the analyses, the cumulative risk ratio are close to 1 for both studied shipping lanes. The Baltic Sea have high background concentrations of zinc and copper, and the contaminants emitted via ships grey water are not the only contaminants emitted to the Baltic Sea. Therefore, all efforts to reduce the emissions of these compounds, for example reducing or eliminating the emission of grey water from ships, should be considered.

Action requested

The Meeting is invited to take note of the information provided and encourage interested States to provide similar information.