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EVALUATION AND HARMONIZATION OF RULES AND GUIDANCE ON THE DISCHARGE OF LIQUID EFFLUENTS FROM EGCS INTO WATERS, INCLUDING CONDITIONS AND AREAS

EGCS washwater discharges and accumulation levels in port water and sediment

Submitted by CLIA and INTERFERRY

SUMMARY

Executive summary:	This document provides an overview of a CE Delft study on EGCS washwater impacts to port waters and sediment through the use of MAMPEC computer modelling. The report provides an evaluation of potential accumulation levels of washwater components in the waters and sediment of modelled port types
Strategic direction if applicable:	1
Output:	1.12
Action to be taken:	Paragraph 12
Related documents:	MEPC 74/14/7

Introduction

1 This information document contributes to the output regarding discharge of liquid effluents from EGCS. It provides an overview of a CE Delft study on EGCS washwater impacts to port waters and sediment using empirical data of almost 300 washwater samples as inputs for MAMPEC-BW computer modelling. The report provides an evaluation of potential cumulative effects of several metals and polycyclic aromatic hydrocarbons (PAHs) on the waters and sediments of the port types that were modelled.

2 The aim of the study was to provide a method for evaluating the impacts of operating exhaust gas cleaning systems in open loop mode in ports on water and sediment and to test the methodology conservatively in a series of model ports. The complete report is available online on the CE Delft website[1].

[1] https://www.cedelft.eu/en/publications/2399/the-impacts-of-egcs-washwater-discharges-on-port-water-and-sediment

Methodology

3 The study consists of a number of defined tasks which can be separated into two main areas: first, the calculation of predicted equilibrium water and five-year sediment concentrations; and second, the evaluation of these concentrations against water and sediment environmental standards and other contributors.

4 The study relies on the MAMPEC-BW[2] model which is a steady-state modelling tool with regard to the water concentrations. The model calculates the equilibrium state for the substance concentrations in the water, suspended particulate matter (SPM), and sediment based on a continuous inflow of the substances and continuous hydrodynamic water exchanges.

5 A reference scenario was defined in which just over 40 tonnes of fuel is consumed everyday for 365 days per year, year after year, indefinitely, by ships at berth operating EGCS in open loop mode. For the reference scenario, the modelled equilibrium concentrations of eleven metals and sixteen PAHs in the water and the sediment were then compared with the agreed European Environmental Quality Standards (EQS) for priority substances for 2021 and onwards under the Water Framework Directive, 2013/39/EU.

6 The substances considered in the sample set for the study are listed in the tables below and are inclusive of those set out in the IMO guidelines for washwater data collection as detailed in annex 3 to the *2015 Guidelines for exhaust gas cleaning systems* (resolution MEPC.259(68)) (2015 EGCS Guidelines). The study considered phenanthrene, the PAH specified by the IMO in MEPC 259(68), as well as 15 additional PAHs. As the 2015 EGCS Guidelines utilize turbidity as a surrogate for suspended solids such as metals, the study includes an assessment of the sample set against the IMO washwater criteria for turbidity. The sample set was also assessed against the IMO washwater criteria for pH and Nitrates. While not specified by IMO, periodic monitoring of selenium and thallium is required under US EPA Vessel General Permit (VGP) and are therefore included in the study.

Metal	CAS No.	Metal	CAS No.
Arsenic (As)	7440-38-2	Nickel (Ni)	7440-02-0
Cadmium (Cd)	7440-43-9	Selenium (Se)	7782-49-2
Chromium (Cr)	7440-47-3	Thallium (Tl)	7440-28-0
Copper (Cu)	7440-50-8	Vanadium (V)	7440-62-2
Lead (Pb)	7439-92-1	Zinc (Zn)	7440-66-6
Mercury (Hg)	7439-97-6		

PAH	CAS No.	PAH	CAS No.
Acenaphthene	83-32-9	Chrysene	218-01-9
Acenaphthylene	208-96-8	Dibenz(a,h)anthracene	53-70-3
Anthracene	120-12-7	Fluoranthene	206-44-0
Benzo(a)anthracene	56-55-3	Fluorene	86-73-7
Benzo(a)pyrene	50-32-8	Indeno(1,2,3-cd) pyrene	193-39-5
Benzo(b)fluoranthene	205-99-2	Naphthalene	91-20-3
Benzo(g,h,i)perylene	191-24-2	Phenanthrene	85-01-8
Benzo(k)fluoranthene	207-08-9	Pyrene	129-00-0

[2] The MAMPEC (Marine Antifoulant Model to Predict Environmental Concentrations) model is recognized and used by regulatory authorities in the EU, US and by the IMO for ballast water discharges. See https://www.deltares.nl/en/software/mampec/

Results

7 The results of the study show that equilibrium concentrations of metals and PAHs in the water and the five-year sediment concentrations depend predominantly on the hydrodynamic exchange of the port water with the surrounding waters. As an example, a port with a wider port entrance will lead to lower concentrations than an enclosed port with a narrower port entrance. Additionally, a river port which is not enclosed, and has a continuous water exchange, will lead to lower concentrations than an enclosed port with a wide port entrance.

8 In most ports and for most substances, under the reference scenario, the increase in concentrations is less than 0.1% of the limit values in the new EQS standards of Directive 2013/39/EU coming into force in 2021. In ports with low hydrodynamic exchange, and especially for a few Polycyclic Aromatic Hydrocarbons, the increase in concentration can increase to 0.6% of the limit value.

9 A portion of the substances discharged by EGCS operated in open loop mode in ports ends up in the port sediment. Assuming, conservatively, a zero concentration to begin with, the modelling shows that for the Standard OECD-EU commercial harbour, the increase in sediment concentrations of metals and PAHs after five years is less than 0.3% of the referenced standards for dredged materials.

10 The modelling results suggest that local hydrodynamic circumstances, as well as background concentrations of priority substances, should be taken into account when assessing the potential accumulation from the use of an exhaust gas cleaning system in open loop mode in a specific port. The modelling results also suggest that in cases that are considered default cases for regulation in other areas (ballast water management systems, antifouling coating), the impacts of using exhaust gas cleaning systems in open loop mode are small in relation to the agreed European Environmental Quality Standards (EQS) for priority substances for 2021 and onwards under the Water Framework Directive 2013/39/EU.

Study provided to GESAMP Task Team

11 The CE Delft Report was previously provided to the GESAMP Task Team for its consideration.

Action requested of the Sub-Committee

12 The Sub-Committee is invited to take note of the information provided in this document.