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## INTERPRETATIONS OF, AND AMENDMENTS TO, MARPOL AND RELATED INSTRUMENTS

### Proposal to amend MARPOL Annex IV to include the possibility to establish Special Areas for the prevention of pollution by sewage and to designate the Baltic Sea as a Special Area under Annex IV

Submitted by Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland,  
the Russian Federation and Sweden

#### SUMMARY

**Executive summary:** This document contains a proposal to amend MARPOL Annex IV to include the possibility to establish “special areas” for the prevention of pollution from sewage of passenger ships and a proposal to designate the Baltic Sea as such a Special Area. It is proposed that discharge criteria for nutrient discharges from sewage would be applied to passenger ships sailing in these special areas. Due to its biogeographical characteristics and decades of anthropogenic nutrient input, the Baltic Sea suffers from a severe eutrophication problem. Amending MARPOL Annex IV to take into account this sea area’s sensitivity to nutrients is therefore necessary. Consequently, it is proposed that more stringent discharge regulations apply to passenger ships sailing in special areas.

**Strategic direction:** 7.1

**High-level action:** 7.1.2

**Planned output:** 7.1.2.1

**Action to be taken:** Paragraph 17

**Related documents:** MEPC 59/14; MEPC.1/Circ.685; MEPC 60/6/3, MEPC 60/INF.4; MEPC.2(VI); MEPC.159(55) and resolution A.927(22)

#### Introduction

1 The current MARPOL Annex IV allows discharge of untreated sewage into the sea on certain conditions at a distance of more than 12 nautical miles from the nearest land. Sewage treated in accordance with the standards of resolution MEPC.2(VI) or MEPC.159(55) may be

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discharged anywhere. However, there is no requirement to remove nutrients, such as phosphorus (P) and nitrogen (N), from the sewage prior to discharge into the sea. The scope of MARPOL Annex IV is perhaps sufficient for most sea areas, but for example in the highly eutrophic Baltic Sea stricter regulations are needed.

2 This document proposes to amend MARPOL Annex IV by providing for the possibility to designate special areas with new sewage nutrient discharge regulations for passenger ships and also proposes to designate the Baltic Sea as a Special Area. The proposed amendments to Annex IV are presented in annex 1 to this document. Corresponding amendments to the form of the International Sewage Pollution Certificate are presented in annex 2. The document also contains a proposal for a new MEPC resolution for sewage treatment plants for passenger ships. Annex 3 presents the draft “Guidelines on Implementation of Effluent Standards and Performance Tests for Sewage Treatment Plants for Passenger Ships”. These new guidelines would only apply to passenger ships and would have the same text as resolution MEPC.159(55), “Revised Guidelines on Implementation of Effluent Standards and Performance Tests for Sewage Treatment Plants”, except for the inclusion of the requirement of nutrient removal as an effluent standard.

## Background

3 Being one of the largest brackish water bodies in the world, the Baltic Sea has a unique marine ecosystem with indispensable values. It has exceptional hydrographical and ecological characteristics and its ecosystem is particularly sensitive to changes in the environment. Eutrophication is undisputedly the most significant environmental problem in the Baltic Sea. Since the 1900s, the Baltic Sea has changed from an oligotrophic clear-water sea into a eutrophic marine environment, mostly due to human activity. Eutrophication is a process in an aquatic ecosystem where high nutrient concentrations stimulate the growth of algae which leads to imbalanced functioning of the system. Indicators for eutrophication that can be seen in the Baltic Sea today are intense algal growth, excess of filamentous algae, phytoplankton blooms, production of excess organic matter, oxygen depletion with recurrent internal loading of nutrients and death of benthic organisms, including fish. Besides being an environmental problem, the eutrophication in the Baltic Sea has severe impacts also on fisheries, human health and recreational values.

4 Compared to other sea areas, the Baltic Sea is unusually prone to eutrophication caused by input of phosphorus and nitrogen compounds. This is mainly due to its shallow water depth, large catchment area with a population of 85 million people and the slow rate of water exchange. The nutrient input stems partly from natural atmospheric and riverine input, but mostly from agriculture, municipal waste waters, fish-farms and atmospheric emissions from traffic and combustion of fossil fuels, *i.e.* nutrients from anthropogenic sources. To estimate the amount of nutrients discharged into the Baltic Sea from ships’ sewage, a theoretical study was conducted in 2006 and updated in 2009 (Hänninen & Sassi 2009<sup>1</sup>). The results show that the sewage annually produced on ships in the Baltic Sea area could contain a maximum 356 tonnes of N and 119 tonnes of P. However, it is difficult to estimate the actual total amount of nutrients discharged into the sea from ships because even today, part of the sewage is discharged into port reception facilities based on voluntary agreements between ports and ship owners. If all sewage were discharged into the sea, the percentage of this input, compared to the total annual nutrient input into the Baltic Sea, could be < 0.035% for N and < 0.34% for P. Although seemingly small,

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<sup>1</sup> Hänninen, S. and Sassi, J. 2009. Estimated nutrient load from waste waters originating from ships in the Baltic Sea area – updated 2009. VTT Research Report VTT-R-07396-08, see [http://www.vtt.fi/inf/julkaisut/muut/2009/VTT\\_R\\_07396\\_08.pdf](http://www.vtt.fi/inf/julkaisut/muut/2009/VTT_R_07396_08.pdf)

this amount is far from negligible. The nutrients from sewage are directly available for uptake by algae. Especially the growth of blue-green algae, which is limited by the amount of P in the water, is stimulated by sewage. One must also take into account that the discharges are concentrated spatially along the shipping routes, causing serious effects locally. Temporally the sewage discharges are concentrated in the summer season when algae normally have used up most of the N and P dissolved in the water. Therefore the nutrients in sewage have far greater effects on the environment than the percentages mentioned above would suggest.

5 Efforts to reduce nutrient inputs are a top priority among the Baltic Sea States. Reductions have so far mainly been achieved through improvements at major point sources, such as municipal sewage treatment plants and industrial wastewater outlets. Achieving further reductions is demanding, and extra efforts should be directed to address diffuse sources of nutrients such as agriculture. The Helsinki Commission's Baltic Sea Action Plan (BSAP) was adopted by the ministers of the environment of the Baltic Sea States in 2007. It includes measures to reduce nutrient inputs to the Baltic Sea by, for example, more stringent municipal wastewater standards, wastewater treatment also for single-family homes and small settlements, substitution of phosphorus in detergents and limiting the nutrient leakage from agriculture and other diffuse sources. Reducing nutrient discharges from shipping is also a requirement of the BSAP.

6 Nutrient limits from urban wastewaters discharged into sensitive areas have been regulated in the European Union by European Council Directive 91/271/EEC since the early 2000's. Sensitive areas are identified in the Directive as areas that are found to be eutrophic or which in the near future may become eutrophic if protective action is not taken. For example total phosphorus levels must not exceed 2 mg/l (or 80% reduction) for waste water treatment plants of 10,000-100,000 people and 1 mg/l (or 80% reduction) if the population is more than 100,000 people. Total nitrogen for the same population groups must not exceed 15 mg/l (or 70-80%) or 10 mg/l (or 70-80%) respectively.

7 In the Baltic Sea even more stringent nutrient limits are recommended by HELCOM Recommendations 28E/5 and 28E/6 (see [http://www.helcom.fi/stc/files/BSAP/BSAP\\_Final.pdf](http://www.helcom.fi/stc/files/BSAP/BSAP_Final.pdf)) that were agreed upon by the Ministers of the Environment of the Baltic Sea as a part of the Baltic Sea Action Plan in 2007. According to HELCOM Recommendation 28E/5 effluents from wastewater treatments plants with a population equivalent (p.e.) of more than 100.000, discharging directly into a marine environment, should not contain more than 0.5 mg/l P (or 90% reduction) and 10 mg/l N (or 70-80% reduction). Slightly less stringent reduction levels are required of wastewater treatment plants for smaller populations. Even single family homes and settlements below 300 p.e. should treat their wastewaters to levels corresponding to 5 mg/l P (or 70% reduction) and 25 mg/l N (or 29% reduction), see HELCOM Recommendation 28E/6. These recommendations will enter into force between 31 December 2010 and 31 December 2018 depending on the size of the population.

8 The Baltic Sea is one of the most intensively trafficked sea areas in the world. Both the number and the size of the ships have been growing during recent years, and this trend is expected to continue. Passenger and cruise traffic is also increasing rapidly in the Baltic Sea, significantly adding to the amount of sewage created on board. The submitters of this document do not wish to see the amount of nutrients discharged into the Baltic Sea, through the sewage of ships, grow at the same rate.

9 MARPOL Annex IV contains regulations for the prevention of pollution by sewage from ships. Untreated sewage may be discharged into the sea at a distance of more than 12 nautical miles from land provided that, in any case, the sewage that has been stored in holding tanks, or sewage originating from spaces containing living animals, shall not be discharged instantaneously but at a moderate rate when the ship is *en route* and proceeding at not less than 4 knots; the rate of discharge shall be approved by the Administration based upon standards developed by the Organization. Comminuted and disinfected sewage may be discharged at a distance of more than 3 nautical miles from the nearest land. Sewage that has been treated with a sewage treatment plant, approved according to the recommendations and guidelines of resolution MEPC.2(VI) or MEPC.159(55), may be discharged anywhere, provided that the effluent does not produce visible or floating solids nor cause discoloration of the surrounding water. Comminuting, disinfecting or the treating of sewage according to the above-mentioned standards does not notably reduce the amount of nutrients in the sewage. Therefore the current provisions of MARPOL Annex IV do not provide the Baltic Sea with the required level of protection from nutrient pollution by sewage from ships. This in turn means that there is a compelling need to limit the sewage discharges from ships in the Baltic Sea.

10 It is not only the Baltic Sea States that consider that the sewage discharge regulations of MARPOL Annex IV and the treatment standards of resolutions MEPC.2(VI) and MEPC.159(55) provide an inadequate level of protection of their marine environment. At MEPC 59, WWF introduced a proposal (MEPC 59/14) for voluntary actions to reduce nutrient input from the sewage of passenger ships in enclosed and semi-enclosed sea areas. The proposal received support from many delegations from all over the world. The Committee agreed to encourage passenger vessels to refrain from discharging waste water into the sea in enclosed and semi-enclosed sea areas that are threatened by eutrophication. The agreement has been disseminated as Circular MEPC.1/Circ.685. Also in the United States there have been discussions to introduce more stringent sewage discharge regulations (see, e.g., Cruise Business Review 3/2008).

### **Proposal**

11 Recognizing the severe eutrophication of the Baltic Sea, the submitters of this document propose, in addition to the proposal to include in MARPOL Annex IV the possibility to designate special areas, to amend the Annex by designating the Baltic Sea as a Special Area with revised sewage discharge regulations for passenger ships. Discharge of sewage into the sea from passenger ships would be allowed in the Special Area only for sewage processed through a sewage treatment plant which is type approved by the Administration, taking into account the standards and test methods developed by the Organization, and which also reduces the N concentration to less than 20 mg/l, or at least 70%, and the P concentration to less than 1.0 mg/l, or at least 80%. The draft amendments to MARPOL Annex IV are outlined in the attached annex 1, the draft amendments to the form of International Sewage Pollution Certificate are presented in annex 2, and a new draft MEPC resolution on “Revised Guidelines on Implementation of Effluent Standards and Performance Tests for Sewage Treatment Plants for Passenger Ships”, is presented in annex 3.

12 Taking into account the vulnerable nature of the Baltic Sea and the increasing eutrophication, all nutrient input should be minimized. Bearing in mind the ecological and economical effects of not taking actions against eutrophication in the Baltic Sea, the submitters consider an amendment of MARPOL Annex IV to be necessary.

13 In addition to amendments to MARPOL Annex IV, the Guidelines for the Designation of Special Areas under MARPOL 73/78 (resolution A.927(22)) would also have to be amended, since the current Guidelines can only be applied for special areas to be designated under MARPOL Annexes I, II and V. This matter is addressed in document MEPC 60/6/3.

### **Benefits and implications of the proposed amendments for the Baltic Sea**

14 In case all the ferries and cruise liners operating in the Baltic Sea area would collect their sewage waters onboard and utilize port reception facilities, about 63% of the theoretical nutrient input from the sewage of ships into the Baltic Sea, would be eliminated. The same effect could also be achieved by using an effective onboard sewage treatment system that removes nutrients from sewage water. The short term impacts of this would be reduced blooms of blue-green algae along the shipping lanes. In the long term, this nutrient cut would be an important step in combating the problem of eutrophication in the Baltic Sea.

15 It is technically feasible to retrofit sewage treatment systems capable of removing nutrients. According to Hänninen and Sassi (2009) the cost of retrofitting such a complete system on board a 3300 pax cruise vessel could be in the range of a few million USD, while the operational costs (including power, chemicals and labour) for the complete system are estimated to around US\$150,000 per annum. Contribution of the nutrient reduction components to the price of the complete sewage treatment plant represent around 11-23% of the total cost of the treatment plant. Contribution of nutrient removal to the total operational costs of the whole system is quite marginal. More information can be found in document MEPC 60/INF.4.

16 Another option is to discharge sewage into port reception facilities. Port waste reception facilities for the sewage of ships are readily available or can be retrofitted in the ports of the Baltic Sea. The so called no-special-fee system of the Helsinki Commission (HELCOM) entails that all ships are required to pay a waste fee, regardless of the amount of waste discharged ashore. In many ports the no-special-fee system is also applied to the discharge of sewage from ships. Therefore, discharge of sewage to port reception facilities in the Baltic Sea ports does not significantly increase the costs for shipowners.

### **Action requested of the Committee**

17 The Committee is invited to consider the proposals contained in this document and decide as appropriate.

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## ANNEX 1

## PROPOSED AMENDMENTS TO MARPOL ANNEX IV

This annex proposes amendments to MARPOL Annex IV providing for the possibility to establish special areas where more stringent sewage discharge requirements would apply for passenger vessels, and also designating the Baltic Sea as a special area under Annex IV. The proposed amendments are shown in the following paragraphs where new text is underlined and deleted text is crossed out.

**Add new sections *5bis*, *7bis*, and *7ter* to regulation 1, *Definitions*:**

*5bis* *Special area* means a sea area where for recognized technical reasons in relation to its oceanographical and ecological condition and to the particular character of its traffic the adoption of special mandatory methods for the prevention of sea pollution by sewage is required.

For the purposes of this Annex, the special areas shall include:

- .1 the Baltic Sea area as defined in regulation 1.11.2 of Annex I; and
- .2 any other sea area designated by the Organization in accordance with criteria and procedures for designation of special areas with respect to prevention of pollution from sewage from ships<sup>2</sup>.

*7bis* *A passenger* is every person other than:

- .1 the master and the members of the crew or other persons employed or engaged in any capacity on board a ship on the business of that ship; and
- .2 a child under one year of age.

*7ter* *A passenger ship* is a ship which carries more than twelve passengers.

For the application of regulation 11.3, a *new passenger ship* is a passenger ship:

- .1 for which the building contract is placed, or in the absence of a building contract, the keel of which is laid, or which is in a similar stage of construction, on or after [1 January 2013]; or
- .2 the delivery of which is three years or more after [1 January 2013].

*An existing passenger ship* is a passenger ship which is not a new passenger ship.

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<sup>2</sup> Refer to Assembly resolution A.927(22), Guidelines for the designation of special areas under MARPOL 73/78 and guidelines for the identification and designation of particularly sensitive sea areas.

**Add new section 2 to regulation 9, *Sewage systems*:**

2 Every passenger ship which, in accordance with regulation 2, is required to comply with the provisions of this Annex, and for which regulation 11.3 applies while in a special area, shall be equipped with one of the following sewage systems:

- .1 a sewage treatment plant which shall be of a type approved by the Administration, taking into account the standards and test methods developed by the Organization,<sup>3</sup> or
- .2 a holding tank of the capacity to the satisfaction of the Administration for the retention of all sewage, having regard to the operation of the ship, the number of persons on board and other relevant factors. The holding tank shall be constructed to the satisfaction of the Administration and shall have a means to indicate visually the amount of its contents.

**Divide regulation 11 into three sub-sections: A for the discharge of sewage from ships other than passenger ships in all areas and for the discharge of sewage from passenger ships outside special areas; B for the discharge of sewage from passenger ships within a special area; and C for general requirements:**

**Regulation 11**

*Discharge of sewage*

A *Discharge of sewage from ships other than passenger ships in all areas and discharge of sewage from passenger ships outside special areas*

1 Subject to the provisions of regulation 3 of this Annex, the discharge of sewage into the sea is prohibited, except when:

- .1 the ship is discharging comminuted and disinfected sewage using a system approved by the Administration in accordance with regulation 9.1.2 of this Annex at a distance of more than 3 nautical miles from the nearest land, or sewage which is not comminuted or disinfected at a distance of more than 12 nautical miles from the nearest land, provided that, in any case, the sewage that has been stored in holding tanks, or sewage originating from spaces containing living animals, shall not be discharged instantaneously but at a moderate rate when the ship is *en route* and proceeding at not less than 4 knots; the rate of discharge shall be approved by the Administration based upon standards developed by the Organization<sup>4</sup>; or
- .2 the ship has in operation an approved sewage treatment plant which has been certified by the Administration to meet the operational requirements referred to in regulation 9.1.1 of this Annex, and

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<sup>3</sup> Reference is made to draft MEPC resolution, Revised Guidelines on Implementation of Effluent Standards and Performance Tests for Sewage Treatment Plants for Passenger Ships, see annex 3 to this document.

<sup>4</sup> Refer to the Recommendation on standards for the rate of discharge of untreated sewage from ships adopted by the Marine Environmental Protection Committee of the Organization by resolution MEPC.157(55).

- .2.1 the test results of the plant are laid down in the ship's International Sewage Pollution Prevention Certificate; and
- .2.2 additionally, the effluent shall not produce visible floating solids nor cause discoloration of the surrounding water.

2 The provisions of paragraph 1 shall not apply to ships operating in the waters under the jurisdiction of a State and visiting ships from other States while they are in these waters and are discharging sewage in accordance with such less stringent requirements as may be imposed by such State.

~~3 When the sewage is mixed with wastes or waste water covered by other Annexes of MARPOL, the requirements of those Annexes shall be complied with in addition to the requirements of this Annex.~~

*B Discharge of sewage from passenger ships within a special area*

3 Any discharge into the sea of sewage from a passenger ship shall be prohibited

- a) for new passenger ships on, or after [1 January 2013],
- b) for existing passenger ships on, or after [1 January 2018],

except when the following conditions are satisfied:

the ship has in operation an approved sewage treatment plant which has been certified by the Administration to meet the operational requirements referred to in regulation 9.2 of this Annex, and

- .1 the test results of the plant are laid down in the ship's International Sewage Pollution Prevention Certificate; and
- .2 additionally, the effluent shall not produce visible floating solids nor cause discoloration of the surrounding water.

*C General requirements*

4 When the sewage is mixed with wastes or waste water covered by other Annexes of MARPOL-73/78, the requirements of those Annexes shall be complied with in addition to the requirements of this Annex.

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ANNEX 2

**PROPOSED AMENDMENTS TO THE  
FORM OF INTERNATIONAL SEWAGE POLLUTION PREVENTION CERTIFICATE**

1 Add the following text (new text is shown underlined) under the heading “Particulars of ship”:

Type of ship for the application of regulation 11.3:\*

New/Existing passenger ship

Ship other than a passenger ship

2 Amend section \* 1.1. to read as follows (new text is shown underlined):

\* 1.1. Description of the sewage treatment plant:

Type of sewage treatment plant .....

Name of manufacturer .....

The sewage treatment plant is certified by the Administration to meet the effluent standards as provided for in resolution MEPC.2(VI).

The sewage treatment plant is certified by the Administration to meet the effluent standards as provided for in resolution MEPC.159(55).

The sewage treatment plant is certified by the Administration to meet the effluent standards as provided for in [new MEPC resolution, see Annex 3].

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\* Delete as appropriate.



## ANNEX 3

**PROPOSED NEW MEPC RESOLUTION  
“GUIDELINES ON IMPLEMENTATION OF EFFLUENT STANDARDS AND  
PERFORMANCE TESTS FOR SEWAGE TREATMENT PLANTS FOR PASSENGER  
SHIPS OPERATING IN SPECIAL AREAS UNDER MARPOL ANNEX IV”**

1 This annex proposes a new MEPC resolution, “Guidelines on Implementation of Effluent Standards and Performance Tests for Sewage Treatment Plants for Passenger Ships Operating in Special Areas under MARPOL Annex IV”.

2 The new guidelines would only apply to passenger ships and would have the same text as resolution MEPC.159(55), “Revised Guidelines on Implementation of Effluent Standards and Performance Tests for Sewage Treatment Plants”, except for the inclusion of the additional requirement of nutrient removal, as an effluent standard in section 4 of the guidelines (new text is shown underlined), as follows:

.6 Nutrient removal

The nutrient concentrations of the samples of effluent without dilution<sup>5</sup> should be:

.1 total nitrogen<sup>6</sup> [ $< 20$  mg/l or at least 70% reduction<sup>7</sup>];

.2 total phosphorus [ $< 1.0$  mg/l or at least 80% reduction<sup>8</sup>].

3 It is also proposed that the following text would be added to Certificate of Type Approval for Sewage Treatment Plants after the text “(v) pH of the effluent is between 6 and 8.5.”:

(vi) nutrient concentration of the effluent is less than [20 mg/l or at least 70%] for total nitrogen and less than [1.0 mg/l or at least 80%] for total phosphorus.

4 Finally, it is proposed that the new guidelines should enter into force at the same point of time as the new discharge regulations for new passenger ships, i.e. [1 January 2013].

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<sup>5</sup> Influent containing grey water mixed with sewage is not considered dilution.

<sup>6</sup> Total nitrogen means the sum of total Kjeldahl nitrogen (organic and ammoniacal nitrogen) nitrate-nitrogen and nitrite-nitrogen.

<sup>7</sup> Reduction in relation to the load of the influent.

<sup>8</sup> Reduction in relation to the load of the influent.