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PREVENTION AND RESPONSE  
13th session  
Agenda item 17

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## ANY OTHER BUSINESS

### Comments on document PPR 13/17/1

Submitted by FOEI, Pacific Environment, CSC, EDF and ZESTAs

#### SUMMARY

*Executive summary:* This document comments on document PPR 13/17/1 and highlights that development of guidelines for managing ammonia effluent generated from ammonia-fuelled ships must account not only for the acute and short-term toxicity of ammonia effluent, but also the wider impacts of reactive nitrogen release, including impacts to marine organisms from chronic, long-term ammonia effluent release, and disturbance to the nitrogen cycle. Prohibiting discharge of ammonia effluent to the marine environment is the management measure best aligned with the precautionary principle.

*Strategic direction, if applicable:* 2

*Output:* Not applicable

*Action to be taken:* Paragraph 16

*Related documents:* PPR 13/17/1; PPR 13/INF.12; PPR 13/17; PPR 13/INF.5; MSC 110/6/1 and MSC 110/6/8

#### Introduction

1 This document is submitted in accordance with paragraph 6.12.5 of the *Organization and Method of Work of the Maritime Safety Committee and the Marine Environment Protection Committee and their subsidiary bodies* (MSC-MEPC.1/Circ.5/Rev.6), and provides comments on document PPR 13/17/1 (Republic of Korea and RINA). The comments in this document are also relevant to consideration of document PPR 13/17 (Japan).

#### Background

2 In document PPR 13/17/1, measures are proposed which aim to advance the development of interim guidelines for managing ammonia effluent generated by ammonia-fuelled ships. As noted in document PPR 13/17/1, ammonia effluent can be generated during the normal operation of ammonia-fuelled ships. For instance, ammonia release mitigation systems may be used on board these ships, which release ammonia gas during fuel supply and usage. Because ammonia gas is extremely toxic and presents risks to human health, these emissions (as well as other emissions and leaks) should be captured and contained. One option for doing so is to use water to absorb the ammonia gas.

3 As outlined in document PPR 13/17/1 (paragraph 6), this process generates potentially high-strength, highly toxic ammonia effluent. Therefore, there is a need for guidelines relating to the storage and disposal of this effluent (PPR 13/17/1, paragraph 10). In paragraph 11 of document PPR 13/17/1, two possibilities are outlined:

- .1 "Strict prohibition of discharge at sea": this option would see no discharge of ammonia effluent into the marine environment, instead effluent would be collected and either treated onboard, or transferred off the ship.
- .2 "Conditional discharge allowance": this option would permit discharge of ammonia effluent under normal operational conditions, subject to specific conditions being met. Potential conditions indicated in document PPR 13/17/1 include that ships are "operating at a speed of at least 7 knots, more than 12 nautical miles from the nearest land, in waters deeper than 25 metres, and following appropriate dilution or neutralization measures".

4 In paragraph 12 of document PPR 13/17/1, the co-sponsors express preference for a "conditional discharge framework", stating that "mandating exclusive shore disposal could impose excessive burdens on ship operation and economic viability". In paragraph 17 of document PPR 13/17/1, the co-sponsors also propose the development of "toxicity-based discharge criteria", which would manage effluent discharge based on "Predicted No Effect Concentrations (PNEC)". These concentrations would be based on the toxicity of ammonia effluent, with an initial study presented in document PPR 13/INF.12 (Republic of Korea).

## Discussion

5 The co-sponsors of this document welcome the procedural proposals made in document PPR 13/17/1 to advance the development of relevant guidelines. However, they also provide the following comments, consideration of which will be essential for the development of robust and science-based guidelines.

### ***Environmental impacts go beyond acute and short-term toxicity***

6 Document PPR 13/17/1 refers to the environmental risks of the discharge of ammonia effluent into the marine environment. As noted above, the co-sponsors of document PPR 13/17/1 propose that toxicity-based discharge criteria are developed, based on PNEC limits derived from estimates of the acute and short-term toxicity of ammonia effluent to marine organisms, as studied for example in the short-term study presented in document PPR 13/INF.12 (which was conducted over a period of 96 hours).

7 However, acute and short-term toxicity to marine organisms is just one aspect of the potential environmental impacts of ammonia effluent discharge. The co-sponsors of document PPR 13/17/1 state clearly that "even trace amounts of ammonia effluent discharged into the marine environment may pose potential risks to surrounding marine ecosystems".

8 Firstly, longer-term, low-level exposure — even at concentrations below acute toxicity thresholds — may cause chronic effects on marine species that accumulate over much longer timescales and may not be captured by short-term studies. The cumulative impacts of ammonia effluent pollution are recognized in document PPR 13/17/1 (paragraphs 6 and 7), and other studies have emphasized that research into these impacts is required.<sup>1</sup> Research could be carried out in support of guideline development, but currently, prohibiting ammonia effluent discharge is the approach best aligned with the precautionary principle.

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<sup>1</sup> Dawson L, Ware, J and Vest L, 'Ammonia as a Shipping Fuel: Impacts of large spill scenarios' (2022) [www.edf.europa.org/sites/default/files/EDF-Europe-Ammonia-at-sea-FullReport.pdf](http://www.edf.europa.org/sites/default/files/EDF-Europe-Ammonia-at-sea-FullReport.pdf)

9 Moreover, repeated, low concentration ammonia effluent release could contribute to the broader issue of anthropogenic reactive nitrogen (Nr) release, which has already altered the global nitrogen cycle<sup>2</sup> beyond the safe "planetary boundary"<sup>3</sup> and caused significant environmental and biodiversity impacts. These environmental impacts have been outlined in detail in documents MSC 110/6/1 (Pacific Environment and EDF) and MSC 110/6/8 (Pacific Environment, CSC, and EDF). To summarize:

- .1 Increased Nr inputs to marine ecosystems can cause eutrophication, an excess of nutrients which can stimulate algal growth. In turn, this can result in oxygen depletion, with potentially deadly consequences for marine life.<sup>4</sup>
- .2 Nitrogen pollution from shipping contributes to ocean acidification.<sup>5</sup>
- .3 The environmental and biodiversity impacts of Nr release can hamper efforts to reduce GHG emissions. Microbial processes utilizing Nr in the surface ocean result in N<sub>2</sub>O being released to the atmosphere. Marine oxygen depletion and acidification have been shown to amplify these emissions.<sup>6,7</sup>

10 Paragraph 17 of document PPR 13/17/1 states that any "discharge should be permitted only when it is demonstrated that the environmental impact is within acceptable limits". Acute and short-term toxicity to marine organisms, while important, is just one aspect of assessing acceptable environmental limits. Research is clear that minimizing Nr release from the entire ammonia fuel value chain is essential to avoid significant additional nitrogen cycle disruption.<sup>8,9</sup> The contribution of ammonia effluent to the total Nr released from the ammonia fuel value chain must be considered when developing guidelines, and ammonia effluent limits should not be decided on the basis of short-term toxicity studies alone.

***Strict prohibition of discharge at sea must be fully considered***

11 Strictly prohibiting discharge would provide a "simple and stringent framework that could fundamentally prevent marine pollution", as noted in document PPR 13/17/1, paragraph 9.

12 However, the co-sponsors of document PPR 13/17/1 state in paragraph 9 that if this approach were applied, and all effluent is retained on board, "limited onboard storage capacity and dependence on the availability of port reception facilities could adversely impact operational efficiency and economic feasibility". Citing these concerns, as well as points

<sup>2</sup> Canfield DE, Glazer AN and Falkowski PG, 'The Evolution and Future of Earth's Nitrogen Cycle' (2010) 330 Science 192.

<sup>3</sup> Sakschewski B, Caesar L and others, 'Planetary Health Check 2025' (2025) <https://www.planetaryhealthcheck.org/#reports-section>

<sup>4</sup> Gray J, Wu R and Or Y, 'Effects of Hypoxia and Organic Enrichment on the Coastal Marine Environment' (2002) 238 Marine Ecology Progress Series 249.

<sup>5</sup> Hassellöv I and others, 'Shipping Contributes to Ocean Acidification' (2013) 40 Geophysical Research Letters 2731.

<sup>6</sup> Breider F and others, 'Response of N<sub>2</sub>O Production Rate to Ocean Acidification in the Western North Pacific' (2019) 9 Nature Climate Change 954.

<sup>7</sup> Limburg KE and others, 'Ocean Deoxygenation: A Primer' (2020) 2 One Earth 24.

<sup>8</sup> Wolfram P and others, 'Using Ammonia as a Shipping Fuel Could Disturb the Nitrogen Cycle' (2022) 7 Nature Energy 1112.

<sup>9</sup> Bertagni MB and others, 'Minimizing the Impacts of the Ammonia Economy on the Nitrogen Cycle and Climate' (2023) 120 Proceedings of the National Academy of Sciences e2311728120.

relating to worker safety, the co-sponsors of document PPR 13/17/1 note their preference for "a conditional discharge framework (which ensures) both environmental protection and operational feasibility" (PPR 13/17/1, paragraph 12).

13 However, no quantification of the additional storage capacity, or cost, required to retain ammonia effluent on board ships is given to justify this choice. The discharge scenario given in document PPR 13/INF.12 indicates 2,870 kg of ammonia solution would be generated by the fuel-line purging process of a 90,000 DWT ammonia dual-fuel ship. At a representative density of 900 kg/m<sup>3</sup>,<sup>10</sup> this equates to 3.2 m<sup>3</sup> of ammonia effluent solution. A 90,000 DWT Aframax bulk carrier would be expected to carry around 650,000 barrels, or over 100,000 m<sup>3</sup>, of crude oil<sup>11</sup>, meaning the space taken up by this ammonia effluent is just 0.003 % of this carrying capacity. Storage infrastructure and additional sources of ammonia effluent would increase these space requirements, however this example illustrates how quantification of the practicalities of storing ammonia effluent is required to support decision-making. It may also be possible to sell collected ammonia effluent for further use, reducing overall costs.<sup>12</sup>

14 Overall, strict prohibition of discharge should remain the preferred option for managing ammonia effluent, and guideline development must be based on actual quantification of costs and logistical requirements.

### Summary and proposals

15 The co-sponsors of this document support the procedural proposals made by the co-sponsors of document PPR 13/17/1 to: include the item "development of guidelines for the management of ammonia effluent from ammonia-fuelled ships" in the provisional agenda for PPR 14; establish a group of experts to facilitate further discussion, and; include relevant contact points in the session's report to encourage intersessional dialogue on this matter. Furthermore, the co-sponsors of this document express their willingness to engage with, and contribute constructively to, this process. In this spirit, the co-sponsors of this document propose that:

- .1 development of the interim guidelines must account not only for the acute and short-term toxicity of ammonia effluent, but also chronic, long-term toxicity and wider environmental impacts of reactive nitrogen release; further information on these impacts should be incorporated into guideline development; and
- .2 strict prohibition of discharge is the only management option consistent with the precautionary principle, and should be the preferred approach.

### Action requested of the Sub-Committee

16 The Sub-Committee is invited to consider the comments in this document along with the proposals in paragraph 16, and take action as appropriate.

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<sup>10</sup> Representative density taken for 30% ammonia solution. The density of a 3% ammonia solution as modelled in document PPR 13/INF.12 is likely to be higher, meaning the volume of effluent generated may be lower.

<sup>11</sup> Assuming 1 barrel of oil weighs 136 kg. Estimates consistent with Clarksons, 'A guide to bulk vessel sizes' (no date), retrieved from <https://www.clarksons.com/home/glossary/v/a-guide-to-bulk-vessel-sizes/>

<sup>12</sup> Powders MT and others, 'The Use of Ammonia Recovered from Wastewater as a Zero-Carbon Energy Vector to Decarbonise Heat, Power and Transport – A Review' (2025) 268 Water Research 122649.