

SUB-COMMITTEE ON POLLUTION
PREVENTION AND RESPONSE
9th session
Agenda item 14

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**REVISION OF MARPOL ANNEX IV AND ASSOCIATED GUIDELINES TO INTRODUCE
PROVISIONS FOR RECORD-KEEPING AND MEASURES TO CONFIRM THE
LIFETIME PERFORMANCE OF SEWAGE TREATMENT PLANTS**

Comments on document PPR 9/14

Submitted by FOEI, WWF, Pacific Environment and CSC

SUMMARY

Executive summary: This document comments on document PPR 9/14 (Norway) and provides data from Alaska demonstrating the need for actions to ensure the performance of existing sewage treatment plants including monitoring, maintenance and establishing effluent limits

Strategic direction, if applicable: 1

Output: 1.23

Action to be taken: Paragraph 15

Related documents: MEPC 71/INF.22; MEPC 74/18; PPR 7/WP.7, PPR 7/16, PPR 7/16/4; PPR 8/7, PPR 8/7/7, PPR 8/7/10, PPR 8/11 and PPR 9/14

Background

1 This submission is made in accordance with the provisions of 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.2). It comments on document PPR 9/14 (Norway) regarding the report of the Correspondence Group on the Revision of MARPOL Annex IV and Associated Guidelines to introduce provisions for record-keeping and measures to confirm the lifetime performance of sewage treatment plants.

2 The scope of application of the draft amendments to MARPOL Annex IV in relation to the terms of reference of the Correspondence Group (ToR 3) notes that discussions on the applicability of the amendments to existing ships should be undertaken. In this document the co-sponsors provide effluent sampling data from ships in Alaska adhering to different local regulatory requirements. This data supports the need for actions that ensure the performance of existing sewage treatment plants including monitoring, maintenance and establishing effluent limits to best protect the marine environment.

Context

3 MARPOL Annex IV provides regulations and guidelines for the treatment and discharge of sewage and sewage sludge generated on board ships. Since its entry into force in 2003, MARPOL Annex IV has been incrementally revised to improve sanitary conditions and to better preserve the integrity of the marine environment. However, document MEPC 71/INF.22 (Netherlands) concluded that 97% of ships tested did not meet sewage effluent discharge standards despite using approved sewage treatment plants (STP). Chronic STP failure has been attributed to inconsistencies in type approval and a lack of maintenance and onboard testing requirements. As a result, effectively untreated sewage discharges continue to harm marine ecosystems and put coastal populations at risk.

4 The critical elements needed to enhance STP performance and meet necessary effluent limits include initial testing, performance monitoring, maintenance, developing (and using) management plans and record-keeping. These elements should be applied to both new builds and existing ships.

Monitoring of existing ships in Alaska

5 The State of Alaska provides information publicly online regarding effluent sample results and the wastewater treatment equipment used by each ship.* Data from passenger ships in Alaska provides a comparison between two different sewage treatment regulatory structures. Large passenger ships are required to meet strict effluent limits while small passenger ships and ferries operate under active monitoring and wastewater management plans without defined limits. While effluent quality has improved for all types of passenger ships in Alaska, the quality from large passenger ships is substantially better.

6 Large passenger ships (those carrying more than 250 passengers) in Alaska are required to meet United States Coast Guard and State of Alaska requirements for the discharge of treated sewage and grey water. These include a requirement to treat with an Advanced Wastewater Treatment System (AWTS), take frequent performance samples, and meet effluent limits based on human health and water quality standards.

Effluent sample results, selected STP Types	Samples	BOD avg.	TSS avg.	Total Residual Chlorine avg.	Fecal coliform avg.	Fecal coliform geometric mean	Fecal coliform Std Deviation
Alaska passenger vessels							
Large vessel mixed sewage and greywater (2000-2001)	14	261	190	1	2,375,421	10,132	4,938,997
AWTS mixed sewage and grey water (2013-2019)	1210	8	3	0	8	1	52

Results in mg/L except bacteria as fc/100ml

AWTS as identified by State of Alaska

7 The performance success of AWTS systems used by large passenger ships in Alaska is a good example of how effluent limits, combined with sample testing and monitoring, can result in dramatically improved results. Most results for post-regulation implementation are at relatively low levels, including total suspended solids (TSS) and biological oxygen demand (BOD), with most results for fecal coliform below the detection limit.

8 For small passenger ships (those carrying 50 to 250 overnight passengers) and large ferries that discharge treated sewage or grey water, the State of Alaska requires ships to operate with an approved Best Management Practices (BMP) plan. The Alaska BMP programme does not set effluent limits but requires efforts to improve effluent quality such as performance monitoring, reporting and record-keeping. Plans can include elements such as holding effluent on board while in ecologically sensitive areas.

* The State of Alaska Department of Environmental Conservation provides reports on samples taken in 2020 and prior years. See <https://dec.alaska.gov/water/cruise-ships/cruise-reports/> and <https://dec.alaska.gov/water/cruise-ships/cruise-reports/prior-reports/>

9 Large ferries in Alaska provide an example of sewage treatment improvements made possible by the combination of upgrades to STP equipment, performance monitoring, wastewater management plans and improvements to treatment operations. State of Alaska large ferries are government-owned and received specific funding with the goal of improved wastewater treatment performance.

Effluent sample results		BOD	TSS	Total Residual	Fecal coliform	Fecal coliform	Fecal coliform
Selected Alaska large ferries	Samples	avg.	avg.	Chlorine avg.	avg.	geometric mean	Std Deviation
Treated mixed sewage and grey water (2000-2005)	40	158	98	4.2	7,711,959	1,864	31,233,364
Treated mixed sewage and grey water (2013-2020)	55	83	64	1.9	241,207	115	857,668

Results in mg/L except bacteria as fc/100ml

Selected ferries- Columbia, Kennicott, Malaspina, Matanuska. A fifth large ferry was not included as it had a major STP replacement, gaps in operations, and was sold.

10 A comparison of ferry results before the Alaska BMP programme was implemented (2000-2005) to recent years (2013-2020) shows a reduction in fecal coliform levels, with smaller reductions in TSS and BOD. Very high levels in fecal coliform do occur occasionally. The standard deviation for fecal coliform is over 850,000 fc/100ml, indicating high variability.

11 Other ships in the Alaska BMP programme also demonstrate an overall reduction in fecal coliform, with marginal improvements to TSS and BOD. We note that the composition of ships changed by year, that some ships replaced STP, and that many ships in the BMP programme changed ownership, making a direct comparison over time more difficult.

Effluent sample results		BOD	TSS	Total Residual	Fecal coliform	Fecal coliform	Fecal coliform
Small passenger vessels in Alaska	Samples	avg.	avg.	Chlorine avg.	avg.	geometric mean	Std Deviation
Treated sewage (2000-2005)	91	195	277	3.1	2,312,787	4,877	5,069,507
Treated sewage (2013-2019)	65	186	146	7.2	942,983	845	2,163,903
Treated mixed sewage and grey water (2000-2005)	37	560	230	2.4	10,364,802	300,338	19,516,282
Treated mixed sewage and grey water (2013-2019)	53	293	171	5.1	998,873	2,231	3,411,397

Results in mg/L except bacteria as fc/100ml

12 When comparing large ship AWTS results to recently built Alaska BMP ships with type approved STP (meeting the requirements adopted by resolution MEPC.227(64)), there is a large difference in results. The sample size for ships with type approved STP (meeting the requirements adopted by resolution MEPC.227(64)) is small but average fecal coliform results are quite high and have a standard deviation over 5,000,000 fc/100ml. These results confirm that the requirements of large passenger ships to meet strict effluent limits provide better results than small passenger ships and ferries that instead require active monitoring and wastewater management plans without defined limits.

Effluent sample results, selected STP Types		BOD	TSS	Total Residual	Fecal	Fecal coliform	Fecal coliform
Alaska passenger vessels	Samples	avg.	avg.	Chlorine avg.	coliform avg.	geometric mean	Std Deviation
AWTS mixed sewage and grey water (2013-2019)	1210	8	3	0	8	1	52
MEPC 227(64) treated sewage and greywater (2017-2019)	10	706	159	0	2,061,100	2,760	5,027,652

Results in mg/L except bacteria as fc/100ml

AWTS as identified by State of Alaska

MEPC.227(64) samples not including any identified as AWTS

Support for performance monitoring and effluent limits for existing ships

13 Improvements to maintenance and operations alone may not resolve poor effluent performance from an STP that has been poorly or incorrectly installed. Further, a failure of the certification process could result in design flaws being overlooked. These important elements are being discussed in the revision of MARPOL Annex IV in relation to new builds and should be expanded to include existing ships. Data from passenger ships in Alaska provide an example of both the improvements, which are possible for existing ships, as well as the limitations that may be encountered in the absence of frequent testing, performance monitoring and effluent limits. Therefore, we stress the importance of taking actions to ensure STP on all existing ships undergo testing and performance monitoring to ensure poorly performing STP can be identified and corrected.

Recommendations

14 On the basis of the information presented in the paragraphs above, the co-sponsors recommend the following elements be considered when creating standards for existing ships:

- .1 Testing is needed to confirm the operational performance of STP on existing ships. Performance monitoring and frequent indicative monitoring are needed to ensure STP units are functional and effluent is being treated.
- .2 Maintaining a sewage management plan and record-keeping for existing ships are needed to improve and document maintenance and treatment operations.
- .3 Effluent limits for existing ships are needed to obtain improved effluent performance from existing STPs.

Action requested of the Sub-Committee

15 The Sub-Committee is invited to take note of the information provided in paragraphs 5 to 13, to consider the recommendations contained in paragraph 14, and take action as appropriate.
