

SUB-COMMITTEE ON SHIP DESIGN AND
CONSTRUCTION
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Agenda item 14

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**REVIEW OF THE GUIDELINES FOR THE REDUCTION OF UNDERWATER NOISE
(MEPC.1/CIRC.833) AND IDENTIFICATION OF NEXT STEPS**

Scoping document on Underwater Noise from Commercial Shipping

Submitted by Canada, New Zealand, United Kingdom and United States

SUMMARY

<i>Executive summary:</i>	This document proposes an approach for reviewing the 2014 <i>Guidelines for the reduction of underwater noise from commercial shipping to address adverse impacts on marine life</i> (MEPC.1/Circ.833) to increase awareness and address identified areas of improvement
<i>Strategic direction, if applicable:</i>	1, 2 and 3
<i>Output:</i>	TBC
<i>Action to be taken:</i>	Paragraph 14
<i>Related documents:</i>	MEPC 75/14 and SDC 8/14/2

Introduction

1 At its 76th session in June 2021, the Marine Environment Protection Committee (MEPC) accepted the proposal from Australia, Canada and the United States to review the *2014 Guidelines for the reduction of underwater noise from commercial shipping to address adverse impacts on marine life* (MEPC.1/Circ.833) (2014 Guidelines) and identify next steps. The issue of underwater noise will therefore be added to the work programme of MEPC.

2 As recommended in the proposal, the issue has been referred to the Sub-Committee on Ship Design and Construction (SDC) for action. This document is submitted to support SDC in the review of the 2014 Guidelines.

Background

3 Commercial shipping is a main contributor to underwater noise. The international community recognizes that underwater-radiated noise (URN) from commercial ships has deleterious effects on critical life functions for a wide range of cetacean, fish species and invertebrates.

4 The 2014 Guidelines were intended to provide general advice on the reduction of URN to designers, shipbuilders and ship operators. However, a study conducted by Environics Research and the World Maritime University in 2019¹ found that although there was a general awareness of the 2014 Guidelines, they were not being used to make changes to reduce URN. A lack of regulation, measurement specification, data demonstrating the impacts of URN and scepticism about the feasibility of changes were identified as the key barriers to the uptake of the 2014 Guidelines and consideration of mitigation technologies for ships.

5 The Technical Workshop held at IMO in January 2019² also identified barriers to the uptake of the 2014 Guidelines, such as a lack of measurement standards, baseline noise data and the fact that the 2014 Guidelines are not legally binding. It was noted that industry is prioritizing the implementation of mandatory initiatives, such as the Energy Efficiency Design Index and the ballast water requirements, before undertaking any voluntary measures to reduce underwater noise.

6 Hence, to efficiently support SDC in the review of these Guidelines, Canada and other interested Member States (Australia, Belgium, New Zealand, the Netherlands, the United Kingdom and the United States) met to discuss how to approach this review. There was general agreement that amendments to the Guidelines were needed and, therefore, suggestions and recommendations on how to approach the revision of the Guidelines were proposed to support the review process.

Purpose

7 The main purpose of the proposed revision of the Guidelines is to ensure that they better reflect the current knowledge and scientific evidence around the impact of underwater ship noise from commercial shipping, as well as increase the awareness and uptake of those Guidelines. The revision of the Guidelines could therefore facilitate their usability and implementation by the intended audience to the greatest extent possible.

8 This scoping document reflects the outcome of the discussions described in paragraph 6. It provides a proposed new outline for the 2014 Guidelines and includes suggestions for improvements for consideration by SDC in its review and proposed revisions (see the annex). It is recognized that the revision of the Guidelines will address some, but not all of the key barriers to uptake identified by the 2019 study and 2019 Technical Workshop. Hence, as per the terms of reference adopted on this item for SDC, the development of a proposal for a program of action and/or next steps to further prevent and reduce URN based on the findings of the review will be pursued after the review of the 2014 Guidelines.

Considerations

9 Given the complexities associated with ship design and construction and the various approaches to reducing underwater noise, the approach suggested is to guide ship owners/designers through each step of the process necessary to effectively reduce underwater noise from commercial ships and can be applied to ships to be built or existing ships. It focuses on the URN reduction of the ship itself (to be built or existing) as a noise source, with the intended audience being those in a position to directly influence that change – owners, designers, shipbuilders, and operators.

¹ Environics Research, World Maritime University, Transport Canada, Chamber of Shipping of America, and World Wildlife Fund. (2019). Filtering through the noise: Benchmarking study on the implementation of the International Maritime Organization's underwater vessel noise guidelines pp 7.

² Acentech Inc. (2019). Quieting Ships to Protect the Marine Environment Workshop Final Report. Prepared for Transport Canada/Government of Canada pp 71; MEPC 74/INF .36. (2019). Quieting ships to protect the marine environment workshop summary report. Submitted by Canada, available at: <https://docs.imo.org/Documents/Detail.aspx?did=115566>

10 The proposed outline of the revised Guidelines reflects the idea that a successful strategy to reduce ship URN would be an iterative process of understanding the ship in consideration, its predicted (or actual) URN levels, its URN-reduction goals, the measures that can be implemented to meet those goals and ongoing monitoring to ensure that the goals have been met on an ongoing basis. Furthermore, interactions and contributions from measures applied to achieve other objectives, such as reduction of onboard noise and improvements in energy efficiency, would also be considered.

11 Consideration could also be given to how the 2014 Guidelines can be amended by proposing an iterative approach that can be applied to 1) ships to be built and 2) existing ships to further prevent and reduce URN. Various stakeholders such as flag States, port States, classification societies, designers, shipbuilders, shipowners and ship operators could be encouraged to see how the new revised Guidelines can be applied in their specific applications and consider technologies and operational measures not addressed in the new Guidelines, which may be more appropriate.

12 The approach for URN mitigation provided by the Guidelines could be presented in a generic fashion that can be expected to have longstanding validity, whereas it would only make reference to other relevant technical standards, requirements or resources that are more likely to change or be updated more frequently.

13 It is also proposed that the following items could be added to the 2014 Guidelines:

- .1 the addition of language that would trigger a review and update of the 2014 Guidelines every few years;
- .2 a process for information sharing of results and lessons learned from ship URN-reduction efforts;
- .3 Guidelines for monitoring approaches for the URN of ships; and
- .4 a section with more detailed information and resources/references regarding the links and co-benefits, where they exist, between energy efficiency improvements and requirements and URN-reduction (see proposed outline of the Guidelines in the annex).

Action requested of the Sub-Committee

14 The Sub-Committee is invited to consider the information and recommendations provided in the annex and to take action, as deemed appropriate.

ANNEX

PROPOSED OUTLINE AND SUGGESTIONS FOR THE REVISED GUIDELINES FOR THE REDUCTION OF UNDERWATER NOISE FROM COMMERCIAL SHIPPING TO ADDRESS ADVERSE IMPACTS ON MARINE LIFE

1 Preamble

The text of this section could be amended to more accurately characterize the nature of the hazard(s) posed by ship underwater radiated noise (URN). This could be accomplished with more definitive and clearer language, including references (MEPC 73/INF.23, for example). The Preamble could also include text to reflect that mitigating the impact of ship URN on marine life is a problem shared between a variety of stakeholders – maritime administrations, fishing industry, flag States, port States, port authorities, NGOs, etc. (References to some of these stakeholders can be provided; for example, Green Marine, Vancouver Fraser Port Authority's ECHO Program and International Whaling Commission (IWC), among others). Consideration could be given to explicitly highlight the role that IMO Member States can play in implementing effective networks of noise measurement stations domestically and in supporting uptake of the guidelines.

2 Application

No recommended changes for this section.

3 Purpose

In the 2014 Guidelines, the stated purpose is to "... provide general advice about reduction of underwater noise ..." It is suggested that in the revised Guidelines, the purpose could be elevated to providing a general approach that could be followed and refined when seeking to mitigate a ship's URN, including references and resources that are available to support those efforts.

The amendments to the Guidelines that are being proposed would provide a stepwise approach that could be followed to first assess the underwater noise signature of an existing ship or ship to be built, and secondly, the different measures that could be taken to reduce the URN levels. The process could be presented in the form of a flowchart which would support a cost-benefit analysis of the different measures in terms of reductions in acoustic footprint and any implications for improved or reduced fuel efficiency. This might involve a separate process depending on the ship type and whether an existing or newbuild. This would also include evaluating operational measures specific to the type of ship that is being considered.

4 Definitions:

This section would be reviewed and updated as necessary as the Guidelines are revised.

5 (New section proposed): A general approach for designing or refitting a ship to reduce URN

This section would include wording to recognize that reduction of ship URN is a complex problem; URN needs to be managed to adapt to a variety of goals (quieter in critical habitats, 'normal' when not) and using a variety of approaches (noting that biologically meaningful noise reduction will likely be the result of a combination of technical and operational measures).

Each of the following sections could specifically address any differences in approach between ships to be built and existing ships. Appropriate references and links to resources could also be included.

6 (New section proposed): Baselineing

6.1 Understanding the ship and its operational profile – speeds, geographical areas, identification of factors affecting operations (restricted waterways, strong currents, requirements of the propulsion system (e.g. ability to operate at reduced speed), time spent fully laden or in ballast, etc.).

6.2 Understanding the habitats in which the ship operates – species of concern (and the sound frequencies likely to cause the greatest impacts), seasonal considerations.

6.3 Understanding the ship's URN – discusses how the ship can measure its URN. The sub-section could include discussion of what measurement standards are available (ISO standards for deep water, standards for shallow water being developed), field trials for existing ships, onboard data collection of noise sources for existing ships, computational modelling (during design), etc.

6.4 Additional suggestions to reducing the ship's URN - This sub-section could include discussion of ship classification society optional notations, ICES standard, local rules, regulations or measures.

7 (New section proposed): Underwater noise management planning

This section discusses the process of examining and evaluating the various options that are possible for a given ship/fleet and developing a plan to reduce the URN and/or achieve URN goals. The noise management plan may include a variety of operational, organizational and technological measures to reduce underwater noise. These plans would include a combination of immediate and long-term actions and would be intended to be flexible and allow owners/organizations to identify the measures best suited to their ship/fleet.

7.1 Guidance on the application of various techniques for the evaluation of URN-reduction approaches – discusses and provides guidance, references, resources, lessons learned, etc. that are relevant to the activities that may be undertaken during this stage. For example, when conducting field trials for the purpose of comparing URN before and after implementation of an operational approach on an existing ship. Another example could be the approach used for optimization of propeller design for URN reduction and efficiency goals.

7.2 Design and technical noise-reduction approaches³

7.2.1 Propeller noise

7.2.2 Wake flow modification

7.2.3 Supplementary treatments

7.2.4 Machinery noise

7.2.5 Hydrodynamic noise

7.2.6 Other mitigation technologies

³ The proposed sub-sections in 7.2 reflect the categorization of technical measures used in the Vard report (2019). For each technology, the report identifies whether the measure can be applied to ships to be built or existing ships, or both, as well as relative cost to implement, effectiveness, advantages/co-benefits and disadvantages.
(<https://tcdocs.ingenumcanada.org/sites/default/files/2019-07/Ship%20Underwater%20Radiated%20Noise%20v5.pdf>)

- 7.2.7 Echosounder noise
- 7.3 Operational and maintenance approaches
 - 7.3.1 Propeller maintenance (and cleaning/coating)
 - 7.3.2 Hull maintenance (and coating)
 - 7.3.3 Ship speed
 - 7.3.4 Ship routing

8 (New section proposed): Implementation and monitoring

Sub-sections could address various approaches for ship URN monitoring, such as self-monitoring, monitoring by classification societies and environmental monitoring at critical locations. This would also include details of computational models that might be used to predict a ship's URN and also to predict the changes associated with any modifications, as well as potential port programs to support monitoring.

9 (New section proposed): Energy efficiency and URN reduction

This section could discuss technical and operational measures used to increase a ship's energy efficiency and whether the measures are advantageous or disadvantageous to URN reduction.

Annex to the Guidelines (New annex proposed): Integrated tool to evaluate potential URN, costs and implications for fuel efficiency

The aim of this annex would be to present an interactive tool (similar to a flowchart or other visual support), based on the material in sections 6-9 that would take a ship operator through the steps of understanding the URN from their ship, the implications for marine life in the area where it is operated and the various steps that could be taken to optimally reduce the URN. The output would provide the necessary information in a structured way to enable the operator to prioritize actions to reduce the acoustic footprint of the ship and evaluate the expected benefits that would be associated with these actions.

Reference

The table below compares the different sections and sub-sections between the 2014 Guidelines and the new proposed outline of the revised guidelines, for ease of reference:

2014 Guidelines structure	Revised structure
1. Preamble	1.Preamble: Amended text
2. Application	2.Application: No changes
3. Purpose	3.Purpose: Amended text
4. Definitions	4.Definitions: To update based on revised content
	5. (New): A general approach for designing or refitting a ship to reduce URN
	6. (New) Baselineing
	7. (New) Underwater noise management planning
5. Predicting underwater noise levels	Relevant to new section 6.4 and 7.1

2014 Guidelines structure	Revised structure
6. Standards and references	Relevant to new section 6.3
7. Design considerations	Relevant to new section 7.2
8. Onboard machinery	Relevant to new section 7.2
9. Additional technologies for existing ships	Relevant to new section 7.2
10. Operational and maintenance considerations	Relevant to new section 7.3
	8. (New): Implementation and monitoring
	9. (New): Energy efficiency and URN reduction
	Annex (New): Integrated tool to evaluate potential URN, costs and implications for fuel efficiency.
