

Group No. \_\_\_\_\_

## **CISMaRT/Transport Canada Workshop on Ship Noise Mitigation Technologies**

**November 28-29, 2018**

### **Breakout Session on Ship Noise Mitigation Technologies – General Aspects**

This is the first of two breakout sessions. It focuses on general aspects of ship noise surrounding ship noise mitigation technologies. The second breakout session concentrates on specific aspects, namely noise mitigation technologies summarized in a report authored by VARD Marine Ltd. dated October 31, 2018.

In the present breakout session, general aspects of underwater radiated noise (URN) from ships are considered. All inputs are important, whether directly or indirectly, to implementing noise mitigating technologies and strategies.

This breakout discussion report should be submitted to the workshop facilitator at the end of the brainstorming session. Please write legibly since this report will be used as input to the final workshop report.

1. Marine life varies from location to location in the world's oceans. Is it reasonable to suppose that the level of noise mitigation required will similarly vary? Is there sufficient data available to quantify the required level of mitigation? If not, please outline the kind/s of project/s that could address the shortcoming.

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2. Measurements of underwater noise from shipping traffic have been made. Most measurements have been opportunistic although some data has been gathered in dedicated trials. The measured noise is generally representative of total noise and hence it is a challenge to identify the contribution from individual sources of noise. Are further dedicated measurement programs required to understand this situation better? If yes, please outline the basic features of such a measurement program.

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3. A key component of any assessment of underwater noise levels is the measuring procedures and techniques adopted. Various standard making bodies (ANSI, ISO, ITTC etc.) and classification societies (ABS, BV, DNV GL, etc.) have developed requirements in this regard. Are there efforts to harmonize these requirements? Should there be? What are the primary challenges given the wide variety of ship types? Please suggest projects to address these challenges.

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4. In general, which is preferable to a ship operator – noise mitigation by operational measures or by building in low-noise features in the design? What factors are important in making this comparison? Is there sufficient information available to make tradeoff studies?

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5. The general consensus is that that propellers on large commercial ships are the greatest source of URN in the ocean. Noise from propellers on naval ships is a key design parameter. How applicable is this technology to larger commercial ships? And how accessible is naval technology?

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6. Which three or four simple ship design parameters, or combinations of parameters, are the best indicators of likely high levels of URN. For example, it has been suggested that the EEDI (Energy Efficiency Design Index, a measure of CO<sub>2</sub> emissions per ship's capacity mile) could be used as a surrogate for ship URN. Are you aware of any studies?

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7. Is there a significant role for wind-assisted propulsion technologies (e.g. Flettner rotor, sails) to reduce noise levels indirectly?

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8. The implementation of URN mitigation technologies has associated co-benefits. Examples may include reduced noise and vibration levels onboard ship, and decreased fuel consumption. Has this been systematically studied? If yes, please identify. Please also suggest projects that would investigate this aspect of URN mitigation technology.

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9. What broad long-term trends in commercial shipping are likely to have an impact on URN levels? Examples might include reduced world trade, increase in fuel costs, increase in ship size, transition to LNG as a fuel, etc.

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10. In a recent study, 10 priority research questions related to marine vessel acoustic science were identified. In regard to vessel attributes the following two issues were raised:

- a. What attributes of ships are the most effective indicators of URN?
- b. What are the tradeoffs in noise exposure between ship high speed/short time exposure and low speed/long time exposure?

Answers to the second question could provide valuable input into developing URN mitigation strategies. What type of research might be conducted to address the questions raised?

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