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DEVELOPMENT OF A MANDATORY CODE FOR SHIPS OPERATING IN POLAR WATERS

Heavy fuel oil use in Arctic waters

Submitted by Friends of the Earth International (FOEI), the Clean Shipping Coalition (CSC), the International Fund for Animal Welfare (IFAW), the World Wide Fund for Nature (WWF) and Pacific Environment

SUMMARY

Executive summary:	In this document, FOEI, CSC, IFAW, WWF and Pacific Environment recommend inclusion of a provision within the Polar Code banning the use of heavy fuel oil by vessels in Arctic waters
Strategic direction:	5.2
High-level action:	5.2.1
Planned output:	5.2.1.19
Action to be taken:	Paragraph 15
Related documents:	DE 53/18/3; DE 54/13/8, DE 54/INF.5; DE 55/12/5, DE 55/12/18; DE 56/10/1, DE 56/INF.3 and DE 56/INF.14

Introduction

1 This document is submitted in accordance with the provisions of paragraph 6.12.5 of the Guidelines on the organization and method of work of the Committees and their subsidiary bodies (MSC-MEPC.1/Circ.4) and provides comments on the report of the correspondence group (DE 56/10/1).

2 The co-sponsors welcome document DE 56/10/1 which includes at annex 1 a draft text for the environmental chapter of a Polar Code and will contribute to further discussions of the proposed chapter during DE 56. The co-sponsors also welcome document DE 56/INF.3, the report of the hazard identification workshop in support of the development of the environmental aspects of the Polar Code.

3 This submission, supported by detailed information contained in document DE 56/INF.14, proposes a prohibition on the use of heavy fuel oil (HFO)[1] by vessels in Arctic waters, as defined by the Polar Code. A ban on use of HFO is already in force for Antarctic waters.[2]

Increase in Arctic shipping

4 The diminishing state of summer sea ice and the presence of substantial amounts of natural resources are key factors in the expected growth of Arctic shipping.[3] While uncertainties exist about the precise level of shipping projected to occur, it will likely be significant.[4] Already, the shipping industry is preparing for expanded activities in the region by purchasing ice-strengthened vessels, investing in infrastructure, and engaging in demonstration voyages. In the near- to mid-term, shipping related to oil and gas exploration, recovery and transport[5] is anticipated to be the fastest growing type of Arctic shipping.[6] Greater cruise ship activity in the Arctic will likely occur as well.[7]

5 Moreover, nascent trans-Arctic traffic has commenced. In 2011, 22 ships traversed the Northwest Passage and 34 ships sailed through Russia's Northern Sea Route.[8] Further, a number of reports indicate that container transport through the Northern Sea Route can be economically feasible.[9]

6 With regard to actual shipment projections, a recent study found that part-year Arctic transits between Asia and Europe along the Northern Sea Route would result in the potential transport of about 1.4 million twenty-foot equivalent units in 2030 and 2.5 million TEUs in 2050.[10] Dr. James Corbett has projected even greater Arctic shipping activity, estimating that two per cent and five per cent of global seaborne traffic would divert through the Arctic in 2030 and 2050, respectively.[11]

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1 The term heavy fuel oil in this document denotes residual marine fuel or mixtures containing predominately residual fuel and some distillate fuel, such as intermediate fuel oil.

2 MARPOL Annex I, regulation 43.

3 *See* Arctic Council, Arctic Marine Shipping Assessment 2009 Report, 4-5 (2009), *available at* http://arcticportal.org/en/pame/amsa-2009-report [hereinafter AMSA].

4 *E.g.* J. Corbett et al., *Arctic shipping emissions inventories and future scenarios*, 10 Atmos. Chem. and Phys. 9689 (2010), *in* Clean Shipping Coalition, *Emissions inventory and analysis of impacts of short-lived climate forcing aerosols from international shipping activity in the Arctic*, (Dec. 10, 2010) (submitted to IMO's Bulk Liquids and Gases Subcommittee and reviewed as BLG 15/INF.5).

5 According to DNV, 19 of 26 oil and gas tankers over 5,000 gt navigating in the Arctic use heavy fuel oil. Det Norske Veritas (DNV), Report – Heavy fuel in the Arctic (Phase 1), Report for PAME, Report No./DNV Reg. No.: 2011-0053/ 12RJ7IW-4, 30 (2011), *available at* http://www.arctic-council.org/index.php/en/about/documents/category/26-pame-nuuk-ministerial.

6 *See G. Peters et al., Future Emissions from Shipping and Petroleum Activities in the Arctic, 11 Atmos. Chem. Phys. 5305 (2011).*

7 *See* AMSA, *supra* note 3, at 79.

8 M. Byers, *Melting Arctic brings new opportunities,* ALJAZEERA, Dec. 22, 2011, *available at* http://www.aljazeera.com/indepth/opinion/2011/12/2011121913304370977.html.

9 *See e.g.* M. Liu and J. Kronback, *The potential economic viability of using the Northern Sea Route (NSR) as an alternative route between Asia and Europe*, 18 J. Transp. Geogr. 434 (2009).

10 Peters et al., *supra* note 6.

11 Corbett et al., *supra* note 4.

Environmental risk from increased Arctic shipping

7 The onset of increased polar shipping poses severe environmental risks, particularly with regard to a bunker or cargo spill.[12] It should be underscored that, while sea ice as a whole is diminishing, its fragmentation will likely lead to increased ice movement and variability in certain areas of the Arctic (e.g. Canadian Arctic).[13] Especially concerning is the increased movement of older, thicker sea ice, which previously was relatively immobile, and the deterioration of glaciers and ice shelves,[14] resulting in greater numbers of icebergs, bergy bits, and growlers and a corresponding increase in danger to vessels.

8 Moreover, other climatic changes expected to occur would make Arctic shipping more dangerous. For instance, an anticipated increase in fog and low-level clouds during the open-water season will elevate the occasions of poor visibility in summer and autumn, when Arctic shipping is at its apex.[15] Vessel icing is also expected to occur more frequently in the Arctic fall. Furthermore, a recent DNV study posits that changes in meta-ocean conditions, notably wave heights, may significantly increase the probability of vessel failure and thereby acute oil spill incidents.[16]

9 In the event of a vessel heavy fuel oil spill, there is limited capability to protect the Arctic environment. In the region, spill response infrastructure is minimal and countermeasures such as mechanical recovery, in situ burning, and dispersants often cannot be deployed or have little to no effect. Thus, preventing a spill from occurring and minimizing environmental harm if a spill takes place are paramount objectives. While ice-strengthened hulls, double skin protection around bunker tanks, and prudent tank placement are critical in attempting to avoid a fuel discharge, they are not fail-safe; therefore, the last element, the type of fuel bunkered, should not be undervalued, as it can be instrumental in assuring that a spill does not become an environmental catastrophe.[17]

Marine environmental protection is enhanced by using distillate fuel rather than HFO

10 When spilled, lighter, more refined marine fuels naturally disperse and evaporate much more quickly than HFO.[18] Tests have shown that weathering can break down marine diesel in approximately three days, whereas over 90 per cent of HFO by mass persisted even after 20 days in the water.[19,20] Marine distillate fuels also generally do not emulsify, in

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12 *See* AMSA, *supra* note 3, at 5.

13 *Id.* at 166.

14 C. Noronha, *Canadian Arctic nearly loses entire ice shelf*, ASSOCIATED PRESS, Sept. 29, 2011, *available at* http://www.google.com/hostednews/ap/article/ALeqM5hmhI9NnRZFg6ncM40p_FPKi8ApGw?docId=5d34a245df0d41d99897797b5534ed36.

15 L. Holland-Bartels and J. Kolak, Chapter 5, *Oil-Spill Risk, Response, and Impact*, 153, *in* An Evaluation of the Science Needs to Inform Decisions on Outer Continental Shelf Energy Development in the Chukchi and Beaufort Seas, Alaska, L. Holland-Bartels and B. Pierce (eds.), USGS Circular 1370, (2011), *available at* http://pubs.usgs.gov/circ/1370/pdf/circ1370.pdf.

16 DNV Research and Innovation, Potential Impact of Climate Change on Tanker Design, Position Paper 08-2011, *available at* http://www.dnv.com/binaries/dnv_tanker%20design%20pos%20paper_tcm4-470615.pdf.

17 Moreover, heavy-grade oil carriage restrictions should be considered for certain Arctic waters exhibiting special ecological and cultural characteristics.

18 A. Evenset and G. Christensen, Environmental impacts of expedition cruise traffic around Svalbard, prepared for Association of Arctic Expedition Cruise Operators, Akvaplan-niva AS Report: 4823-1, 4-5 (2011), *available at* http://www.aeco.no/documents/Finalreport.pdf ("It is believed that around 70 - 80 % of all MDO/MGO will evaporate within 24 hours after a spill.").

19 DNV Heavy Fuel Report, *supra* note 5, at 38-39.

contrast to HFOs, which after three to five days emulsify to the maximum water content (40 to 80 per cent), significantly increasing the volume of oil to be recovered.[21] A recent DNV study concluded that "the consequences of HFO spills are likely to be more severe than spills of marine diesels" and that "significant risk reduction will be achieved if the onboard oil type is of distillate type rather than HFO."[22] The DNV study found, as well, that over 70 per cent (167 out of 237) of the large vessels (5,000 gt and above) operating in the Arctic used HFO.[23] These larger vessels can hold substantial quantities of fuel for propulsion purposes[24] and also presumably would be travelling with full bunker tanks since fuelling options in the region are limited. The actual number of vessels burning HFO in the Arctic is likely higher as the DNV study period only tracked vessels between August and November 2010.[25]

11 An HFO spill in the Arctic would adversely affect the region's unique ecosystems and species, many of which are threatened or endangered,[26] as well as Arctic indigenous peoples and other coastal residents.[27] Arctic wildlife are particularly susceptible to oil spills because they tend to be concentrated along the ice edge, in leads, or within polynyas – open water areas surrounded by ice – where breeding, nesting, and rearing young occurs at certain times each year.[28]

Ancillary benefits of switching to distillate – reductions in harmful air emissions

12 A recent study indicates that vessel use of distillate fuel rather than bunker fuel reduces air emissions of particulate matter,[29] including black carbon. The study analyzed the emissions of a container vessel as it switched from high-sulfur HFO to low-sulfur distillate fuel and slowed its speed off the California coast.[30] Over 90 per cent reductions of particulate matter, and 75 per cent reductions in black carbon, were achieved on a per kilometre basis in the demonstration.[31,32]

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20 Cold temperatures, lack of sunlight, and ice cause oil to persist longer in arctic environments than in more temperate locations.

21 DNV Heavy Fuel Report, *supra* note 5, at 38-39.

22 *Id.*

23 *Id.* at 30.

24 Panamax containerships, bulk carriers, and tankers can carry 5,600m^3, 2,600m^3, and 1,700m^3 of HFO, respectively. K. Michel and T. Winslow, *Cargo Ship Bunker Tanks: Designing to Mitigate Oil Spillage*, prepared for SNAME conference, Joint California Sections Meeting, 5 (1999), *available at* http://www.sname.org/Home/.

25 DNV Heavy Fuel Report, *supra* note 5, at 1; *see also* AMSA for year-round data in 2004.

26 Pew Environment, fact sheet, Protecting Life in the Arctic, *available at* http://www.pewtrusts.org/uploadedFiles/wwwpewtrustsorg/Fact_Sheets/Protecting_ocean_life/Factsheet%20-%20Safeguarding%20Arctic.pdf.

27 *See* DE 56/INF.14.

28 AMSA, *supra* 3, at 38;

29 Air pollution from diesel engines, including those aboard vessels, is a major source of harmful fine particulate emissions. A myriad of medical studies have linked particle exposure to morbidity and mortality, including death due to lung cancer and cardiopulmonary disease such as strokes and heart attacks. U.S. EPA, Particulate Matter: Health, *available at* http://www.epa.gov/oar/particlepollution/health.html; *see also,* US EPA (2004) Air Quality Criteria for Particulate Matter (2004), Vol I Document No. EPA600/P-99/002aF and Vol II Document No. EPA600/P-99/002bF; DE 56/INF.14.

30 D. Lack et al., *Impact of Fuel Quality Regulation and Speed Reductions on Shipping Emissions: Implications for Climate and Air Quality*, 45 Environ. Sci. Technol. 9502 (2011), *in* United States, *Impact of fuel quality regulation and speed reductions on shipping emissions: Implications for climate and air quality* (Nov. 11, 2011) (submitted to IMO's Bulk Liquids and Gases Sub-Committee and reviewed as BLG 16/INF.5) and accompanying synopsis: United States, *Impact on the Arctic of Emissions of Black Carbon from International Shipping* (Nov. 25, 2011) (submitted to IMO's Bulk Liquids and Gases Sub-Committee and reviewed as BLG 16/15/2).

31 *Id.*

13 Switching to distillate fuel would also save many lives and reduce monetized health costs considerably. A recent study by Dr. James Corbett and others estimates 6,200 premature mortalities per year in the Arctic front area (above 40 degrees North latitude) from co-emitted black carbon and particulate organic matter from ships.[33] Monetized costs related to these premature mortalities amount to roughly $39 billion each year.[34]

14 Black carbon emissions in the Arctic are likely to grow as Arctic ice melts and sea lanes open up to increased shipping activity. A recent high-growth scenario of Arctic shipping, including both destinational and diverted trans-Arctic traffic, projects black carbon emissions to exceed 2004 levels by nearly five-fold in 2030 and over 18-fold by 2050.[35] That same high-growth scenario suggests that black carbon from Arctic shipping in 2030 may increase global warming potential of the vessels' emissions by some 17 to 78 per cent.[36]

Action requested of the Sub-Committee

15 The Sub-Committee is invited to include a provision in the Polar Code prohibiting the use of heavy fuel oil by vessels in Arctic waters, equivalent with environmental protection presently afforded Antarctic waters.

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32 The majority of black carbon reductions achieved in the study were attributed to switching to a cleaner fuel rather than from slowing down. *See* D. Lack, Black Carbon Emissions from Shipping – Effects of Vessel Speed, Ship Speed Limits
Seminar, Oct. 4, 2011, *available at* http://www.transportenvironment.org/docs/events/speed_limiters_for_shipping/Lack_BC_Speed_Ships_post.pdf; A. Petzold et al., *Operation of Marine Diesel Engines on Biogenic Fuels: Modification of Emissions and Resulting Climate Effects*, 45 Environ. Sci. Technol. 10394 (2011)(finding up to nearly 90 per cent reductions in black carbon emissions when switching from HFO to marine gas oil).

33 Clean Shipping Coalition, *Updated study estimating premature mortality above 40 degrees north latitude resulting from primary particulate emissions from international shipping activity* (May 6, 2011) (submitted to IMO's Marine Environment Protection Committee and reviewed at MEPC 62/INF.32).

34 Clean Shipping Coalition et al., *Reduction of emissions of Black Carbon from shipping in the high northern latitudes* (May 6, 2011) (submitted to IMO's Marine Environment Protection Committee and reviewed at MEPC 62/4/16).

35 Corbett et al., *supra* note 4.

36 *Id.*