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REDUCTION OF THE IMPACT ON THE ARCTIC OF EMISSIONS OF BLACK CARBON FROM INTERNATIONAL SHIPPING

Comments on document PPR 8/5/1

Submitted by ISO

SUMMARY

Executive summary:	In terms of overall Black Carbon emissions, it is not seen that setting an H/C limit would address the issues since VLSFOs are generally not prone to aromaticity and furthermore the hydrocarbon structure of a fuel is only one element in the factors which govern BC emissions
Strategic direction, if applicable:	3
Output:	3.3
Action to be taken:	Paragraph 15
Related documents:	PPR 8/5/1; PPR 7/8, PPR 7/22/Add.1 and MEPC 76/5

Introduction

1 This document is submitted 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) and provides comments on document PPR 8/5/1 (Finland and Germany).

2 Document PPR 8/5/1 provides the final results of a testing campaign aimed at studying the impact of the quality of fuel oils on Black Carbon (BC) emissions. ISO/TC28/SC4/WG6 provided comments on the initial results presented in documents PPR 7/8 (Finland and Germany) during PPR 7 (PPR 7/22/Add.1, annex 22, paragraph 8), in particular highlighting the fact that the selected fuels reported in document PPR 7/8 were not representative of the bulk of the actual VLSFOs being supplied to ships at that time, which is now also acknowledged in document PPR 8/5/1. This observation was based on analysis data of VLSFOs delivered to ships in the period October 2019 to January 2020.

3 In the study, three fuels with aromatic content in the range 70 to 95% had been tested and comparisons made to GTL, DMA and 2.5% sulphur HFO (50% aromatics). Document PPR 8/5/1 recognizes that the tested fuels might not be representative of the fuels available on the global market.

4 Paragraph 37 of document PPR 8/5/1 proposes the implementation and limitation of the aromatic content or H/C ratio in marine fuels and requests the International Organization for Standardization to review ISO 8217 to include specifications that consider the results of the study.

Discussion

5 Table 1 in document PPR 8/5/1 provides only information on the sulphur and aromatics content of the tested fuels and lacks more detailed information on the fuel oil characteristics to enable a better understanding of the character of the fuel being tested, in the way that marine bunkers are assessed for delivery. At the least, it would be useful to have additional information on parameters such as density, viscosity, micro carbon residue (MCR), calculated carbon aromaticity index (CCAI) and pour point, which provide the initial indicators of the degree to which the fuel tends towards being aromatic or paraffinic in nature.

6 The point raised on the validity of CCAI is well recognized. CCAI is an index, derived from the measured parameters of viscosity and density and has served the industry well as an ever-available alert to any unusual blend mixes which may signify a high aromaticity without having to carry out additional and complex analysis. This, as with all the test methods in the ISO 8217 standard, are currently subject to review. It has been further suggested that the Fuel Ignition Analyser (FIA) test method (IP541), a constant volume combustion test providing an estimated cetane number (ECN), might be included in the ISO 8217 standard as an alternative to CCAI. It should be noted that reference is already made in an informative annex of ISO 8217 to the option of using the FIA following a comprehensive 5-year study carried out before 2010. Whilst the FIA and CCAI along with the other test methods will be reconsidered in the current revision process of the ISO 8217:2017 standard, ISO/TC28/SC4/WG6 is acutely aware that there are only a few of these FIA test rigs available globally and to date are mainly used only for investigative purposes. This therefore means, notwithstanding the cost of such a test (which typically could well be more than tripling the analysis cost), that as the situation stands the test method will not lend itself to routine application to each bunker loaded.

7 In the testing campaign, the fuels were tested in a single cylinder 4-stroke medium speed research engine. ISO/TC28/SC4/WG6 is well aware of the fact that a higher aromatic content of the fuel may affect the efficient combustion of fuels and hence impact on emissions, with 4-stroke medium and high-speed engines being more sensitive to the aromatic content in the fuel than the 2-stroke low-speed engines. Therefore, it should not be overlooked that the degree of BC emissions is also heavily influenced by the engine settings, engine condition and operating profiles, all of which contribute to its performance and subsequently to the amount of BC emitted; this can be the case even with the most favourable low aromaticity fuels. ISO suggests therefore that the suitability of a fuel's characteristic, in this context, should not be assessed in isolation of the capacity of the ship's fuel temperature control ability and also of the machinery plant's condition intended for the fuel to be used in.

8 ISO/TC28/SC4/WG6 continued monitoring the quality of fuels supplied to ships from 1 January 2020. ISO submission to MEPC 76 (MEPC 76/5) provides detailed information on the quality of VLSFOs supplied to ships in the period January to June 2020, based on bunkers, as loaded, test data collected from a number of major global testing agencies. Further to the data in that submission, table 1 provides the maximum, minimum and average of the density, MCR (micro carbon residue) and CCAI (calculated carbon aromaticity index) of 2020 RM VLSFOs in comparison to 2018 HSFO data. This illustrates the spread of the data but still the average and minimum for 2020 RM VLSFOs being noticeably and significantly lower than for the RM HSFOs in 2018.

Table 1: ranges of density, MCR and CCAI, 2020 vs. 2018

	RM VLSFO 2020			RM HSF0 2018		
	min	**Avg**	**max**	**min**	**Avg**	**max**
Density, kg/m3	855	936	1011	903	988	1019
MCR, mass %	<0.1	5.4	16.4	1.0	13.8	20.6
CCAI	763	813	891	778	848	881

9 This collected data shows that 2020 RM VLSFOs have lower viscosity, lower density, lower MCR and lower CCAI, higher net specific energy and along with the percentage of VLSFOs having higher pour points point to VLSFOs in general tending to be more paraffinic in nature. As a result, VLSFOs, in general, are proving to have enhanced ignition and combustion properties over that of HSFOs and would be expected to reduce the tendency to form BC emissions in comparison to HSFO.

10 ISO/TC28/SC4/WG6 is in the process of reviewing ISO 8217:2017 and will take into consideration the outcome of its fuel quality review and consider the possibility to include an additional informative indicator to evaluate whether a fuel tends to be paraffinic or aromatic in character. In relation to the request in paragraph 37 of document PPR 8/5/1 to ISO, it is noted that the responsibility of ISO, as an international standardization organization, is to develop standards, for voluntarily adoption, to provide standardized testing procedures, and, as in this case, to define fuel categories and specifications of the fuel as delivered prior to conventional onboard treatment enabling safe, efficient and effective operation of the ship. Setting of environmental limits is not therefore within the remit of ISO.

Conclusion

11 ISO/TC28/SC4/WG6 recognizes that there is a correlation between the tendency to form BC emissions and the aromatic content of fuels. However, it also is aware that other factors such as engine type, its maintenance condition, and operational performance can contribute significantly more to BC emission.

12 Based on the fuel quality review as described above, the 0.50% sulphur fuels tested in this measurement campaign were not representative of the VLSFOs currently being supplied to ships. It therefore cannot be concluded that the VLSFOs currently on the market produce more BC emissions than HSFOs.

13 In the view of ISO/TC28/SC4/WG6, document PPR 8/5/1 fails to justify the inclusion of a BC emission related aromaticity limit for marine fuels in the Arctic. In view of the multiple influencing factors resulting in the formation of BC, not just the fuel, ISO would suggest the BC limit should be in term of post combustion condition.

14 It can be concluded that the vast majority of VLSFOs would fall under the definition of HFO in the HFO ban approved by MEPC 75. The HFO ban will prohibit the use in the Arctic regions of fuels as defined in MARPOL Annex I, regulation 43.1.2 (oils, other than crude oils, having a density at 15°C higher than 900 kg/m^3 or a kinematic viscosity at 50°C higher than 180 mm^2/s). This therefore means for the most part that distillate marine fuels generally having a low aromaticity would be used in Arctic regions, rather than VLSFOs.

Action requested of the Sub-Committee

15 The Sub-Committee is invited to review the information provided in this document and to consider it in further discussions.