

INTERSESSIONAL MEETING ON  
CONSISTENT IMPLEMENTATION OF  
REGULATION 14.1.3 OF MARPOL ANNEX VI  
Agenda item 2

ISWG-AP 1/2/11  
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ENGLISH ONLY

**DEVELOPMENT OF DRAFT GUIDELINES FOR CONSISTENT IMPLEMENTATION OF  
REGULATION 14.1.3 OF MARPOL ANNEX VI**

**Preparatory and transitional issues: ship implementation planning for 2020**

**Submitted by IBIA**

**SUMMARY**

*Executive summary:* The purpose of this document is to assist ship operators who opt to comply with the 0.50% sulphur limit by using oil-based fuel oil by describing options available for cleaning fuel oil tanks and systems, considerations for each option and approximate estimates of timelines. These could be helpful to understand the requirements when developing implementation plans for individual ships. The document also contains observations on dealing with the impact of possible non-availability of fuel oil meeting the 0.50% sulphur limit.

*Strategic direction, 1  
if applicable:*

*Output:* 1.17

*Action to be taken:* Paragraph 32

*Related documents:* PPR 5/WP.6 and PPR 5/25

**Background**

1 PPR 5 agreed to develop a single set of guidelines on "Consistent implementation of regulation 14.1.3 of MARPOL Annex VI", and agreed to the outline of the draft Guidelines as set out in annex 5 to document PPR 5/WP.6 (PPR 5/24, paragraph 13.20).

2 The first item of the guidelines pertain to preparatory and transitional issues, in particular "ship implementation planning for 2020", including calculation for the time needed for ships to "be fully flushed of all fuel oils exceeding the applicable sulphur content" prior to entry into force of the regulation, and a description of how to deal with and limit the impact of possible non-availability of fuel oil complying with the 0.50% sulphur limit.

3 The purpose of this document is to assist ship operators who opt to comply with the 0.50% sulphur limit by using oil-based fuel oil by describing options available for cleaning fuel oil tanks and systems, considerations for each option and approximate estimates of timelines. These could be helpful to understand the requirements when developing implementation plans for individual ships. The document also contains observations on dealing with the impact of possible non-availability of fuel oil meeting the 0.50% sulphur limit.

4 This document does not provide detailed step-by-step guides for tank cleaning. These are available from, for example, the Energy Institute (HM 50. *Guidelines for the cleaning of tanks and lines for marine tank vessels carrying petroleum and refined products*) and ISGOTT (International Safety Guide for Oil Tankers and Terminals).

## **Introduction**

5 The majority of ships are expected to use oil-based fuel oils for compliance with the 0.50% sulphur limit taking effect on 1 January 2020. Most of these ships will have been using high viscosity high sulphur fuel oil (HSFO) based primarily on residual fuel oils. Such fuels tend to stick to the inside of fuel tanks forming layers of semi-solid substances containing sediments and asphaltenic sludge; some such residues will also typically have solidified and settled in various parts of the fuel oil service system including pipelines, settling and service tanks.

6 It will therefore be necessary to clean ships' fuel oil tanks and fuel oil service systems prior to 1 January 2020, as simply loading compliant fuel into empty fuel tanks that have not been cleaned will cause both operational risks to ships and risk of non-compliance with the 0.50% sulphur limit, as such remaining HSFO residues sticking to various surfaces would dissolve/dislodge.

## **Risks to consider**

7 Many of the fuels complying with the 0.50% sulphur limit are expected to be very paraffinic due to crude sources of blending components and also a high content of distillate components. If such fuels are loaded into HSFO fuel tanks that have not been cleaned, they could rapidly dissolve and dislodge sediments and asphaltenic sludge in storage tanks, settling tanks and pipelines, potentially leading to purifier and filter operational issues and in extreme cases fuel starvation resulting in loss of power.

8 HSFO sludge and residues that dissolve and enter the fuel system can also potentially increase the sulphur content of the fuel at the engine rail, causing a compliant fuel to become non-compliant.

9 It is therefore not recommended to simply load compliant fuel directly into tanks previously used for HSFO or to start flushing through the fuel oil service system to achieve compliance, without taking preparatory and precautionary steps. Operators should ensure the fuel oil tanks and systems are sufficiently clean prior to the first loading and use of compliant fuels to prevent a sudden and severe dislodging of built-up residues.

## **Options for tank cleaning, approximate timelines and considerations**

10 Fuel oil tanks should be cleaned on a regular basis on ships to remove built-up sediments and sludge, usually during dry docking and whenever inspections of the fuel tanks are due. However, leading up to 1 January 2020, it would not be practicable for the majority of the global fleet that has been running on HSFO to undergo dry docking during a very short period, hence other options for cleaning tanks and fuel oil systems during service will need to be considered.

11 Unfortunately, the time and work involved in preparing HSFO tanks to fuels complying with the 0.50% sulphur limit cannot be defined precisely, as it will vary depending on how long it has been since the last time the tanks were cleaned, the condition of the tank coating and the effectiveness of the cleaning process itself. The estimates in this document may err on the side of caution as it is almost impossible to pinpoint at what stage the ship's fuel oil system is sufficiently clean to guarantee compliance.

### **Manual cleaning during dry docking**

12 Time required varies; it can be done in two to four days per tank. In addition to cleaning tanks, all of the pipework in the fuel oil service system needs to be flushed through. Overall it may take one to two weeks.

13 A ship that has had all its fuel oil tanks and fuel system cleaned can start loading compliant fuels and expect to be fully compliant right away.

14 However, if only the tanks have been cleaned in dry-dock, it could take two to five days to flush through the pipework in the fuel oil service system to ensure full compliance with the 0.50% sulphur limit.

### **Manual cleaning during service**

15 If tanks are to be cleaned manually during service, safety considerations are paramount; refer to IMO resolution A.1050(27) on *Revised recommendations for entering enclosed spaces aboard ships*.

16 Time required will vary depending on tank size and the number of tanks, how long it has been since the last tank cleaning and the number of crew available to perform safe and complete tank cleaning operations. Tank cleaning can be performed by the ship's crew and/or by employing a riding crew for this purpose. It is always good practice to inspect the tank once cleaned to check condition of the tank, and to inspect heating coils, conduct pressure tests and undertake repairs as necessary.

17 If the cleaning is done by the ship's existing crew it would likely take a minimum of four days per tank. For an average tank, a week should be allowed. If employing a riding crew to clean the tanks, if working in shifts, it would likely take a minimum of two days to clean a tank, but four days per tank should be allowed. It could be more due to unexpected circumstances.

18 Tanks need to be empty before they can be cleaned, hence the time needed to drain tanks needs to be taken into account when estimating the overall time required.

19 In addition to cleaning tanks, all of the pipework in the fuel oil service system needs to be flushed. Flushing the remaining pipework and fuel oil service system after all tanks have been cleaned could take another one to two days.

20 The residues from tank cleaning should be retained on board until they can be disposed of correctly or discharged to shore reception facilities.

### **Cleaning tanks in service with specialised additives**

21 An alternative to manual cleaning is to gradually clean the sediments and asphaltenic sludge from HSFO tanks and fuel system by dosing additives. There are successful examples of this approach for ships that needed to reallocate HSFO tanks to fuels complying with the 0.10% sulphur limit that took effect in ECAs in 2015.

22 One example of this is Innospec's Octamar™ BT series, which contains an asphaltene dispersant stabilizer. This was used by many shipping companies to clean their tanks including the fuel handling system prior to changes in tank use.

23 For this procedure, Innospec usually recommends that a gradual clean-up is conducted over five bunkers prior to the change in tank allocation. This conservative estimate ensures a smooth system clean-up by preventing excessive sludge blockages; it may be possible to achieve tank and system cleanliness over a shorter time frame, depending on how long it has been since tanks were last cleaned as well as the level of sludge build-up. Other manufactures of such products may give different advice on the time scale to achieve tank and system cleanliness

24 As such products would be dosed directly into the fuel storage tank, it would clean the whole fuel oil service system, including settling and service tanks.

25 The action of the dispersant additive will potentially lead to increased levels of sludge and sediments in the fuel which may lead to operational issues. During the clean-up period, it is recommended that the ship's crew should closely monitor the operation of centrifuges and filters for any issues or deterioration in performance.

26 After using specialized additives to clean out all HSFO residues from a ship's fuel system, the risk of HSFO residues from the fuel oil tanks and service system causing sulphur non-compliance may be sufficiently reduced from the first bunkering of compliant fuel oil into each tank allocated for either a 0.50% or a 0.10% sulphur limit fuel oil. To minimize risks of non-compliance, a sulphur fuel analysis should be done to determine if the fuel in the ship's tanks is compliant or whether a second bunkering of compliant fuel is required.

### **Impact of reloading non-compliant fuel oil after tank cleaning**

27 If a ship, after cleaning out its tanks and fuel oil system, is unable to obtain compliant fuel oil and has to load and use HSFO until it arrives at a port where compliant fuel oil is available, its storage tank(s) and fuel oil service system, including the settlement and service tanks, will again be contaminated with residues of HSFO. The level of build-up of such HSFO residues will depend on how many times each tank is loaded with HSFO after the tank cleaning, and how long the ship has to operate on HSFO.

28 Provided the fuel tank has only been loaded with HSFO once since it was cleaned, as soon as the tank is empty, it is expected that any HSFO residues causing sulphur non-compliance would be eliminated after the second bunkering of compliant fuel oil into each tank that was previously cleaned. The risk of HSFO residues causing sulphur non-compliance may also be sufficiently reduced from the first bunkering by loading a product with a sulphur content below the maximum 0.50% limit.

### Testing for sulphur content after tank cleaning

29 In order to verify compliance, after fuel with maximum 0.50% sulphur content has been loaded to the cleaned tank(s) and following sufficient running time on that fuel, it is recommended that fuel samples are taken just prior to the engine and tested for sulphur content using the ISO 8754 test method. Such testing should be done well before 1 January 2020 to allow time for any remedial action which may be required.

### Summary

30 The time required to clean fuel oil tanks and service systems to achieve full compliance will vary depending on many factors including the size and number of tanks, how long it was since the last tank cleaning, prior fuel used and the cleaning method. As such, each ship must make its own careful estimates for the time required to achieve compliance as part of its implementation planning, taking into account the method chosen.

31 The following is a summary of options, their approximate timelines and key considerations:

- .1 **manual cleaning during dry dock:** this may take one to two weeks. Unless the entire fuel system has been cleaned, it may take another two to five days of operation to flush the fuel oil system with compliant fuels after resuming service to minimize risk of non-compliance;
- .2 **manual cleaning during service:** this may take two to four days per tank (or more due to unforeseen circumstances) plus one to two days to flush through the fuel oil system after all tanks have been cleaned. For planning purposes, it is recommended to allow up to one week per tank. As each tank must be empty before cleaning, time required to empty each tank must also be calculated; and
- .3 **cleaning tanks while in service with additives:** however long it takes the ship to undertake bunkering of each HSFO tank while dosing with additives for as many times as the product manufacturer/supplier advises in each individual case. Once loaded with compliant fuel, to minimize risks of non-compliance, a sulphur fuel analysis should be done to determine if the fuel in the ship's tanks is compliant or whether another bunkering of compliant fuel is required.

### Action requested of the Intersessional Meeting

32 The Intersessional Meeting is invited to consider the information put forward in this document in support of ship implementation planning, and take action as appropriate.

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