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REVIEW OF RELEVANT NON-MANDATORY INSTRUMENTS AS A CONSEQUENCE OF THE AMENDED MARPOL ANNEX VI AND THE NO_x TECHNICAL CODE

Guidelines for the development of a VOC management plan

Submitted by INTERTANKO and OCIMF

SUMMARY

Executive summary:	This document proposes amendments to the draft Guidelines for the development of a VOC management plan for crude oil tankers and explains the reasons why the proposed amendments are deemed necessary
Strategic direction:	7.3
High-level action:	7.3.1
Planned output:	7.3.1.1
Action to be taken:	Paragraph 16
Related documents:	MEPC 58/23, paragraphs 5.33 and 5.34; BLG 13/13 and MEPC 47/INF.6

Background

1 During the review of the draft guidelines for the development of a VOC management plan at MEPC 58, the co-sponsors identified certain issues within the proposed document which, in their opinion, needed revision before the document was adopted by the Committee. MEPC 58 has therefore referred the document to the BLG Sub-Committee for further consideration.

The issues

2 The co-sponsors have identified three main issues in the draft guidelines which, in their opinion, are not applicable for the development of a VOC management plan. These are:

.1 relevance of any action by the crew to manage VOC emissions during cargo discharge operation (paragraphs 1.3 and 2.2 of the draft guidelines);

.2 "tank filling and discharge sequencing should be planned to minimise the time needed to fill or discharge each tank" (paragraph 1.4 of the draft guidelines); and

.3 "partial filling of tanks should be avoided to the extent possible" (paragraph 1.4 of the draft guidelines).

These issues will be discussed below and justification will be given why the co-sponsors suggest corrections to the draft Guidelines as outlined in the annex to this submission.

Relevance of any action by the crew to manage VOC emissions during cargo discharge operation

3 Paragraphs 1.3 and 2.2 would indicate that there are VOC emissions during the cargo discharge operation. However, VOC emissions during discharge were relevant only on pre-MARPOL single hull tankers (when pre-MARPOL tankers took in ballast water into cargo tanks, then VOC vapours from the cargo tanks were displaced and released into the atmosphere). This is not the case and thus not applicable to tankers with complete segregation between cargo and ballast tanks. Therefore, VOC emissions control during cargo discharge and ballasting is not relevant for the VOC management plan applicable to post-MARPOL and double hull tankers. Consequently, there is no need for crew action to control VOC emissions during discharge.

Speed and sequence of cargo tanks filling

4 Paragraph 1.4 sets forward a series of best management practices for VOC emission control for the management plan guidelines. Although this paragraph has the riding caveat that the suggested best management practices should be considered whilst maintaining the safety of the ship, the co-sponsors consider that an indication in the speed of filling the tanks or revision/alteration of the sequence of filling based on VOC evolution assessments is in contradiction of safe operations and not appropriate for inclusion in the management plan.

5 The general concept of rapid individual tank filling to limit VOC generation and thus, emission by displacement was initially considered as a possible methodology in the late 1990s. The proposal consisted of two alternative methods, namely:

.1 To construct crude oil tankers with smaller centre tanks and larger wing tanks. The centre tank would be loaded first in a rapid manner and then the content of the centre tank is "dropped" via a form of sluice valve arrangement into the larger associated wing tanks for the centre tank to be rapidly refilled again. It was assumed that a rapid filling of the centre tank would generate a "piston" type effect which would cause any evolved VOC to re-condense into the associated liquid crude oil.

.2 The second methodology was sequencing the loading of crude oil into specific tanks thereby displacing the evolved VOC from the loading via the common inert gas pipeline system into the still empty cargo tanks. The loading programme progresses until all the tanks are loaded and the final VOC displacement to atmosphere occurs from the final tank/s being loaded.

6 The industry did not adopt these concepts due to safety and oil pollution concerns associated with such operations. It is for these very reasons that crude oil tankers load numerous tanks simultaneously in order to control the filling rate in any one tank and to avoid the promotion of stresses in the ship's structure along the length of the ship that could occur by rapidly loading one or a limited number of cargo tank/s at any one time. The other reason for a strict plan of tank filling and sequence of filling is to ensure that the double hull tankers keep a good margin of their intact stability.

7 The co-sponsors wish to draw to the Sub-Committee's attention that for conventionally trading tankers it is the loading terminals responsibility to receive and deal with VOCs generated during the loading process. However the industry has developed a number of installations and operational procedures capable of limiting evolvement of the VOC volumes during transportation and thus limiting to a minimum any VOC release. When used by tankers, these will be included into the ships VOC management plan.

Partial filling is not relevant to VOC emissions during transit

8 The second bullet point under paragraph 1.4 of the draft Guidelines states that "partial filling of tanks should be avoided to the extent possible". The rationale behind the proposal is based on the concept that the greater vapour space within the cargo tank due to partial loading, the greater concentrations or volumes of VOC vapours would be displaced during the next loading.

9 The first observation on this proposal is the lack of proper definition of the term "partial filling". Crude oil tanker operators will naturally attempt to maximise the cargo loaded onboard a tanker but, for example, when taking several parcels of differing crude oils on the same voyage, tank size limitations restrict the optimisation of cargo tank capacity when it is inconsistent with the diverse parcel sizes.

10 In addition, the total amount of cargo parcels loaded on tankers is a decision which is beyond that of the tanker operator. As an example, Figure 1 below shows a variation of percentage final ullages as derived from tanker cargo data during a three-year research programme into the Carriage of Crude Oil by Sea (reference to document MEPC 47/INF.6).

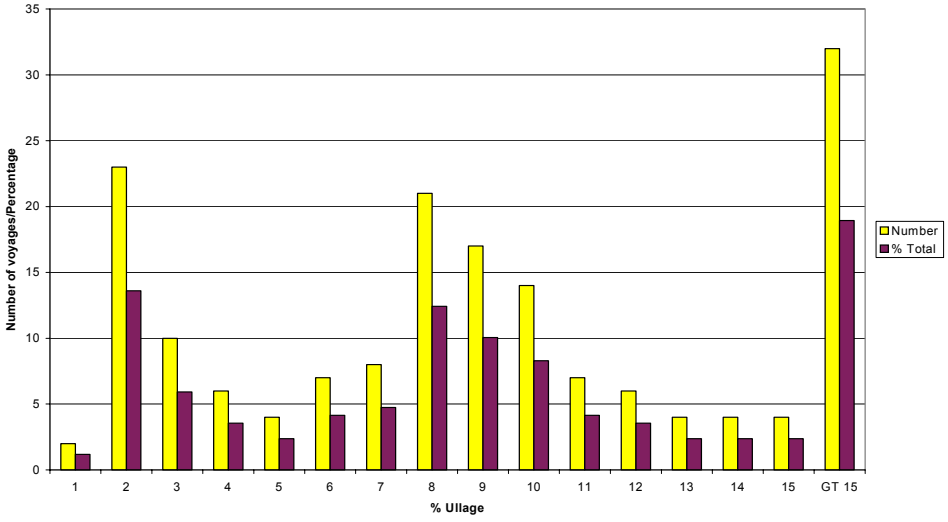

Figure 1

11 Also, the assumption that partial filling generates more VOC is not consistent with the results of an analysis of some 2000 samples of crude oil investigated during an extensive research programme of which a report was presented in document MEPC 47/INF.6. Actually, the results of the research programme indicated that the VOC pressure increases significantly after the filling of cargo tanks reaches 80% and higher. This can be seen in the graph below for a selection of different crude oils. The X axis on the graph in Figure 2 gives the vapour to liquid ratio in the cargo tanks. In other words, for a vapour/liquid ratio of 0.20, it means that the cargo tank is filled 80% with cargo. The minimum valour/liquid ratio value is 0.02% which corresponds to a cargo filling percentage up to 98%.

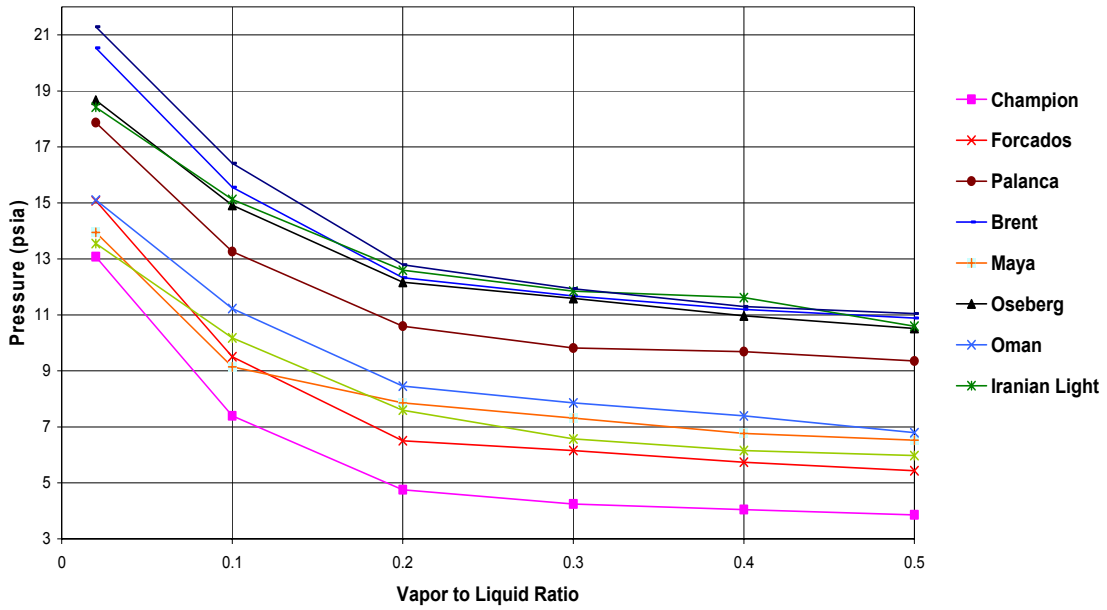

Figure 2

12 The direct measurements show that during transportation, tankers need to release VOC only when the VOC pressure on the ullage space is high and that happens only when the filling rate is over 90%. So, there is no problem with less filling than that on which tankers need to release VOC during transportation. Many tankers have been however, built with strengthened deck structure to sustain the VOC overpressure during transportation even at high filling rates.

13 There were arguments that partial filling means a lot of VOC in the larger ullage spaces and that VOC would be displaced. From numerous measurements before loading, the VOC concentration has been found to be typically between 4% and 10% of the tank volume with rare but extreme events being up to 20%. Based on data from onboard measurements, the co-sponsors would assess that the majority of VOC which remains in the cargo tank is due to Crude Oil Washing (COW) procedures and its volume depends upon the crude oil used for this operation and the severity or length of time used for the operation. Therefore, the co-sponsors would conclude that partial cargo tank filling is irrelevant as a management operational tool to limit VOC emissions.

14 One final observation is with regard to the COW procedure addressed in paragraph 1.4. The co-sponsors suggest that COW is an operational procedure which is completed according to a pre-set "programme" and not, as suggested within this paragraph "a unit". A suggestion for a slight change was therefore inserted into the text.

15 For easy reference, the suggested changes are indicated in the annex to this submission which contains the proposed text of draft Guidelines for the development of a VOC management plan as given in annex 2 of document BLG 13/13. The new text is underlined and the text suggested to be removed is crossed out.

Action requested of the Sub-Committee

16 The Sub-Committee is invited to consider the information and proposals above and take action as appropriate.

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ANNEX

DRAFT GUIDELINES FOR THE DEVELOPMENT OF A VOC MANAGEMENT PLAN

1 Objectives

.1 The purpose of the VOC management plan is to ensure that the operation of a tanker, to which regulation 15 of MARPOL Annex VI applies, prevents or minimizes VOC emissions to the extent possible.

.2 Emissions of VOCs can be prevented or minimized by:

- optimizing operational procedures to minimize the release of VOC emissions; and/or

- using devices, equipment, or design changes to prevent or minimize VOC emissions.

.3 To comply with this plan, the loading and carriage ~~and discharge~~ of cargoes which generate VOC emissions should be evaluated and procedures written to ensure that the operations of a ship follow best management practices for preventing or minimizing VOC emissions to the extent possible. If devices, equipment, or design changes are implemented to prevent or minimize VOC emissions, they shall also be incorporated and described in the VOC management plan as appropriate.

.4 While maintaining the safety of the ship, the VOC management plan should encourage and, as appropriate, set forth the following best management practices:

- the loading procedures should take into account potential gas releases due to low pressure and, where possible, the routing of oil from crude oil manifolds into the tanks should be done so as to avoid or minimize excessive throttling and high flow velocity in pipes;

- ~~partial filling of tanks should be avoided to the extent possible since the existence of a large volume of gas above the oil in the tanks will contribute to increased VOCs in the gas that is vented and also to the VOCs remaining in the tanks after discharge. The VOCs remaining in the tanks after the discharge of cargo will be emitted due to displacement during the next loading~~;

- ~~tank filling and discharge sequencing should be planned to minimize the time needed to fill or discharge each tank~~;

- the ship should define a target operating pressure for the cargo tanks. This pressure should be as high as safely possible and the ship should aim to maintain tanks at this level during the loading and carriage of relevant cargo;

- when venting to reduce tank pressure is required, the decrease in the pressure in the tanks should be as small as possible to maintain the tank pressure as high as possible;

- the amount of inert gas added should be minimized. Increasing tank pressure by adding inert gas does not prevent VOC release but it may increase venting and therefore increased VOC emissions; and

- when crude oil washing is considered, its effect on VOC emissions should be taken into account. VOC emissions can be reduced by shortening the duration of the washing or by using a closed cycle crude oil washing ~~unit~~ programme.

2 Additional considerations

.1 A person in charge of carrying out the plan

- A person shall be designated in the VOC management plan to be responsible for implementing the plan and that person may assign appropriate personnel to carry out the relevant tasks;

.2 Procedures for preventing or minimizing VOC emissions

- Ship-specific procedures should be written or modified to address relevant VOC emissions, such as the following operations:

  - Loading;

  - Carriage of relevant cargo;

  - ~~Discharge~~; and

  - Crude oil washing.

- If the ship is equipped with VOC reduction devices or equipment, the use of these devices or equipment should be incorporated into the above procedures as appropriate.

.3 Training

- The plan should describe the training programmes to facilitate best management practices for the ship to prevent or minimize VOC emissions.