INTERNATIONAL MARITIME ORGANIZATION

E

SUB-COMMITTEE ON BULK LIQUIDS AND GASES
17th session
Agenda item 18

BLG 17/18
8 February 2013
Original: ENGLISH

REPORT TO THE MARITIME SAFETY COMMITTEE AND THE MARINE ENVIRONMENT PROTECTION COMMITTEE

Section		Page
1	GENERAL	4
2	DECISIONS OF OTHER IMO BODIES	4
3	EVALUATION OF SAFETY AND POLLUTION HAZARDS OF CHEMICALS AND PREPARATION OF CONSEQUENTIAL AMENDMENTS	4
4	ADDITIONAL GUIDELINES FOR IMPLEMENTATION OF THE BWM CONVENTION	10
5	PRODUCTION OF A MANUAL ENTITLED "BALLAST WATER MANAGEMENT – HOW TO DO IT"	16
6	IMPROVED AND NEW TECHNOLOGIES APPROVED FOR BALLAST WATER MANAGEMENT SYSTEMS AND REDUCTION OF ATMOSPHERIC POLLUTION	16
7	DEVELOPMENT OF INTERNATIONAL MEASURES FOR MINIMIZING THE TRANSFER OF INVASIVE AQUATIC SPECIES THROUGH BIOFOULING OF SHIPS	17
8	DEVELOPMENT OF AN INTERNATIONAL CODE OF SAFETY FOR SHIPS USING GASES OR OTHER LOW-FLASHPOINT FUELS	18
9	DEVELOPMENT OF A REVISED IGC CODE	23
10	CONSIDERATION OF THE IMPACT ON THE ARCTIC OF EMISSIONS OF BLACK CARBON FROM INTERNATIONAL SHIPPING	26
11	REVIEW OF RELEVANT NON-MANDATORY INSTRUMENTS AS A CONSEQUENCE OF THE AMENDED MARPOL ANNEX VI AND THE NO_X TECHNICAL CODE	31

SUSTAINABLE DEVELOPMENT: IMO'S CONTRIBUTION BEYOND RIO+20

Section		Page
12	DEVELOPMENT OF A CODE FOR THE TRANSPORT AND HANDLING OF LIMITED AMOUNTS OF HAZARDOUS AND NOXIOUS LIQUID SUBSTANCES IN BULK IN OFFSHORE SUPPORT VESSELS	39
13	CASUALTY ANALYSIS	41
14	CONSIDERATION OF IACS UNIFIED INTERPRETATIONS	41
15	BINNIAL AGENDA AND PROVISIONAL AGENDA FOR BLG 18	41
16	ELECTION OF CHAIRMAN AND VICE CHAIRMAN FOR 2014	43
17	ANY OTHER BUSINESS	43
18	ACTION REQUESTED OF THE COMMITTEES	44

LIST OF ANNEXES

ANNEX 1 DRAFT AMENDMENTS TO THE INTERNATIONAL CODE FOR THE CONSTRUCTION AND EQUIPMENT OF SHIPS CARRYING DANGEROUS CHEMICALS IN BULK (IBC CODE)

ANNEX 2 CARGO TANK CLEANING ADDITIVES EVALUATED AND FOUND TO MEET THE REQUIREMENTS OF REGULATION 13.5.2 OF MARPOL ANNEX II

ANNEX 3 DRAFT MEPC RESOLUTION ON 2013 AMENDMENTS TO THE REVISED GUIDELINES AND SPECIFICATIONS FOR OIL DISCHARGE MONITORING AND CONTROL SYSTEMS FOR OIL TANKERS (RESOLUTION MEPC.108(49))

ANNEX 4 DRAFT MSC/MEPC CIRCULAR ON GUIDANCE ON THE TIMING OF REPLACEMENT OF EXISTING CERTIFICATES BY REVISED CERTIFICATES AS A CONSEQUENCE OF THE ENTRY INTO FORCE OF AMENDMENTS TO THE IBC CODE

ANNEX 5 DRAFT BWM CIRCULAR ON GUIDANCE ON BALLAST WATER SAMPLING AND ANALYSIS FOR TRIAL USE IN ACCORDANCE WITH THE BWM CONVENTION AND GUIDELINES (G2)

ANNEX 6 RECOMMENDATIONS RELATED TO THE TRIAL PERIOD FOR REVIEWING, IMPROVING AND STANDARDIZING OF THE CIRCULAR ON GUIDANCE ON BALLAST WATER SAMPLING AND ANALYSIS FOR TRIAL USE IN ACCORDANCE WITH THE BWM CONVENTION AND GUIDELINES (G2)

ANNEX 7 DRAFT MEPC RESOLUTION ON INFORMATION REPORTING ON TYPE APPROVED BALLAST WATER MANAGEMENT SYSTEMS

ANNEX 8 DRAFT BWM CIRCULAR ON AMENDMENTS TO THE GUIDANCE FOR ADMINISTRATIONS ON THE TYPE APPROVAL PROCESS FOR BALLAST WATER MANAGEMENT SYSTEMS IN ACCORDANCE WITH GUIDELINES (G8) (BWM.2/CIRC.28)

ANNEX 9 DRAFT BWM CIRCULAR ON OPTIONS FOR BALLAST WATER MANAGEMENT FOR OFFSHORE SUPPORT VESSELS IN ACCORDANCE WITH THE BWM CONVENTION

ANNEX 10 DRAFT MEPC CIRCULAR ON GUIDANCE FOR EVALUATING THE 2011 GUIDELINES FOR THE CONTROL AND MANAGEMENT OF SHIPS' BIOFOULING TO MINIMIZE THE TRANSFER OF INVASIVE AQUATIC SPECIES

ANNEX 11 DRAFT AMENDMENTS TO THE INTERNATIONAL CODE FOR THE CONSTRUCTION AND EQUIPMENT OF SHIPS CARRYING LIQUEFIED GASES IN BULK (IGC CODE)

ANNEX 12 DRAFT MEPC RESOLUTION ON GUIDELINES AS REQUIRED BY REGULATION 13.2.2 OF MARPOL ANNEX VI IN RESPECT OF NON-IDENTICAL REPLACEMENT ENGINES NOT REQUIRED TO MEET THE TIER III LIMIT

ANNEX 13 DRAFT AMENDMENTS TO THE TECHNICAL CODE ON CONTROL OF EMISSION OF NITROGEN OXIDES FROM MARINE DIESEL ENGINES (NO_X TECHNICAL CODE 2008)

ANNEX 14 DRAFT UNIFIED INTERPRETATION TO REGULATION 13.2.2 OF MARPOL ANNEX VI CONCERNING "TIME OF THE REPLACEMENT OR ADDITION" OF AN ENGINE FOR THE APPLICABLE NO_X TIER STANDARD FOR THE SUPPLEMENT TO THE IAPP CERTIFICATE

ANNEX 15 PROPOSED BIENNIAL AGENDA FOR THE 2014-2015 BIENNIUM AND ITEMS ON THE COMMITTEES' POST-BIENNIAL AGENDAS THAT FALL UNDER THE PURVIEW OF THE SUB-COMMITTEE

ANNEX 16 DRAFT PROVISIONAL AGENDA FOR BLG 18

ANNEX 17 REPORT ON THE STATUS OF PLANNED OUTPUTS FOR THE 2012-2013 BIENNIUM

1 GENERAL

Introduction

1.1 The Sub-Committee on Bulk Liquids and Gases (BLG) held its seventeenth session from 4 to 8 February 2013 under the chairmanship of Mr. S. Oftedal (Norway). The Vice-Chairman, Mr. R. Zhang (China), was also present.

1.2 The session was attended by delegations from Member States and observers from international organizations and non-governmental organizations in consultative status as listed in document BLG 17/INF.1.

Secretary-General's opening address

1.3 The Secretary-General welcomed participants and delivered his opening address, the full text of which can be downloaded from the IMO website at the following link: http://www.imo.org/MediaCentre/SecretaryGeneral/Secretary-GeneralsSpeechesToMeetings .

Chairman's remarks

1.4 In responding, the Chairman thanked the Secretary-General for his words of guidance and encouragement and assured him that his advice and requests would be given every consideration in the deliberations of the Sub-Committee.

Adoption of the agenda

1.5 The Sub-Committee adopted the agenda (BLG 17/1/Rev.1) and agreed, in general, to be guided in its work by the annotations to the provisional agenda contained in document BLG 17/1/1 and the proposed working arrangements for the session (BLG 17/1/2). The agenda, as adopted, with the list of documents considered under each agenda item, is set out in document BLG 17/INF.17.

2 DECISIONS OF OTHER IMO BODIES

2.1 The Sub-Committee noted the outcomes of DE 56, MEPC 63, FSI 20, STW 43, MSC 90, C 108, DSC 17, MEPC 64, C 109, MSC 91 and FP 56 relevant to the work of the Sub-Committee, as reported in documents BLG 17/2, BLG 17/2/1, BLG 17/2/2 and BLG 17/2/3 (Secretariat) and took them into account in its deliberations when dealing with relevant agenda items.

2.2 The Sub-Committee noted, in particular, that MEPC 63 and MSC 90 had approved the Committees' revised *Guidelines on the organization and method of work* (MSC-MEPC.1/Circ.4/Rev.2) and urged all those concerned to strictly follow the revised Guidelines.

3 EVALUATION OF SAFETY AND POLLUTION HAZARDS OF CHEMICALS AND PREPARATION OF CONSEQUENTIAL AMENDMENTS

3.1 The Sub-Committee recalled that this part of the agenda traditionally contains routine classification tasks which are normally put directly to the ESPH Working Group prior to further consideration by the Sub-Committee. Notwithstanding the above, the Sub-Committee also recalled that it traditionally considers the report of the intersessional meeting of the ESPH Working Group and any other documents submitted to the session containing matters of principle for which discussions in plenary are necessary.

Report of ESPH 18

3.2 In considering the report of the eighteenth intersessional meeting of the ESPH Working Group (BLG 17/3), the Sub-Committee approved the report in general and, in particular:

.1 agreed with the evaluation of new products and consequential inclusion in the IBC Code;

.2 concurred with the evaluation of cleaning additives, noting that 25 formulations had been evaluated and approved for inclusion in the list of cleaning additives meeting the requirements of the criteria outlined in MEPC.1/Circ.590;

.3 noted the concern of the Working Group with regard to the usage in some cleaning additives of components that are carcinogenic, mutagenic, reprotoxic or sensitizing;

.4 noted that further new data on electrical equipment for inclusion in chapter 17 of the IBC Code has been incorporated into List 1 of MEPC.2/Circ.18;

.5 agreed to other product additions, amendments and deletions introduced for MEPC.2/Circ.18; including the addition of three new biofuels to annex 11;

.6 concurred with the Group that biofuel blends for shipment under MARPOL Annex II should be fully assessed before they can be transferred to the Guidelines for the carriage of blends of petroleum oil and biofuels;

.7 noted the work being undertaken by the GESAMP/EHS Working Group to update and improve GESAMP Reports and Studies No.64 dealing with the revised GESAMP Hazard Evaluation Procedure for Chemical Substances Carried by Ships;

.8 agreed to the draft amendments to the IBC Code set out in annex 1, for consideration and subsequent approval by MEPC 65 and MSC 92, noting the recent outcome of FP 56 which had concurred with the amendments proposed;

.9 noted the discussion on the reissue of chemical code certificates and the request for further information to be submitted to BLG 17 for consideration;

.10 agreed to the proposed amendments to the *Guidelines and Specifications for Oil Discharge Monitoring and Control Systems for Oil Tankers* and directed that these should be issued as a list of changes to the original resolution MEPC.108(49);

.11 noted the continuing discussions on the options to further develop the criteria for assessing products based on the GESAMP Hazard Profile together with a consideration of physical properties and endorsed the conclusions reached so far, noting that further discussions on this topic would take place at this session; and

.12 approved the future work programme of the ESPH Working Group notwithstanding any additional tasks that may be given to it following discussion of items relevant to its work.

3.3 With regard to paragraph 3.2.9 above relating to the reissue of Chemical Carrier Code Certificates of Fitness and noting that the group had not previously reached any conclusion on this point, it was proposed by the observer from IACS that the matter should be considered again by the group and that IACS would provide new information to assist in establishing the core principles of the issue which might then be utilized in order to formulate appropriate guidance.

3.4 In essence, it was proposed that the principle of MSC-MEPC.5/Circ.6 should be applied, except that the adoption date of the IBC Code amendments, rather than the entry-into-force date, would be the trigger point to begin reissuing revised Certificates of Fitness and their Attachment 1. Should a solution be agreed, it was also suggested that this should be disseminated as a BLG circular, to be approved at this session, noting the timing constraints effective in relation to the forthcoming entry into force of the IBC Code amendments adopted by resolutions MEPC.225(64) and MSC.340(91).

3.5 The need to finally resolve this issue and to utilize the principle of the IACS approach was supported by a number of delegations and it was agreed, therefore, that this item should be included in the terms of reference for the Working Group to be established for this session.

3.6 With respect to action point 13.1.13 of document BLG 17/3, relating to possible amendments that may be needed to the IOPP Certificate, Form B, point 6.1.5 as a consequence of the review of the *Guidelines and Specifications for Oil Discharge Monitoring and Control Systems for Oil Tankers*, it was suggested by the delegation of Norway that although the reference to "oil-like noxious liquid substances" had been deleted, there may still be a need to add biofuels to the listing. This was noted by the Sub-Committee but, recognizing that biofuels are not formally defined within MARPOL Annex I, it agreed that for now no action on this point was required.

3.7 Noting that during the review of the ESPH 18 meeting a reference had been made to discussions held on the use of ventilation to remove cargo residues from a tank instead of a prewash, it was proposed by the delegation of the Cook Islands that the outcome of this should be captured within the report for BLG 17, in order that it did not become lost. This was accepted by the Sub-Committee and in this context it was noted that:

.1 the ESPH Group had considered Regulation 13.4, whereby ventilation is allowed to be used to remove cargo from a tank instead of a prewash in certain circumstances, subject to the permission of the Government of the receiving country. In practice, permission is generally granted by a MARPOL surveyor in the form of a signature in the Cargo Record Book (allowing ventilation either in port or en route to the next port depending upon the local controls);

.2 the Group was advised that in some ports it has reportedly been difficult to get a MARPOL surveyor to attend the vessel, and in such circumstances it was, therefore, proposed that the vessel should ensure that it can demonstrate through documentary evidence that it has given adequate notice of requiring a surveyor and should advise the Administrations of the port State involved and its flag State of any failure to attend; and

.3 in this regard, the Group recalled that Regulation 16 of MARPOL Annex II, "Measures of Control", makes it clear that each Party to the Convention has a responsibility to appoint or authorize surveyors for the purpose of implementing this regulation and that paragraph 7 of this regulation sets out unequivocally the surveyors' responsibility with respect to exemptions.

Outcomes of MSC 90, MSC 91, MEPC 64 and FP 56

3.8 The Sub-Committee observed that a number of issues arising from the outcomes of MSC 90, MSC 91, MEPC 64 and FP 56 as reported in documents BLG 17/2, BLG 17/2/1, BLG 17/2/2, and BLG 17/2/3 (all by the Secretariat) were relevant to this agenda item, and consequently it was noted that:

.1 MSC 90 and MEPC 64 had endorsed the actions taken by the Sub-Committee in relation to the report of ESPH 17 and approved the work programme for the next intersessional meeting of the ESPH Working Group (ESPH 18, held in October 2012). Additionally, both Committees had approved the holding of an intersessional meeting of the ESPH Working Group (ESPH 19) in 2013;

.2 MSC 91 and MEPC 64 had adopted respectively resolutions MSC.340(91) and MEPC.225(64), on the *2012 Amendments to the IBC Code* (chapters 17, 18 and 19);

.3 MSC 90 had adopted resolution MSC.325(90) adding a new regulation to SOLAS chapter VI regarding the prohibition of the blending of bulk liquid cargoes and production processes during sea voyages;

.4 MEPC 64 had approved MEPC.1/Circ.761/Rev.1 on the amendments to the *2011 Guidelines for the carriage of blends of petroleum oil and biofuels;*

.5 FP 56 had concurred with the draft consequential amendments to the IBC Code prepared by ESPH 18, as set out in document BLG 17/3 (annex 6), in light of the work undertaken by the FP Sub-Committee on the development of measures to prevent explosions on oil and chemical tankers transporting low-flashpoint cargoes; and

.6 FP 56 had also agreed a draft MSC circular for submission to MSC 92 setting out a Unified Interpretation of the SOLAS Convention and the IBC and IGC Codes, relating to guidance on the uniform application of the requirements for the location of entrances, air inlets and openings in the superstructures and/or deckhouses of oil and chemical tankers and gas carriers (as set out in document FP 56/23, annex 11).

Evaluation of products

3.9 The Sub-Committee noted documents BLG 17/3/1 (Brazil), BLG 17/3/3 (Finland), BLG 17/3/4 (United States), BLG 17/3/5 (United States) and BLG 17/3/6 (South Africa) relating to new product evaluations.

3.10 The Sub-Committee tasked the working group to carry out the evaluation of these proposals since it was recognized that the evaluation of such products is a routine task of the working group which is normally put directly to the group prior to any consideration by the Sub-Committee.

Review of chapters 17, 18 and 21 of the IBC Code

3.11 The Sub-Committee considered document BLG 17/3/2 together with BLG 17/INF.12 (both by Norway, the Netherlands and CEFIC), which addressed the review of chapters 17, 18 and 21 of the IBC Code and the possible use of some of the inherent properties of chemical substances to assist with this work.

3.12 It was noted that these reflected very detailed considerations and continued the review theme which is progressively being advanced by the ESPH Group, and consequently it was agreed to forward these documents also to the working group for direct assessment and action as appropriate.

Reference information needed for the assignment of carriage requirements

3.13 The Sub-Committee considered document BLG 16/3/7 (Republic of Korea) which proposed expanding the MEPC.2/Circular with a new annex containing reference information which is relevant for the assignment of carriage requirements.

3.14 In general, there was support for consideration of this proposal, but again, as it was recognized that this issue is very much within the province of the ESPH Group, it was decided to ask the working group to consider the details of the proposal and then advise the Sub-Committee of its deliberations accordingly.

Establishment of the Working Group

3.15 Recognizing the necessity to make further progress on the above issues, the Sub-Committee established the Working Group on Evaluation of Safety and Pollution Hazards of Chemicals (ESPH) and instructed it, taking into account the comments and decisions made in plenary, to:

.1 consider issues relating to the evaluation of new products;

.2 conduct an evaluation of cleaning additives;

.3 review the MEPC.2/Circular on "Provisional classification of liquid substances transported in bulk", and other related matters;

.4 finalize the amendments for the *Revised Guidelines and Specifications for Oil Discharge Monitoring and Control Systems for Oil Tankers* (resolution MEPC.108(49));

.5 review products requiring oxygen-dependent inhibitors;

.6 consider further the reissue of chemical tanker certification;

.7 review further the safety criteria guidelines used in chapter 21 of the IBC Code;

.8 prepare the work programme and agenda for ESPH 19; and

.9 submit a written report by Thursday, 7 February 2013.

Report of the ESPH Working Group

Action taken by the Sub-Committee

3.16 Having considered the report of the ESPH Working Group (BLG 17/WP.3), the Sub-Committee approved it in general and, in particular:

.1 agreed to the evaluation of two new substances and their consequential inclusion in the IBC Code, subject to endorsement by MEPC 65;

.2 concurred with the evaluation of cargo tank cleaning additives found to meet the requirements of regulation 13.5.2 of MARPOL Annex II, as set out in annex 2, for inclusion in the next edition of the MEPC.2/circular, subject to endorsement by MEPC 65;

.3 agreed to the evaluation of three trade-named mixture products for inclusion in List 3 of the MEPC.2/circular with validity for all countries and no expiry date, subject to endorsement by MEPC 65;

.4 endorsed the proposal of the group to add a table reflecting references and related information for ascertaining carriage requirements to the IMO website and to note this point in the annual MEPC.2/circular;

.5 agreed to the draft amendments to the *Revised Guidelines and Specifications for Oil Discharge Monitoring and Control Systems for Oil Tankers* (resolution MEPC.108(49)) and the draft associated MEPC resolution on their adoption, as set out in annex 3, for consideration and adoption by MEPC 65;

.6 noted the discussion on cargoes requiring oxygen-dependent inhibitors in relation to inert gas controls and the request for information regarding oxygen cut-off limits to be provided for any products concerned;

.7 endorsed the procedures relating to the reissue of chemical code certificates when the IBC Code is amended and agreed to the draft MSC-MEPC.5/Circular, as set out in annex 4 , for approval by MEPC 65 and MSC 92. Having completed the work on this issue it also agreed to delete this item from the work programme of the ESPH Working Group;

.8 noted the progress on the review of the safety guidelines used in chapter 21 of the IBC Code and agreed with the proposal to summarize the possible amendments at the next ESPH meeting for consideration and assessment of the impact of any changes at BLG 18;

.9 approved the future work programme for the intersessional meeting of the ESPH Working Group in October 2013; and

.10 agreed to request MSC 92 and MEPC 65 to approve an intersessional meeting of the ESPH Working Group in 2014.

4 ADDITIONAL GUIDELINES FOR IMPLEMENTATION OF THE BWM CONVENTION

4.1 The Sub-Committee noted that, since the last BLG session, three more States (Denmark, Niue and the Russian Federation) had acceded to the Ballast Water Management Convention, bringing the number of contracting Governments to 36 representing 29.07 per cent of the world merchant fleet tonnage. The Sub-Committee urged the other Member States to ratify or accede to the Convention at their earliest convenience.

4.2 The Sub-Committee recalled that the Council at its 109th session had noted the decisions taken and work carried out by the MEPC concerning the BWM Convention, while recognizing that significant technical issues remained outstanding; and had urged the MEPC to identify and suggest pragmatic solutions to any impediments, in particular port State control issues, to the early entry into force and implementation of the Convention.

PLANNING OF WORK

4.3 The Sub-Committee had for its consideration eight documents submitted under this agenda item and agreed to plan its work as follows:

.1 development of a BWM circular on ballast water sampling and analysis, taking into account documents BLG 17/4 and BLG 17/4/Corr.1 (Bahamas et al.), BLG 17/4/1 (Chairman), BLG 17/4/2 (Germany), BLG 17/INF.15 (European Commission) and BLG 17/INF.16 (Germany);

.2 application of the BWM Convention to Offshore Support Vessels, taking into account document BLG 17/4/3 (Vanuatu); and

.3 additional guidance with regard to application of the provisions contained in Guidelines (G8), taking into account document BLG 17/4/4 (Liberia et al.).

DEVELOPMENT OF A BWM CIRCULAR ON BALLAST WATER SAMPLING AND ANALYSIS

4.4 The Sub-Committee recalled that MEPC 58, following the adoption of *Guidelines for ballast water sampling (G2)*, had instructed the Sub-Committee to develop, as a matter of high priority, a circular to provide sampling and analysis guidance to be followed and to give advice on the uniform application of that guidance. The Sub-Committee also recalled that BLG 16, due to the significant difference in views over its implications and its relationships with other guidelines, had decided to continue development of the draft circular at BLG 17, using the text contained in annex 1 of BLG 16/WP.4 as a basis.

4.5 The Sub-Committee further recalled that in order to clarify the implications of approving the circular and to facilitate the harmonization of the disparate views expressed at BLG 16, the Chairman had offered to provide an overview of the requirements of the BWM Convention, Guidelines (G2) and (G8) and other guidance documents and their relationship with the draft circular on ballast water sampling and analysis protocols.

4.6 The Sub-Committee noted that MEPC 64 had instructed the Sub-Committee to consider the proposals made in document MEPC 64/2/15 (Germany) on monitoring and sampling of certain ballast water management systems and advise the MEPC accordingly. The Sub-Committee also noted that MEPC 64 had agreed that the sampling and analysis procedures should not be more stringent than what is required for Type Approval of ballast water management systems.

4.7 The Sub-Committee had for its consideration the following documents:

.1 BLG 17/4 and BLG 17/4/Corr.1 (Bahamas, Greece, Japan, Liberia, Panama, ICS, BIMCO, INTERTANKO, SIGTTO, INTERCARGO, InterManager and IPTA) proposing that port States should not exercise ballast water sampling until standardized and internationally agreed IMO PSC sampling and analysis guidelines are in place. The co-sponsors were of the view that inspection of documentation such as the Ballast Water Management Plan, Type Approval Certificate and Ballast Water Record Book would suffice, and that Type Approved BWMS should be regarded as operationally compliant if properly operated and maintained. Furthermore, the co-sponsors considered that sampling during PSC inspection, even when refraining from criminal prosecution, is not the appropriate mechanism for collecting sampling data to be used during finalization or improvement of the sampling circular;

.2 BLG 17/4/1 (the Chairman) presenting key elements relating to compliance, as well as sampling and analysis under the BWM Convention in order to assist the Sub-Committee in further progressing the development of the sampling and analysis protocols; and

.3 BLG 17/4/2 (Germany) proposing detailed self-monitoring standards for ballast water management systems, based on the proposal contained in document MEPC 64/2/15. The delegation of Germany suggested that Administrations should not pursue criminal sanctions solely on the basis of sampling, provided that the ship has a duly maintained and operated BWMS which uses self-monitoring and that all documentation is in good order.

4.8 The Sub-Committee took note of the information provided in document BLG 17/INF.15 (European Commission) on the development of a sampling protocol and threshold to test whether a vessel is in gross non-compliance with the BWM Convention and document BLG 17/INF.16 (Germany) on a project concerning effective new technologies for the assessment of compliance with the BWM Convention.

4.9 After the introduction of all the documents submitted on the matter, the Chairman of the Sub-Committee stated that as the legal basis for port State control and sampling of ship's ballast water is contained in article 9 of the Convention and that the MEPC has instructed the Sub-Committee to develop the sampling and analysis circular aimed at harmonizing the inspection procedures, there is an urgent need for the Sub-Committee to finalize the draft circular.

4.10 The Chairman further stated that although the draft circular contains the current state-of-the-art science with respect to sampling and analysis of ballast water, it undoubtedly needs further improvement and standardization in light of future development of the sampling and analysis techniques. With a view to alleviating the concerns expressed by Member Governments and international organizations over the manner of confirming compliance in accordance with the draft circular and to facilitating the development of the Guidelines for port State control under the 2004 BWM Convention currently under development by the FSI Sub-Committee, the Chairman proposed that the Sub-Committee should instruct the working group to:

.1 finalize the draft circular on ballast water sampling and analysis for trial use;

.2 define the trial period and develop a mechanism to review, improve and standardize the sampling and analysis protocols; and

.3 develop appropriate recommendations based on the principle of "No criminal sanctions solely on the basis of sampling", for consideration by the MEPC and subsequent inclusion in the port State control guidelines, taking into account documents BLG 17/4 and BLG 17/4/2.

4.11 A large number of delegations supported the Chairman's proposal, indicating that the proposal forms a good basis for identifying an interim practical and proactive solution to a long-lasting problem.

4.12 In the ensuing discussion, the following views, *inter alia*, were expressed:

.1 that the trial period needs to be defined. In this connection, some delegations expressed the view that the trial period should start following the entry into force of the Convention while some other delegations suggested that Member States should be encouraged to use the guidance now in the context of flag State implementation and for scientific and research purposes;

.2 that the term "criminal sanctions" needs to be clarified taking into account the provisions in articles 8, 9 and 10 of the Convention; in this context, some delegations pointed out that refraining from applying criminal sanctions or detaining ships does not prevent the port States from taking preventive measures to protect the environment;

.3 that in developing the draft circular, care should be taken to ensure, as decided by MEPC 64, that the sampling and analysis procedures should not be more stringent than what is required for Type Approval of ballast water management systems;

.4 that self-monitoring standards for ballast water management systems should be developed based on the proposal contained in document BLG 17/4/2 (Germany). In this connection, some delegations cautioned that such standards should be pragmatic and cost effective and that early installers of ballast water management systems should not be penalized for not fulfilling these standards;

.5 that the traditional port State control inspection practice and procedures should be maintained and that in that context, ballast water sampling and analysis should not be exercised until transparent, standardized and internationally recognized sampling and analysis methods are in place; and

.6 that since the legal base of the sampling is contained in article 9 of the Convention, the legitimate right of a port State cannot be denied unless other alternative enforcement options are in place.

4.13 The delegation of the United States, while welcoming the proposal to develop the guidance for trial use, reserved its position on the suggested principle of "No criminal sanctions solely on the basis of sampling", given that details of the proposal still need to be worked out. The United States delegation suggested that the working group should be allowed to consider all the options available under the Convention for the trial period.

4.14 Following the discussion, the Sub-Committee agreed to instruct the working group to further consider the Chairman's proposal, taking into account documents BLG 17/4, BLG 17/4/1 and BLG 17/4/2.

APPLICATION OF THE BWM CONVENTION TO OFFSHORE SUPPORT VESSELS

4.15 The Sub-Committee recalled that MEPC 64 had agreed that a BWM circular could facilitate the implementation of the provisions of the Convention in the particular case of Offshore Support Vessels (OSV) and had instructed the Sub-Committee to initiate the development of such a circular based on the proposals in documents MEPC 64/2/14 and MEPC 64/2/20 by Vanuatu.

4.16 In considering document BLG 17/4/3 (Vanuatu) containing a draft circular prepared on the basis of these documents, some delegations suggested that the working group should consider expanding the draft circular to apply to other types of vessels as well.

4.17 Following the discussion, the Sub-Committee agreed to refer the document to the Ballast Water and Biofouling Working Group for detailed consideration.

ADDITIONAL GUIDANCE WITH REGARD TO APPLICATION OF THE PROVISIONS CONTAINED IN GUIDELINES (G8)

4.18 The Sub-Committee recalled that MEPC 64 had instructed BLG 17 to further consider the draft text in annex 1 of document MEPC 64/WP.8 to improve resolution MEPC.175(58) and to provide additional guidance with regard to application of the provisions contained in Guidelines (G8), including expansion of BWM.2/Circ.28, inviting Member States and observers to submit relevant proposals in this respect.

4.19 The Sub-Committee further recalled that MEPC 64 had invited Member Governments and international organizations to submit case studies, including quantitative data and information, to document problems with the supply, operation and suitability of Type-Approved ballast water management systems to the BLG Sub-Committee to facilitate more informed analysis of these aspects.

4.20 In considering document BLG 17/4/4 (Liberia et al.) containing proposed amendments to BWM.2/Circ.28 and resolution MEPC.175(58), a number of delegations proposed that elements such as standardized self-monitoring systems, quantities of chemical products used and matters related to crew safety should also be considered in this context.

4.21 Following the discussion, the Sub-Committee agreed to refer the document to the Ballast Water and Biofouling Working Group for detailed consideration. In addition, the Sub-Committee agreed to instruct the working group to consider minimum requirements for the self-monitoring of ballast water management systems as proposed in document BLG 17/4/2.

ESTABLISHMENT OF THE BALLAST WATER AND BIOFOULING WORKING GROUP

4.22 Having considered the above matters, the Sub-Committee established the Ballast Water and Biofouling Working Group (see also paragraph 7.2) and instructed it, taking into account the comments made and decisions taken in plenary, to:

.1 finalize the BWM circular on ballast water sampling and analysis for trial use, using the text contained in BLG 16/WP.4, annex 1 as a basis, taking into account the decision by MEPC 64 that sampling and analysis

procedures should not be more stringent than what is required for Type Approval of ballast water management systems;

.2 define the trial period and develop a mechanism to review, improve and standardize the sampling and analysis protocols;

.3 develop appropriate recommendations based on the principle of "No criminal sanctions solely on the basis of sampling", for consideration by the MEPC and subsequent inclusion in the port State control Guidelines, taking into account documents BLG 17/4 and BLG 17/4/2;

.4 finalize the draft circular on other methods of ballast water management for Offshore Support Vessels to comply with the BWM Convention, using the text contained in document BLG 17/4/3 as a basis;

.5 prepare additional guidance with regard to the application of the provisions contained in Guidelines (G8) using text in document BLG 17/4/4 as a basis;

.6 consider minimum requirements for the self-monitoring of ballast water management systems as proposed by BLG 17/4/2 in accordance with Guidelines (G8), paragraph 4.10 to 4.14, and advise the Sub-Committee accordingly; and

.7 submit a written report on the work carried out, including recommendations to the MEPC, for consideration by the Sub-Committee on Friday, 8 February 2013.

REPORT OF THE BALLAST WATER AND BIOFOULING WORKING GROUP

4.23 Having considered the part of the report of the working group (BLG 17/WP.4) relating to this agenda item, the Sub-Committee approved the report in general and took action with respect to ballast water issues, as outlined below.

4.24 The delegation of the Bahamas expressed concern that the non-criminalization principle had not yet gained complete acceptance. It also reiterated its concern regarding the practicality of testing, possible infrastructural costs to developing States for sampling and analysis and the uncertainty which remains for ships which have already installed ballast water management systems. The delegation of Panama associated itself with the concern expressed by the delegation of the Bahamas.

Development of a BWM circular on ballast water sampling and analysis

4.25 The Sub-Committee agreed to the draft BWM Circular on *Guidance on ballast water sampling and analysis for trial use in accordance with the BWM Convention and Guidelines (G2)*, set out in annex 5, for approval by MEPC 65 and subsequent dissemination as a BWM circular.

4.26 The Sub-Committee agreed that the length of the trial period should be two to three years following entry into force of the Convention. In this connection, the Sub-Committee encouraged Member States to begin using the sampling and analysis procedures for scientific and research purposes and report their findings to the Sub-Committee.

4.27 The Sub-Committee agreed to invite MEPC 65 to consider the Recommendations related to the trial period for reviewing, improving and standardizing of the above-mentioned circular, set out in annex 6, and take action as appropriate.

4.28 The delegation of the United States reserved its position on the principle of port States refraining from applying criminal sanctions or detaining ships on the basis of sampling during the trial period.

4.29 The Sub-Committee invited Member States and observers to propose improvements to the *Guidance on sampling and analysis*, including but not limited to the range of options outlined in the circular, and to provide information on detailed protocols to the Sub-Committee for inclusion in future revisions of the circular, as appropriate.

4.30 The Sub-Committee agreed to forward document BLG 17/WP.4 to the FSI 21 for their consideration and action, as appropriate.

4.31 The Sub-Committee invited the FSI Sub-Committee to finalize the *Guidelines for port State control under the 2004 BWM Convention* as a matter of urgency prior to the entry into force of the BWM Convention to facilitate the trial period and ratification of the Convention.

Additional guidance with regard to application of the provisions contained in Guidelines (G8)

4.32 The Sub-Committee agreed to the draft MEPC resolution regarding information reporting on type approved ballast water management systems, set out in annex 7, for consideration by MEPC 65 with a view to adoption.

4.33 The Sub-Committee agreed to the draft amendments to the *Guidance for Administrations on the type approval process for ballast water management systems in accordance with Guidelines (G8)* (BWM.2/Circ.28), set out in annex 8, for approval by MEPC 65 and subsequent dissemination as a BWM Circular, taking into account the intention of some delegations to further develop an appendix containing specific monitoring parameters for self-monitoring systems for inclusion in the revised circular.

Application of the BWM Convention to Offshore Support Vessels

4.34 The Sub-Committee agreed to the draft circular on options for ballast water management for Offshore Support Vessels in accordance with the BWM Convention, set out in annex 9, for approval by MEPC 65 and subsequent dissemination as a BWM circular.

Re-establishment of the Ballast Water Working Group

4.35 The Sub-Committee noted the group's recommendation to re-establish the Ballast Water Working Group at BLG 18 with the following provisional terms of reference.

.1 update the BWM circular on sampling and analysis in light of technological advances of sampling and analysis as required;

.2 undertake preparatory actions to implement the trial period for reviewing, improving and standardizing of the BWM circular for sampling and analysis; and

.3 provide a written report to BLG 18.

4.36 In this connection, the Sub-Committee noted that the Chairman would advise well in time before BLG 18 on the final arrangements of working and drafting groups, taking into account the submissions received on the respective subjects (see paragraph 15.4).

Extension of the target completion year

4.37 In view of the above, the Sub-Committee invited MEPC 65 to extend the target completion year for the output to 2015.

5 PRODUCTION OF A MANUAL ENTITLED "BALLAST WATER MANAGEMENT – HOW TO DO IT"

5.1 The Sub-Committee noted that no documents had been submitted to the current session under this agenda item.

5.2 The Sub-Committee invited Member Governments and international organizations to submit to BLG 18 their proposals on how best to proceed with the development of the manual on "Ballast Water Management – How to do it", recognizing its importance for the smooth and coordinated implementation of the Ballast Water Management Convention.

6 IMPROVED AND NEW TECHNOLOGIES APPROVED FOR BALLAST WATER MANAGEMENT SYSTEMS AND REDUCTION OF ATMOSPHERIC POLLUTION

6.1 The Sub-Committee noted that, in accordance with resolution A.1038(27), it is expected to consider any submission under this new agenda item, with a view to promoting and encouraging the use in shipping of the best available environmental technology not entailing excessive costs, in line with the goal of sustainable development.

Compatibility between ballast water management systems and ballast tank coatings

6.2 The Sub-Committee recalled that the observers from IPPIC and NACE International had both submitted information documents to MEPC 64 regarding the compatibility between ballast water management systems and tank coatings. The Sub-Committee further recalled that MEPC 64 had invited the two observers to harmonize their recommendations and to provide a joint submission to BLG 17 with a view to providing additional clarification on the application of Guidelines (G8) with respect to corrosion, including aspects related to compatibility between ballast water management systems and ballast tank coatings.

6.3 In considering document BLG 17/6 (IPPIC and NACE International), some delegations expressed their support for the proposed recommendations on corrosivity of ballast tank coatings, ballast piping systems and anodes, while other delegations were of the view that a thorough technical review is needed before forwarding the recommendations to the GESAMP-BWWG for consideration. In this connection, some delegations also expressed concerns over a reference made to a NACE standard in the co-sponsor's recommendations.

6.4 The Chairman of the GESAMP-Ballast Water Working Group expressed his concern regarding some technical details of the recommendations. Nevertheless, he proposed that the co-sponsors' recommendations could be reviewed at the fifth GESAMP-BWWG Stocktaking Workshop scheduled for September 2013, for possible inclusion in the future revision of the Methodology for information gathering and conduct of work of the GESAMP-BWWG (BWM.2/Circ.13/Rev.1). With a view to facilitating the discussion on the matter, the Chairman of the GESAMP-Ballast Water Working Group also indicated his intention to invite the co-sponsors of document BLG 17/6 to attend the above-mentioned workshop.

6.5 Consequently, the Sub-Committee agreed to refer the co-sponsors' recommendations on corrosivity of ballast tank coatings, ballast piping systems and anodes,

set out in the annex to document BLG 17/6, to the GESAMP-Ballast Water Working Group for consideration and action as appropriate.

Equivalent technologies for reduction of sulphur oxides

6.6 The Sub-Committee noted the information contained in document BLG 17/INF.8 (IMarEST) on the consideration of equivalent technologies for reduction of sulphur oxides.

7 DEVELOPMENT OF INTERNATIONAL MEASURES FOR MINIMIZING THE TRANSFER OF INVASIVE AQUATIC SPECIES THROUGH BIOFOULING OF SHIPS

7.1 The Sub-Committee recalled that MEPC 62 had adopted, by resolution MEPC.207(62), the *2011 Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species*. The Sub-Committee further recalled that BLG 16 had agreed to continue the development of a guidance document for the evaluation of the Biofouling Guidelines implementation process, based on the existing work undertaken under this output (BLG 16/5/1).

Guidance and performance measures for evaluating the Guidelines for control and management of ships' biofouling to minimize the transfer of invasive aquatic species

7.2 Having considered documents BLG 17/7 and BLG 17/INF.9 (Australia, the Netherlands and New Zealand) containing draft guidance and performance measures for evaluating the *Guidelines for control and management of ships' biofouling to minimize the transfer of invasive aquatic species*, the Sub-Committee agreed to add the following term of reference to the Ballast Water and Biofouling Working Group established during the consideration of agenda item 4 (see also paragraph 4.[…]):

.1 finalize the guidance and performance measures for evaluating the effectiveness of the *Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species*, using documents BLG 17/7 and BLG 17/INF.9 as a basis.

Report of the Working Group

7.3 Having considered the part of the report of the Working Group (BLG 17/WP.4) related to this agenda item, the Sub-Committee took action with respect to the biofouling issues as outlined below.

7.4 The Sub-Committee agreed to the draft MEPC circular on *Guidance for evaluating the 2011 Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species,* set out in annex 10, for approval by MEPC 65, and encouraged Member Governments and interested organizations to submit to the BLG Sub-Committee information on the application of the 2011 Biofouling Guidelines.

7.5 The Sub-Committee requested the Secretariat to explore the possibility of developing an online version of the questionnaire, as set out in section 4 of the Guidance, in order to collate information through a GISIS module.

Completion of the work on the output

7.6 The Sub-Committee invited MEPC 65 to note that the work on this planned output had been completed.

8 DEVELOPMENT OF AN INTERNATIONAL CODE OF SAFETY FOR SHIPS USING GASES OR OTHER LOW-FLASHPOINT FUELS

General

8.1 The Sub-Committee recalled that BLG 16, having considered the first part of the IGF Working Group's report (BLG 16/WP.5), had forwarded the draft International Code for Ships using Gas as Fuel (IGF Code) to the FP, SLF, DE and STW Sub-Committees for comment and instructed the group to submit part 2 of its report to this session.

8.2 The Sub-Committee also recalled that BLG 16 had re-established the IGF Correspondence Group to further develop the draft IGF Code, based on the decisions contained in document BLG 16/WP.5 and part 2 of the working group's report, to be submitted to this session, and to consider the issue of application of the Code, taking into account document BLG 16/6/4.

Report (part 2) of the working group established at BLG 16

8.3 The Sub-Committee considered part 2 of the report of the IGF Working Group established at BLG 16 (BLG 17/8) and, having approved it in general, noted that the group's report had been further considered in detail by the correspondence group established at BLG 16 (see paragraph 8.4).

Report of the correspondence group and related submissions

8.4 The Sub-Committee considered the report of the correspondence group (BLG 17/8/1), which contained an updated draft of the IGF Code with a number of square brackets, and noted that the group had focused on the requirements for ships using natural gas as fuel and identified issues to be further discussed (e.g. compressed natural gas in general, portable tanks, requirements for arrangement of entrances and other openings, definition of hazardous areas, monitoring and safety functions) at this session. The correspondence group also reported on the application of the IGF Code, attaching draft SOLAS amendments and proposing a two-step approach (step 1: finalizing and implementing the part related to natural gas; and step 2: finalizing the requirements for other low-flashpoint fuels as soon as possible but at a later stage).

8.5 The Sub-Committee approved the report in general and, before considering the actions requested by the correspondence group, decided to first consider the documents commenting on the correspondence group's report, as outlined in paragraphs 8.6 to 8.18.

Proposed modifications to the draft IGF Code

8.6 The Sub-Committee considered document BLG 17/8/2 (Japan), proposing modifications to the draft IGF Code and stating that LNG-fuelled ships should have the same safety level as conventional oil-fuelled ships, and that the flexible design and building of LNG-fuelled ships should be allowed provided the ship meets the goal and functional requirements of the Code. Having noted general support for the above proposals, the Sub-Committee referred the document to the working group for further consideration.

Methyl/ethyl alcohol

8.7 The Sub-Committee considered documents BLG 17/8/3 and BLG 17/INF.10 (Sweden) providing additional information on methyl/ethyl as marine fuel and proposing that the work on methyl/ethyl alcohol fuel be finalized together with LNG in the IGF Code, since MARPOL Annex VI limits the sulphur content of marine fuel in designated SECAs – which will come into force on 1 January 2015 – and that there are many similarities between the requirements for LNG and Methyl/Ethyl Alcohol.

8.8 In considering the matter, the Sub-Committee noted the explanation by the coordinator of the correspondence group that the draft Code has alternative design provisions for approving fuels other than LNG, but it only has detailed technical provisions for LNG. Having noted that many delegations preferred to finalize the requirements of LNG as a first step, taking into account that ships using LNG as fuel are already operating, the Sub-Committee referred the above-mentioned documents to the working group with the understanding that priority be given to the technical provisions for LNG so that the Code can be finalized in 2014.

European LNG Infrastructure project

8.9 The Sub-Committee considered documents BLG 17/8/4 and BLG 17/INF.13 (Denmark) informing about the recommendations from the North European LNG Infrastructure Project and proposing to include the relevant parts of those recommendations in the draft IGF Code, and decided to refer those documents to the working group for detailed consideration.

Use of the heating system

8.10 The Sub-Committee considered document BLG 17/8/5 (France) concerning conditions for determining steel grades near liquefied gas tanks used for propulsion and proposing to reinstate heating systems in the draft IGF Code on condition that they offer a satisfactory level of safety and redundancy, and decided to refer that document to the working group for further consideration.

Low-flashpoint fuels

8.11 The Sub-Committee, having considered document BLG 17/8/6 (CESA) stressing that eight different low-flashpoint fuels listed in the definitions of the draft Code should be considered as part of step 2 (see paragraph 8.4) and proposing to add low-flashpoint diesel fuels in the definition, since such diesel fuels are of significance to broaden the low-sulphur fuel options required in SECAs, and attaching a new part A-8 to the Code, decided to refer the above-mentioned document to the working group for further consideration.

Location of fuel tanks

8.12 The Sub-Committee considered document BLG 17/8/7 (CESA) proposing to harmonize the damage assumptions and subdivision in paragraph 5.3.4.1 of the draft IGF Code with SOLAS regulation II-1/8, thus providing both protection and flexibility regarding the location criteria for gas fuel tanks under the draft IGF Code.

8.13 In this connection, the Sub-Committee also considered document BLG 17/INF.14 (Germany) presenting information on a possible procedure for the lateral arrangement of gas fuel tanks in the context of collision safety based on methodology of IMO alternative design

and a risk model and indicating the fact that, in case of side collision, a small fuel tank is subject to a smaller risk than a large fuel tank.

8.14 Having noted some concerns that the proposed probabilistic approach on location of fuel tanks may reduce the safety level required in the current draft Code and recalling that SLF 55 would consider the matter, the Sub-Committee did not refer the above-mentioned documents to the working group and requested the Secretariat to forward documents BLG 17/8/7 and BLG 17/INF.14 to SLF 55 for comment.

HAZID Report

8.15 The Sub-Committee noted document BLG 17/INF.11 (Germany and Norway), containing the results of a hazard identification (HAZID) for ships using LNG as fuel, titled "Safety assessment of generic LNG-fuelled vessel". In this regard, the Sub-Committee noted the statement by the observer from SIGTTO that it does not agree with all the conclusions in the aforementioned document even though it had participated in the HAZID.

Comments from FP 56

8.16 The Sub-Committee considered document BLG 17/2/3 (Secretariat) referring to the report of FP 56 (FP 56/WP.1) and informing that FP 56 had endorsed the action taken by its working group and had forwarded its outcome, in particular paragraph 17 and annex 2 of document FP 56/WP.6, to BLG 17 for further consideration.

8.17 The Sub-Committee referred the outcome of FP 56 (FP 56/WP.1, paragraphs 20.13 to 20.19; and paragraphs 16 to 19 and annex 2 of document FP 56/WP.6) to the working group for further consideration.

ESD protected machinery spaces

8.18 The Sub-Committee, having taken decisions on the above-mentioned issues, considered the remaining action requested by the correspondence group related to the application of ESD protected machinery spaces, as set out in paragraph 16 of document BLG 17/8/1 and, having noted the explanation by the coordinator of the correspondence group that the group had asked whether additional limitations for the application of ESD protected machinery spaces should be introduced, agreed not to introduce such additional limitations.

Establishment of the working group

8.19 The Sub-Committee established the Working Group on the IGF Code and instructed it, based on part 2 of the report of the working group established at BLG 16 (BLG 17/8) and the correspondence group's report (BLG 17/8/1), taking into account documents BLG 17/8/2 to BLG 17/8/6 (regarding BLG 17/8/4, related to the IGF Code only), BLG 17/INF.10, BLG 17/INF.11 and BLG 17/INF.13, as well as the outcome of FP 56 (FP 56/WP.6 and FP 56/23) and the comments and decisions made in plenary, to:

.1 further develop the draft International Code of safety for ships using gases or other low-flashpoint fuels (IGF Code), focusing on LNG; and consider how to accommodate other fuels in the draft Code and/or SOLAS;

.2 further consider the application of the IGF Code and prepare draft SOLAS amendments to make the Code mandatory;

.3 consider whether there is a need to re-establish the correspondence group and, if so, prepare the terms of reference for consideration by the Sub-Committee; and

.4 submit a written report (part 1) by Thursday, 7 February 2013, for the tasks set out in subparagraphs .1 and .3 above and continue working through the week on the remaining task, and submit part 2 of the report to BLG 18 as soon as possible after this session so that it can be taken into account by the correspondence group (see paragraph 8.33).

Report of the working group

8.20 Having received the report (part 1) of the working group (BLG 17/WP.5), the Sub-Committee approved it in general and took action as indicated in paragraphs 8.21 to 8.29.

Outcome of FP

8.21 The Sub-Committee noted the action taken by the group in incorporating the proposed amendments by FP 56 in chapter 11 of the draft Code.

Compressed natural gas

8.22 The Sub-Committee endorsed the group's decision that compressed natural gas (CNG) should be part of section A-1 apart from the requirements for the storage tank.

Portable tanks

8.23 The Sub-Committee endorsed the views of the group that portable tanks must have the same level of safety as other tanks and comply with all the requirements of the Code and, regarding the concern that portable tanks would not be sufficiently considered in the stability calculations, noted that the majority of the group was of the opinion that this is covered by the Intact Stability Code.

Requirements for arrangements of entrances and other openings

8.24 The Sub-Committee noted the progress made by the group on section 5.11 of the draft IGF Code on "Requirements for arrangements of entrances and other openings"; section 5.12 on "Requirements for air locks"; and section 5.13 on "Air locks ventilation monitoring".

Definition of hazardous areas

8.25 The Sub-Committee endorsed the action taken by the group on the revision of the definition for hazardous areas and a list of relevant examples and further noted the divided views of the group in that regard. Following discussion, the Sub-Committee decided that equipment, including generators, which should be allowed in ESD protected machinery spaces be considered further at the next session. The delegation of France reserved its position on paragraph 12.5.1 of the draft Code, stating that, although the list of hazardous areas was given as an example in the draft Code, it would be used regularly as a reference.

Monitoring and safety functions

8.26 The Sub-Committee noted the discussions of the group on monitoring and safety functions and decided that the matter of inclusion of a requirement for fixed gas detection in all ventilation inlets be considered further at the next session .

How to accommodate fuels other than natural gas within the IGF Code

8.27 The Sub-Committee noted the group's modifications to accommodate fuels other than natural gas within the IGF Code and endorsed the group's view that an alternative design must meet the functional requirements of the IGF Code. Subsequently, the Sub-Committee agreed, in principle, to the proposed draft SOLAS amendments (BLG 17/WP.5, annex) in order to extend the application of the IGF Code to other fuels.

SOLAS amendments on the application of the IGF Code

8.28 The Sub-Committee agreed, in principle, to the draft amendments to SOLAS developed by the group (BLG 17/WP.5, annex) in order to make the IGF Code mandatory and endorsed the group's views that all the SOLAS amendments should be part of a package and should be submitted to MSC for approval and subsequent adoption, together with the draft IGF Code.

8.29 The Sub-Committee noted the group's views that, regarding an inclusion of requirements for a certificate of fitness within the SOLAS amendments, any requirement for certification could be addressed within the IGF Code.

Re-establishment of the correspondence group

8.30 Having noted the progress made by the group, the Sub-Committee re-established the Correspondence Group on the IGF Code, under the coordination of Norway*, and instructed it, based on the comments and decisions made at BLG 17 and taking into account documents BLG 17/WP.5 and BLG 17/WP.5/Add.1, to:

.1 finalize the general part of the draft IGF Code as well as chapters and sections in part A-1 that are not identified as finalized in this report or in part 2 of the group's report. Only issues identified as unsolved through notes and square brackets should be considered;

.2 finalize the related draft SOLAS amendments;

.3 consider further development of the proposals for low-flashpoint oil and Methyl/Ethyl Alcohol; and

.4 submit a report to BLG 18.

---

* **Coordinator:**
Ms. T. Stemre
Senior Adviser
Legislation and International Relations
Norwegian Maritime Directorate
P.O.Box 2222
N-5509 Haugesund
Norway
Tel: +47 52 74 51 51
Fax: +47 52 74 50 01
E-mail: tbs@sjofartsdir.no

8.31 Noting that decision, the delegation of Germany reserved its position, stating that it does not see substantial items which may hinder the finalization of the part of the draft Code related to LNG as ship fuel, since the remaining items are identified and can be addressed by submissions; therefore, it does not see a need for a correspondence group to be established to deal with part A-1 of the IGF Code.

Extension of the target completion year

8.32 In view of the above, the Sub-Committee invited MSC 92 to extend the target completion year for the output to 2014.

Second part of the working group's report

8.33 Having received part 2 of the working group's report immediately after the session, the Secretariat issued it as an addendum to part 1 of the working group's report (BLG 17/WP.5/Add.1), taking into account the proposed Sub-Committee restructuring (see paragraph 15.6) to facilitate the work of the correspondence group (see paragraph 8.30).

9 DEVELOPMENT OF A REVISED IGC CODE

General

9.1 The Sub-Committee recalled that BLG 16, having considered the report of the IGC Drafting Group (BLG 16/WP.7), had endorsed the list of sections of the draft IGC Code to be forwarded to the STW, FP, SLF and DE Sub-Committees for their input, which was set out in annex 2 to document BLG 16/7.

9.2 The Sub-Committee also recalled that BLG 16 had requested the Secretariat to prepare a consolidated text of the draft revised Code after the meeting for consideration by other bodies and BLG 17.

Draft revised IGC Code and comments from Sub-Committees

9.3 The Sub-Committee considered document BLG 17/9 (Secretariat), attaching the draft revised IGC Code (International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk), together with documents:

.1 BLG 17/2 (Secretariat) informing that STW 43 had agreed that the STCW Convention and Code provide adequate training relating to the use of protective equipment and emergency procedures for personnel serving on liquefied gas carriers and had also agreed that there was no need for additional training requirements; and

.2 BLG 17/2/3 (Secretariat) informing that FP 56 had prepared proposed modifications to the draft revised IGC Code (FP 56/WP.1, paragraphs 20.2 to 20.5; and FP 56/WP.6, paragraphs 7 to 10 and annex 1),

and instructed the drafting group to include the proposed modifications prepared by FP 56 in the draft IGC Code.

9.4 In this regard, the Sub-Committee noted the concern raised by the observer from IACS that the provisions of section 14.4 might not be in line with the SOLAS and FSS requirements intended for personal protection on board passenger and general cargo ships, whereas the intent of section 14.4 was to ensure personal protection against hazardous

products, as in the case of gas carriers. For this reason, the Sub-Committee agreed that it was necessary to harmonize the contents of section 14.4 with the similar provisions of the IBC Code. The Sub-Committee also agreed that the requirements of Dimethyl Ether in chapter 19 of the draft Code should be revised to align it with resolution MSC.220(82).

Editorial modifications

9.5 The Sub-Committee considered document BLG 17/9/1 (Japan and SIGTTO) proposing editorial modifications to the draft revised IGC Code, and agreed to the proposed modifications for inclusion in the draft Code.

Emergency Shutdown (ESD) systems

9.6 Having considered document BLG 17/9/2 (Japan, Marshall Islands, United Kingdom and SIGTTO) proposing modifications to the draft revised IGC Code regarding Emergency Shutdown (ESD) systems, the Sub-Committee agreed to the proposed modifications for inclusion in the draft Code.

Application of the Code

9.7 The Sub-Committee considered document BLG 17/9/2 (Japan and SIGTTO), proposing to delete the words "to all ships" in paragraph 18.10.1 of the draft Code regarding the requirement for a cargo emergency shutdown system, since this requirement relates to the structure of a ship and the requirements should apply only to new ships, and agreed to delete the words "all ships" from the Code and to the above-mentioned proposal, for inclusion in the draft Code.

Limit state methodologies

9.8 The Sub-Committee considered document BLG 17/9/4 (Germany, Japan, Norway and SIGTTO), which recalled that BLG 16 had agreed to develop a draft MSC resolution on Use of Limit State Methodologies in the Design of Containment Systems of Novel Configuration as a mandatory instrument, and noted that, while the group of experts from Germany, Japan, Norway and ship classification societies had tried to prepare a draft MSC resolution based on the text in paragraph 4.26 in annex 1 to document BLG 16/7, taking into account document BLG 16/7/1, additional discussion was still needed on some points.

9.9 Recognizing the need to develop limit state methodologies, the Sub-Committee, taking into account that the revised IGC Code should be finalized at this session, agreed to keep the current text of the revised Code relating to that matter and invited Member States and international organizations to submit relevant documents to MSC 92, when the Committee will be expected to approve the revised Code with a view to subsequent adoption at MSC 93.

References to MARPOL

9.10 The Sub-Committee, having considered document BLG 17/9/5 (Japan and SIGTTO) suggesting that the expression "in accordance with MARPOL" should be avoided on the grounds that the IGC Code is mandated by the SOLAS Convention only and proposing to delete such references to MARPOL, agreed that the revised Code should continue to be made mandatory under SOLAS only and that, therefore, all references to MARPOL should be deleted accordingly.

Status of the revised IGC Code

9.11 The Sub-Committee considered document BLG 17/9/6 (Japan and SIGTTO) inviting the Sub-Committee to clarify whether the revised IGC Code would be a new code or amendments to the existing code and, subject to the decision on the matter, proposing modifications to the draft revised Code as well as the draft amendments to SOLAS.

9.12 After a brief discussion, the Sub-Committee agreed to the option to have the revised Code as an amendment to the existing Code and, subsequently, agreed to the proposed text in paragraph 5 of document BLG 17/9/6 to clarify the application of the Code.

Gas detection systems and gas inerting

9.13 The Sub-Committee considered document BLG 17/9/7 (France) proposing modifications to paragraph 13.6.16 of the draft Code on gas detection systems and gas inerting to clarify its intention, and agreed to the proposed modifications for inclusion in the draft Code.

Upper filling limit of tanks

9.14 The Sub-Committee considered document BLG 17/9/8 (France) proposing an amendment to paragraph 15.4.1 of the draft Code to increase the upper filling limit of tanks, but did not agree to the proposal, taking into account the safety concerns expressed regarding any increase to the upper filling limit of tanks.

Establishment of a drafting group

9.15 Having considered the above matters, the Sub-Committee established the Drafting Group on Revision of the IGC Code and instructed it, based on the draft revised IGC Code (BLG 17/9, annex) and taking into account documents BLG 17/9/1 to BLG 17/9/7 and the comments and decisions made in plenary, to finalize the text of the draft revised IGC Code.

Report of the drafting group

9.16 Having received the report of the drafting group (BLG 17/WP.6), the Sub-Committee approved it in general and, in particular:

.1 agreed to the application provisions set out in modified paragraphs 1.1.2 and 1.1.3 to clearly reflect the applicability of the revised Code to new ships only;

.2 noted that all references to the MARPOL Convention were deleted as instructed (see paragraph 9.10);

.3 agreed to the replacement of references to resolutions A.739(18) and A.789(19) by reference to SOLAS regulation XI-1/1, in view of the expected adoption of the IMO's *Code for recognized organizations* (RO Code);

.4 noted the replacement of section 14.4 on "Personal protection requirements for individual products" by text similar to that contained in the IBC Code; and

.5 agreed to the introduction of the word "gauge" after the words "pressure values", whenever it appears, to ensure consistency with the existing

IGC Code, on the understanding that other multiple-pressure values appearing in the Code may refer to gauge pressure as well.

The Sub-Committee also agreed to replace the word "Note 2" by "✓" in the row of "Fire detection on deck or in compressor house" and the column of "Fuel gas compressors" (Table 18.1 – ESD functional arrangements).

9.17 The Sub-Committee endorsed the recommendation of the group to include the text of paragraph 4.27.3 on "Limit state design" in square brackets for further consideration by MSC 92, pending the expected submission of relevant proposals on the draft Limit State Design Guidance to the Committee's session. The Committee was invited to note this decision when considering the draft revised IGC Code for approval.

9.18 The Sub-Committee agreed with the opinion of the group that no action was needed on developing further guidance (in addition to that contained in BLG.1/Circ.32) for existing gas carriers transporting mixed C4 cargoes, given the existing practice in place providing for assessment of the fitness of every particular ship to carry certain cargo types and the prerequisite in the form of permission by the Administration to carry these cargoes (relevant addendum to the International Certificate of Fitness).

9.19 The Sub-Committee requested the Secretariat to inform the FSI Sub-Committee that consequential amendments may be necessary to resolutions A.1052(27), A.1053(27) and A.1054(27), which refer to the current IGC Code (in particular, section 1.5, which is to be renumbered as section 1.4 in the revised IGC Code).

9.20 Having considered the above matters, the Sub-Committee agreed to the draft amendments to the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code), as set out in annex 11, for submission to MSC 92 for approval with a view to subsequent adoption. In this regard, the Sub-Committee authorized the Secretariat to make any corresponding editorial corrections to the draft amendments to the IGC Code.

Completion of work on this output

9.21 The Maritime Safety Committee was invited to note that the work on this output has been completed.

10 CONSIDERATION OF THE IMPACT ON THE ARCTIC OF EMISSIONS OF BLACK CARBON FROM INTERNATIONAL SHIPPING

10.1 The Sub-Committee recalled that MEPC 62 had agreed (MEPC 62/24, paragraph 4.20) to a work plan for the Sub-Committee to consider the impact on the Arctic of emissions of Black Carbon from international shipping, as follows:

.1 develop a definition for Black Carbon emissions from international shipping;

.2 consider measurement methods for Black Carbon and identify the most appropriate method for measuring Black Carbon emissions from international shipping;

.3 investigate appropriate control measures to reduce the impact of Black Carbon emissions from international shipping; and

.4 submit a final report to MEPC 65, where the Committee should agree on the appropriate action(s).

10.2 The Sub-Committee also recalled that BLG 16, having considered a number of draft definitions for Black Carbon under agenda item 15, "Any other business", had agreed to keep the definitions in abeyance and had established a correspondence group to progress the work intersessionally.

10.3 The Sub-Committee further recalled that BLG 16 had requested the MEPC to establish a separate agenda item to enable consideration of the impact on the Arctic of emissions of Black Carbon from international shipping at this session, so as to clearly identify the subject and to enable Member Governments and international organizations to prepare appropriate input to the Sub-Committee (BLG 16/16, paragraph 15.7).

10.4 The Sub-Committee noted that MEPC 63 had agreed to establish a separate agenda item on this matter at the current session (MEPC 63/23, paragraph 19.4).

Discussion

10.5 The Sub-Committee had for its consideration the following documents submitted under this agenda item:

.1 BLG 17/10, BLG 17/10/Corr.1 and BLG 17/INF.4 (United States) providing the report of the correspondence group on the progress made on its consideration of a definition for Black Carbon emissions from international shipping, measurement methods for Black Carbon and appropriate control measures to reduce the impact of Black Carbon emissions from international shipping;

.2 BLG 17/INF.7 (Secretariat) providing information on an investigation, sponsored by Transport Canada, of appropriate control measures (abatement technologies) to reduce Black Carbon emissions from international shipping;

.3 BLG 17/10/2 (CSC) emphasizing that a study sponsored by Transport Canada and set out in the annex to document BLG 17/INF.7 presents complete and up-to-date information on the performance of potential Black Carbon abatement technologies/measures. The observer from the Clean Shipping Coalition believed that, at this stage, the study provided sufficient information to inform a report to the MEPC;

.4 BLG 17/10/3 (CSC) providing recent additional data on Arctic melting and the opening and use of the Arctic sea routes in 2012. The information indicated that the minimum Arctic ice extent had dropped below four million square kilometers and that 46 vessels had navigated the Northern Sea Route in 2012;

.5 BLG 17/10/1 (EUROMOT) proposing to measure Black Carbon emissions via the filter smoke number method, which is considered as an optical measurement technique to be technically well proven and is standardized in ISO-10054. The observer from EUROMOT considered that the method is robust, technically relatively simple and can easily be applied to test-bed measurements, as well as on board ships; and

.6 BLG 17/INF.2 (IMarEST) providing a critical review of marine Black Carbon (BC) inventories. The observer from IMarEST estimated that shipping had been responsible for about 184,000 tonnes of BC in 2007 and about 2,800 tonnes in the Arctic in 2004, using higher-resolution emission factors drawn from real world testing on ships and activity data taken from both the second IMO GHG study and the peer-reviewed literature.

10.6 In the ensuing discussion some delegations expressed the view that a pragmatic and result-oriented approach was required to undertake the work plan. Some delegations called for greater certainty in the conclusions drawn from the data and information presented in studies, stating that there is a need for a definition to be developed prior to consideration of technical control measures, and that additional work was required to evaluate the impact on the Arctic of emissions of Black Carbon from international shipping. Several delegations raised concerns over the removal of the caveats related to estimates of Black Carbon emissions in the appended technical reports but then not replicated in the cover sheets of the documents.

10.7 The delegation of Japan, supported by several delegations, expressed the view that the correspondence group, if re-established, should focus on the impact on the Arctic of Black Carbon emissions, including the development of an appropriate definition, and that the scope of the work should not include other aspects of global Black Carbon shipping emissions such as impact on human health. Once an appropriate definition is developed the work plan should include quantification of the volume of Black Carbon emissions from ships which may have an impact on the Arctic, an evaluation of that impact, consideration of the options for reducing the impact and investigation of possible appropriate control measures.

10.8 Other delegations expressed the view that when considering a definition for Black Carbon for international shipping it was important for the Organization to consider work by other international organizations such as the United Nations Economic Commission for Europe (UNECE). One delegation expressed the view that without an agreed global definition it would be difficult to compare the impact on the Arctic of Black Carbon emissions from international shipping with the impact caused by Black Carbon emissions from other sources.

10.9 In welcoming the report of the correspondence group several delegations expressed the view that there would be a need for a working group at the next session of the Sub-Committee to enable the work plan to be progressed in a more appropriate manner.

Definition for Black Carbon emissions from international shipping

10.10 The Sub-Committee recalled that BLG 16 had considered definitions of Black Carbon as proposed in documents BLG 16/15/1 (Norway) and BLG 16/15/4 (IMarEST), and that several other delegations had suggested alternative definitions (BLG 16/16, paragraphs 15.9 to 15.13).

10.11 The Sub-Committee noted that the correspondence group had considered the definitions further and most participants had expressed the view that the following policy definition is imperfect, but largely acceptable:

> "*Black Carbon from international shipping is formed by incomplete combustion of hydrocarbon fuels, and is the most effective component of particulate matter (PM), by mass, at absorbing solar energy.*"

10.12 The Sub-Committee also noted that, in view of the large differences of opinion expressed during its discussion, the Correspondence Group had concluded that much work would still be needed to develop the technical definition of Black Carbon emissions from international shipping.

10.13 The Sub-Committee noted that the correspondence group had considered the development of two definitions for Black Carbon, namely a policy definition and a technical definition, and that the development of a technical definition should be the focus for a technical body. Some delegations expressed the view that only one definition should be developed to effect certainty in Black Carbon emission reduction. Other delegations considered both definitions were needed, as the purpose of a policy definition would be to provide a general understanding for regulatory purposes, the purpose of a technical definition being the identification of appropriate measurement methods.

10.14 Some delegations expressed the view that the draft policy definition set out in the report of the correspondence group should make reference to "organic fuels" as opposed to "hydrocarbon fuels" to enable a wider range of fuel oils to be considered. One delegation expressed the view that the term "by mass" should be deleted as this indicated a predisposition to a particular measurement approach. Other delegations did not agree to this deletion. One delegation expressed the view that reference should be made in the definition to "light absorption" being the main defining factor for Black Carbon.

10.15 Following the discussion, the Sub-Committee agreed that more work was needed before finalizing an appropriate definition and that the focus of that work should be on the development of a technical definition.

Measurement methods for Black Carbon

10.16 The Sub-Committee noted that the Correspondence Group had considered measurement methods for Black Carbon and that most participants had expressed a view in favour of an approach which focuses on the light-absorbing and climate-affecting properties of Black Carbon, especially those that most strongly affect the Arctic region. The Sub-Committee further noted that some participants had supported a specific measurement method, such as the Filter Smoke Number (FSN) method (ISO 8178-3 and ISO 10054), while other participants had supported the use of a photo-acoustic method, either alone or in parallel with a mass measurement.

10.17 The Sub-Committee recalled that, in introducing document BLG 17/10/1, the observer from EUROMOT had indicated its support for the use of the FSN measurement method. Some delegations had expressed support for this method as it was considered to be simple and widely available, had good repeatability and avoided the need to measure light absorption, which could be interpreted differently.

10.18 Some delegations expressed the view that it was premature to identify a measurement method, that the FSN method may underestimate Black Carbon emissions, and that until an appropriate definition is developed other measurement methods needed to be considered further.

10.19 Following the discussion, the Sub-Committee agreed that a measurement method for Black Carbon should be further considered at its next session.

Possible control measures

10.20 The Sub-Committee noted that the correspondence group had considered possible control measures to reduce the impact of Black Carbon emissions from international shipping, and had identified many potential measures, such as alternate power sources, emulsified fuel, excess air, in-engine measures, and particulate filters, as set out in table 1 in document BLG 17/10.

10.21 The Sub-Committee also noted that the correspondence group had recognized that, in the absence of a definition and measurement method for Black Carbon from ships, quantitative evaluations of technologies with the potential to reduce Black Carbon emissions had not yet been made available.

10.22 The Sub-Committee further noted that the annex to document BLG 17/INF.7 (Secretariat) provided an investigation of control measures (abatement technologies) and included several appendices containing detailed quantitative evaluations of technologies.

10.23 Some delegations expressed the view that it would be premature to consider appropriate control measures before an appropriate definition for Black Carbon had been developed, and that some of the control measures identified were already in use, including switching to low-sulphur fuel oils.

10.24 The Sub-Committee noted that there had been a collation of possible control measures for Black Carbon, that consideration of control measures was linked to the further consideration of the definition and measurement method, and that there was thus a need for an intersessional correspondence group to be established to enable further consideration at its next session.

Conclusion of the discussion

10.25 The Sub-Committee agreed to instruct the drafting group established under agenda item 11 to prepare draft terms of reference for a correspondence group to consider the impact on the Arctic of emissions of Black Carbon from international shipping.

Report of the Drafting Group

10.26 During consideration of the part of the drafting group report (BLG 17/WP.7) related to this output, the delegation of Marshall Islands, supported by the delegation of Cook Islands, expressed the view that the output should address the impact on the Arctic of black carbon emission from "shipping in the Arctic" and not "international shipping", as currently appeared in the agenda of the Sub-Committee.

10.27 The observer from the Clean Shipping Coalition expressed the view that MEPC 63 had reconfirmed that the title of the output was factual and correct and had agreed not to modify it (MEPC 63/23, paragraph 19.5).

10.28 The Chairman, in inviting the Sub-Committee to note the above comments, stated that in accordance with the Committees' Guidelines, the Sub-Committee should not modify the scope of the existing outputs unless directed or authorized to do so by the MEPC.

Establishment of a Correspondence Group

10.29 The Sub-Committee established the Correspondence Group on Consideration of the Impact on the Arctic of Emissions of Black Carbon from International Shipping and Review of

Relevant Non-mandatory Instruments as a Consequence of the Amended MARPOL Annex VI and NO_x Technical Code, under the coordination of the United States* and, for this output, instructed it to (see paragraph 11.54):

.1 develop a technical definition for Black Carbon emissions from international shipping as the basis for any future measurement methods;

.2 further consider measurement methods for Black Carbon and identify the most appropriate method for measuring Black Carbon emissions from international shipping, taking into account the development of a technical definition under .1 above;

.3 further identify, collate and investigate possible control measures to reduce the impact on the Arctic of Black Carbon emissions from international shipping; and

.4 submit a report to BLG 18.

Extension of the target completion year

10.30 In view of the above, the Sub-Committee invited MEPC 65 to extend the target completion year for the output to 2014.

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

11.1 The Sub-Committee recalled that BLG 16 had established a correspondence group to further develop the draft guidelines and other necessary guidelines under MARPOL Annex VI and the NO_x Technical Code 2008 (BLG 16/16, paragraph 8.59).

11.2 The Sub-Committee also recalled that BLG 16 had developed a new priority list of necessary guidelines to support the implementation and enforcement of MARPOL Annex VI and the 2008 NO_x Technical Code 2008 (BLG 16/16, paragraph 8.58).

Planning of work

11.3 The Sub-Committee noted that eight documents had been submitted under this item and agreed to plan its work as follows:

.1 consideration of the report of the correspondence group including three sets of draft guidelines set out in annexes 1, 2 and 3 to document BLG 17/11;

---

* **Coordinator**:
Mr. Wayne Lundy
Senior Engineer
United States Coast Guard
Systems and Engineering Division
2100 Second Street SW
Washington, DC 20593
United States of America
Tel: +001 202 372 1379
E-mail: Wayne.M.Lundy@uscg.mil

.2 consideration of guidelines for gas fuels, liquefied natural gas or other gases which may be used as ship fuel, as well as NO_x Technical Code calculation factors and specific issues relating to the testing of engines so fuelled;

.3 consideration of washwater discharge criteria for exhaust gas cleaning systems;

.4 consideration of the use of continuous NO_x monitoring to demonstrate compliance with the Tier III NO_x emission limit (regulation 13.5.1 of MARPOL Annex VI);

.5 consideration of the need for a definition of an "identical" marine diesel engine under regulation 13.1.1.2 of MARPOL Annex VI; and

. 6 consideration of the guidelines called for under paragraph 2.2.5.6 of the revised NO_x Technical Code 2008 (NO_x-reducing devices).

Report of the correspondence group

11.4 The Sub-Committee recalled that BLG 16 had instructed the correspondence group to develop three sets of guidelines listed in category A (High priority) in the new priority list, namely:

.1 guidelines for replacement engines not required to meet the Tier III limit, as required under regulation 13.2.2;

.2 guidelines on the information to be submitted as part of the required notification by an Administration to the Organization in respect of approval of an approved method as required under regulation 13.7.1 of MARPOL Annex VI; and

.3 other relevant guidelines pertaining to equivalents set forth in regulation 4 of MARPOL Annex VI and not covered by other guidelines.

11.5 The Sub-Committee considered the report of the correspondence group (documents BLG 17/11, BLG 17/11/Corr.1 and BLG 17/INF.5) providing information on the progress made on the development of the above-mentioned Guidelines.

Guidelines for replacement engines not required to meet the Tier III limit, as required under regulation 13.2.2

11.6 The Sub-Committee noted that the correspondence group had identified a number of criteria that should be considered in the development of the draft guidelines, and that there were a number of square brackets in the draft text set out in annex 1 to document BLG 17/11.

11.7 The Sub-Committee considered the square brackets one by one and agreed to:

.1 replace the whole paragraph 1.2 with an alternative text;

.2 delete paragraph 1*bis*;

.3 delete the second sentence in paragraph 2.3;

.4 delete paragraph 4*bis*; and

.5 delete paragraph 1.3, 1.4 and 1.5 as set out on page 3.

11.8 Several delegations expressed the view that the guidelines should reflect that when evidence and documentation are provided by the shipowner to the Administration as to what prevents a Tier III compliant engine from being installed, reference should be made to all of the provisions in the guidelines to determine whether a non-identical replacement engine should not be required to meet the Tier III limit.

11.9 The Sub-Committee agreed that a drafting group should be instructed to review and finalize the draft Guidelines, using annex 1 to document BLG 17/11 as the basis, taking into account comments made in plenary.

Guidelines to outline the information to be submitted as part of the required notification from an Administration to the Organization in respect of the approval of an Approved Method as required under regulation 13.7.1 of MARPOL Annex VI

11.10 The Sub-Committee recalled that MEPC 62 had instructed the Sub-Committee to develop guidelines or a circular (whichever is deemed more appropriate) covering the information to be submitted as part of the required notification by an Administration to the Organization in respect of the approval of an approved method, as required under regulation 13.7.1 of MARPOL Annex VI (MEPC 62/24, paragraph 4.56.8).

11.11 The Sub-Committee also recalled that BLG 16 had agreed that guidelines should be developed by the correspondence group using document MEPC 62/7/8 (IACS) as a basis (BLG 16/16, paragraph 8.50).

11.12 The Sub-Committee noted that the correspondence group had inserted a flow chart in annex 2 to document BLG 17/11, illustrating the approved method process similar to appendix II to the NO_x Technical Code 2008.

11.13 The Sub-Committee, in recalling that regulation 13.7.1 requires that existing engines must comply with the Tier I NO_x emission limit, either by installation of the certified approved method (regulation 13.7.1.1), or by certification of the engine confirming that it operates within the limits set forth in NO_x Tier I, Tier II or Tier III (regulation 13.7.1.2), noted that the correspondence group had received an additional proposal to develop guidance on the second option inviting compliance by means of the provisions of regulation 13.7.1.2 of MARPOL Annex VI.

11.14 Some delegations expressed the view that the flow chart presented in annex 2 to document BLG 17/11 was not appropriate for the guidelines setting out the information that should be submitted to the Organization, and that some of the elements of that flow chart were not included in MARPOL Annex VI. One delegation considered that the flow chart presented the process but did not describe the information that needed to be communicated. Several delegations supported the removal of the texts in square brackets in paragraph 4 of the draft text.

11.15 While noting that the flow chart in general was useful for the Sub-Committee in considering this matter, the Sub-Committee agreed to delete the flow chart as it might cause confusion during the verification process of the approved method, and to remove the texts in square brackets in paragraph 4.

11.16 Following the discussion, the Sub-Committee noted that more work was needed to develop the draft guidelines covering the information to be submitted to the Organization by an Administration in respect of the approval of an approved method, and that it would be premature to send the draft text to the drafting group.

11.17 In this context, the Sub-Committee noted that should a correspondence group be re-established, this should be part of its terms of reference, and invited interested delegations to submit input to the correspondence group.

Other relevant guidelines pertaining to equivalents set forth in regulation 4 of MARPOL Annex VI and not covered by other guidelines

11.18 The Sub-Committee noted that the correspondence group had prepared text of draft guidelines on the assessment of equivalent methods as permitted by MARPOL Annex VI, regulation 4, by collating the views exchanged within the group as a starting point for consideration, as set out in annex 3 to document BLG 17/11.

11.19 The Sub-Committee had for its consideration the following two documents providing comments and suggestions for the development of the guidelines:

.1 BLG 17/11/3 (United States) proposing to include emissions averaging schemes in the draft guidelines. The delegation of the United States highlighted that a well-designed, regionally-limited emission-averaging programme should be able to meet the requirement of equivalent emission reductions while providing shipowners with compliance flexibility and reducing their compliance costs; and

.2 BLG 17/11/4 (CSC) commenting that the use of an alternative method of compliance with the sulphur requirements contained in MEPC.1/Circ.789 (sulphur emission-averaging schemes) carries the potential to seriously weaken the integrity of MARPOL Annex VI. The CSC observer proposed that an explicit moratorium should be placed on approval or adoption of any sulphur emission-trading, aggregate emissions ceilings or similar scheme for application in the North American ECA or elsewhere.

11.20 The Sub-Committee recalled that MEPC 57, having considered the outcome of BLG 12 concerning the review of the technical aspects of MARPOL Annex VI and the NO_x Technical Code, had decided that it could not recommend introducing a market-based instrument in the revised MARPOL Annex VI (MEPC 57/21, paragraph 4.26.9).

11.21 Some delegations expressed the view that an emission-averaging scheme, as proposed by the United States in document BLG 17/11/3, which focuses on a fleet of ships operating in a specified region, is different from emission trading as deliberated by BLG 12. Other delegations expressed the view that emission trading, even within a specified group of ships should be considered a market based mechanism or instrument, and so should not be accepted as an equivalent method under MARPOL Annex VI, and that acceptance compromises the robustness of regulation 14 of MARPOL Annex VI.

11.22 Some delegations emphasized that specific guidance for each equivalent method is needed in order for them to be considered and accepted in a transparent and uniform manner, and that the draft guidelines set out in annex 3 to BLG 17/11 are too vague and generic to provide clear guidance.

11.23 The Sub-Committee noted that the draft guidelines raised some specific interpretation issues including the following specific issues pursuant to implementation of regulation 4 of MARPOL Annex VI:

.1 whether equivalent methods can be applied to a group of ships;

.2 the role of the flag State and port States when approval of an alternative compliance method is under consideration; and

.3 whether guidance should be generic or applicable to specific alternative compliance methods only, for example, the *2009 Guidelines for Exhaust Gas Cleaning Systems* (Resolution MEPC.184(59)).

11.24 The Sub-Committee agreed that these specific issues should be forwarded to the MEPC for further consideration and to request further instruction, as appropriate.

Guidelines for gas fuels, liquefied natural gas or other gases which may be used as ship fuel, as well as NO_x Technical Code calculation factors and specific issues relating to the testing of engines so fuelled

11.25 The Sub-Committee recalled that BLG 16 had noted that the use of gas fuels is increasing for a number of reasons, including reducing emissions from ships, and that no technical requirements for demonstration of compliance for gas-fuelled engines had been included in the revised MARPOL Annex VI or the NO_x Technical Code 2008.

11.26 The Sub-Committee also recalled that BLG 16 had agreed that there is a need for the development of guidelines for gas fuels, liquefied natural gas or other gases which may be used as ship fuel, as well as NO_x Technical Code calculation factors and specific issues relating to the testing of engines so fuelled, and had invited interested delegations to make submissions to this session of the Sub-Committee (BLG 16/16, paragraph 8.44).

11.27 The Sub-Committee, having considered document BLG 17/11/1 (Japan and EUROMOT) proposing amendments to paragraphs 5.3, 5.12.3, 5.12.5, 6.3 and Appendix 6 of the NO_x Technical Code 2008 in order to certify dual fuel engines appropriately, agreed that the amendments to the NO_x Technical Code 2008 are necessary.

11.28 The delegation of China expressed the view that the existing paragraph 5.3.4 of the NO_x Technical Code 2008 should be deleted as new paragraph 5.3.7 proposed in document BLG 17/11/1 provides further explanation and clarification of the original paragraph 5.3.4.

11.29 Consequently, the Sub-Committee instructed the drafting group to review and finalize the draft amendments, using text in annex to document BLG 17/11/1as a basis.

Washwater discharge criteria for exhaust gas cleaning systems

11.30 The Sub-Committee recalled that MEPC 59, following the adoption of the 2009 Guidelines for exhaust gas cleaning systems (2009 Guidelines) (resolution MEPC.184(59)), had agreed that the washwater discharge criteria should be revised in the future as more data becomes available on the contents of discharge and its effects, taking into account advice provided in document MEPC 59/4/19 (GESAMP) (MEPC 59/24, paragraph 4.32.6).

11.31 The Sub-Committee also recalled that BLG 15, having considered documents MEPC 60/4/19 (IMarEST), MEPC 60/4/25 (Norway), MEPC 61/4/3 (United States) and

MEPC 61/4/6 (France), had agreed not to amend the 2009 Guidelines at that session in order to avoid multiple revisions. Consequently, BLG 15 invited Member Governments and international organizations to submit the outcome and experiences in applying the 2009 Guidelines, including relevant data and information for consideration of the future amendments to the 2009 Guidelines (BLG 15/19, paragraph 11.44).

11.32 The Sub-Committee had for its consideration the following documents providing comments and suggestions for the development of the guidelines:

.1 documents BLG 17/11/2 and BLG 17/INF.3 (Denmark) proposing that washwater discharge criteria in section 10 of the 2009 Guidelines should be reconsidered in order to clarify the pH criteria for washwater applicable at sea and in ports, harbours and estuaries; and providing information on an assessment study of possible impacts of scrubber water discharges on the marine environment, which showed that discharge of washwater with a low pH value has a negligible effect on the marine environment in the long term due to the buffering capacity of sea water; and

.2 document BLG 17/11/5 (INTERFERRY) supporting the information and conclusions provided in documents BLG 17/2 and BLG 17/INF.3 that discharge of washwater with low pH has a negligible effect on the marine environment; and reproducing the draft amendments to the 2009 Guidelines as proposed in document MEPC 60/4/19 (IMarEST).

11.33 Several delegations supported the proposals as set out in documents BLG 17/11/2 and BLG 17/11/5 as they considered it would remove the energy-intensive requirement for onboard mixing of washwater with seawater prior to discharge without adversely affecting the marine environment.

11.34 Other delegations did not support the proposed amendments as they considered that there was a need for additional studies with a wider scope than that presented in document BLG 17/INF.3 in order to demonstrate that the environmental impact when discharging washwater with a low pH value into the marine environment was acceptable, and also that, until such work is undertaken, the Sub-Committee should not consider such an amendment to the guidelines. Moreover, one delegation recalled the need for any equivalent system or method to fully comply with the requirement contained in regulation 4.4 of MARPOL Annex VI.

11.35 One delegation expressed the view that the interpretation made in document BLG 17/11/2 to the effect that the pH requirement at open sea would be more stringent than in port is incorrect, since the recording of the plume at 4m distance is only a control record for the commissioning of the system, and all other measurements in transit are to be undertaken directly at the ship's overboard discharge. The reduction of the pH requirements to the value of 3.0 proposed in document BLG 17/11/5 is not acceptable as it would allow for the direct discharge of washwater with a low pH value into the sea.

11.36 Following the discussion, the Sub-Committee did not agree to the amendments to the 2009 Guidelines as proposed, and agreed to invite further information to be submitted on the following:

.1 impact on the marine environment of discharging washwater with a low pH value; and

.2 current availability of Exhaust Gas Cleaning Systems that can meet the requirements as set out in the 2009 Guidelines and those that cannot.

11.37 The observer delegation of IPTA reminded the Sub-Committee that a further reduction in the sulphur limit of fuel oil used in ECAs will come into effect in less than two years, and that many shipowners are trying currently to evaluate methods of ensuring that they will be in a position to comply. In this regard, the IPTA observer was of the view that it would be vital that certainty be provided as soon as possible with regard to which technologies will be acceptable, in order for shipowners to be able to carry out their forward planning with confidence.

Use of continuous NO_x monitoring to demonstrate compliance with the Tier III NO_x emission limit (regulation 13.5.1 of MARPOL Annex VI)

11.38 The Sub-Committee recalled that MEPC 62 had instructed it to consider continuous NO_x monitoring as an additional method to demonstrate compliance with the Tier III NO_x emission limit for two sessions, i.e. BLG 16 and BLG 17, and to report the outcome of the consideration of the matter to MEPC 65 (MEPC 62/24, paragraph 4.56.3).

11.39 The Sub-Committee also recalled that, having considered the matter, BLG 16 could not reach an agreement on a mandatory continuous NO_x monitoring to demonstrate compliance (BLG 16/16, paragraph 8.12).

11.40 The Sub-Committee noted that no further documents had been submitted to this session. The United States indicated that a consensus on its proposal as set out in document BLG 16/11/8 had not been achieved in the intersessional period.

11.41 Consequently, the Sub-Committee agreed to report to MEPC 65 that mandatory requirements of continuous NO_x monitoring to demonstrate compliance with the Tier III NO_x emission limit is not appropriate at this stage.

Need for a definition of an "identical" marine diesel engine under regulation 13.1.1.2 of MARPOL Annex VI

11.42 The Sub-Committee noted that regulation 13.1.1.2 of MARPOL Annex VI specifies that an engine that undergoes a major conversion on or after 1 January 2000 must meet the emission standards in place at the time of the major conversion, except if the engine is replaced by an identical engine.

11.43 The Sub-Committee recalled that the correspondence group established by BLG 15 had identified the need for a definition of "identical" marine diesel engine under regulation 13.1.1.2 of MARPOL Annex VI.

11.44 The Sub-Committee also recalled that BLG 16, having considered whether the intent of regulation 13.1.1.2 of MARPOL Annex VI is a general exclusion or rather an exceptional clause used only in the most extreme cases, had agreed that this should be an exceptional clause and had invited the IACS observer to develop a unified interpretation for the definition of “identical” marine diesel engine as referred to in regulation 13.1.1.2 of MARPOL Annex VI (BLG 16/16, paragraph 8.35).

11.45 In this context, the Sub-Committee noted the information provided by the observer from IACS that the IACS unified interpretation on identical engines was available on its website, and its intention to submit the unified interpretation to BLG 18 for consideration by the Sub-Committee.

Guidelines called for under paragraph 2.2.5.6 of the revised NO_x Technical Code 2008 (NO_x-reducing devices)

11.46 The Sub-Committee recalled that, under the new priority list developed by BLG 16, guidelines called for under paragraph 2.2.5.6 of the revised NO_x Technical Code 2008 (NO_x reducing device) were listed as category C (low priority).

11.47 The Sub-Committee, having noted that no documents had been submitted on this matter at this session, invited interested delegations to make submissions to the next session of the Sub-Committee.

Establishing the Drafting Group

11.48 The Sub-Committee established the drafting group on matters related to MARPOL Annex VI and the NO_x Technical Code and instructed it, taking into account the decisions taken and comments made in plenary, to:

.1 further develop, with a view to finalization, the draft guidelines for non-identical replacement engines not required to meet the Tier III limit, as required under regulation 13.2.2, using annex 1 to BLG 17/11 as a basis;

.2 review and finalize the text of draft amendments to the NO_x technical Code 2008 concerning use of dual fuel engines, using the annex to BLG 17/11/1 as a basis;

.3 review and finalize the text of the unified interpretation on "time of the replacement or addition of the engine" for the applicable NO_x Tier standard for the supplement to the IAPP Certificate, using annex to BLG 17/14 as a basis;

.4 prepare draft terms of reference for a correspondence group on:

.1 consideration of the impact on the Arctic of emissions of Black Carbon from international shipping; and

.2 review of relevant non-mandatory instruments as a consequence of the amended MARPOL Annex VI and the NO_x Technical Code.

Report of the drafting group

11.49 Having considered the report of the drafting group (BLG 17/WP.7), the Sub-Committee approved it in general and took action as indicated below.

Guidelines as required by regulation 13.2.2 of MARPOL Annex VI in respect of non-identical replacement engines not required to meet the Tier III limit

11.50 The Sub-Committee agreed to the draft MEPC resolution on guidelines as required by regulation 13.2.2 of MARPOL Annex VI in respect of non-identical replacement engines not required to meet the Tier III limit, as set out in annex 12, for consideration by MEPC 65 with a view to adoption.

Draft amendments to the NO_x Technical Code 2008 concerning use of dual fuel engines

11.51 The Sub-Committee agreed to the draft amendments to the NO_x Technical Code 2008 concerning use of dual fuel engines for approval by MEPC 65, with a view to subsequent adoption.

11.52 The Sub-Committee also agreed to the draft amendment to paragraph 1.3.10 of the NO_x Technical Code 2008 to ensure consistency in the use of the term "gas fuel" for approval by MEPC 65, with a view to subsequent adoption.

11.53 The draft amendments to the Technical Code on Control of Emission of Nitrogen Oxides from Marine Diesel Engines (NO_x Technical Code 2008) are set out in annex 13.

Establishment of a Correspondence Group

11.54 The Sub-Committee established the Correspondence Group on Consideration of the Impact on the Arctic of Emissions of Black Carbon from International Shipping and Review of Relevant Non-mandatory Instruments as a Consequence of the Smended MARPOL Annex VI and NO_x Technical Code, under the coordination of the United States*, and for this output, instructed it to (see paragraph 10.29):

.1 further develop draft guidelines to outline the information to be submitted as part of the required notification from an Administration to the Organization in respect of the approval of an Approved Method, as required under regulation 13.7.1 of MARPOL Annex VI;

.2 develop draft guidelines as called for under paragraph 2.2.5.6 of the revised NO_x Technical Code 2008 (NO_x-reducing devices); and

.3 submit a report to BLG 18.

Extension of the target completion year

11.55 In view of the above, the Sub-Committee invited MEPC 65 to extend the target completion year for the output to 2015.

12 DEVELOPMENT OF A CODE FOR THE TRANSPORT AND HANDLING OF LIMITED AMOUNTS OF HAZARDOUS AND NOXIOUS LIQUID SUBSTANCES IN BULK IN OFFSHORE SUPPORT VESSELS

General

12.1 The Sub-Committee recalled that BLG 16 had established the Correspondence Group on the Development of the Draft Code for the Transport and Handling of Limited

* **Coordinator**:
Mr. Wayne Lundy
Senior Engineer
United States Coast Guard
Systems and Engineering Division
2100 Second Street SW
Washington, DC 20593
United States of America
Tel: +001 202 372 1379
E-mail: Wayne.M.Lundy@uscg.mil

Amounts of Hazardous and Noxious Liquid Substances in Bulk in Offshore Support Vessels (OSV Chemical Code) to progress the work intersessionally.

12.2 The Sub-Committee had for its consideration document BLG 17/12 (Denmark) containing the report of the correspondence group, and document BLG 17/INF.6 (Denmark) providing the text of the draft Code prepared by the group, as well as a collation of comments received during the work of the group.

12.3 The Sub-Committee noted that, while the group had made significant progress on the development of the draft OSV Code, it had been impossible to prepare a complete draft Code due to time constraints and various outstanding issues.

12.4 In the ensuing discussions, there was considerable support for the need to establish a correspondence group to further develop the draft OSV Chemical Code, for consideration by a working group to be established by the Sub-Committee at its next session with a view to forwarding relevant parts of the draft Code to other sub-committees for advice and input.

Re-establishment of the correspondence group

12.5 Following the discussion, the Sub-Committee re-established the Correspondence Group on the Development of the OSV Chemical Code, under the coordination of Denmark*, and instructed it, taking into account the comments made and decision taken at BLG 17, to:

.1 prepare the draft Code for the Transport and Handling of Limited Amounts of Hazardous and Noxious Liquid Substances in Bulk in Offshore Support Vessels (OSV Chemical Code) on the basis of documents BLG 17/12 and BLG 17/INF.6, with special focus on:

- preparing chapter 2 on ship survival capability and location of cargo tanks, with a view to forwarding the text to the SLF Sub-Committee for advice and input;
- preparing chapter 8 on fire-fighting requirements, with a view to forwarding the text to the FP Sub-Committee for advice and input; and
- preparing chapter 3 on ship design and chapter 5 on cargo transfer, with a view to forwarding the text to the DE Sub-Committee for advice and input; and

.2 submit a written report to BLG 18.

---

* **Coordinator**: (The Danish Maritime Administration has moved offices)
Ms. Clea Henrichsen
Regulation, Manning and Certification
Danish Maritime Authority
Carl Jacobsensvej 31
2500 Valby,
Denmark
Tel.: +45 22928439
Email: cge@dma.dk

Extension of the target completion year

12.6 In view of the above, the Sub-Committee invited the Committee to extend the target completion year for the output to 2015.

13 CASUALTY ANALYSIS

13.1 The Sub-Committee noted that no submissions had been made for consideration at this session and that this is a continuous output which remains on the agenda pending the outcome, if any, of the FSI Sub-Committee's consideration.

14 CONSIDERATION OF IACS UNIFIED INTERPRETATIONS

14.1 The Sub-Committee, having considered document BLG 17/14 (IACS) providing its unified interpretation UI MPC 98 relating to "time of the replacement or addition" of an engine for the applicable NO_x Tier standard for the supplement to the IAPP Certificate, as referred to in regulation 13.2.2 of MARPOL Annex VI, agreed that the unified interpretation should be developed on the basis of IACS UI MPC 98, and instructed the drafting group established under agenda item 11 to review and finalize the unified interpretation.

14.2 In considering the part of the Drafting Group report (BLG 17/WP.7) related to this output, the observer from IACS confirmed that the UI refers only to the relevant part of regulation 13.2.2 of MARPOL Annex VI, and omits reference to the other parts of regulation 13.2.2 and regulation 13.5.2.2 of MARPOL Annex VI relating to instances where the Tier III requirement does not have to be complied with, as this could result in confusion as to the subject of the UI.

14.3 The Sub-Committee agreed to the unified interpretation to regulation 13.2.2 of MARPOL Annex VI on "time of the replacement or addition" of an engine for the applicable NO_x Tier standard for the supplement to the IAPP Certificate, as set out in annex 14, for consideration and approval by MEPC 65.

15 BIENNIAL AGENDA AND PROVISIONAL AGENDA FOR BLG 18

General

15.1 In considering matters related to the biennial agenda, provisional agenda and arrangements for its next session, the Sub-Committee recalled that:

.1 MSC 91 had requested all sub-committees to prepare their respective proposals for the High-level Action Plan for the coming biennium, for consideration by MSC 92, for inclusion in the Committee's proposals to C 110 on the High-level Action Plan for 2014-2015; and

.2 with regard to the Sub-Committee's proposed restructuring, the Sub-Committee should still prepare its biennial and provisional agendas accordingly, bearing in mind that they are subject to change pending the decisions of MEPC 65, MSC 92 and C 110.

Proposals for the biennial agenda for 2014-2015 and provisional agenda for BLG 18

15.2 Taking into account the progress made at the session and the decisions of MEPC 64 and MSC 91, the Sub-Committee prepared its proposed biennial agenda for 2014-2015, including outputs on the Committees' post biennial agendas that fall under the purview of the Sub-Committee (BLG 17/WP.2, annex 1), and also the provisional agenda for

BLG 18 (BLG 17/WP.2, annex 2), as set out in annexes 15 and 16, respectively, for consideration by MEPC 65 and MSC 92.

Arrangements for the next session

15.3 The Sub-Committee agreed to establish working and drafting groups on the following subjects at its next session:

.1 evaluation of safety and pollution hazards of chemicals and preparation of consequential amendments;

.2 additional guidelines for implementation of the BWM Convention;

.3 development of an international code of safety for ships using gases or other low-flashpoint fuels;

.4 consideration of the impact on the Arctic of emissions of Black Carbon from international shipping;

.5 review of relevant non-mandatory instruments as a consequence of the amended MARPOL Annex VI and the NO_x Technical Code; and

.6 development of the Code for the Transport and Handling of Limited Amounts of Hazardous and Noxious Liquid Substances in Bulk on Offshore Support Vessels,

whereby the Chairman, taking into account the submissions received on the respective subjects, would advise the Sub-Committee well in time before BLG 18 on the final selection of such groups.

15.4 The Sub-Committee established correspondence groups on the following subjects, due to report to BLG 18:

.1 development of an international code of safety for ships using gases or other low-flashpoint fuels;

.2 consideration of the impact on the Arctic of emissions of Black Carbon from international shipping and review of relevant non-mandatory instruments as a consequence of the amended MARPOL Annex VI and the NO_x Technical Code; and

.3 development of the draft Code for the Transport and Handling of Limited Amounts of Hazardous and Noxious Liquid Substances in Bulk in Offshore Support Vessels.

Status of planned outputs in the High-level Action Plan

15.5 The Sub-Committee, having noted that the status of planned outputs will no longer be produced as part of a working paper produced during the session in order to avoid a duplication of work, invited MEPC 65 and MSC 92 to note the status of planned outputs, as set out in annex 17.

Intersessional meetings

15.6 The Sub-Committee, having recalled its decision under agenda item 3 (see paragraph 3.16.10), invited MSC 92 and MEPC 65 to approve the holding of an intersessional meeting of the ESPH Working Group in 2014.

Date of next session

15.7 The Sub-Committee noted that the date of the next meeting will be announced in due course, pending the decisions by MEPC 65, MSC 92 and C 110 on the Sub-Committee's proposed restructuring.*

16 ELECTION OF CHAIRMAN AND VICE-CHAIRMAN FOR 2014

16.1 In light of the decisions of C 109 and MSC 91 regarding the Sub-Committee restructuring, the Sub-Committee did not elect a Chairman and Vice-Chairman for 2014.

17 ANY OTHER BUSINESS

Development of amendments to SOLAS and the relevant codes concerning mandatory carriage of appropriate atmosphere testing instruments on board ships

17.1 The Sub-Committee recalled (BLG 17/2) that DSC 17, when considering its agenda item on "Amendments to SOLAS to mandate enclosed space entry and rescue drills", taking into account the outcomes of BLG 16 and STW 43, had agreed on a justification for an unplanned output to develop amendments to the SOLAS Convention and relevant codes concerning mandatory carriage of appropriate atmosphere-testing instruments on board ships.

17.2 The Sub-Committee also recalled that DSC 17 had invited MSC 91, subject to approval of the above-mentioned unplanned output, to instruct the BLG, FP and STW Sub-Committees to consider draft amendments to SOLAS (DSC 17/17, annex 8) at their forthcoming sessions and forward any comments and proposals, as appropriate, to DSC 18.

17.3 The Sub-Committee noted (BLG 17/2/2) that MSC 91 had approved the unplanned output, taking into account document MSC 91/13/3, with a target completion year of 2013, in association with the FP, BLG and STW Sub-Committees.

17.4 In this connection, the Sub-Committee noted that DSC 17 had prepared a justification for the aforementioned unplanned output, which included a draft amendment to SOLAS chapter XI-1, adding a new regulation 7 (DSC 17/17, annex 8, appendix 1) recommending that highest priority be given to developing relevant SOLAS carriage requirements for oxygen meters, and that, at MSC 91, document MSC 91/13/3 (Australia, P&I Clubs and IACS) had proposed that the development of mandatory requirements for instruments which test the atmosphere of enclosed spaces should also consider the possible duplication of equipment, since the testing of the atmosphere of cargo spaces is already addressed in SOLAS regulations VI/3.1 and II-2/4.5.7.1 and IBC Code, section 13.2.

* Whenever a reference to BLG 18 appears in this report, it should be construed as a reference to the first session of the new Sub-Committee, if approved by the Committees and the Council.

17.5 The Sub-Committee, having noted, in particular that:

.1 since the draft amendment to SOLAS chapter XI-1 would apply to every ship, careful consideration is needed to develop such requirements;

.2 in addition to current mandatory requirements, further requirements for instruments which test the atmosphere of enclosed spaces should be considered; and

.3 bearing in mind the origin of the unplanned output, highest priority should be given to develop SOLAS requirements of oxygen meters,

agreed that highest priority be given to oxygen meters and requested the Secretariat to forward the above comments to DSC 18.

Reform of the subsidiary bodies reporting to MSC and MEPC

17.6 The Sub-Committee, having noted the information provided by the Secretariat regarding the discussions at C 109 and MSC 91 on matters related to the review and reform of the Organization (C 109/D and MSC 91/22), was invited by the Secretary-General to comment on the proposed reform of the subsidiary bodies, in particular the reallocation of duties for the BLG and DSC Sub-Committees, i.e. the establishment of a new sub-committee to deal with environment-related matters and another new sub-committee to consider cargo matters (MSC 91/19/9).

17.7 The views expressed were noted with appreciation by the Secretary-General and he informed the Sub-Committee that they would be taken into account when preparing the detailed proposal requested by MSC 91 regarding the proposed names, terms of reference, provisional agendas, biennial agendas, cost-benefit analysis and meeting dates for each body, for consideration at MEPC 65 and MSC 92.

Expressions of appreciation

17.8 The Sub-Committee expressed its appreciation to the following delegates who had recently relinquished their duties, retired or been transferred to other duties or were about to do so, for their invaluable contribution to its work and wished them a long and happy retirement or, as the case might be, every success in their new duties:

- **Dr. Phillip Belcher** (the Bahamas) (on moving to newer pastures);
- **Captain Walter Mille** (Belgium)(on retirement);
- **Captain Fernando Pinho** (Brazil) (on transfer to new duties);
- **Dr**. **Kai Truempler** (Germany) (on transfer to new duties); and
- **Ms. Ingrid de Wilde** (CEFIC) (on transfer to new duties).

18 ACTION REQUESTED OF THE COMMITTEES

18.1 The Marine Environment Protection Committee, at its sixty-fifth session, is invited to:

.1 endorse, subject to MSC 92's concurrent decision, the decisions taken by the Sub-Committee regarding the outcome of ESPH 18 (paragraph 3.2);

.2 approve, subject to MSC 92's concurrent decision, the draft amendments to the IBC Code, with a view to subsequent adoption (paragraph 3.2.8 and annex 1);

.3 endorse the evaluation of two new substances and their consequential inclusion in the IBC Code (paragraph 3.16.1);

.4 endorse the evaluation of cargo tank cleaning additives found to meet the requirements of regulation 13.5.2 of MARPOL Annex II, for inclusion in the next edition of the MEPC.2/Circular (paragraph 3.16.2 and annex 2);

.5 endorse the evaluation of three trade-named mixture products for inclusion in List 3 of the MEPC.2/Circular with validity for all countries and no expiry date (paragraph 3.16.3);

.6 adopt the draft MEPC resolution on 2013 amendments to the Revised Guidelines and Specifications for Oil Discharge Monitoring and Control Systems for Oil Tankers (resolution MEPC.108(49)) (paragraph 3.16.5 and annex 3);

.7 approve, subject to MSC 92's concurrent decision, the draft MSC-MEPC circular on Guidance on the timing of replacement of existing certificates by revised certificates as a consequence of the entry into force of amendments to the IBC Code (paragraph 3.16.7 and annex 4);

.8 approve the draft BWM Circular on Guidance on ballast water sampling and analysis for trial use in accordance with the BWM Convention and Guidelines (G2) (paragraph 4.25 and annex 5);

.9 consider the Recommendations related to the trial period for reviewing, improving and standardizing the BWM circular on *Guidance for ballast water sampling and analysis for trial use in accordance with the BWM Convention and Guidelines (G2)*, and take action as appropriate (paragraph 4.27 and annex 6);

.10 adopt the draft MEPC resolution on information reporting on type approved ballast water management systems (paragraph 4.32.and annex 7);

.11 approve the draft BWM circular on amendments to the Guidance for Administrations on the type approval process for ballast water management systems in accordance with Guidelines (G8) (BWM.2/Circ.28) (paragraph 4.33 and annex 8);

.12 approve the draft BWM circular on options for ballast water management for Offshore Support Vessels in accordance with the BWM Convention (paragraph 4.34 and annex 9);

.13 approve the draft MEPC circular on Guidance for evaluating the 2011 Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species (paragraph 7.4 and annex 10);

.14 note the progress made in the consideration of the impact on the Arctic of emissions of Black Carbon from international shipping and the establishment of a correspondence group to further progress the work (paragraph 10.29);

.15 provide clear instruction to the Sub-Committee on specific issues pursuant to implementation of regulation 4 of MARPOL Annex VI to facilitate the development of the Guidelines pertaining to equivalents set forth in regulation 4 of MARPOL Annex VI and not covered by other guidelines (paragraphs 11.23 and 11.24);

.16 adopt the draft MEPC resolution on Guidelines as required by regulation 13.2.2 of MARPOL Annex VI in respect of non-identical replacement engines not required to meet the Tier III limit (paragraph 11.50 and annex 12);

.17 approve the draft amendments to the Technical Code on Control of Emission of Nitrogen Oxides from Marine Diesel Engines (NOx Technical Code 2008), with a view to subsequent adoption (paragraph 11.53 and annex 13);

.18 approve the unified interpretation to regulation 13.2.2 of MARPOL Annex VI on the "time of the replacement or addition" of an engine for the applicable NOx Tier standard for the supplement to the IAPP Certificate (paragraph 14.3 and annex 14);

.19 approve, subject to MSC 92's concurrent decision, the biennial agenda of the Sub-Committee for the 2014-2015 biennium and the outputs to be placed on the Committee's post-biennial agenda which are under the purview of the Sub-Committee (paragraph 15.2 and annex 15);

.20 approve, subject to MSC 92's concurrent decision, the draft provisional agenda for BLG 18 (paragraph 15.2 and annex 16);

.21 note the report on the status of the Sub-Committee's planned outputs in the High-level Action Plan for the current biennium (paragraph 15.5 and annex 17);

.22 approve, subject to MSC 92's concurrent decision, the holding of an intersessional meeting of the ESPH Working Group in 2014 (paragraph 15.6); and

.23 approve the report in general.

18.2 The Maritime Safety Committee, at its ninety-second session, is invited to:

.1 endorse, subject to MEPC 65's concurrent decision, the decisions taken by the Sub-Committee regarding the outcome of ESPH 18 (paragraph 3.2);

.2 approve, subject to MEPC 65's concurrent decision, the draft amendments to the IBC Code with a view to subsequent adoption (paragraph 3.2.8 and annex 1);

.3 approve, subject to MEPC 65's concurrent decision, the draft MSC-MEPC circular on Guidance on the timing of replacement of existing certificates by revised certificates as a consequence of the entry into force of amendments to the IBC Code (paragraph 3.16.7 and annex 4);

.4 note the progress made on the development of the draft International Code of safety for ships using gases or other low-flashpoint fuels (IGF Code), in particular that the correspondence group was re-established to progress the work intersessionally (paragraph 8.30);

.5 approve the draft amendments to the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code), noting that paragraph 4.27.3 on "Limit state design" is in square brackets, pending the expected submission of relevant proposals to MSC 92, with a view to subsequent adoption (paragraphs 9.17 and 9.20 and annex 11);

.6 approve, subject to MEPC 65's concurrent decision, the biennial agenda of the Sub-Committee for the 2014-2015 biennium and the outputs to be placed on the Committee's post-biennial agenda which are under the purview of the Sub-Committee (paragraph 15.2 and annex 15);

.7 approve, subject to MEPC 65's concurrent decision, the draft provisional agenda for BLG 18 (paragraph 15.2 and annex 16);

.8 note the report on the status of the Sub-Committee's planned outputs in the High-level Action Plan for the current biennium (paragraph 15.5 and annex 17);

.9 approve, subject to MEPC 65's concurrent decision, the holding of an intersessional meeting of the ESPH Working Group in 2014 (paragraph 15.6); and

.10 approve the report in general.

***

ANNEX 1

DRAFT AMENDMENTS TO THE INTERNATIONAL CODE FOR THE CONSTRUCTION AND EQUIPMENT OF SHIPS CARRYING DANGEROUS CHEMICALS IN BULK (IBC CODE)

Chapter 1 – General

1 New paragraphs 1.3.37 and 1.3.38 are added as follows:

1.3.37 Purging means the introduction of inert gas into a tank which is already in an inert condition with the object of further reducing the oxygen content; and/or reducing the existing hydrocarbon or other flammable vapours content to a level below which combustion cannot be supported if air is subsequently introduced into the tank.

1.3.38 Gas-freeing means the process where a portable or fixed ventilation system is used to introduce fresh air into a tank in order to reduce the concentration of hazardous gases or vapours to a level safe for tank entry.

Chapter 8 – Cargo tank venting and gas-freeing arrangements

2 In paragraph 8.15, the references to "SOLAS regulations II-2/4.5.3 and 4.5.6" are replaced by the references to "SOLAS regulations II-2/4.5.3, 4.5.6 and 16.3.2".

3 A new paragraph 8.5 is inserted as follows:

8.5 Cargo tank purging

When the application of inert gas is required by 11.1.1, before gas freeing, the cargo tanks shall be purged with inert gas through outlet pipes with cross sectional area such that an exit velocity of at least 20 m/s can be maintained when any three tanks are being simultaneously supplied with inert gas. The outlets shall extend not less than 2m above the deck level. Purging shall continue until the concentration of hydrocarbon or other flammable vapours in the cargo tanks has been reduced to less than 2 per cent by volume.

4 The existing paragraph 8.5 and sub-paragraphs 8.5.1, 8.5.2 and 8.5.3 are renumbered as paragraph 8.6 and subparagraphs 8.6.1, 8.6.2 and 8.6.3, respectively.

Chapter 9 – Environmental control

5 The chapeau of paragraph 9.1.3 is replaced by the following:

9.1.3 Where inerting or padding of cargo tanks is required by this Code in column "h" of chapter 17:

Chapter 11 – Fire protection and fire extinction*

6 Sub-paragraph 11.1.1.1 is replaced by the following:

11.1.1.1 regulations 10.8 and 10.9 shall not apply;

Chapter 15 – Special requirements

7 Paragraph 15.13.5 is replaced by the following:

15.13.5 When a product containing an oxygen dependent inhibitor is to be carried in a ship:

.1 constructed on or after date of entry into force of the new SOLAS IG requirements, and for which inerting is required as per paragraph 11.1.1 of this Code, the application of inert gas shall not take place before loading or during the voyage, but shall be applied before commencement of unloading*.

.2 constructed before the entry into force of the SOLAS amendments for IG, the product shall be carried without inertion (in tanks of a size not greater than 3,000 m^3). Such cargo shall not be carried in a tank requiring inertion under the requirements of SOLAS Chapter II-2*

* When new Arrangements for the carriage of Oxygen dependant inhibitors is agreed.

Chapter 17 – Summary of minimum requirements

8 The explanatory notes for "Tank environment control (column h)" are replaced by the following:

Tank environmental control (*column h*)	Inert:	inerting (9.1.2.1)
	Pad:	liquid or gas padding (9.1.2.2)
	Dry:	drying (9.1.2.3)
	Vent:	natural or forced ventilation (9.1.2.4)
	No:	no special requirements under this Code (inerting requirements may be required under SOLAS)

***

ANNEX 2

CARGO TANK CLEANING ADDITIVES EVALUATED AND FOUND TO MEET THE REQUIREMENTS OF REGULATION 13.5.2 OF MARPOL ANNEX II[1]

Name of cleaning additive	Name of manufacturer	Reporting Country
Accell Clean Marine	Advanced BioCatalytics Corp.	United States
Accell Clean Marine Plus	Advanced BioCatalytics Corp.	United States
TC-01 – Heavy Duty Alkaline Tank Cleaner	ANMAR ENDUSTRIYEL KIMYA SAN. TIC. LTD. STI	Turkey
TC-02 – Non-Caustic Alkaline Tank Cleaner	ANMAR ENDUSTRIYEL KIMYA SAN. TIC. LTD. STI	Turkey
TC-03 – Non-Toxic, Water-Based Alkaline Cleaner	ANMAR ENDUSTRIYEL KIMYA SAN. TIC. LTD. STI	Turkey
TC-04 – Heavy Duty Concentrated Tank Cleaner	ANMAR ENDUSTRIYEL KIMYA SAN. TIC. LTD. STI	Turkey
TC-05 – Solvent Based Tank Cleaner	ANMAR ENDUSTRIYEL KIMYA SAN. TIC. LTD. STI	Turkey
TC-06 – Heavy Duty Water Based Hydrocarbon Free Tank Cleaner	ANMAR ENDUSTRIYEL KIMYA SAN. TIC. LTD. STI	Turkey
TC-07 – Water Based Neutral Tank Cleaning Detergent	ANMAR ENDUSTRIYEL KIMYA SAN. TIC. LTD. STI	Turkey
TC-10 - Rust and Oxidation Remover for NLS Cargo Tank cleaning	ANMAR ENDUSTRIYEL KIMYA SAN. TIC. LTD. STI	Turkey
CH-1 – High Foam Alkaline Cleaner for NLS Cargo Tanks	ANMAR ENDUSTRIYEL KIMYA SAN. TIC. LTD. STI	Turkey
DG-04 – Multi-Purpose Liquid Detergent for NLS Cargo Tank cleaning	ANMAR ENDUSTRIYEL KIMYA SAN. TIC. LTD. STI	Turkey
DG-03 – Heavy Duty Water Based Degreaser for NLS Cargo Tank cleaning	ANMAR ENDUSTRIYEL KIMYA SAN. TIC. LTD. STI	Turkey
DG-01 – Solvent Based Degreaser HD Split for NLS Cargo Tank cleaning	ANMAR ENDUSTRIYEL KIMYA SAN. TIC. LTD. STI	Turkey
DG-02 – Heavy Duty Solvent Based Degreaser for NLS Cargo Tank cleaning	ANMAR ENDUSTRIYEL KIMYA SAN. TIC. LTD. STI	Turkey
DG-05 – Environment Cleaner Degreaser	ANMAR ENDUSTRIYEL KIMYA SAN. TIC. LTD. STI	Turkey
SM-80	KALON S.A. SMYTH MORRIS	Spain
GREM COLD WASH	KALON S.A. SMYTH MORRIS	Spain
Careclean SC	Marine Care B.V.	The Netherlands
Careclean Acrylate Neutralizer	Marine Care B.V	The Netherlands
Careclean Formula #3	Marine Care B.V	The Netherlands
Careclean Formula #4	Marine Care B.V	The Netherlands
Careclean Formula #5	Marine Care B.V	The Netherlands
Careclean WAF	Marine Care B.V	The Netherlands

[1] All products evaluated in accordance with MEPC.1/Circ.590.

Name of cleaning additive	Name of manufacturer	Reporting Country
TECO CHLOR	TECO Chemicals AS	Norway
TANKCLEANER 9M	UNI Americas LLC	United States

***

ANNEX 3

DRAFT MEPC RESOLUTION

2013 AMENDMENTS TO THE REVISED GUIDELINES AND SPECIFICATIONS FOR OIL DISCHARGE MONITORING AND CONTROL SYSTEMS FOR OIL TANKERS (RESOLUTION MEPC.108(49))

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee conferred upon it by international conventions for the prevention and control of marine pollution,

NOTING resolution MEPC.108(49) by which the Committee adopted the Revised Guidelines and Specifications for Oil Discharge Monitoring and Control Systems for Oil Tankers,

NOTING ALSO that the revised MARPOL Annex I was adopted by resolution MEPC.117(52) and entered into force on 1 January 2007;

HAVING CONSIDERED, at its sixty-fifth session, proposed amendments to the Revised Guidelines and Specifications for Oil Discharge Monitoring and Control Systems for Oil Tankers, prepared by the Sub-Committee on Bulk Liquids and Gases at is seventeenth session,

1. ADOPTS the 2013 Amendments to the Revised Guidelines and Specifications for Oil Discharge Monitoring and Control Systems for Oil Tankers, the text of which is set out in the annex to this resolution,

2. RECOMMENDS Governments to apply the annexed amendments when approving oil discharge monitoring and control systems being installed under regulation 31 of MARPOL Annex I on oil tankers constructed on or after 1 January 2005.

***

ANNEX

2013 AMENDMENTS TO REVISED GUIDELINES AND SPECIFICATIONS FOR OIL DISCHARGE MONITORING AND CONTROL SYSTEMS FOR OIL TANKERS

REVISED GUIDELINES AND SPECIFICATIONS FOR OIL DISCHARGE MONITORING AND CONTROL SYSTEMS FOR OIL TANKERS

1 In the Table of Contents, a new entry 3.7 is added, as follows:

"3.7 Bio-fuels"

2 In paragraphs 1.1.1 and 1.1.2.1, the references "regulation 15(3)(a) of Annex I of MARPOL 73/78" are replaced by the references "regulation 31 of MARPOL Annex I.

3 Paragraph 1.1.3 is replaced by the following:

"1.1.3 These Guidelines and Specifications also apply to oil content monitoring systems used for monitoring each individual bio-fuel blend containing 75 per cent or more of petroleum oil, carried in accordance with paragraph 4.1 of MEPC.1/Circ.761. Wherever in these Guidelines and Specifications reference is made to oil being monitored, this applies likewise to bio-fuel blends."

4 In paragraph 2.1, the references "Annex I of MARPOL 73/78" and "regulation 15(3)(a)" are replaced by the references "MARPOL Annex I " and "regulation 31", respectively.

5 In paragraph 2.2, the references "regulation 15" and "regulation 9(1)(a)" are replaced by the references "regulation 31" and "regulation 34.1", respectively.

6 In section 3, a new definition is added, as follows:

"3.7 Bio-fuels

Bio-fuels are products as recorded in annex 11 of the MEPC.2/Circular which are intended for blending with petroleum oil and may be shipped as blends in accordance with MEPC.1/Circ.761, as amended."

7 A new paragraph 5.7 is added, as follows:

"5.7 Manufacturer recommended spares for the ODME should be carried to ensure the operation of the equipment."

8 The existing paragraph 5.7 is renumbered as paragraph 5.8.

9 In paragraph 6.1.1, the reference "regulation 18" is replaced by the reference "regulation 30".

10 The footnote associated with paragraph 6.1.6 is replaced by the following:

"* As specified in IEC publication 92 or an equivalent standard acceptable to the administration."

11 In paragraph 6.8.2, the references "regulation 9(1)(a)(iv) and (v)" are replaced by the references "regulation 31.1.4 and 31.1.5."

12 The chapeau of paragraph 6.11.1 and subparagraph .1 is replaced by the following:

"6.11.1 The alternative means of obtaining information in the event of a failure in the monitoring system should follow the requirements in MARPOL Annex I, regulation 31.4 and the operational manual as approved by the Administrations and should be as follows:

.1 oil content meter or sampling system: location and measurement of the oil/water interface using the equipment as required in regulation 32, visual observation of the surface of the water adjacent to the effluent discharge and recording the relevant data for the discharge accurately in the Oil Record Book Part II in sections H and I;".

13 In the footnote associated with subparagraph 6.12.2, the reference "regulation 9(1)(a)(5)" is replaced by the reference "regulation 34.1.5".

14 In paragraph 7.2.2, after the words "white products", insert the words ", individual bio-fuel blends".

15 In subparagraph 8.3.3, the references "regulations 9(1)(a)(iv) and (v)" are replaced by the references "regulations 34.1.4 and 34.1.5".

ANNEX, PART 1 – TEST AND PERFORMANCE SPECIFICATIONS FOR TYPE APPROVAL OF OIL CONTENT METERS

16 In the table under paragraph 1.2.6, under the column "Parameters Tolerance" and row "6", the text "RMG 35 Parameters as per ISO 8217:1996 (table 2)" is replaced by the following text:

"RMG 35 Parameters as per ISO 8217:2010/Corr 1:2011 (tables 1 and 2)"

17 In paragraph 1.2.7, the reference standard "ISO 8217: 1996 (table 1)" is replaced by the referenced standard "ISO 8217: 2010/Corr 1:2011 (tables 1 and 2)".

18 New paragraph 1.2.8 is added, as follows:

"1.2.8 If the meter is to be considered suitable for an individual bio-fuel blend containing 75 per cent or more of petroleum oil, it should also be tested against each such substance for which approval is required, in a manner similar to the tests set out in paragraphs 1.2.5 and 1.2.6. The high shear pump shown in figure 1 should be kept in operation at high speed during this test to assist in dissolving the appropriate fraction of the substance in the water stream."

19 New paragraph 1.2.9 is added, as follows:

"1.2.9 Individual Bio-fuel blends should be tested at 75 per cent and 99 per cent petroleum oil."

20 The existing paragraphs 1.2.8 to 1.2.19 are renumbered as paragraphs 1.2.10 to 1.2.21.

APPENDIX, CERTIFICATE OF TYPE APPROVAL FOR OIL CONTENT METERS INTENDED FOR MONITORING THE DISCHARGE OF OIL-CONTAMINATED WATER FROM THE CARGO TANK AREAS OF OIL TANKERS

21 Under the "The oil content meter is acceptable for the following applications:", the text "*Oil-like noxious liquid substances, other products, or applications, listed below" is replaced by the following:

> "* Individual bio-fuel blends containing 75 per cent or more of petroleum oil, other products, or applications, listed below"

APPENDIX, TEST DATA AND RESULTS OF TESTS CONDUCTED ON AN OIL CONTENT METER IN ACCORDANCE WITH PART 1 OF THE ANNEX TO THE GUIDELINES AND SPECIFICATIONS CONTAINED IN IMO RESOLUTION MEPC.108(49)

22 The table for "OIL LIKE noxious liquid substances, other products or applications" is deleted, and tables for "INDIVIDUAL BIO-FUEL BLENDS AND CONCENTRATIONS" and "OTHER PRODUCTS OR APPLICATIONS" are added, as follows:

INDIVIDUAL BIO-FUEL BLENDS AND CONCENTRATIONS *

		READINGS (ppm)				
		Indicated	Measured	Grab sample	***REMARKS***	
Bio-Fuel Blend 75% Petroleum Oil		……	……	……		
Name of Bio-fuel and petroleum oil components						
…… %						
…….. %						
……	15	……	……	……		
	100	……	……	……		
90% M.F.S.V. =		……	……	……		
RECORDED ZERO		……			RE-ZERO	YES/NO**
					TIME	mins
					RECALIBRATE	YES/NO**
					TIME	mins
					CLEAN	YES/NO**
		……	……	……	TIME	mins
Bio-Fuel Blend 99% Petroleum Oil						
Name of Bio-fuel and petroleum oil components						
…… %						
…….. %						
……	15	……	……	……		
	100	……	……	……		
90% M.F.S.V. =		……	……	……		
RECORDED ZERO		……			RE-ZERO	YES/NO**
					TIME	mins
					RECALIBRATE	YES/NO**
					TIME	mins
					CLEAN	YES/NO**
					TIME	mins

RESPONSE TIMES

		Seconds
First detectable reading		……
	63 ppm	……1
	90 ppm	……
Stabilized maximum reading or 100 ppm	….. ppm	……
First detectable drop		……
	37 ppm	……2
	10 ppm	……
Stabilized minimum reading	….. ppm	……
RESPONSE TIME = $\frac{1+2}{2}$	=	……

* This page should be included in the certificate only if the oil content meter has been tested against bio-fuel blends.

** Delete as appropriate.

OTHER PRODUCTS OR APPLICATIONS*

	READINGS (ppm)				
	Indicated	Measured	Grab sample	***REMARKS***	
Name of product	……	……	……		
…… 15	……	……	……		
100	……	……	……		
90% M.F.S.V. =	……	……	……		
RECORDED ZERO	……			RE-ZERO	YES/NO**
				TIME	Mins
				RECALIBRATE	YES/NO**
				TIME	Mins
				CLEAN	YES/NO**
	……	……	……	TIME	Mins
Name of product					
…… 15	……	……	……		
100	……	……	……		
90% M.F.S.V. =	……	……	……		
RECORDED ZERO	……			RE-ZERO	YES/NO**
				TIME	Mins
				RECALIBRATE	YES/NO**
				TIME	Mins
				CLEAN	YES/NO**
				TIME	Mins

***

* This page should be included in the certificate only if the oil content meter has been tested against other products and applications substances.

** Delete as appropriate.

ANNEX 4

DRAFT MSC-MEPC.5/CIRCULAR

GUIDANCE ON THE TIMING OF REPLACEMENT OF EXISTING CERTIFICATES BY REVISED CERTIFICATES AS A CONSEQUENCE OF THE ENTRY INTO FORCE OF AMENDMENTS TO THE IBC CODE

1 The Marine Environment Protection Committee at its sixty-fifth session (13 to 17 May 2013) and the Maritime Safety Committee, at its ninety-second session (12 to 21 June 2013) reviewed the matter of the replacement of an existing International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk ("certificate") by a revised certificate that is required to be issued as a consequence of amendments to the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IBC Code).

2 Both Committees agreed to approve the following guidance, which for the matter described in paragraph 1 above can be used in place of the provisions of MSC-MEPC.5/Circ.6, with regard to the replacement of an existing certificate by a revised certificate that is issued before the entry into force of amendments to the IBC Code:

.1 the issuance of the revised certificate may be initiated from the date of adoption (the later of the adoption dates by MSC or MEPC, as the case may be) of the IBC Code amendments, rather than the date of entry into force of the amendments;

.2 the revised certificate should have the same expiration date as the existing certificate;

.3 the revised certificate should be provided with a stamp/text on the front page stating that the revised certificate is effective, and supersedes the existing certificate, on the date of entry into force of the amendments to the IBC Code.

3 As an illustrative example of paragraph 2 above, the attached diagram explains two scenarios:

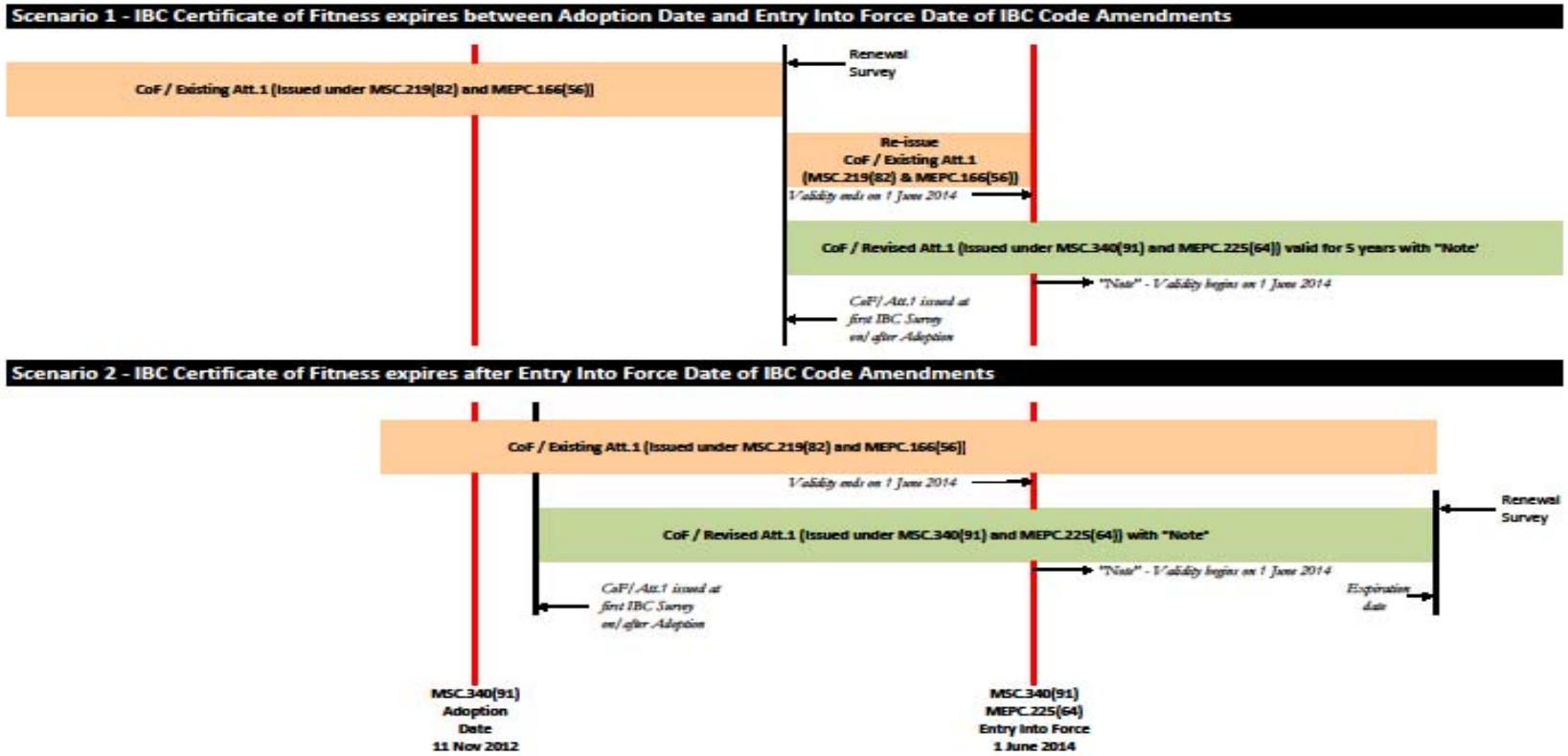
.1 Scenario 1 is an example of a renewal survey carried out between the adoption date and the entry-into-force date of the amendments to the IBC Code; and

.2 Scenario 2 is an example of an existing certificate that is valid beyond the entry-into-force date.

4 The Committees noted that the above arrangements should facilitate a smooth and practical implementation scheme for the worldwide fleet of chemical carriers that may require to have revised certificates immediately upon the entry into force of the amendments to the IBC Code.

5 When a cargo is loaded prior to the entry-into-force date and unloaded after the entry-into-force date, of the amendments to the IBC Code, the relevant provisions of the IBC Code at the time of loading should be applicable until the cargo has been unloaded.

6 Member Governments are invited to bring this circular to the attention of all parties concerned, in particular, masters, shipowners and port State control officers.


Scenario 1 - IBC Certificate of Fitness expires between Adoption Date and Entry Into Force Date of IBC Code Amendments
CoF / Existing Att.1 (Issued under MSC.219(82) and MEPC.166(56))
Renewal Survey
Re-issue CoF / Existing Att.1 (MSC.219(82) & MEPC.166(56))
Validity ends on 1 June 2014
CoF / Revised Att.1 (Issued under MSC.340(91) and MEPC.225(64)) valid for 5 years with "Note"
"Note" - Validity begins on 1 June 2014
CoF/ Att.1 issued at first IBC Survey on/ after Adoption
Scenario 2 - IBC Certificate of Fitness expires after Entry Into Force Date of IBC Code Amendments
CoF / Existing Att.1 (Issued under MSC.219(82) and MEPC.166(56))
Validity ends on 1 June 2014
Renewal Survey
CoF / Revised Att.1 (Issued under MSC.340(91) and MEPC.225(64)) with "Note"
"Note" - Validity begins on 1 June 2014
CoF/ Att.1 issued at first IBC Survey on/ after Adoption
Expiration date
MSC.340(91) Adoption Date 11 Nov 2012
MSC.340(91) MEPC.225(64) Entry into Force 1 June 2014

***

ANNEX 5

DRAFT BWM CIRCULAR

GUIDANCE ON BALLAST WATER SAMPLING AND ANALYSIS FOR TRIAL USE IN ACCORDANCE WITH THE BWM CONVENTION AND GUIDELINES (G2)

1 INTRODUCTION

1.1 The purpose of this guidance is to provide general recommendations on methodologies and approaches to sampling and analysis to test for compliance with the standards described in regulationsD-1 and D-2 of the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (BWM Convention). This document is an updated version of the guidance contained in document BLG 16/WP.4, taking into account advances in research since the document was first drafted. This document should be read in conjunction with the BWM Convention, the Port State Control Guidelines, the Guidelines for Ballast Water Sampling (G2), and the Guidance for the assessment of compliance with the discharge standards of the BWM Convention. Furthermore, and as instructed by MEPC 64, the sampling and analysis procedures to be used for enforcement of the BWM Convention should result in no more stringent requirements than what is required for Type Approval of ballast water management systems (BWMS).

1.2 This document is made up of two parts:

.1 a discussion of the principles of sampling, accompanied by a list of recommended methods and approaches for analysis and sampling protocols available for compliance testing to the D-1 and D-2 standards in section 5; and

.2 background information on sampling and analysis methodologies and approaches. This can be found in the annex.

1.3 Sampling and analysis for compliance testing is a complex issue. According to the *Guidelines for ballast water sampling (G2)*, testing for compliance can be performed in two steps. As a first step, prior to a detailed analysis for compliance, an indicative analysis of ballast water discharge may be undertaken to establish whether a ship is potentially in compliance with the Convention.

1.4 When testing for compliance, the sampling protocol used should result in a representative sample of the whole discharge of the ballast water from any single tank or any combination of tanks being discharged.

2 DEFINITIONS

2.1 For the purpose of this guidance, the definitions in the BWM Convention apply and:

.1 A **sample** means a relatively small quantity intended to show what the larger volume of interest is like.

.2 **Representative sampling** reflects the relative concentrations and composition of the populations (organisms and/or chemicals) in the volume of interest. Samples should be taken in accordance with the annex, part 1 and/or part 2 of the *Guidelines on ballast water sampling (G2)*.

.3 **Analysis** means the process of measuring and determining the concentrations and composition of the populations of interest (organisms and/or chemicals) within the sample.

.4 An **indicative analysis** means a compliance test that is a relatively quick indirect or direct measurement of a representative sample of the ballast water volume of interest:

.1 an indirect, indicative analysis may include measurements whose parameters do not provide a value directly comparable to the D-2 standard, including biological, chemical, or physical parameters (e.g. dissolved oxygen levels, residual chlorine levels, Adenosine triphosphate (ATP), nucleic acid, chlorophyll *a*, and that by variable fluorescence, etc. The practicalities, applicability and limitations of these methods should be understood before they are used in compliance testing;

.2 a direct measurement, which is directly comparable to the D-2 standard (i.e. the determination of the number of viable organisms per volume) may also be indicative if it has:

- a large confidence interval, or

- high detection limits; and

.3 an indicative analysis is an analysis performed in accordance with sections 4.1 and 4.2.

.5 A **detailed analysis** means a compliance test that is likely to be more complex than indicative analysis and is a direct measurement of a representative sample used to determine the viable organism concentration of a ballast water volume of interest. The result of such measurement:

.1 should provide a direct measurement of viable organism concentration in the ballast water discharge which is directly comparable to the D-2 standard (number of viable organisms per volume);

.2 should be of sufficient quality and quantity to provide a precise measurement of organism concentration (+/- [X] organisms per volume) for the size category(ies) in the D-2 standard being tested for; and

.3 should use a measurement method with an adequate detection limit for the purpose for which it is being applied.

A detailed analysis is an analysis performed in accordance with the methods and approaches in sections 4.3 and 4.4. Detailed analysis should usually be undertaken on a sample taken in accordance with the procedures in section 4.4.

.6 **Testing for compliance** using indicative analysis and detailed analysis can employ a range of general approaches or standard methods. These approaches or methods are divided into those that sample a small proportion

of the volume of interest to indicate or confirm compliance or a larger proportion of the volume of interest that can be utilized to indicate and confirm compliance. Those that provide a wide confidence interval should not be used to confirm compliance unless the result and confidence limit are demonstrably over the D-2 standard as measured directly or indirectly. Approaches/Standards are highlighted in sections 4.1, 4.2 and 4.4 for indicative analysis and sections 4.3 and 4.4 for detailed analysis.

.7 **Method** means a detailed step-by-step analysis procedure (for indicative or detailed analysis) or sampling methodology, which the laboratory or organization undertaking the work can follow, be audited against and be accredited to.

.8 **Approach** means a detailed step-by-step analysis procedure (for indicative or detailed analysis) or sampling methodology, which the laboratory or organization undertaking the work can follow. These procedures will not have been validated by an international or national standards organization.

.9 **General approach** means a conceptual description or broad methodology of sample collection or analysis.

.10 **The precision** of a measurement system is the degree to which repeated measurements under unchanged conditions show the same results.

.11 **The detection limit** is the lowest concentration level that can be determined to be statistically different from a blank sample within a stated confidence interval. Limits of detection are method and analysis specific.

.12 **Plankton** means **phytoplankton** (e.g. diatoms or dinoflagellates) **and zooplankton** (e.g. bivalve larvae or copepods) that live in the water column and are incapable of swimming against a current.

.13 **Confidence interval** means a statistical measure of the number of times out of 100 that test results can be expected to be within a specified range. For example, a confidence level of 95 per cent means that the result of an action will probably meet expectations 95 per cent of the time.

.14 **Operational indicator** means a parameter used to monitor and control the operation of the BWMS as defined during testing for Type Approval, e.g. limit values of physical or chemical parameters such as flow rates, dose, etc.

.15 **Performance Indicator** means a biological parameter (e.g. ATP, chlorophyll *a*, direct counts) used to estimate or measure the performance of the BWMS in achieving the D-2 standard.

3 PRINCIPLES FOR SAMPLING AND ANALYSIS FOR BALLAST WATER DISCHARGES

3.1 All samples and analysis carried out to determine whether a ship is in compliance with the BWM Convention should be performed under reliable and verified QA/QC procedures (note that any method, approach or sampling procedure should be rigorously validated and practicability should be assessed).

3.2 The first premise of any sampling and/or any analysis protocol is to identify the purpose of the protocol, i.e. to prove whether the discharge of a ship is meeting the D-1 standard or meeting the D-2 standard. There are many ways in which this can be done, however, they are limited by:

.1 the requirements of the methodologies available for sampling the ballast water discharge;

.2 the methods of analysis of samples being collected;

.3 the methods involved in statistically processing the results of these analyses;

.4 the specific operation of the ballast water management system (including when the treatment is applied during the ballast cycle and the type of treatment used); and

.5 the practicalities of sampling a very large volume of water and analysing it for very low concentrations of organisms.

3.3 Successful sampling and analysis is also based on identifying the viable biological population being sampled and its variability. If this population is homogenous, it is much easier to sample than one that is known to be heterogeneous. In the case of ballast water, the sample is drawn from a discharge with a population that can vary significantly. Consequently, the samples collected for indicative or detailed analysis should be representative samples.

3.4 Sampling a ballast water discharge is restricted even further when parts of the ballast water may have already been discharged. Very few inferences can be made on the quality of that ballast water already discharged based on sampling the remaining discharge as it happens. So the challenge is to determine the volume of interest and how to sample it.

3.5 The qualitative difference between indicative analysis and detailed analysis often relies on the level of statistical confidence, which, in detailed analysis may be superior.

3.6 Indicative analysis (using operational or performance indicators) can be undertaken at any time throughout the discharge. In cases where indicative analysis identifies that a system is grossly exceeding the D-2 standard, it may be sufficient to establish non-compliance, however, the practicalities, application and limitations of the methodology being used for indicative analysis need to be understood fully.

3.7 Based on the discussion in section 3.3, two different potential detailed sampling approaches can therefore be considered:

.1 sampling the entire discharge from a vessel during a port visit. During this approach:

.1 it will be impossible, by definition, for vessels to discharge prior to sampling;

.2 large numbers of samples are likely to be required over a long period of time;

.3 large sample volumes may be required over a long period of time; and

.4 sampling personnel would be required on the vessel over a significant period of time;

.2 collecting a representative sample of the ballast water being discharged during some chosen period of time, e.g. one sample or a sequence of samples. During this approach:

.1 the sampling can be developed to fit the situation on board the vessel; and

.2 a representative sample of the discharge can be taken, and that volume can be selected in many ways, providing the opportunity for identifying and sampling specific volumes of the discharge if appropriate, e.g. choosing a percentage of the discharge or sampling duration.

3.8 The D-2 standard expresses a low concentration of organisms to identify in the analysis. The confidence in the result of any sampling and analysis depends on the error inherent in the sampling method and on the error inherent in the method used for analysing the sample. The cumulative error of both must be taken into account when evaluating the result.

3.9 The tables in sections 4.1, 4.2 and 4.3 set out the range of methodologies and approaches, currently identified for use to analyse ballast water discharges and how they relate to the specific sampling protocols in section 4.4. These methodologies and approaches are stand-alone techniques that need to be combined with specific sampling protocols. These protocols should recognize the limitations of each methodology, its inherent sampling requirements, and how it can fit into a comprehensive sampling protocol for compliance testing.

3.10 Although some methodologies and approaches used in type approval testing may also be applicable in compliance testing, the latter, especially indicative sampling, may also require other approaches.

Table 1: Definition and differences between indicative and detailed analysis for the D-2 standard

	Indicative analysis	**Detailed analysis**
Purpose	To provide a quick, rough estimate of the number of viable organisms	To provide a robust, direct measurement of the number of viable organisms
Sampling		
Volume	Small or large depending on specific analysis	Small or large depending on specific analysis
Representative sampling	Yes, representative of volume of interest	Yes, representative of volume of interest
Analysis method		
Analysis parameters	Operational (chemical, physical) and/or performance indicators (biological)	Direct counts (biological)
Time-consuming	Lower	Higher
Required skill	Lower	Higher
Accuracy of numeric organism counts	Poorer	Better
Confidence with respect to D-2	Lower	Higher

4 METHODOLOGIES FOR COMPLIANCE TESTING UNDER THE BWM CONVENTION

4.1 Table 2: Analysis methods that may provide an indication of compliance with the D-1 standard*

Indicator	General approach	Standard method	Notes	Level of confidence or detection limit and citation for validation studies
Salinity	Conductivity meter to monitor salinity.	No international standard for ballast water analysis at this time although standard methods for measuring salinity do exist.	External elements can affect the salinity.	To be determined.
Salinity	Refractometer to monitor salinity.	No international standard for ballast water analysis at this time although standard methods for measuring salinity do exist.	Temperature can affect the readings.	To be determined.
Types of organisms in discharge – oceanic, coastal, estuarine or fresh water	Visual identification.	No international standard for ballast water analysis at this time.	Expensive, time-consuming, needs extensively trained personnel; may produce false results if encysted organisms from previous ballasting operations hatch.	To be determined.

* Additional information can be found in document BLG 16/4.

Indicator	General approach	Standard method	Notes	Level of confidence or detection limit and citation for validation studies
Turbidity	Portable turbidity sensors.	No international standard for ballast water analysis at this time.	Requires understanding of turbidity characteristics in relation to the distance from shore.	To be determined.
Dissolved Inorganic and Organic constituents (Nutrients, metals coloured dissolved organic matter (CDOM))	Portable nutrient sensors.	No international standard for ballast water analysis at this time.	Requires understanding of inorganic or organic constituent characteristics in relation to the distance from shore.	To be determined.

4.2 Table 3: Indicative analysis methods for use when testing for potential compliance with the D-2 standard[2]

Indicator	General approach	Standard method	Notes	Level of confidence or detection limit and citation for validation studies
Viable organisms ≥ 50 µm	Visual counts or stereo-microscopy.	No international standard for ballast water analysis at this time.	Can be expensive and time-consuming, needs moderately trained personnel. (Note that OECD Test Guideline for Testing of Chemicals 202, "*Daphnia* sp. acute immobilization test and reproduction test" could be used as basis for standard methodology.)	To be determined.
Viable organisms ≥ 50 µm	Visual inspection.	No international standard for ballast water analysis at this time.	Visual inspection is likely to only register organisms bigger than 1,000 micro-metres in minimum dimension.	To be determined.

[2] Additional reference can be found in document BLG 15/5/4.

Indicator	General approach	Standard method	Notes	Level of confidence or detection limit and citation for validation study or use
Viable organisms ≥ 10 µm and < 50 µm	Variable fluorometry.	No international standard for ballast water analysis at this time.	Only monitors photosynthetic phytoplankton and thus may significantly underestimate other planktonic organisms in this size fraction.	To be determined.
Viable organisms ≥ 50 µm and ≥ 10 µm and < 50 µm	Photometry, nucleic acid, ATP, bulk fluorescein diacetate (FDA), chlorophyll *a.*	No international standard for ballast water analysis at this time.	Semi-quantitative results can be obtained. However, some of these organic compounds can survive for various lengths of time in aqueous solution outside the cell, potentially leading to false positives. Welschmeyer and Maurer (2012)	To be determined.
Viable organisms ≥ 50 µm and ≥ 10 µm and < 50 µm	Flow cytometry.	No international standard for ballast water analysis at this time.	Very expensive.	To be determined.

Indicator	General approach	Standard method	Notes	Level of confidence or detection limit and citation for validation studies
Enterococci	Fluorometric diagnostic kit.	No international standard for ballast water analysis at this time.	Minimum incubation time 6 h. Semi-quantitative results from portable methods (see paragraph 2.2.2 of annex 1).	To be determined.
Escherichia coli	Fluorometric diagnostic kit.	No international standard for ballast water analysis at this time.	Minimum incubation time 6 h. Semi-quantitative results from portable methods (see paragraph 2.2.2 of annex 1).	To be determined.
Vibrio cholerae (O1 and O139)	Test kits.	No international standard for ballast water analysis at this time.	Relatively rapid indicative test methods are available.	To be determined.

4.3 Table 4: Detailed Analysis Methods for use when testing for compliance with the D-2 standard

Indicator	General approach	Standard method	IMO citation	Notes	Level of confidence or detection limit and Ccitation for validation studies
Viable organisms ≥ 50 µm and ≥ 10 µm and < 50 µm	Visual counts or stereomicroscopy examination. May be used with vital stains in conjunction with fluorescence + movement.	No international standard for ballast water analysis at this time, but see US EPA ETV Protocol, v. 5.1	BLG 15/5/5 and BLG 15/5/6 BLG 15/INF.6	Can be expensive and time-consuming, needs trained personnel. (Note that OECD Test Guideline for Testing of Chemicals 202, "*Daphnia* sp. acute immobilization test and reproduction test" could be used as basis for standard methodology.)	To be determined.
Viable organisms ≥ 10 µm and < 50 µm	Visual counts with use of vital stains.	No international standard for ballast water analysis at this time, but see US EPA ETV Protocol, v. 5.1	BLG 15/5/10 (method) BLG 15/5/5 and BLG 15/5/6 (approach) MEPC 58/INF.10	Requires specific knowledge to operate them. It should be noted that there may be limitations using vital stains with certain technologies.	To be determined. Steinberg *et al*., 2011

Indicator	General approach	Standard method	IMO citation	Notes	Level of confidence or detection limit and Ccitation for validation studies
Viable organisms ≥ 10 µm and < 50 µm	Flow cytometers (based on chlorophyll *a* and vital stains).	No international standard for ballast water analysis at this time.	BLG 15/5/5 and BLG 15/5/6	Expensive and require specific knowledge to operate them. It should be noted that there may be limitation using vital stains with certain technologies.	To be determined.
Viable organisms ≥ 50 µm and Viable organisms ≥ 10 µm and < 50 µm	Flow cameras (based on chlorophyll *a* and vital stains).	No international standard for ballast water analysis at this time.	BLG 15/5/5 and BLG 15/5/6	Expensive and require specific knowledge to operate them. It should be noted that there may be limitations using vital stains with certain ballast water management systems.	To be determined.

Indicator	General approach	Standard method	IMO citation	Notes	Level of confidence or detection limit and Ccitation for validation studies
Viable organisms ≥ 50 µm and Viable organisms ≥ 10 µm and < 50 µm	Culture methods for recovery, regrowth and maturation.	No international standard for ballast water analysis at this time.	BLG 15/5/5 and BLG 15/5/6	Require specific knowledge to conduct them. Densities are expressed as Most Probable Numbers (the MPN method). Most species do not manage to grow using this method therefore cannot be used alone. 2-3 weeks incubation time needed.	To be determined.
Enterococci	Culture methods.	ISO 7899-1 or ISO 7899-2	BLG 15/5/5 and BLG 15/5/6	Requires specific knowledge to conduct them. At least 44-h incubation time,. EPA Standard Method 9230	To be determined.

Indicator	General approach	Standard method	IMO citation	Notes	Level of confidence or detection limit and Ccitation for validation studies
Escherichia coli	Culture methods.	ISO 9308-3 or ISO 9308-1	BLG 15/5/5 and BLG 15/5/6	Requires specific knowledge to conduct them. At least 24-h incubation time. EPA Standard Method 9213D	To be determined.
Vibrio cholerae (O1 and O139)	Culture and molecular biological or fluorescence methods.	ISO/TS 21872-1/13/	BLG 15/5/5 and BLG 15/5/6	Requires specific knowledge to conduct them. 24-48 h incubation time. US EPA ETV Fykse *et al.*, 2012 (semi-quantitative pass/fail-test) Samples should only be cultured in a specialized laboratory.	To be determined.

Indicator	General approach	Standard method	IMO citation	Notes	Level of confidence or detection limit and Ccitation for validation studies
Enterococci, *Escherichia coli, Vibrio cholerae (O1 and O139)*	Culture with fluorescense-in-situ-hybridization (FISH)	No international standard for ballast water analysis at this time.		Requires specific knowledge to conduct them. Quantitative and qualitative results after 8 h. Samples should only be cultured in a specialized laboratory.	To be determined.
Viable organisms ≥ 50 µm and Viable organisms ≥ 10 µm and < 50 µm	Visual counts using stereomicroscopy examination. and Flow cytometry	No international Sstandard for ballast water analysis at this time.	BLG 17/INF.15	A Sampling Protocol that identifies whether a system is broken or not working and producing a discharge that is significantly above the D-2 standard. Designed to detect gross non-compliance with 99.9% confidence. Needs to be Validated.	To be determined.

4.4 Table 5: General approaches for sampling use when testing for compliance with the BWM Convention

General approaches for sampling	**Discharge line or BW tank**	**Citation for validation study or use**	**Sample error and detection limit**	**Relative sample error amongst approaches**
Filter skid + isokinetic sampling	Discharge line	Drake et al., 201First et al., 2012 (land-based testing); shipboard validation underway, Prototype 01, SGS	To be determined	Lower
Cylinder containing plankton net + isokinetic sampling	Discharge line	MEPC 57/INF.17	To be determined	Lower
Sampling tub containing plankton net + isokinetic sampling	Discharge line	Gollasch, 2006 and Gollasch et al., 2007 Cangelosi et al., 2011	To be determined	Lower
Continuous drip sampler + isokinetic sampling	Discharge line	Gollasch and David, 2010, 2013	To be determined	Lower
Grab sample	BW tank	David and Perkovic, 2004; David et al 2007, BLG14/INF.6	To be determined	Higher

4.5 Table 6: Sampling and analysis methods/approaches for use when testing compliance with the BWM Convention. A checkmark indicates an appropriate combination of sampling and analysis.

Analysis type **size class or indicator microbe** **analysis method/approach**	Filter skid + isokinetic sampling[3]	Plankton net + isokinetic sampling	Continuous drip sampler + isokinetic sampling	Grab sample
Indicative Analysis ≥ 50 µm Visual inspection Stereomicroscopy counts Flow cytometry Nucleic acid ATP Chlorophyll *a,* Bulk *FDA*	✓	✓		
Indicative Analysis < 50 µm and ≥ 10 µm variable fluorometry Flow cytometry Nucleic acid ATP Chlorophyll *a,* bulkBulk *FDA*			✓	✓
Indicative Analysis Enterococci, *E. coli* Fluorometric diagnostics			✓	✓

[3] Methods other than using an isokinetic approach as defined in Guidelines (G2) for acquiring a representative sample may be used in certain circumstances. Such methods should be validated prior to use.

Analysis type **size class or indicator microbe** **analysis method/approach**	Filter skid + isokinetic sampling[3]	Plankton net + isokinetic sampling	Continuous drip sampler + isokinetic sampling	Grab sample
Indicative Analysis *Vibrio cholerae* Test kits Culture methods + microscopy			✓	✓
Detailed Analysis ≥ 50 µm Stereomicroscopy counts Flow cytometry/Flow camera	✓	✓		
Detailed Analysis < 50 µm and ≥ 10 µm Visual counts + vital stain(s) Flow cytometry/Flow camera Culture methods			✓	
Detailed Analysis Enterococci, *E. coli* Culture methods FISH with pre-cultivation			✓	
Detailed Analysis *Vibrio cholerae* Culture methods FISH with pre-cultivation			✓	

4.6 References

David M & Perkovic M (2004). Ballast Water Sampling as a Critical Component of Biological Invasions Risk Management, Marine Pollution Bulletin, Vol. 49, 313–318.

David M, Gollasch S, Cabrini M, Perkovič M, Bošnjak D & Virgilio D (2007). Results from the First Ballast Water Sampling Study in the Mediterranean Sea - the Port of Koper Study. Marine Pollution Bulletin 54(1), 53-65

First MR, Lemieux EJ, Hyland WB, Grant JF, Moser CS, Riley SC, Robbins-Wamsley SH, Steinberg MK, Wier TP, Drake LA (2012). Validation of a closed-housing filter skid for in-line sampling of aquatic organisms. Journal of Plankton Research 34:321-331

Fykse EM, Nilsen T, Nielsen AG, Tryland I, Delacroix S, Blatny JM (2012). Real-time PCR and NASBA for rapid and sensitive detection of *Vibrio cholerae* in ballast water. Marine Pollution Bulletin 64:200-206

Gollasch S (2006). A new ballast water sampling device for sampling organisms above 50 micron. Aquatic Invasions, Volume 1, Issue 1: 46-50

Gollasch S, David M, Voigt M, Dragsund E, Hewitt C & Fukuyo Y (2007). Critical review of the IMO International Convention on the Management of Ships' Ballast Water and Sediments. In Hallegraeff, G.M. (ed.): Harmful Algae 6, 585-600

Gollasch S & David M (2013). Recommendations for Representative Ballast Water Sampling. Final report of research study of the Bundesamt für Seeschifffahrt und Hydrographie (BSH), Hamburg, Germany. Order Number 4500025702. 28 pp.

Gollasch S & David M (2010). Testing Sample Representativeness of a Ballast Water Discharge and developing methods for Indicative Analysis. Final report of research study undertaken for the European Maritime Safety Agency (EMSA), Lisbon, Portugal, 124 pp.

Steinberg MK, Lemieux EJ, Drake LA (2011). Determining the viability of marine protists using a combination of vital, fluorescent stains. Marine Biology 158:1431-1437

U.S. Environmental Protection Agency (2010). Environmental Technology Verification Program (ETV) Generic protocol for the verification of ballast water treatment technology, Version 5.1. Report number EPA/600/R-10/146, United States Environmental Protection Agency, Washington, D.C

Welschmeyer N & Maurer B (2012). A portable, sensitive plankton viability assay for IMO shipboard ballast water compliance testing. In: Proceeding of the Global R and D forum on Compliance Monitoring and Enforcement, Eds. A. Olgun, F.T. Karokoc and F. Haag

Throndsen, J (1978). Chapter 7.6: The dilution-culture method. In Phytoplankton manual, Ed: Sourina, A., UNESCO, France, p. 218-224.

ANNEX

TECHNICAL DISCUSSION FOR THE GUIDANCE TO BALLAST WATER SAMPLING AND ANALYSIS IN ACCORDANCE WITH FOR COMPLIANCE TO THE BWM CONVENTION AND GUIDELINES (G2)

1 INTRODUCTION

1.1 The purpose of this annex is to provide background information on:

- the development and use of methodologies for both indicative and detailed analysis and appropriate sampling; and

- analysis of the sample at an accredited laboratory.

1.2 This annex highlights the advantages, disadvantages and limitations of many different measures. Although recommendations are given in this document on what methodologies may be used, there are distinct benefits in using certain technologies at certain times. This should not stop the use of any of the methodologies, as long as the limitations are taken into account.

1.3 Any methods for analysis used for assessing compliance with the BWM Convention should be carefully validated under a range of operating conditions.

2 INDICATIVE ANALYSIS: METHODOLOGY AND APPROACHES

2.1 The D-1 standard

2.1.1 The D-1 standard requires the vessel to exchange its ballast water 200 nm from the coastline in waters 200 m deep, or if this cannot be achieved for safety reasons, 50 nm from the coastline in waters of the same depth. Therefore, the water in exchanged ballast water should have a similar salinity to that of mid-ocean water.

2.1.2 Indicative analysis for the D-1 standard of the BWM Convention could rely on the chemical parameters (e.g. salinity) of the water in the ballast water discharge, or on an estimate of species present. However the latter might need trained personnel, If the ballast water discharge being tested has a salinity significantly less than that of 30 PSU, then it is likely that the ballast water has not been exchanged en route under the conditions required in the D-1 standard, or that the exchange has not been completed successfully.

2.1.3 Two exceptions to this are:

- when ballast water is taken up in port areas that are located in high-salinity environments, above 30 PSU. In such a case ballast water with a PSU of 30 may not originate from mid-ocean waters and therefore the ship may not be compliant with the D-1 standard; or

- when ballast water has been exchanged in designated ballast water exchange areas within 50 nm from the coastline in waters that may be of less salinity than the mid-ocean water. In this case the ballast water exchange would be compliant.

Therefore the origin of the last ballast water exchange should be known before interpreting the results of salinity analysis.

2.1.4 Checking salinity could be backed up by further analysis of the organisms in the ballast water discharge to determine the origin of the ballast water, however this would take time and need experienced staff. This can be done in line with the visual analysis methodologies outlined in paragraph 2.4.3 below. However, it should be noted that there are many external factors that could affect the salinity and the organisms in the ballast water, such as wet sediments in the ballast tanks, the state of the tide in the port concerned during its uptake and the fact that exchange may not remove all coastal organisms.

2.1.5 There are many ways to quickly and easily monitor the salinity of water on the market, and generic salinity measures should be used for indicative analysis.

2.2 Bacteria levels in the D-2 standard

2.2.1 Bacterial levels could be tested by a wealth of available portable methods. However, as the D-2 standard for bacteria is measured in colony forming units (CFU), the systems utilized may have to include a specific incubation time of the samples, which for commercially available systems is never shorter than four hours. Therefore, the time it takes for incubation limits the use of such systems for indicative analysis.

2.2.2 Advances in fluorometric diagnostics have resulted in a methodology that identifies the presence or absence of bacteria in a sample of the ballast water discharge. This methodology is based upon the detection of enzymes produced by the target bacteria in unconcentrated fresh water or marine samples and presently easily portable test kits for E. coli and Enterococci are available. This method can identify low levels of bacteria in water samples in less than 10 minutes, but the results are only semi-quantitative, i.e. a low level reading equates to a low level of bacteria. However, although the presence of bacteria can be shown, whether or not these organisms are living (i.e. form colonies) cannot be proven with this method at the present time. These diagnostic methods could be used in indicative analysis if very large numbers of organisms are identified.

2.3 Organisms of less than 50 micrometres and greater than or equal to 10 micrometres in minimum dimension[4] in the D-2 standard

2.3.1 Methods to measure the organisms in this category of the D-2 standard can be divided into two categories as follows:

.1 the use of biological indicators for organisms:

.1 nucleic acid;

.2 adenosine triphosphate (ATP), a coenzyme used as the main energy storage and transfer molecule in the cells of all known organisms; and

.3 indicators for the presence of organisms, such as chlorophyll *a,*

[4] The "Minimum Dimension" means the minimum dimension of an organism based upon the dimensions of that organism's body, ignoring e.g. the size of spines, flagellae, or antenna. The minimum dimension should therefore be the smallest part of the "body", i.e. the smallest dimension between main body surfaces of an individual when looked at from all perspectives. For spherical shaped organisms, the minimum dimension should be the spherical diameter. For colony forming species, the individual should be measured as it is the smallest unit able to reproduce that needs to be tested in viability tests. This should be considered whenever size is discussed in this document.

.2 the use of direct counts of living organisms (coupling a means to determine viability and manual or automatic counting of individual organisms).

2.3.2 The presence of nucleic acid or ATP in a sample may be taken as an indication of life, but it should be noted that this nucleic acid or ATP could come from any living organism of any size within the sample. There are no definitive methods available to correlate the amount of nucleic acid or ATP with the amount, or viability of organisms in the sample and, therefore, the presence of these chemicals are limited as an indicative analysis methodology. However, zero measurements of these chemicals may indicate that no organisms are in the sample, i.e. the treatment process was successful and in the D-2 standard is being met. Additionally, if nested filters are used to isolate specific size groups, then ATP, which degrades relatively quickly, can provide an indication of the potential presence of a large concentration of organisms in one size class. If linked to thresholds of ATP concentrations, this can be used to indicate samples which are highly likely to be above the standard.

2.3.3 The same problems occur when using other bio-chemical indicators to monitor the number of organisms in this category. As many of the organisms in this size range are likely to be phytoplankton, an obvious step would be to measure the level of chlorophyll *a*, a photosynthetic pigment which is essential for photosynthesis in the sample. Zero concentrations may indicate that there is no phytoplankton in the sample and chlorophyll *a* may also be a good indicator as to whether a BWMS using an oxidizing process was working to design dosages, as it might be expected to bleach such pigments. However, caution has to be exercised as:

.1 chlorophyll *a* can persist in seawater outside of a cell, therefore sampling should only be limited to the particulate phase. However, nucleic acid and ATP can exist in dead organisms, detrital material, senescent or dead cells, decomposing macroalgae, plant detritus from terrestrial ecosystems and other non-living particles, etc.;

.2 there may be zooplankton in the sample being analysed;

.3 no cell count can be directly measured from a chlorophyll *a* measurement, as many small cells may provide a similar signal strength to that of fewer bigger cells; and

.4 no size distinction can be made and the chlorophyll *a* could derive from phytoplankton in the larger size category of the D-2 standard.

As a consequence, direct concentration measurements of this chemical would be difficult to use in indicative analysis. A wealth of portable tools exists to document the chlorophyll a content in seawater.

2.3.4 One potential exception is the Pulse-Amplitude Modulated Fluorometer (PAM) which measures the chlorophyll *a* fluorescence in living cells by exciting chlorophyll *a* molecules and registering the subsequent fluorescent signal. Such a response is only available in living cells and it should be noted that this method only provides an indirect measurement of those phytoplankton that use chlorophyll *a* in the sample, in both size categories of the D-2 standard. Testing this methodology on ballast water discharges suggests that there is a correlation between the ratio of variable and maximum fluorescence and the number of phytoplankton in this size category. However, the relationship between fluorescence signals and mixed assemblages of phytoplankton from different locations needs to be validated.

2.3.5 For analysis of organisms above 10 microns in minimum dimension, a flow cytometer may also be used. A common element of these systems is that they automatically count

objects, including organisms, per size class in a fluid. The more simplified systems cannot separate organisms from sediment and detritus, or living from dead organisms. More sophisticated systems can also assess organism viability for phytoplankton by using organism stains together with flow cytometry. The separation of living phytoplankton from detrital material and zooplankton is based on the presence of auto chlorophyll fluorescence of phytoplankton cells. It should be noted, however, that using chlorophyll *a* fluorescence as an indicator of living organisms may result in overcounting, as the molecule can remain intact for a significant amount of time as has been proved in preparing fixed (dead) samples. The practicability to use such devices on board a ship should be carefully assessed before use. To make a stable stream to produce adequate size of water particles, the device should be set in perfectly horizontal. Also any vibration should be isolated for accurate measurement.

2.3.6 Systems using flow cytometry deliver automated results promptly and may be used to assess the number of living phytoplankton in a sample after treatment with a viability stain. However, readings provided by the flow cytometer should also be examined manually to verify the automated readings. Concerns have been raised by users that the viability of smaller algae may not always be categorized correctly in these systems, as the viability signal may be too low for detection. Other concerns include the efficiency of portable versions and the limited ability of some of them to monitor organisms greater than or equal to 50 micrometres in minimum dimension. Although these systems may become a major tool in the future, there are elements, such as the reliability of portable versions of the systems that limit their use at the present time, which is especially the case for organisms greater than or equal to 50 micrometres in minimum dimension. Also, it is not clear if the time to analyse a sample is greater than can be allotted in compliance testing. These can be overcome by taking the sample off the ship and using a fixed or mobile system near to the ship or the port.

2.3.7 Visual inspection could be another method of indicative analysis that is a quick and simple way to justify the need for detailed analysis. Taking an appropriate sample, concentrating it if necessary, and visually inspecting it against the light may show living organisms in the sample, but it should be noted that without magnification a visual inspection is likely to result in only organisms greater than or equal to 1,000 micrometres in minimum dimension being detected, unless chains or clumps are formed by colony forming organisms or the density of organisms is sufficiently large to colour the water. An assessment of the viability in such an inspection is limited to complete body movements of the organisms as organ activity and antennae or flagella movements may not be seen. As samples from BWMS that are not compliant are likely to contain organism levels that are orders of magnitude above the D-2 performance standard, visual inspections could be used in indicative analysis. However, it is assumed that only organisms bigger than 1,000 micrometres in minimum dimension may be determined in such way, therefore its use for this size category is limited.

2.3.8 Visual inspection can also be undertaken using a field stereomicroscope with a low magnification (e.g. x 10). However, this methodology may require concentration of the sample and may need analysis by a trained operator to detect viable organisms. It should be also be noted that this methodology would be more efficient and practicable for organisms greater than or equal to 50 micrometres in minimum dimension.

2.4 Organisms greater than or equal to 50 micrometres in minimum dimension in the D-2 standard

2.4.1 Many of the methodologies for monitoring organisms less than 50 micrometres and greater than or equal to 10 micrometres in minimum dimension may also be valid for monitoring organism levels in this category. However, nucleic acid and ATP methodologies encounter the same problems as outlined in paragraphs 2.3.2 and 2.3.3; and monitoring chlorophyll *a* levels, through fluorometers or the PAM methodology described above, has limited value for this size category of the D-2 standard, as the majority of organisms in this category are likely to be zooplankton.

2.4.2 Visual inspections may significantly underestimate the number of organisms in this size category due to the issues described in paragraph 2.3.8. However, the method may be robust enough to determine whether the BWMS is working at orders of magnitude above the D-2 standard based on a simple extrapolation from the sample to the D-2 standard. Detailed analysis may be needed to confirm this, especially when levels near the D-2 standard are encountered.

2.4.3 Additionally, stereomicroscopy can also be used to identify viable organisms greater than or equal to 50 micrometres in minimum dimension. The sample should be concentrated appropriately. Viability assessment should be based on movements of intact organisms. This movement may be stimulated. In addition organ activity should be observed and fully intact non-moving organisms which show organ activity should be counted as living. Stains might also be used to help in viability determination – though methods are still under development. The viable organism numbers should be recorded and the numbers extrapolated up to the total volume of water filtered.

2.4.4 If the results in paragraphs 2.4.2 and 2.4.3 show elevated levels of organisms, then this result will indicate that the D-2 standard is not being met.

2.4.5 Further research must be encouraged; innovative methods for assessing for D-2 compliance, preferably based on in situ, automatic sampling and analytical procedures, should facilitate the most uniform implementation of the BWM Convention.

2.5 Operational indicators

2.5.1 Other indirect parameters and indicators could be used to indicate whether a BWMS is meeting the D-2 standard. These include, but are not limited to, indicators from the electronic self-monitoring of the BWMS and residual chemicals (or lack of) from the BWMS, such as dissolved oxygen levels, residual chlorine, etc.

3 DETAILED ANALYSIS METHODOLOGIES AND APPROACHES

3.1 Once detailed analysis has been instigated by the port State, they should be prepared to undertake full analysis of the sample at an appropriate laboratory.

3.2 Bacteria

3.2.1 There are already international standards in place to analyse for the bacteriological indicators contained within the D-2 standard.

3.2.2 For Enterococci, ISO 7899-1 or 7899-2; or Standard Method 9230 (in the United States) should be used, and ISO 9308-3, ISO 9308-1 or Standard Method 9213D (in the United States) are appropriate for Escherichia coli.

The methods used should be quantitative and based on a 95–percentile statistical evaluation. The number of laboratory samples should be sufficient to define the mean and standard deviation of Log 10 bacterial enumerations.

3.2.3 For *Vibrio cholerae* ISO/TS 21872-1/13 is appropriate. 100 ml of ballast water should be filtered and incubated according to ISO/TS 21872-1. Analysis needs to be undertaken in a specialist laboratory.

3.3 Organisms of less than 50 micrometres and greater than or equal to 10 micrometres in minimum dimension

3.3.1 Many of the analysis methods used to ascertain the numbers of organisms within this category have already been discussed in section 2. However, section 2 focuses on indicative analysis, rather than the more detailed analysis. Therefore, the following sections examine these methodologies in more detail. Some of these methodologies discussed here also relate to organisms greater than or equal to 50 micrometres in minimum dimension.

3.3.2 Simple upright and inverted microscopes are very useful for the enumeration of morphologically healthy organisms and motile organisms, as well as for measuring the size of organisms. Using this technology needs some skill and experience to evaluate the health of the individual organisms in the sample. However, this technology and experience should be available globally.

3.3.3 Fluorescence generated from photosynthetic pigments can be used for more detailed analysis of the morphological health of organisms and for the evaluation of stained organisms and a microscope with fluorescence capabilities is needed. However, this methodology only identifies phytoplankton (both living and dead) in the sample and makes no size differentiation. Zooplankton should be analysed through the methods highlighted in section 3.4.

3.3.4 Fluorescein di-acetate (FDA), chloromethylfluorescein diacetate (CMFDA) and Calcein-AM vital stains have both been used to determine viability. When non-specific esterases (enzymes found in live cells) are present, they cleave the acetate groups from the stains, and the resultant fluorescein molecules fluoresce green when illuminated with a blue light from an epi-fluorescence microscope. This method works best with live samples. Microscopes with a fluorescence capability and operators with skills and experience of analysis should be available at universities and research laboratories worldwide. However, it should be noted that these stains do not always work on all species or at all salinities and further research to validate this approach may be needed to support the use of these stains for this type of analysis.

3.3.5 Flow cytometers are advanced technologies which can be used in a laboratory to determine size, and viability of organisms in ballast water when a reliable vital stain(s) is (are) used to indicate organism viability. Cytometer detected particles, including organisms, can be processed visually or by a computer to quantify viable organisms in that sample. These systems reduce manual labour, but require specific knowledge to operate them. High particle loads in ballast water may reduce the detection limits of these methodologies and the volume of samples analysed. At the present, portable versions of these technologies have not fully been proven for use on ballast water discharges, however, samples could be taken off the ship and analysed using a fixed or mobile system near to the ship or the port.

3.3.6 Regrowth experiments, in which the visual appearance of photosynthetic organisms in a sample is followed by a specific period in order to quantify the Most Probable Number (MPN), are methods to evaluate the number of organisms in a sample. However, these are slow and are work intensive. In addition, a major drawback of this methodology may be that specific growth factors during the incubation may not be fulfilled, giving a risk of bias. Regrowth and reproduction may be seasonably variable, giving different results at different times. Further, a viable organism may be in good health and reproducing rapidly, or in poor health, not reproducing until health has improved. Finally, this is likely to be time-consuming.

3.3.7 Bulk parameter measurements, such as photosynthetic activity, are also not suitable for detailed analysis (please see paragraphs 2.3.2 and 2.3.3), but can be used as supporting data for other methods used to determine the number of viable organisms in the ballast water samples.

3.3.8 Planktonic organisms may be fragile and samples may need to be concentrated further to aid the accurate quantification of organisms. There are many methods to achieve this, however, care has to be taken to reduce physical stress as this may result in reduced viability levels. A simple, rapid, flexible and cautious method for concentrating plankton cells is the use of transparent membrane filters. If the sample analysis is performed on board the sample can be filtered directly on to this membrane, which can subsequently be placed directly under a microscope for examination. The sample volume to be analysed would need to be adjusted depending on the cell density, however, live, vital stained and fixed organisms within this size category can be evaluated on these filters. If the representative analysis is performed at a laboratory, this process for concentration should be performed at the laboratory just before starting the staining process to avoid under-estimate of viable organisms. Importantly, the loss (if any) of organisms (i.e. those cells passing through the filter and recovered in the filtrate) would need to be determined. Alternatively a filter mesh may be used to concentrate the sample and the concentrated organisms may, after filtration, be transferred into an observation chamber. Again, the loss of organisms through damage must be quantified.

3.4 Organisms greater than or equal to 50 micrometres in minimum dimension in the D-2 standard

3.4.1 Paragraphs 3.3.2 to 3.3.8 are also applicable to the analysis of organisms in this size category.

3.4.2 In addition, the following issues need to be considered when developing a methodology for analysing organism numbers in this size category:

.1 testing the sample for movement and response to different stimuli are simple techniques for the examination of viable/dead zooplankton under a stereomicroscope. The observation for organ activity, such as heartbeats, may also contribute to the viability assessment. The use of a filtering mesh (e.g. 50 microns in diagonal dimension) under the Petri dish of the stereomicroscope, or the addition of 50 micron micro beads to the sample, may help with size calculations and vital stains may also add value to these methodologies. Separate guidelines on this issue are being developed through the land-based facilities and the ETV protocol in the United States;

.2 methods using a combination of flow cytometry and microscopy have the disadvantage of high complexity, high price and small sample sizes, which means the ballast water samples would have to be concentrated further; and

.3 the storage condition and time before analysis is likely to be critical to reduce mortality in the sample.

3.4.3 It is therefore recommended that simple microscopic examination of organisms in this size category is used for compliance monitoring. The microscopic examination of organisms is a robust, simple and cheap methodology which can be completed in laboratories worldwide.

4 Sources of error

4.1 The ideal method for compliance monitoring is a procedure that:

- detects organisms in the ballast water discharge*;*
- has an appropriate limit of detection;
- is precise;
- is accurate;
- is economical;
- is quick;
- can be carried out with minimal technical expertise; and
- can be obtained in all parts of the world.

However, any result obtained would have to include confidence limits based on both the sampling error and analytical error.

4.2 Sources of error include, but are not limited to, errors arising within:

.1 sampling, including:

- sample loss (e.g. during filtration);
- incorrect use of equipment;
- day-to-day variations in the conditions in which the sampling is taking place; and
- the experience of the technicians;

.2 processing the sample, including:

- incorrect use of equipment;
- day-to-day variations in the conditions in which the sampling is taking place; and
- the experience [and fatigue] of the technicians;

.3 analysis of the sample:

- incorrect use of equipment;
- the experience [and fatigue] of the technicians;
- day-to-day variations in the conditions in which the sampling is taking place;
- the number of organisms counted. The distribution of organisms in a range of samples usually follows the Poisson distribution and higher numbers of samples give a lower relative variation and sample error;
- the inherent variation and errors arising from the methods used for analysis. This is especially so when the evaluation of organism numbers in a sample is based on manual counting methods due to human error. For example, although the definition of the minimum dimension of an organism in Guidelines (G2) is quite detailed, analytical results may be influenced by practical issues. These include situations when the size of an organism is determined on a two dimensional microscope, which cannot view the organism "from all perspectives"; and
- poor harmonization between laboratories and quality control within the laboratory. In the field of chemical analysis, inter-laboratory calibration occurs and is tested. Inter-laboratory calibration of biological samples is also common practice, but the difficulty in the compliance monitoring context is that the viability of the organisms needs to be documented and the viability may be impaired by the mode and duration of sample shipments to different laboratories. Therefore, laboratories should be well managed, and uncertainty limits (the analysis variation) should be calculated for each laboratory. This should be achieved in conjunction with ISO 17025, which provides a standard for the general requirements needed by laboratories to prove they are competent to carry out tests and/or calibrations, including sampling.

4.3 The variation arising from sampling should be added to that from analysis to determine the confidence limits within which the true value of the organism number lies. This has an important bearing on how the result can be used for enforcement of the BWM Convention.

4.4 The sampling uncertainty can be obtained by setting up a null–hypothesis, that is a general or default position that is expected in the results, e.g. the average concentration of organisms is equal to the D-2 standard at a selected level of significance and then the data would be analysed using one of the following tests:

Table 1: Statistical handling of the results

Distribution of the results	Test	Notes
Normal distribution	t-test	It is unlikely this test will be used, as it is not used with "rare" populations, i.e. the expected population of organisms in treated ballast water
A distribution that is not normal	Non-parametric Wilcoxon rank test	Not normal due to the small number of samples
Poisson distribution	Chi-square test	Used when the analytical results are treated as one sample (i.e. the numbers of organisms over the entire volume are very rare [low] and combined).

Ideally, an analysis of the distribution should be performed before the data are statistically evaluated.

4.5 There has been much discussion within the IMO on whether the results of the analysis should be averaged to assess compliance or that every result should have to meet the D-2 standard. This is a unique debate at IMO due to the biological nature of the subject matter being analysed, and different States have significantly different views on this issue. Therefore, it will be very difficult to arrive at a conclusion as in the case of non-compliance the results of the analysis are likely to be used in the legal jurisdictions of each IMO Member State, and each of those States may require different evidence to support any enforcement action.

4.6 If the results of detailed analysis are to be averaged, then both the sample variation and the analysis variation need to be calculated and applied to the result. However, some analysis of the sample variation may be needed, as it may be unacceptably high. For example, for five treated ballast water samples, viable organism number results of 9,9,9,9 and 9 will provide the same average as 0,0,0,0 and 45. Both systems would pass the D-2 standard, if averaged; however, the variation is considerably bigger for the second set of results and may prove to be unacceptable because of the one large value.

4.7 If each of the results is treated as an individual value that has to meet the D-2 standard, then again the confidence limits would have to be calculated from the sampling and analytical errors. Here if all results are less than the D-2 standard, then the sampling has proved that the BWMS is meeting the standard.

4.8 The basic difference between instantaneous and average approaches is that the results of the average approach describe the variations of the concentration of organisms during the de-ballasting event, whereas the results of the instantaneous approach describes the variation based on the assumptions of the Poisson distribution. However, the average approach, based on the results of a few samples, has the disadvantage that the variation may be too high, is unacceptable and needs to be improved, which could invalidate the evaluation and lead to inconclusive results.

4.9 The instantaneous approach has the disadvantage that variations in the organism levels at different times of the discharge are not taken into account, which should not be a problem if all the samples meet the D-2 standard. If the discharge is not always under

the D-2 standard, the problem can be mitigated by using a flow-integrated sample over set periods of time, which, if taken properly, represents an average of the organisms in the treated ballast water over that time when presented with variance estimates and confidence intervals. This constitutes a better representation of the ballast water quality than separate samples. In addition, a lower variation should be obtained because a larger sample is being analysed. The average approach is likely to have the same disadvantages unless the samples are very large and collected over most of the discharge.

4.10 The differences between applying an instantaneous sampling regime or an average sampling regime to the result are less extreme when taking numerous flow-integrated samples. This is because for each discharge there will be a number of results arising from samples that have been averaged over a specific time.

5 DETAILED ANALYSIS: THE SAMPLE PROTOCOL

5.1 Sample protocols for discharges of treated ballast water through a distinct discharge point fall into two categories, the first based on specified and replicated volumes and the second based on flow integration over a specified time. The first entails taking a specific number of set volumes of the ballast water discharge, whilst the second takes a continuous sample over a set time period. The flow integration sampling protocol can be achieved by either continuously sub-sampling a small amount throughout the entire duration of the discharge, therefore collecting one sample over time, or taking multiple sub-samples over a specific time scale (i.e. 5 minutes, 10 minutes or 15 minutes) repeatedly throughout the discharge, providing a result for each subsample.

5.2 However, for sampling protocols based on specified and replicated volumes, defining both the number of samples and their volume to ensure representativeness, takes time. As a representative sampling procedure is needed to ensure compliance with the BWM Convention, then the flow integration protocols based on set times should be implemented.

5.3 Using a sampling protocol that continuously sub-samples small amounts throughout the entire duration of the discharge, may significantly underestimate the amount of larger organisms (i.e. organisms greater than or equal to 50 micrometres in minimum dimension) in the sample due to damage to the organisms held in the cod-end of the filter. If such a system is used then a protocol for replacing the cod end needs to be developed.

5.4 The arrangements for detailed analysis should take into account the requirements of the methods and/or approaches they intend to use for detailed and/or indicative analysis. Special consideration should be given and contingencies arranged for sampling in remote ports, where it is likely to take time to mobilize samplers and sampling resources.

6 DETAILED METHODOLOGY

6.1 As described in paragraph 5.1, there are two distinct ballast water sampling protocols, one based on flow integration and one based on the use of specified and replicated volumes. As they both use filtration and concentration of the sample the following section can apply to both methods.

6.2 For in-line sampling, a sampling system should be set up which:

- collects organisms greater or equal to 50 µm;
- allows samples of the ballast water to be taken and filtered;
- enables the amount of ballast water sampled to be measured to allow for extrapolation of the results; and
- allows the filtered ballast water to be discharged safely without affecting the stability and safety of the ship, its crew and the samplers, or other discharges from the vessel such as bilge water.

***

ANNEX 6

RECOMMENDATIONS RELATED TO THE TRIAL PERIOD FOR REVIEWING, IMPROVING AND STANDARDIZING THE CIRCULAR ON GUIDANCE ON BALLAST WATER SAMPLING AND ANALYSIS FOR TRIAL USE IN ACCORDANCE WITH THE BWM CONVENTION AND GUIDELINES (G2)

Introduction

1 Circular BWM.2/Circ.[...] provides the current state of knowledge of methods and approaches for ballast water sampling and analysis.

2 It is recognized that the many of the sampling and test methods in the circular have not yet been adequately validated. As a consequence, these methods have not yet been fully integrated in port State control procedures in order to validate their practical utility for determining compliance with the Convention. Given that these methods are rapidly improving, Member States and observers are encouraged to further develop sampling and analysis protocols, including but not limited to, the range of options outlined in the Circular. Information on detailed protocols should be provided to the Sub-Committee for inclusion in revisions of the Circular as appropriate.

3 Once the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 enters into force, a trial period will be initiated where port State control can further trial the approaches in the circular to ensure they are practical and fit for purpose. The trial period would be for 2 to 3 years following entry into force of the Convention.

4 It is to be noted that MEPC 64 agreed that sampling for port State control should be no more stringent than the sampling used for type approval of a ballast water management system.

5 The results of the trial will be reviewed by the Committee and when appropriate the trial should be halted or extended. The goal at the end of the trial period would be to have a suite of accepted procedures that can be used for sampling and analysing ballast water in a globally consistent way.

Nature of Trial Period

6 The trial period, and the data gathered during the trial, is essential in providing a sound basis for future enforcement. Prior to a satisfactory completion of the trial period, leading to agreement on the appropriate sampling and analysis protocols, port States would refrain from applying criminal sanctions or detaining the ship, based on sampling. This does not prevent the port State from taking preventive measures to protect its environment, human health, property or resources

7 During the trial period, aside from the provision above relating to sampling, all port State control activities (for example certificate review and operating procedural review) and enforcement options will be available to port State control. Therefore, the ship should have evidence that the ballast water management system is Type Approved and has been maintained and operated in accordance with the ships' Ballast Water Management Plan. The system should incorporate a self-monitoring system in accordance with the Guidelines (G8) and associated guidance. Having a treatment system particulars document on board is also recommended (see document MEPC 61/INF.19).

Trial Procedure

8 The trial will evaluate, review and assess the potential sampling and analysis protocols with a view to recommending for approval by the Committee detailed analysis protocols that may be used to assess compliance with regulation D-2 of the Convention.

8.1 At least one standard precise protocol for indicative and detailed analysis of organisms at each size class is desired; the trial may, however, identify that multiple protocols are available for detailed or indicative analysis at a given size class. Key factors to be reviewed for each protocol will be:

8.1.1 Practicability:

.1 Cost effectiveness and timeliness; and

.2 General applicability with regard to vessel type and geographic region.

8.1.2 Effectiveness in assessing compliance:

.1 Consistency with Guidelines (G8) Type Approval sampling procedures

9 In advance of the trial, before the required entry into force conditions for the BWM Convention have been met, the following actions are anticipated:

.1 development of new methods and scientific validation of new and existing methods, approaches and general approaches communicated to the Organization are incorporated into BWM.2/Circ.[…] on an on-going basis;

.2 further development of PSC guidance by FSI; and

.3 development and approval of the process by which the trial will be evaluated.

10 In advance of the trial, at the first meeting of the Sub-Committee after the required entry into force conditions for the BWM Convention have been met, the following actions are anticipated:

.1 The methods and approaches in BWM.2/Circ.[…] that are considered mature enough for use in the context of port state control are identified for inclusion in the trial;

.2 taking into account the methods and approaches identified in paragraph 10.1, the trial procedure is reviewed and confirmed; and

.3 the methods and approaches and trial procedure identified are communicated to all interested parties by the Organization.

11 During the trial, the following actions are anticipated;

.1 port States sample and analyse the ballast water on vessels according to the port State control guidelines, using the methods and approaches selected in paragraph 10.1; and

.2 port States share the results of the sampling and analysis process as usual, making clear the trial nature of the procedure.

12 Following the first year of the trial, which begins upon the entry into force of the convention, the following actions are anticipated:

.1 port States that sample and analyse the ballast water of ships may submit information reports to the BLG Sub-Committee on the key factors for review listed in paragraph 8, and generally on any insights gained that are relevant to the purpose of the trial period;

.2 similarly, Member States and observers may submit information reports containing similar insights drawn from their experiences or brought to their attention during the trial; and

.3 following consideration of these reports, the Organization reviews the details of the methods and approaches being trialled and/or removes/adds methods and approaches as appropriate. Appropriate revisions are made to BWM.2/Circ.[…] and communicated to all interested parties by the Organization.

13 Following the second year of the trial, the following actions are anticipated:

.1 the actions described in paragraph 12 are repeated;

.2 the reports from both years of the trial are reviewed to determine if changes are needed to standardize the options available; and

.3 consideration is given to any need to extend the trial to a third year.

14 Following the conclusion of the trial, the following actions are anticipated:

.1 recommendations are provided to the Committee on standardized sampling and analysis protocols considered appropriate for use in the assessment of compliance with regulation D-2, and amendments are incorporated in BWM.2/Circ.[…];

.2 the agreed arrangements in paragraphs 6 and 7 in place for the trial are discontinued; and

.3 advances in scientific knowledge on methods, approaches and general approaches that are communicated to the Organization are considered by the Committee and may be incorporated into BWM.2/Circ.[…] if approved, for use by port State control officers.

***

ANNEX 7

DRAFT MEPC RESOLUTION

**INFORMATION REPORTING ON
TYPE APPROVED BALLAST WATER MANAGEMENT SYSTEMS**

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee conferred upon it by the international conventions for the prevention and control of marine pollution,

RECALLING ALSO that the International Conference on Ballast Water Management for Ships held in February 2004 adopted the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (the Ballast Water Management Convention) together with four Conference resolutions,

RECALLING FURTHER that, on entry into force, the Ballast Water Management Convention will require ships to install ballast water management systems, which meet the D-2 standard stipulated therein,

RECOGNIZING that the collection and dissemination of accurate information on type-approved ballast water management systems (BWMS) will be beneficial for all interested stakeholders,

NOTING resolution MEPC.175(58) by which the Committee adopted the Information reporting on type-approved ballast water management systems,

HAVING CONSIDERED the recommendation made by the Sub-Committee on Bulk Liquids and Gases at its seventeenth session, on the need to revise resolution MEPC.175(58),

1. INVITES Member States, when approving a ballast water management system in accordance with the Guidelines for approval of ballast water management systems (G8), to report the following information to the Organization:

.1 approval date;

.2 name of the Administration;

.3 name of the BWMS;

.4 a copy of the Type Approval Certificate and any appendices which includes details on all imposed limiting conditions on the operation of the BWMS in accordance with paragraph 6.1 of the Guidelines for approval of ballast water management systems (G8) (resolution MEPC.174(58)) as follows: Such limiting conditions to include any applicable environmental conditions (e.g. salinity, UV transmittance, temperature, etc.) and/or system operational parameters (e.g. min/max pressure, pressure differentials, min/max Total Residual Oxidants (TRO), etc.);

.5 an annex to the Type Approval Certificate which contains the test results of each land-based and shipboard test run. Such test results shall include at

least the numerical salinity, temperature, flow rates, and where appropriate UV transmittance. In addition, these test results shall include all other relevant variables;

.6 the protocol according to which testing was undertaken, including details on:

.1 whether ambient, cultured or a mixture of test organisms have been used (including a species-level identification for cultured organisms, and an identification to the lowest possible taxonomic level for ambient organisms);

.2 the shipboard test protocol including the operating parameters of the system during successful treatment operations, for example dosage rates, UV intensity and electrical current applied;

.3 energy consumption of the BWMS under normal or tested Treatment Rated Capacity (TRC), if available;

.4 the full test report of the land-based test including all unsuccessful, failed and invalid tests;

.5 the full test report of the shipboard test including all unsuccessful, failed and invalid tests, and detailed information of the test set up and actual flow rate at each test cycle;

.6 QA/QC documentation of the testing facility or body; and

.7 national accreditation of the test facility, if appropriate;

.7 a description of the Active Substance(s), if employed; and

.8 identification of the specific MEPC report and paragraph number granting Final Approval in accordance with the Procedure for approval of ballast water management systems that make use of Active Substances (G9), adopted by resolution MEPC.169(57).

2. INSTRUCTS the Secretariat to make such information available by an appropriate means.

3. REVOKES resolution MEPC.175(58)

***

ANNEX 8

DRAFT BWM CIRCULAR

AMENDMENTS TO THE GUIDANCE FOR ADMINISTRATIONS ON THE TYPE APPROVAL PROCESS FOR BALLAST WATER MANAGEMENT SYSTEMS IN ACCORDANCE WITH GUIDELINES (G8) (BWM.2/CIRC.28)

1 Paragraphs 3.1.14 and 3.1.15 are replaced by the following:

"3.1.14 provided the following, when submitting the Type Approval application:

.1 sufficient information to verify operation in different salinity ranges (fresh, brackish and marine water) in which the BWMS will operate;

.2 sufficient information to verify operation in the different temperature ranges (cold, temperate and tropical) in which the BWMS will operate;

.3 sufficient information to verify operation with the different sediment loads under which the BWMS will operate;

.4 sufficient information to verify operation of the minimum effective treatment flow rate as well as the maximum Treatment Rated Capacity (TRC) including the duration of these tests; and

.5 suggestions for improvements of the installation related to safety or additional testing R&D,

3.1.15 made all laboratory-scale and if appropriate full-scale land-based test results and documentation available, including all unsuccessful, failed and invalid tests, to the Administration; and"

2 A new paragraph 3.1.16 is added as follows:

"3.1.16 made all shipboard test results and documents available, including all unsuccessful, failed and invalid tests as well as detailed information of the test set up and flow rate at each test cycle, to the Administration."

3 A new paragraph 3.2 is added as follows:

"3.2 In accordance with paragraphs 4.10 to 4.14 of the Guidelines (G8), Administrations should ensure that type approved BWMS have a suitable self-monitoring system that will monitor and record sufficient data to verify correct operation of the system. Suggestions for monitoring parameters that may be appropriate are provided in the appendix to this Circular. Administrations should make every effort to ensure that newly installed BWMS that have already been granted Type Approval meet this recommendation within one year following approval of this Circular. Administrations should issue treatment system particulars, including details of the self-monitoring system (as described in document MEPC 61/INF.19), for all type approved systems."

4 Paragraph 5.2.13 is replaced with the following:

".13 a safety and hazard assessment of the installation, operation and maintenance of the BWMS on the shipboard test is undertaken and approved in line with the technical guidance developed by the Organization (BWM.2./Circ.20), and includes as a minimum:

.1 any potential impact on the crew health and safety; and

.2 references to the classification society safety and hazard rules and recommendations."

5 A new paragraph 5.3.4 is added as follows:

"5.3.4 in accordance with Guidelines (G8), the appendix of the Type Approval Certificate should include details on all imposed limiting conditions on the operation of the BWMS. Such limiting conditions to include any applicable environmental conditions (e.g. salinity, UV transmittance, temperature, etc.) and/or system operational parameters (e.g. min/max pressure, pressure differentials, min/max Total Residual Oxidants (TRO), etc.)"

6 A new paragraph 5.3.5 is added as follows:

"5.3.5 an annex to the Type Approval Certificate which contains the test results of each land-based and shipboard test run. Such test results shall include at least the numerical salinity, temperature, flow rates, and where appropriate UV transmittance. In addition, these test results shall include all other relevant variables."

7 Paragraph 6.1 is replaced with the following:

"6.1 The Administration should forward a report of the Type Approval process to the Organization including the relevant documentation as specified in resolution MEPC.175(58)[5]."

***

[5] New resolution MEPC.175(58) reference to be inserted once adopted.

ANNEX 9

DRAFT BWM CIRCULAR

OPTIONS FOR BALLAST WATER MANAGEMENT FOR OFFSHORE SUPPORT VESSELS IN ACCORDANCE WITH THE BWM CONVENTION

1 INTRODUCTION

1.1 These procedures are intended to relate to the activities of Offshore Support Vessels. Operationally, these vessels differ from the operational models associated with deep-sea trading vessels by being designed to operate in near coastal waters characterized by carrying materials to facilities and vessels working in offshore energy fields.

1.2 The purpose of these procedures is to provide options available for complying with the requirements of the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (the Convention).

1.3 Ballast water management should be consistent with the objectives of the Convention – "to prevent, minimize and ultimately eliminate the risks to the environment, human health, property and resources arising from the transfer of harmful aquatic organisms and pathogens through the control and management of ships' ballast water and sediments, as well as to avoid unwanted side effects from that control, and to encourage developments in related knowledge and technology". Depending on the option used, verification for approvals could differ from those specified in paragraph 1.7 of resolution MEPC.206(62), but keep the same level of protection.

1.4 Resolution MEPC.127(53) contains *Guidelines for ballast water management and development of ballast water management plans (G4)* which includes Part A chapter 1 "Ship operational procedures".

1.5 The application of the current measures should be decided considering the principles of risk analysis and taking into account the operational condition of the ship.

2 APPLICATION

2.1 The methods of compliance contained in paragraph 3 below are intended to provide options for meeting the functional goals of the Ballast Water Management Convention for Offshore Support Vessels.

2.2 The Offshore Support Vessels' approved Ballast Water Management Plans should meet the requirements and follow the form set out by resolution MEPC.127(53). An Administration approved plan may address circumstances specific to operation in waters under the jurisdiction of another party subject to the authorization of that party with the functional premise describing the vessel and the operational model that the vessel is operating under and present viable methods of complying with the objectives of the Convention.

2.3 In line with the Convention, Administrations may allow other ship types to apply the optional methods identified in this document, if found appropriate.

3 METHODS OF COMPLIANCE

3.1 Generally the options for compliance for Offshore Support Vessels will be identified on the ships' International Ballast Water Management Certificate and in the Ballast Water Management Plan. The general understanding is that options may include the following:

.1 The use of an other method of ballast water management as per regulation B-3.7 of the Convention following the resolution MEPC.206(62).

.2 an exemption, as per regulation A-4 of the Convention, following the *Guidelines for risk assessment under regulation A-4 (G7)*.

.3 Use of ballast water determined by the coastal State as being sourced from the "same location" as the point of discharge (as per regulation A-3.5).

.4 Use of temporary ballast water management systems may be allowed for the purposes of undertaking activities outside those considered normal, routine support activities for compliance with the objectives of the Convention. If, or when available, a temporary BWMS appliance is installed, the unit should comply with the relevant approval processes promulgated by the flag Administration in accordance with the Convention and associated guidelines.

.5 Use of permanent or temporary BWMS installed aboard another vessel operating from the same port or locality as a local reception facility, with the approval of the flag Administration and the acceptance of the local coastal State Administration, for the treatment of unmanaged ballast water.

.6 Meeting the regulation D-2 discharge standard through permanent installation of a Type Approved ballast water management system.

3.2 Drill water or water taken and stored on board for the purpose of protecting low flash point liquid (LFL) tanks, which is not discharged into the environment, is not subject to the requirements of the Convention.

4 SURVEY AND CERTIFICATION REQUIREMENTS

4.1 Generally the process of survey and certification follows section E of the Convention.

***

ANNEX 10

DRAFT MEPC CIRCULAR

GUIDANCE FOR EVALUATING THE 2011 GUIDELINES FOR THE CONTROL AND MANAGEMENT OF SHIPS' BIOFOULING TO MINIMIZE THE TRANSFER OF INVASIVE AQUATIC SPECIES

1 Context

1.1 The Marine Environment Protection Committee (MEPC), at its sixty-second session, adopted, by resolution MEPC .207(62), the *2011 Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species,* (the Guidelines). The aim of the Guidelines is to provide a globally consistent approach to managing biofouling by providing useful recommendations on general measures to minimize the risks associated with biofouling for all types of ships.

1.2 MEPC requested that members take urgent action in applying the Guidelines, including: disseminating the Guidelines to the shipping industry and other interested parties; taking the Guidelines into account when adopting measures to minimize the risk of introducing invasive aquatic species via biofouling; and reporting to the MEPC on any experience gained in their implementation. MEPC agreed to keep the Guidelines under review based on experience gained in their implementation. This would include consideration of whether the voluntary Guidelines are effective in influencing biofouling management practices.

1.3 This Guidance is provided to assist Member States and observers who wish to collect information needed to undertake future reviews of the Guidelines, to do this in a more consistent way. The Guidance identifies the types of performance measures (section 3) that could help to assist in evaluating the different recommendations in the Guidelines. A party wishing to collect information may do so for all or only some of these measures.

1.4 It is anticipated that the information needed to review the Guidelines could be collected by Member States and/or observers and submitted to the Sub-Committee.

2 Evaluation process

2.1 A process for evaluating the information collected could include annual reviews of the implementation of the Guidelines by the Sub-Committee with a more comprehensive review undertaken after the Guidelines have been in place for five years. The first review of available information could occur in a meeting of the Sub-Committee in early 2014 with a more comprehensive review at a meeting of the Sub-Committee in early 2017. It may also be useful to undertake a stocktake of available information at year three - 2015 - to determine whether sufficient information is likely to be available to undertake a more comprehensive review after five years. If it is determined that further information is likely to be required, the Sub-Committee could actively encourage collection of the necessary information. The proposed process is further detailed in the appendix.

The focus of the review is likely to change over time. Initially the information available is likely to be on the level of dissemination and awareness of the Guidelines: whether there are any impediments (including omissions and errors) to the implementation of the Guidelines that need to be addressed and evidence of early implementation, e.g. use of biofouling management plans and record books or in-water inspection. In subsequent reviews, the focus could shift more towards evaluating the extent and level of implementation and

evidence of change in the extent of biofouling on ships. New research and/or technology developments related to the Guidelines would be relevant for all reviews. If, as a result of the review, modifications to the Guidelines are considered necessary, the Sub-Committee could recommend these to the MEPC.

2.2 The comprehensive review of all available information at year five could help determine whether the Guidelines are having sufficient impact on biofouling management using the performance measures outlined in this guidance. If the Guidelines are determined to have sufficient impact, they could continue to be implemented in their current form with the Sub-Committee determining the nature and regularity of on-going reviews. If the Guidelines, or elements of the Guidelines, are determined to have insufficient impact the Sub-Committee could provide advice to MEPC on whether other actions may need to be taken to enhance the effectiveness of the Guidelines in preventing the transfer of invasive aquatic species.

3 Performance measures

3.1 Performance measures can help to evaluate whether the *2011 Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species* are improving biofouling management practice in the maritime industry, and thereby reducing the likelihood of invasive aquatic species being transferred through ships' biofouling. It is not considered feasible at this time to directly measure the environmental benefits of the Guidelines, i.e. to assess whether the Guidelines result in fewer biological invasions by aquatic species as a result of transfer via biofouling of ships.

3.2 The following types of performance measures could be used to help evaluate the different recommendations in the Guidelines:

.1 Awareness and dissemination of the Guidelines – have the Guidelines been disseminated to relevant parties and are they aware of the Guidelines?

.2 Impediments to implementation of the Guidelines – are there any omissions and errors with the Guidelines that need to be corrected and/or are appropriate facilities and tools available to effectively implement the Guidelines?

.3 Application of the Guidelines – is there evidence of use of the Guidelines?

.4 Change in level of biofouling – is there evidence of changes in the level of biofouling from in-water or dry-dock inspections and/or data on the net benefits from managing biofouling?

.5 Extent of research and development – what research and technology development, related to the Guidelines, is available?

3.3 Performance measures for the different components of the Guidelines are outlined in table 1. Each performance measure consists of the criteria being considered, an indicator for the criteria and a goal that the Guidelines are trying to achieve. Note that the Year column in Table 1 refers to the year following implementation when information is likely to be available for the relevant performance measure. Table 2 outlines a questionnaire that could be used to provide a uniform, but voluntary, approach to collecting information.

3.4 In collecting information for performance measures it is useful to collect information not only on progress towards the specified goal but also information on why a particular goal is or is not being achieved. This would help BLG to determine if actions, such as modifying the Guidelines, are required.

3.5 The high level goal across all performance measures is to see an increase in the uptake of the recommendations of the Guidelines over time.

Table 1: Performance measures

Part 1, awareness and dissemination of the Guidelines				
	Criteria	**Indicator**	**Goal**	**Year(s)**
1.1	The Guidelines, or communications based on the Guidelines, have been disseminated to: shipowners and operators and shipping agents; maintenance/recycling facility owners and operators; in-water inspection and cleaning service providers; ship designers, naval architects and builders; anti-fouling coating companies; Harbour Masters; and organizations involved in maritime/seafarer education and training.	Number and proportion of Member States and Recognized Organizations that have disseminated the Guidelines or communications based on the Guidelines.	Most Member States and Recognized Organizations have disseminated the Guidelines or communications based on the Guidelines.	Year 1 Year 2
1.2	The following are known to be aware of, and understand the Guidelines: shipowners and operators and shipping agents; maintenance/recycling facility owners and operators; in-water inspection and cleaning service providers; ship designers, naval architects and builders; anti-fouling coating companies; Harbour Masters; and organizations involved in maritime/seafarer education and training.	Number and proportion of ships/facilities/etc., that are known to be aware of the Guidelines.	Most ships/ facilities are aware of the Guidelines.	Year 1 Year 2
1.3	Biofouling management is known to be included in relevant training and education programmes for: shipowners and operators and shipping agents; maintenance/recycling facility owners and operators; in-water inspection and cleaning providers;	Number and proportion of known relevant training and education programmes that include biofouling management content.	Most relevant programmes include biofouling management content.	Year 2 Year 3

	ship designers, naval architects and builders; anti-fouling coating companies; Harbour Masters; and organizations involved in maritime/seafarer education and training.			
1.4	Member States are notifying the Organization of other measures being applied for biofouling management. For example, national regulations or emergency measures.	Information related to other biofouling management measures being applied by Member States is being provided to, and disseminated by, the Organization.	Member States and the maritime industry are aware of other biofouling management measures being undertaken by IMO Member States.	Year 3 Year 4

Part 2 Impediments to implementation of the Guidelines				
	Criteria	**Indicator**	**Goal**	**Year(s)**
2.1	The Guidelines can be implemented by: shipowners and operators; maintenance/recycling facilities; in-water inspection and cleaning providers; and ship designers, naval architects and builders.	Feasibility issues, omissions and errors are identified in the use of the Guidelines.	Feasibility issues, omissions and errors are addressed in the review and revision of the Guidelines.	Year 1 Year 2 Year 3
		Number and proportion of ships/facilities/etc., that have indicated lack of facilities or tools as reasons for not aligning their practices with the Guidelines.	Availability of facilities and tools addressed through market demand and research initiatives.	Year 1 Year 2 Year 3 Year 4
2.2	Use of the Guidelines does not present a safety issue for: ship's crew; maintenance and recycling workers; in-water service providers; and any other entities directly applying the Guidelines.	Any safety issues or concerns raised by use of the Guidelines are identified in the use of the Guidelines.	Safety issues are addressed in the review and revision of the Guidelines.	Year 2 Year 3

Part 3 Application of the Guidelines				
	Criteria	**Indicator**	**Goal**	**Year(s)**
3.1	Ships have biofouling management plans and are maintaining biofouling record books or equivalent documentation.	Number and proportion of ships known to have biofouling management plans and maintaining biofouling management record books.	Most ships have biofouling management plans and record books.	Year 1 Year 2

3.2	Ships are conducting the following activities in line with the Guidelines: - in-water inspections - in-water cleaning, if appropriate.	Number and proportion of ships known to be conducting in-water inspections and, if appropriate, in-water cleaning.	Most ships are conducting in-water inspections, and in-water cleaning, if appropriate.	Year 2 Year 3
3.3	Facilities are adopting appropriate measures for capture of waste.	Number and proportion of facilities that have waste capture measures in place aligned with the Guidelines.	Most facilities have adopted appropriate waste capture measures.	Year 2 Year 3
3.4	The following are known to have practices that follow, or are aligned with, the Guidelines: shipowners and operators and shipping agents; maintenance/recycling facility owners and operators; in-water inspection and cleaning providers; ship designers, naval architects and builders; anti-fouling coating companies; and organizations involved in maritime/seafarer education and training.	Evidence that practices follow, or are substantially aligned with the Guidelines.	Most ships, facilities, etc. are implementing the Guidelines.	Year 2 Year 3 Year 4
3.5	In-water cleaning technologies are able to capture most of the macrofouling debris from in-water cleaning.	Number and availability of in-water cleaning technologies that incorporate capture of debris for all ship types.	In-water technologies, able to capture most of the macrofouling debris, are widely available and sufficient to meet demand.	Year 2 Year 3
3.6	The Guidelines are being taken into account by Member States that apply other measures for biofouling management. For example, national regulations or emergency measures.	Whether other biofouling measures take into account the Guidelines.	All other biofouling management measures take into account the Guidelines.	Year 2 Year 3

Part 4 Change in Level of Biofouling				
	Criteria	**Indicator**	**Goal**	**Year(s)**
4.1	Ships are maintaining submerged surfaces and internal seawater cooling systems in accordance with the Guidelines to ensure they are as free of biofouling as is practical.	Number and proportion of ships known to have submerged hull surfaces that are as free of biofouling as is practical.	Most ships, adhering to the Guidelines, have submerged hull surfaces as free of biofouling as is practical.	Year 3

		Number and proportion of ships known to have niche areas and internal seawater cooling systems that are as free of biofouling as is practical.	Most ships, adhering to the Guidelines have niche areas and internal seawater cooling systems as free of biofouling as is practical.	
		The effectiveness of control measures applied are evaluated at dry dock.	The effectiveness of measures is verified.	Year 3 Year 4
		Net costs attributable to implementing the Guidelines (i.e. cost minus benefit, e.g. reduced fuel consumption) as a % of total operating costs.	Net costs attributable to implementing the Guidelines are understood.	Year 2 Year 3
4.2	Indirect or consequential benefits obtained from implementing the Guidelines.	Any known indirect or consequential benefits (such as proven reduced GHG emissions or improved energy efficiency) from the use of the recommendations in the Guidelines.	Indirect or consequential benefits of implementing the Guidelines are understood.	Year 3

Part 5 Research and Development				
	Criteria	**Indicator**	**Goal**	**Year(s)**
5.1	Research and development of technologies to improve biofouling management is being undertaken.	Information on research and technology development, relevant to the Guidelines, can be identified.	Current status of research and technology development, relevant to the Guidelines, is understood.	Year 1 Year 2 Year 3 Year 4
5.2	Research into the indirect or consequential benefits of implementing the Guidelines is being undertaken.	Research into indirect or consequential benefits of implementing the Guidelines can be identified.	Indirect or consequential benefits of implementing the Guidelines are understood.	Year 3 Year 4

4 Performance measure questionnaire

4.1 These questions are provided as guidance for those who may be interested in collecting information on the implementation of the biofouling Guidelines. It is recognized that not all those using the questionnaire will have authority or linkages with all listed audiences.

4.2 The purpose of this voluntary questionnaire is to gather information regarding the implementation of the Guidelines based on the respondent's experience. Specifically, the respondent is asked to provide information regarding a range of issues that include but are not limited to: the clarity of the Guidelines, dissemination and inspection strategies, educational products, inspection, biofouling management plans, etc. The respondent's information will be used to evaluate the effectiveness of the measures within the Guidelines for the control and management of ships' biofouling.

4.3 Where relevant and if possible, additional details and quantitative data should be provided rather than simply yes/no answers.

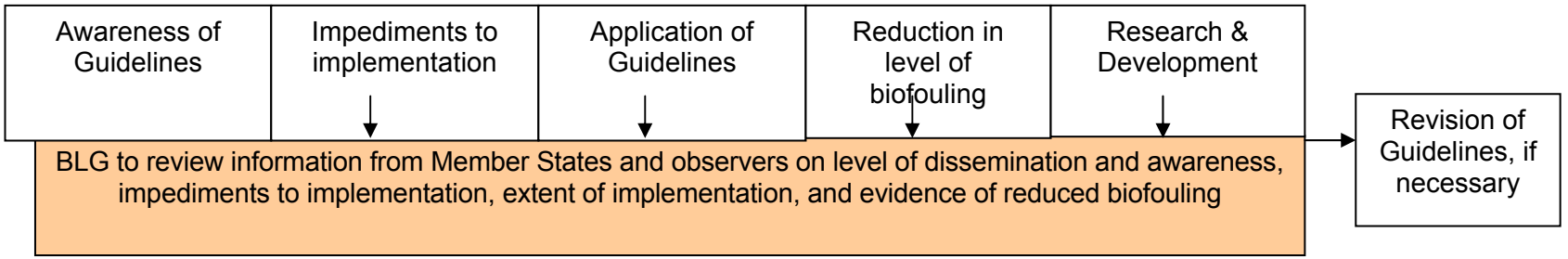
Table 2: Questionnaire for data collection

Question Have you disseminated the Guidelines, or communications based on the Guidelines, to relevant parties including: shipowners and operators and shipping agents; maintenance/recycling facility owners and operators; in-water inspection and cleaning service providers; ship designers, naval architects and builders; anti-fouling coating companies; Harbour Masters; and organizations involved in maritime/seafarer education and training?	**Audience** Member States
Response (additional comment/explanation)	
Question Are you aware of the Guidelines? Is the information in the Guidelines clear?	**Audiences** Shipowners and operators and shipping agents; maintenance/ recycling facility owners and operators; in-water inspection and cleaning service providers; ship designers, naval architects and builders; anti-fouling coating companies; Harbour Masters; organizations involved in maritime/seafarer education and training;recognized organizations.
Response (if not clear, please provide details)	
Question Are you aware of any information being included in relevant educational programmes?	**Audience** Member States.
Response (if yes, please provide details)	
Question Have you developed biofouling management measures in addition to the Guidelines, e.g. national regulations? Are these measures based on the Guidelines? Has this additional information been provided to IMO?	**Audience** Member States.
Response (please provide details)	

Question Are there any feasibility issues, omissions or errors that have meant that the Guidelines are difficult to implement?	**Audiences** Shipowners and operators; maintenance/recycling facilities; in-water inspection and cleaning providers; ship designers, naval architects and builders;recognized organizations.
Response (if yes, please provide details)	
Question Are facilities and/or tools available to support the implementation of the Guidelines?	**Audiences** Shipowners and operators; maintenance/recycling facilities; in-water inspection and cleaning providers; and ship designers, naval architects and builders; recognized organizations.
Response (please provide details)	
Question Have any safety issues been identified in implementing the Guidelines?	**Audiences** Ship's crew; maintenance and recycling workers; in-water service providers; and any other entities directly applying the Guidelines.
Response (if no, please provide details)	
Question Are ships developing biofouling management plans and maintaining their biofouling record books?	**Audience** Member States; Shipowners and operators.
Response (please provide details)	
Question Are you undertaking in-water inspections and in-water cleaning? Are these activities in line with the Guidelines?	**Audiences** Shipowners and operators and shipping agents; maintenance/ recycling facility owners and operators; and in-water inspection and cleaning service providers.
Response (please provide details)	
Question Does your facility capture hull cleaning waste to minimize the risk of it entering the water?	**Audience** Maintenance/recycling facility owners and operators.
Response (please provide details)	
Question Do your practices follow, or align with, the Guidelines?	**Audiences** Shipowners and operators and shipping agents; maintenance/ recycling facility owners and operators; in-water inspection and cleaning providers; ship designers, naval architects and builders anti-fouling coating companies; and organizations involved in maritime/seafarer education and training.
Response (please provide details)	

Question Is your in-water cleaning technology able to capture most of the macrofouling debris from in-water cleaning?	**Audience** In-water inspection and cleaning providers
Response (please provide details)	
Question Are the submerged hull surfaces of ships as free of biofouling as is feasible? Have you seen a decrease over time in the amount of biofouling on submerged hull surfaces?	**Audience** Member States; maintenance/ recycling facility owners and operators; anti-fouling coating companies.
Response (please provide details)	
Question Are the niche areas and internal seawater cooling systems of ships as free of biofouling as is feasible? Have you seen a decrease over time in the amount of biofouling in niche areas and internal seawater cooling systems of ships?	**Audience** Member States; maintenance/ recycling facility owners and operators; anti-fouling coating companies
Response (please provide details)	
Question Have you collected information about the effectiveness of specific measures in the Guidelines through dry dock inspections of ships?	**Audiences** Member States; shipowners and operators; and maintenance/ recycling facility owners and operators.
Response (please provide details)	
Question Do you have any information on the direct or indirect benefits associated with implementing with the Guidelines, e.g. reduced fuel consumption as a % of total operating costs?	**Audience** Shipowners and operators
Response (if yes, please provide details)	
Question Do you have any information on the additional costs associated with implementing the Guidelines?	**Audience** Member States; and shipowners and operators
Response (if yes, please provide details)	
Question Are you aware of any research and/or development of technologies to improve biofouling management?	**Audiences** Member States; organizations involved in maritime/seafarer education and training; and research organizations
Response (if yes, please provide details)	
Question Are you aware of any research into indirect or consequential benefits of implementing the Guidelines?	**Audiences** Member States; organizations involved in maritime/seafarer education and training; and research organizations
Response (if yes, please provide details)	

APPENDIX: AN OVERVIEW OF THE EVALUATION PROCESS



BLG or MEPC decision to undertake review depending on level of information available on the implementation and effectiveness of the Guidelines

Comprehensive review:
To determine if the Guidelines are sufficiently influencing biofouling management practices and therefore reducing the risk of transfer of invasive aquatic species

Action:
If impact is considered sufficient Guidelines remain under review.
If impact is considered insufficient then advise MEPC of possible alternative actions that may be considered to improve the control of biofouling on ships

***

ANNEX 11

DRAFT AMENDMENTS TO THE INTERNATIONAL CODE FOR THE CONSTRUCTION AND EQUIPMENT OF SHIPS CARRYING LIQUEFIED GASES IN BULK (IGC CODE)

[The text of the draft amendments to the IGC Code is contained in document BLG 17/18/Add.1.]

***

ANNEX 12

DRAFT MEPC RESOLUTION

GUIDELINES AS REQUIRED BY REGULATION 13.2.2 OF MARPOL ANNEX VI IN RESPECT OF NON-IDENTICAL REPLACEMENT ENGINES NOT REQUIRED TO MEET THE TIER III LIMIT

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee (the Committee) conferred upon it by international conventions for the prevention and control of marine pollution,

RECALLING ALSO that, at its fifty-eighth session, the Committee adopted, by resolution MEPC.176(58), a revised MARPOL Annex VI (hereinafter referred to as "MARPOL Annex VI") which significantly strengthens the emission limits for nitrogen oxides (NO_x) in light of technological improvements and implementation experience,

NOTING that regulation 13.2.2 of MARPOL Annex VI specifies which NO_x emission standard shall be applied when a marine diesel engine is replaced with a non-identical marine diesel engine,

RECOGNIZING the need to develop guidelines to set forth the criteria of when it is not possible for a replacement engine to meet the standards in regulation 13.5.1.1 (Tier III),

HAVING CONSIDERED, at its [sixty-fifth] session, the guidelines as required by regulation 13.2.2 in respect of non-identical replacement engines not required to meet the Tier III limit, proposed by the Sub-Committee on Bulk Liquids and Gases at its seventeenth session,

1. ADOPTS the Guidelines as required by regulation 13.2.2 in respect of non-identical replacement engines not required to meet the Tier III limit, as set out at annex to the present resolution;

2. INVITES Administrations to take the annexed Guidelines into account when certifying a marine diesel engine which is replaced with a non-identical marine diesel engine;

3. REQUESTS the *Parties* to MARPOL Annex VI and other Member Governments to bring the annexed Guidelines to the attention of shipowners, ship operators, shipbuilders, marine diesel engine manufacturers, and any other interested groups; and

4. AGREES to keep these Guidelines under review in light of the experience gained.

GUIDELINES AS REQUIRED BY REGULATION 13.2.2 IN RESPECT OF NON-IDENTICAL REPLACEMENT ENGINES NOT REQUIRED TO MEET THE TIER III LIMIT

1 When it becomes necessary to replace an engine to which regulation 13 of MARPOL Annex VI applies in principle (power output of more than 130 kW) the non-identical replacement engine shall comply with the standards set forth in paragraph 5.1.1 of the respective regulation (Tier III) when operating in an area designated under regulation 13.6 of MARPOL Annex VI if the replacement takes place on or after 1 January 2016 unless:

.1 a replacement engine of similar rating complying with Tier III is not commercially available; or

.2 the replacement engine, in order to be brought into Tier III compliance, needs to be equipped with a NO_x reducing device which due to:

.1 size cannot be installed in the limited space available on board; or

.2 extensive heat release could have adverse impact on the ships structure, sheeting, and/or equipment whilst additional ventilation and/or insulation of the engine-room/compartment will not be possible.

2 In making the determination that a Tier III engine is not a feasible replacement engine for a ship, it should be necessary to evaluate not just engine dimensions and weight but may also include other pertinent ship characteristics. These pertinent characteristics could include:

.1 downstream ship components such as drive shafts, reduction gears, cooling systems, exhaust and ventilation systems, and propeller shafts;

.2 electrical systems for diesel generators (indirect drive engines); and

.3 such other ancillary systems and ship equipment that would affect the choice of an engine.

3 Restrictions should also be considered concerning engine adjustment/matching needed to meet boundary conditions and performance data necessary for SCR operation at all relevant mode points.

4 If the replacement engine is part of a multi-engine (twin-engine) arrangement and it is replacing an engine that is not a Tier III compliant engine due to it having been installed prior to the Tier III implementation date, a need to match a replacement engine within a multi-engine arrangement should be part of the criteria to be considered. In such cases, if it were decided to exempt a replacement engine in multi-engine arrangements it must be clear that is where engines are installed as matched pairs (or more) as propulsion engines and that matching is necessary to ensure comparable manoeuvring/drive response rather than where multiple engines are installed such as in the case of generators.

5 A replacement engine that meets the Tier III limit should be installed provided it does not incur an increase in the ship's electrical demand beyond the installed capacity.

6 In no case should modification to the ship's structure be allowed which weakens its structural stability below the acceptable level.

7 The Administration should consider how far the shipowner's specification of the device will determine whether a non-identical replacement engine is not required to meet the Tier III limit (for example, by requiring an excessive urea storage capacity – relative to bunker capacity – or that the SCR device is not to increase engine weight/volume by more than an unjustifiably low percentage).

8 There may be differences between a Tier III and a Tier II engine that should **not** affect the determination of whether a non-identical replacement engine should not be required to meet the Tier III limit, such as:

.1 warranty period or life expectancy;

.2 cost; or

.3 production lead time.

9 The shipowner should provide evidence to the Administration that a Tier III engine cannot be installed and should report specifically what prevents a Tier III compliant engine from being installed, taking into account the provisions of these guidelines. The shipowner should document the search for compliant Tier III engines and explain why the closest available engine with respect to size or performance is not appropriate for the ship. The search should include engines produced by manufacturers other than the original engine's manufacturer. This documentation, duly endorsed by the Administration, should be kept with the replacement engine's EIAPP certificate.

***

ANNEX 13

DRAFT AMENDMENTS TO THE TECHNICAL CODE ON CONTROL OF EMISSION OF NITROGEN OXIDES FROM MARINE DIESEL ENGINES (NO_X TECHNICAL CODE 2008)

1 In abbreviations, subscripts and symbols, table 4 is replaced by the following:

Table 4 – Symbols for fuel composition

Symbol	Definition	Unit
w_{ALF}*	H content of fuel	% m/m
w_{BET}*	C content of fuel	% m/m
w_{GAM}	S content of fuel	% m/m
w_{DEL}*	N content of fuel	% m/m
w_{EPS}*	O content of fuel	% m/m
α	Molar ratio (H/C)	1

* Subscripts "$_G$" denotes gas fuel fraction.
"$_L$" denotes liquid fuel fraction.

2 Paragraph 1.3.10 is replaced by the following:

"1.3.10 *Marine diesel engine* means any reciprocating internal combustion engine operating on liquid or dual fuel, to which regulation 13 applies, including booster/compound systems if applied.

Where an engine is intended to be operated normally in the gas mode, i.e. with the main gas fuel and only a small amount of liquid pilot fuel, the requirements of regulation 13 have to be met only for this operation mode. Operation on pure liquid fuel resulting from restricted gas supply in cases of failures shall be exempted for the voyage to the next appropriate port for the repair of the failure."

3 The existing paragraph 5.3.4 is deleted.

4 New paragraphs 5.3.4, 5.3.5 and 5.3.6 are added after the existing paragraph 5.3.3 as follows:

"5.3.4 The selection of gas fuel for testing for dual fuel depends on the aim of tests. In case where an appropriate standard gas fuel is not available, other gas fuels shall be used with the approval of the Administration. A gas fuel sample shall be collected during the test of the parent engine. The gas fuel shall be analysed to give fuel composition and fuel specification.

5.3.5 Gas fuel temperature shall be measured and recorded together with the measurement point position.

5.3.6 Gas mode operation of dual fuel engines using liquid fuel as pilot or balance fuel shall be tested using maximum liquid-to-gas fuel ratio, such maximum ratio means for the different test cycle modes the maximum liquid-to-gas setting certified. The liquid fraction of the fuel shall comply with 5.3.1, 5.3.2 and 5.3.3."

5 A new sentence is added at the end of existing paragraph 5.12.3.3 as follows:

"In case of using dual fuel, the calculation shall be in accordance with paragraphs 5.12.3.1 to 5.12.3.3. However, q_{mf}, w_{ALF}, w_{BET}, w_{DEL}, w_{EPS}, f_{fw} values shall be calculated in accordance with the following table."

Factors in the formula (6) (7) (8)		Formula for factors
q_{mf}	=	$q_{mf\_G}+q_{mf\_L}$
w_{ALF}	=	$\frac{q_{mf\_G}\times w_{ALF\_G}+q_{mf\_L}\times w_{ALF\_L}}{q_{mf\_G}+q_{mf\_L}}$
w_{BET}	=	$\frac{q_{mf\_G}\times w_{BET\_G}+q_{mf\_L}\times w_{BET\_L}}{q_{mf\_G}+q_{mf\_L}}$
w_{DEL}	=	$\frac{q_{mf\_G}\times w_{DEL\_G}+q_{mf\_L}\times w_{DEL\_L}}{q_{mf\_G}+q_{mf\_L}}$
w_{EPS}	=	$\frac{q_{mf\_G}\times w_{EPS\_G}+q_{mf\_L}\times w_{EPS\_L}}{q_{mf\_G}+q_{mf\_L}}$

6 Table 5 is replaced by the following:

Table 5 – Coefficient u_{gas} and fuel-specific parameters for raw exhaust gas

Gas		NOx	CO	HC	CO_2	O_2
ρ_{gas} kg/m^3		2.053	1.250	*	1.9636	1.4277
	ρ_e †	Coefficient u_{gas}‡				
Liquid fuel**	1.2943	0.001586	0.000966	0.000479	0.001517	0.001103
Rapeseed Methyl Ester	1.2950	0.001585	0.000965	0.000536	0.001516	0.001102
Methanol	1.2610	0.001628	0.000991	0.001133	0.001557	0.001132
Ethanol	1.2757	0.001609	0.000980	0.000805	0.001539	0.001119
Natural gas	1.2661	0.001621	0.000987	0.000558	0.001551	0.001128
Propane	1.2805	0.001603	0.000976	0.000512	0.001533	0.001115
Butane	1.2832	0.001600	0.000974	0.000505	0.001530	0.001113

* Depending on fuel.

** Petroleum derived.

† ρ_e is the nominal density of the exhaust gas.

‡ At λ = 2, wet air, 273 K, 101.3 kPa.

Values for *u* given in table 5 are based on ideal gas properties.
In multiple fuel type operation the u_{gas} value used shall be determined from the values applicable to those fuels in the table set out above proportioned in accordance to the fuel ratio used.

7 Paragraph 6.3.1.4 is replaced by the following:

"6.3.1.4 In practical cases, it is often impossible to measure the fuel oil consumption once an engine has been installed on board a ship. To simplify the procedure on board, the results of the measurement of the fuel oil consumption from an engine's pre-certification test-bed testing may be accepted. In such cases, especially concerning residual fuel oil operation (RM-grade fuel oil according to ISO 8217:2005) and dual fuel operation, an estimation with a corresponding estimated error shall be made. Since the fuel oil flow rate used in the calculation (q_{mf}) must relate to the fuel oil composition determined in respect of the fuel sample drawn during the test, the measurement of q_{mf} from the test-bed testing shall be corrected for any difference in net calorific values between the test bed and test fuel oils and gases. The consequences of such an error on the final emissions shall be calculated and reported with the results of the emission measurement."

8 Table 6 is replaced by the following:

Table 6 – Engine parameters to be measured and recorded

Symbol	Term	Unit
H_a	Absolute humidity (mass of engine intake air water content related to mass of dry air)	g/kg
$n_{d,i}$	Engine speed (at the i^{th} mode during the cycle)	min^{-1}
$n_{turb,i}$	Turbocharger speed (if applicable) (at the i^{th} mode during the cycle)	min^{-1}
P_b	Total barometric pressure (in ISO 3046-1:1995: p_x = P_x = site ambient total pressure)	kPa
$P_{C,i}$	Charge air pressure after the charge air cooler (at the i^{th} mode during the cycle)	kPa
P_i	Brake power (at the i^{th} mode during the cycle)	kW
$q_{mf,i}$	Fuel oil (in case of dual fuel engine, it would be fuel oil and gas) (at the i^{th} mode during the cycle)	kg/h
s_i	Fuel rack position (of each cylinder, if applicable) (at the i^{th} mode during the cycle)	
T_a	Intake air temperature at air inlet (in ISO 3046-1:1995: T_x = TTx = site ambient thermodynamic air temperature)	K
$T_{SC,i}$	Charge air temperature after the charge air cooler (if applicable) (at the i^{th} mode during the cycle)	K
T_{cacin}	Charge air cooler, coolant inlet temperature	°C
T_{cacout}	Charge air cooler, coolant outlet temperature	°C
$T_{Exh,i}$	Exhaust gas temperature at the sampling point (at the i^{th} mode during the cycle)	°C
T_{Fuel}	Fuel oil temperature before the engine	°C
T_{sea}	Seawater temperature	°C
T_{Fuel_G}*	Gas fuel temperature before the engine	°C

* only for dual-fuel engine

9 New paragraph 6.3.4.3 is added after existing paragraph 6.3.4.2 as follows:

"6.3.4.3 In case of dual fuel engine, the gas fuel used shall be the gas fuel available on board."

10 Paragraph 6.3.11.2 is replaced by the following:

"6.3.11.2 The NO_x emission of an engine may vary depending on the ignition quality of the fuel oil and the fuel-bound nitrogen. If there is insufficient information available on the influence of the ignition quality on the NO_x formation during the combustion process and the fuel-bound nitrogen conversion rate also depends on the engine efficiency, an allowance of 10 per cent may be granted for an on board test run carried out on an RM-grade fuel oil (ISO 8217:2005), except that there will be no allowance for the pre-certification test on board. The fuel oil and gas fuel used shall be analysed for its composition of carbon, hydrogen, nitrogen, sulphur and, to the extent given in (ISO 8217:2005) and (ISO 8178-5:2008), any additional components necessary for a specification of the fuel oil and gas fuel."

11 Table 9 is replaced by the following:

Table 9 – Default fuel oil parameters

	Carbon	Hydrogen	Nitrogen	Oxygen
	w_{BET}	w_{ALF}	w_{DEL}	w_{EPS}
Distillate fuel oil (ISO 8217:2005, DM grade)	86.2%	13.6%	0.0%	0.0%
Residual fuel oil (ISO 8217:2005, RM grade)	86.1%	10.9%	0.4%	0.0%
Natural gas	75.0%	25.0%	0.0%	0.0%

For other fuel oils, default value as approved by the Administration.

12 New paragraph 2.5 is added after existing paragraph 2.4 in appendix VI as follows:

"2.5 q_{mf}, w_{ALF}, w_{BET}, w_{DEL}, w_{EPS}, f_{fd} parameters, in formula (1), in case of gas mode operation of dual fuel engine, shall be calculated as follows:"

Factors in formula (1)		Formula of factors
q_{mf}	=	$q_{mf\_G}+q_{mf\_L}$
w_{ALF}	=	$\frac{q_{mf\_G} \times w_{ALF\_G} + q_{mf\_L} \times w_{ALF\_L}}{q_{mf\_G} + q_{mf\_L}}$
w_{BET}	=	$\frac{q_{mf\_G} \times w_{BET\_G} + q_{mf\_L} \times w_{BET\_L}}{q_{mf\_G} + q_{mf\_L}}$
w_{DEL}	=	$\frac{q_{mf\_G} \times w_{DEL\_G} + q_{mf\_L} \times w_{DEL\_L}}{q_{mf\_G} + q_{mf\_L}}$
w_{EPS}	=	$\frac{q_{mf\_G} \times w_{EPS\_G} + q_{mf\_L} \times w_{EPS\_L}}{q_{mf\_G} + q_{mf\_L}}$

***

ANNEX 14

DRAFT UNIFIED INTERPRETATION TO REGULATION 13.2.2 OF MARPOL ANNEX VI CONCERNING "TIME OF THE REPLACEMENT OR ADDITION" OF AN ENGINE FOR THE APPLICABLE NO_X TIER STANDARD FOR THE SUPPLEMENT TO THE IAPP CERTIFICATE

MARPOL ANNEX VI

Regulation 13.2.2
Nitrogen oxides (NO_x)

Regulation 13.2.2 reads as follows:

For a major conversion involving the replacement of a marine diesel engine with a non-identical marine diesel engine or the installation of an additional marine diesel engine, the standards in this regulation in force at the time of the replacement or addition of the engine shall apply.

Interpretation

The term “time of the replacement or addition” of the engine in regulation 13.2.2 of MARPOL Annex VI is to be taken as the date of:

.1 the contractual delivery date of the engine to the ship*; or

.2 in the absence of a contractual delivery date, the actual delivery date of the engine to the ship*, provided that the date is confirmed by a delivery receipt; or

.3 in the event the engine is fitted on board and tested for its intended purpose on or after 1 July 2016, the actual date that the engine is tested on board for its intended purpose applies in determining the standards in this regulation in force at the time of the replacement or addition of the engine.

The date in paragraphs .1, .2 or .3 above, provided the conditions associated with those dates apply, is the "Date of major conversion – According to regulation 13.2.2" to be entered in the IAPPC Supplement. In this case, the "Date of installation", which applies only for identical replacement engines, shall be filled in with "N.A.".

If the engine is delivered before 1 January 2016 but not tested before 1 July 2016 due to unforeseen circumstances beyond the control of the shipowner, then the provisions of "unforeseen delay in delivery" may be considered by the Administration in a manner similar to MARPOL Annex I UI4.

***

* The engine is to be fitted on board and tested for its intended purpose before 1 July 2016.

ANNEX 15

PROPOSED BIENNIAL AGENDA FOR THE 2014-2015 BIENNIUM AND ITEMS ON THE COMMITTEES' POST-BIENNIAL AGENDAS THAT FALL UNDER THE PURVIEW OF THE SUB-COMMITTEE

PROPOSED BIENNIAL AGENDA FOR THE 2014-2015 BIENNIUM*

Number	Description	Parent organ(s)	Coordinating organ(s)	Associated organ(s)	Target completion year
1.1.2.2	**Consideration of IACS unified interpretations**	MSC/MEPC		BLG/DE/FP/FSI/ NAV/SLF	Continuous
2.0.1.8	**Additional guidelines for implementation of the BWM Convention, including port State control**	MEPC	BLG / FSI		~~2013~~ 2015
2.0.1.9	**Guidelines for replacement engines not required to meet the Tier III limit (MARPOL Annex VI)****	MEPC	BLG		~~2013~~ 2015
2.0.1.11	**Other relevant guidelines pertaining to equivalents set forth in regulation 4 of MARPOL Annex VI and not covered by other guidelines****	MEPC	BLG		~~2013~~ 2015
2.0.1.12	**Guidelines called for under paragraph 2.2.5.6 of the NOx Technical Code****	MEPC	BLG		~~2013~~ 2015
5.2.1.3	**Development of international code of safety for ships using gases or other low flashpoint fuels**	MSC	BLG	DE/FP/SLF/STW	~~2013~~ 2014
~~5.2.1.4~~	~~Development and approval of a revised IGC Code~~	~~MSC~~	~~BLG~~	~~DE/FP/SLF/STW~~	~~2013~~
7.1.2.5	**Production of a manual entitled "Ballast Water Management – How to do it"**	MEPC	BLG		~~Continuous~~ 2015

* Proposed modifications to the Sub-Committee's 2012-2013 biennial agenda, as set out in annex 36 to document MSC 91/22. Outputs printed in bold have been selected for the draft provisional agenda for BLG 18, as shown in annex 2. Struck-out text indicates proposed deletions and shaded text indicates proposed changes. Deleted outputs will be maintained in the report on the status of planned outputs. Output numbers subject to change by A 28.

** To be considered under output 7.3.1.1.

Number	Description	Parent organ(s)	Coordinating organ(s)	Associated organ(s)	Target completion year
7.1.2.15	**Development of a Code for the transport and handling of limited amounts of hazardous and noxious liquid substances in bulk on offshore support vessels**	MSC / MEPC	BLG	DE	~~2013~~ 2015
~~7.1.2.20~~	~~Development of international measures for minimizing the transfer of invasive aquatic species through biofouling of ships~~	~~MSC / MEPC~~	~~BLG~~	~~DE~~	~~2013~~
7.2.2.3	**Evaluation of safety and pollution hazards of chemicals and preparation of consequential amendments**	MEPC	BLG		Continuous
7.3.1.1	**Review of relevant non-mandatory instruments as a consequence of the amended MARPOL Annex VI and the NO_x Technical Code**	MEPC	BLG		~~2013~~ 2015
7.3.2.2	**Consideration of the impact on the Arctic of emissions of Black Carbon from international shipping**	MEPC	BLG		~~2013~~ 2014
12.1.2.1	**Casualty analysis**	MSC	FSI	BLG / DE / FP / NAV / STW / SLF	Continuous
13.0.3.1	**Improved and new technologies approved for ballast water management systems and reduction of atmospheric pollution**	MEPC	BLG		Annual

ITEMS ON THE COMMITTEES' POST-BIENNIAL AGENDAS THAT FALL UNDER THE PURVIEW OF THE SUB-COMMITTEE*

MARITIME SAFETY COMMITTEE (MSC) AND MARINE ENVIRONMENT PROTECTION COMIITTEE (MEPC)

1

ACCEPTED POST-BIENNIAL OUTPUTS								
Number	**Biennium approved**	**Reference to HLA**	**Description**	**Parent organ(s)**	**Coordinating organs(s)**	**Associated organ(s)**	**Timescale (sessions)**	**References**
~~54~~	~~2012-2013~~	~~7.2.2~~	~~Safety aspects of alternative tanker designs assessed~~	~~MSC / MEPC~~	~~BLG~~		~~2~~	~~BLG 3/18, paragraph 15.7, Work on this output is to be carried out when a proposal for an alternative tanker design is submitted to the Organization.~~
~~55~~	~~2012-2013~~	~~5.2.1~~	~~Adoption of the revised IGC Code~~	~~MSC~~	~~BLG~~	~~DE / FP / SLF / STW~~	~~2~~	
4	7.2.2	7.2.2.2	Environmental aspects of alternative tanker designs	MEPC	BLG		Ongoing	BLG 3/18, paragraph 15.7

***

* Refer to annex 38 of document MSC 91/22.

ANNEX 16

DRAFT PROVISIONAL AGENDA FOR BLG 18

Opening of the session and election of the Chairman and Vice-Chairman for 2014

1 Adoption of the agenda

2 Decisions of other IMO bodies

3 Evaluation of safety and pollution hazards of chemicals and preparation of consequential amendments

4 Additional guidelines for implementation of the BWM Convention

5 Production of a manual entitled "Ballast Water Management – How to do it"

6 Improved and new technologies approved for ballast water management systems and reduction of atmospheric pollution

7 Development of international code of safety for ships using gases or other low-flashpoint fuels

8 Consideration of the impact on the Arctic of emissions of Black Carbon from international shipping

9 Review of relevant non-mandatory instruments as a consequence of the amended MARPOL Annex VI and the NO_x Technical Code

10 Development of a Code for the transport and handling of limited amounts of hazardous and noxious liquid substances in bulk on offshore support vessels

11 Casualty analysis

12 Consideration of IACS unified interpretations

13 Biennial agenda and provisional agenda for BLG 19

14 Election of Chairman and Vice-Chairman for 2015

15 Any other business

16 Report to the Committees

***

ANNEX 17

REPORT ON THE STATUS OF PLANNED OUTPUTS FOR THE 2012-2013 BIENNIUM

SUB-COMMITTEE ON BULK LIQUIDS AND GASES								
Planned output number in the High-level Action Plan for 2012-2013	**Description**	**Target completion year**	**Parent organ(s)**	**Coordinating organ(s)**	**Associated organ(s)**	**Status of output for Year 1**	**Status of output for Year 2**	**References**
1.1.2.2	Cooperation with IACS: consideration of unified interpretations	Continuous	MSC MEPC		BLG	Ongoing	Ongoing	BLG 17/18, section 14; MSC 78/26, paragraph 22.12
2.0.1.8	Additional guidelines for implementation of the BWM Convention, including port State control	2013	MEPC	BLG FSI		In progress	In progress	BLG 17/18, section 4; MEPC 57/21, paragraph 18.11
2.0.1.9	Development of guidelines for replacement engines not required to meet the Tier III limit (MARPOL Annex VI)	2013	MEPC	BLG		In progress	In progress	BLG 17/18, section 11; MEPC 57/21, paragraph 18.11
2.0.1.11	Development of guidelines pertaining to equivalents set forth in regulation 4 of MARPOL Annex VI and not covered by other guidelines	2013	MEPC	BLG		In progress	In progress	BLG 17/18, section 11; MEPC 57/21, paragraph 18.11
2.0.1.12	Development of guidelines called for under paragraph 2.2.5.6 of the NO_x Technical Code	2013	MEPC	BLG		In progress	In progress	BLG 17/18, section 11; MEPC 57/21, paragraph 18.11
5.2.1.3	Development of international code of safety for ships using gases or other low-flashpoint fuels	2013	MSC	BLG	DE	In progress	In progress	BLG 17/18, section 8; MSC 78/26, paragraph 24.11

Planned output number in the High-level Action Plan for 2012-2013	Description	Target completion year	Parent organ(s)	Coordinating organ(s)	Associated organ(s)	Status of output for Year 1	Status of output for Year 2	References
5.2.1.4	Development of a revised IGC Code	2013	MSC	BLG	FP/DE/SLF/ STW	In progress	Completed	BLG 17/18, section 9; MSC 83/28, paragraph 25.7
5.2.2.6	Development of amendments to SOLAS to mandate enclosed space entry and rescue drills	2012	MSC	DSC	BLG	Completed		BLG 16/16, section 10; MSC 87/26, paragraph 24.11
7.1.2.5	Production of a manual entitled "Ballast Water Management – How to do it"	2013	MSC	BLG		In progress	In progress	BLG 17/18, section 5
7.1.2.8	Guidance on biofouling for recreational craft less than 24 metres in length	2012	MEPC	BLG		Completed		BLG 16/16, section 5; MEPC 56/23, paragraph 19.12
7.1.2.14*	Development of international measures for minimizing the transfer of invasive aquatic species through biofouling of ships	~~2012~~ 2013	MEPC	BLG		In progress	Completed	BLG 17/18, section 7; MEPC 56/23, paragraph 19.12
7.1.2.15	Development of a Code for the transport and handling of limited amounts of hazardous and noxious liquid substances in bulk on offshore support vessels	2013	MEPC	BLG	DE	In progress	In progress	BLG 17/18, section 12; MEPC 60/22, paragraph 19.3

* Output number refers to resolution A.1016(26) as this output has not been included in this biennium's High-level Action Plan, as adopted by resolution A.1038(27). The Council will assign a new number for this item in due course.

Planned output number in the High-level Action Plan for 2012-2013	Description	Target completion year	Parent organ(s)	Coordinating organ(s)	Associated organ(s)	Status of output for Year 1	Status of output for Year 2	References
7.2.2.3	Evaluation of safety and pollution hazards of chemicals and preparation of consequential amendments	Continuous	MSC MEPC	BLG		Ongoing	Ongoing	BLG 17/18, section 3
7.3.1.1	Review of relevant non-mandatory instruments as a consequence of the amended MARPOL Annex VI and the NO_x Technical Code	~~2012~~ 2013	MEPC	BLG		In progress	In progress	BLG 17/18, section 11; MEPC 57/21, paragraph 18.11
7.3.2.2	Keep under review IMO measures and contributions to international climate mitigation initiatives and agreements –(including CO_2 sequestration and ocean fertilization as well as consideration of the impact on the Arctic of emissions of Black Carbon from international shipping)	Annual	MEPC		BLG	In progress	In progress	BLG 17/18, section 10; MEPC 62/24, paragraph 4.20
12.1.1	Casualty analysis	Continuous	MSC	FSI	BLG	Ongoing	Ongoing	BLG 17/18, section 13; MSC 80/24, paragraph 21.6
13.0.3	Consideration of improved and new technologies approved for ballast water management systems and reduction of atmospheric pollution	Continuous	MEPC	BLG		Ongoing	Ongoing	BLG 17/18, section 6