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

Second draft of the manual entitled: "Ballast Water Management – How to do it"

Submitted by IMarEST

SUMMARY

Executive summary: Since PPR 2, IMarEST has continued working on reviewing and updating the manual entitled "Ballast Water Management – How to do it". This submission contains the revised version of such a document, which incorporates the latest developments from relevant IMO bodies up to MEPC 68.

Strategic direction: 7.1

High-level action: 7.1.2

Planned output: 7.1.2.5

Action to be taken: Paragraph 9

Related documents: Resolution A.1061(28); MEPC 65/2/10, MEPC 65/22; PPR 1/2, PPR 1/6, PPR 1/16; PPR 2/6 and PPR 2/21

Introduction

1 PPR 1 had noted with appreciation the offer of IMarEST (PPR 1/6) to support, through access to its network of experts, the Organization in the production of a manual entitled "Ballast Water Management – How to do it". PPR 2 considered the first draft of the manual, which was submitted by IMarEST (PPR 2/6), and invited IMarEST and the Secretariat to continue with the development of the manual and Member Governments and international organizations to continue supporting this activity, with a view to submission of the final version of the manual to PPR 3 for consideration. Since PPR 2 the IMarEST has engaged with the Secretariat, its expert members and with representatives of Singapore to review and update the draft manual.

2 The IMarEST Ballast Water Expert Group (BWEG) have contributed text to the manual dependent on their specific areas of expertise and have additionally acted as reviewers. The BWEG was established in 2010 and is comprised of senior IMarEST members with expertise in all areas of ballast water management, including testing, treatment, sampling,

monitoring and compliance. In addition, the BWEG has representation from other relevant constituencies, including classification societies, the International Chamber of Shipping, the North Sea Ballast Water Opportunity (NSBWO) Project, various national Administrations associated with the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004, and others.

The draft manual

3 The revised manual contained in the annex reflects text received from individual members of the BWEG and was reviewed at working meetings.

4 The draft manual was revised taking into account the recommendations made at PPR 2. In particular, care was taken to produce text which is factual and can reflect the intent of the BWM Convention and its Guidelines, avoiding subjective interpretations or views. Moreover, the current text was updated to reflect all the latest relevant decisions made by IMO bodies, including the latest relevant developments from MEPC 67 and MEPC 68.

5 However, as there are ongoing discussions on some important ballast water management topics, both at MEPC and in this Sub-Committee, it was decided, in consultation with the Secretariat, to keep certain parts of the manual in abeyance as they would be affected by the outcomes of those discussions and it therefore makes more sense to finalize them at a more appropriate time in the future. This is applicable for the following parts of the manual:

- .1 sections 8.3 and 8.4, dealing with exceptions and exemptions (regulations A-3 and A-4), in light of ongoing discussions on these topics;
- .2 section 9.1, dealing with ballast water management for ships (regulation B-3), in light of the pending amendment of this regulation; and
- .3 chapter 14, dealing with the *Guidelines for approval of ballast water management systems* (G8), in light of the ongoing review of these guidelines.

6 These parts are provided in square brackets, to indicate that their text cannot be considered final at this stage and the Sub-Committee is invited to note this in its consideration of the submitted draft manual. Pending the Sub-Committee's decisions on the continuation of this work, further text would be developed in consultation with the Secretariat as and when those issues are resolved.

7 In addition, it should be noted that a review of the text of the draft manual from a legal perspective has not been undertaken as yet. This is relevant for the entire manual, but in particular parts I, II and III, and the Sub-Committee is invited to decide on the way forward in this regard.

8 Finally, following consultation with the Secretariat, chapter 16 (Implementing the Guidelines for the uniform implementation of the BWM Convention) of the first draft of the manual that was submitted to PPR 2 has been removed and its content was incorporated within the relevant sections of the current version of the manual.

Action requested of the Sub-Committee

9 The Sub-Committee is invited to consider the revised and updated draft of the manual entitled "Ballast Water Management – How to do it" and decide on the way forward for this activity.

ANNEX

BALLAST WATER MANAGEMENT – HOW TO DO IT

PREFACE

This publication entitled "Ballast water management – How to do it" is published by the International Maritime Organization (IMO) to provide advice on the process of ratification, implementation and enforcement of the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (hereafter the Convention).

This manual provides useful practical information to Governments, particularly those of developing countries, Administrations, shipowners, port State control authorities, environmental agencies and other stakeholders on the implications of ratifying, implementing and enforcing the BWM Convention. The aim is to encourage the further ratification and proper implementation and enforcement of the Convention. However, it should be noted that, for legal purposes, the authentic text of the Convention should always be consulted.

It is emphasized that the annex to the Convention will be a living document that develops over time, once the Convention enters into force. This manual does not attempt to be fully up to date and the reader is strongly advised to consult any updates of the Convention and relevant guidelines through IMO documents and publications.

TABLE OF CONTENTS

- 1 Introduction: The Ballast Water Management Convention

PART I: RIGHTS AND OBLIGATIONS

- 2 Structure and components of the Convention
3 Rights and obligations under the Convention
4 Jurisdiction

PART II: MEETING OBLIGATIONS

- 5 Means of meeting obligations

PART III: LEGAL ASPECTS

- 6 Integrating the Convention into national law
7 Legal aspects of enforcement

PART IV: IMPLEMENTATION

- 8 Implementing Section A – General provisions
9 Implementing Section B – Management and control requirements for ships
10 Implementing Section C – Special requirements in certain areas
11 Implementing Section D – Standards for ballast water management
12 Implementing Section E – Survey and certification requirements for ballast water management
13 Ballast water sampling
14 Approval of ballast water management systems (Guidelines (G8))
15 Approval of ballast water management systems using Active Substances (Procedure (G9))
16 Duties of shipowners
17 Ballast water management options available for ships

PART V: TECHNICAL ASPECTS OF ENFORCEMENT

- 18 Non-compliance detection and response
19 Guidance for port State control

PART VI: ORGANIZATION

- 20 Basic maritime Administration
21 Delegation of duties by the maritime Administration
22 Training of personnel
23 Guidelines, circulars and other IMO publications relevant to the BWM Convention

CHAPTER 1 – Introduction: The Ballast Water Management Convention

Invasive aquatic species present a major threat to marine ecosystems and shipping has been identified as a significant pathway for introducing species to new environments. The problem has increased with the introduction of steel hulls, allowing ships to use water instead of solid materials as ballast, and in particular over the last few decades as trade and traffic volumes have expanded. The effects of the introduction of non-indigenous species have, in many areas of the world, been devastating. Quantitative data show the rate of bio-invasions is continuing to increase at an alarming rate. As the volumes of seaborne trade continue overall to increase, the problem may not yet have reached its peak.

The Convention aims to prevent the spread of harmful aquatic organisms and pathogens from one region to another, by establishing standards and procedures for the management and control of ships' ballast water and sediments.

Under the Convention, ships to which the Convention's provisions apply will be required to manage their ballast water and sediments to a certain standard, according to a ship-specific ballast water management plan (BWMP). All ships will also have to carry a ballast water record book (BWRB) and an International Ballast Water Management Certificate (IBWMC). The ballast water management standards will be phased in over a period of time. As an intermediate solution, ships should exchange ballast water mid-ocean. However, it is expected that eventually most ships may need to install an on-board ballast water management system.

Parties to the Convention are given the option to take additional measures, which are subject to criteria set out in the Convention and relevant guidelines for the uniform implementation of the Convention.

The Convention consists of articles and annexes which include legal requirements, technical standards and regulations for the control and management of ships' ballast water and sediments. There are various resolutions and circulars developed by the Organization relating to the Convention.

PART I: RIGHTS AND OBLIGATIONS

CHAPTER 2 – Structure and components of the Convention

The Ballast Water Management Convention is a legal instrument composed of various documents (articles, annex, resolutions and circulars). The articles of the Convention bind the contracting Parties with the requirements/regulations set out in the annex to the Convention. The resolutions and circulars provide technical and procedural guidance which is non-mandatory unless referred to in the annex to the Convention. These components are described briefly below as they are referred to in this manual and relate to the situation at the time of writing.

2.1 Articles of the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004

- Article 1 – Definitions
- Article 2 – General obligations
- Article 3 – Application
- Article 4 – Control of the transfer of harmful aquatic organisms and pathogens through ships' ballast water and sediments
- Article 5 – Sediment reception facilities
- Article 6 – Scientific and technical research and monitoring
- Article 7 – Survey and certification

Article 8	–	Violations
Article 9	–	Inspection of ships
Article 10	–	Detection of violations and control of ships
Article 11	–	Notification of control actions
Article 12	–	Undue delay to ships
Article 13	–	Technical assistance, co-operation and regional co-operation
Article 14	–	Communication of information
Article 15	–	Dispute settlement
Article 16	–	Relationship to international law and other agreements
Article 17	–	Signature, ratification, acceptance, approval and accession
Article 18	–	Entry into force
Article 19	–	Amendments
Article 20	–	Denunciation
Article 21	–	Depositary
Article 22	–	Languages

2.2 Annex – Regulations for the control and management of ships' ballast water and sediments

2.2.1 Section A – General provisions

This section includes definitions and provisions related to application, exemptions/exceptions and equivalent compliance, as follows:

Regulation A-1	Definitions
Regulation A-2	General applicability
Regulation A-3	Exceptions
Regulation A-4	Exemptions
Regulation A-5	Equivalent compliance

2.2.2 Section B – Management and control requirements for ships

This section highlights the requirements for ships to implement the Convention. This includes having on board a ballast water management plan approved by the Administration, maintaining a ballast water record book to log ballast water movements (uptake, treatment, exchange, circulation, discharge) and adopting measures for sediment management. Regulations include:

Regulation B-1	Ballast water management plan
Regulation B-2	Ballast water record book
Regulation B-3	Ballast water management for ships
Regulation B-4	Ballast water exchange
Regulation B-5	Sediment management for ships
Regulation B-6	Duties of officers and crew

2.2.3 Section C – Special requirements in certain areas

This section covers the additional measures that a Party, individually or jointly with other Parties, may impose on ships to prevent, reduce, or eliminate the transfer of harmful aquatic organisms and pathogens through ships' ballast water and sediments. Regulations include:

Regulation C-1	Additional measures
Regulation C-2	Warnings concerning ballast water uptake in certain areas and related flag State measures
Regulation C-3	Communication of information

2.2.4 Section D – Standards for ballast water management

This section details the standards and requirements for ballast water management. The standards include those for ballast water exchange and for biological performance, related to water quality for discharge. There are also requirements for the approval of ballast water management systems, testing and evaluation of prototype ballast water treatment technologies, and review criteria. Regulations include:

Regulation D-1	Ballast water exchange standard
Regulation D-2	Ballast water performance standard
Regulation D-3	Approval requirements for ballast water management systems
Regulation D-4	Prototype ballast water treatment technologies
Regulation D-5	Review of standards by the Organization

2.2.5 Section E – Survey and certification requirements for ballast water management

This section details the requirements for the survey of ships and the issuance of an International Ballast Water Management Certificate. Regulations include:

Regulation E-1	Surveys
Regulation E-2	Issuance or endorsement of a Certificate
Regulation E-3	Issuance or endorsement of a Certificate by another Party
Regulation E-4	Form of the Certificate
Regulation E-5	Duration and validity of the Certificate

2.2.6 Appendices to annex

There are two appendices to the annex to the Convention, containing a model Certificate and ballast water record book, to be followed by Administrations and other stakeholders.

Appendix I	Form of International Ballast Water Management Certificate
Appendix II	Form of ballast water record book

2.3 Technical guidelines

Inter alia the following guidelines relating to the uniform implementation of the Convention have been developed and adopted starting from the 53rd session of the Marine Environment Protection Committee (MEPC 53). The guidelines are kept under review by the MEPC and will be updated as new technologies emerge and additional knowledge becomes available.

- Guidelines for sediment reception facilities (G1)
- Guidelines for ballast water sampling (G2)
- Guidelines for ballast water management equivalent compliance (G3)
- Guidelines for ballast water management and the development of ballast water management plans (G4)
- Guidelines for ballast water reception facilities (G5)
- Guidelines for ballast water exchange (G6)
- Guidelines for risk assessment under regulation A-4 of the BWM Convention (G7)
- Guidelines for approval of ballast water management systems (G8)
- Procedure for approval of ballast water management systems that make use of Active Substances (G9)
- Guidelines for approval and oversight of prototype ballast water treatment technology programmes (G10)
- Guidelines for ballast water exchange design and construction standards (G11)

- Guidelines on design and construction to facilitate sediment control on ships (G12)
- Guidelines for additional measures regarding ballast water management including emergency situations (G13)
- Guidelines on designation of areas for ballast water exchange (G14)
- Guidelines on port State control under the BWM Convention

In addition to the above, there are numerous resolutions and circulars developed by the Organization and the list of these is included in chapter 23.

2.4 Actions required

Those concerned with the ratification and implementation of the Convention should study the documents outlined in this chapter in order to understand the general implications. Further study and in-depth understanding will be necessary for those concerned with particular aspects of ratification and implementation. Information on the legal and practical implementation is given in the other chapters of this manual.

CHAPTER 3 – Rights and obligations under the Convention

Many of the articles of the Convention set down definite requirements. These are in addition to the regulations of the annex and some require specific actions by the Parties. The resolutions and circulars adopted by the Organization relevant for the Convention are in fact considered non-mandatory (except when referred to in an article or the annex to the Convention). However, these provide valuable technical and operational guidance that Parties to the Convention are encouraged to follow.

3.1 Definitions

Most of the definitions contained in article 1 are straightforward but a number of definitions are worth mentioning, in order to make it quite clear what the BWM Convention does and does not cover.

With respect to the definition of "Administration", this means the Government of the State under whose authority the ship is operating. With respect to a ship entitled to fly a flag of any State, the Administration is the Government of that State. With respect to floating platforms, including floating storage units (FSUs) and floating production storage and offloading units (FPSOs), the Administration is the Government of the coastal State over which exploration and exploitation of the sea-bed is occurring.¹

"Ballast water" means water with its suspended matter taken on board a ship to control trim, list, draught, stability or stresses of the ship. It is to be noted that this definition focuses on the function and purpose of the water, hence not all water present in a ship falls under the definition of "ballast water" (e.g. water present in the hopper area of a dredger, water stored in ballast tanks for other purposes, technical water, grey water, etc.)

"Ballast water management" means any mechanical, physical, chemical and/or biological process, used either singularly or in combination to remove, render harmless or avoid the uptake or discharge of harmful aquatic organisms and pathogens within ballast water and sediments.

¹ In the context of this manual "Administration" simply refers to the appropriate Government authority with responsibility for implementing and/or enforcing the requirements of a legal instrument.

"Harmful aquatic organisms and pathogens" means aquatic organisms or pathogens which, if introduced into the sea, including estuaries, or into freshwater courses, may create hazards to the environment, human health, property or resources, impair biological diversity or interfere with other legitimate uses of such areas.

"Sediments" means matter settled out of ballast water within a ship.

"Ship" means a vessel of any type whatsoever operating in the aquatic environment and includes submersibles, floating craft, floating platforms, floating storage units (FSUs) and floating production storage and offloading units (FPSOs).

3.2 General obligations

Under article 2 (General obligations) Parties undertake to give full and complete effect to the provisions of the Convention and the annex in order to prevent, minimize and ultimately eliminate the transfer of harmful aquatic organisms and pathogens through the control and management of ships' ballast water and sediments. Parties are given the right to take, individually or jointly with other Parties, more stringent measures, consistent with international law. Parties should ensure that ballast water management practices do not cause greater harm than they prevent to their environment, human health, property or resources, or those of other States.

Furthermore the Parties shall endeavour to cooperate under the auspices of the Organization to address threats and risks to sensitive, vulnerable or threatened marine ecosystems and biodiversity in areas beyond the limits of national jurisdiction in relation to ballast water management and to avoid, as far as practicable, the uptake of ballast water with potentially harmful aquatic organisms and pathogens.

3.3 Application

The Convention applies to:

- .1 ships entitled to fly the flag of a Party; and
- .2 ships not entitled to fly the flag of a Party but which operate under the authority of a Party.

The Convention does not apply to:

- .1 ships not designed or constructed to carry ballast water;
- .2 ships which only operate in national waters or national waters and on the high seas (unless the relevant Party determines otherwise);
- .3 any warship, naval auxiliary or other ship owned or operated by a State and used, in the interim, on government non-commercial service; and
- .4 permanent ballast water in sealed tanks on ships, that is not subject to discharge.

3.4 Control of the transfer of harmful aquatic organisms and pathogens through ships' ballast water and sediments

Each Party shall require that ships comply with the requirements of the Convention and shall take effective measures to ensure that those ships comply with those requirements.

Furthermore, each Party must develop national policies, strategies or programmes that promote the attainment of the objectives in the Convention for ports and waters under its jurisdiction.

3.5 Sediment reception facilities

Under article 5 (Sediment reception facilities) Parties undertake to ensure that ports and terminals where cleaning or repair of ballast tanks occurs have adequate facilities for the reception of sediments.

3.6 Scientific and technical research and monitoring

Article 6 (Scientific and technical research and monitoring) calls for Parties individually or jointly to promote and facilitate scientific and technical research on ballast water management and to monitor the effects of ballast water management in waters under their jurisdiction.

3.7 Survey and certification

Ships are required to be surveyed and certified (article 7 – Survey and certification). Other Parties should accept a certificate issued under the authority of a Party to the Convention.

3.8 Violations

The Convention requires Parties to prohibit violations and to establish sanctions under their law and take procedures against offenders. National legislation implementing the Convention should reflect these requirements and a maritime Administration is required to fulfil these obligations.

3.9 Inspection of ships

Ships may be inspected by port State control officers (article 9 – Inspection of ships), who can verify that the ship has a valid certificate and ballast water management plan, inspect the ballast water record book, etc. If there are concerns, then a detailed inspection (which may entail sampling the ballast water) may be carried out and the Convention states that the Party carrying out the inspection shall take such steps as will ensure that the ship shall not discharge ballast water until it can do so without presenting a threat of harm to the environment, human health, property or resources.

3.10 Detection of violations and control of ships

Parties to the Convention agree to cooperate in monitoring compliance with the Convention and detecting violations. Where requested or felt necessary, a coastal or port State shall inspect a ship in order to collect evidence to verify whether it has made a prohibited discharge and, where such a discharge is proved, shall take appropriate measures. A port State shall, in response to a request from another Party, inspect a ship in order to collect evidence or to verify whether it has committed a violation in other waters. Appropriate national legislation and a competent maritime Administration are required in order to fulfil this obligation.

3.11 Notification of control actions

If an inspection indicates a violation, the ship shall be notified. A report shall be forwarded to the Administration, including any evidence of the violation. In addition, the recognized organization responsible for the issuance of Certificates shall be notified. The port State authority concerned shall also notify the next port of call about the violation including all relevant information.

3.12 Undue delay to ships

All possible efforts shall be made to avoid a ship being unduly detained or delayed. Where undue delay does occur, the ship is entitled to compensation for any loss or damage suffered. A competent and efficient maritime Administration is required in order to fulfil this obligation

3.13 Technical assistance, cooperation and regional cooperation

Under article 13 (Technical assistance, co-operation and regional co-operation) Parties undertake, directly or through the Organization and other international bodies, as appropriate, in respect of the control and management of ships' ballast water and sediments, to provide support for those Parties which request technical assistance to train personnel; to ensure the availability of relevant technology, equipment and facilities; to initiate joint research and development programmes; and to undertake other action aimed at the effective implementation of the Convention and of guidance developed by the Organization related thereto.

3.14 Communication of information

Parties to the Convention undertake to provide the Organization with documents as follows (for circulation, where appropriate, of the information to all Parties):

- .1 any requirements and procedures, including laws, regulations and guidelines, for implementation of the Convention;
- .2 the availability and location of any reception facilities for the environmentally safe disposal of ballast water and sediments; and
- .3 any requirements for information from a ship which is unable to comply with the provisions of the Convention.

3.15 Dispute settlement

Parties shall settle any dispute between them concerning the interpretation or application of this Convention using peaceful means of their own choice.

3.16 Relationship to international law and other agreements

Nothing in the Convention shall prejudice the rights and obligations of any State under customary international law as reflected in the United Nations Convention on the Law of the Sea (UNCLOS).

3.17 Signature, ratification, acceptance, approval and accession

The Convention is open for accession by any State. States may become Parties to the Convention by ratification, acceptance or approval, if they had signed the Convention subject to ratification, acceptance or approval before 1 June 2005, or by accession.

3.18 Entry into force

Article 18 provides the conditions and timing of entry into force of the Convention, being twelve months after the date on which not less than thirty States, the combined merchant fleets of which constitute not less than 35% of the gross tonnage of the world's merchant shipping, have either signed it without reservation as to ratification, acceptance or approval, or have deposited the requisite instrument of ratification, acceptance, approval or accession in accordance with article 17.

3.19 Amendments

Article 19 provides the procedures for amendments to the Convention. It should be noted that any Party may propose an amendment to this Convention. Proposed amendments need to be submitted to the Secretary-General of the Organization or to a conference of Parties and amendments need to be adopted by a two-thirds majority.

3.20 Denunciation

Parties to the BWM Convention may terminate their obligations at any time by notifying the Secretary-General of the Organization after the expiry of two years from the date on which this Convention enters into force for that Party.

3.21 Depositary

The Convention is deposited with the Secretary-General of the Organization.

3.22 Languages

The Convention is established in the Arabic, Chinese, English, French, Russian and Spanish languages.

CHAPTER 4 – Jurisdiction

Jurisdiction refers to the authority of the contracting Party exercised in the forms of flag State, port State or coastal State. Jurisdiction dictates the legal enforcement of the Convention's requirements. It is vital to distinguish between the State's competence to prescribe legislation for individual ships (legislative jurisdiction) and its competence to enforce thus prescribed legislation (enforcement jurisdiction). The Parties to the Convention shall, with due regard to their particular conditions and capabilities, develop national policies, strategies or programmes for ballast water management in ports and waters under their jurisdiction that accord with, and promote the attainment of, the objectives of the Convention. According to article 16 of the Convention, States' rights and obligations under international law, such as UNCLOS, shall not be prejudiced by the Convention's provisions.

4.1 Flag State jurisdiction

The rule is that, exceptions applying, a ship on the high seas is subject only to the jurisdiction of its flag State. The flag State must ensure its ships conform to international rules and regulations (such as this Convention) through a survey and certification process. The jurisdiction of the flag State may concurrently hold with port States or coastal States, if alleged violation occurs while the ship is visiting the waters of the latter States.

4.2 Port State jurisdiction

Port States can exercise jurisdiction on those ships calling at their ports through the port State control (PSC) mechanism, which provides a "safety net" with regard to ships that may be in violation of the Convention. The jurisdiction right of the port State may include inspection of certificates, inspection to detect violations, etc. There are three grounds for port State intervention:

- On its own initiative (possibly in the context of regional cooperation)
- At the request of the flag State or a coastal State
- Following a complaint or information by crew, trade union or other stakeholder.

Port States may participate in regional agreements to effectively enforce compliance (e.g. Memoranda of Understanding on port State control) and they may have a common enforcement mechanism. Further information can be found in chapter 5 of this manual.

4.3 Coastal State jurisdiction

Coastal States can exercise their rights and jurisdictions, thus enjoying sovereignty, to prevent any infringement of their laws relating to their exclusive economic zone (EEZ) by ships sailing in their waters. However, the sovereignty may be limited by the principle of innocent safe passage and it may vary in degree over the different areas (zones) of the sea.

4.4 Application of the Convention

Article 3 of the Convention identifies the ships to which the Convention shall or shall not apply. The Organization developed *Guidance on entry or re-entry of ships into exclusive operation within waters under the jurisdiction of a single Party* (BWM.2/Circ.52). The Organization has also approved circulars on the application of the Convention to mobile offshore units and offshore support vessels (BWM.2/Circ.46 and BWM.2/Circ.44).

It is to be noted that all enforcement agencies, whether acting in a port State or coastal State capacity, must be cognizant of the fact that any improper action taken by them (such as unduly delaying or detaining a ship) may lead to civil liability.

PART II: MEETING OBLIGATIONS

CHAPTER 5 – Means of meeting obligations

5.1 Participation

Ratification, acceptance, approval or accession to the Convention, and its subsequent implementation, require the participation of the following stakeholders:

- .1 Government of the State (the political body having power to conclude international agreements)
- .2 Administration – legal
- .3 Administration – maritime
- .4 Shipowners and operators
- .5 Port authorities

Each stakeholder should know exactly what its institutional rights, obligations and responsibilities are, the responsibilities of its staff and the requirements to be imposed on ships and ports.

As previously stated, in the context of this document Administration refers to the appropriate Government authority with responsibility for implementing and/or enforcing the requirements of a legal instrument.

5.2 Consultation

When a State is considering ratifying, accepting, approving or acceding to the Convention, the organizations that fall within the stakeholder categories listed in paragraph 5.1 above should be consulted in order to be properly prepared to implement and enforce all of the obligations and requirements.

5.3 Government of the State

The political desire of a State to accept, approve, accede to or ratify the Convention is fundamental. Governments may wish to become parties to the Convention because of:

- .1 marine environmental concerns for waters under their jurisdiction;
- .2 concerns over water quality, which affects the population, or sea areas under their jurisdiction;
- .3 desire to have uniform enforcement of the Convention;
- .4 benefits to their shipowners (worldwide acceptance of ships);
- .5 benefits to their ports (means of control of pollution); or
- .6 concern for the worldwide environment.

Advice to governments may come from the public at large, from their own maritime or environmental Administration and from their maritime industry.

It should be recognized that, whereas Parties to the Convention have obligations, they also have privileges. Parties accept the obligation to minimize and ultimately eliminate the transfer of harmful aquatic organisms and pathogens through ships' ballast water and sediments, in return for which they have the privilege of not having harmful aquatic organisms and pathogens introduced by other Parties (if they are Parties to the Convention, and the introduction occurs within their territorial waters, they have the right to take legal action). A non-Party does not accept the obligation to place restrictions upon its ships and, therefore, its ships cannot face legal action for failing to comply; however, this will not be the case in the territorial waters or ports of a Party, where Parties acting in their roles as coastal or port States shall apply the requirements of the Convention as may be necessary to ensure that no more favourable treatment is given to such ships. It has to accept, moreover, that failure to accept such obligations means that when its own territorial waters are affected it does not have the privilege under the Convention to insist upon legal action against the ship concerned.

5.4 Administration – legal

Once the political desire has been established and a decision made to become a Party, it is necessary to consider the means of ratifying or acceding to and implementing the Convention.

5.5 Administration – maritime

The responsible Administration will have by far the greatest administrative task in the implementation of the Convention. It is likely that this body will provide advice to the legal branch and the Government of a State on the one hand, and will advise the shipping industry and port authorities on the other. The maritime Administration also has responsibility for the approval of ballast water treatment systems in accordance with relevant guidelines.

5.6 Shipowners and operators

Shipowners will need to select and equip ships for their operational needs and train seafarers, especially their merchant marine officers, in order to meet the requirements of the Convention. This includes ensuring that the ballast water management plan is being executed. An outline of these requirements is given in part IV of this manual (chapters 8 to 12) in line with the respective sections of the annex to the Convention. Further information on duties of the shipowners can be found in chapter 16.

5.7 Port authorities

The main concern for port authorities, next to enforcement in port, will be the provision of adequate sediment reception facilities and the quality and volume of the discharged water. Port State authorities should communicate their inspection requirements in order to promote a worldwide uniform interface between such authorities. The *Guidelines for port State control under the BWM Convention* (resolution MEPC.252(67)) provides advice in this area.

5.8 Impact of the Convention

The impact of the Convention will vary depending on the role of the stakeholder. When considering the necessary means of meeting its obligations under the Convention, a State should recognize that the impact will vary according to whether it is a flag State, a port State or a coastal State. Most States will be all three, however some may be large flag States but have little with regard to port or coastal State responsibilities, or vice versa. The impact of the Convention will also vary with the trade pattern of a port State and the fleet composition of a flag State.

5.9 Obligations

All stakeholders involved with the Convention need to consider and meet their obligations with respect to:

- preparation of legislation, including regulations;
- survey and certification;
- inspection;
- design and construction requirements;
- equipment requirements;
- operational requirements;
- documentation;
- procedures; and
- agreements with other governments.

5.10 Developing a compliance strategy for the Convention

5.10.1 Why compliance?

Under article 2(1) of the Convention, parties accept to undertake comprehensive actions in order to prevent, reduce and ultimately eliminate the transfer of harmful aquatic organisms and pathogens through the control and management of ships' ballast water and sediments. In accordance with this obligation, a Party to the Convention will need to implement a range of monitoring, compliance and enforcement mechanisms to give force and effect to the Convention. Enforcement of the Convention should primarily focus on preventing the transfer of harmful aquatic organisms and not simply on apprehending and punishing violators. The extent to which education, incentives, monitoring and policing programmes are used by a State to ensure compliance with the Convention depends upon the type of jurisdiction that the State enjoys over a ship.

5.10.2 Strategies for ensuring compliance

An effective compliance programme should incorporate all of the following elements:

- .1 compliance monitoring through routine inspections, surveys, and/or examinations;
- .2 reporting procedures;
- .3 adequate investigations of violations reported or otherwise detected;
- .4 a system of adequate sanctions in respect of violations;
- .5 education and public awareness programmes; and
- .6 cooperation and coordination with other Parties.

A compliance programme should be adaptable enough to allow compliance priorities to respond to prevailing circumstances. One or more of its elements may be more salient for a State Party depending on key variables, including the state of the national fleet, the type of ships calling at ports of the State Party, the emergence of new equipment, procedural Convention standards, the availability of human and technological resources within the Administration and the familiarity of relevant stakeholders with the Convention.

In setting priorities for a compliance strategy, the Administration should undertake an exercise to identify which ships have the highest potential for being in violation, or where a violation would be most significant.

5.10.3 Awareness

Any compliance strategy should take into consideration that resources spent on education and prevention will save resources that might have been spent on prosecution. Education and prevention strategies are necessary to sensitize all potential stakeholders about how they can assist in protecting the marine environment from the transfer of harmful aquatic organisms and pathogens. In this way, they may prove a cost-effective resource for Parties with limited financial or policing resources. Public education can also engender more positive behaviour from consumer-oriented operations.

5.10.4 Cooperation and coordination of port State control

Article 10.4 of the Convention, as well as several important resolutions, lay the ground work for the doctrine of cooperation and interchange as a mutual effort of enforcement among Parties to the Convention. Such cooperation is an important tool in fostering clarity and uniformity in implementation and compliance objectives, in collecting evidence and in enforcement procedures. Cooperation may take several forms, such as joint investigations of violations, supplying information about a particular ship, gathering evidence of a violation, and prosecuting flag State ships within the jurisdiction of another country for provable Convention violations. Reciprocal arrangements in respect of investigations and compliance monitoring will be particularly valuable for Parties which are geographically proximate and/or which share common mechanisms for enforcement. Such arrangements can be formally achieved through Memoranda of Understanding (MoUs) on port State control. Nine MoUs on port State control are in existence worldwide (see figure 1). Proper regional cooperation and exchange of boarding results among participating Administrations are an effective enforcement tool and can also reduce the requirement for individual States to board all vessels.

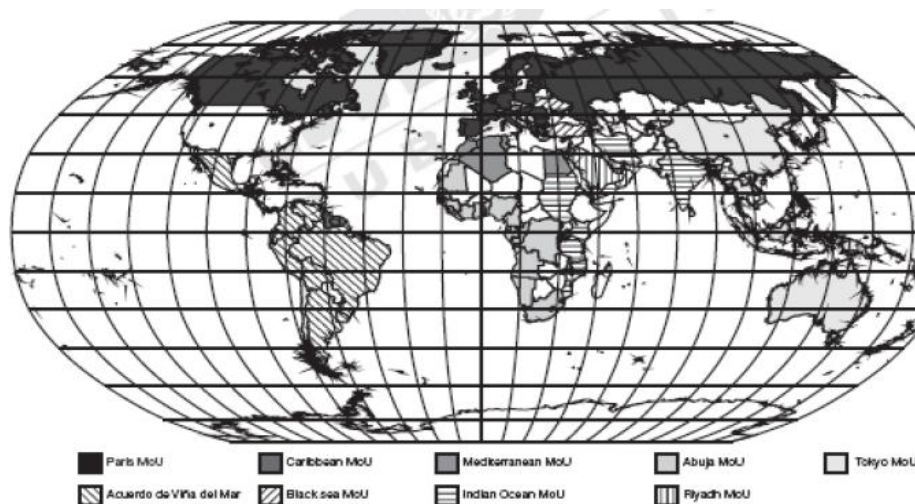


Figure 1: Overview of the nine MoUs on port State control

PART III: LEGAL ASPECTS

CHAPTER 6 – Integrating the Convention into national law

6.1 General

It is assumed that every State Administration will have a legal department or lawyers, which may be attached to its Administration or to a larger administrative department such as, for example, a Department of Transport. It is further assumed, for the purposes of this manual, that these legal administrators (or lawyers) will have primary responsibility for the legislation that is necessary to implement the Convention. Whatever the form of the Administration, it must be considered desirable for a single body to be given the overall responsibility for ratification, legislation and implementation. The legal system will vary from State to State, but the principal legal actions necessary for integrating the Convention into national law and implementation are likely to be as outlined in figure 2 and in the following paragraphs.

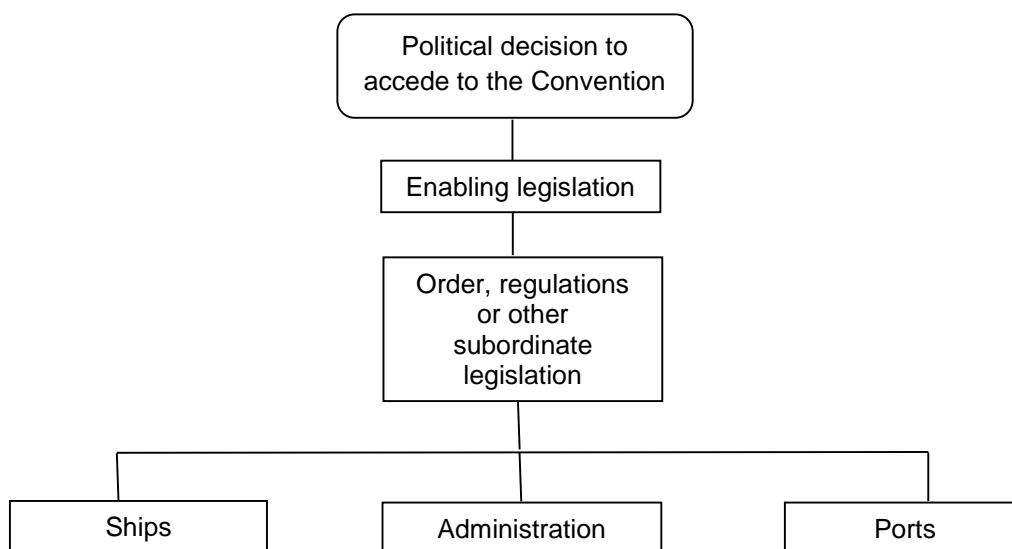


Figure 2: Integrating the Convention into national law and implementation

6.2 Parties to the Convention – instrument of accession

States may become Parties to the Convention by:

- (a) signature not subject to ratification, acceptance, or approval; or
- (b) signature subject to ratification, acceptance, or approval, followed by ratification, acceptance or approval; or
- (c) accession.

Ratification, acceptance, approval or accession shall be effected by the deposit of an instrument to that effect with the Secretary-General of the Organization. In acceding, governments indicate their acceptance and approval of the Convention and their readiness to implement its requirements.

6.3 Entry into force

The Convention shall enter into force twelve months after the date on which not less than thirty States, the combined merchant fleets of which constitute not less than 35% of the gross tonnage of the world's merchant shipping, have either signed it without reservation as to ratification, acceptance or approval, or have deposited the requisite instrument of ratification, acceptance, approval or accession in accordance with article 17 of the Convention.

For States that have deposited an instrument of ratification, acceptance, approval or accession in respect of the Convention after the requirements for entry into force thereof have been met, but prior to the date of entry in force, the ratification, acceptance, approval or accession shall take effect on the date of entry into force of the Convention or three months after the date of deposit of the instrument, whichever is the later date. Any instrument of ratification, acceptance, approval or accession deposited after the date on which the Convention enters into force shall take effect three months after the date of deposit.

After the date on which an amendment to the Convention is deemed to have been accepted under article 19, any instrument of ratification, acceptance, approval or accession deposited shall apply to the Convention as amended.

6.4 Enabling legislation

It is necessary to consider whether existing legislation gives the power through which the Convention may be integrated into the national legal system. This facility may exist in maritime legislation such as a Mercantile Marine Act, Merchant Shipping Act, or similar legislation. A decision is then necessary on whether any such existing maritime legislation needs amending or whether new legislation, specifically for the purpose of implementing the Convention, is required. It is advisable to look at how other international maritime conventions, such as the International Convention for the Safety of Life at Sea (SOLAS), the International Convention on Load Lines, International Regulations for Preventing Collisions at Sea (COLREGS), or the International Convention for the Prevention of Pollution from Ships (MARPOL), have been introduced. It is important that implementation of amendments to the Convention and associated resolutions and recommendations be permitted.

It should be noted that the Convention enters into force three months after the deposit of an instrument of accession. The implementing legislation should therefore enter into force no later than at that time. To ensure that this will be the case, the preparation of such legislation should be initiated well in advance of the accession to the Convention. This timing is obviously particularly important if the implementing legislation is to be adopted by a parliament, congress, etc.

6.5 Order

The legal system of some States may permit regulations to be made directly under the enabling legislation; others require an "order" approved by their Government (e.g. parliament, assembly, congress, legislative assembly, etc.) to bring the various parts of subsidiary legislation into effect.

6.6 Regulations

The regulations that compose the annex to the Convention can, to a large extent, be produced as national regulations with very minor changes. However, due to varying degree of jurisdiction needing to be maintained, some of the regulations may not be straightforward to reproduce in national legislation.

CHAPTER 7 – Legal aspects of enforcement

7.1 What are violations?

It is important that legislation or regulations implementing the Convention establish the elements of a Convention violation such that enforcement personnel or courts are able to ascertain whether clear objective evidence of a violation is present. Unlike detecting violations in other international conventions (e.g. MARPOL Annex I), detecting marine organisms which exceed the ballast water performance standard (regulation D-2) may not be straightforward. While documentary evidence (such as the ballast water record book) plays a major role in detecting violations of the ballast water exchange standard in regulation D-1, scientific evidence (gathered primarily through the analysis of a ballast water discharge sample) is the key for detecting violations of the discharge standard in regulation D-2. Further information on ballast water exchange and discharge standards (regulations D-1 and D-2) can be found in chapter 11.

While it is recognized that States have different standards of proof under their individual legal systems, in general States should allow for the reception of a wide variety of credible evidence, including circumstantial evidence, to indicate violations of the Convention. The gathering, presentation and admitting of evidence for violations must be carefully developed by States, where practicable in cooperation with other States, for the effective enforcement of the Convention.

7.2 Sanctions

Article 8.1 of the Convention states that any violation of the requirements of this Convention shall be prohibited and sanctions shall be established under the law of the Administration of the ship concerned, wherever the violation occurs. The Administration shall promptly inform the Party that reported the alleged violation, as well as the Organization, of any action taken. If the Administration has not taken any action within one year after receiving the information, it shall so inform the Party that reported the alleged violation.

Article 8.2 of the Convention states that any violation of the requirements of this Convention within the jurisdiction of any Party shall be prohibited and sanctions shall be established under the law of that Party.

The type of sanctions applicable to varying violations under the Convention is a matter for determination by the individual Party and may be a function of several legal, political and economic circumstances. Moreover, the approach to sanctions in civil law and in common law jurisdictions may also differ. As sanctions can be very effective as a compliance tool, it would be beneficial for States to prescribe sanctions that are in harmony with applicable systems in neighbouring States or territories. This would help to avoid the perception that some States have less stringent sanctions than others, which may in turn insinuate a "safe haven" to the potential violator. On the other hand, sanctions may take voluntary mitigation efforts and self-reporting into account. Such a progressive system is easier and less expensive to police and preserves prosecutorial assets for larger cases where substantial harm has occurred.

Flag States should adopt sanctions for those activities that defeat the purposes of the regulations, such as falsification of records required by the Convention. It is to be noted that there are requirements for ballast water management systems (BWMS) to incorporate control and monitoring equipment and to store the operational and performance data for at least 24 months. These data provide vital evidence on the operation and performance of the BWMS which can be cross referenced with the ballast water record book (BWRB) entries and ship log entries to identify potential violations.

Sanctions for these types of violations may be deemed criminal and could thereby serve as an important tool in promoting truthfulness in reporting, monitoring and other regulatory requirements. It is important to note that swift and certain sanctions for violations will have an important deterrent effect. It is also important to note that merely providing for the imposition of sanctions in national legislation will not, on its own, achieve significant benefits. Such sanctions should be supported by effective technical procedures for gathering evidence.

PART IV: IMPLEMENTING THE REGULATIONS

CHAPTER 8 – Implementing Section A: General provisions

8.1 Definitions

Seven terms are defined in regulation A-1: "anniversary date", "ballast water capacity", "company", "constructed", "major conversion", "from the nearest land" and "Active Substance". These seven terms are fundamental for the comprehension of various provisions of the Convention. A State may add more definitions if it thinks those will help clarify the implementation of the Convention.

8.2 General applicability

Regulation A-2 is a key section that provides functional requirements for the Convention to achieve its goal. It states that, except where expressly provided otherwise, the discharge of ballast water shall only be conducted through ballast water management in accordance with the provisions of the Convention.

More generally, section A of the annex to the Convention deals with the scope of the regulations. When implementing the Convention, the Government of a State Party to the Convention first has to define precisely the scope of those regulations. For example, if it is recognized that the text of the Convention only applies to international voyages a decision needs to be made as to whether a Government wants those rules to also apply to national voyages, which is at the discretion of the State.

8.3 Exceptions²

[Regulation A-3 provides for exceptions that are justified in certain cases:

- ensuring the safety of a ship in emergency situations or saving life at sea;
- accidental discharge resulting from damage;
- avoiding or minimizing pollution incidents;
- uptake and discharge on the high seas of the same ballast water and sediments; and
- discharge at the same location where the whole of that ballast water originated providing that there has been no mixing with unmanaged ballast water from other areas.

The first three cases above are similar to those found in other maritime treaties, whereas the fourth and fifth are specific to ballast water and might raise issues to be addressed, therefore extra attention needs to be paid to them.]

8.4 Exemptions²

[Regulation A-4 constitutes a way to implement the Convention with some flexibility, giving the government of a State party to the Convention the possibility, in the waters under its jurisdiction, to grant exemptions to certain ships so that they are not required to apply regulations B-3 (Ballast water management for ships) or C-1 (Additional measures).

Therefore, the government of a State Party to the Convention needs to anticipate that work on its exemptions policy should be undertaken sufficiently in advance of the Convention entering into force, in order to be able to provide shipowners with the necessary information to apply for an exemption.

Exemptions can be granted for a determined period, not exceeding five years, to certain ships and according to certain conditions:

- the ship operates exclusively between specified ports or locations;

² This section is in square brackets because it is currently kept in abeyance as its content may be affected by the outcomes of ongoing discussions at the IMO.

- the ship takes up only ballast water coming from those specified ports or locations; and
- a risk assessment has to be performed prior to the exemption request.

The exemption possibility is meant to apply to individual ships or groups of similar ships on specified voyages or similar specified voyages and particular attention needs to be paid to short-sea shipping in this specific case.

The *Guidelines for risk assessment under regulation A-4 of the BWM convention (G7)* provide assistance in the granting of exemptions. When being used these need to be adapted to the local conditions. These local conditions can include both biogeography and biodiversity and these conditions should be used by the Government of the State to define its exemptions policy and to ensure clear internal guidelines are followed in decision making.

While this regulation primarily addresses the port State authorities, the flag State authority may be involved to address enquiries raised by the port State authorities involved with the request. An exemption decision can only be granted if all States that may be affected by the exemption agree that the risk assessment demonstrates there is no risk of invasion.

The study of an exemption request and its possible granting procedure can be developed in three stages:

- risk assessment (according to Guidelines (G7)) proposed by a shipowner when asking for exemption;
- study of this assessment by all the port States concerned; and
- communication of any granted exemption to the Organization.]

8.5 Equivalent compliance

A simplified application of the Convention can be used in relation to pleasure craft and craft used for search and rescue through regulation A-5 and the *Guidelines for ballast water management equivalent compliance (G3)*. If the Government of a State Party to the Convention decides to apply the Convention's principles to domestic voyages, it can choose to apply regulation A-5 too to domestic ships.

CHAPTER 9 – Implementing Section B – Management and control requirements for ships

9.1 Ballast water management for ships³

[The specific provisions of the Convention require, inter alia, the development of individual ships' ballast water management plans, the maintenance of appropriate records and the compliance with certain concentration-based discharge limits which are dependent on the date of construction and ballast-water capacity of the ship in question.

The Convention stipulates two standards for discharged ballast water. The D-1 standard covers ballast water exchange (BWE) while the D-2 standard covers ballast water treatment. The Convention requires either the D-1 or the D-2 standard after entry into force. If entry into force occurs prior to 1 January 2017, the Convention will require compliance with the D-2 standard according to the schedule in table 1.

³ This section is in square brackets because it is currently kept in abeyance as its content may be affected by the outcomes of ongoing discussions at the IMO.

Table 1: Compliance timetable

Construction year		BW capacity (m3)	New schedule
Before 2009		Between 1500 and 5000	1st IOPP* renewal survey after entry into force of the Convention
		Less than 1500 or greater than 5000	1st IOPP* renewal survey after the anniversary date of delivery of ship in 2016
2009 or after		Less than 5000	1st IOPP* renewal survey after entry into force of the Convention
	Between 2009 and 2011	5000 or more	1st IOPP* renewal survey after the anniversary date of delivery of ship in 2016
	After 2011	5000 or more	1st IOPP* renewal survey after entry into force of the Convention

* Note: IOPP is the International Oil Pollution Prevention Certificate.

If the Convention enters into force after 31 December 2016, the applicable date of compliance with the D-2 standard is that of the first IOPP renewal survey for all ships. Ships built after entry into force will be required to have a treatment system installed at delivery.

Article 4 of the Convention (Control of the transfer of harmful aquatic organisms and pathogens through ships' ballast water and sediments) calls for Parties to:

- require ships to which the Convention applies flying their flag or operating under their authority to comply with the requirements of the Convention and to take effective measures to ensure that those ships comply with those requirements; and
- with due regard to their particular conditions and capabilities, to develop national policies, strategies or programmes for ballast water management in ports and waters under their jurisdiction that accord with, and promote, the attainment of the objectives of the Convention.

Compliance with the Convention can be achieved inter alia through the following options:

- as an interim measure exchange the ballast water as specified by regulation D-1 until regulation D-2 applies for the specific ship;
- treat the ballast water by using a type approved ballast water management system in accordance with regulation D-2; or
- implement other methods of ballast water management accepted as alternatives to the requirements described in regulation B-3, paragraphs 1 to 5, provided that such methods ensure at least the same level of protection to the environment, human health, property or resources, and are approved in principle by the Marine Environment Protection Committee (MEPC).]

9.2 Ballast water management systems and other methods

Ballast water management systems (BWMS), treatment methods and technologies have developed rapidly in preparation for the anticipated ratification and subsequent entry into force of the Convention. Current options include:

- mechanical treatment, e.g. filtration, separation or destruction;
- physical treatment, e.g. ultraviolet light, electric currents, heat treatment, deoxygenation;

- chemical and electrochemical treatment. i.e. those making use of Active Substances;
- combinations of the above; and
- in addition, sediment management, either by separation and return to local uptake water (compliant to the Convention) or by removal for disposal.

Alternative methods of compliance could include carriage of permanent ballast in sealed tanks, no ballast on board or discharge of ballast water to an approved reception facility. Ships conducting ballast water management shall discharge ballast water in accordance with the standards set out in section D of the Convention.

More information on ballast water management options for ships can be found on chapter 17.

9.3 Ballast water exchange (BWE)

Ballast water exchange allows for implementation of the Convention by initially requiring ships to discharge and replace ballast water taken in port or coastal areas with water from the open sea, defined as 200 nautical miles from the nearest land whenever possible, but in all cases at least 50 nautical miles from the nearest land, and in water at least 200 metres in depth. This procedure aims at reducing the propagule pressure (commonly defined as a composite measure of the number of individuals of a species released into a region to which they are not native) by limiting aquatic organisms that could become established in other coastal waters. Aquatic organisms taken up with ballast water from the open sea are likely to be far fewer in number and less capable of establishing a bio-invasion in the receiving coastal waters.

A ship shall not be required to deviate from its intended voyage, or delay the voyage, in order to comply with any particular requirement for distances from the nearest land or water depths. A ship conducting ballast water exchange shall not be required to comply with regulation D-1 if the master reasonably decides that such exchange operation would threaten the ship's stability or in general the safety of the ship, its crew, or its passengers because of adverse weather, ship design or stress, equipment failure, or any other extraordinary condition. Further information on BWE methods can be found in chapter 17.

BWE is an interim measure intended to be phased out when all relevant ships are required to comply with the D-2 standard. The ballast water exchange standard (regulation D-1) and the ballast water performance standard (regulation D-2) are discussed further in chapter 11.

9.3.1 Designation of areas for ballast water exchange

The Organization has developed *Guidelines on designation of areas for ballast water exchange (G14)*, addressing how States may designate areas, in consultation with adjacent or other States, as appropriate, where ships may conduct BWE.

Generally there are three integral steps to follow in designating an area as a BWE area:

- identification of the area, considering the legal aspects, navigational constraints, etc.;
- risk assessment; and
- designation of the area, in accordance with national and international laws and obligations.

9.3.2 Ballast water exchange in the Antarctic area

The ballast water management plan for ships entering Antarctic waters needs to take into account the issues related to BWE in cold environments and in particular in Antarctic conditions. Further information can be found in the *Guidelines for ballast water exchange in the Antarctic treaty area* (resolution MEPC.163(56)).

9.4 Sediment management

Aquatic organisms can settle out of ballast water and can continue to exist within the sediments that accumulate within ballast water tanks. These organisms can survive for long periods after the water they were originally in has been discharged. They may thereby be transported from their natural habitat and discharged in another port or area where they may cause harm or damage to the environment, human health, property and resources. All ships to which the Convention applies have to remove and dispose of sediments from spaces designated to carry ballast water in accordance with the provisions of the ship's ballast water management plan.

Each Party to the Convention undertakes to ensure that, in ports and terminals designated by that Party where cleaning or repair of ballast tanks occurs, adequate facilities are provided for the reception of sediments. Such reception facilities shall operate without causing undue delay to ships and shall provide for the safe disposal of such sediments that does not impair or damage their environment, human health, property or resources, or those of other States.

Sediment management is essential for any form of ballast water management. Ships will not be able to comply with the Convention if proper disposal of sediments from ballast water management is not carried out on an adequate scale. The *Guidelines on design and construction to facilitate sediment control on ships (G12)* provide details on ballast water tanks and how their internal structure should be designed to avoid the accumulation of sediments.

As well as design considerations, ballast water sediment management will, under normal circumstances, entail hosing down ballast water tanks, from the top all the way down to the bottom and, after flushing the tank bottom, digging up remaining mud and sediments, which have to be carried or lifted up to the main deck for further containment or direct disposal to a shore reception facility.

Ships should, during ballasting operations, as far as practicable, make every effort to limit the uptake of ballast water with potential high concentrations of sediments.

9.5 Ballast water management plan (BWMP)

The Convention requires every ship to carry a ship-specific ballast water management plan (BWMP) approved by its flag State or a recognized organization on behalf of the flag State. Regulation B-1 specifies that a BWMP shall:

- detail safety procedures for the ship and the crew associated with ballast water management as required by the Convention;
- provide a detailed description of the actions to be taken to implement the ballast water management requirements and supplemental ballast water management practices as set forth in the Convention;
- detail the procedures for the disposal of sediments, at sea and to shore;

- include the procedures for the coordination of shipboard ballast water management that involves discharge to the sea with the authorities of the State into whose waters such discharge will take place;
- designate the officer on board in charge of ensuring that the plan is properly implemented;
- contain the reporting requirements for ships provided for under the Convention; and
- be written in the working language of the ship. If the language used is not English, French or Spanish, a translation into one of these languages shall be included.

The Organization has adopted *Guidelines for ballast water management and development of ballast water management plans (G4)*. In addition to the mandatory aspects of the BWMP listed above, the guidelines also offer more details and provide a standard format for the BWMP. A BWMP should, inter alia, contain:

- plans/drawings and a description of the ballast system
- information on ballast water sampling points and sampling procedures
- operational or safety procedures and restrictions
- description of the method(s) used on board for the ballast water management and sediment control, including procedures for the disposal and handling of sediments
- duties of the ballast water management officer
- recording requirements
- crew training and familiarization

The BWMP should be reviewed in accordance with the International Safety Management (ISM) Code. Any changes would then need to be reapproved by the flag State or recognized organization on behalf of the flag State. The BWMP will be available for review by port State control inspectors and other authorities in connection with verifying compliance with the Convention's requirements.

9.6 Ballast water record book (BWRB)

The Convention specifies that all ships shall have on board a BWRB, which shall at least contain the information specified in appendix II to the annex to the Convention (see regulation B-2.1). The BWRB may be in an electronic format, or integrated into other record/log book systems. Entries in the BWRB shall be signed by the officer in charge of the operation and each completed page shall be signed by the master.

All ballast water operations should be fully recorded without delay and the entries in the BWRB should be made as follows:

- when ballast water is taken on board;
- whenever ballast water is circulated, transferred between tanks or treated for ballast water management purposes;

- when ballast water is discharged into the sea;
- when ballast water is discharged to a reception facility;
- accidental or other exceptional uptake or discharge of ballast water;
- additional operational procedure and general remarks; and
- exemptions including emergency procedures.

The minimum information to be entered in the BWRB (as detailed in appendix II) includes date/time and location, port or facility of uptake (latitude/longitude), depth if out of port, as well as estimated amount of ballast water uptake or discharge in cubic metres, and whether the ballast water management plan (BWMP) was implemented prior to discharge. The BWRB shall be kept on board the ship for a minimum of two years and be kept in custody by the company for a minimum of an additional three years. The BWRB will be available for review by port State control inspectors and other authorities in connection with verifying compliance with the Convention's requirements.

9.7 Duties of officers and crew

Regulation B-6 states that officers and crew shall be familiar with their duties in the implementation of ballast water management particular to the ship on which they serve and shall, appropriate to their duties, be familiar with the ship's BWMP. Officers and crew engaged in ballast water operations should be familiarized and trained in the operation of the installed ballast water management system (BWMS) and their associated duties. In addition to instructions in the general aspects of ballast water management and the requirements of the Convention, ship-specific training should include operational procedures and maintenance of the BWMS and all related safety considerations, as detailed in the BWMP and the BWMS operating manual.

To facilitate the implementation, administration and execution of the BWMP, a qualified and responsible officer shall be designated (regulation B-1.5). The duties of the designated officer should be specified in the BWMP; such duties could include but are not limited to:

- having responsibility for proper implementation of the BWMP including familiarization and training of officers and crew with ballast water management related duties;
- ensuring that the ballast water management operations follow procedures laid down in the BWMP;
- preparing the ballast water declaration/reporting form prior to arrival in port;
- providing assistance to crew and officers under port State control and other inspections;
- witnessing any sampling of ballast water that may need to be undertaken;
- ensuring that sediment management is implemented and carried out in accordance with the BWMP;
- monitoring and ensuring that the BWRB is properly kept up to date;

- overseeing that other ballast water management and sediment management tasks specified by the BWMP are carried out; and
- having operational responsibility during ballast water exchange.

CHAPTER 10 – Implementing Section C – Special requirements in certain areas

The Convention provides that special requirements in certain areas may be necessary to prevent, reduce, or eliminate the transfer of harmful aquatic organisms and pathogens. These requirements are in addition to the prescriptive measures detailed in Section B. Section C, dealing with these special requirements, includes three regulations:

- Regulation C-1, Additional measures.
- Regulation C-2, Warnings concerning ballast water uptake in certain areas and related flag State measures.
- Regulation C-3, Communication of information.

It is to be noted that regulations C-1 and C-2, while both working towards the intent of the Convention, are different in focus. Regulation C-1 is focused on ballast water discharge and concerns additional measures that an Administration can require to increase protection of its own waters. Regulation C-2 is focused on ballast water uptake and requests Parties to identify and communicate the timing and location of certain areas where ballast water should not be taken up.

Section C is important to the intent of the Convention. Regulation C-1 allows each Party to have their own additional ballast water management requirements. Ensuring that such additional measures can be met and are effectively communicated is critical to avoid confusion and ensure compliance. Regulation C-2 offers potential relief to concerns that ballast water management systems may be overwhelmed under certain conditions and locations. It is this regulation that encourages Parties to monitor their own waters and inform ship operators when such conditions may exist. It is therefore important that Parties monitor their own waters and effectively inform challenging conditions to ships.

This chapter provides the following guidance relative to Section C of the Convention:

- Process for a Party to introduce additional measures (regulation C-1).
- Process for a Party to communicate ballast uptake warnings (regulation C-2).
- Practical guidance for ship operators for compliance with regulations C-1 and C-2.

10.1 Additional measures

Regulation C-1 sets out the process for a Party to introduce additional measures that may increase protection of its own waters. It should be repeated that these are additional measures beyond the minimum measures required in Section B. In other words, it is the intent of the Convention that Section B provides adequate protection for most locations. These additional measures are intended for certain areas that are different, for example more environmentally sensitive, than most locations.

The development and implementation of such measures provides many practical challenges that require careful consideration. Parties may consider the following as they assess additional measures:

- Scientific evaluation of the effectiveness and potential unintended consequences of such additional measures.
- Practicality of implementing measures that might affect ship operations.
- Impact of such measures on port logistics.
- Ability to perform compliance monitoring and enforcement of such measures.
- Means to communicate such measures so that ships will be able to comply.

The Convention provides clear guidance on the process for a Party to introduce additional measures in regulation C-1.3.

10.2 Warnings concerning ballast water uptake in certain areas and related flag State measures

Regulation C-2 sets out the process for a Party to notify ships of known challenging conditions, in order to avoid transporting harmful aquatic organisms and pathogens to other locations. Such other locations might be within that Party's own waters or in another Party's waters. Such warnings might be temporary, while others might need to remain in effect permanently.

A harmful algal bloom is an example where a temporary warning may be required. Such blooms result when sunlight and nutrients encourage the rapid reproduction of algal organisms to very high concentrations. Some blooms result in potentially harmful toxins. Such blooms could have concentrations of organisms that are much higher than ballast water management systems are designed to treat. As a result, a ship taking up ballast water where a harmful algal bloom is occurring, risks transporting that bloom to another location.

A sewage outfall is an example of a location where a permanent warning is appropriate. In such locations, there may regularly occur high levels of pathogens due to high nutrient levels that exceed the design parameters of ballast water management systems. The result could be either the transport of such pathogens to other locations, or inhibiting the treatment process due to effects such as high levels of dissolved organic carbon.

The Convention provides clear guidance on the process for a Party to introduce and issue such warnings in regulation C-2.

10.3 Practical guidance for ship operators for compliance with regulations C-1 and C-2.

Ships are required to comply with the various additional measures (regulation C-1) and warnings (regulation C-2) issued by Parties. Such measures and warnings, generally described above, are subject to be issued, changed and expired as needed to provide appropriate protection. As such, ship operators and masters are required to routinely check through their flag State and other sources, such as the port States where the ship is expected to call, classification societies and trade organizations.

The additional measures, in practice, may increase record keeping and reporting. There may also be the possibility of treatment standards that are different or higher than those of the Convention and of additional water quality discharge requirements such as maximum total residual oxidant concentrations.

CHAPTER 11 – Implementing Section D – Standards for ballast water management

11.1 Ballast water exchange standard

The ballast water exchange (BWE) standard is set out in regulation D-1, as follows:

- .1 ships performing ballast water exchange in accordance with this regulation shall do so with an efficiency of at least 95 per cent volumetric exchange of ballast water;
- .2 for ships exchanging ballast water by the pumping-through method, pumping through three times the volume of each ballast water tank shall be considered to meet the standard described in paragraph 1. Pumping through less than three times the volume may be accepted provided the ship can demonstrate that at least 95 per cent volumetric exchange is met.

The conditions under which ballast water exchange should take place are discussed in chapters 9 and 17 of this manual. The BWE procedures are to be included in the BWMP and approved by the flag Administration. Further details regarding BWMPs and ballast water management via the exchange method can be found in the *Guidelines for ballast water management and development of ballast water management plans (G4)* and the *Guidelines for ballast water exchange (G6)*.

Sampling for compliance verification of ballast water exchange can be performed to check the ballast water salinity; however this can have some limitations. Additional information regarding sampling and analysis to verify compliance with regulation D-1 can be found in the *Guidance on ballast water sampling and analysis for trial use in accordance with the BWM Convention and Guidelines (G2)* (BWM.2/Circ.42/Rev.1).

11.2 Ballast water performance standard

Regulation D-2 of the Convention specifies the biological performance standard for ballast water discharge, but does not prescribe the method(s) a ship should use to meet the requirements. The most effective and efficient method to meet the performance standard will vary depending on various factors for each ship. The majority of ships are expected to install an approved ballast water management system to achieve the performance standard. Therefore, to implement and achieve the ballast water performance standard in regulation D-2, a ship's officer in charge of ballast water management should follow the appropriate procedures specified in the approved BWMP.

The ballast water performance standards in regulation D-2 are summarized in table 2.

Table 2: Performance standards (regulation D-2)

Microorganism category	Performance standard
Plankton, size $\geq 50 \mu\text{m}^{(a)}$	< 10 viable cells/m ³
Plankton, size 10-50 $\mu\text{m}^{(a)}$	< 10 viable cells/mL
Toxicogenic <i>Vibrio cholerae</i>	< 1 cfu ^(b) /100 mL
<i>Escherichia coli</i>	< 250 cfu ^(b) /100 mL
Intestinal Enterococci	< 100 cfu ^(b) /100 mL

^(a) Minimum dimension.

^(b) cfu: Colony-forming unit.

Information on the approval of ballast water management systems can be found in chapters 14⁴ and 15 of this manual, while information on sampling both for enforcement and

⁴ Chapter 14 is currently kept in abeyance as its content may be affected by the outcomes of ongoing discussions at the IMO.

for type approval testing can be found in chapter 13. In addition, options available for ships to meet the ballast water performance standard, including ballast water treatment and use of other methods, are discussed in chapter 17.

Should sampling for verification of compliance with regulation D-2 be deemed necessary, additional information can be found in the *Guidance on ballast water sampling and analysis for trial use in accordance with the BWM Convention and Guidelines (G2)* (BWM.2/Circ.42/Rev.1).

11.3 Approval requirements for ballast water management systems

Regulation D-3 stipulates the basis for ballast water management system (BWMS) approval and directs Administrations, manufacturers and shipowners to the guidelines and procedures developed for the approval process.

BWMS used in order to comply with this Convention must be approved by the Administration in accordance with the *Guidelines for approval of ballast water management systems (G8)*. In addition, BWMS that make use of Active Substances shall be approved by the Organization in accordance with the *Procedure for approval of BWMS that make use of active substances (G9)*. Further information on the approval of BWMS can be found in chapters 14⁴ and 15 of this manual.

11.4 Prototype ballast water treatment technologies

Regulation D-4 contains provisions for the evaluation and testing of promising ballast water treatment technologies. For a ship participating in such a programme approved by the Administration, the ballast water performance standard in regulation D-2 shall not apply until five years from the date on which the ship would otherwise be required to comply or from the date of installation of this technology. Throughout this period, the treatment technology must be operated consistently and as designed.

Details regarding the application of regulation D-4 and a sample statement of compliance for a prototype ballast water treatment technology can be found in the *Guidelines for approval and oversight of prototype ballast water treatment technology programmes (G10)*.

11.5 Review of standards by the Organization

Regulation D-5 establishes the timelines and other aspects that the Marine Environment Protection Committee (MEPC) shall consider in order to review the standards set out in regulation D-2. The purpose of the Committee review includes, inter alia:

- Determining the availability of technology to achieve the D-2 standard;
- Assessing technical aspects of available technology (e.g. safety, environmental acceptability, biological effectiveness and practicability);
- Cost effectiveness, i.e. economics; and
- Review of guidelines developed by the Organization.

Regulation D-5 also stipulates how the Committee may form review group(s) to undertake this review, as well as how amendments may be made and adopted.

It should be noted that the Committee has already carried out several reviews on the availability of technology to achieve the D-2 standard and the conclusion was that there are options available for all ship types, including those that may have a very large ballast water capacity and flow rate.

CHAPTER 12 – Implementing Section E – Survey and certification requirements for ballast water management

Survey and certification guidelines for the purpose of complying with the Convention are provided in the Interim Survey Guidelines under the Harmonized System of Survey and Certification (BWM.2/Circ.7) in accordance with regulation E-1 of the Convention. The guidelines are kept in abeyance until the Convention enters into force. The interim survey guidelines are to be updated to the most recent HSSC Guidelines (at the time of writing resolution A.1053(27), as amended by resolution A.1076(28)). Readers are advised to be familiar with the content of that document and keep track of possible effective dates.

12.1 Surveys

Surveys are required for all ships of 400 gross tonnage and above excluding floating platforms, floating storage units (FSUs) and floating production, storage and offloading units (FPSOs) to which the Convention applies. The Administration should establish appropriate measures for ships that are not subject to these provisions in order to ensure that appropriate provisions of the Convention are complied with.

Certificates or endorsements are to be issued indicating completion of the survey. Before the ship is put in service an initial survey is required to verify that the ballast water management plan and the ship's structure, equipment, systems, fittings, arrangements and material or processes comply fully with the requirements of the Convention, following which the certificate is issued. Ships are also subject to annual surveys, which must occur within three months before or after each anniversary date. The intermediate survey will take place within three months before or after the second or third anniversary date, and shall take place of one of the annual surveys as mentioned above. An additional survey, either partial or general, shall be made after any change, replacement or significant repair is made to the system. The survey should ensure that any such change, replacement, or significant repair has been effectively made, so that the ship complies with the requirements of the Convention. All surveys shall be endorsed on the certificate. The certificate must also be renewed at a full renewal survey, at a date specified by the Administration but not exceeding every five years, to verify full compliance (structure, equipment, systems, fittings, arrangements and material or processes) with the applicable requirements of the Convention. These survey requirements are outlined in figure 3.

Year 0 Initial survey*	Year 1 Annual survey	Year 2 Annual or intermediate survey	Year 3 Annual or intermediate survey	Year 4 Annual survey	Year 5 Renewal survey
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Figure 3: Schedule for survey and certification

* Before the ship is put in service or before the Certificate is issued for the first time

Organizations with responsibility for issuing certificates will have individual checklists when undertaking the process of issuing a certificate. However, a number of common principles are likely to apply, as follows:

Annual, intermediate and renewal survey:

- Does the vessel have valid statutory and classification certificates?
- Are all flag Administration technical and reporting requirements compiled with?

12.1.1 Initial survey

The initial survey with regard to ballast water management should include, as per resolution [A.1053(27), section 4.1], an examination of plans and drawings as well as an on-board survey.

The examination of plans and drawings should include the following:

- examination of the design and construction plans (regulation B-5); and
- examination of the ballast water management plan (regulation B-1).

Examination of the plans for the installation of the ballast water management system:

- if applicable, examination of the plans for installation of a prototype ballast water treatment technology (regulation D-4).

The on-board survey during ship construction and/or after installation of a BWMS should include the following:

- the ballast water management plan and ballast water record book are provided in accordance with the required format and other requirements of the Convention (regulations B-1 and B-2);
- there a designated officer on board in charge of ensuring that ballast water management is properly implemented;
- the ballast water management system is type approved, the type approval certificate(s) is on board and the ballast water management system conforms to the type approval certificate (regulation D-3);
- a statement has been provided that electrical and electronic components are tested in accordance with environmental testing procedures (Guidelines (G8));
- equipment manuals are available for the major components, a BWMS operation and technical manual specific to the ship is available, installation specification and commissioning procedures are available for the BWMS and installation of the ballast water management system has been carried out in accordance with the manufacturer's specifications;
- sampling facilities are provided and are arranged so as to allow the collection of representative samples before the ballast water discharge point (Guidelines (G2));
- the operational inlets/outlets are located correctly as shown on the pumping and piping arrangement drawings;
- If applicable, the bulkhead penetrations are installed correctly;
- the control and monitoring equipment is functioning properly;
- The ballast water management system recording device is working properly;
- if consumables (e.g. Active Substances or chemicals) are required, there are enough on board;
- overall installation and operation of the ballast water management system, including alarms, audible or visual;

- If applicable, dosage instructions for Active Substances or chemicals are available on board;
- pumps, pipes and valves are correctly installed; and
- If applicable, satisfactory installation and statement of compliance of a prototype ballast water management system (regulation D-4).

If the above steps are completed satisfactorily, the International Ballast Water Management Certificate should be issued in accordance with regulations E-2, E-4 and E-5.

12.1.2 Annual survey

The following should be checked during an annual survey:

- examination of current certificates and other records under the Harmonized System of Survey and Certification (HSSC)
- check whether any new equipment has been fitted and, if so, confirm that it has been approved before installation and that any changes are reflected in the certificate;
- confirm that the ballast water management plan is on board;
- check whether the appropriate entries have been made in the ballast record book (regulation B-2).
- view the type approval certificate for the ballast water management system;
- view the records of the recording device;
- if applicable, view the statement of compliance for a prototype ballast water treatment technology and verify that it is continuing to be operated in accordance with approved procedures (regulation D-4);
- examine the ballast water management system and confirm its satisfactory operation;
- if applicable, confirm that the Active Substances required by the manufacturer's recommendations are provided on board and that the dosage instructions are available on board; and
- verify safety devices and arrangements are operational.

12.1.3 Intermediate survey

During an intermediate survey, in addition to the requirements of the annual survey an examination of the ballast water management system is to be carried out for obvious defects, deterioration or damage including examination of associated pumps, piping and fittings for wear and corrosion.

12.1.4 Renewal survey

During a renewal survey, in addition to the requirements of the annual and intermediate surveys the satisfactory operation of the ballast water management system should be confirmed.

12.2 Certification

Regulations E-2 to E-5 set out the requirements with regard to the issuance and endorsement of the International Ballast Water Management Certificate (IBWMC), as well as its form, duration and validity. An outline of the main provisions is given in this section.

12.2.1 Issuance or endorsement of a Certificate

An International Ballast Water Management Certificate shall be issued, either by the Administration or by any person or organization duly authorized by it, after successful completion of an initial or renewal survey, in accordance with regulation E-1. In every case, the Administration assumes full responsibility for the Certificate. The Certificate shall be endorsed, again either by the Administration or by any person or organization duly authorized by it, after successful completion of an annual or intermediate survey.

A Certificate issued under the authority of a Party shall be accepted by the other Parties as having the same validity as a Certificate issued by them. Moreover, at the request of the Administration, a ship may be surveyed and a Certificate issued or endorsed, by or under the authority of another Party. A Certificate so issued shall have the same force and receive the same recognition as a Certificate issued by the Administration. An International Ballast Water Management Certificate cannot be issued to a ship entitled to fly the flag of a State which is not a Party.

The full requirements for the issuance or endorsement of a Certificate are set out in regulations E-2 and E-3.

12.2.2 Form of the Certificate

Appendix I to the annex to the Convention contains the form of the Certificate, which is to be followed when drawing up a Certificate. Regulation E-4 sets out the language requirements for the Certificate.

12.2.3 Duration and validity of the Certificate

A Certificate shall be issued for a period not exceeding five years. When the renewal survey is completed, the new Certificate shall be valid to a date not exceeding five years from the date of expiry of the existing Certificate. Paragraphs 1 to 7 of regulation E-5 set out in detail the provisions regarding the duration and validity of the Certificate and the conditions and circumstances under which the validity may be extended, but in no case for a period longer than three months. Moreover, regulation E-5.8 addresses the case where an annual survey may be completed prior to three months before the Anniversary date.

In certain cases a Certificate shall cease to be valid. This is addressed in detail in regulation E-5.9; a summary of such cases is as follows:

- .1 if the ship's relevant structure, equipment, systems, fittings, arrangements and material are changed, replaced or significantly repaired and the Certificate is not endorsed;
- .2 upon transfer of the ship to the flag of another State;
- .3 if the relevant surveys are not completed within the specified periods; or
- .4 if the Certificate is not endorsed in accordance with regulation E-1.1.

CHAPTER 13 – Ballast water sampling

To assess whether a ship is in compliance with the ballast water exchange standard (regulation D-1) or the ballast water performance standard (regulation D-2) of the Convention, samples may need to be taken and analysed.

Ballast water samples taken will need to accurately reflect the physical nature (related to regulation D-1) and/or the live organism concentration (related to regulations D-1 and D-2) of the entire ballast water volume carried on a ship. Ballast water may be many thousands of cubic metres in volume held in several different and often complex shaped tanks. In addition, water and the organisms in it may not be homogeneously distributed in a ballast water tank. Sampling needs to be executed in a way that minimizes the impact on the nature of the water and the organisms present in it. Sampling of ballast water is, therefore, complex and possibly the most crucial aspect of on board testing for compliance with the regulations.

To achieve consistency in on board compliance testing of ballast water, uniform protocols for sampling and analysis of ballast water are essential. BWM.2/Circ.42/Rev.1 gives guidance on ballast water sampling and analysis in accordance with the Convention and Guidelines (G2). 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 regulations D-1 and D-2.

There are two different occasions where the sampling for the ballast water performance standard (regulation D-2) is employed:

- Sampling for type approval testing of ballast water management systems (BWMS) (land-based and shipboard tests); and
- Sampling for compliance.

13.1 Sampling for type approval testing of BWMS (land-based and shipboard tests)

Sampling and analysis of ballast water is undertaken as part of the type approval process for ballast water management systems during both shipboard and land-based test cycles. Note that sampling for type approval is generally discharge or uptake sampling rather than in-tank sampling.

Shipboard test cycles are undertaken on an installed BWMS during normal ship ballasting operations. Land-based testing is undertaken under controlled conditions at an approved testing facility. Results are measured against the ballast water performance standard (regulation D-2) and also compared to intake levels for the organisms of interest, which must meet required challenge conditions for a valid test. Widely accepted methods for sample collection, handling, storage and analysis should be used. Sampling for the type approval process should meet the criteria set out in the guidelines for sample sizes and replication.

The following is generally accepted for sampling ballast water for type approval: samples are taken from the discharge line sampling point provided; sampling takes place over the whole discharge from a single ballast water tank; the filtered water in the tank is sampled for organisms between 10 and 50 µm in size and bacteria; water is run off into sample bottles.

13.2 Sampling for compliance

Sampling ballast water for compliance on ships may be undertaken for two reasons:

- .1 To measure levels of organisms (related to regulations D-1 and D-2) and/or physical characteristics (related to regulation D-1) of ballast water on discharge; and
- .2 To measure levels of organisms (related to regulations D-1 and D-2) and/or physical characteristics (related to regulation D-1) of water in ballast water tanks in order to prevent discharge of non-exchanged, untreated or improperly treated ballast water.

13.2.1 Main aspects of sampling and analysis

Port State control (PSC) sampling and analysis for compliance with the ballast water performance standard (regulation D-2) can be performed in two ways:

- .1 An indicative analysis of ballast water may be undertaken to determine whether a ship is likely to comply with the Convention or not (i.e. a measure of the risk of non-compliance). This involves taking representative ballast water samples from a ballast water tank or discharge stream and using a simple and fast technique to measure the risk of non-compliance; and
- .2 If required, PSC may wish to perform a detailed analysis. This requires a complex series of direct measurements from representative samples of a ballast water discharge from any single tank or any combination of tanks being discharged. These are used to determine the viable organism concentration for each of the categories in the D-2 standard.

Organisms and sediment will commonly distribute themselves unevenly in a ballast tank with time, after ballasting has taken place. Some examples of the causes of uneven distribution are:

- Vertical migration of zooplankton (animals often above 50 µm in size)
- Patchiness of organisms taken up in the source water
- Accumulation of plankton near the walls and surfaces within ballast tanks
- Avoidance of pumps
- Settling of organisms and sediment

To take account of this variability, the samples collected for indicative and detailed analysis need to be representative of the whole discharge from a given tank or combination of tanks. In addition to allowing for the uneven distribution in ballast water tanks, obtaining representative samples directly from tanks is more challenging because of their access, shape, size and complexity.

Obtaining representative samples is therefore crucial but may be difficult to achieve. A homogenous (well mixed) population is much easier to sample than one that is known to be heterogeneous (not mixed) as is the case with ballast water tanks.

A representative sample is a subset of a whole population (in this case a ballast water tank full of water) that accurately reflects the characteristics of the whole (tank). Securing a representative sample from a tank is very different to obtaining one from a discharge pipe. It is important to ensure that samples are representative of the entire volume of interest and, if not collected throughout the entire discharge, they should be collected in a time-averaged manner in the case of multiple sample collection (i.e. evenly distributed throughout a discharge).

Successful sampling and analysis should be designed to cause minimum mortality to organisms. The sampling protocol will also depend upon whether it is for indicative or detailed

analysis, available sampling methodologies, methods of analysis, practicalities of sampling on specific ships, access, sampling points, tank volume, etc. Sample collection, preservation and transport is a skilled process, which requires training and specialist equipment. Taking samples for indicative analysis may be relatively easier than taking samples for detail analysis. However this depends on the method of indicative analysis in use.

The sample volume taken needs to reflect the required level of detection. For example, for detailed analysis (in particular for compliance for the performance standard in regulation D-2) a significant volume of water will be required which will be typically 500 to 1000 litres per sample. On the other hand, indicative analysis can be undertaken at any time throughout the discharge (although representativeness must be considered) and a range of sampling methods can be used. Some of these will depend upon the analysis being undertaken e.g. measuring organisms greater than or equal to 50 µm will require a much larger sample (taken through a net or filter skid) than a phytoplankton check using a handheld fluorometer.

Evaluating compliance with the ballast water exchange standard (regulation D-1) requires indicative comparison of the physical and/or biological parameters of ballast water with that of the port of origin. For example the water in exchanged ballast water should have a similar salinity to that of mid-ocean water (unless the port of origin has a high salinity or exchange was undertaken in a designated area of lower salinity within 50 nautical miles from the coastline). Therefore, analysis of the salinity of the water in the ballast water discharge will often be the first step in BWE compliance checking.

13.2.2 Sampling locations

Sampling of ballast water may be performed at various locations on board a ship depending on the purpose. Sampling may be undertaken either from the ballast water tanks (via manholes, through sounding pipes, or through air pipes) or directly from the discharge line. In-tank sampling via manholes, sounding and air pipes should only be used in cases where ballast water exchange (regulation D-1) is monitored or for regulation D-2 when the treatment of the ballast water is executed during the uptake or in-tank during holding times. In-tank sampling for regulation D-2 must not be performed when ballast water treatment is undertaken or completed on discharge.

Obtaining a representative sample directly from a ballast tank when they vary so much in size, shape, complexity and position is challenging. Sampling from a number of different locations, both spatially and with depth and also from different tanks, should be considered. Larger numbers of separate samples are preferred to single or composite samples. Detailed sampling and analysis for regulation D-2 from manholes, sounding pipes or air pipes is not recommended as it is challenging to obtain sufficient sample sizes and does not give accurate results.

The sampling of discharged ballast water (generally to verify compliance with regulation D-2 or for type approval testing of BWMS) should be done via the ballast water discharge pipe as close to the discharge point as possible. The Guidelines (G8) require ballast water management systems to have sampling points so arranged in order to collect representative samples of the ship's ballast water installed. The Guidelines (G2) recommend that sampling points should have an isokinetic pipe and valve system that allows the taking of a representative sample of ballast water from within the discharge pipe.

Sampling for compliance with the ballast water exchange standard (regulation D-1) is a forensic process (i.e. it requires knowledge of source water parameters and comparison with measured parameters) that can be done in-tank or via a discharge sample point. However, it is most likely to be done in-tank prior to the discharge of ballast water.

13.2.3 Trial period for sampling and analysis

Ballast water sampling and analysis is still evolving and, as a result, has in some cases not been adequately validated for port State control (PSC) use. Consequently the required sampling and analysis methods are not yet integrated into PSC procedures and therefore their use in determining compliance with the Convention cannot yet be assessed.

Following entry into force of the Convention there will be a trial period when PSC can trial and validate ballast water sampling approaches. The trial period will be for two to three years following entry into force. The results of the trial will be monitored and reviewed by the Marine Environment Protection Committee and, when appropriate, the trial will be halted or extended. The goal at the end of the trial period will be to have a suite of accepted procedures that can be used for sampling and analysing ballast water in a globally consistent way.

It should be noted that the *Guidance for sampling and analysis for trial use in accordance with the BWM Convention and Guidelines (G2)* (BWM.2/Circ.42/Rev.1) provides that port States should refrain from applying criminal sanctions or detaining a ship based on sampling during the trial period agreed by the Organization. This does not prevent the port State from taking preventive measures to protect its environment, human health, property or resources. The port State will retain its right to exercise enforcement jurisdiction, including sanctions and detaining ships, during the trial period if an alleged violation is proven by means other than sampling and analysis.

CHAPTER 14 – Approval of ballast water management systems (Guidelines (G8))⁵

14.1 Overview of Guidelines for approval of ballast water management systems (G8)

The purpose of Guidelines (G8) is to ensure uniform and proper application of the Convention, in particular regulation D-3, and set forth the requirements for BWMS testing, design and construction, as well as to verify that approved systems meet regulation D-2 standards and are safe for vessel crew, the environment and public health. The guidelines are aimed at Administrations, equipment manufacturers and shipowners to assist with the requirements for determining equipment suitability. The guidelines apply to the approval of BWMS intended for installation on board ships required to comply with regulation D-2.

The testing requirements to obtain approval of a BWMS are detailed in the Guidelines (G8) annex, parts 2 and 3. Equipment manufacturers should submit information that fulfils Guidelines (G8) requirements for evaluation by the Administration and, when the requirements are fulfilled, the Administration should issue a Type Approval Certificate for the BWMS.

14.2 [Technical specifications]

Guidelines (G8), section 4 outlines the technical specifications that Administrations approving BWMS should verify during the approval process. These include:

- .1 any substances utilized are acceptable to the Administration in regard to adequate storage, application within the BWMS and on board ships, and proper mitigation measures are in place for any introduced hazards;
- .2 proper audible and/or visual alarms, as well as recording by control equipment, are incorporated into the BWMS in the event of by-passing the treatment for cleaning, calibration, repair, or equipment failure, as applicable;

⁵ This chapter (except section 14.1) is in square brackets because it is currently kept in abeyance as its content may be affected by the outcomes of ongoing discussions at the IMO.

- .3 maintenance and troubleshooting procedures are clearly defined by the BWMS manufacturer, adequate access is to be provided on board for conducting maintenance and all repairs/maintenance are recorded;
- .4 BWMS access beyond the essential areas, e.g. for routine maintenance and troubleshooting, requires breaking of a seal;
- .5 in order to avoid essential ship systems being impaired, restricted or degradable by the use of BWMS or in the event of a BWMS emergency, the BWMS has suitable by-passes or overrides, which are to be recorded by control equipment, as needed to protect the safety of the ship and/or crew; and
- .6 appropriate facilities are available to check the performance of BWMS components that take measurements and calibration records should be available on board for inspection.

Administrations approving a BWMS need to verify that the treatment equipment is robust and suitable for working in the shipboard environment and designed to minimize dangers to persons on board. The BWMS equipment should be simple and effective and, if intended to be outfitted in locations on board where flammable atmospheres may exist, be appropriately designed in accordance with relevant safety rules and regulations.

BWMS should incorporate control and self-monitoring equipment that allows automatic operation per the manufacturer's specifications, records function and/or failures of the equipment and facilitates compliance with regulation B-2 of the Convention.

14.3 Typical documentation requirements for the approval process

Section 5 of Guidelines (G8) provides details on the documentation that an Administration should receive from a manufacturer for approval of a BWMS. The following is a brief summary of the required documentation:

- .1 detailed description of the BWMS, including ship installation requirements;
- .2 equipment manuals that contain, inter alia, technical details, drawings, installation arrangements and operation/maintenance information;
- .3 methods of conditioning the treated ballast water prior to discharge, as applicable, and an assessment of discharged water that includes treatment residuals and/or by-products, as well as toxicity testing in accordance with Procedure (G9);
- .4 description of any waste streams produced by the BWMS and actions for proper disposal/management; and
- .5 technical section of a manual including information on, inter alia, monitoring and control devices, special requirements to maintain system boundaries, sampling devices and commissioning test or guidance to satisfy the manufacturer's specific installation criteria.

14.4 Procedures for approval and certification

A BWMS that fulfils the requirements of Guidelines (G8) may be approved for installation on board ships. Administrations should issue a Type Approval Certificate in the format as shown

in the Guidelines (G8) appendix. The Type Approval Certificate should contain specific information about the BWMS including, but not limited to:

- .1 BWMS type or model and applicable equipment drawings for the approved equipment;
- .2 components of BWMS that are type approved including the manufacturer for each component, their operating range and possibility of other components that can be substituted;
- .3 flow rates, salinities, ballast water treatment capacities, temperature regimes, minimum holding time or any other limiting conditions, as applicable;
- .4 if the BWMS is subjected to Procedure (G9) approval, limiting conditions and recommendations of the GESAMP-BWWG are to be included, as applicable;
- .5 summary of land-based and shipboard test results;
- .6 if the approval is based upon a Type Approval Certificate issued by another Administration or based upon separate testing or testing already carried out under another Administration, such certificate should identify the Administration involved; and
- .7 a validity date for the Type approval Certificate.

A BWMS approved by one Administration may be approved for use on vessels under another Administration. Should a BWMS previously approved by one Administration fail type approval in another country, the countries concerned should consult with one another to reach a mutually acceptable agreement.

14.5 BWMS installation requirements

Section 7 of Guidelines (G8) provides details about the location of sampling facilities to collect representative samples of a ship's ballast water that a BWMS should include. Position of sampling points may be determined by the Administration and should best suit the treatment technique and equipment function

14.6 Installation survey and commissioning procedures

After a BWMS has received approval from an Administration, Guidelines (G8), section 8, specifies that the following documentation should be verified by an Administration during a BWMS installation survey and commissioning:

- .1 a copy of the BWMS Type Approval Certificate;
- .2 a statement from the Administration (or authorized representative) that the electrical and electronic components have been type-tested in accordance with Guidelines (G8), annex, Part 3 specifications;
- .3 the manufacturer's technical and operation manuals for the BWMS equipment; and
- .4 the manufacturer's installation specifications and installation commissioning procedures, including initial equipment calibration, as applicable.

The Administration should verify that:

- .1 the BWMS installation was carried out in accordance with the manufacturer's installation and equipment specifications;
- .2 the installed BWMS conforms with the pumping and piping arrangement drawings, as well as the Type Approval Certificate issued by the Administration or its representative;
- .3 the installation workmanship is satisfactory and in accordance with the relevant standards; and
- .4 the BWMS control and monitoring equipment operates properly.

14.7 Specifications for pre-test evaluations of the system documentation

This part of the Guidelines (G8) annex provides guidance to assist with a pre-testing evaluation of a BWMS's readiness to undergo the approval process, as well as an evaluation of the proposed test requirements and procedures. The required documentation should be submitted to the Administration by the BWMS manufacturer as a pre-requisite to, and in advance of, the approval testing.

14.8 Readiness evaluation

During a readiness evaluation the approving Administration should examine and evaluate the following aspects of the BWMS, inter alia:

- .1 design and construction to ensure proper and safe operation of the BWMS on board ships. Health and safety of the ship's crew, interactions of the BWMS with the ship's systems and/or cargo, or potential adverse environmental effects should be considered; and
- .2 an evaluation of the manufacturer's research and development efforts, if any, under operational shipboard conditions.

14.9 Test proposal evaluation

The Administration should evaluate the BWMS test plan proposal for installing, calibrating, and operating/maintaining the BWMS during type approval testing to identify any potential human health or environmental concerns, as well as management of treatment by-products or waste streams, if applicable.

14.10 Documentation

As part of the BWMS pre-testing evaluation, the following documentation should be submitted to the Administration:

- .1 technical manual;
- .2 BWMS drawings;
- .3 information about the BWMS installation arrangements and the scope of the ships the BWMS is intended to be installed on, which can later be used for the ship's ballast water management plan; and
- .4 information on any potential environmental and/or public health impacts.

Specific information about the test set-up for land-based testing may also be included, such as the sampling needed to ensure proper BWMS function and efficacy, as well as information about compliance with applicable environmental or human health standards during the type approval testing process.

14.11 Test and performance specifications for approval of ballast water management systems

This part of the Guidelines (G8) annex specifies the quality assurance and quality control procedures that should be implemented by the testing body during the shipboard and land-based testing of a BWMS. The steps required for a complete test cycle and the criteria for successful testing are detailed for both shipboard and land-based testing.

14.12 Quality assurance and quality control procedures

The testing body should implement a quality control program during testing in accordance with the recognized international standards that are acceptable to the Administration. In summary, the quality control program should consist of the following:

- .1 Quality Management Plan (QMP) that addresses the quality management structure and policies of the testing body; and
- .2 Quality Assurance Project Plan (QAPP) which is a project specific technical document pertaining to the BWMS being tested, the test facility, and other testing implementation details.

14.13 Shipboard tests and success criteria

Administrations should refer to part 2 of Guidelines (G8) to understand the requirements for successful shipboard testing of a BWMS. Part 2 defines a shipboard test cycle (i.e. ballast uptake, storage, treatment, and discharge) and details of how the performance of the BWMS should be evaluated in a shipboard environment. In brief, the following information and results should be supplied to the satisfaction of the Administration:

- .1 test protocol corresponding to the planned test cycles (prior to testing);
- .2 documentation on the treatment rated capacity (TRC) of the BWMS and confirmation that it operates at the TRC for which it is intended to be approved notwithstanding the consistency with normal ballast operation of ship;
- .3 results of three consecutive, valid shipboard test cycles that demonstrate treated ballast water discharge compliance with regulation D-2;
- .4 organism concentration limit ballast water uptake for both control and treatment tank and discharge standards to demonstrate test cycle validity;
- .5 sampling regime information to meet the required sample sizes/volumes and replications for both control and treatment tank;
- .6 the time period the testing cycles were conducted over (not less than six months);
- .7 data regarding salinity, temperatures, particulate organic carbon and total suspended solids; and

- .8 data regarding BWMS operation over the test period, including, but not limited to:
 - .1 records of BWMS operation, volumes and locations of ballast uptake and discharge;
 - .2 possible explanations for an unsuccessful shipboard test cycle, if applicable;
 - .3 BWMS maintenance and repair records, as applicable; and
 - .4 engineering parameter monitoring data, as well as control and monitoring equipment function records.

14.14 Land-based testing and success criteria

Land-based testing serves to determine the biological efficacy and environmental acceptability of a BWMS, as well as to evaluate the repeatability and comparability of the treatment equipment. Administrations should refer to section 2.3 of the annex to Guidelines (G8) to understand the requirements for successful land-based testing of a BWMS. The section defines a land-based test cycle (i.e. ballast uptake, storage, treatment and discharge), the land-based test set up and design criteria and details of how BWMS performance should be evaluated.

In general, successful land-based testing consists of:

- .1 five (5) valid test cycles in at least two different salinities (i.e. a minimum total of 10 valid test cycles), with each test cycle taking place over a five (5) day period;
- .2 testing in varied water qualities with a wide range of organisms;
- .3 proper operation of the BWMS at the specified treatment rated capacity; and
- .4 analysis of treated water discharge to:
 - .1 verify compliance with regulation D-2; and
 - .2 evaluate aquatic toxicity, in accordance with Procedure (G9) for BWMS that make use of Active Substances.

The land-based test set up should be representative of how the BWMS would be installed on a ship, including the complete BWMS, piping and pumping arrangements and a storage tank that is shielded from light to simulate a ballast tank. The control and treatment simulated ballast tanks should each have a capacity of at least 200 m³ and be cleaned between test cycles. Facilities for sampling should be included in the test set up.

Ballast water treatment equipment scaling

This section of the Guidelines (G8) annex provides the criteria in the event BWMS equipment scaling is required and the documentation a manufacturer is required to provide to the Administration. Inline treatment systems may be downscaled as per the given criteria but in-tank systems should be tested on a scale similar to verification of full scale effectiveness. For further guidance on equipment scaling refer to BWM.2/Circ.33.

Land-based test design – inlet and outlet criteria

Guidelines (G8) specifies the water quality parameters that must be met at the different test salinities, as well as the organism concentrations that must be in the influent water during the land-based test cycles. The guideline allows the minimum test organism concentrations to be either naturally occurring or cultured species to meet the testing criteria; viruses and bacteria do not need to meet minimum concentration requirements, but should be measured and recorded in both the influent and discharge water.

Land-based monitoring and sampling

Monitoring and sampling of water during land-based testing determines the biological efficacy and environmental acceptability related to the BWMS. Guidelines (G8) specifies that environmental parameters (e.g. dissolved oxygen, pH) are measured at specific times and locations during land-based testing, and that separate samples are collected for biological and aquatic toxicity analysis. The volumes of the samples and testing methods for evaluation are also detailed and should be followed for proper implementation of the guideline. The criteria for determining the validity of a test cycle, and the statistical analysis of the results that should be performed, are specified in part 2 of the annex to Guidelines (G8).

Reporting of the test results

Upon completion of the approval tests, a detailed report including the test design, analytical methods and test results should be submitted to the Administration. The biological efficacy results should be accepted if the land-based and shipboard testing conducted in accordance with the Guidelines (G8) annex demonstrates the BWMS has met the standard in regulation D-2 in all test cycles, as specified in paragraph 4.7 of the Guidelines (G8) annex, part 4.

14.15 Specification for environmental testing for approval of ballast water management systems

Part 3 of the annex to Guidelines (G8) provides Administrations with details regarding the requirements to test and verify the quality and reliability of electrical and electronic components of a BWMS to perform in ship board environment. The electrical and electronic components of the BWMS should be tested in the standard production configuration at an approved laboratory.

14.16 Test specifications

Guidelines (G8) provides detailed specifications on the required test parameters for electrical and electronic components. The testing includes:

- .1 vibration;
- .2 temperature;
- .3 humidity;
- .4 protection against heavy seas;
- .5 fluctuation in power supply; and
- .6 inclination.

The BWMS manufacturer should provide the Administration with evidence of compliance with the environmental tests as detailed in Guidelines (G8).

14.17 Sample analysis methods for the determination of biological constituents in ballast water

In part 4 of the Guidelines (G8) annex, guidance is provided regarding the sampling methods used to determine the biological efficacy of a BWMS. Administrations should refer to part 2 of the Guidelines (G8) annex for additional details.

Samples for evaluating BWMS performance should be collected, handled, stored and analysed using widely accepted standard methods, and these methods should be clearly described in test plans and reports. Due to the variations expected in samples, in species composition and the anticipated rarity of organisms in treated ballast water, alternative methods may be considered when standard methods are not available or applicable. Details about alternative methods, as well as any research conducted to validate such methods, should be provided in test plans and reports. The number of viable organisms in test samples should be evaluated by appropriate methods and aquatic toxicity tests should be performed in accordance with Procedure (G9).

When the sample analysis verifies compliance with the requirements in paragraph 4.7 of this part, the test cycle should be deemed successful.

14.18 Appendix to Guidelines (G8)

The Appendix provides Administrations with an example template of the Type Approval Certificate that should be issued when a BWMS has successfully completed approval testing to the satisfaction of the Administration.]

CHAPTER 15 – Approval of ballast water management systems using Active Substances (Procedure (G9))

15.1 Overview of the *Procedure for approval of ballast water management systems that make use of Active Substances (G9)*

The principles of the approval process are based upon regulations D-3 and D-5. These provide that ballast water management systems (BWMS) should be safe for the ship, its equipment and crew. As the technologies should not cause more environmental impact than they solve, these systems must also meet the standards of environmental acceptability. For this reason, it is required that BWMS that make use of Active Substances undergo a separate approval procedure additional to that of Guidelines (G8), as described in the *Procedure for approval of ballast water management systems that make use of Active Substances (G9)* and the associated Methodology for the conduct of work. The Procedure (G9) describes not only the technical aspects but also the role and duties of all stakeholders in the process, including manufacturers, Administrations and the Organization.

In support of the evaluation process a special expert group was established to advise the Marine Environment Protection Committee (MEPC) on the approval of such systems, namely the Ballast Water Working Group of the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP-BWWG). The GESAMP-BWWG, established in November 2005, reviews all proposals submitted to the Organization for approval of ballast water management systems that make use of Active Substances. GESAMP-BWWG reports to the Organization on whether such proposals present unreasonable risk to the environment, human health, property or resources in accordance with the criteria specified in Procedure (G9). The Group does not evaluate the operation or design of the systems, or their effectiveness, only their potential for environmental, safety and human health risks. The GESAMP-BWWG has also developed a Methodology for information gathering and conduct of work.

Regular updates of information on obtained Basic and Final Approvals are made in accordance with section 8.3 of Procedure (G9). The technical requirements have been revised based on experience with the approval process. Recent workshops thoroughly reviewed inconsistencies between the Methodology and circulars such as BWM.2/Circ.28 and BWM.2/Circ.37, the latter describing the information that should be made available in proposals for approval of BWMS in accordance with Procedure (G9).

15.2 Applicability

Procedure (G9) applies to the approval of BWMS that make use of Active Substances to comply with the Convention in accordance with regulation D-3.

15.3 Definitions

Active Substances are defined by the Convention as "substances or organisms, including a virus or a fungus that have a general or specific action on or against harmful aquatic organisms and pathogens". Procedure (G9), section 2, should be referred to for additional definitions.

15.4 Procedures for approval and certification

Manufacturers are required to submit information on their technology in a proposal dossier to a national Administration. Administrations should check the quality and completeness in the dossiers against the applicable version of the Methodology before the official submission of the application for Basic or Final Approval to the Organization. Eventually, approval may be granted by the Marine Environment Protection Committee (MEPC) based on the independent advice provided by the GESAMP-BWWG.

In the process of the GESAMP-BWWG reviewing the dossiers submitted by Administrations and reporting to the Organization its findings, they may request additional data from Administrations. The approval scheme is two-staged; Basic Approval has to be granted first, followed by Final Approval. GESAMP-BWWG will report its evaluation of the BWMS to the MEPC. In connection with the submission of the application for approval a fee is paid to the Organization to cover the costs incurred by the Organization in respect of the scientific services provided by the GESAMP-BWWG.

The approval scheme for Active Substances or Preparations and BWMS that make use of Active Substances is detailed in figure 4.

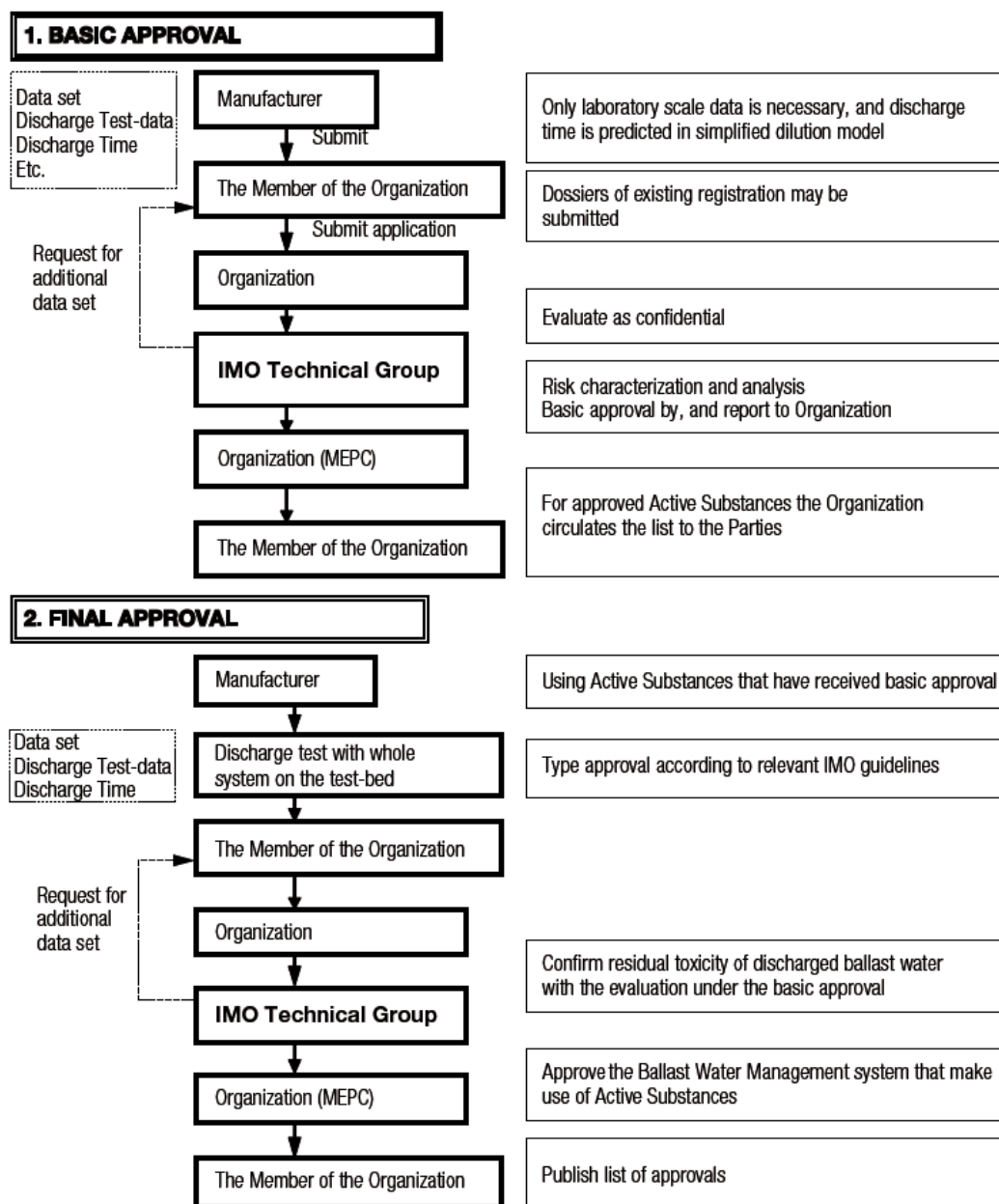


Figure 4: Approval scheme for Active Substances or Preparations and ballast water management systems that make use of Active Substances

15.5 Summary of Procedure (G9) requirements

Equipment manufacturers should include in their dossiers a chemical identification of chemical compounds, including Active Substances, Preparations and any other Relevant Chemicals, even those generated on board. For BWMS that make use of Active Substances, in particular chlorine based systems, special attention is drawn to the formation of disinfection by-products (DBPs) due to possible effects on the environment and human health. The description of chemical compounds should include a dataset which includes physical and chemical properties, mammalian toxicity, environmental fate and effects. Following production of this information, a risk characterization should be described that is based upon information on persistency, bioaccumulation and toxicity (PBT) and specified testing on toxicity of the treated ballast water. The evaluation includes criteria on both human safety and environmental protection.

The requirements for Basic Approval are more general, as theoretical studies, literature data and simplified testing can fulfil the data and information requirements. For Basic Approval, the GESAMP-BWWG reviews the comprehensive proposal, along with any additional data submitted, as well as other relevant information available to the Group, and reports to the Organization.

For Final Approval, more detailed tests and full assessments are required, based on full-scale testing of the BWMS. The application for Final Approval should include tests performed as part of the land-based type approval process using the treated ballast water discharge and must specifically address any concerns identified and recommendations made during the consideration for Basic Approval. Results are based on tests under type approval testing under Guidelines (G8), e.g. field or full-scale testing, and include test results using two types of water. Note that the Final Approval dossier should also confirm the evaluation carried out during Basic Approval of the risks to the ship and personnel including consideration of the storage, handling and application of the Active Substance.

15.6 Technical specifications

In Procedure (G9), sections 4, to 7 describe the technical requirements, while more detailed guidance on technical requirements is found in circular BWM.2/Circ.13/Rev.3. The Methodology gives thorough guidance on all aspects needed for a complete dataset. The required data contain detailed physical and chemical properties of the Active Substance or Preparation. This includes reactivity towards materials, vapour pressure, and melting and boiling points; as well as data on effects on aquatic plants, invertebrates and fish and other biota. This in turn includes acute and chronic toxicity, endocrine disruption and carcinogenic and mutagenic effects. It should be noted that for certain substances their specific effects on sediment organisms or the bio-magnification, persistence in the food web and potential effects need to be described.

The Methodology additionally outlines the mammalian toxicity data that should be submitted for approval. In summary, the topics include acute toxicity, effects on skin and eye, repeated-dose toxicity, chronic toxicity, developmental and reproductive toxicity, carcinogenicity, mutagenicity/genotoxicity and toxicokinetics.

For compounds that are commonly described in ballast water treatment, data is gathered in a Database held by the Organization, which will be made available through the Global Integrated Shipping Information System (GISIS). At the time of writing the database includes 41 substances. For these compounds, no other data needs to be added in the proposal, unless it is scientifically justified.

Using these data, a risk characterization is conducted by including a hazard identification. Other elements are dose (what concentrations are expected) and exposure (what is the intensity, frequency and exposure to an agent). All information leads to risk characterization (how does the data lead to a quantification of risks).

Based upon information on persistency, bioaccumulation and toxicity (PBT), the risk for environmental effects is characterized in combination with actual testing on the toxicity of treated ballast water. Discharge concentrations are calculated with the MAMPEC-BW model, using the dataset and measurements from the testing. The resulting environmental risks are compared to safety thresholds, e.g. predicted no effect concentrations (PNEC). Human exposure scenario (HES) models were developed to compare the exposure to human based thresholds, e.g. derived minimal effect levels (DMEL).

As was mentioned in section 15.5 above, the requirements for Basic Approval are more general and the data may be derived from theoretical studies, literature data and may include

simplified testing to fulfil data requirements. For Final Approval, toxicity testing is specified in detail and should be derived in combination with ballast water management system efficacy testing for Guidelines (G8) type approval. Following the risk assessment, several risk mitigation or risk management options may be included. For example, specific requirements exist on the methods to monitor the total residual oxidants (TRO). The latter is required as this is relevant to check for the production of DBPs in ballast water which may pose a risk to the environment and human health.

15.7 Typical documentation requirements for the approval process

For a submission to the Organization, all data reports and references are included in the actual dossier. For example, this includes full test reports from chemical and toxicological laboratories, data sources and technical information on systems.

15.8 Appendix to Procedure (G9)

The appendix provides Administrations with an approval scheme for BWMS that make use of Active Substances, outlining the Basic and Final Approval process (see Figure 4 above).

CHAPTER 16 – Duties of shipowners

16.1 Duties and obligations

The shipowner's and operator's duties and obligations under the Convention include ensuring that ships have the ability at all times to be compliant with the requirements set up in the Convention by implementing a ballast water management plan (BWMP). These include, but are not limited to, meeting the applicable ballast water exchange or performance standards (regulations D-1 or D-2, respectively) and undertaking sediment management.

Alternatively, if exceptions or exemptions have been granted to the ship, the shipowner and operator must ensure that they are properly documented and entered into the ballast water record book (BWRB). It is to be noted that exceptions are situation specific, hence record keeping and communication is the only way of demonstrating compliance. In contrast, exemptions are required to be granted by the Administration prior to the intended voyage(s).

In order to ensure a proper implementation of the BWMP, an officer on board must be designated in a timely manner and provided with necessary training.

All ships to which the Convention applies must have on board the following:

- A ship-specific ballast water management plan (BWMP) approved by the Administration
- A valid International Ballast Water Management Certificate (IBWMC), if the ship is 400 gross tonnage and above
- A ballast water record book (BWRB)

If the ship has a ballast water management system (BWMS), it must be approved in accordance with Guidelines (G8) and, if applicable, Procedure (G9).

16.2 Complying with the Convention

In order to comply with the Convention, the shipowner and operator must ensure that:

- All shipboard ballast operations are safely executed in accordance with one of the available options available under the Convention, e.g.: in compliance with regulation D-1 or D-2, as applicable; by application of any other approved methods (regulation B-3.7); by participation in a programme approved by the Administration to test and evaluate prototype technologies (regulation D-4); or in accordance with any exception or exemption granted under the Convention (regulations A-3 and A-4);
- The on-board ballast water management system, if applicable, is fitted with sampling points located in suitable and accessible areas;
- A competent officer is assigned for ballast water management and the officer and crew are trained in order to carry out their respective ballast water management duties;
- All ballast water operations are carried out in accordance with the ship's BWMP with due regard to the safety of the ship, its cargo and crew;
- The BWMS, if installed, is operated and maintained in accordance with the manufacturer's instructions and provided with sufficient spares and consumables, as required;
- The BWRB is correctly maintained and kept up to date at all times; and
- The BWRB is kept on board the ship for a minimum of two years and after that is kept under the control of the company for an additional minimum period of three years

16.3 Training of the crew

Ship owners must ensure, in accordance with regulation B-6 (Duties of officers and crew), that the officers and crew are properly trained and competent to carry out their assigned ballast water management duties and functions. It may constitute a deficiency if the master or the crew are not familiar with essential shipboard procedures relating to ballast water management, or have not implemented such procedures, and PSC may impose sanctions or detain the ship.

The training of the crew may include, but not be limited to, the following:

- Introduction to ballast water management
- Familiarization with the ship's BWMP and assigned duties
- Emergency procedures
- Operation of the ship's BWMS, if fitted
- making entries and record keeping in the ship's BWRB

Officers and crew involved in the shipboard ballast operations and the operation and maintenance of the BWMS have to be competent in their specific assigned duties.

Ideally the training and familiarisation for the Convention and associated tasks should be included in the company's safety management system (SMS).

CHAPTER 17 – Ballast water management options available for ships

The Convention defines two ballast water management standards:

- regulation D-1 specifies the ballast water exchange standard; and
- regulation D-2 specifies the ballast water performance standard.

17.1 Ballast water exchange

Ballast water exchange (BWE) is based on the assumption that the coastal water used as ballast water differs largely in biotic and abiotic conditions from oceanic waters. The latter, typically being highly saline and poor in nutrients, contains far less organisms, which are also very different from the coastal ones. An exchange of ballast water in such areas should result in minimizing organisms and pathogens. The organisms from coastal or fresh waters will not normally survive when discharged into deep ocean water with its different physical and chemical characteristics, while oceanic organisms will not normally survive in coastal waters, let alone in freshwater environments. By exchanging ballast water the probability of transferring organisms and pathogens through ballast water is considerably reduced. BWE is to meet the ballast water exchange standard as per regulation D-1 described in chapter 11.

Three methods of BWE are detailed in the *Guidelines for ballast water exchange (G6)*:

- sequential method – a ballast tank is first emptied and then refilled with replacement ballast water to achieve at least a 95% volumetric exchange;
- flow-through method – replacement ballast water is pumped into a ballast tank allowing water to flow through overflow or other arrangements. At least three times the tank volume of each tank shall be considered to meet the standard; and
- dilution method – replacement ballast water is filled (pumped) through the top of the ballast tank with simultaneous discharge from the bottom at the same flow rate and maintaining a constant level in the tank throughout the ballast exchange operation. At least three times the tank volume is to be pumped through the tank.

Designation of areas for BWE is discussed in chapter 9 of this manual.

17.2 Ballast water treatment

Ballast water exchange in open seas entails major operational and safety considerations with regard to stability and stresses, in particular in heavier weather conditions. Additionally it may not be as effective in reducing the transfer of invasive organisms or pathogens as envisaged. The Convention therefore requires, in the long term, ballast water management in accordance with regulation D-2 to minimize the risk of invasive species. The most common approach is the installation of a shipboard ballast water management system (BWMS). Other methods that give equivalent protection may be allowed, provided that they demonstrate effectiveness to the satisfaction of the Administration.

There are different ballast water management systems available and in development. Generally these technologies can be categorized into three types based on their primary mechanism: mechanical, physical and chemical.

17.2.1 Mechanical treatment

Mechanical treatment can be done by filtration, cyclonic separation and electro-mechanical separation. Mechanical treatment is generally only done at intake and is not influenced by the length of the voyage.

Screen and disk filters can be used at ballast water intake to reduce sediment and organisms. Mesh sizes of these filter screens vary and the smaller the mesh size the more will be filtered prior to intake. Filters with a mesh size of 50 µm or less are commonly applied in BWMS to contribute to achieving the standard described in regulation D-2.

Most filters are self-cleaning with back flushing cycles. Waste water from the back flush is discharged directly overboard. Together with the resistance of the filter this self-cleaning procedure will form pressure drops and affect the flow rate negatively.

Cyclonic separation uses centrifugal forces to separate solid particles from water. However, this is only possible with particles having a specific gravity higher than that of water. Electro-mechanical separation works with a flocculent injection that attaches to the sediment and organisms. Solid particles are then removed by filtration and magnetic separation.

Mechanical separation is often used in conjunction with physical and/or chemical treatment methods (see below).

17.2.2 Physical treatment

Physical treatment can be done by ultraviolet irradiation (UV), de-oxygenation, cavitation and ultrasound.

UV is used to eliminate or damage organisms (phytoplankton, zooplankton, human pathogens and bacteria) by damaging the cell membrane to such extent that the organism is not able to reproduce. The effectiveness is dependent on the turbidity and the transmittance rate in water. Most ballast water treatment systems that use UV irradiation combined it with prior mechanical treatment. One advantage of UV is that this treatment can be performed at intake and discharge of ballast water to ensure that no organisms will be able to reproduce. This treatment is possible on long and short voyages.

Removing dissolved oxygen in the ballast water is called de-oxygenation and eliminates aerobic organisms (i.e. those that require oxygen). Oxygen is replaced by inert gases (often nitrogen). Although de-oxygenation can be positive in order to prevent corrosion, it is important to use inert gas, which does not react chemically, to avoid any oxidative or hydrolytic effects. De-oxygenation may require a longer holding period, which should be considered when having a fleet employed on short voyages.

In the shipping industry, cavitation normally negatively affects materials and should be prevented. However, if controlled, the cavitation method can be used in order to damage membranes of organisms, ensuring that they are not able to reproduce when discharged into the environment. Care should be taken to protect against the possible effects of hydrodynamic forces and ultrasonic oscillations on materials and the environment, including humans. This treatment can be applied on long and short voyages and is often combined with another physical treatment method.

17.2.3 Chemical treatment

Ballast water can be chemically treated by administering chemicals (Active Substances) or Preparations, or by producing Active Substances on board (see chapter 15 for more information). Care should be taken when using disinfectant Active Substances; they can kill living organisms in the water but also affect humans. Commonly used Active Substances are chlorine, chlorine dioxide, ozone, sodium peroxide and sodium hypochlorite. Chlorine can also be generated on board by using an electrolytic cell and having enough dissolved salt in the ballast water. Active Substances should be depleted or be neutralized (including possible generated toxic by- and end products) before discharging into the environment. The limits for the concentrations of the Active Substances and neutralizing agents are to be listed in the Type Approval Certificate of the BWMS.

Classification societies normally impose strict installation guidelines on such BWMS, to prevent the risk of explosion from the accumulation of hydrogen gas, which is a by-product of certain systems, and to minimize exposure to toxic products.

17.2.4 Combinations of treatment techniques

Treatment technologies can be combined and differ in rate of application, holding time, power consumption and effects on other ship equipment or structures. A combination of different treatments can reduce the limitations of an individual technology. Therefore, many ballast water management systems (BWMS) use a combination of two or more technologies, e.g. filtration combined with UV, filtration combined with chemical injection/electro-chlorination, etc.

17.3 Use of fresh water

The use of drinking or potable water for ballast water has been the subject of much debate for several reasons. There are two different approaches to the use of fresh water:

- .1 drinking water purchased from public water supply; and
- .2 fresh water produced by on-board water generators

The main concern for public water supply may be the inconsistency of the standards of water available around the world. It should be noted that the source water, which is always fresh water, may still be contaminated with organisms or human pathogens. Moreover, if Active Substances are used as disinfectants, then the discharge water may have residual concentrations of those Active Substances. These considerations constitute a need for approval in accordance with Guidelines (G8) or Procedure (G9), as applicable.

If fresh water produced by on-board water generators is used as ballast water, then these systems also need to be approved in accordance with Guidelines (G8) or Procedure (G9), as applicable.

For methods using a public water supply as a source where no substances are required to be added, such approval may not be required. The Organization is yet to develop guidance and criteria for the use of fresh water.

17.4 Discharge to shore facilities

The availability of ballast water reception facilities in ports to receive, process and redistribute ballast water would be an important tool in implementing the Convention. Shore facilities would be responsible for and capable of managing the ballast water to meet the required standards. Such a solution would be beneficial for older ships, for which installing a BWMS would not be economically feasible, for ships lacking space for equipment or those operating exclusively on designated trading routes. Discharging to a shore facility could also facilitate sediment management under the Convention. Many ports lack the necessary infrastructure to accommodate the intake or supply of ballast water to and from the ship. Dedicated barges or ships, which could receive, supply and/or treat ballast water, can also be considered as a reception facility similar to a shore facility.

It is to be noted that ballasting and deballasting activities are running in parallel with the ships' loading and unloading operations. Any disturbance in the flow of ballast water will immediately affect these operations. Finally, the flow in ballast water is not in an equilibrium for each port or region, which implies a net in- or outflow to/from certain regions in the world. Nevertheless,

for certain areas or ports shore facilities could be a feasible option, in particular in environmentally sensitive areas.

There are other factors such as engineering, operational and logistics affecting the feasibility of using a shore facility or a floating facility. The above issues must be carefully considered before proceeding, along with paying due attention to the differences in regulatory considerations.

17.5 Other methods

There may be other methods that can be used for the management of ballast water and those methods are also required to be approved by the Administration. The Organization has developed guidance with regard to the criteria to be used for such evaluations, which can be found in the *Procedure for approving other methods of ballast water management in accordance with regulation B-3.7 of the BWM Convention* (resolution MEPC.206(62)).

Other methods of ballast water management are to be approved in principle by the Marine Environment Protection Committee (MEPC) prior to approval by the Administration. The procedure ensures that other methods approved by an Administration are capable of at least achieving equivalence to the level of protection provided by the standards of the Convention with respect to the prevention of the transfer of harmful aquatic organisms and pathogens as required by regulations B-3.1 to B-3.5.

PART V: TECHNICAL ASPECTS OF ENFORCEMENT

Chapter 18 – Non-compliance detection and response

After entry into force of the Convention, there will be two standards enforced for ships depending on the applicability regime. Detection of non-compliance will be based on the applicable exchange or performance standards (regulation D-1 or D-2, respectively) and the method of achieving the respective standards.

Non-compliance with regulation D-1 (ballast water exchange standard) may be difficult to detect without conducting a salinity check of the discharge sample. If some other method (regulation B-3.7) is used by a ship then the detection may not be possible without discharge sample analysis. However, such other methods may entail key performance indicators that provide a fair assessment of possible compliance.

The technological advancements in the field of detection and monitoring pave the way for indicative analysis of ballast water discharges. These direct or indirect monitoring tools may be useful in identifying gross exceedance of the D-2 standards.

18.1 Detection

An approved ballast water management system (BWMS) when properly operated should meet the D-2 standard. Such BWMS, whether disinfecting by making use of Active Substance or not, are evaluated for environmental acceptability during the type approval process in accordance with Guidelines (G8). In the first case, Procedure (G9) is followed to ensure that unacceptable concentrations of harmful substances from the treatment (residual toxicity) will not be present in the discharge; for BWMS that do not make use of Active Substances Procedure (G9) is not applicable and environmental acceptability is evaluated in accordance with Guidelines (G8).

Only when the BWMS is not functioning properly will the discharge potentially contain harmful substances. The first indication of such failure will be obtained from the monitoring device. Regular checks or a warning signal upon failure are important.

The risk of pollution by residual Active Substances should be clearly separated from the risk of the transfer of harmful aquatic organisms by ineffective treatment. Risk of pollution by residual Active Substances can occur when a voyage is cut short, so the holding time needed to render the treatment disinfectant harmless cannot be met, or because a failure occurred in the disinfectant dosing mechanism or neutralization mechanism, where applicable. Chemical pollution, irrespective of the operation of a BWMS, can also occur if the area of ballast water uptake is polluted by a persistent or slowly degradable source of contamination.

When risk of non-compliance is envisaged, the ballast water may not be safe to discharge and the port of call should be notified. Prevention should always be the first aim. If the situation is beyond the stage of prevention then contingency planning becomes an actual need. Such contingency measures are to be identified and included in the approved ballast water management plan (BWMP). Further guidance can be found in the *Guidelines for ballast water management and development of ballast water management plans (G4)*.

18.2 Response – contingency measures

Contingency measures to meet the challenges of either polluted (with residual Active Substances) or not at all (or not adequately) disinfected ballast water are best placed on shore and preferably in the port of call. If no ballast water reception facility is available in the port of call, the nearest port or location holding a contingency facility should be sought. The facility can consist of a reception facility for polluted/untreated ballast water or a treatment unit available in the port of call that can process the ballast water by a port-based treatment system.

The IMO guidance for emergency situations (BWM.2/Circ.17), although specifically targeted at a risk of release of invasive species, nevertheless contains several items that also apply for pollution. An emergency response should take into account the nature of the pollution (what chemicals and/or contaminants and at which expected quantities), the natural characteristics of the area of release and the contingency capacity of the country or region likely to be affected. In order to minimize damage and to enable rapid normalization of the operation of ports and ships, industry cooperation will be needed at the time of the emergency. Although this is perceived as a rather complex operation, in practice, such measures are likely to be simple and may only be identifiable for situations where ballast water discharges from certain ships need to be prevented.

If polluted, contaminated or ineffectively treated ballast water is accidentally or intentionally released, then ways to mitigate the damage have to be identified. Again the characteristics of the contamination and of the area(s) affected are crucial, together with knowledge of the contingency preparedness in the area. A risk assessment may be needed. It is also needed to notify all stakeholders of an emergency situation; according to BWM.2/Circ.17, this should be the responsibility of an appointed (lead) agency overseeing the emergency situation and procedures.

As to mitigation measures, much can be learnt from pollution response knowledge from other sources of pollution in dissolved form, such as dissolved chemicals. It is unlikely that pollution resulting from ballast water operations will be in solid or oily form; hence techniques to contain such sources of pollution (such as booms around the spill or discharge) will not be applicable.

Support from shore-based contingency measures, such as initiatives facilitated by ports, should strongly be encouraged. If such shore-based facilities are not available, as an interim measure, the port State should identify locations where ballast water exchange (BWE) can take place. Identification of such exchange areas need to be conducted with a comprehensive risk assessment.

CHAPTER 19 – Guidance for port State control

Port State control (PSC) refers to the inspection of foreign ships in national ports to verify that the condition of the ship and its equipment comply with the requirements of the national/ international regulations and that the ship is manned and operated in compliance with those rules.

States that are Parties to the Convention shall be entitled to inspect foreign ships' conformity with its requirements, in accordance with article 9 of the Convention. Articles 10 and 11 of the Convention state the enforcement actions for violations, which are also discussed in chapter 3 of this manual.

Irrespective of the methods applied to manage ballast water (presented in chapter 17) the discharged water should meet the quality standard as indicated in regulation D-1 for ballast water exchange (BWE) or D-2 for ballast water performance, as applicable. It is the obligation of port State control or other designated authorities to ensure adequate control and, when required, inspection of the ballast water record book (BWRB) and management practices.

The Organization developed *Guidelines for port State control under the BWM Convention* (resolution MEPC.252(67)) intended to be used to verify compliance with the requirements of the Convention. The PSC inspection can be described as a four-stage process:

- .1 the first stage, the initial inspection, should focus on documentation and ensuring that an officer has been nominated for ballast water management on board the ship and to be responsible for the ballast water management system, and that the officer has been trained and knows how to operate the system;
- .2 the second stage, the more detailed inspection, where the operation of the ballast water management system is checked and the PSC officer clarifies whether the system has been operated properly according to the ballast water management plan and the self-monitored operational indicators verified during type approval procedures, may be carried out when there are clear grounds for believing, after the initial inspection, that the condition of the ship or of its equipment does not correspond substantially with the particulars of the IBWM Certificate, or when the crew does not appear to be familiar with and/or has not implemented essential shipboard procedures for ballast water management. Clear grounds shall exist when the inspector finds evidence which in his/her professional judgement warrants a more detailed inspection of the ship, its equipment or its crew (article 9.2 of the Convention). Such clear grounds include: intake of ballast water from an area for which a notification is in place for known hazardous conditions, lack of familiarity with the operation of the BWMS, incorrect/misleading BWRB entries, evidence of deviation from an approved BWMP, exceedance of the limiting conditions of the BWMS, type and condition of the BWMS equipment not corresponding with the type approval certificate, etc.
- .3 the third stage, where sampling and indicative analysis (using operational or performance indicators) may be undertaken if the results of the more detailed

inspection described above so dictate, to identify whether the ship is meeting the ballast water performance standard described in regulation D-2, and

- .4 the fourth stage, in cases where the indicative analysis identifies that the discharge may be exceeding the D-2 standard, incorporates a detailed analysis to ascertain any non-compliance.

In most cases the first stage (initial inspection) will be sufficient. If clear grounds exist as outlined above, the inspection may be escalated to the second and any subsequent stages, as appropriate. The fourth stage (detailed analysis) is far more time consuming and costly and may have implications on the ship's schedule. However, the time required for analysing the samples shall not be used as a basis for unduly delaying the operation, movement or departure of the ship. Upon determination of non-compliance of the ballast water discharge standard (regulation D-1 or D-2), the port State authorities shall prohibit ballast water discharge until the threat is removed. In case of malfunctioning, repair of the BWMS will be required. Alternatively the deballasting can be continued, if a safe alternative exists, with the agreement of the port State (e.g. shore facility or in a dedicated area where threat to the environment is minimal).

Regardless of the stage of inspection, whenever clear grounds have been identified that the ship poses a threat to the environment, human health, property or resources (whether through a PSC inspection, if the crew/operators discover the ballast water treatment was not properly undertaken, or when there are grounds for implementing a detailed analysis to ascertain the non-compliance with the applicable standard), the master of the ship should be informed immediately and the ship should not undertake any further ballast water discharge. Any discharge taking place should therefore be stopped immediately.

If a ship is found to be in violation of the Convention, the PSC officer may take steps to warn, detain or exclude the ship or grant such a ship permission to leave in order to discharge ballast water elsewhere (such as a designated ballast water exchange area) or to undertake repairs. In exercising his/her functions, the PSC officer should use professional judgement to determine whether to detain the ship until any noted deficiencies are corrected or to permit the ship to sail with deficiencies, which do not pose an unreasonable threat of harm to the marine environment. Further information can be found in the *Guidelines for port State control under the BWM Convention* (resolution MEPC.252(67)), while chapter 13 of this manual addresses issues related to sampling.

PART VI: ORGANIZATION

CHAPTER 20 – Basic maritime Administration

Before ratifying the Convention, a State must be in a position to meet the requirements included in the articles and regulations. Almost all maritime States have accepted and implemented a number of existing international maritime safety and environmental conventions (e.g. SOLAS, MARPOL, Load Lines, COLREG, etc.) and, in order to implement these, a maritime Administration in some form should exist. It is the existing maritime Administration that should first be examined when considering the undertakings and duties involved in ratifying and implementing the Convention. The duties of a maritime Administration are shown in Figure 5 and are applicable to a number of maritime conventions. It is advisable to examine these duties in order to identify those required under this Convention and decide how they will be covered. It will be seen that these duties have been divided into those of the flag State, port State, and coastal State for clarity, but there is inevitably a degree of overlap in these duties.

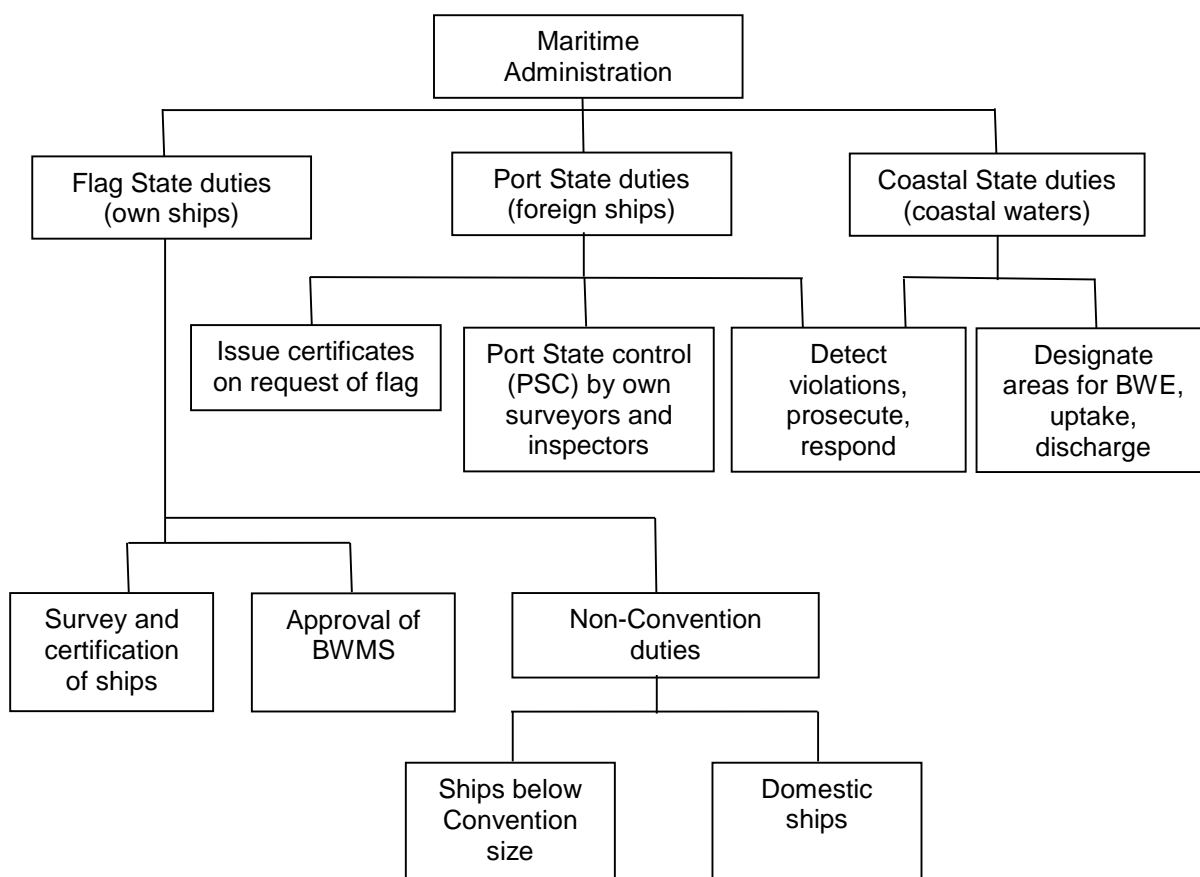


Figure 5: Duties of maritime Administrations

20.1 Duties and implementation

The maritime Administration headquarters and operational or district areas (survey and inspection) have distinctive roles in implementing the Convention. The Administration and classification societies acting as recognized organizations (ROs) on their behalf have in some cases a very close link.

20.1.1 Administrative duties – Headquarters

A short description of duties is given under each of the following, which are generally applicable for all IMO treaties:

- .1 IMO representation: the successful functioning of the Organization relies on the contributions made by member States in the form of proposals, information, technical papers, reports, etc., and their participation in the meetings of various organs. It is, therefore, an important function of a maritime Administration to provide such contributions with respect to the Convention.
- .2 Legislation: the work involved in preparing legislation to permit national regulations to be made to implement the Convention is described in chapter 3.
- .3 Regulations: these require preparation in a form suitable for national regulations (see chapter 3).

- .4 Implementation of regulations: normally expected to be carried out through existing structures used for the implementation of other conventions.
- .5 Instructions to surveyors: it is necessary, in most cases, to provide surveyors with guidance on national procedures and clarifying documents.
- .6 Delegation of surveys and issuance of certificates: usually Administrations don't have sufficient resources to deal with all the surveys and certification required by the various international maritime conventions. This applies also to this Convention and a certain extent of delegation may be expected. Decisions need to be made, including conditions, taking into account the circumstances of the country (see chapter 21 of this manual).
- .7 Records of ship certification: necessary for the control of flag State ships.
- .8 Design approval: approval of ship design to meet the provisions of the Convention.
- .9 Survey reports: confirmation that ships meet the approved designs and are constructed to relevant standards.
- .10 Equipment or system approval: approval of required equipment or systems (e.g. BWMS) in accordance with applicable standards and guidelines.
- .11 Issuance of certificates: issuance of IBWMC on completion of design approval and ship surveys, and Type Approval Certificates for equipment/systems.
- .12 Violation reports: assessment of reports by own inspectors or other port State reports of contravention of the requirements of the Convention.
- .13 Prosecution of offenders: compiling of evidence and preparation of cases for prosecution.
- .14 Monitoring reception facilities: necessary for the State to ensure adequacy of reception facilities for ballast water and sediments, where applicable.
- .15 Informing the Organization as required: put in place arrangements and procedures for reporting incidents and other items listed in article 14 of the Convention

20.1.2 Surveys and inspections

A short description of the surveyors' and inspectors' duties is given in the following paragraphs with further details for PSC provided in chapter 19:

- .1 Ship survey to verify compliance with the Convention (flag State duty): a most important element of compliance with the requirements of the Convention, which should be conducted by appropriately qualified surveyors. Information on the Harmonized System of Survey and Certification (HSSC) can be found in chapter 12.
- .2 Inspections: inspections are necessary for port State control and to ensure compliance with required standards and operational procedures.

- .3 Investigations and prosecutions: inspectors should be capable of investigating cases of non-compliance with the Convention's provisions and identifying violations. In association with headquarters (if necessary), they should arrange the prosecution of offenders.

20.2 Small maritime Administrations

Some States with relatively small fleets and/or small or few ports, as well as developing ones, may not have the capacity of a large maritime Administration. They should, however, recognize their commitment to safety and environmental protection and have a maritime Administration with the ability to fulfil their obligations under the Convention. In such cases, they are likely to depend heavily on recognized organizations.

20.3 Composition of a maritime Administration

Factors affecting the composition of a maritime Administration are mentioned earlier in this chapter and should be considered when planning for implementation of the Convention. Duties as a flag State, port State and coastal State have been outlined in Figure 5 and the allocation of available resources between these duties may cause challenges. A large coastline with a large number of ports and, consequentially, a large number of ship visits may mean the provision of a large force of inspectors on port State control (PSC) duties, even for a country with a small fleet. Other countries may have large fleets but small coastlines with few ports, requiring a large surveyor force for flag State duties. A balance should be achieved and, in some cases, surveyors may act as inspectors as well. As described further in chapter 21, delegation of certain duties is likely to be necessary.

However, it is to be noted that the same Government or maritime Administration will view the subject matter from different perspectives in its capacity as a flag State, a port State and a coastal State. The flag State perspective will have a regulatory/implementation focus relating to the survey and certification of ships flying its flag and possibly the approval of BWMS to be installed on those ships. The port State perspective will have an enforcement focus in relation to the inspection of visiting ships flying the flags of other States when they are in a port, or inspection of offshore installations of the coastal State. The coastal State perspective will largely involve identifying locations for ballast water exchange (BWE) and interfacing with the relevant enforcement agency to ensure that discharges take place only where they are permitted. Thus the interests in the three capacities may be divergent. Further information can be found in chapter 4.

CHAPTER 21 – Delegation of duties by the maritime Administration

As discussed in chapter 20, an Administration may not have sufficient resources to perform all its obligations under the Convention, including dealing with survey and certification. Delegation of duties is permissible under the Convention, but it should be recognized that this delegation does not relieve an Administration of its responsibilities.

21.1 General considerations for the delegation of duties

The general considerations for the delegation of duties are clearly defined in regulations E-1 (Surveys), paragraphs 3, 4, 5 and 8, and E-2 (Issuance or endorsement of Certificate), paragraph 2. In summary, they are:

- .1 the Administration may delegate surveys to individuals or organizations recognized by it;

- .2 the Administration shall empower these individuals or organizations to require ships to comply with the Convention and to carry out surveys and inspections if requested by a port State;
- .3 the Administration shall notify the Organization of such delegation of duties;
- .4 in every case the Administration shall guarantee the completeness and efficiency of the survey; and
- .5 in every case the Administration assumes full responsibility for the Certificate.

Therefore, although the responsibility is for the Administration itself to carry out the survey and certification of ships flying its flag, it may, for pragmatic reasons, delegate these functions, subject to conditions. This requires a number of factors to be considered:

- .1 what an Administration can or should do with its own resources;
- .2 what is to be delegated;
- .3 who, or which organizations, should be entrusted with delegated duties;
- .4 what powers they should be given;
- .5 how the completeness and efficiency of the delegated duties may be ensured;
- .6 how arrangements may be made to provide the Organization with the necessary relevant information; and
- .7 how the assumption of full responsibility for certificates issued by others may be justified.

These aspects are considered in the following sections of this chapter.

21.2 What duties to delegate

A maritime Administration should, ideally, have sufficient resources to carry out surveys of ships flying its flag and inspections of foreign ships in its ports. However, where the maritime Administration does not have sufficient qualified surveyors, or surveys of its ships have to be made outside the State, surveys, as well as the issuance of certificates, may be delegated, but only under the strict conditions permitted by the Convention. Port State inspections of foreign ships are normally performed by a maritime Administration's own inspectors and recognized organizations are normally not used for such purposes.

After assessment, delegation may therefore be found advisable for surveys outside the State (where distance, cost, staff resources, etc., make this necessary), for work which is well established and for which other organizations have the necessary expertise, and for duties beyond the capability of the maritime Administration.

21.3 Who should be entrusted and what powers should be given

The Convention allows the delegation of duties as outlined above both to individuals (nominated surveyors), who may or may not be members of an organization, and to recognized organizations (ROs), which, for all practical purposes, means classification societies. Nominated surveyors and recognized organizations should have support from the maritime

Administration in order for them to carry out the duties required by the Convention. In particular, power should be given to require repairs to a ship and to carry out surveys and inspections even though these may not be agreed or requested by the shipowner. The practical way is for individual surveyors to be formally given the powers of the relevant maritime Administration's surveyors, or for the recognized organizations to be given the requisite powers by national regulations or other formal authority, acceptable under national legislation.

21.4 Assuming full responsibility for surveys and certificates

As discussed earlier in this chapter, when delegating duties the Administration retains full responsibility for the surveys carried out and the certificates issued by its nominated surveyors and recognized organizations. The maritime Administration should therefore be satisfied that it can fully justify the assumption of this responsibility. For this reason, the Administration must first of all exercise caution in its selection of such nominated surveyors and recognized organizations. This can be done based on knowledge of the individual nominated surveyor's or recognized organization's expertise. This should then be followed up by ensuring that they carry out the delegated duties satisfactorily, which can be achieved by requiring reports, monitoring their work during inspections, auditing the organizations, checking issued certificates, and other means identified by the Administration, which should be confirmed at the time of the agreement for the delegation of duties.

21.5 Appointment of nominated surveyors

In practice appointment of nominated surveyors may be done on the basis of a satisfactory assessment of each individual person based on his or her qualifications, experience and capability to conduct surveys to the required standard and the current Convention requirements. It will require careful consideration by the Administration and some internal organization will be necessary to keep individual surveyors informed of changes to current requirements and to ensure that they are carrying out their duties completely and efficiently (see paragraph 21.4).

21.6 Recognized organizations

In practice, the term recognized organization may usually be taken to mean a classification society, however this does not preclude the use of other organizations and the contents of this paragraph would be relevant were any to be considered. The Administration should decide which organizations it will entrust with the authority to act on its behalf for the Convention purposes. These are likely to be the same as those authorized to act under other conventions, but they may be reduced or added to as necessary. Much will depend on the size of the flag fleet, the presence or otherwise of a national classification society which can meet its needs and the classification societies normally used by ships coming onto the State's register. It is essential that recognized organizations are clearly aware of the extent of delegation permitted. The Administration should give guidance in a written agreement stating whether the recognized organizations are to survey to the full requirements of the Convention. Clear instructions should be issued:

- laying down the action to be taken in the event of temporary non-compliance with the Convention
- on the interpretation of regulations,
- on the issuance of exemptions where this is left to the discretion of the Administration,
- on the approval of equipment on behalf of the Administration,
- on the survey of ships not classed, and on the ready provision of information to the Administration when requested.

With these points in mind, an Administration may consider the service an organization is prepared and able to provide.

The general criteria to be met by recognized organizations acting on behalf of a maritime Administration should include the following:

- .1 the RO should have sufficient experience and skill in performing technical surveys;
- .2 the RO should be represented in all regions where the ships flying the flag of the Administration operate, which requires a minimum number of personnel; and
- .3 the RO should be able to fulfil a continuing quality-assurance programme.

At its sixty-fifth session, the Marine Environment Protection Committee (MEPC) adopted the *Code for Recognized Organizations (RO Code)* through resolution MEPC.237(65), which took effect on 1 January 2015. The RO Code serves to provide, as far as national laws allow, a standard approach to assist the Administrations in meeting their responsibilities in recognizing, authorizing and monitoring their recognized organizations. The RO Code establishes the mandatory requirements that an organization shall fulfil to be recognized by a flag State and to perform statutory certification and services on behalf of its authorizing flag States, as well as the mandatory requirements that flag States shall adhere to when authorizing an RO and guidelines for flag State oversight of its ROs.

21.7 Provision of information to IMO

It is a duty of the maritime Administration to inform the IMO about the specific responsibilities and conditions of the authority delegated to the nominated surveyors and recognized organizations.

CHAPTER 22 – Training of personnel

22.1 Consideration of training requirements for personnel

The need for training of personnel for the purpose of implementing the Convention depends on several factors and will need to be assessed by each State. This is a matter for the marine Administration and the environmental protection authorities, its national shipping industry and other stakeholders to explore.

The following points need to be considered:

- .1 are the Administration's own staff sufficiently conversant with the Convention and relevant guidelines?
- .2 are the staff of the maritime Administration technically competent to fulfil their obligations?
- .3 do more appropriately qualified staff need to be recruited and trained?
- .4 are the national shipowners conversant with the Convention?
- .5 what training do ships' masters and crew need?

In exploring the possibilities for training, the following options may be considered:

- .1 cooperation with other, more experienced, maritime Administrations;
- .2 raising the technical competence of the Administration staff to an adequate standard by training or recruitment or both;
- .3 organising national seminars/courses or regional training schemes for surveyors, inspectors, administrators, lawyers, shipowners, masters and crew, possibly through IMO's Integrated Technical Cooperation Programme, and taking also advantage of the available training materials developed by the GloBallast Partnerships project;
- .4 taking advantage of learning opportunities at the World Maritime University, especially for those capable of benefiting and subsequently returning to responsible positions in the maritime Administration and shipping industry;
- .5 including the BWM Convention in the curriculum for seafarers' courses and examinations for certificates; and
- .6 requesting shipowners to arrange training for senior ship officers to ensure that they are aware of the on-board procedures and legislation.

22.2 Administration personnel

A training programme is necessary to make administrative and inspection personnel knowledgeable about the requirements of the Convention and also to make surveyors competent in surveying ships for technical compliance with ballast water management. Inspection personnel must also be made knowledgeable about ballast water stripping operations. Further, it is of the utmost importance that all involved stay informed on any amendments to the various guidelines and guidance documents.

In most cases consideration should be given to conveying this information in the national language. It is recommended, however, to provide adequate information to local instructors in the first instance. Combined training activities, in which experienced instructors initially work in parallel with local instructors, teaching courses for administrative and inspection personnel, may be beneficial. Such training should concentrate both on the content of the Convention in general and on practical surveying procedures.

The timing for such training must be adjusted to suit the planned entry into force of the requirements in the acceding State, so that sufficient time is given for thorough introduction to the practical requirements, but also that the content of the instructions is not forgotten while the actual implementation is still being prepared. When the schedule for the accession and implementation of the Convention has been decided, such training should be initiated. It may be necessary to engage outside instructors to cover both theoretical and practical aspects of inspection.

22.3 Ships' officers

In addition to general awareness on the protection of the marine environment, ships' officers need instructions about the requirements and regulations of the Convention as a whole and instructions regarding the handling and operation of the equipment being installed on board ships in particular. For experienced officers this additional information could be given in relatively short courses.

22.4 Main topics to form part of a ballast water management training programme:

- articles and regulations of the Convention
- guidelines accompanying the Convention
- Ballast water management plan (BWMP) development, implementation and operation
- Ballast water management safety procedures
- Safety procedures for ballast water exchange operations, if applicable
- ballast water management techniques and methodologies
- How to operate and maintain a ballast water management system
- National and regional requirements
- Ballast water record book keeping
- Safety procedures for sediment control and handling
- Handling, storage and preparation of chemicals and Active Substances

The training procedures should cover crew familiarization and training of relief crews, and the training should be fully documented and correspond to the training requirements specified in the BWMP.

CHAPTER 23 – Guidelines, circulars and other IMO publications relevant to the Convention

A number of the regulations contained in the annex of the Convention require procedures, equipment, etc., to be based on guidelines developed by IMO. Some of these guidelines exist as separate publications. A complete up-to-date list of resolutions and BWM circulars can be found on the IMO website (www.imo.org).

23.1 Guidelines for the uniform implementation of the BWM Convention

- .1 Guidelines for sediment reception facilities (G1) (resolution MEPC.152(55))
- .2 Guidelines for ballast water sampling (G2) (resolution MEPC.173(58))
- .3 Guidelines for ballast water management equivalent compliance (G3) (resolution MEPC.123(53))
- .4 Guidelines for ballast water management and development of ballast water management plans (G4) (resolution MEPC.127(53))
- .5 Guidelines for ballast water reception facilities (G5) (resolution MEPC.153(55))
- .6 Guidelines for ballast water exchange (G6) (resolution MEPC.124(53))
- .7 Guidelines for risk assessment under regulation A-4 of the BWM Convention (G7) (resolution MEPC.162(56))
- .8 Guidelines for approval of ballast water management systems (G8) (resolution MEPC.174(58))
- .9 Procedure for approval of ballast water management systems that make use of Active Substances (G9) (resolution MEPC.169(57))
- .10 Guidelines for approval and oversight of prototype ballast water treatment technology programmes (G10) (resolution MEPC.140(54))
- .11 Guidelines for ballast water exchange design and construction standards (G11) (resolution MEPC.149(55))

- .12 2012 Guidelines on design and construction to facilitate sediment control on ships (G12) (resolution MEPC.209(63))
- .13 Guidelines for additional measures regarding ballast water management including emergency situations (G13) (resolution MEPC.161(56))
- .14 Guidelines on designation of areas for ballast water exchange (G14) (resolution MEPC.151(55))

23.2 Guidelines related to the implementation of the Convention

- .1 Guidelines for port State control under the BWM Convention (resolution MEPC.252(67))
- .2 Measures to be taken to facilitate entry into force of the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (resolution MEPC.253(67))
- .3 Information reporting on type approved ballast water management systems (resolution MEPC.228(65))
- .4 Procedure for approving other methods of ballast water management in accordance with regulation B-3.7 of the BWM Convention (resolution MEPC.206(62))
- .5 Installation of ballast water management systems on new ships in accordance with the application dates contained in the Ballast Water Management Convention (BWM Convention) (resolution MEPC.188(60))
- .6 Guidelines for ballast water exchange in the Antarctic treaty area (resolution MEPC.163(56))
- .7 Application of the international convention for the control and management of ships' ballast water and sediments, 2004 (resolution A.1088(28))

23.3 Circulars related to the implementation of the Convention

- .1 Guidance on entry or re-entry of ships into exclusive operation within waters under the jurisdiction of a single Party (circular BWM.2/Circ.52)
- .2 Application of the BWM Convention to Mobile Offshore Units (circular BWM.2/Circ.46)
- .3 Clarification of "major conversion" as defined in regulation A-1.5 of the BWM Convention (circular BWM.2/Circ.45)
- .4 Options for ballast water management for Offshore Support Vessels in accordance with the BWM Convention (circular BWM.2/Circ.44)
- .5 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) (circular BWM.2/Circ.43)
- .6 Guidance on ballast water sampling and analysis for trial use in accordance with the BWM Convention and Guidelines (G2) (circular BWM.2/Circ.42/Rev.1)
- .7 Issuance of Ballast Water Management Certificates prior to entry into force of the BWM Convention and Ballast Water Management Plans approved according to resolution A.868(20) (circular BWM.2/Circ.40)

- .8 Information that should be made available in proposals for approval of ballast water management systems in accordance with the Procedure for approval of ballast water management systems that make use of Active Substances (G9) (circular BWM.2/Circ.37)
 - .9 Guidance on scaling of ballast water management systems (circular BWM.2/Circ.33)
 - .10 Applicability of the Ballast Water Management Convention to hopper dredgers (circular BWM.2/Circ.32)
 - .11 Framework for determining when a Basic Approval granted to one ballast water management system may be applied to another system that uses the same Active Substance or Preparation (circular BWM.2/Circ.27)
 - .12 Engineering Questionnaire on Ballast Water Management Systems (circular BWM.2/Circ.21)
 - .13 Guidance to ensure safe handling and storage of chemicals and preparations used to treat ballast water and the development of safety procedures for risks to the ship and crew resulting from the treatment process (circular BWM.2/Circ.20)
 - .14 Guidance document on arrangements for responding to emergency situations involving ballast water operations (circular BWM.2/Circ.17)
 - .15 Methodology for information gathering and conduct of work of the GESAMP-BWWG (circular BWM.2/Circ.13 and revisions)
 - .16 Harmonized implementation of the Guidelines for approval of Ballast Water Management Systems (G8) (circular BWM.2/Circ.8)
 - .17 Interim Survey Guidelines for the purpose of the International Convention for the Control and Management of Ships' Ballast Water and Sediments under the Harmonized System of Survey and Certification (resolution A.948(23)) (circular BWM.2/Circ.7)
-