

Ballast Water Management Workbook

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1. International Convention for the Control and Management of Ships' Ballast Water and Sediments

Foreign marine species are introduced into new environments through ships ballast water, sediments in ballast tanks or attached to the hull and propeller. This introduction is a major threat to the ecosystems around the globe.

It has been estimated that approx. 3,000 to 4,000 million tons of untreated ballast water are discharged every year. Globally it has been estimated that ship ballast is transporting more than 10.000 species including living organisms and pathogens such as bacteria and viruses, which are discharged with the ballast water when the ships reach their destination.

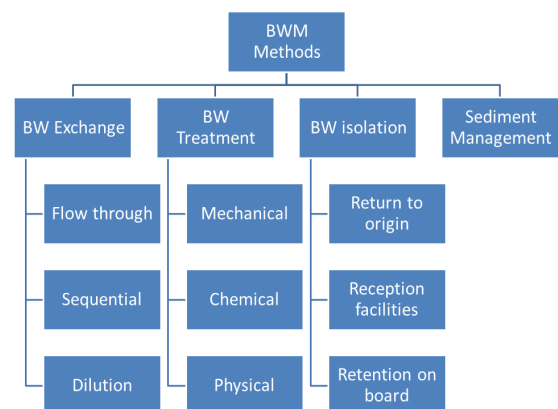
More than 90 % of the world's trade measured by volume spends some of its lifetime on board a ship. Without shipborne transportation the world's economy would collapse. Further the use of ballast water is essential to the safe and efficient operation of shipping. As the ballast water with its content of foreign marine species and pathogens are a threat to ecosystems it is vital that active measures are put into place to minimize the spread of foreign species.

This is widely recognized and the **International Convention for the Control and Management of Ships' Ballast Water and Sediments** (hereafter referred to as "Convention") was adopted by the IMO in London 2004

The stated aim of the Convention is to reduce the risks to the environment. The Convention with its Annex and supporting guidelines regulates management of ballast water and sediments from ships. The Annex is an integral part of the Convention meaning that reference to the annex is the same as reference to the Convention.

Aim of the Convention:
Prevent, minimize and ultimately eliminate the risks to the environment, human health, property and resources arising from the transfer of harmful aquatic organisms and pathogens through the control and management of ships' ballast water and sediments, as well as to avoid unwanted side-effects from that control and to encourage developments in related knowledge and technology.

The Convention provides four different methods to achieve the aim.



Although Ballast Water Management by the exchange method was originally allowed under the Ballast Water Management Convention, both the IMO and US Coastguard set deadlines for ships to have Ballast Water Treatment systems fitted.

The IMO final deadline for all ships to have an approved Ballast Water Treatment system fitted was September 2024. The US Coastguard deadlines have also now passed, unless granted an extension. However, in an emergency, and subject to the approval of the Port State, it may be necessary to use the exchange method as a contingency measure. Contingency measures are only applicable when a ship is unable to meet the D-2 Performance Standard; such measures will be listed in the ship's Ballast Water Management Plan and may include:

- Changes to the voyage and/or cargo operations
- Retention on board
- Discharge to a port reception facility
- Discharge to another ship
- Ballast water exchange
- Ballast water management in accordance with a method agreed with the Port State.

Regulation D-2 to the Convention details the performance standard for discharged ballast water.

Viability organisms size / type	IMO criteria
Viability organisms > 50 µm in minimum dimension	< 10 Viability organisms / m ³
Viability organisms 10 - 50 µm in minimum dimension	< 10 Viability organisms / ml
Viability organisms < 10 µm in minimum dimension	
Escherichia coli	< 250 cfu / 100 ml
Intestinal Enterococci	< 100 cfu / 100 ml
Toxicogenic Vibrio cholerae (O1 and O139)	< 1 cfu / 100ml < 1 cfu / g wet weight zoo plankton
Note: cfu: Colony forming unit	

D-2 Performance standard

Regulation B-1 to the convention requires ships to develop, carry and implement a Ballast Water Management Plan (BWMP) approved by the flag state. The BWMP is specific to each ship and shall detail how the ship implements the requirements of the Convention and the associated guidelines.

A proper Ballast Water Management Plan will help to avoid operational delays which again will save both time and cost.

Regulation B-2 to the convention requires ships to have a Ballast Water Record Book where records of all ballast water operations are documented.

Regulation B-4 to the convention defines areas where ballast water exchange may be carried out as follows:

- conduct ballast water exchange at least 200 nautical miles from the nearest land and in water at least 200 metres in depth
- if unable to conduct ballast water exchange as above: as far from the nearest land as possible, and in all cases at least 50 nautical miles from the nearest land and in water at least 200 metres in depth.

When the requirements cannot be met areas may be designated by coastal States where ships can conduct ballast water exchange.

Regulation B-5 to the convention requires all ships to remove and dispose of sediments from spaces designated to carry ballast water.

Training and education

Regulation B-6 to the convention requires 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,
- appropriate to their duties, be familiar with the ship's ballast water management plan.

Training for ships' masters and crews as appropriate should include:

- instructions on the requirements of the Convention,
- the ballast water and sediment management procedures and,
- the ballast water record book.

Particular regard should be made to matters of ship safety and maintenance of records. All in accordance with the

information contained in the IMO guidelines on ballast water management.

The ballast water management plan should include description of:

- training and education on ballast water management practices and the systems and,
- procedures used on board that ship.

The Ballast Water Management Convention calls for a number of guidelines to be developed to guide the implementation of the specific articles and regulations. They are often referred to with the letter G and a number for example G2, G6, G11, etc.

In addition to the requirements set out in Ballast Water Management Convention it is very important that you are aware of any national and/or regional requirements that can affect your ballast water operation.

2. Exercises

Ensure that you have access to the International Convention for the Control and Management of Ships' Ballast Water and Sediments including the guidelines accompanying the Convention before you start on the exercises. It can also be beneficial to have access to the vessels Ballast Water Management Plan when completing this course. All questions and exercises are marked with a score; to get full score try to answer all questions as comprehensive as possible. All questions must be answered and a score of 75% is required to pass the course.

Exercise 1 (5 marks)

It is essential that sounding pipes, air pipes and non-return devices in the ballast tanks are in good order. How do you ensure these components are maintained and working properly on board your vessel, and what can be the consequence if they are not working properly?

Exercise 2 (5 marks)

Ballast water operations must be continuously monitored, what are the safety precautions to be considered before start-up of a ballast water operation? What may be the consequences if these safety precautions are not followed?

Exercise 3 (5 marks)

Consult your ship's certificates to locate the International Ballast Water Management Certificate. Making reference to the dates on the document, state the expiry date and the name of the authority issuing the certificate.

Exercise 4 (5 marks)

Consult your ship's certificates to locate the USCG Certificate of Approval for the ballast water management system. Making reference to the dates on the document(s), state the relevant dates(s) and the name of the authority issuing the certificate(s).

If your ship is not trading in US waters, state this fact as your answer.

Exercise 5 (5 marks)

Describe the four methods for ballast water management available to ships.

Exercise 6 (5 marks)

Explain the meaning of ballast water management "Contingency Measures". State where you would find detail of these measures and which authority would need to approve application of the measure.

Exercise 7 (6 marks)

Consult your ship's documentation on ballast tanks and pumps. Select two tanks and state the volume of each tank.

State the pumping capacity available for each tank and the time required to complete a ballasting operation for the two tanks.

Exercise 8 (3 marks)

Ballast sediment can be a reservoir of foreign organisms and pathogens.

Consult the G4 guidelines. Describe how uptake of harmful organisms and pathogens may be minimized during ballast water uptake.

Exercise 9 (5 marks)

Consult the G4 guidelines. With respect to ballast water operations, describe the training and familiarization requirements for ships' officers and crew.

Exercise 10 (6 marks)

Describe the four main technologies utilized in ballast water treatment systems.

Select one technology and discuss strengths and weaknesses of the technology.

Exercise 11 (5 marks)

Consult the G2 guidelines (section 5). Describe how the samples needed to determine compliance with the Convention should / should not be taken.

Who are the G2 guidelines intended for?

Exercise 12 (5 marks)

Consult the G4 guidelines. Describe the procedure for removal of sediments and which considerations must be made before this operation is commenced.

How often are sediments removed from the ballast tanks on board your vessel?

3. Document status

Issue no.	Date	Author
1667 A	12.10.2004	AB
1667 A1	30.03.2006	AB
1667 A2	22.05.2006	AB
1667 A3	26.02.2007	AB
1667 A4	01.01.2008	AB
1667 A5	19.06.2009	AB
1667 B1	30.08.2012	AB
1667 B2	20.11.2014	AB
1667 C1	17.01.2017	AB
1667 C2	20.09.2017	AB
1667 C3	15.08.2018	AB
1667 C4	03.10.2018	AB
1667 4.0	26.11.2020	ILG
1667 4.1	01.09.2024	ILG

4. Changes in the document

Issue no.	Paragraph no.	Description
1667 A1	Para 1.2 Para 1.5 Para 2.1 Chapt. 3 Para 4.7 Exercise 2	Updated text with reference. Updated with "Note" Added text before Annex B. Added reference. Changed text to "..several methods under development" Added note since CBT is not updated.
1667 A2	Para 1.5 Para 1.8 Para 4	Added text to paragraph. Added text to paragraph. Added text with marks
1667 A3	Para 1.0	Added new paragraph 1.9, Evaluation of on board course.
1667 A4	Para 1.5 - 1.8	Updated with new email and text.
1667 A5	Para 1.3	Added prerequisites. New numbers on para after this.
		Text on front page changed to Procedure and workbook.
		Exercise2 has been revised.
1667 B1		Major revision of workbook and procedure, WB divided into part A and B.
1667 B2	Para 1.9	Removed "CBT Login ID" added "Ships flag"
1667 C1		Major revision, chapters 2 and 3 are new.
1667 C2		Added text in chapter 2
1667 C3	Para 1.7 Para 4	Updated text Updated evaluation form
1667 C4		Replaced e-learning module #27 with modules #421 and #422
1667 4.0		New Ocean TG course template. Split procedure and workbook, changed version numbering
1667 4.1		Updated workbook after SME revision due to outphasing of exchange method. Minor revision of wording.