



Ship Sanitation Inspection and Issuance of Ship Sanitation Certificate

Ballast Water Management

Learning Content

- **Main concepts**
- **Main risks**
- **IMO Ballast water management convention**
- **Regulations D-1, D-2, D-3, D-4**
- **Inspection of ships and control measures**
- **Sampling**



What is Ballast Water?

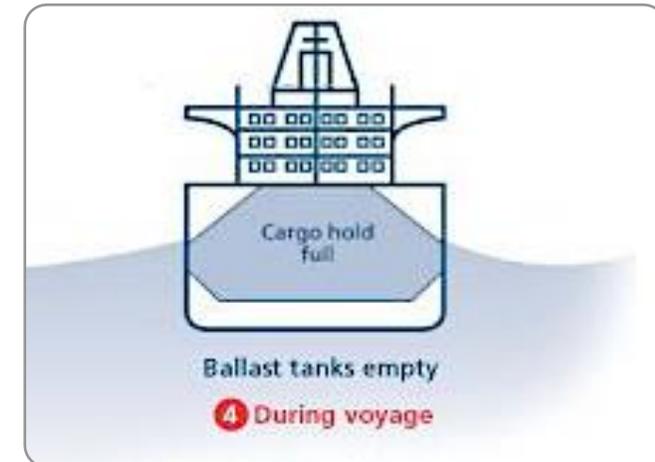
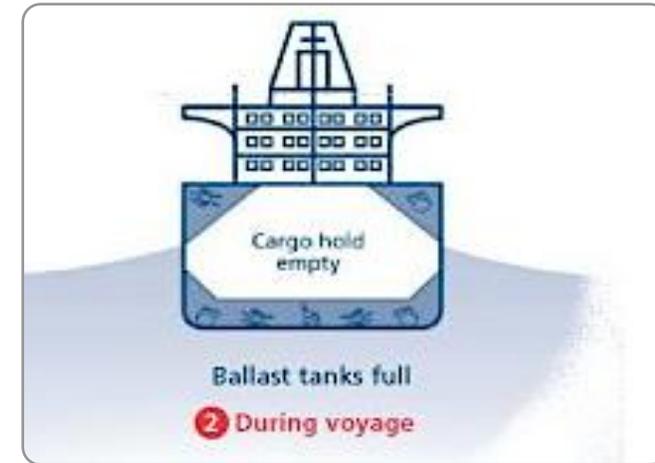
Ships need to control their balance during cargo operations and navigation. Ballast water is used to keep the stability of ship

- **Ballast water:** Water taken on board a ship to maintain stability and navigate safely.
- **Sediments:** Matter settled out of ballast water
- **Ballast Water Management:** Mechanical, physical, chemical and biological processes, to prevent discharge of harmful aquatic organisms and pathogens within ballast water and sediments



Ballast Water Operation

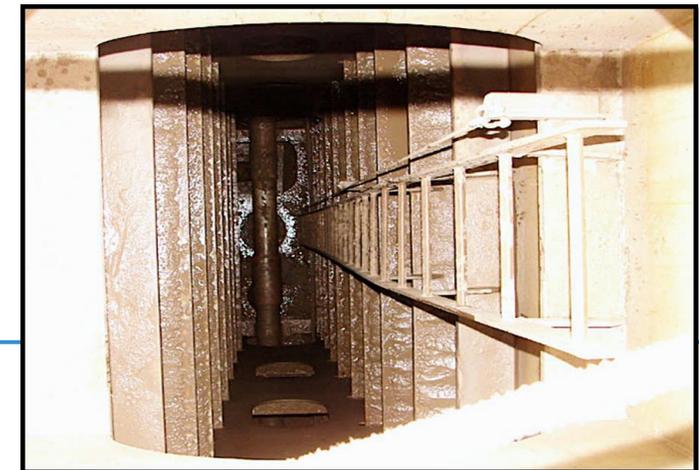
- When a ship arrives in a port with empty cargo holds, several tonnes of ballast water are in the ballast-water tanks in order to stabilise the ship while crossing sea.
- **During loading operations, the ballast water has to be pumped into the port basin to keep the ship stable.**



Ballast Water Operation

- **Balance out the ship** when its weight unevenly distributed during voyage and and loading-unloading.
- **Large amounts of ballast water are pumped into or out of the ship.** Approximately 10 billion tonnes of ballast water are transported annually by ships
- More than 7000 marine species travel daily within ballast water.
- **Essential operation, but carries potential risks.**

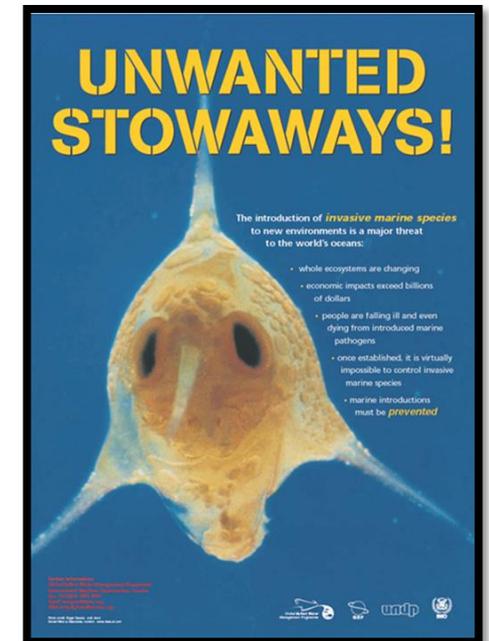
Ballast water pumps, tanks



Main Risks

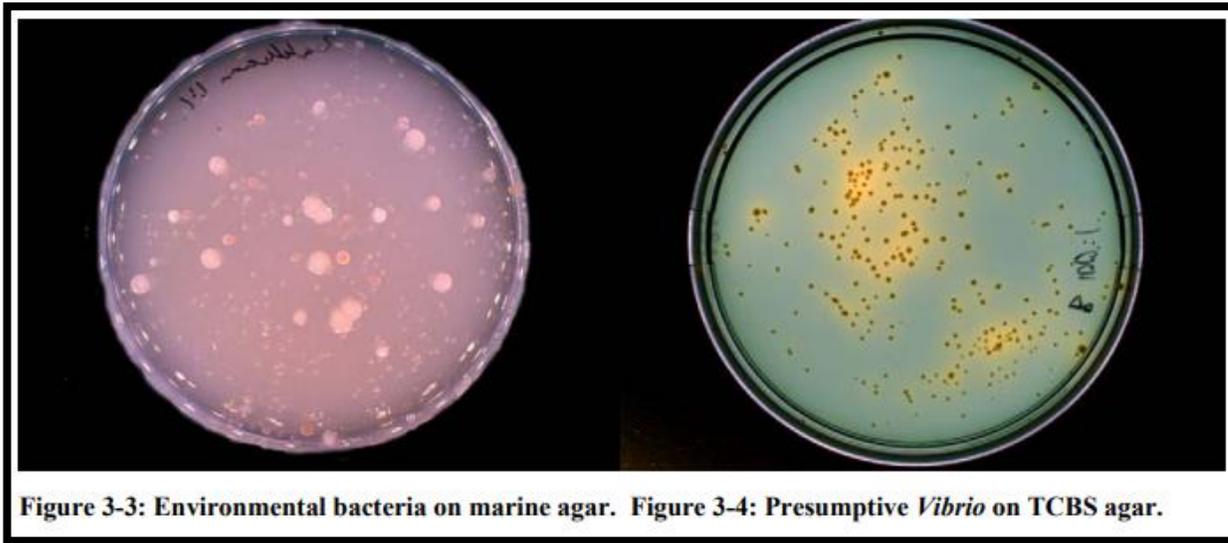
Discharge of the ballast water and sediments in port waters can transfer harmful aquatic organisms and pathogenic agents that may pose a threat to human life, the environment and ecosystem balance.

- **Risk of bioinvasion:** Invasive species may survive and multiply in the host environment.
- **Biological risk to human health:** Ballast water can cause public health problems by transporting pathogens.
- **Environmental risk:** Invasive species posing threat to local ecosystems.
- Chemical contamination risk, economic risk



Main Risks – Vibrio Cholera

- Port areas near the mouths of rivers are prime breeding ground for cholera bacteria, especially in countries where sanitation is poor. *V. cholera* bacteria attach to the surfaces of planktonic animals, other zooplankton and aquatic plants. By attaching themselves **the bacteria can enter ballast water and be transmitted to new areas** around the world.



<https://nva.sikt.no/registration/0198e9c90cda-d723aeb1-d4c6-41a7-8ad5-84ef2ea85f0c>

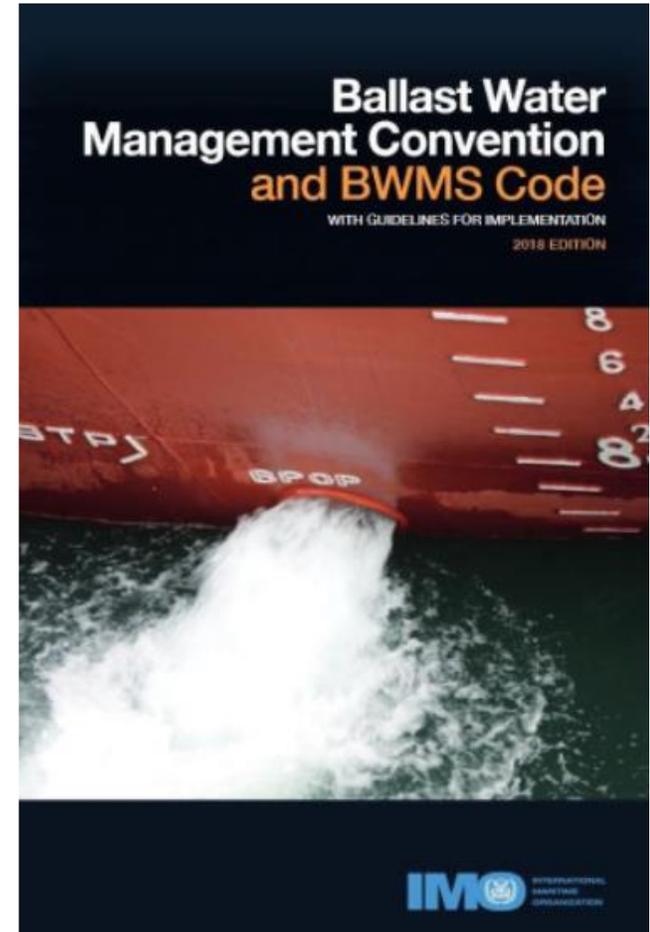
Vibrio cholerae transfer by cargo ship was documented when the same strain was isolated from ballast and other nonpotable water samples collected from 5 cargo ships from ports in Latin America that arrived in the US Gulf of Mexico.

<https://pmc.ncbi.nlm.nih.gov/articles/PMC3471641/>

Ballast Water Management Convention (BWMC)

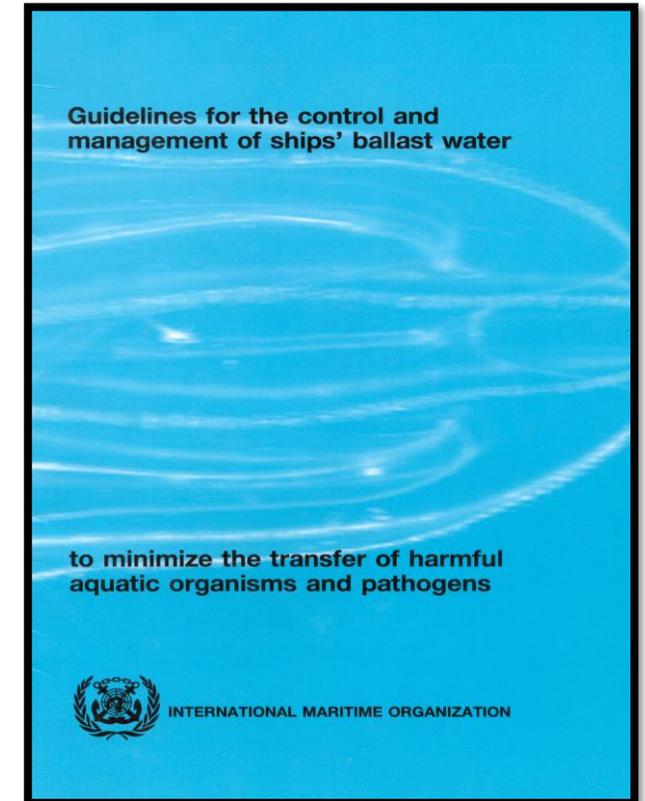
The International Convention for the Control and Management of Ships' Ballast Water and Sediments

- The convention was adopted by the IMO in **2004**
- The Convention entered into force globally on **8 September 2017**.
- Ships must meet standards by **8 September 2024**
- **Aim is preventing the spread of harmful aquatic organisms and pathogens in ships' ballast water.**



IMO Guidelines for Ballast Water Management

- 2017 Guidelines for **ballast water exchange** (resolution MEPC.288(71))
- Guidelines for **sediment reception facilities** (resolution MEPC.152(55))
- Guidelines for **ballast water sampling** (resolution MEPC.173(58))
- Guidelines for ballast water management and development of **ballast water management plans** (resolution MEPC.127(53))
- 2016 Guidelines for **approval of ballast water management systems** (resolution MEPC.279(70) (superseded by the BWMS Code (resolution.300(72))



<https://wwwcdn.imo.org/localresources/en/OurWork/Environment/Documents/Biofouling%20pages/Compilation%20of%20relevant%20Guidelines%20and%20guidance%20documents%20-%202025-05.pdf>

Ballast Water Management Convention

Ships in international traffic are required to carry:

1. A ballast water management plan
2. A ballast water record book
3. An International Ballast Water Management Certificate (400 gross tonnage and above)



1 - Ballast Water Management Plan

Ballast water management plan includes a **detailed description of the actions** to be taken to implement the ballast water management requirements and practices.

IMO Guidelines For Ballast
Water Management and
Development of Ballast Water
Management Plans

RESOLUTION MEPC.127(53)
Adopted on 22 July 2005
GUIDELINES FOR BALLAST WATER MANAGEMENT AND DEVELOPMENT
OF BALLAST WATER MANAGEMENT PLANS (G4)

MEPC 53/24/Add.1
ANNEX 5
Page 14

APPENDIX

STANDARD FORMAT FOR THE BALLAST WATER MANAGEMENT PLAN

PREAMBLE

The ballast water management plan should contain the information required by Regulation B-1 of the Convention.

For guidance in preparing the plan the following information is to be included. The plan should be specific to each ship.

INTRODUCTION

At the beginning of each plan, wording should be included to reflect the intent of the following text.

[https://wwwcdn.imo.org/localresources/en/KnowledgeCentre/IndexofIMOResolutions/MEPCDocuments/MEPC.127\(53\).pdf](https://wwwcdn.imo.org/localresources/en/KnowledgeCentre/IndexofIMOResolutions/MEPCDocuments/MEPC.127(53).pdf)

2 - Ballast Water Record Book

Ballast water operation details must be recorded in the Ballast Water Record Book

- Ballast water is taken on board
- Treated ballast water
- Discharged into the sea or to a reception facility
- Accidental or other exceptional discharges

BALLAST WATER LOGBOOK For All Vessel

Name of Tank: No.2 W.B.T (C) Total Tank Capacity: 2116.36 m³

Date DD/MM/YY	Exchanges(EX) Discharges(D) Shift (S)	E/R/F/T Alt, DL (#1)	Start / End		Depth (m)	Temp (°C)	SG	Initial Content (MT)	Final Content (MT)	Pump Used, or Gravity	Time Start / Finish	Remarks (#2)	Signature
			Port or Lat.	Long.									
06/Jan/12	L		ROTTERDAM		18	10	1.025	NIL	900	No.2 Pump	1703-1805		[Signature]
07/Jan/12	S		KATWIERP		-	-	1.025	900	800	No.2 Pump	1432-1440	SHIFT TO No.10 W.B.T (S)	[Signature]
07/Jan/12	D	E	KATWIERP		18	10	1.025	800	NIL	No.2 Pump	1500-1630		[Signature]
25/Jan/12	L	R	09-57.7N 109-58.8E	10-19.8N 110-10.5E	1644	25	1.025	NIL	1,500	No.2 Pump	1330-1448		[Signature]
01/Feb/12	D	E	SUNNYSIDE DOCK YARD		-	-	1.025	1,000	NIL	No.2 Pump	1750-1820		[Signature]
27/Mar/12	S	-	ROTTERDAM		-	-	1.025	NIL	550	No.2 Pump	0646-0730		[Signature]
27/Mar/12	S	-	ROTTERDAM		-	-	1.025	550	850	No.2 Pump	0902-0920	SHIFT FROM No.3 W.B.T (S)	[Signature]
01/Apr/12	D	-	HAMBURG		16	06	1.025	850	NIL	No.2 Pump	0350-0440		[Signature]
06/May/12	S	-	XIAMEN		-	-	1.025	NIL	150	No.2 Pump	1355-1404		[Signature]
06/May/12	L	-	XIAMEN		16	20	1.017	150	1900	No.2 Pump	1638-1817		[Signature]
07/May/12	EX	E/R	23-49.9N 118-38.8E	23-19.6N 118-58.8E	42	24	1.017	1900	NIL	No.2 Pump	1050-1205	EXCHANGE	[Signature]
07/May/12	EX	E/R	23-19.6N 118-58.8E	22-59.0N 119-21.7E	73	23	1.025	NIL	1900	No.2 Pump	1205-1345	EXCHANGE	[Signature]
08/May/12	D	-	KANUN SLUING		16	24	1.025	1900	250	No.2 Pump	2130-2242		[Signature]
09/May/12	S	-	KANUN SLUING		-	-	1.025	250	NIL	No.2 Pump	0810-0834	SHIFT TO No.10 W.B.T (S)	[Signature]

(*) E/R: Empty then Refill F/T: Flow Through Alt: Alternative DL: Dilution
 (#2) Remark: When "Cleaning" or "Discharge sediment or Other Debris from Ballast tanks/ Holds (Include normal de-ballasting), to be mention "Cleaning" or "Discharge Sediment" or "Discharge Other Debris" etc in the Column of Remark

BALLAST WATER LOGBOOK (Form No. LG-005)

Exchange

Tank now empty

3 - Ballast Water Management Certificate

Ships of 400 gross tonnage and above is must have a Ballast Water Management Certificate

- The Certificate is **issued by or on behalf of the Administration** (flag state)
- It certifies that the ship carries out ballast water management in accordance with the BWM Convention.
- The Certificate **specifies which standard the ship is complying with.**

International Ballast Water Management Certificate
(Statement of Voluntary Compliance)

Issued under the provisions of the International Convention for the Control and Management of Ships' Ballast Water and Sediments (hereinafter referred to as "the Convention") under the authority of the Government of:

THE UNITED STATES OF AMERICA

By the
United States Coast Guard

Particulars of ship:

Name of Ship
Distinctive numbers or letters
Port of registry
Gross tonnage.....
IMO number 1.....
Date of Construction.....
Ballast Water Capacity (in cubic metres).....

Details of Ballast Water Management Method(s) Used

Method of Ballast Water Management Used.....
Date Installed (if applicable).....
Name of Manufacturer (if applicable).....

1 IMO Ship Identification Number Scheme adopted by the Organization by resolution A.600(15).
An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The Coast Guard estimates that the average burden for each response is 6 minutes. You may submit comments concerning the accuracy of this burden for each estimate or any suggestions for reducing the burden to Commandant (CGA-CVC), U.S. Coast Guard Stop 7501, 2703 Marina Luther King Jr. Ave SE, Washington, DC 20503-7501 or Office of Management and Budget, Paperwork Reduction Project (1625-0041), Washington, DC 20503.

Regulations of Ballast Water Management Convention

The Convention includes 4 important regulations for ballast water management

- Reg, **D-1**: details with the ballast water **exchange standard**
- Reg, **D-2**: ballast water performance **standard for ballast water treatment**
- Reg, **D-3: Approval Management** for Ballast Water Management Systems
- Reg, **D-4**: Prototype Ballast Water **Treatment Technologies**

D-1: Ballast Water Exchange Standards

D-1 standard requires ships to exchange their ballast water in open seas

- Whenever possible, conduct ballast water exchange **at least 200 nautical miles from the nearest land** and in water **at least 200 meters in depth**.
- In case it is not possible: at least 50 nautical miles from the nearest land and in water at least 200 meters in depth.
- Must achieve **at least 95% volumetric exchange** with a sequential method by 3 complete water exchange operations.



D-2: Ballast Water Performance Standard

D-2 specifies the maximum amount of viable organisms and indicator microbes allowed to be discharged.

Ships shall discharge:

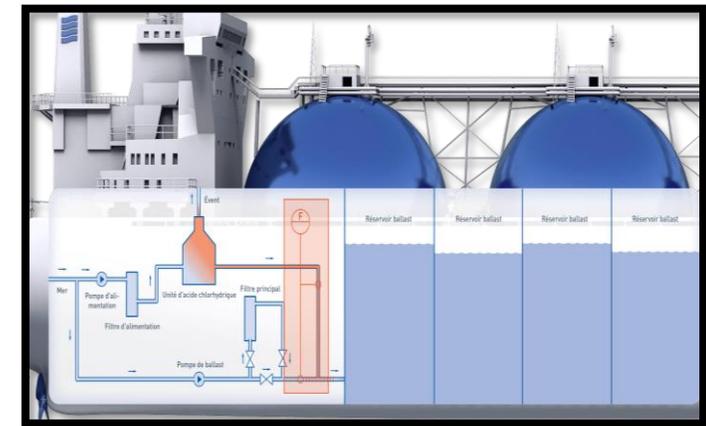
1. Less than **10 viable organisms** per cubic meter (m^3) greater than or equal to 50 micrometer in minimum dimension
2. Less than **10 viable organisms** per millilitre which are between 10 micrometres and 50 micrometres in minimum dimension
3. Less than **1 CFU/100ml** for toxicogenic vibrio cholerae
4. Less than **250 CFU/100 ml** for *Escherichia coli*
5. Less than **100CFU/100ml** intestinal enterococci



D-3: Approval Management for Ballast Water Systems

D-3 covers approval requirements for ballast water management systems

- The Ballast water management systems **must be approved by the Administration** taking into account IMO Code for approval of ballast water management systems (**BWMS Code**)
- The Ballast water management systems includes:
 - **Filtration:** can reduce densities of aquatic organisms
 - **Treatment:** Electrolysis; Ultraviolet light; Ozonation; Injection of chemicals; Deoxygenation



D-4 Prototype Ballast Water Treatment Technologies

D-4 covers Prototype Ballast Water Treatment Technologies.

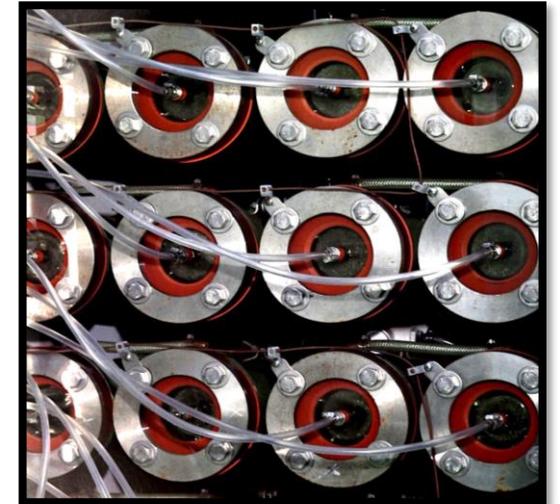
- It allows for ships participating in a programme approved by the Administration to test and evaluate promising Ballast Water treatment technologies to have a leeway of five years before having to comply with the requirements.

UV Treatment system



Highly dependent on water capacity, high energy consumption

Ozone generator system



Highly toxic, complex installation-implementation

Sampling

- Testing parameters include: salinity, temperature, organic matter, sediments, pathogens etc.)
- **Salinity test provide information about ballast water exchange in the open sea.** Salinity is the measure of the number of grams of salts per kilogram of seawater.
- **The averaged salinity in the global ocean is 35.5 PSU** (Practical Salinity Unit) , varying from less than 15 PSU at the mouth of the rivers to more than 40 PSU in the Dead Sea.
- Samples should be taken from the ballast water tanks or the discharge line, (as near to the point of discharge as practicable, during ballast-water discharge, whenever possible.)

IMO Guidelines for ballast water sampling
MEPC.173(58)



[https://wwwcdn.imo.org/localresources/en/KnowledgeCentre/IndexofIMOResolutions/MEPCDocuments/MEPC.173\(58\).pdf](https://wwwcdn.imo.org/localresources/en/KnowledgeCentre/IndexofIMOResolutions/MEPCDocuments/MEPC.173(58).pdf)

Ship Sanitation Inspection

Verifying and examination of:

- International Ballast Water Management Certificate
- An approved ballast water management plan
- The ballast water record book
- An approved ballast water treatment system
- Constructional drawings of ballast water system
- Maintenance instructions for ballast water management
- Sample results of ballast water



11.1 Management

**11.2 Ballast water exchange
and treatment**

11.3 Discharge

THANK YOU