Ballast water Management, enforcement and sampling

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1. Introduction

- ~ 9000-12000 million tons of untreated ballast water are discharged every year in ports
- Many species, including bacteria, microbes, small invertebrates, eggs, cysts and larvae are carried in BW
- May survive and reproduce in the host environment, becoming invasive, and multiplying into pest proportions
- Ecological, socio-economic, human health problems, often irreversible
2. BWMC basic requirements

- Ballast water management plan
- BW Record Book
- Survey and certification
- Ballast water exchange until 2016
- On-board treatment
3.1 Exceptions / Exemptions

- Exceptions: Emergency situations, safety of ship and crew, discharge in same location as uptake,

- Exemptions:

  - Ships on voyage or operating exclusively between specific ports
  - For up to 5 years, subject to intermediate review
  - Based on G7, Guidelines for Risk Assessment
  - To be communicated to IMO
  - To be recorded in the BW Record Book
3.2 Type approval

- Treatment systems not using active substances approved in accordance with G8
- At the moment National Approval, MED when the Convention is adopted (will take some years)

- Treatment systems using active substances must be tested and approved by IMO in accordance with Procedures in G9

- Type approval can take more than a year – land-based and shipboard testing
3.3 Available systems

- 65 systems have type approval under G8
- 40 systems have type approval under G9, 55 have Basic approval

Setup:
- Filtration step for large organisms and sediment
- Treatment step for desinfecting / inactivating

- Systems using active substances (G9) only treat at BW uptake
- Other systems treat at uptake and discharge
G8, G9 systems

- G9 systems:
  - Ozone injection
  - Chlorine suppletion

- G8 systems:
  - UV treatment
  - Inert gas

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4. Port State Control

Articles 9 to 12 of the Ballast Water Management Convention include provisions for port state control

Art. 9 BWM Convention – Inspection of ships
- MEPC.252(67) Guidelines for PSC under the BWM convention
- PSC Instruction 48/2015
- BWM.2/Circ.42 – Guidance on ballast water sampling
- IMO Guidelines “G2” – General recommendations for ballast water sampling by PSC Authorities
Inspection – tiered approach

1. Initial
2. More detailed
3. Indicative analysis
4. Detailed analysis
Tiered approach

Initial:

- BWM Certificate
- Procedures on board according BWM Plan
- BWRB on board and up-to-date
- Type approval certificate for BWMS
- Ballast water record book
- Appointment of the Designated Officer
- Overall condition of BW equipment

- Clear Grounds, if any of the above is not met
Tiered approach

More detailed:

- Check of the duties of the Designated Officer – detailed knowledge
- Check of the record-keeping applied on board (if in compliance with the Convention)
- BWMS in good working order / bypass / active substances
- BWMS operational / self-monitoring / check BWRB against log files
- Check for changes since the initial / last survey

- When doubts exist, proceed to sampling
5. Sampling and analysis

- Two methods: Indicative and detailed
- Indicative to prove (gross non-)compliance
- Detailed to prove compliance to D2
- Sampling should be undertaken in a safe, rapid and practical manner (= e.g. samples should be concentrated to a manageable size)
- Samples should be taken from the ballast water discharge line
- Sampling protocol should result in samples that are representative of the whole discharge of ballast water from any single tank
Tiered approach – sampling & analysis

- **Indicative Analysis for D-2 Method selection criteria**
- Reliable results to prove (non-)compliance
- Deliver prompt results (at best less than 30 minutes)
- Address all D-2 organism groups
- Simple to use
- Portable
Tiered approach - Indicative

Indicative Analysis Methods organisms < 50 μm and ≥ 10 μm

- Presence/absence methods (no viability, no counts)
  - e.g. DNA, ATP, Chl are methods that deliver results in less than 5 minutes
- Viability and counts
  - Flow cameras (less than 60 minutes, not portable, viability stain needed)
- Best compromise: PAM (phytoplankton) and ATP (all organisms)
  - portable, easy to use, low expertise needed
  - Viability in less than 10 minutes
  - No counts, but biomass
Tiered approach - Detailed analysis:

- Sampling still under discussion
- Harmonised approach is necessary – compliance in one port, non-compliance in another. Laboratory standards are not harmonised.

- Organisms $\geq 50 \, \mu m$ : 6 methods
- Organisms $< 50 \, \mu m$ and $\geq 10 \, \mu m$: 8 methods
- Bacteria: 11 methods
Sampling according D2:

3 replicate samples at beginning, middle, end
- Sample sizes:
  - Large organisms – 1m$^3$, concentrated to 1l
  - Small organisms – 1l
  - Bacteria – 0,5l
- 27 samples in total to be analysed
- Analysis cannot all be done on board
Who takes samples

Trained personnel from

- Port State Control officers
- Other department of the Inspectorate
- Other authorities
- Private sector such as universities or laboratories
  - Based on contracts between authority and private company
    (Agreement with methodologies to be developed)
**Actions in case of non compliancy**

1. Detention and repair of equipment and ship has to show compliance after repair.
2. Ballast water to be retained and board for next port of repair and limit cargo handling. Inform Port states, Flag state and RO.
3. Ballast water to be discharged to shore reception facility.
4. Ballast water to be discharged to a barge with mobile treatment unit or to another ship.
5. Allow the ship to return to the point of origin to discharge its ballast water. Only in case of unmixed ballast water.

Or,
1. *Exchange ballast water according to the D-1 standard, used as a last resort when there are no other options.*
2. *May Port state control allow discharge of ballast in case of big differences in salinity or temperature or organisms?*
Questions
Typical chlorination system