BALLAST WATER CONTROL AND MANAGEMENT
Canada Update (Pacific)

Name of Presenter: Raman Bhalla (PSCO)
Transport Canada Vancouver (British Columbia)
GLOBAL SHIPPING NETWORK

Ships have been increasing in size and speed. There are now an estimated 108,000 ships in the global fleet, moving an estimated 10.0 billion tons of ballast water around the world each year.
which is the bigger threat?

...surprisingly, it is the drop of ballast water, 10 billion tonnes of which is transferred around the world each year. Ballast water is carried by ships to provide balance and stability.

Although essential to the safe operation of ships, ballast water can contain thousands of species of marine plants and animals.

When discharged into new environments, these species may become invasive, with potentially devastating effects on the local ecology, economy and human health.

Unlike an oil spill, which can be cleaned up, the effects of marine species introductions are usually irreversible.

Ballast water transfer and invasive marine species are perhaps the biggest environmental challenges facing the global shipping industry this century.
NON INDIGENOUS SPECIES INTRODUCTIONS

Global movement of ballast water considered one of most important vectors for transfer of marine NIS (Ruiz et al. 2005)
Major Pathways and Origins of Infestations of Invasive Species in the Marine Environment

Invasive marine species pathways and origins
- From NW Atlantic
- From NE Atlantic
- From Asia

Major areas with invasive marine species
- > 250
- 150 - 250
- < 150

Number of invasive alien species

In 2004 the IMO passed “Standards for Ballast Water Discharge”

- The International Convention for the Control and Management of Ships’ Ballast Water and Sediments (BWM Convention) entered into force on 8 September 2017.

- MEPC 71 agreed on the implementation dates for the D-2 discharge standard under Regulation B-3

- The agreement ensures full global implementation by 8th September 2024
These guidelines apply to ships as stipulated in Article 3 of the Ballast Water Management Convention

THE CONVENTION
- Main Text (Articles, Regulations & Appendices)
  - Annex in 5 Sections
    - 14 Guidelines
    - 8 Resolutions
    - 63 Circulars
# BWMC Guidelines

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BWMC BASIC REQUIREMENTS

- Ballast Water Management Plan
- BW Record Book
- Survey and Certification
- Ballast Water Exchange
- On Board Treatment
IMPLEMENTATION SCHEDULE FOR MEETING D 2 STANDARD OF CONVENTION

Entry into Force on 8 September 2017

• Regulation D 1 standard (BW exchange) mandatory after this date

• Application of Regulation D 2 (Treatment) depends on renewal date of IOPP certificate.

• Early renewal of IOPP certificate is allowed

• Ships constructed after 8th September 2017 must comply on delivery, while existing ships in general must comply by the first IOPP renewal after 8th September 2019.

• Most ships are expected to install treatment systems and comply
IMPLEMENTATION

• 7-year implementation schedule
• No penalization of early movers
• No requirement to replace first generation BWMS if operated / maintained despite “occasional” lack of efficiency.
• First 2 years no sanctions, warning, detention due to occasional exceedance of D 2
• Exchange is only to be carried out when possible:
  No delay or deviation is required
  • When this is not possible, no other action is required
  • (like D-2, discharge to reception facilities, other methods, etc)
  • To be recorded in BWRB
EXPERIENCE BUILDING ASSOCIATED WITH BWMC

Experience-Building phase

• The experience-building phase emphasizes environmental protection (rather than penalization)

  During the experience-building phase, a ship should not be penalized (sanctioned, warned, detained or excluded) solely due to an exceedance of the performance standard following use of a ballast water management system, if:
  1. the system is approved;
  2. the system is installed correctly;
  3. the system has been maintained according to the manufacturer’s instructions;
  4. the ballast water management plan has been followed, including the operational instructions and manufacturer’s specifications; and
  5. either the system’s self-monitoring indicates that the system is working, or the port state is advised in advance that the system is defective prior to any discharge.

• Port states may take action to protect the environment.
  – Shipowners, port and flag states should work together in accordance with the guidance on contingency measures.
Experience-Building Phase

Data Gathering Stage

Data Analysis Stage

Convention Review Stage

Text Review
Critical Amendments

Non-Penalization extended to all ships in agreed circumstances
SUMMARY OF CONVENTION

Summary of Convention Regime

Convention
- Purpose Standard Application Timeline

Flag State
- Type Approval of BWMS
- Ballast Water Management Plan
- Approval of BWMP
- Ballast Water Management
- Survey Certification
- Record Book

Ship
- Unintentional Non-Compliance With D-2
- EBP Contingency Measures
- Stop Ballast Warn Sanction Detain Exclude

Port State
- PSC Inspection Sampling Analysis

Deficiencies
- Stop Ballast Warn Sanction Detain Exclude
PREPARATION BY FLAG STATE

Preparation by Flag State

Approve Equipment
- Based on own testing
- Assurance to port state that equipment has been tested
  - G8 Guidelines
  - G9 Guidelines

Approve Management Plans
- Based on other party
- Assurance to port states that BWM practice is sound
  - G4 Guidelines
  - (and others)

Survey and Certification
- Assurance to port states that ship is in compliance
- The BWMP and any associated structure, equipment, systems, fitting, arrangements and material or processes comply fully.
  - Inclusion of BWMS Test.
PREPARATION BY SHIP

Develop Management Plan (G4 and other guidelines)

Safety Procedures
Detailed Actions to be taken to manage BW
Ballast Water Exchange Procedure
BWMS to be used (and associated procedures)

Training
Reporting requirements
Procedures for coordinating with port states
Designate officer in charge

Location of Sampling Points
Drawings and description of arrangements
Contingency Measures

Approval By Administration • Validation during Survey
WHO WE ARE?

Transport Canada, Marine Safety

We administer national and international laws designed to:

• Ensure the safe operation, navigation, design, and maintenance of ships,
• Protection of life and property, and
• Prevention of ship source pollution
VESSELS BOUND FOR PACIFIC COAST

• Inspect all vessels with ballast.
• Target and inspect high risk vessels.
• Data collection (Ballast Water Treatment System).
• Enforce Ballast water regulations.
• Vessel operational issue:
  • Avoid ships delays or restrictions by good ballast water management practices and communication.
PACIFIC PERSPECTIVE

- Ballast Water Regulations

- TP-13617

- Risk Assessment

- Compliance and Enforcement
COMPLIANCE

1. Reporting through TRANSPORT CANADA Regional Marine Safety Office

2. Port State Control verification:
   (a) Salinity testing, (refractometer, electronic salinometer)
   (b) Logs, and BW reports
   (c) Ballast Water Management Plan
ENFORCEMENT

- Regulations,
  - Report in a timely manner.
  - Submit report form to the appropriate address as required by TP 13617.
  - Verify compliance by salinity check (30 ppt.)
- Guidelines,
  - Follow-up with the ship in cases where the ship reported that ballast water control measures were not taken.
- Enforcement tools under the CSA 2001 may be applied in certain cases, such as:
  - Ship providing false information or,
  - Non-compliance with provisions of the ballast water management Regulations
BALLAST WATER EXAMINATION OBJECTIVES

• Ballast tanks of ships will be subject to examination during PSC.
• Ballast water management practices will also be subject to examination.
• High risk vessel will be targeted for a visit.
• Non compliant vessels will be subject to corrective actions and close follow-up.
• In order to put the efforts at the right place, an assessment of the ballast water management practices in the Region will be done to better identify practices that are most problematic.
BALLAST WATER EXAMINATION CHALLENGES

• Ships to Comply with ballast water management practices including the flushing of empty ballast tanks to protect from the introduction of invasive species

• New Ballast Water reporting forms must be submitted by ships destined for Canadian ports in the manner set out in Sec. 5.2 of TP 13617, as soon as possible after the ballast water management process, by email to pacballastwater-paceauballast@tc.gc.ca for early analysis in order to enable early corrective action, when required

• Communication
  • Vessels to be properly informed
  • BWRF to be filled properly in Adobe fillable Form for easy Data Management

• Non compliant vessels will have to take corrective actions and will be subject to a close follow-up.
Purpose of the ballast water regulations is to help ensure that ballast water is managed in such a manner so as to reduce the potential invasions from non-indigenous aquatic organisms and pathogens.

Transport Canada is proposing to amend the Ballast Water Control and Management Regulations to align them with the IMO’s BWM Convention, which entered into force on September 8th, 2017.
GUIDE TO CANADA’S BALLAST WATER REGULATIONS (TP 13617 E)

TP 13617 elaborates on the following:

- Preparation of Ballast Water Management Plans.
- The use of ballast water treatment systems.
- Provisions for reporting.
- Procedures and Standards when conducting Flushing/exchange (Under D 1).

Must achieve at least:
- 95% volumetric exchange
- Pumping three times the volume (flow-through) meets the above requirement
- Salinity of at least 30 PPT or>
TP 13617 is a Guide to the Ballast Water Management Regulations

The Guide elaborates on the following:

- Preparation of Ballast Water Management Plans
- Procedures and considerations when conducting exchanges
- The use of ballast water treatment systems
- Provisions for reporting
- Procedures for small pleasure craft and rescue vessels
- NOBOB vessels
APPLICATION

Applies to: - Canadian ships everywhere, and,
- To all ships in waters under Canadian jurisdiction designed to carry ballast.

It does not apply to vessels:
- Operated exclusively within waters under Canadian jurisdiction, and the US waters of Great Lakes
- Used in search and rescue less than 50 m length
- Pleasure craft, Max 50 m length and < 8 m³
- Vessels that carry permanent ballast water
- Government vessels in non-commercial service
BALLAST WATER MANAGEMENT PLAN

• Required to be carried on board
• The plan must contain at least the following . . .
  • Detailed description of BW management processes
  • Detailed description of the crew BW procedures
  • Safety procedures with respect to BW management
  • Detailed description of disposal of sediment
  • Coordinating procedures with Canadian authorities
  • Design specifications of the Ballast Water system
  • Specifics for treatment, flow through or exchange
  • Responsible officer.
  • Ballast Water reporting form and methods of
  • Operational limits e.g. wave height for various speed
EXCEPTIONS / EXEMPTIONS

• The ship operate exclusively between ports, offshore terminals or anchorage areas situated on the west coast of North America north of Cape Blanco

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
SEQUENTIAL BWE (EMPTY REFILL)

- Ballast tank is first emptied, then refilled, to achieve at least 95% exchange of the original water.
FLOW THROUGH BWE

- Replacement ballast water is pumped into the ballast tank bottom, and the excess water is allowed to exit the tank by the tank overflow or similar arrangement.
- Three times the tank volume is pumped through the tank to achieve 95% volumetric exchange of the original water.
RATIONALE for EXCHANGE

1. Purges planktonic organisms from tanks
2. Reduces sediment accumulation (resting eggs and benthic taxa)
3. Reduces fitness of taxa remaining in tanks through salinity shock
4. Any saltwater species entrained from the ocean should have reduced fitness if released in freshwater/coastal habitats
LIMITATIONS OF BALLAST EXCHANGE

- Ship safety
- Volumetric exchange can be variable (80-100%) - influenced by tank structure, weather and crew
- Proportional reduction may be insufficient if initial density very high (1% survival could still be thousands of individuals)
- Applicable only for transoceanic ships (cannot curtail spread by domestic or coastal shipping)
- Less protective of brackish/marine ports than freshwater ports – reduced effect of osmotic shock
LIMITATIONS OF BALLAST WATER EXCHANGE

While BWE has been a ‘good news’ story for the Great Lakes, it is not a perfect solution. There are a number of limitations that make BWE less than 100% effective. In particular, there are concerns that BWE is less protective of Canada’s coastal ports, since there is a reduced effect of salinity shock when the receiving ports are marine (rather than freshwater).
EXCHANGE - TRANSOCEANIC

• Ships that navigate beyond 200 nm where the water depth is at least 2000 m must exchange in those waters

What if the above requirements cannot be met:

• In respect of a voyage to a port, offshore terminal or anchorage area on the west coast of Canada, an area at least 50 nautical miles west of Vancouver Island and the Queen Charlotte Islands and at least 50 nautical miles west of a line extending from Cape Scott to Cape St. James where the water depth is at least 500 m, with the exception of waters within 50 nautical miles of the Bowie Seamount (53°18’ north latitude and 135°40’ west longitude);
EXCHANGE – NON TRANSOCEANIC

• Applies to ships that exchange ballast water and does not navigate beyond 200 nm from shore where the depth of water is at least 2000 m

• Those vessels cannot discharge BW unless it’s been exchanged at least 50 nm from shore where the water depth is at least 500 m
Pacific Coast
Territorial Sea Coordinates and Baseline

As per the
Territorial Sea
Geographical Coordinates
Order, Oceans Act
# BALLAST WATER INVASIVE SPECIES REPORT

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<td>04-Apr-2016 \ LOS ANGELES (LAX), UNITED STATES</td>
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<td>05-Apr-2016 \ STOUGHTON (SCH), UNITED STATES</td>
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</tr>
</tbody>
</table>

**Note:** The list above is based on input data as of October 2015. For the most current information, please refer to the official sources.
RISK MATRIX

• Master to Provide Information:
  • Nature of the ballast water,
  • Operations previously performed.
  • Prevailing sea conditions.
  • Harmful aquatic organisms and pathogens.
  • Remove or render harmless.
  • Feasibility (design and operation).
  • Consequences (ship and of persons on board).
Ballast Water invasion probability (BWIP) tool requires data input
- Information is available on Ballast Water Reporting forms
- Tool ranks ships from most risky to least risky using best available science
- Inspectors can prioritize inspections based on best science
- Tool provides simple way to use available information to guide decision making
- Tested using data from past Non Indigenous Species (NIS) establishments to ensure risk ratings are providing valuable information.
### BALLAST WATER RISK ASSESSMENT

#### Ballast water risk assessment for VEWC for June 2017 - only vessels carrying and discharging ballast water in waters under Canadian jurisdiction

<table>
<thead>
<tr>
<th>Vessel Name</th>
<th>Ballast source</th>
<th>Ballast destination</th>
<th>Environmental Distance</th>
<th>Risk level</th>
</tr>
</thead>
<tbody>
<tr>
<td>SITC Hsuan, Tank 1</td>
<td>Zhoushan</td>
<td>Vancouver(CAN)</td>
<td>1,238</td>
<td>High risk</td>
</tr>
<tr>
<td>Ladole Venture, Tank</td>
<td>Kachimaka</td>
<td>Vancouver(CAN)</td>
<td>1,723</td>
<td>Moderate risk</td>
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<tr>
<td>Angel Transporter, Tank</td>
<td>Jingtan</td>
<td>Roberts Bank</td>
<td>0.809</td>
<td>High risk</td>
</tr>
<tr>
<td>Angel Transporter, Tank</td>
<td>T Osaka</td>
<td>Roberts Bank</td>
<td>1,817</td>
<td>Moderate risk</td>
</tr>
<tr>
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<td>48.17</td>
<td>Roberts Bank</td>
<td>1,94</td>
<td>High risk</td>
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<tr>
<td>Start Lysefjord, Tank 1</td>
<td>Changshu</td>
<td>Port Mahon</td>
<td>3.658</td>
<td>Low risk</td>
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<tr>
<td>Start Lysefjord, Tank 2</td>
<td>Changshu</td>
<td>Crofton</td>
<td>3.933</td>
<td>Low risk</td>
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<tr>
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<td>Changshu</td>
<td>Harmsc</td>
<td>3.83</td>
<td>Low risk</td>
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<tr>
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<td>Chiba</td>
<td>Vancouver(CAN)</td>
<td>2.062</td>
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<tr>
<td>Global Effort, Tank 2</td>
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<td>Vancouver(CAN)</td>
<td>1.55</td>
<td>High risk</td>
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<tr>
<td>Global Effort, Tank 3</td>
<td>Ube</td>
<td>Vancouver(CAN)</td>
<td>1.433</td>
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<tr>
<td>MBA Magritte, Tank 1</td>
<td>Toshiohara</td>
<td>Vancouver(CAN)</td>
<td>1.46</td>
<td>High risk</td>
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<td>Los Angeles</td>
<td>Vancouver(CAN)</td>
<td>1.459</td>
<td>High risk</td>
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<td>Global Trinity, Tank 1</td>
<td>Takamatu</td>
<td>Vancouver(CAN)</td>
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<td>High risk</td>
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<td>Vancouver(CAN)</td>
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<td>Leen, Tank 1</td>
<td>Chinsenka</td>
<td>Vancouver(CAN)</td>
<td>1.307</td>
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<tr>
<td>Big Fish, Tank 1</td>
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<tr>
<td>Big Fish, Tank 2</td>
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<td>Roberts Bank</td>
<td>0.932</td>
<td>High risk</td>
</tr>
<tr>
<td>Flag Lm, Tank 1</td>
<td>Daian</td>
<td>Vancouver(CAN)</td>
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<td>High risk</td>
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<tr>
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<tr>
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<td>Kunsan</td>
<td>Port Alberni</td>
<td>3.785</td>
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<tr>
<td>American Bulkser, Tank 1</td>
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<td>Port Alberni</td>
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<tr>
<td>Radialle of the Seas, T</td>
<td>51.16 - 137.05</td>
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<td>1.143</td>
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<td>Radialle of the Seas, T</td>
<td>51.14 - 128.59</td>
<td>Vancouver(CAN)</td>
<td>1.053</td>
<td>High risk</td>
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<td>Nieuw Amsterdam, T</td>
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**Total**: 66
EXAMPLES OF RISK ASSESSMENT
BALLAST WATER REPORTING FORM

Transport Canada receives ballast water data from reporting forms required for incoming ships.
## Ballast Water Reporting Form

**Schedule 6 - Canadian Ballast Water Reporting Form (20 tanks)**

### Vessel Information
- **Vessel Name:**
- **Port of Arrival:**
- **BHL Number:**
- **Date of Arrival:**
- **Total Ballast Water on Board:**

### Owner Information
- **Owner:**
- **Agent:**
- **Volume:**
- **Units:**

### Ballast Water Usage and Capacity
- **Type:**
- **Last Port:**
- **Country:**
- **Gross Tonnage:**
- **Year Built:**
- **Net Tonnage:**
- **Flag:**

### Ballast Water Management
- **Total Number of Ballast Water Ballast Wells to Be Discharged:**
- **How Many Wells Have Undergone Exchange:**
- **How Many Wells Have Undergone Alternative Management:**

### Additional Information
- **Ballast Water Management Plan on Board:**
- **IMO Ballast Water Management Plan:**
- **Canadian Ballast Water Management Plan:**
- **Management Plan Approved:**
- **USCG Date:**
- **USCG Type:**
- **Management Plan Approved:**

### Ballast Water History
- **Record all ballast water ballast wells regardless of ballast water exchange on Page 2:**
- **Wells Discharged with a Ballast Water Exchange:**
- **Wells Discharged without a Ballast Water Exchange:**

### Responsible Officer's Name and Title

---

*Page 1 of 3*
# BALLAST WATER RECORD OF TANKS

## 5. BALLAST WATER RECORD

### All tanks as per BALLAST WATER INTENTIONS

**Ballast water sources**

- **Date (yyyy-mm-dd)**
- **Pumpe/tank and longitude**
- **Volume (m³)**
- **% of ballast water intended**
- **Method (W/B)**
- **W/B height (m)**
- **Safety temperature (°C)**

## 6. BALLAST WATER DISCHARGE

- **Date (yyyy-mm-dd)**
- **Pumpe/tank and longitude**
- **Volume (m³)**
- **Safety temperature (°C)**
BALLAST INSPECTION REPORT

1. Vessel name: [Blank]
2. Flag: [Blank]
3. IMO / Official No.: [Blank]
4. Last port of call: [Blank]
5. Owner: [Blank]
6. Manager (if applicable): [Blank]
7. Are copies of the following publications on board:
   a) MHSI Exposure Assessment Manual [Yes/No]
   b) Ballast Water Control and Management Regulations [Yes/No]
   c) TP-28111A, a Guide to Canada’s Ballast Water Control and Management Regulations [Yes/No]
   d) The U.S. Shipping Federation Code of Best Practices for Ballast Water Management [Yes/No]
   e) Is there a Ballast Water Management Plan (BWMP) on board? [Yes/No]
   f) Is there a Ballast Water Treatment system on board approved by the MHSI (US standard)? [Yes/No]
   g) If not, the treatment system approved (if any): [Blank] [Blank]
8. Was the Treatment system operated by the crew? [Yes/No]
   a) Yes [Blank]
   b) No [Blank]
9. The BWMP was provided by: [Blank] [Blank] [Blank] [Blank] [Blank]
10. The BWMP was reviewed by: [Blank] [Blank] [Blank] [Blank] [Blank]
11. In the BWMP, the vessel: [Yes/No]
   a) Yes [Blank]
   b) No [Blank]
12. Do the master and officers demonstrate a working knowledge of the BWMP? [Yes/No]
13. Does the BWMP contain detailed instructions for discharging ballast water? [Yes/No]
14. Does the BWMP contain detailed instructions for conducting ballast water inspections? [Yes/No]
15. Does the BWMP contain detailed instructions for conducting ballast water treatment? [Yes/No]
16. Does the BWMP contain detailed instructions for conducting ballast water management? [Yes/No]
17. Does the BWMP contain detailed instructions for conducting ballast water monitoring? [Yes/No]
18. Does the BWMP contain detailed instructions for conducting ballast water testing? [Yes/No]
19. Does the BWMP contain detailed instructions for conducting ballast water sampling? [Yes/No]
20. Does the BWMP contain detailed instructions for conducting ballast water analysis? [Yes/No]
21. Does the BWMP contain detailed instructions for conducting ballast water treatment? [Yes/No]
22. Does the BWMP contain detailed instructions for conducting ballast water management? [Yes/No]
23. Does the BWMP contain detailed instructions for conducting ballast water testing? [Yes/No]
24. Are records of ballast inspections available? [Yes/No]
25. Are records of ballast water treatment available? [Yes/No]
26. Has a detailed log of all ballast operations been maintained? [Yes/No]
27. Has safety training been updated in the report? [Yes/No]
28. Has the ballast water reporting form been submitted? [Yes/No]
29. Is the completed form signed and dated? [Yes/No]
30. Is the completed form signed and dated? [Yes/No]
31. Is the completed form signed and dated? [Yes/No]

32. Officers

(Official signature and date) [Blank]
(Official signature and date) [Blank]
(Official signature and date) [Blank]

Page 1 of 2

Canada
# Ballast Water Testing Form

**Canadian Ballast Water Tank Testing Form**

**Vessel Name:**  
**BD #:**  
**LPC:**  

**Inspection Location:**  
**Date:**  
**Time On:**  
**Time Off:**  
**SWRF (Date/Time):**  

**Next Ports of Call in Canada or the Great Lakes basin:**  
(1)  
(2)  
(3)  
(4)  

Inspectors are required to fill in columns 1-4. Remaining columns to be filled in only if the origin of water or sediments is of concern (poor exchange, mud, dry or NA).

<table>
<thead>
<tr>
<th>Tank ID &amp; Type</th>
<th>Salinity of sample (PSU)</th>
<th>Depth of sounding (m)</th>
<th>Condition of ballast</th>
<th>Treatment as Reported</th>
<th>Origin of tank contents</th>
<th>High Risk Indicate cause with number(s)</th>
<th>Ballast Mgmt. Interventions while in Canadian Waters (Tank specific)</th>
</tr>
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<tbody>
<tr>
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</tbody>
</table>

**Total # Ballast Tanks:**  
**# Pumpable:**  
**# Unpumpable:**  
**# High Risk Unpumpable Tanks:**  
**Recommended for Follow-up Y/N:** (explain below)

Comments: (label with tank ID for specific)  

**Inspector:**  
(Master)  

See Legend on Reverse  
****Note – Insert Continuation Form****  

Rev. November 24, 2009
COLLECTING A SAMPLE

• Guidelines for Sampling (G2):
  • The sampling protocol should result in samples that are representative of the whole discharge of ballast water from any single tank or any combination of tanks being discharged
  • Samples should be taken from the discharge line, as near to the point of discharge as practicable, during ballast water discharge
SAMPLING / ANALYSIS D - 1
INDIRECT SAMPLING For PSCO

- D-2 Technology
- Onboard alarms on BWTS
- Indirect measure
- Total UVT
- Residual Chlorine / Oxidant
- Electrolytic Voltage
- D-1 Salinity
• Multiple tools now available for indicative analysis
• Most are based on fluorometry (measure photosynthetic activity by microscopic plants) – indicative of the 10-50 um size class
• Able to detect gross non-compliance
• Results need to put into context considering tool limitations (error)
• The unit is simple to use: Fill the sample cuvette with ballast water, press the button and in about 2 minutes the result is displayed as Low Risk/High Risk/Fail.

• Press the button again to see a Ballast Water Index result – the BWI can be converted to an estimated number of individuals/ml – so it’s relatable to the discharge limits. Press the button again to see Fv

• Result – A measure of cell health. DFO has put together step-by-step instructions to use the device and is preparing guidance to help understand what the results mean so that good decisions can be made based on the device output.
ENSURING ENVIRONMENTAL PROTECTION (PSC)

- The PSC procedure can be described as a four-stage inspection:
  - Initial inspection (Documentation)
  - More detailed inspection (On Board Ship)
  - Sampling of Ballast Water Tanks (Look for Evidence of exchange)
  - Indicative analysis – can be done by inspectors-PSC
  - Detailed analysis – delegation to technical Experts
INITIAL INSPECTION

An initial inspection will be to examine the following:

• Check that a valid IBWMC certificate is on board

• Check the approved Ballast Water Management Plan (BWMP) is onboard

• Check the Ballast Water Record Book (BWRB) is on board

• Check that an officer has been nominated to be responsible for the Ballast Water Management System (BWMS) and that the officers and crew are familiar with essential BWM procedures, including the operation of BWMS
MORE DETAILED INSPECTION

A more detailed inspection should include:

• Ballast water management procedure on board the vessel
• Details of specific operational or safety restrictions which effect the ship and or the crew including procedures for safe tank entry
• Details of specific safety aspects of ballast water management system
• Procedures for the disposal of sediments at sea and to shore
• List and/or diagram indicating the locations of sampling and access points in pipelines and ballast water tanks
• Outline the duties of the designated officer as set forth in BWMP
• Details of the record-keeping requirements of the convention in accordance with BWMP
Ballast water performance standard (Regulation D-2) can be performed in two ways:

• An indicative analysis of ballast water may be undertaken to determine whether a ship is likely to comply with the Convention or not

• A detailed analysis. These are used to determine the viable organism concentration for each of the categories in the D-2 standard
COMPLIANCE AND ENFORCEMENT REGIME

Compliance and Enforcement

Article 8: Violations
Any violation of the requirements of this Convention:
- shall be prohibited and sanctions shall be established by the flag state, wherever the violation occurs.
- shall be prohibited and sanctions shall be established under the law of each Party.
- shall be adequate in severity to discourage violations.

Article 9: Inspections
Initial inspection includes:
- certificate, record book & sampling/analysis
- Detailed inspection if ship condition does not match certificate or unfamiliar with (or not doing) procedures
- Inspections may be done on request of any other Party if evidence provided

Article 10: Control
Warn, Sanction, Detain, Exclude
- may grant such a ship permission to leave the port or offshore terminal for the purpose of discharging Ballast Water or proceeding to the nearest appropriate repair yard or reception facility available, provided doing so does not present a threat of harm to the environment, human health, property or resources.

Inspecting Party Must Stop Discharge On Deficiencies or Non-Compliant Samples!
CONTROL ACTIONS

If the indicative analysis are not in compliance with the Convention PSCO shall implement one or more of the following:

• Retention of all ballast water on board

• Require the vessel to undertake any repairs required to the BWMS

• Permit the vessel to proceed to exchange ballast water in a location acceptable to the Administration. Allow the vessel to discharge ballast to an appropriate shore reception facility or

• Allow the vessel to treat the ballast water or a portion of it on board in accordance with a method approved by the Port Administration
EXCEPTIONAL CIRCUMSTANCES

Applies to ships unable to manage BW D – 1 / D – 2 due to equipment failure or for safety considerations.

• Must inform Minister of Transport with information at least 96 hours or ASAP before entry into territorial sea.

• The master must ensure that alternative measures are implemented in consultation with the Port State.

• Risk assessment will be carried out.

• Await instructions from Transport Canada.

• Port State to report information re EBP
CONTROL ACTIONS

• If a ship has violated the BWM Convention, the PSCO may take steps to warn, detain or exclude the ship or grant such a ship permission to leave to discharge ballast water elsewhere or seek repairs or reception facility.

• Non-Penalization under trial period (and experience building phase -> MEPC71)

• Port States should refrain from applying criminal sanctions or detaining the ship, based on sampling during the trial period. This does not prevent the port State from taking preventive measures to protect its environment, human health, property or resources.
LETTER OF WARNING

Letter of Warning

Date: 
Port of Inspection: 
This warning letter is to serve notice on:

The Master or Operator of (IMO No. 
During the inspection of your ballast water management procedures and or Ballast Water Management Plan, the undersigned inspector has noticed non-compliance with the provision(s) of the Ballast Water Control and Management Regulations, made under Part 9 of the Canada Shipping Act, 2001, as the following:

This Letter of Warning for non-compliance with the “Ballast Water Control and Management Regulations”, and the circumstances to which it refers, will form part of the compliance history of your vessel, and will be taken into consideration in case of future violations. You may correct this letter of warning within seven days from the date it was issued to the following address:

Transport Canada - Marine Safety Office at: 
Phone No: 
Fax No: 
Received by: 
Master Safety Inspector: 
Name: 
Signature: 
Signature: 

Under “Canada Shipping Act, 2001”, Part 9, Section 191, (1) Every person who, or vessel that, contravenes any of the following commits an offence:

(a) a provision of the regulations (“Ballast Water Control and Management Regulations”) made under Part 9 of the Act, subsection (2) of this section can remain current to a fine of not more than $1,000,000 or 12 months imprisonment or a term of not more than 12 months, or both.
LETTER OF RETENTION

Letter of Retention

Date: ______________

Port of Inspection: ____________________

To: The master or operator of ____________________ IMO No: ______________

The undersigned Marine Safety Inspector advising you that during the examination of your ballast water and overview of your ballast water report, the ballast water in the following tanks, or holds found not in compliance with the provision(s) of the Ballast Water Control and Management Regulations, made under Part 9 of the Canada Shipping Act 2001, as the following:

________________________________________________________________________

________________________________________________________________________

Pursuant to Section 4(3) of the Ballast Water Control and Management Regulations, you are hereby advised not to discharge ballast water from these tanks or holds in Canadian waters unless the ballast water management option(s), in accordance with these Regulations, has been undertaken, and this Letter of Retention has been rescinded. Until such time, any internal ballast water transfer or addition of on top of the retained ballast water shall be documented in the vessel’s logbook, and be conducted in consultation with the Transport Canada Marine Safety Office which has issued this direction. You may contact this Letter of Retention within seven days from the date it was issued to the following address:

Transport Canada - Marine Safety Office at ____________________

Phone No: ______________ Fax No: ______________

Received by: ______________

Marine Safety Inspector: ______________ Name: ______________

Signature: ______________ Signature: ______________

*Under “Canada Shipping Act 2001” Part 9, Section 15(1)(A) Every person who, or vessel that, contravenes any of the following commits an offence:

(A) a provision of the regulations (“Ballast Water Control and Management Regulations”) made under the Part (Part 9 of CSA 2001), under subsection (2) is liable on summary conviction to a fine of not more than $1,000,000 or to imprisonment for a term of not more than 18 months, or to both.*
# Ballast Water Statistics Pacific Region

**Year 2015**

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# Ballast Water Statistics Pacific Region

## Year 2016

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# BALLAST WATER STATISTICS (2017)

## Ballast Water Statistics Pacific Region

### Year 2017

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1. Inspected - details obtain of lay outs and sampling points with photoses
2. BWTS Data - information from ships type, make details.
NEI Treatment Systems, LLC  
Attn: Mr. John D. Bradley  
Chief Executive Officer  
249 E. Ocean Boulevard, Suite 500  
Long Beach, CA 90802

ALTERNATE MANAGEMENT SYSTEM ACCEPTANCE

The Coast Guard has completed its review of the Alternate Management System (AMS) application submitted by NEI Treatment Systems, LLC, for the Venturi Oxygen System (VOS) ballast water treatment system (BWTS). This letter grants AMS acceptance in accordance with the requirements of 33 CFR 151.2026 for VOS models VOS-500 to -6000 with ballast water treatment rated capacities of 100 to 6,500 cubic meters/hour (m³/hr), as type approved by the Netherlands Ministry of Transport, Public Works, and Water Management, and as detailed in type approval certificate No. 6698/2011 issued on July 18, 2011, and expiring July 18, 2016. AMS acceptance is based on this type approval certificate issued by the Netherlands Ministry of Transport, Public Works, and Water Management.

VOS models have also been issued type approval certificates from the following:

- The Bureau of Maritime Affairs of the Republic of Liberia under type approval certificate No. 2NEI092211 issued September 22, 2011, for VOS models VOS-500 to -6000;
- The Office of the Maritime Administrator of the Marshall Islands under an un-numbered type approval certificate issued August 6, 2011, for VOS models VOS-500 to -6000;
- The Panama Maritime Authority under type approval certificate No. TA-0001 issued February 11, 2010, for the VOS-2500 model with a treatment rated capacity of 2,500 m³/hr;
- The Government of Malta under an un-numbered type approval certificate issued January 19, 2010, for the VOS-2500 model with a treatment rated capacity of 2,500 m³/hr.

The VOS BWTSs are assigned the following AMS identification number:
TYPE APPROVAL CERTIFICATE

THE REPUBLIC OF LIBERIA
BUREAU OF MARITIME AFFAIRS

TYPE APPROVAL CERTIFICATE OF
BALLAST WATER MANAGEMENT SYSTEM

No. 73632/2021

This is to certify that the Ballast Water Management System listed below has been examined and tested in accordance with the requirements of the specifications contained in the guidelines contained in IMO resolution MEPC.174 (54). This certificate is valid only for the Ballast Water Management System referred to below.

Ballast Water Management System supplied by or under licence from NM Treatment Systems, LLC

Under type and model designation VOS-200 to VOS-500 and incorporating

Ballast Water Management System manufactured by or under licence from NM Treatment Systems, LLC

To equipment/assembly drawing No: VOS 500 to VOS 6000

Date: 8 December 2010

Other equipment manufactured by: N/A

To equipment/assembly drawing No: N/A

Date: N/A

Treatment Rate Capacity: 400 - 4,500 m³/h

A copy of this Type Approval Certificate should be carried on board a vessel fitted with this type of Water Management System at all times. A reference to the test protocol and a copy of the test results should be available for inspection on board the vessel.

Signature: __________________________

Deputy Commissioner of Maritime Affairs,
Republic of Liberia

Issued this 11th day of September 2021
TYPE APPROVAL COMPLIANCE CERTIFICATE

BALLAST WATER MANAGEMENT SYSTEM
TYPE APPROVAL COMPLIANCE CERTIFICATE

This is to certify that the Ballast Water Management System listed below was examined and tested in accordance with the requirements of the specifications contained in the Guidelines contained in IMO Resolution MEPC.174 (58). This Type Approval Compliance Certificate is valid only for the Ballast Water Management System referred to below.

Ballast Water Management System supplied by: NEI Treatment Systems, LLC
or under licence from:

Under type and model designation VDS-2500

and incorporating:

Ballast Water Management System manufactured by or under licence from: NEI Treatment Systems, LLC

To equipment/assembly drawing No.: 07-2500-101 Date: 29 August 2007

Other equipment manufactured by: --

To equipment/assembly drawing No.: -- Date: --

Treatment Rated Capacity: 2,500 m³/h

A copy of this Type Approval Compliance Certificate should be carried on board a vessel fitted with this Ballast Water Management System at all times. A reference to the test protocol and a copy of the test results should be available for inspection on board the vessel.

No Limiting Conditions imposed.

This Type Approval Compliance Certificate is based on the Type Approval Certificate No. 02 NEI 070809 issued by the Republic of Liberia on 8 July 2009.
Organisms differ worldwide and BWMS cannot be tested everywhere. Approval screens out BWMS that can’t meet D-2 where tested. Approval does not mean a BWMS will work on all ships or in all situations.
INTERNATIONAL BALLAST WATER MANAGEMENT CERTIFICATE (Flag State)
CERTIFICATE OF COMPLIANCE WITH BWMC

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<td>Utilization Number or License</td>
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<td>Method of Ballast Water Management used</td>
<td>Untreated</td>
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<tr>
<td>Dimensions of Mock-up (Length x Width x Height)</td>
<td>2003-08-24</td>
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<tr>
<td>Type of Ballast Water Management System</td>
<td>DNV GL, Ballast Water Management Technology</td>
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The principle of Ballast Water Management (mock-up) involved is as follows:

1. The ship is subject to regulations E-1.
RATIONALE FOR TREATMENT SYSTEMS

• Quantitative discharge standard
• Less influence of weather, ship structure, crew
• More uniform protection across habitat types
• Currently ~66 different treatment systems, based on 11 treatment processes: Filtration, Ultraviolet Light, ozone, Biocides, Electrochlorination
• Most have multiple treatment steps: Filtration+UV
• All treatment systems must be type approved by the International Maritime Organization (and USCG)
TYPE OF TREATMENT

Mechanical treatment:
• Filtration, cyclonic separation and electro-mechanical separation

Physical treatment:
• Ultraviolet irradiation (UV), Cavitation / De-oxygenation and ultrasound

Chemical treatment:
• Active Substances Ozone generation, Electro chlorination
BALLAST WATER TREATMENT SYSTEM
SAMPLING POINTS
SAMPLE POINTS
Sampling / Analysis D-2

- Taken from BW during discharge
- Representative of the whole discharge
- Sampling Ports supplied by shipyards often not consistent with Protocols under Guidelines G(2)
## STATUS OF SAMPLING PROGRAM

- Samples collected on 17 ships with 9 different BWMS as of October 2017

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<tr>
<th>Manufacturer</th>
<th>Model</th>
<th>Uptake Action</th>
<th>Discharge Action</th>
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<td>Alfa Laval</td>
<td>Pure Ballast 3.0</td>
<td>Filtration+UV</td>
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<td>Guardian</td>
<td>Filtration+UV</td>
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<td>Ballast ACE</td>
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<td>MAHLE</td>
<td>Ocean Protection Sysystem</td>
<td>Filtration(2)+UV</td>
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<td>Panasia</td>
<td>GloEn Patrol</td>
<td>Filtration+UV</td>
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<td>RWO</td>
<td>Clean Ballast</td>
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<td>Neutralizer</td>
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Ballast Water System Information

1. Vessel Name: ___________________  2. Arrival / Departure Time: ____________
3. IMO Number: ___________________  4. Make / Manufacturer: ________________
7. Type of water the system can operate in:
   (a) Fresh Water  (b) Brackish Water  (c) Salt Water
8. Is the System Operational?  YES  NO
9. Is the Crew trained & familiarized to operate the BWTS plant?  YES  NO
10. Diameter of Ballast pipe, at the location of the sample port (inch or mm)

11. Information about the sample port:
   - Describe the sample port – flange is blanked off or ball valve is present
     - Diameter of the flange
     - Type of flange  (a) DIN  (b) ANSI  (c) JIS standard
     - Size of ball valve if present and thread type  (d) NPT  (e) BSP

12. Location accessibility:
   - Ideal (accessible by personal with a clear area of space 1 x 1 x 2.5 m [Width x Length x Height])
   - Challenging (below deck plating, accessible only by ladder, or located with minimal clearance)

13. Pictures of sample port and location of sampling points in pipelines & tanks, if possible.

14. Comments
# List of Ballast Water Systems

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<td>Alfa Laval AS</td>
<td>PureBallast</td>
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<tr>
<td>AHEAD Ocean Technology (Baltic) Co., Ltd</td>
<td>AHEAD BWMS</td>
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<td>AQUA ENG Co., Ltd</td>
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<td>EGOCOSSE 57’s Ballast Water Management System</td>
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DETAINABLE DEFICIENCIES

The following non-exhaustive list of deficiencies should be considered to be of such nature that may warrant the Detention of a ship:

- Absence of a IBWMC
- Absence of a BWMP
- Absence of a BWRB
- Indication that the vessel or its equipments do not correspond substantially with the particulars of the IBWMC and/or BWMP
- The designated personnel are not familiar with essential shipboard procedures relating to ballast water management
DETAINABLE DEFICIENCIES

• No ballast water management procedures have been implemented on board.
• No Designated Officer has been nominated.
• The ship has not complied with the BWMP for management and treatment of ballast water
• Absence, serious deterioration or failure of proper operation of equipment required under the BWMP
• Result of non-compliance by sampling
• Ballast water has been discharged other than in accordance with the regulations of the BWM Convention
• (Regulation A-2)
DEFICIENCIES CODES

• 14801-BWMP-Missing/not approved/incorrect/not updated/incorrect language
• 14802-BWRB–Missing/not properly filled/incorrect language
• 14803–Construction dates applicable for BWM–Not as required
• 14804-BallastWaterExchange–Not carried out as required/not as required/inoperative/not properly maintained
• 14805-Sedimentremoval–not carried out/not as required
DEFICIENCIES CODES

• 14806-Crew training and familiarization—Lack of familiarity
• 14807—Performance standard not met—Insufficient/missing/not approved
• 14808—Prototype ballast water treatment—Not approved/expired
• 14809—Conditions for exemption—Invalid/expired/incorrect/
  missing/not properly filled
• 14810—Ballast Water discharge violation in port—Not as required/expired/incorrect/missing exemption
• 14811—BWMS—Malfunction/not properly maintained
• 14899—Other
CONCLUSION

• The joint efforts and Cooperation of all Stakeholders will contribute to:

  • Proper ballast water management practices;
  
  • The protection of our waters from the introduction of harmful aquatic organisms and pathogens; and
  
  • Prevent delays and constraints to ships.
REFERENCES

PMOU - Port State Control Committee Instruction 48/2015/13

TMOU - Guidance to Port State Control Officers for verifying Compliance with the International Convention for the Control and Management of Ships’ Ballast Water and Sediments, 2004

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THANK YOU FOR YOUR ATTENTION