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Baffinland Iron Mines Corporation

Ballast Water Management Plan

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1 INTRODUCTION

The objective of the Ballast Water Management Plan (BWMP) is to outline management measures Baffinland has put in place to prevent and/or minimize potential adverse impacts to the marine environment that could result from the accidental introduction of non-native aquatic invasive species (AIS) via Project vessel ballast water discharges. It is noted that ballast water management is first and foremost the responsibility of vessels, Transport Canada and the International Maritime Organization (IMO). There are several governance frameworks and regulations that outline and uphold responsibilities for each these parties (see Section 1.5.1.1 and 1.5.1.2 below).

1.1 RELATIONSHIP TO OTHER MANAGEMENT PLANS

This plan should be reviewed in combination with the following management plans prepared for the Project:

- Shipping and Marine Wildlife Management Plan (SMWMP)
- Marine Environmental Effects Monitoring Plan (MEEMP)

1.2 MANAGEMENT PLAN REVISION


The Ballast Water Management Plan will be updated as required on the basis of management reviews, incident investigations, regulatory changes or other operational changes to the Project.

1.3 PURPOSE

The purpose of the BWMP is to outline measures and procedures to protect the marine environment from potential introduction of AIS via Project vessel ballast water discharges.

This document includes the following sections:

- Regulatory framework
- Ballast water management
- Roles and responsibilities
- Ballast water monitoring
- Adaptive management

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1.4 AIS AND SHIPPING

The term ‘invasive species’ refers to a subset of introduced species which when released into the environment have the potential to harm ecosystems, the use of natural resources, threaten human health, or damage infrastructure. This harm may occur as a result of competition or predation with native species, introduction of parasites or diseases, interference with fisheries, damage to habitat or structures, etc. Not all introduced species are considered invasive, but the difficulty of predicting which introduced species will cause harm in a new environment means that all unintended species introductions may be considered potentially harmful, i.e., it is precautionary to prevent all unintentional species introductions in case the species become invasive.

Canada’s strategy for controlling aquatic species invasions is based on the principle that the most effective approach is through prevention measures, thus management of the pathways through which invasive species enter and spread through Canadian waters is essential (Canadian Council of Fisheries and Aquaculture Ministers Aquatic Invasive Species Task Group 2004). One such pathway is via shipping in marine environments, in particular the transportation of species through the water or sediments contained in ballast tanks.

Ballast water is carried by vessels for stability, and is contained in ballast tanks (i.e., purpose-built tanks used only for ballast water). Typically, stability is maintained by pumping water into the tanks from the external environment so that the ship rides level and at the correct depth (draft) in the water. Fully laden vessels require less ballast than a ship that is not carrying cargo, so most vessels take on ballast water when travelling with light or no loads of cargo and discharge the ballast water before more cargo is loaded.

1.5 REGULATORY FRAMEWORK

This BWMP identifies procedures in place for the effective management and monitoring of ship ballast water in a manner consistent with applicable regulations, guidelines, and terms and conditions of the Project Certificate.

1.5.1 APPLICABLE LEGISLATION

This BWMP has been developed in accordance with Transport Canada’s Ballast Water Control and Management Regulations (Regulations; SOR/2011-237) pursuant to the Canada Shipping Act, 2001 (S.C. 2001, c. 26) and the International Maritime Organization (IMO)’s International Convention for the Control and Management of Ships’ Ballast Water and Sediment (IMO 2017).

1.5.1.1 FEDERAL

According to the Ballast Water Control and Management Regulations (Regulations) under the *Canada Shipping Act* (SOR/2011-237), all ships entering the Canadian Exclusive Economic Zone (EEZ) must comply with modified D-1 standards and are required to exchange their ballast water in open seas, away from coastal waters (i.e., over 200 nautical miles from land and in water at least 2,000 metres deep). The objective of the exchange is to release non-native coastal species, preventing them from colonizing

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Canadian coastal waters, and to replace them with oceanic biota that are less likely to survive in the Canadian coastal waters (Levings et al. 2004; Simard and Hardy 2004).

1.5.1.2 INTERNATIONAL

In response to the threat of the introduction and spread on non-native species through ballast water, the International Maritime Organization (IMO) adopted the International Convention for the Control and Management of Ships' Ballast Water and Sediments (i.e., the Ballast Water Management (BWM) Convention). The BWM Convention was recently ratified by Canada and entered into force on 08 September 2017. Under the BWM Convention, all ships are required to have an International Ballast Water Management Certificate, their own BWMP, and a comprehensive record of ballast water exchange and monitoring results recorded in an on-board ballast water record book (with a detailed record of when ballast water is taken on board, when it is circulated or treated for BWM purposes, and when it is discharged into the ocean). Ships also need to record accidental or other exceptional discharges of ballast water to the marine environment.

The BWM Convention includes two performance standards for the discharge of ballast water: D-1 and D-2. The D-1 standard concerns ballast water exchange, which must be undertaken within open ocean areas, defined as waters >200 nautical miles from land and in seas >200 m deep. The D-2 standard covers approved ballast water treatment systems. All ships entering Canadian waters must currently meet the D-1 standard. The D-2 standard will come into force over a phased time period depending on each ship's date of construction and the timing of its International Oil Pollution Prevention (IOPP) certificate renewal survey. All new build ships must meet the D2 (treatment) standard after entry into force (8 September 2017). For existing ships, the BWM Convention requires that either the D-1 (exchange) or D-2 (treatment) standard is met after entry into force (8 September 2017). However, as ballast water exchange (D-1) is not considered an ideal method of ballast water management, the BWM Convention requires compliance with D-2 (treatment) upon a ship's first IOPP Certificate renewal survey occurring after 8 September 2017. Until then, all ships arriving in Canada via international waters must continue ballast water exchange outside the Canadian Exclusive Economic Zone (EEZ).

The D-2 standard (treatment) specifies a maximum number of organisms and indicator microbes that is authorized to be discharged to the marine environment according to the schedule set by the IMO (MEPC 2017). At this point in time, sampling and analysis methodologies to test for compliance with the D-2 standard have not been fully developed by the IMO yet. It is acknowledged in the IMO guidelines that although significant technical advances and refinements have been made in this area since the adoption of the Convention, there are still numerous issues to be resolved. Administrations are still undertaking research to define the most appropriate methods to test for compliance, and the best way to collect, handle and analyze samples. However, it is expected that in due course, appropriate guidance will become available once full compliance testing regimes are developed and the applicable regulators have had time to gain experience and develop best practice in ballast water sampling and analyses.

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Shipboard treatment must meet the requirements of the D-2 standard that came into effect September 8, 2017. This states the following:

- Ships built after September 8, 2017 must meet the D-2 standard
- Existing ships must meet at least the D-1 (ballast water exchange) standard; they may also choose to install a ballast water management system or otherwise meet the D-2 (discharge) standard but this is not mandatory until the corresponding compliance date.
- IOPPC Renewal survey after 8 September 2019 A ship undergoing a renewal survey linked to the ship's International Oil Pollution Prevention Certificate after 8 September 2019 will need to meet the D-2 standard by the date of this renewal survey.
- IOPPC Renewal survey between 8 September 2017 and 8 September 2019 - If the previous IOPPC renewal survey was between 8 September 2014 and 8 September 2017, then the ship must comply with D-2 standard by this renewal survey. - If the previous IOPPC renewal survey was before 8 September 2014, then the ship can wait until the next renewal survey (which will be after 8 September 2019)

A complete list of approved ballast water management systems (IMO 2017) is presented in Appendix D.

1.5.2 PROJECT CERTIFICATE NO. 005

The BWMP addresses several Project Certificate No. 005 Terms and Conditions, as outlined in Table 1:

TABLE 1:LIST OF RELEVANT PROJECT CERTIFICATE CONDITIONS

PC Term and Condition No.	Description of Term and Condition
87	The Proponent shall develop a detailed monitoring program at a number of sites over the long term to evaluate changes to marine habitat and organisms and to monitor for non-native introductions resulting from Project-related shipping. This program needs to be able to detect changes that may have biological consequences and should be initiated several years prior to any ballast water discharge into Steensby Inlet and Milne Inlet to collect sufficient baseline data and should continue over the life of the Project.
89	The Proponent shall develop and implement an effective ballast water management program that may include the treatment and monitoring of ballast water discharges in a manner consistent with applicable regulations and/or exceed those regulations if they are determined to be ineffective for providing the desired and predicted results. The ballast water management program shall include, without limitation, a provision that requires ship owners to test their ballast water to confirm that it meets the salinity requirements of the applicable regulations prior to discharge at the Milne Port, and a requirement noting that the Proponent, in choosing shipping contractors will, whenever feasible, give preference to contractors that use ballast water treatment in addition to ballast water exchange.

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PC Term and Condition No.	Description of Term and Condition
90	The Proponent shall incorporate into its Shipping and Marine Mammals Management Plan provisions to achieve compliance with the requirements under the International Convention for the Control and Management of Ship's Ballast Water and Sediment (2004) or its replacement and as implemented by the <i>Canadian Ballast Water and Control Regulations</i> as may be amended from time to time.

2 BALLAST WATER MANAGEMENT

To minimize the risk of introduction of AIS through ballast water discharge, Baffinland will ensure the following management measures are implemented for foreign flag vessels arriving directly to Milne Port from international waters:

- Ensure that all foreign flag vessels chartered to perform Baffinland trade comply with the Regulations and the BWM Convention.
- Ensure that all foreign flag vessels chartered to perform Baffinland trade that are not yet required to meet the D-2 standard of the BWM Convention meet the D-1 standard of the BWM Convention, which requires all ships to exchange ballast water in open seas, away from coastal areas (>200 nautical miles from land and in water at least 2,000 metres deep).
- Provide all foreign flag vessels chartered to perform Baffinland trade with a copy of Baffinland's Ballast Water Management Plan.
- Verify by inspection that all foreign flag vessels chartered to perform Baffinland trade have a record of their Ballast Water Exchange and sampling results according to the Regulations.
- Verify by inspection that all foreign flag vessels chartered to perform Baffinland trade maintain and carry on-board an up-to-date International Ballast Water Management Certificate.

2.1 ON-BOARD DOCUMENTATION

2.1.1 SHIP-SPECIFIC BWMP

In accordance with SOR/2011-237 of the Canada Shipping Act (2011) and the BWM Convention, all international foreign flag vessels retained by Baffinland are required to have a vessel-specific BWMP that includes a detailed description of the actions to be taken to implement the ballast water management requirements and supplemental ballast water management practices. This BWMP should contain the information required by Regulation B-1 of the BWM Convention, including, but not limited to, the following:

- Introduction
- Vessel particulars, including name, flag, port of registry, gross tonnage, deepest ballast draft, etc.

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- IMO number (in accordance with resolution A.600(15), IMO Ship Identification Scheme)
- Total ballast capacity of the ship in cubic meters and other units if applicable to the ship
- A description of the main ballast water management method(s) used on the ship
- Roles and responsibilities with regards to ballast water management
- Description and plans/drawing of the Ballast System
- Ballast water sampling points
- Operation of the ballast water management systems
- Safety procedures for the Ship and the Crew
- Operational or Safety Restrictions
- Description of the Methods used on board for ballast water management and sediment control
- Procedures for the disposal of sediments
- Methods of communication
- Recording requirements
- Crew training and familiarization
- Exemptions
- Approving authority

A more detailed description of the standard format of a ship-specific BWMP is provided in Appendix A.

2.1.2 BALLAST WATER RECORDS

Each ship will carry and maintain a Ballast Water Record Book that contains the following information:

- Vessel information: vessel name, IMO number, owner, type, gross tonnage, date of construction, and flag (i.e., no abbreviation will be accepted).
- Voyage information: arrival port, province/state, country, arrival date, agent, last port, country of last port, next port, country of next port, next port (2 and 3), countries of next port (2 and 3)
- Ballast water usage and capacity: volume, number of tanks in ballast, number of holds in ballast, and total ballast water capacity (volume and vessel's ballast management plan – number of tanks and holds).
- Ballast water management: ballast water managed under D-1 and/or D-2, total number of ballast water tanks/holds to be discharged, number of tanks/holds undergone exchange, number of tanks treated using a ballast water management system, ballast water management used (manufacturer, model), number of tanks/holds not managed, reasons why no ballast water management was conducted, indication of approved ballast water management plan on board, indication of management plan implemented, indication of ballast water record book on board, international ballast water management certificate, date of issue, expiry date, authority that issued the certificate, place of issue, date required to meet regulations D-2, ballast water regulations on board, and other applicable regulation.
- Ballast water history: ballast water source before management (tanks/holds list, tank capacity, date, port or latitude/longitude, volume on arrival), ballast water management practices (date,

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start point latitude/longitude, end point latitude/longitude, used volume (m³), % Exchanged, D-1 method, D-2 method, wave height (m), salinity (units) ppt), and proposed ballast water discharge (date, port or latitude/longitude, volume, salinity (units) ppt).

- Title and signature: name of the master, vessels contact e-mail addresses and phone number.

2.1.3 INTERNATIONAL BALLAST WATER MANAGEMENT CERTIFICATE

An International Ballast Water Management Certificate is issued by or on behalf of the Administration (flag State) and certifies that the ship carries out ballast water management in accordance with the BWM Convention and specifies which standard the ship is complying with, as well as the date of expiry of the Certificate.

2.2 ROLES AND RESPONSIBILITIES

It is important to note that ultimately, it is the ship operators/owners that are responsible for ensuring vessels are compliant with the BWM Convention. Predominantly, this involves maintaining current BWM certification/records and arranging on-board installation of an approved ballast water treatment systems (when applicable). The BWM Convention does not place any specific legal obligations on port and harbour authorities in relation to ballast water treatment.

However, as described in Baffinland's Sustainable Development Policy (Appendix E), Baffinland's commitment to responsible environmental management of potential Project effects, including those resulting from ballast water discharge, is the responsibility of all Project employees and contractors who interact with the Project. Specific responsibilities related to the management and monitoring of ballast water are as follows:

Vessel Owners and Operators (External)

- Ensure Project-vessels chartered to perform Baffinland trade meet all federal and international regulations for ballast water management.

Head of Shipping

- It is expected that all vessels chartered for the Project meet all national and international regulations for ballast water via contractual obligations and inspection as required.
- Communicate and distribute copies of relevant management plans, including Baffinland's BWMP to all vessel owners and operators and any contractors hired by Baffinland to support shipping operations

Environmental Superintendent

- Ensure that all Site Environment Port and Logistics staff and relevant contractors have been made aware of applicable ballast water management regulations.
- Provide support to the Milne Port Environmental Coordinator to facilitate ballast water testing.

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Milne Port Environmental Coordinator

- Provide support to the Ballast Water Monitor and Port and Logistics employees and contractors to execute ballast water sampling/testing of all foreign flag vessels calling at Milne Port.
- Sign off on Baffinland's Ballast Water Testing Log.

Port Captain (Contractor)

The Port Captain oversees and organizes efficient operation of the assigned fleet at Milne Port. The Port Captain will contact the Head of Shipping if any non-compliance scenarios arise.

Ballast Water Monitor

- Complete ballast water testing as described in Baffinland's Standard Operating Procedure for Ballast Water Salinity Testing (Appendix B).
- Record all ballast water testing results in Baffinland's Ballast Water Testing Log.
- Communicate any potential non-compliance events immediately to the Port Captain and Head of Logistics.
- Conducted vessel document inspections, as required. If any complications arise, the ballast water monitor will report these to the Port Captain.

3 MONITORING AND CONTROLS

As a matter of due diligence, Baffinland has elected to conduct regular inspections of the chartered foreign flag vessels and conduct on-board ballast water testing to verify vessel compliance with the applicable ballast water regulation, the BWM Convention and Baffinland's BWMP.

3.1 INSPECTIONS


3.1.1 PRE-ARRIVAL INSPECTION

Prior to arrival, Fednav Agency acting as agents to Baffinland will monitor ballast exchange reporting of all foreign flag vessels calling Milne Inlet. This includes:

- Monitoring all ballast exchange reporting
- Providing vessel masters with a copy of the Canadian Ballast Water Reporting Form (see Appendix F)
- Once the completed form is received, verify that ballast exchange was carried out in compliance with the regulations, and ensure the form was completed accurately

3.1.2 ON-BOARD INSPECTION

Baffinland will conduct regular inspections of ships arriving at Milne Port from international waters for the purpose of determining whether the vessels are in compliance with Baffinland's BWMP, federal ballast

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water regulations and the BWM Convention standards. In addition to ballast water testing (see Section 5.2), inspections may include a request to review the following on-board documents:

- Ship-specific BWMP
- Ballast Water Record Book
- International Ballast Water Management Certificate

3.2 BALLAST WATER TESTING

Ship operators/owners are legally responsible for ensuring their ships are compliant with federal ballast water regulations and the BWM Convention. To facilitate the administration of ballast water management and treatment procedures on board each ship, a responsible officer on the ship is typically assigned/designated to ensure the maintenance of appropriate ballast water records and to ensure that ballast water management and/or treatment procedures are followed, recorded, and reported in accordance with the Regulations. There are no specific legal obligations on the part of port and harbour authorities in relation to overseeing ballast water management or treatment procedures on behalf of the ship owner/operators, including for testing of ballast water or reporting ballast water readings to the federal authority.

As a matter of due diligence, Baffinland has elected to conduct ballast water sampling in one randomly selected ballast water tank on all foreign flag vessels arriving directly to Milne Port from international waters to confirm that effective exchange has occurred in accordance with the Regulations and the BMW Convention. Specifically, ballast water salinity will be measured prior to discharge to verify that it meets the D-1 threshold (at least 30 parts per thousand [ppt]). Ballast water salinity testing will be conducted by a trained environmental technician in accordance with Baffinland's Standard Operating Procedure (SOP) for salinity testing of ship ballast water (Appendix B). In addition to providing detailed instructions for salinity testing of ballast water on foreign flag vessels calling at Milne Port, the SOP also provides guidance for accessing on-board ballast tanks, selecting ballast tanks for testing, equipment set-up and deployment, detailed sampling and data entry procedures, guidance on instrument calibration, maintenance and storage, and reporting requirements. Monitoring results will be recorded in the salinity measurement logbook (Appendix C) and results will be presented in the Annual Reports to NIRB under Term and Condition No. 89.

If ballast water measurements indicate that a Project vessel is not compliant with the Regulations or BWM Convention, the results will be immediately reported to Baffinland's Head of Shipping and Logistics. In the unlikely scenario of a non-compliance event, Baffinland will initiate adaptive management measures (see Section 4.0).

4 ADAPTIVE MANAGEMENT

If the average salinity reading is less than 30 ppt or greater than 40 ppt, the following steps will be taken:

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- Recalibration of YSI to determine if there is an error with the instrument.
- Review vessel Ballast Water Records to verify ballast water exchange occurred
- Using secondary YSI instrument if needed to retest ballast water tanks.


If after the above steps have been followed and the average salinity reading remains less than 30 ppt or greater than 40 ppt, the Port Captain will notify Baffinland's Head of Shipping of the situation. The Head of Shipping will then, in consultation with the vessel Master and vessel owner/operator, defer to Transport Canada on what the appropriate next steps for the vessel would be.

Baffinland will continue to consult with Transport Guidance on guidance regarding best practices for testing and adaptive management in relation to the D-2 standard.

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Appendix A:
Transport Canada Standard Format for Vessel
Ballast Water Management Plan

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A.1 STANDARD FORMAT FOR THE BALLAST WATER MANAGEMENT PLAN

(as prescribed under A Guide to Canada's Ballast Water Control and Management Regulations (Transport Canada 2007))

A.1.1 Preamble

The ballast water management plan should contain the information required by Regulation B-1 of the Control and Management of Ships' Ballast Water and Sediments, 2004 (the Convention).

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

A.1.2 Introduction

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

1. This Plan is written in accordance with the requirements of Regulation B-1 of the International Convention for the Convention and the associated Guidelines.
2. The purpose of the Plan is to meet the requirements for the control and management of ship's ballast water and sediments in accordance with the Guidelines for Ballast Water Management and the Development of Ballast Water Management Plans resolution MEPC.127(53) (The Guidelines). It provides standard operational guidance for the planning and management of ships' ballast water and sediments and describes safe procedures to be followed.
3. This Plan has been approved by the Administration and no alteration or revision shall be made to any part of it without the prior approval of the Administration.
4. This Plan may be inspected on request by an authorized authority.

Note: *The Plan is to be written in the working language of the crew, if the text is not in English, French, or Spanish, the plan is to include a translation into one of these languages.*

A.1.3 Vessel Particulars

At least the following details should be included:

- Vessels' name
- Flag
- Port of registry
- Gross Tonnage
- IMO number*

*In accordance with resolution A.600(15), IMO Ship Identification Number Scheme.

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- Length (BP)
- Beam
- International call sign
- Deepest ballast drafts (normal and heavy weather)
- Total ballast capacity of the ship in cubic meters and other units if applicable to the ship
- A brief description of the main ballast water management method(s) used on the ship
- Identification (rank) of the appointed ballast water management officer

A.1.4 Index

An index of sections should be included to reference the content of the Plan.

A.1.5 Purpose

Should contain a brief introduction for the ship's crew, explaining the need for ballast water management, and the importance of accurate record keeping

A.1.6 Plans/Drawings of the Ballast Water Treatment System

Plans or drawings of the ballast system for example:

1. Ballast tank arrangement
2. Ballast capacity plan
3. A ballast water piping and pumping arrangement, including air pipes and sounding arrangements
4. Ballast water pump capacities
5. The ballast water management system used onboard, with references to detailed operational and maintenance manuals held on board
6. Installed ballast water treatment systems
7. A plan and profile of the ship, or a schematic drawing of the ballast arrangement and sampling locations.

A.1.7 Description of the Ballast System

A Description of the Ballast System

A.1.8 Ballast Water Sampling Points

Lists and/or diagrams indicating the location of sampling and access points in pipelines and ballast water tanks.

A note that sampling of ballast water is primarily a matter for the authorized authority, and there is unlikely to be any need for crew members to take samples except at the express request, and under the supervision, of the authorized authority.

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A.1.9 *Operation of the Ballast Water Management System*

- A detailed description of the operation of the Ballast Water Management System(s) used on board.
- Information on general ballast water management precautionary practices.

A.1.10 *Safety Procedures for the Ship and the Crew*

Details of specific safety aspects of the ballast water management system used.

A.1.11 *Operational or Safety Restrictions*

Details of specific operational or safety restrictions including those associated with the management system which affects the ship and or the crew including reference to procedures for safe tank entry.

A.1.12 *Description of the Method(s) Used on Board for Ballast Water Management and Sediment Control*

Details of the method(s) used on board for the management of ballast and for sediment control including step-by-step operational procedures.

A.1.13 *Procedures for the Disposal of Sediments*

Procedures for the disposal of sediments at sea and to shore

A.1.14 *Methods of Communication*

Details of the procedures for co-ordinating the discharge of ballast in waters of a coastal State

A.1.15 *Duties of the Ballast Water Management Officer*

Outline of the Duties of the Designated Officer

A.1.16 *Recording Requirements*

Details of the Record-keeping Requirements of the Convention

A.1.17 *Crew Training and Familiarization*

Information on the provision of crew training and familiarization

A.1.18 *Exemptions*

Details of any exemptions granted to the ship under Regulation A-4.

A.1.19 *Approving Authority*

Details and stamp of approving authority

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Appendix B:
Baffinland Standard Operating Procedure (SOP)
for Salinity Testing of Ballast Water

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B.1 Purpose

The objective of the Baffinland Iron Mines Corporation (Baffinland) Ballast Water Management Plan is to verify the compliance of each ore carrier vessel entering Milne Inlet with the Ballast Water Control and Management Regulations (SOR/2011-237; Regulations) under the *Canada Shipping Act* (S.C. 2001, c. 26). The Regulations are in place to limit the risk of Aquatic Invasive Species (AIS) introductions in Canadian waters from ship ballast water. Under the Regulations, ballast water is managed according to the International Maritime Organization (IMO) D-1 or D-2 Standards (Transport Canada 2018).

According to D-1 Standards, ships must exchange their ballast water in open seas, away from coastal waters, 200 nautical miles from land. A Ballast Water Exchange Report must be completed by the ship, detailing the ship's location coordinates as each ballast tank exchanges water. To enforce compliance with the plan and regulations, Baffinland implements a compulsory monitoring of ships' ballast water to verify that the salinity is above 30 parts per thousand (ppt).

B.2 Scope

Baffinland has developed a Standard Operating Procedure (SOP) for salinity testing of ship ballast water to confirm that foreign flag vessels calling at the Project site are compliant with ballast water discharge requirements as per the Regulations and Baffinland's Ballast Water Management Plan. Salinity testing of the ballast water tanks for each ship entering Milne Port is required to provide a recordable measure that ballast water was exchanged mid-ocean and its salinity is above 30 ppt. A designated Environmental Monitor (Monitor) will sample the ballast water following the steps identified below.

B.3 Accessing the Ship

The Monitor will store all equipment and paperwork in a backpack to keep hands free prior to ascending the staircase of the ship to the ship deck. The Monitor will ask the Ship Captain for the location and access to a randomly selected ballast tank. The ship's crew will identify the selected ballast tank for salinity testing.

B.4 Protocol

A YSI Pro30 conductivity instrument will be used to measure salinity of the ballast water aboard the foreign flag vessels (Figure 1). Salinity measurements will be taken at up to three depths within the ballast tank on each foreign flag vessels.




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Figure 1: YSI Pro30 Conductivity Instrument

B.4.1 Initial Setup

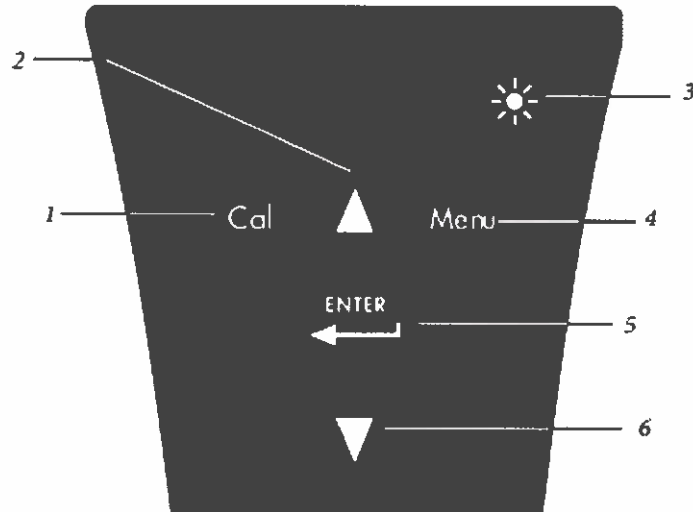
Prior to taking ballast water measurements, the YSI Pro30 should be setup to ensure proper operation in the field. A diagram of the functions of the handheld unit is shown in Figure 2. To setup the YSI Pro30 for ballast water monitoring, the following steps should be taken:

- Ensure that 2 C-cell batteries are inserted in the battery chamber. A battery symbol  will blink in the lower left corner of the display to indicate low battery when approximately one hour of battery life remains.
- Connect the cable to the handheld unit by aligning the keys, pushing together firmly, and twisting the outer ring until it locks into place.
- Turn the instrument on by pressing the Power key  on the front of the instrument. The LCD display should come on. Allow a few seconds for the instrument to complete its diagnostic routine.
- Press the MENU key  to access the System Setup menu.

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- Highlight Cond. Units and press Enter to select the desired conductivity units. Select the COND-µs/cm option to display conductivity in microSiemens per centimetre.
- Press the ESC Exit key to return back to the main System Setup menu.
- Highlight Cond. Auto Stable and press Enter. The Auto Stable function allows preset values to be selected to determine when a conductivity reading is stable. Select a 1.5% change in readings over 5 seconds. With Auto Stable enabled, an Ⓢ symbol will appear next to the conductivity reading on the Run screen. The symbol will blink during stabilization and display steadily when the conductivity reading is stable.
- Press the ESC Exit key to return back to the main System Setup menu.
- Highlight Temperature Units and press Enter. Ensure the temperature units are set to °C.
- Press the ESC Exit key twice to return back to Run screen.


KEY PAD



Number	Key	Description
1		Calibrate Press and hold for 3 seconds to calibrate. Opens Calibrate menu from the Run screen.
2		Up Arrow Use to navigate through menus, to navigate through box options along the bottom of the Run screen and to increase numerical inputs.
3		Power and Backlight Press once to turn instrument on. Press a second time to turn backlight on. Press a third time to turn backlight off. Press and hold for 3 seconds to turn instrument off.
4		Menu Use to enter the System Setup menu from the Run screen.
5		Enter Press to confirm entries and selections.
6		Down Arrow Use to navigate through menus, to navigate through box options at the bottom of the Run screen and to decrease numerical inputs.

Figure 2: Operational Diagram for the YSI Pro 30 Handheld Unit

B.4.2 Calibration Procedure

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The Ballast Water Monitor shall use a YSI Pro30 instrument that has been calibrated within 24 hours of boarding the ship. A record of the calibration results will be kept in a binder at Milne Port for verification purposes. The YSI Pro30 has a built-in temperature sensor, therefore temperature calibration is not required. To calibrate the conductivity sensor the following calibration steps for the YSI Pro30 must be followed:

- Ensure the conductivity sensor is clean and dry before performing the conductivity calibration.
- Rinse the probe with Deionized water prior to calibrating.
- Fill a clean container (e.g., plastic cup or glass beaker) with at least 3 inches (~50-100 mL) of 1413 $\mu\text{s}/\text{cm}$ calibration solution and place the sensor into the solution. The calibration solution should cover the holes of the conductivity sensor that are closest to the cable (Figure 3). Do not rest the probe on the bottom of the container, suspend the probe above the bottom at least $\frac{1}{4}$ inch.

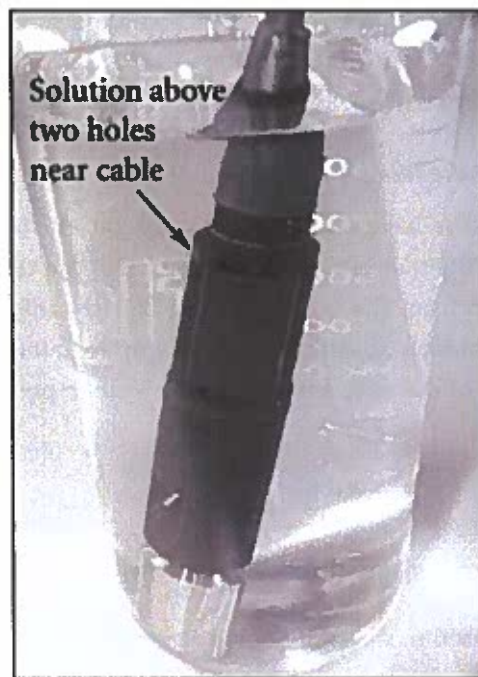


Figure 3: Conductivity Sensor Submerged in Calibration Solution

- Gently move the probe up and down to remove any air bubbles from the sensor.
- Turn the instrument on and allow the conductivity and temperature readings to stabilize.
- Press and hold the Cal key for 3 seconds. Highlight Conductivity and press enter. Next highlight the desired calibration method as Conductivity and press enter.

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- Highlight the units you wish to calibrate as $\mu\text{s/cm}$.
- Use the up and down arrow key to adjust the value on the display to match the value of the conductivity calibration solution ($1413 \mu\text{s/cm}$). When calibrating conductivity, it is necessary to look up the value of the solution at the current temperature and enter the value into the Pro30 (most calibration solutions are labelled with a value at 25°C). Pressing the up or down key for 5 seconds will move the changing digit one place to the left. The Pro30 will remember the entered calibration value and display it the next time a conductivity calibration is performed.
- Press enter to complete the calibration. Or, if necessary Press Cal to cancel the calibration and return to the Run screen.
- ‘Calibration Successful’ will display for a few seconds to indicate a successful calibration and then the instrument will return to the Run screen.
- If the calibration is unsuccessful, an error will display on the screen. Press the Cal key to exit the calibration error message and return to the Run screen. Consult Section 9 (Troubleshooting) of the Operation Manual to troubleshoot the calibration error.

B.4.3 Salinity Measurement Procedure

To determine the actual depth of the ballast tank, lower a weighted line (e.g., transect tape or marked line with weight) to the bottom of the tank and record the depth of the tank. Using the YSI, take a reading at the surface, approximately 1 m from the bottom of the ballast tank, and at a depth approximately halfway between the surface and bottom to gather a salinity profile. If it is not possible to record all three measurements, due to the design of the tank or ship, measure when possible and highlight reasons why in your logbook.

Taking Measurements:

- Before taking measurements, ensure the instrument has been calibrated within the last 24 hours.
- Attach the handheld unit to the cable connector. **Keep the handheld unit dry, water damage to the handheld unit is the primary cause of YSI instrument failure.**
- Turn the instrument on. Allow a few seconds for the instrument to complete its diagnostic routine. If a continuous error message is displayed during the initial powering on of the instrument, consult Section 9 (Troubleshooting) of the Operation Manual. If additional troubleshooting support is required, contact the authorized dealer of the device Hoskins Scientific at 1-604-872-7894.
- Place the probe in the ballast tank to the desired depth ensuring that the conductivity sensor is completely submerged (two holes near the cable should be covered by the sample). Shake the

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probe gently to remove any trapped air bubbles. Sampling depth is to be recorded for every sample.

- Wait for the values to stabilize, approximately 10 seconds.
- Record the Salinity value as shown on the handheld unit in ppt (parts per thousand) into a data book (Figure 4). Select the Save option at the bottom of the Run screen to store the data for future reference. The YSI Pro30 can store up to 50 data sets using sequential numbering from 1 to 50 and starting again at 1 after 50 data sets have been saved (erasing previous data sets).
- Repeat the measurements at all desired depths until measurements have been collected at the surface, mid-point and bottom of the ballast tank.
- At any time, the Data option at the bottom of the Run screen can be selected to navigate to view the data for previous measurements. Once in Data mode, use the up and down arrows to navigate between the sequential data sets.

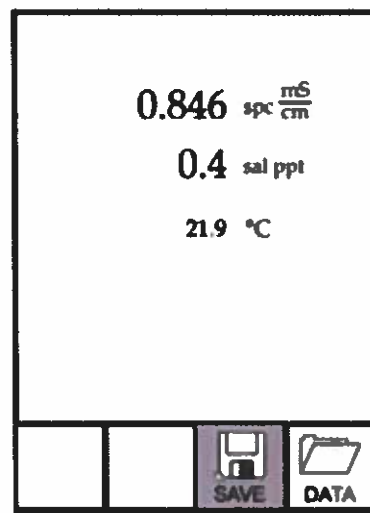


Figure 4: Run Screen on the YSI Pro30 Handheld Unit

After collecting measurements from the surface, mid-point and bottom of the ballast tank, calculate the average salinity of the ballast water by calculating the sum of the values and dividing by three. If the average salinity value is greater than 30 ppt and less than 40 ppt, the ballast water shall be deemed to meet the D-1 Standard and no further action is required beyond the necessary documentation steps aboard the ore carrier.

If the average salinity reading is less than 30 ppt or greater than 40 ppt, the following steps will be taken:

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- Recalibration of YSI to determine if there is an error with the instrument.
- Review vessel Ballast Water Records to verify ballast water exchange occurred
- Using secondary YSI instrument if needed to retest ballast water tanks.

If after the above steps have been followed and the average salinity reading remains less than 30 ppt or greater than 40 ppt, the Port Captain will notify Baffinland's Head of Shipping of the situation. The Head of Shipping will then, in consultation with the vessel Master and vessel owner/operator, defer to Transport Canada on what the appropriate next steps for the vessel would be.

If it is not possible to record all three measurements, due to the design of the tank or ship, measure when possible and highlight reasons why in your logbook.

B.4.4 Instrument Maintenance and Storage

Proper maintenance and storage of the conductivity probe is essential to ensure proper functioning of the conductivity instrument during ballast water monitoring. Regularly inspect the YSI Pro30 using the following steps:

- Ensure that all gaskets which protect the battery compartment are free of dirt/grease to prevent water from entering the battery compartment.
- Regularly clean the openings which allow access to the conductivity electrodes using the small cleaning brush provided in the Maintenance kit. Dip the brush in clean water and insert it into each holes 10 to 12 times. If deposits have formed on the electrodes, it may be necessary to use a mild detergent to clean them. Rinse the probe thoroughly with clean water and calibrate the probe to check the response and accuracy of the conductivity cell.
- For short- and long-term storage, the conductivity sensor should be stored clean and dry.
- Remove the batteries from the instrument for long term storage (>30 days).
- Store the instrument at a temperature between -5 and 70°C. **Do not leave the YSI Pro30 where temperatures may go below -5°C.**
- If servicing of the YSI is required, contact YSI Technical Support directly at 1-800-897-4151

B.5 Reference and Records

Transport Canada, 2012. Discussion paper: Canadian implementation of the ballast water convention. Available online: http://meopar.ca/uploads/BWW_Doc_4_Discussion_Paper.pdf. Accessed June 2018.

Transport Canada, 2018. A Guide to Canada's Ballast Water Control and Management Regulations TP 13617 E (2018).

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YSI Incorporated, 2011. YSI Pro30 Handheld Conductivity Meter manual 606082A. Available at:
<https://www.ysi.com/File%20Library/Documents/Manuals/606082A-YSI-Pro30-Manual-English.pdf>

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Appendix C: Baffinland Ballast Water Testing Log

BALLAST WATER MONITORING LOG			
Vessel Name: _____		IMO Number: _____	
Vessel Arrival Date: _____		Inspection Date: _____	
Vessel Captain: _____		Inspected By: _____	
Monitoring Device (Model Name and Number): _____		Calibration Date: _____	
Ballast Tank Depth: _____		Before: _____	After: _____
Measurement Location (Tank # / Vent): _____		Time of Measurement: _____	

Depth (m)	Time	Salinity (ppt)	Comments

Average Ballast Tank Salinity _____

Ballast Water Management Considerations:

Vessel Captain Signature: _____ Ballast Monitor Signature: _____

Port Captain Signature: _____

Date/Time Logged and Uploaded: _____

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**Appendix D:
Ballast Water Treatment Options**

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D.1 Introduction

This appendix provides potential ballast water management treatment options and provides a list of ballast water management systems which are approved by IMO (IMO 2017). In the event of non-compliance with the Regulations (e.g. salinity of ballast water is below 30 psu, or no records of ballast water exchange is presented by the ship master, etc.), Baffinland will consult with Transport Canada regarding the appropriate course of action and next steps.

D.2 Summary

The two following ballast water treatment options are available (Abu-Kader 2011; Jing et al. 2012; Balaji et al. 2014):

- 1- shipboard ballast water treatment
 - a. Ballast water treated in the pipe during update-discharge (in-line)
 - b. Ballast water treated in the ballast tanks during voyage (in tank)
- 2- shoreside ballast water treatment
 - a. Waste water treatment systems

There are variety of ballast water treatment technologies that are available for ballast water management, using chemical, biological, and physical methods, and combinations of these (Abu-Kader 2011; Jing et al. 2012; Balaji et al. 2014), which are provided in Table 1.

Table 1: List of ballast water treatment options and its descriptions (modified from Jing et al. 2012).

Removal processes	Methods	Advantages and disadvantages	Approximate cost
Mechanical	Filtration	commonly used, well-established, low system effectiveness	1 million USD
	Hydrocyclone	Well established, less effective at microorganisms/hydrocarbon	2.5 million USD
Chemical	Chlorine	Mature technology, low cost high conc. may cause corrosion, negative residuals, toxic	160K USD



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	Chlorine dioxide	efficient at low dose, environment friendly High cost, need special generator and storage	260-400K USD
	Ozone	Powerful oxidant, environment friendly Unstable, toxic by-products	1 to 1.6 million USD
	Hydrogen Peroxide	Limited risk High cost, transport safety requirement	Not available
	Deoxygenation	Minor corrosion, environment friendly Ineffective for anaerobic bacteria/cyst	150-400K USD
Physical	Thermal (heat)	Safe/cost-effective, Long process time, hot water discharge	30-200K USD
	UV	Proven effective bactericide/virucide Unstable lethal dose to water quality ineffective for sediment	3-4million USD
	Ultrasound	No chemical/by-product, Water recirculating pipelines high energy requirement, hull integrity	4-6 million USD
	Electrocution	Ease of handling, low footprint High running cost, safety	Not available
Biological	<i>Glutaraldehyde</i>	biodegradable, no harmful byproducts pH requirement, corrosive, ineffective for sediment	25\$/ton

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	<i>Peracetic acid</i>	effective to most microorganisms at lower conc. Residual toxicity, expensive, pH requirement	\$0.3/ton
	<i>SeaKleen</i>	toxic to wide range of organisms, low toxicity to mammal/fish/birds Less effective for resistant resting stage/sediment, expensive	\$0.2/ton
Combinations	Pair mechanical removal with physical or chemical process	Extensive list	Variable

Use of chlorine (chemical) and filtration (mechanical) are commonly used (Abu-Kader 2011; Jing et al. 2011). Combination of filtration, ozone, and UV should be used to treat ballast water management (Jing et al. 2011).

List of ballast water treatment options approved by IMO (IMO 2017) are provided in Table 2.

Table 2: Ballast water management systems that make use of active substances which received Basic Approval from IMO (IMO 2017).

Number	Name of the system and proposing country	Name of manufacturer	Date of Basic Approval
1	Peraclean® Ocean (subsequently changed to SEDNA® Ballast Water Management System (Using Peraclean® Ocean)), Germany	Degussa GmbH, Germany	24 March 2006 (MEPC 54)
2	Electro-Clean (electrolytic disinfection) system (subsequently changed to Electro-Clean™), Republic of Korea	Techcross Ltd. and Korea Ocean Research and Development Institute (KORDI)	24 March 2006 (MEPC 54)
3	Special Pipe Ballast Water Management System (combined with Ozone treatment), Japan (subsequently changed to FineBallast OZ (the Special Pipe Hybrid Ballast Water	Japan Association of Marine Safety (JAMS)	13 October 2006 (MEPC 55)

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	Management System combined with Ozone treatment version))		
4	EctoSys™ electrochemical system, Sweden (subsequently changed to the RWO ballast water management system)	Permascand AB, Sweden, subsequently acquired by RWO GmbH, Germany	13 October 2006 (MEPC 55)
5	PureBallast System, Sweden	Alfa Laval/Wallenius Water AB	13 July 2007 (MEPC 56)
6	NK Ballast Water Treatment System, Republic of Korea (subsequently changed to NK-O3 BlueBallast System (Ozone))	NK Company Ltd., Republic of Korea	13 July 2007 (MEPC 56)
7	Hitachi Ballast Water Purification System (ClearBallast), Japan	Hitachi, Ltd./Hitachi Plant technologies, Ltd.	4 April 2008 (MEPC 57)
8	Resource Ballast Technologies System, South Africa	Resource Ballast Technologies (Pty) Ltd.	4 April 2008 (MEPC 57)
9	GloEn-Patrol™ Ballast Water Management System, Republic of Korea	Panasia Co., Ltd.	4 April 2008 (MEPC 57)
10	OceanSaver® Ballast Water Management System, Norway	MetaFil AS (subsequently changed to OceanSaver AS)	4 April 2008 (MEPC 57)
11	TG Ballastcleaner and TG Environmentalguard System (subsequently changed to JFE Ballast Water Management System), Japan	The Toagosei Group (TG Corporation, Toagosei Co., Ltd. and Tsurumi Soda Co., Ltd.)	10 October 2008 (MEPC 58)
12	Greenship Sedinox Ballast Water Management System, the Netherlands	Greenship Ltd	10 October 2008 (MEPC 58)
13	Ecochlor® Ballast Water Treatment System, Germany	Ecochlor, Inc, Acton, the United States	10 October 2008 (MEPC 58)
14	Blue Ocean Shield Ballast Water Management System, China	China Ocean Shipping (Group) Company (COSCO)	17 July 2009 (MEPC 59)
15	Hyundai Heavy Industries Co., Ltd. (HHI) Ballast Water Management System (EcoBallast), Republic of Korea	Hyundai Heavy Industries Co., Ltd., Republic of Korea	17 July 2009 (MEPC 59)
16	AquaTriComb™ Ballast Water Treatment System, Germany	Aquaworx ATC GmbH	17 July 2009 (MEPC 59)
17	SiCURE™ Ballast Water Management System, Germany	Siemens Water Technologies	26 March 2010 (MEPC 60)
18	Sunrui Ballast Water Management System (subsequently changed to	Qingdao Sunrui Corrosion and Fouling Control Company	26 March 2010 (MEPC 60)



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	BalClor Ballast Water Management System), China		
19	DESMI Ocean Guard Ballast Water Management System, Denmark	DESMI Ocean Guard A/S	26 March 2010 (MEPC 60)
20	Blue Ocean Guardian (BOG) Ballast Water Management System, (subsequently changed to "ARA Ballast" Ballast Water Management System), Republic of Korea	21st Century Shipbuilding Co., Ltd.	26 March 2010 (MEPC 60)
21	Hyundai Heavy Industries Co., Ltd. (HHI) Ballast Water Management System (HiBallast), Republic of Korea	Hyundai Heavy Industries Co., Ltd., Republic of Korea	26 March 2010 (MEPC 60)
22	Kwang San Co., Ltd. (KS) Ballast Water Management System "En-Ballast", Republic of Korea	Kwang San Co., Ltd.	26 March 2010 (MEPC 60)
23	OceanGuard™ Ballast Water Management System, Norway	Qingdao Headway Technology Co., Ltd.	26 March 2010 (MEPC 60)
24	Severn Trent DeNora BalPure® Ballast Water Management System (subsequently changed to BalPure® BP-500), Germany	Severn Trent De Nora (STON), LLC	26 March 2010 (MEPC 60)
25	Techwin Eco Co., Ltd. (TWECO) Ballast Water Management System (Purimar), Republic of Korea	Techwin Eco Co., Ltd.	1 October 2010 (MEPC 61)
26	AquaStar Ballast Water Management System, Republic of Korea (subsequently changed to AquaStar™ BWMS and MACGREGOR WATER BALLAST TREATMENT SYSTEM)	AQUA Eng. Co., Ltd.	1 October 2010 (MEPC 61)
27	Kuraray Ballast Water Management System, (subsequently changed to MICROFADE™ Ballast Water Management System), Japan	Kuraray Co., Ltd.	1 October 2010 (MEPC 61)
28	ERMA FIRST Ballast Water Management System (subsequently changed to ERMA FIRST BWTS), Greece	ERMA FIRST ESK Engineering Solutions S.A.	15 July 2011 (MEPC 62)
29	BlueSeas Ballast Water Management System, Singapore	Envirotech and Consultancy Pte. Ltd.	15 July 2011 (MEPC 62)
30	SKY-SYSTEM® with Peraclean® Ocean Ballast	Katayama Chemical, Inc.	15 July 2011 (MEPC 62)

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	Water Management System, Japan		
31	JFE BallastAce that makes use of NeoChlor Marine® Ballast Water Management System, Japan	JFE Engineering Corporation	15 July 2011 (MEPC 62)
32	BallastMaster Ballast Water Management System, Germany	GEA Westfalia Separator Systems GmbH	15 July 2011 (MEPC 62)
33	BlueWorld Ballast Water Management System, Singapore	Envirotech and Consultancy Pte. Ltd.	15 July 2011 (MEPC 62)
34	Neo-Purimar™ Ballast Water Management System, Republic of Korea	Samsung Heavy Industries Co., Ltd.	15 July 2011 (MEPC 62)
35	"Smart Ballast" Ballast Water Management System, Republic of Korea	STX Metal Co., Ltd.	2 March 2012 (MEPC 63)
36	DMU ·OH Ballast Water Management System, China	Dalian Maritime University	2 March 2012 (MEPC 63)
37	EcoGuardian™ Ballast Water Management System, Republic of Korea	Hanla IMS Co., Ltd.	2 March 2012 (MEPC 63)
38	KTM-Ballast Water Management System, Republic of Korea (subsequently changed to MARINOMATE™ Ballast Water Management System)	Korea Top Marine (KT Marine) Co., Ltd.	5 October 2012 (MEPC 64)
39	Hamworthy Aquarius™-EC BWMS, the Netherlands (subsequently changed to Aquarius™-EC BWMS)	Hamworthy Water Systems Ltd.	5 October 2012 (MEPC 64)
40	OceanDoctor Ballast Water Management System, China	Jiujiang Precision Measuring Technology Research Institute	5 October 2012 (MEPC 64)
41	HS-BALLAST Ballast Water Management System, Republic of Korea	HWASEUNG R&A Co., Ltd.	5 October 2012 (MEPC 64)
42	GloEn-Saver™ Ballast Water Management System, Republic of Korea	PANASIA Co., Ltd.	5 October 2012 (MEPC 64)
43	Van Oord Ballast Water Management System, the Netherlands	Van Oord B.V.	17 May 2013 (MEPC 65)
44	REDOX AS Ballast Water Management System, Norway	REDOX Maritime Technologies AS	17 May 2013 (MEPC 65)
45	BlueZone™ Ballast Water Management System, Republic of Korea	SUNBO INDUSTRIES Co., Ltd., DSEC Co., Ltd., and the Korean Institute of Machinery & Material (KIMM)	17 May 2013 (MEPC 65)
46	ECOLCELL BTs Ballast Water Management System, Italy	Azienda Chimica Genovese (ACG)	4 April 2014 (MEPC 66)

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47	Ecomarine-EC Ballast Water Management System, Japan	Ecomarine Technology Research Association	4 April 2014 (MEPC 66)
48	ATPS-BLUEsys Ballast Water Management System, Japan	Panasonic Environmental Systems & Engineering Co., Ltd.	4 April 2014 (MEPC 66)
49	KURITA™ Ballast Water Management System, Japan	Kurita Water Industries Ltd.	4 April 2014 (MEPC 66)
50	ElysisGuard ballast water management system, Singapore	KALF Engineering Pte. Ltd.	17 October 2014 (MEPC 67)
51	NK-CI BlueBallast System, Republic of Korea	NK Company Ltd.	15 May 2015 (MEPC 68)
52	ECS-HYCHLORTM System, Republic of Korea	TECHCROSS Inc.	15 May 2015 (MEPC 68)
53	ECS-HYCHEM™ System, Republic of Korea	TECHCROSS Inc.	15 May 2015 (MEPC 68)
54	ECS-HYBRID™ System, Republic of Korea	TECHCROSS Inc.	15 May 2015 (MEPC 68)
55	VARUNA Ballast Water Treatment System, Republic of Korea	Kadalneer Technologies Pte. Ltd.	15 May 2015 (MEPC 68)
56	ClearBal BWMS, Denmark	University of Strathclyde	28 October 2016 (MEPC 70)
57	MICROFADE II BWMS, Netherlands	Kashiwa Co., Ltd. and Kuraray Co., Ltd	7 July 2017 (MEPC 71)
58	Envirocleanse inTank™ BWTS, Norway	Envirocleanse, LLC	7 July 2017 (MEPC 71)

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Table 3: Ballast water management systems that make use of Active Substances which received Final Approval from IMO.

Number	Name of the system and proposing country	Name of manufacturer	Date of Final Approval
1	PureBallast System, Norway	Alfa Laval/Wallenius Water AB	13 July 2007 (MEPC 56)
2	SEDNA® Ballast Water Management System (Using Peraclean® Ocean), Germany	Degussa GmbH, Germany	4 April 2008 (MEPC 57)
3	Electro-Cleen™ System, Republic of Korea	Techcross Ltd. and Korea Ocean Research and Development Institute (KORDI)	10 October 2008 (MEPC 58)
4	OceanSaver® Ballast Water Management System, Norway	OceanSaver AS	10 October 2008 (MEPC 58)
5	RWO Ballast Water Management System (CleanBallast), Germany	RWO GmbH Marine Water Technology, Germany	17 July 2009 (MEPC 59)
6	NK-O3 BlueBallast System (Ozone), Republic of Korea	NK Company Ltd., Republic of Korea	17 July 2009 (MEPC 59)
7	Hitachi Ballast Water Purification System (ClearBallast), Japan	Hitachi, Ltd. /Hitachi Plant technologies, Ltd.	17 July 2009 (MEPC 59)
8	Greenship Sedinox Ballast Water Management System, the Netherlands	Greenship Ltd	17 July 2009 (MEPC 59)
9	GloEn-Patrol™ Ballast Water Management System, Republic of Korea	Panasia Co., Ltd.	26 March 2010 (MEPC 60)
10	Resource Ballast Technologies System, South Africa	Resource Ballast Technologies (Pty) Ltd.	26 March 2010 (MEPC 60)
11	JFE BallastAce® Ballast Water Management System, Japan	JFE Engineering Corporation	26 March 2010 (MEPC 60)
12	Hyundai Heavy Industries Co., Ltd. (HHI) Ballast Water Management System (EcoBallast), Republic of Korea	Hyundai Heavy Industries Co., Ltd., Republic of Korea	26 March 2010 (MEPC 60)
13	Special Pipe Hybrid Ballast Water Management System combined with Ozone treatment version (SP-Hybrid BWMS Ozone version), Japan	Mitsui Engineering & Shipbuilding Co., Ltd.	1 October 2010 (MEPC 61)
14	"ARA Ballast" Ballast Water Management System, Republic of Korea	21st Century Shipbuilding Co., Ltd.	1 October 2010 (MEPC 61)
15	BalClor Ballast Water Management System, China	Qingdao Sunrui Corrosion and Fouling Control Company	1 October 2010 (MEPC 61)

16	OceanGuard™ Ballast Water Management System, Norway	Qingdao Headway Technology Co., Ltd.	1 October 2010 (MEPC 61)
17	Ecochlor® Ballast Water Management System, Germany	Ecochlor Inc, Acton, the United States	1 October 2010 (MEPC 61)
18	Severn Trent De Nora BalPure® Ballast Water Management System (subsequently changed to BalPure® BP-500), Germany	Severn Trent De Nora (STDN), LLC	1 October 2010 (MEPC 61)
19	HiBallast Ballast Water Management System, Republic of Korea	Hyundai Heavy Industries Co., Ltd.	15 July 2011 (MEPC 62)
20	Purimar Ballast Water Management System, Republic of Korea	Samsung Heavy Industries Co., Ltd.	15 July 2011 (MEPC 62)
21	SiCURE™ Ballast Water Management System, Germany	Siemens Water Technologies	2 March 2012 (MEPC 63)
22	ERMA FIRST Ballast Water Management System (subsequently changed to ERMA FIRST BWTS), Greece	ERMA FIRST E.S.K. Engineering Solutions S.A.	2 March 2012 (MEPC 63)
23	MICROFADE™ Ballast Water Management System, Japan	Kuraray Co., Ltd.	2 March 2012 (MEPC 63)
24	AquaStar™ Ballast Water Management, Republic of Korea (subsequently changed to AquaStar™ BWMS and MACGREGOR WATER BALLAST TREATMENT SYSTEM)	AQUA Eng. Co.	2 March 2012 (MEPC 63)
25	Neo-Purimar™ Ballast Water Management System, Republic of Korea	Samsung Heavy Industries Co., Ltd. (SHI)	2 March 2012 (MEPC 63)
26	DESMI Ocean Guard BWMS, Denmark	DESMI Ocean Guard A/S	5 October 2012 (MEPC 64)
27	JFE BallastAce that makes use of NEO-CHLOR MARINETM, Japan	JFE Engineering Corporation	5 October 2012 (MEPC 64)
28	Smart Ballast BWMS, Republic of Korea	STX Metal Co., Ltd.	5 October 2012 (MEPC 64)
29	AQUARIUS® EC Ballast Water Management System, the Netherlands	Wärtsilä Water Systems Limited	17 May 2013 (MEPC 65)
30	EcoGuardian™ Ballast Water Management System, Republic of Korea	Hanla IMS Co., Ltd.	17 May 2013 (MEPC 65)
31	OceanDoctor BWMS, China	Jiujiang Precision Measuring Technology Research Institute and Institute of Marine Materials Science	17 May 2013 (MEPC 65)

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		and Engineering of Shanghai Maritime University	
32	Ballast Water Management System with PERACLEAN® OCEAN (SKY-SYSTEM), Japan	Nippon Yuka Kogyo Co., and Katayama Chemical, Inc.	4 April 2014 (MEPC 66)
33	Evonik Ballast Water Treatment System with PERACLEAN® OCEAN, Germany	Evonik Industries AG	4 April 2014 (MEPC 66)
34	MARINOMATE™ Ballast Water Management System, Republic of Korea	KT Marine Co. Ltd.	17 October 2014 (MEPC 67)
35	BlueZone™ Ballast Water Management System, Republic of Korea	SUNBO Industries Co. Ltd.	17 October 2014 (MEPC 67)
36	KURITA Ballast Water Management System, Japan	Kurita Water Industries Ltd.	17 October 2014 (MEPC 67)
37	Ecomarine-EC Ballast Water Management System, Japan	Ecomarine Technology Research Association	15 May 2015 (MEPC 68)
38	ECS-HYCHLORTM System, Republic of Korea	TEHCROSS Inc.	22 April 2016 (MEPC 69)
39	NK-CI BlueBallast System, Republic of Korea	NK Company Ltd.	22 April 2016 (MEPC 69)
40	ATPS-BLUESys Ballast Water Management System, Japan	Panasonic Environmental Systems & Engineering Co., Ltd.	22 April 2016 (MEPC 69)
41	ECS-HYCHEM™ System, Republic of Korea	TEHCROSS Inc.	28 October 2016 (MEPC 70)
42	ECS-HYBRID™ System, Republic of Korea	TEHCROSS Inc.	7 July 2017 (MEPC 71)

Table 4: Ballast water management systems which received Type Approval Certification by their respective Administrations (resolutions MEPC.175(58) and MEPC.228(65)).

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Number	Approval Date	Name of the Administration	Name of the ballast water management system	Copy of Type Approval Certificate	Active Substance employed	MEPC report granting Final Approval
1	June 2008	Det Norske Veritas, on behalf of the Norwegian Administration	PureBallast System	Provided (MEPC 61/INF.3)	Yes, please refer to MEPC 56/2/2, annex 5	MEPC 56/23, paragraph 2.8
2	10 June 2008	Federal Maritime and Hydrographic Agency, Germany	SEDNA® Ballast Water Management System (Using Peraclean® Ocean)	Provided (MEPC 58/INF.17)	Yes, please refer to MEPC 57/2/10, annex 7	MEPC 57/21, paragraph 2.16
3	2 September 2008 19 January 2010	Office of the Maritime Administration, Marshall Islands Merchant Shipping Directorate of Malta	NEI Treatment System VOS-2500-101	Available at request Provided (BWM.2/Circ.25)	No Active Substances used according to the communication received from the Administration of Marshall Islands (Letter of 10 Dec. 2008) Please refer to circular BWM.2/Circ.25	Not applicable Not applicable
4	31 December 2008	Ministry of Land, Transport and Maritime Affairs, Republic of Korea	Electro-Cleen™ System	Provided (MEPC 59/INF.6)	Yes, please refer to MEPC 58/2/7, annex 7	MEPC 58/23, paragraph 2.8
5	17 April 2009	Det Norske Veritas, on behalf of the Norwegian Maritime Directorate	OceanSaver® Ballast Water Management System	Provided (MEPC 59/INF.17 and MEPC 62/INF.15)	Yes, please refer to MEPC 58/2/8, annex 4	MEPC 58/23, paragraph 2.10
6	24 November 2009	Ministry of Land, Transport and Maritime Affairs, Republic of Korea	NK-O3 BlueBallast System (Ozone)	Provided (MEPC 60/INF.14)	Yes, please refer to MEPC 59/2/16, annex 6	MEPC 59/24, paragraph 2.8.
7	4 December 2009	Ministry of Land, Transport and Maritime Affairs, Republic of Korea	GloEn-Patrol™ Ballast Water Management System	Provided (MEPC 61/2/19)	Yes, please refer to MEPC 60/2/11, annex 4	MEPC 60/22, paragraph 2.7
8	5 March 2010	Ministry of Land, Infrastructure, Transport and Tourism of Japan	Hitachi Ballast Water Management System (ClearBallast)	Provided (MEPC 61/INF.21)	Yes, please refer to MEPC 59/2/19, annex 4	MEPC 59/24, paragraph 2.8
9	26 May 2010 and 25 March 2011	Inspection and Measurement Division, Maritime Bureau, Ministry of Land, Infrastructure, Transport and Tourism of Japan	JFE BallastAce® Ballast Water Management System	Provided (MEPC 62/INF.25)	Yes, please refer to MEPC 60/2/12, annex 5	MEPC 60/22, paragraph 2.7

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10	1 September 2010	Federal Maritime and Hydrographic Agency, Germany	CleanBallast® 500-1 ballast water management system (formerly named RWO Ballast Water Management System (CleanBallast))	Provided (MEPC 67/INF.29)	Yes, please refer to MEPC 59/2/16, annex 5	MEPC 59/24, paragraph 2.8
11	28 January 2011	China Maritime Safety Administration	BalClor™ Ballast Water Management System	Provided (MEPC 62/INF.29)	Yes, please refer to MEPC 61/2/15, annex 9	MEPC 61/24, Paragraph 2.7.3
12	19 April 2011 Renewal 18 January 2013	The South African Department of Transport The South African Department of Transport	Resource Ballast Technologies System	Provided (MEPC 62/INF.18) Provided (MEPC 65/INF.26)	Yes, please refer to MEPC 60/2/11, annex 7	MEPC 60/22, paragraph 2.7
13	29 April 2009	Lloyd's Register, as delegated by the Administration of the United Kingdom	Hyde GUARDIAN™ ballast water management system	Provided (MEPC 59/INF.20)	No Active Substances used according to the communication received from the Administration of United Kingdom (please refer to MEPC 59/INF.20)	Not applicable
14	12 November 2009	Det Norske Veritas, on behalf of the Norwegian Maritime Directorate	OptiMarin Ballast System (OBS)	Provided (MEPC 61/INF.4)	No Active Substances used according to the communication received from the Administration of Norway (please refer to MEPC 61/INF.4)	Not applicable
15	16 February 2011	China Maritime Safety Administration	Blue Ocean Shield Ballast Water Management System	Provided (MEPC 62/INF.28)	No Active Substances used according to the communication received from the Administration of China (please refer to MEPC 62/INF.28)	Not applicable
16	10 March 2011	Det Norske Veritas, on behalf of the Norwegian Maritime Directorate	PureBallst 2.0 and PureBallast 2.0 Ex	Provided (MEPC 62/INF.14)	No Active Substances used according to the communication received from the Administration of Norway (please refer to MEPC 62/INF.14)	Not applicable

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17	16 March 2011	The Ministry of Land, Transport and Maritime Affairs, Republic of Korea	EcoBallast Ballast Water Management System (Hyundai Heavy Industries Co., Ltd.)	Provided (MEPC 63/INF.5)	Yes, please refer to MEPC 59/2/16, annex 8	MEPC 60/22, paragraph 2.13
18	28 March 2011	China Maritime Safety Administration	BSKYTM Ballast Water Management System	Provided (MEPC 62/INF.30)	No Active Substances used according to the communication received from the Administration of China (please refer to MEPC 62/INF.30)	Not applicable
19	29 April 2011	Federal Maritime and Hydrographic Agency, Germany	Ocean Protection System® OPS-250	Provided (MEPC 67/INF.27)	No Active Substances used according to the communication received from the Administration of Germany (please refer to MEPC 67/INF.27)	Not applicable
20	6 June 2011	Inspection and Measurement Division, Maritime Bureau, Ministry of Land, Infrastructure, Transport and Tourism of Japan	FineBallast® OZ (the Special Pipe Hybrid Ballast Water Management System combined with Ozone treatment version)	Provided (MEPC 63/INF.12)	Yes, please refer to MEPC 61/2/15, annex 6	MEPC 61/24, paragraph 2.7
21	27 July 2011	Federal Maritime and Hydrographic Agency, Germany	BalPure® BP-500	Provided (MEPC 64/INF.20)	Yes, please refer to MEPC 61/2/21, annex 7	MEPC 61/24, paragraph 2.7
22	6 August 2011	Office of the Maritime Administrator, Republic of the Marshall Islands	NEI Treatment System VOS-500 to VOS-6000	Available at request	No Active Substances used according to the communication received from the Administration of Marshall Islands (Letter of 9 August 2011)	Not applicable
23	31 October 2011	The Ministry of Land, Transport and Maritime Affairs, Republic of Korea	PurimarTM System	Provided (MEPC 63/INF.6)	Yes, please refer to MEPC 62/2/18, annex 6	MEPC 62/24, paragraph 2.5
24	7 November 2011	Det Norske Veritas, on behalf of the Norwegian Maritime Directorate	OceanGuardTM Ballast Water Management System	Provided (MEPC 65/INF.2)	Yes, please refer to MEPC 61/2/21, annex 5	MEPC 61/24, paragraph 2.7

25	4 November 2011	Federal Maritime and Hydrographic Agency, Germany	Ecochlor® Ballast Water Treatment System, Series 75	Provided (MEPC 67/INF.26)	Yes, please refer to MEPC 61/2/21, annex 6	MEPC 61/24, paragraph 2.7
26	11 November 2011	The Ministry of Land, Transport and Maritime Affairs, Republic of Korea	HiBallast™ Ballast Water Management System	Provided (MEPC 63/INF.4)	Yes, please refer to MEPC 62/2/18, annex 5	MEPC 62/24, paragraph 2.5
27	22 December 2011	Det Norske Veritas, on behalf of the Norwegian Maritime Directorate	OceanSaver® Ballast Water Management System	Provided (MEPC 64/INF.4)	Yes, please refer to MEPC 58/2/8, annex 4	MEPC 58/23, paragraph 2.10
28	10 May 2012 Amended 15 January 2015	Hellenic Republic, Ministry of Development, Competitiveness and Shipping, General Secretariat of Shipping, Merchant Ships Inspection General Directorate, Design and Construction Directorate	ERMA FIRST BWTS	Provided (MEPC 64/INF.26) Amended (MEPC 68/INF.19)	Yes, please refer to MEPC 63/2/11, annex 5	MEPC 63/23, paragraph 2.7
29	30 May 2012	Inspection and Measurement Division, Maritime Bureau, Ministry of Land, Infrastructure, Transport and Tourism of Japan	MICROFADE™ Ballast Water Management System	Provided (MEPC 64/INF.17)	Yes, please refer to MEPC 63/2/11, annex 6	MEPC 63/23, paragraph 2.7
30	12 June 2012	China Maritime Safety Administration	Cyeco™ Ballast Water Management System	Provided (MEPC 64/INF.12)	No Active Substances used according to the communication received from the Administration of China (please refer to MEPC 64/INF.12)	Not applicable
31	15 June 2012	The Ministry of Land, Transport and Maritime Affairs, Republic of Korea	AquaStar™ Ballast Water Management System (subsequently changed to AquaStar™ BWMS and MACGREGOR WATER BALLAST TREATMENT SYSTEM)	Provided (MEPC 64/INF.18)	Yes, please refer to MEPC 63/2/11, annex 7	MEPC 63/23, paragraph 2.7
32	12 July 2012	The Ministry of Land, Transport and	ARA PLASMA BWTS Ballast Water	Provided (MEPC 64/INF.33)	Yes, please refer to MEPC 61/2/15, annex 8	MEPC 61/24,

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		Maritime Affairs, Republic of Korea	Management System			paragraph 2.7
33	27 August 2012	Federal Maritime and Hydrographic Agency, Germany	BallastMaster ultraV 250 ballast water management system (formerly named AquaTriComb BW 250)	Provided (MEPC 67/INF.28)	No Active Substances used according to the communication received from the Administration of Germany (please refer to MEPC 67/INF.28)	Not applicable
34	20 September 2012	The Norwegian Maritime Authority	CrystalBallast® Ballast Water Management System	Provided (MEPC 65/INF.13)	No Active Substances used according to the communication received from the Administration of Norway (please refer to MEPC 65/INF.13)	Not applicable
35	7 November 2012	The Danish Maritime Authority and the Danish Nature Agency	DESMI Ocean Guard OxyClean Ballast Water Management System	Provided (MEPC 65/INF.5)	Yes, please refer to MEPC 64/2/6, annex 4	MEPC 64/23, paragraph 2.6
36	12 December 2012	The Norwegian Maritime Authority	MMC Ballast Water Management System	Provided (MEPC 66/INF.9)	No Active Substances used according to the communication received from the Administration of Norway (please refer to MEPC 66/INF.9)	Not applicable
37	20 December 2012	The Netherlands Ministry of Infrastructure and the Environment	Wärtsilä AQUARIUS® UV ballast water management system	Provided (MEPC 65/INF.11)	No Active Substances used according to the communication received from the Administration of the Netherlands (please refer to MEPC 65/INF.11)	Not applicable
38	5 February 2013	China Maritime Safety Administration	BALWAT Ballast Water Management System	Provided (MEPC 66/INF.15)	No Active Substances used according to the communication received from the Administration of China (please refer to MEPC 66/INF.15)	Not applicable
39	5 June 2013	French Ministry of Ecology Sustainable Development and Energy	BIO-SEA® Ballast Water Treatment System	Provided (MEPC 66/INF.10)	No Active Substances used according to the communication	Not applicable

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					received from the Administration of France (please refer to MEPC 66/INF.10)	
40	26 June 2013	Inspection and Measurement Division, Maritime Bureau, Ministry of Land, Infrastructure, Transport and Tourism of Japan	JFE BallastAce	Provided (MEPC 66/INF.30)	Yes, please refer to MEPC 64/2/7, annex 5	MEPC 64/23, paragraph 2.6
41	22 August 2013	China Maritime Safety Administration	HY™-BWMS	Provided (MEPC 66/INF.14)	No Active Substances used according to the communication received from the Administration of China (please refer to MEPC 66/INF.14)	Not applicable
42	10 October 2013	China Maritime Safety Administration	NiBallast™ Ballast Water Management System	Provided (MEPC 66/INF.12)	No Active Substances used according to the communication received from the Administration of China (please refer to MEPC 66/INF.12)	Not applicable
43	4 November 2013	China Maritime Safety Administration	Cyeco™ Ballast Water Management System	Provided (MEPC 66/INF.16)	No Active Substances used according to the communication received from the Administration of China (please refer to MEPC 66/INF.16)	Not applicable
44	5 November 2013	Inspection and Measurement Division, Maritime Bureau, Ministry of Land, Infrastructure, Transport and Tourism of Japan	FineBallast MF	Provided (MEPC 66/INF.28)	No Active Substances used according to the communication received from the Administration of Japan (please refer to MEPC 66/INF.28)	Not applicable
45	14 November 2013	The Norwegian Maritime Authority	KBAL Ballast Water Management System	Provided (MEPC 65/INF.12)	No Active Substances used according to the communication received from the Administration of	Not applicable

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					Norway (please refer to MEPC 65/INF.12)	
46	2 December 2013	China Maritime Safety Administration	Seascope Ballast Water Management System	Provided (MEPC 66/INF.13)	No Active Substances used according to the communication received from the Administration of China (please refer to MEPC 66/INF.13)	Not applicable
47	20 December 2013	The Norwegian Maritime Authority	Trojan Marinex™ Ballast Water Management System	Provided (MEPC 67/INF.6)	No Active Substances used according to the communication received from the Administration of Norway (please refer to MEPC 67/INF.6)	Not applicable
48	24 February 2014	Federal Maritime and Hydrographic Agency (BSH)	SeaCURE BWMS SC-1500/1	Provided (MEPC 69/INF.13)	No Active Substances used according to the communication received from the Administration of Germany (please refer to MEPC 69/INF.13)	MEPC 63/23, paragraph 2.7
49	27 March 2014	Inspection and Measurement Division, Maritime Bureau, Ministry of Land, Infrastructure, Transport and Tourism of Japan	Miura BWMS ballast water management system	Provided (MEPC 67/INF.20)	No Active Substances used according to the communication received from the Administration of Japan (please refer to MEPC 67/INF.20)	Not applicable
50	30 April 2014	Federal Maritime and Hydrographic Agency, Germany	Cathelco Ballast Water Management System – A2	Provided (MEPC 67/INF.30)	No Active Substances used according to the communication received from the Administration of Germany (please refer to MEPC 67/INF.30)	Not applicable
51	18 June 2014	Inspection and Measurement Division, Maritime Bureau, Ministry of Land, Infrastructure,	ECOMARINE ballast water management system	Provided (MEPC 67/INF.21)	No Active Substances used according to the communication received from the Administration of Japan (please	Not applicable

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		Transport and Tourism of Japan			refer to MEPC 67/INF.21)	
52	30 June 2014	The Norwegian Maritime Authority	Alfa Laval PureBallast 3.0 Ballast Water Management System	Provided (MEPC 67/INF.5)	No Active Substances used according to the communication received from the Administration of Norway (please refer to MEPC 67/INF.5)	Not applicable
53	11 July 2014	China Maritime Safety Administration	PACT marine™ Ballast Water Management System	Provided (MEPC 68/INF.5)	No Active Substances used according to the communication received from the Administration of China (please refer to MEPC 68/INF.5)	Not applicable
54	5 September 2014	The Danish Maritime Authority and The Danish Nature Agency	RayClean™ BWTS	Provided (MEPC 68/INF.10)	No Active Substances used according to the communication received from the Administration of Denmark (please refer to MEPC 68/INF.10)	Not applicable
55	21 October 2014	Inspection and Measurement Division, Maritime Bureau, Ministry of Land, Infrastructure, Transport and Tourism of Japan	SKY-SYSTEM®	Provided (MEPC 68/INF.28)	Yes, please refer to MEPC 66/2/7, annex 4 and Corr.1	MEPC 66/21, paragraph 2.5
56	17 November 2014	China Maritime Safety Administration	OceanDoctor® Ballast Water Management System	Provided (MEPC 68/INF.4)	Yes, please refer to MEPC 65/2/19, annex 7	MEPC 65/22 paragraph 2.8
57	5 January 2015	The Danish Maritime Authority and The Danish Nature Agency	Bawat™ BWMS	Provided (MEPC 68/INF.9)	No Active Substances used according to the communication received from the Administration of Denmark (please refer to MEPC 68/INF.9)	Not applicable
58	27 January 2015	China Maritime Safety Administration	AHEAD®-BWMS ballast water management system	Provided (MEPC 69/INF.2)	No Active Substances used according to the communication received from the	Not applicable

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					Administration of China (please refer to MEPC 68/INF.2)	
59	6 February 2015	United Kingdom, Maritime & Coastguard Agency	Coldharbour GLD™ Ballast Water Management System, incorporating types SeaGuardian™ IGG500 to IGG6000	Provided (MEPC 68/INF.27)	No Active Substances used according to the communication received from the Administration of the United Kingdom (please refer to MEPC 68/INF.27)	Not applicable
60	28 February 2015	China Maritime Safety Administration	YP-BWMS ballast water management system	Provided (MEPC 69/INF.5)	No Active Substances used according to the communication received from the Administration of China (please refer to MEPC 69/INF.5)	Not applicable
61	8 May 2015	Ministry of Oceans and Fisheries of Republic of Korea	EcoGuardian™ Ballast Water Management System	Provided (MEPC 69/INF.31)	No Active Substances used according to the communication received from the Administration of the Republic of Korea (please refer to MEPC 69/INF.31)	MEPC 65/22, paragraph 2.8
62	8 September 2015	Ministry of Oceans and Fisheries of the Republic of Korea	BlueZone™ Ballast Water Management System	Provided (MEPC 69/INF.32)	No Active Substances used according to the communication received from the Administration of the Republic of Korea (please refer to MEPC 69/INF.32)	MEPC 67/20, paragraph 2.6
63	12 September 2015	China Maritime Safety Administration	NiBallast™ Ballast Water Management System	Provided (MEPC 69/INF.3)	No Active Substances used according to the communication received from the Administration of China (please refer to MEPC 69/INF.3)	Not applicable
64	19 November 2015	Netherlands Shipping Inspectorate,	Van Oord Ballast Water Management System	Provided (MEPC 69/INF.15)	No Active Substances used according to the	Please see MEPC 65/22,

		Ministry of Infrastructure and the Environment			communication received from the Administration of Norway (please refer to MEPC 69/INF.15)	paragraph 2.5
65	21 December 2015	China Maritime Safety Administration	Seascope® Ballast Water Management System	Provided (MEPC 69/INF.4)	No Active Substances used according to the communication received from the Administration of China (please refer to MEPC 69/INF.4)	Not applicable
66	23 December 2015	French Ministry of Ecology Sustainable Development and Energy	BIO-SEA® Ballast Water Treatment System (BWTS); Models BIO-SEA *30-55, BIO-SEA *30-87, BIO-SEA *60-55, BIO-SEA *60-87 and BIO-SEA *90-87	Provided (MEPC 70/INF.24)	No Active Substances used according to the communication received from the Administration of France (please refer to MEPC 70/INF.24)	Not applicable
67	11 January 2016	China Maritime Safety Administration	LeesGreen® Ballast Water Management System	Provided (MEPC 70/INF.5)	No Active Substances used according to the communication received from the Administration of China (please refer to MEPC 70/INF.5)	Not applicable
68	15 April 2016	China Maritime Safety Administration	PACT Marine™ Ballast Water Management System	Provided (MEPC 70/INF.4)	No Active Substances used according to the communication received from the Administration of China (please refer to MEPC 70/INF.4)	Not applicable
69	27 July 2016	Singapore	Semb-Eco LUV 500 ballast water management system	Provided (MEPC 70/INF.22)	No Active Substances used according to the communication received from the Administration of Singapore (please refer to MEPC 70/INF.22)	Not applicable
70	12 January 2017	Singapore	Semb-Eco LUV 500 & Semb-Eco LUV 500 ballast water	Provided (MEPC 71/INF.12)	No Active Substances used according to the communication	Not applicable

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			management system		received from the Administration of Singapore (please refer to MEPC 71/INF.12)	
71	13 January 2017	Inspection and Measurement Division, Maritime Bureau, Ministry of Land, Infrastructure, Transport and Tourism of Japan	KURITA BWMS	Provided (MEPC 71/INF.26)	Yes, please refer to MEPC 67/2/4, annex 6	
72	19 March 2017	Netherlands Shipping Inspectorate, Ministry of Infrastructure and the Environment	Damen InvaSave 300	Provided (MEPC 71/INF.4)	No Active Substances used according to the communication received from the Administration of the Netherlands (please refer to MEPC 71/INF.4)	Not applicable
73	30 March 2017	Inspection and Measurement Division, Maritime Bureau, Ministry of Land, Infrastructure, Transport and Tourism of Japan	ATPS-BLUEsys	Provided (MEPC 71/INF.27)	Yes, please refer to MEPC 69/4/5, annex 6	

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Appendix E

Baffinland's Sustainable Development Policy

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BAFFINLAND SUSTAINABLE DEVELOPMENT POLICY

At Baffinland Iron Mines Corporation (Baffinland), we are committed to conducting all aspects of our business in accordance with the principles of sustainable development & corporate responsibility and always with the needs of future generations in mind. Baffinland conducts its business in accordance with the Universal Declaration of Human Rights and ArcelorMittal's Human Rights Policy which applies to all employees and affiliates globally.

Everything we do is underpinned by our responsibility to protect the environment, to operate safely and fiscally responsibly and with utmost respect for the cultural values and legal rights of Inuit. We expect each and every employee, contractor, and visitor to demonstrate courageous leadership in personally committing to this policy through their actions. The Sustainable Development and Human Rights Policy is communicated to the public, all employees and contractors and it will be reviewed and revised as necessary on a regular basis. These four pillars form the foundation of our corporate responsibility strategy:

1. Health and Safety
2. Environment
3. Upholding Human Rights of Stakeholders
4. Transparent Governance

1.0 HEALTH AND SAFETY

- We strive to achieve the safest workplace for our employees and contractors; free from occupational injury and illness, where everyone goes home safe everyday of their working life. Why? Because our people are our greatest asset. Nothing is as important as their health and safety. Our motto is "Safety First, Always".
- We report, manage and learn from injuries, illnesses and high potential incidents to foster a workplace culture focused on safety and the prevention of incidents.
- We foster and maintain a positive culture of shared responsibility based on participation, behaviour, awareness and promoting active courageous leadership. We allow our employees and contractors the right to stop any work if and when they see something that is not safe.

2.0 ENVIRONMENT

- Baffinland employs a balance of the best scientific and traditional Inuit knowledge to safeguard the environment.
- Baffinland applies the principles of pollution prevention, waste reduction and continuous improvement to minimize ecosystem impacts, and facilitate biodiversity conservation.
- We continuously seek to use energy, raw materials and natural resources more efficiently and effectively. We strive to develop more sustainable practices.
- Baffinland ensures that an effective closure strategy is in place at all stages of project development to ensure reclamation objectives are met.

3.0 UPHOLDING HUMAN RIGHTS OF STAKEHOLDERS

- We respect human rights, the dignity of others and the diversity in our workforce. Baffinland honours and respects the unique cultural values and traditions of Inuit.
- Baffinland does not tolerate discrimination against individuals on the basis of race, colour, gender, religion, political opinion, nationality or social origin, or harassment of individuals freely employed.
- Baffinland contributes to the social, cultural and economic development of sustainable communities in the North Baffin Region.
- We honour our commitments by being sensitive to local needs and priorities through engagement with local communities, governments, employees and the public. We work in active partnership to create a

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shared understanding of relevant social, economic and environmental issues, and take their views into consideration when making decisions.

- We expect our employees and contractors, as well as community members, to bring human rights concerns to our attention through our external grievance mechanism and internal human resources channels. Baffinland is committed to engaging with our communities of interest on our human rights impacts and to reporting on our performance.

4.0 TRANSPARENT GOVERNANCE

- Baffinland will take steps to understand, evaluate and manage risks on a continuing basis, including those that may impact the environment, employees, contractors, local communities, customers and shareholders.
- Baffinland endeavours to ensure that adequate resources are available and that systems are in place to implement risk-based management systems, including defined standards and objectives for continuous improvement.
- We measure and review performance with respect to our safety, health, environmental, socio-economic commitments and set annual targets and objectives.
- Baffinland conducts all activities in compliance with the highest applicable legal & regulatory requirements and internal standards.
- We strive to employ our shareholder's capital effectively and efficiently and demonstrate honesty and integrity by applying the highest standards of ethical conduct.

4.1 FURTHER INFORMATION


Please refer to the following policies and documents for more information on Baffinland's commitment to operating in an environmentally and socially responsible manner:

Health, Safety and Environment Policy
 Workplace Conduct Policy
 Inuktitut in the Workplace Policy
 Site Access Policy
 Hunting and Fishing (Harvesting) Policy
 Annual Report to Nunavut Impact Review Board

If you have questions about Baffinland's commitment to upholding human rights, please direct them to contact@baffinland.com.



Brian Penney
 Chief Executive Officer
 March 2016

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Appendix F
Transport Canada – Canadian Ballast Water
Reporting Form



Transport Canada / Transports Canada

CANADIAN BALLAST WATER REPORTING FORM (30 TANKS)

St. Lawrence Seaway

Voie maritime du Saint-Laurent



The information collected under the authority of the Department of Transport Act (R.S.C., 1985, c. T-18), Canada Shipping Act, 2001, Ballast Control and Management Regulations, 2011, and in accordance with the Privacy Act

Date of submission (yyyy-mm-dd): _____ Time of submission (24:00 UTC): _____ Amended Form: Yes No

1. VESSEL INFORMATION		2. VOYAGE INFORMATION			3. BALLAST WATER USAGE AND CAPACITY			
Vessel name:	Arrival port:	State/Province:	Country:					
IMO number:	Arrival date (yyyy-mm-dd):			Total ballast water on board				
Owner:	Agent:			Volume	Units	Number of tanks in ballast	Number of holds in ballast	
Type:	Last port:	Country:			m ³			
Gross tonnage:	Next port:		Country:		Total ballast water capacity			
Date of construction (yyyy-mm-dd):	Next port (2):		Country:		Volume	Units	Vessel's ballast management plan	
Flag:	Next port (3):		Country:			m ³	Total number of tanks	Total number of holds

4. BALLAST WATER MANAGEMENT

Ballast water managed according to: D-1 and/or D-2 Total number of ballast water tanks/holds to be discharged: _____

How many tanks/holds have undergone exchange? _____ How many tanks/holds have been treated using a Ballast Water Management System? _____

Specify Ballast Water Management System used, if any (Manufacturer, Model): _____

How many tanks/holds have not been managed? _____ State the reason why no management was conducted: _____

Approved Ballast Water Management Plan on board? Yes No Management Plan implemented? Yes No Ballast Water Record Book on board? Yes No

Does vessel carry an International Ballast Water Management Certificate? Yes No Date of Issue (yyyy-mm-dd): _____ Expiry Date (yyyy-mm-dd): _____

Authority that issued Certificate: _____ Place of issue: _____

Date required to meet Regulation D-2 (yyyy-mm-dd): _____ Ballast water regulations on board? Yes No Applicable regulation: _____

5. BALLAST WATER HISTORY: Record all ballast tanks/holds regardless of ballast water intentions on Page 2 & 3 (Ballast water sources are the last uptakes prior to any ballast water management practices).

6. (a) NAME OF MASTER:	6. (b) E-MAIL:	6. (c) PHONE NUMBER:
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5. BALLAST WATER HISTORY: RECORD ALL TANKS/HOLDS REGARDLESS OF BALLAST WATER INTENTIONS (Ballast water sources are the last uptakes prior to any ballast water management practices).

Vessel name				IMO number				Arrival date (yyyy-mm-dd)									
Tanks / Holds List multiple sources / tanks separately	BW SOURCES BEFORE MANAGEMENT				BW MANAGEMENT PRACTICES								PROPOSED BW DISCHARGE				
	Tank capacity (m ³)	Date (yyyy-mm-dd)	Port or latitude & longitude	Volume (m ³) on arrival	Date (yyyy-mm-dd)	Start point ¹ latitude & longitude	End point ¹ latitude & longitude	Used ¹ Volume (m ³)	% ¹ Exch	D-1 Method	D-2 <input type="checkbox"/>	Wave height (m)	Salinity (units) ppt	Date (yyyy-mm-dd)	Port or latitude & longitude	Volume (m ³)	Salinity (units) ppt
											<input type="checkbox"/>						
											<input type="checkbox"/>						
											<input type="checkbox"/>						
											<input type="checkbox"/>						
											<input type="checkbox"/>						
											<input type="checkbox"/>						
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											<input type="checkbox"/>						
											<input type="checkbox"/>						
											<input type="checkbox"/>						
											<input type="checkbox"/>						
											<input type="checkbox"/>						

Ballast Water Tank Codes: Forepeak = FP, Double Bottom = DB, Wing = WT, Topside = TS, Afterpeak = AP, Cargo Hold = CH, Other = O.
 Methods: Sequential = SM, Flow Through = FTM, Dilution = DM, Retention = R, Port Reception Facility = PRF, No Management = NM, Potable Water = PW, Salt Water Flushing = SWF

¹ Complete columns only if exchange was conducted.



5. BALLAST WATER HISTORY: RECORD ALL TANKS/HOLDS REGARDLESS OF BALLAST WATER INTENTIONS (Ballast water sources are the last uptakes prior to any ballast water management practices).

Vessel name				IMO number				Arrival date (yyyy-mm-dd)									
Tanks / Holds list multiple sources / tanks separately	BW SOURCES BEFORE MANAGEMENT				BW MANAGEMENT PRACTICES						PROPOSED BW DISCHARGE						
	Tank capacity (m ³)	Date (yyyy-mm-dd)	Port or latitude & longitude	Volume (m ³) on arrival	Date (yyyy-mm-dd)	Start point ¹ latitude & longitude	End point ¹ latitude & longitude	Used ¹ Volume (m ³)	% ¹ Exch	D-1 Method	D-2 <input type="checkbox"/>	Wave height (m)	Salinity (units) ppt	Date (yyyy-mm-dd)	Port or latitude & longitude	Volume (m ³)	Salinity (units) ppt
											<input type="checkbox"/>						
											<input type="checkbox"/>						
											<input type="checkbox"/>						
											<input type="checkbox"/>						
											<input type="checkbox"/>						
											<input type="checkbox"/>						
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											<input type="checkbox"/>						
											<input type="checkbox"/>						
											<input type="checkbox"/>						

Ballast Water Tank Codes: Forepeak = FP, Double Bottom = DB, Wing = WT, Topside = TS, Afterpeak = AP, Cargo Hold = CH, Other = O, Methods: Sequential = SM, Flow Through = FTM, Dilution = DM, Retention = R, Port Reception Facility = PRF, No Management = NM, Potable Water = PW, Salt Water Flushing = SWF

¹ Complete columns only if exchange was conducted.





- **D – 1 method (SM, FTM, DM, R, PRF, NM, PW or SWF):** Indicate, using the drop down menu, the management method using the appropriate code (SM = sequential method, FTM = flow through method, DM = dilution method, R = retention method, PRF = port reception facility, NM = no management, PW = potable water, SWF = salt water flushing).
- **D – 2 method:** Select this check box in the case where ballast water on board was treated using the D-2 method (ballast water treatment system).
- **Wave Height (m):** Estimate the sea height in meters at the time of the ballast water exchange. (Note: this is the combined height of the wind-sea and swell, and does not refer to water depth).
- **Salinity (units) ppt:** Indicate the salinity of the ballast water in the tanks after the exchange was completed, with units in parts per thousand (ppt).
 - If the vessel does NOT have a refractometer on board to determine the salinity, tables converting specific gravity to salinity are available for download at the following NOAA link: http://www.greatlakes-seaway.com/en/pdf/NOAA_conversion_table_tm-139%5B1%5D.pdf

Proposed BW Discharge:

- Complete columns under the general heading of “Proposed BW Discharge” **ONLY** if de-ballasting will take place in waters under Canadian jurisdiction.
- If the amount of ballast water to be discharged is different from the amount proposed, then an amended BWRF is to be submitted. Please check the “Yes” in the first line on the form to indicate that this form is an Amended form for this voyage.
- **Date:** Record the date of the proposed ballast water discharge. Enter the date by using the drop down calendar; otherwise, all dates should be entered in the format of yyyy-mm-dd (separating year, month and date by a “-”).
- **Port or latitude & longitude:** Report the location of the proposed ballast water discharge as either port or latitude & longitude. For latitude & longitude, please use the format dd mm.m or ddd mm.n (Latitude examples: 56 32.5 N or 56.32.5 S; Longitude examples: 016 25.9 W or 159 42.3 E). *No abbreviations for port.*
- **Volume (m³):** Report the expected volume of ballast water to be discharged in cubic metres. Do not enter “Depends on cargo operations” or similar statements. If the actual amount discharged is significantly different from the proposed ballast water discharge, then an amended form must be submitted.
- **Salinity (units) ppt:** Indicate the salinity of the ballast water to be discharged in parts per thousand (ppt).
 - If the vessel does NOT have a refractometer on board to determine the salinity, tables converting specific gravity to salinity are available for download at the following NOAA link: http://www.greatlakes-seaway.com/en/pdf/NOAA_conversion_table_tm-139%5B1%5D.pdf

SECTION 6. TITLE

- Enter the name of the master, the vessels contact email addresses and phone number.

INSTRUCTIONS FOR FILLING OUT THE CANADIAN BALLAST WATER REPORTING FORM: 85-0512

GENERAL

- All entries should be typed and follow the guidance as provided in these instructions.
- Enter the date by using the drop down calendar, otherwise all dates should be entered in the format of yyyy-mm-dd (separating year, month and date by a "-").
- The dates and sources of **ALL** ballast tanks are to be recorded whether empty, having residuals or ballasted regardless of ballasting or de-ballasting intentions.
- Pursuant to section 14 of the Canadian "*Ballast Water Control and Management Regulations*" it is requested that whenever possible, the ballast water reporting form be submitted as soon as ballast water management process is completed.
- This form is available in three (3) configurations – for a vessel with 20, 30 and 50 tanks. Please use the shortest form which allows for the total number of tanks and holds recorded in the vessel's ballast water management plan (BWMP).
- You can save the data typed into this form on your computer for your records. The ballast water reporting form is to be sent as an "Active" PDF to facilitate data inputting. Forms which have been "scanned" and then attached will NOT be accepted. The data contained in these "Scanned" forms cannot be entered into the database and therefore the vessel will be required to re-submit as an "Active" PDF.

SUBMISSION

- **Date of submission:** Enter the date by using the drop down calendar, otherwise, all dates should be entered in the format of yyyy-mm-dd (separating year, month and date by a "-").
- **Time of submission (UTC):** Enter the time that the report will be sent (UTC) using the 24 hour clock format.

AMENDED FORMS

- Check "Yes" if this is an amended reporting form or "No" if it is not. Amended reports are to be submitted if there are any changes to the original ballast water reporting form. This could include changes in the "Arrival Date", "Arrival Port" or planned ballast discharges. An amended report is to be submitted if the actual ballast discharged is different from the originally reported discharge.

SECTION 1 - VESSEL INFORMATION

- **Vessel name:** Enter the name of the vessel.
- **IMO number:** Enter the IMO number of the vessel.

- **Owner:** Enter the name of the registered owner(s) of the vessel. If under charter, enter the name of the operator.
- **Type:** Enter specific vessel type using the following: Bulker, RoRo, Container, Passenger, Chemical Carrier, General Cargo, Reefer, Combo, Oil Tanker, Product Tanker, LNG Carrier, etc. Write out any additional vessel types not listed.
- **Gross tonnage:** Enter the gross tonnage of the vessel.
- **Date of construction:** Enter the year the keel was laid – enter only the year as yyyy.
- **Flag:** Enter the full name of the country under whose authority the ship is operating. *No abbreviations will be accepted.*

SECTION 2. VOYAGE INFORMATION

- **Arrival port:** Enter the name of the arrival port along with the state/province the port is in and the country (Canada or United States). *No abbreviations.*
- **Province/State:** Enter the name of the province or state for the arrival port. *No abbreviations.*
- **Country:** Enter the country of the arrival port at which the vessel will call. *No abbreviations.*
- **Arrival date:** Enter the scheduled arrival date to the above port. Enter the date by using the drop down calendar, otherwise, all dates should be entered in the format of yyyy-mm-dd (separating year, month and date by a "-").
- **Agent:** Enter the name of the agent used for the "Arrival port".
- **Last port:** Enter the last port at which the vessel called. *No abbreviations.*
- **Country of Last port:** Enter the country of the last port at which the vessel called. *No abbreviations.*
- **Next port:** Enter the port at which the vessel will call immediately after departing the "Arrival port". If next port is unknown, enter "Unknown". If vessel will continue operations at another berth(s) in the arrival port, then enter the same as in "Arrival port". *No abbreviations.*
- **Country of Next port:** Enter the country of the "Next port" at which the vessel will call. *No abbreviations.*
- **Next port (2):** Enter the port at which the vessel will call immediately after departing the "Next port". If the "Next port (2)" is unknown, enter "Unknown". *No abbreviations.*



- **Country of Next port (2):** Enter the country of the “Next port (2)” at which the vessel will call. If the country of “Next port (2)” is unknown, enter “Unknown”. *No abbreviations.*
- **Next port (3):** Enter the port at which the vessel will call immediately after departing the “Next port (2)”. If the “Next port (3)” is unknown, enter “Unknown”. *No abbreviations.*
- **Country of Next port (3):** Enter the country of the “Next port (3)” at which the vessel will call. If the country of “Next port (3)” is unknown, enter “Unknown”. *No abbreviations.*

SECTION 3. BALLAST WATER USAGE AND CAPACITY

Total ballast water on board:

- **Volume:** Enter the total volume of ballast water on board, upon arrival at the “Arrival port” listed in Section 2. Volume to be recorded should be in cubic meters (m³) only. Do not include potable water.
- **Number of tanks in ballast:** Enter the number of ballast tanks with ballast, when the vessel arrives at the “Arrival port” listed in Section 2. Do not include tanks carrying only residual ballast water or sediment. If no tanks in ballast, please enter “0”.
- **Number of holds in ballast:** Enter the number of holds with ballast, when the vessel arrives at the “Arrival port” listed in Section 2. Do not include holds carrying only residual ballast water or sediment. If no holds in ballast, please enter “0”.

Total Ballast Water Capacity:

- **Volume:** Enter the maximum volume of ballast water which can be carried as documented in the vessel’s ballast water management plan. Volume to be recorded should be in cubic meters (m³) only.
- **Vessel’s ballast management plan:**
 - **Total number of tanks:** Enter the number of tanks designed to carry ballast water, as listed in the ballast water management plan for the vessel.
 - **Total number of holds:** Enter the number of holds designed to carry ballast water, as listed in the ballast water management plan for the vessel.

SECTION 4. BALLAST WATER MANAGEMENT:

- **Ballast water managed according to D-1 and/or D-2:** Indicate whether ballast water on this trip was managed using D-1 only or D-2 only or D-1 and D-2.
- **Total number of ballast water tanks/holds to be discharged:** Enter the number of tanks and holds with ballast to be discharged into waters under Canadian jurisdiction or into an approved reception facility. Count all tanks and holds separately (e.g. port and starboard tanks should be counted separately). Include all tanks and holds designed to carry ballast water.
- **How many tanks/holds have undergone exchange?** Enter the number of tanks/holds that have undergone exchange.
- **How many tanks have been treated using a Ballast Water Management System?** Enter the number of tanks in which the ballast water has been treated using a Ballast Water Management System.
- **Specify Ballast Water Management System used, if any (Manufacturer, Model):** In case that the vessel is equipped with an approved Ballast Water Treatment System, provide the name of the manufacturer and the model of the system.
- **How many tanks/holds have not been managed?** Enter the number of ballast water tanks that contain ballast that have not been managed.
- **State the reason why no ballast water management was conducted:** This applies to all tanks and holds that have not been exchanged or treated using a Ballast Water Treatment System and are intended to be discharged into waters under Canadian jurisdiction or into an approved reception facility.
- **Approved Ballast Water Management Plan on board?** Is there a written document on board, specific to this vessel, describing the procedure for ballast water management? This should include the procedures for the safe and effective management of ballast water. If the vessel is fitted with a ballast water management system, full details for the operation and maintenance are to be made available (usually provided by vessel's owner, operator, or by vessel's Flag Administration or Class). Check "Yes" or "No".
- **Management Plan implemented?** Was the ballast water management plan followed? Check "Yes" or "No". When "Yes" is checked, shipboard personnel should be able to demonstrate their familiarity with the plan during any inspection by Canadian officials.
- **Ballast Water Record Book on board?** Is there a document on board that is the ballast water record book in which all management procedures of ballast water on board are recorded? Check "Yes" or "No".
- **Does vessel carry an International Ballast Water Management Certificate?** Check "Yes" or "No". A copy of the certificate should be on board of the vessel for inspection. The certificate referred to may indicate that the vessel complies with either Regulation D-1 or D-2 or both. If your vessel carries a Statement or Certificate of Compliance with the BW Convention indicate "Yes".

**CANADIAN BALLAST WATER REPORTING FORM: 85-0512**

- **Date of Issue (yyyy-mm-dd)** (separating year, month and date by a "-"). The date on which the International Ballast Water Management Certificate was issued.
- **Expiry date (yyyy-mm-dd)** (separating year, month and date by a "-"). The date on which the International Ballast Water Management Certificate expires.
- **Authority that issued the Certificate.** Provide the name of the authority that issued the International Ballast Water Management Certificate/or Statement of Compliance.
- **Place of issue.** Provide the name of the place where the International Ballast Water Management Certificate was issued.
- **Date required to meet Regulations D-2 (yyyy-mm-dd)** (separating year, month and date by a "-"). Provide the date on which the vessel has to meet the D-2 ballast water standard.
- **Ballast Water Regulations on board? :** Check "Yes" or "No".
- **Applicable regulation:** If "Yes", use the drop down list to enter the version: SOR 2011-237 of the "*Ballast Water Control and Management Regulations*", or US 33 CFR part 151 C and D or both which you have on board.
 - If you do not have a copy of the "*Ballast Water Control and Management Regulations*" or do not have on board the latest version (SOR 2011-237), it may be downloaded at the following web address: <http://laws-lois.justice.gc.ca/PDF/SOR-2011-237.pdf>
 - If you do not have a copy of the "Part 151 – Vessels carrying oil, noxious liquid substances, garbage, municipal or commercial waste, and ballast water" it may be downloaded at the following web address:
<https://www.ecfr.gov/cgi-bin/text-idx?SID=29a1c2e98fe506c369a95af1475b7ed3&mc=true&node=pt33.2.151&rgn=div5>

SECTION 5. BALLAST WATER HISTORY

- Record all tanks/holds regardless of ballast water intentions on page 2 and 3 (Ballast water sources are the last uptakes prior to any ballast water management practices).
- Follow each tank across the page listing the original source (s) of the ballast under "**BW Source before Management**", all management events under "**BW Management Practices**", and all discharge events under "**Proposed BW Discharge**" separately. Please note, that the columns for BW Management Practices marked with an (!) are to be filled out ONLY if an exchange (Sequential, Flow Through, Dilution or Salt Water Flushing) of ballast water was conducted.
- If no discharges are planned for this trip, columns 15 to 18 are to remain blank.

Ballast Water Source:

- **Tanks/Holds list multiple sources/tanks separately:** Please list all tanks and holds (write out, or use FP=Forepeak; DB=Double bottom; WT=Wing tank; TS=Topside; AP=Aftpeak; CH=Cargo hold; O=Other). *List all BW sources for the same tank on separate lines.*
- **Tank capacity:** Enter the full volumetric capacity of the tank in cubic meters (m³).
- **Date:** Enter the date of the last ballast water uptake, PRIOR to any BW management. Enter the date by using the drop down calendar, otherwise, all dates should be entered in the format of yyyy-mm-dd (separating year, month and date by a "-").
- **Port or latitude & longitude:** Enter the location of the last ballast water uptake. This will be the position/port of last ballast uptake PRIOR to any management, or the "End Point" from an exchange carried out on a previous voyage. For position (latitude and longitude), please use the format dd mm.m or ddd mm.m (Latitude examples: 56 32.5 N or 56 32.5 S; Longitude examples: 016 25.9 W or 159 42.3 E). *No abbreviations for ports. Please include the country also.*
- **Volume (m³) on arrival:** Enter the volume of ballast water in the tank, in cubic meters (m³) on arrival at the port entered in Section 2 "Arrival Port".

Ballast Water Management Practices (exchange only):

- **For ballast water management by exchange:** Fill in all data in columns under the general heading of "BW Management Practices".
- **Date:** Enter the date of ballast water management. Enter the date by using the drop down calendar, otherwise, all dates should be entered in the format of yyyy-mm-dd (separating year, month and date by a "-"). If the exchange occurred over several days, enter the day when the ballast water management was completed.
- **Start point latitude & longitude:** Enter the location of the starting point of the ballast water management practice. Please use the format dd mm.m or ddd mm.m. (Latitude examples: 56 32.5 N or 56 32.5 S; Longitude examples: 016 25.9 W or 159 42.3 E).
- **End point latitude & longitude:** Enter the location of end point of the ballast water management practice. Please use the format dd mm.m or ddd mm.m. (Latitude examples: 56 32.5 N or 56 32.5 S; Longitude examples: 016 25.9 W or 159 42.3 E).
- **Used Volume (m³):** Enter total volume of water used for ballast water management for that tank in cubic metres (m³).
- **% Exch:** Percentage of tanks volumetric capacity used to exchange: (Note: for effective flow through exchange, this value should be at least 300%).

$$\% \text{ Exchange} = \frac{\text{Total Volume of water moved by "Sequential", moved by "Flow-Through", or used in "Salt Water Flushing"}}{\text{Capacity of Ballast Tank or Hold}}$$