Australian Government
Department of Agriculture, Fisheries and Forestry
Biosecurity

National Seaports Program

Australian Ballast Water Management Requirements

Version 5

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Contents

Introduction

On 1 July 2001, Australia introduced mandatory ballast water management requirements (the requirements) to reduce the risk of introducing harmful aquatic organisms into Australia's marine environment through ballast water from international vessels.

These requirements are enforceable under the *Quarantine Act 1908.*

Background

The Australian Quarantine and Inspection Service (AQIS) is the lead agency of the Australian Government for the regulation of ballast water taken up by international vessels. AQIS is responsible for ensuring that foreign ballast water intended for discharge inside Australia's territorial sea (the area within 12 nautical miles of the Australian coastal baseline) has been managed in accordance with Australia's requirements.

Ballast water that has been exchanged at sea by an approved method is deemed to be acceptable for discharge in Australian ports / waters.

Ballast water reporting and management verification form an integral part of the requirements.

The requirements are consistent with the International Maritime Organisation (IMO) Ballast Water Convention that aims to minimise the translocation of harmful aquatic species in ships' ballast water and ballast tank sediments.

There are some practical refinements in the Australian requirements that are not identified in the IMO guidelines. Mariners are advised to take notice of these refinements, which are under the heading 'Practical Considerations'.

During ballast water exchanges, the safety of a vessel and its' crew are of paramount importance. Mariners undertaking ballast water management to comply with Australian requirements must pay primary attention to the safety of the vessel and crew at all times.

This particularly applies to vessels using the Sequential Exchange (Empty / Refill) method. Vessel stability, stresses and sloshing at every stage of a planned operation including the 'half full tank' situation must be pre-calculated before execution of the planned operation.

Mandatory Ballast Water Management Requirements

The discharge of high-risk ballast water in Australian ports or waters is prohibited.

All internationally plying vessels intending to discharge ballast water anywhere inside the Australian territorial sea are required to manage their ballast water in accordance with Australia's mandatory ballast water management requirements.

High Risk Ballast Water

Australian Government Requirements

AQIS deems all salt water from ports and coastal waters outside Australia's territorial sea to be a 'high-risk' and capable of introducing exotic marine pests into Australia.

The discharge of high-risk ballast water from ships is prohibited anywhere inside Australia's territorial sea.

Ballast water of the following types is deemed by AQIS to be 'low-risk':

- Fresh potable water sourced from a municipal water supply, with supporting documentation - Relative Density 1.002 or less at 15oC and 1000 hPa atmospheric pressure
- Ballast water that has been exchanged at an approved location (mid-ocean) by an approved method
- Ballast water of which at least 95 per cent was taken up in mid-ocean
- Ballast water of which at least 95 per cent was taken up inside Australia's territorial sea.

Australian State/Territory Government Requirements

AQIS does not regulate the management of ballast water taken up within Australia's territorial sea and domestic ports. This is managed by the State or Territory Government agencies responsible for the port location.

Victoria, one of seven Australian states / territories, has additional requirements for the management of Australian sourced domestic ballast water which are enforced by the Victorian State Government Environment Protection Authority (EPA) under the *Environment Protection Act 1970*.

Victoria's requirements regulate the management of ballast water taken up within Australia's territorial sea and within domestic ports. The Victorian EPA requires all vessels intending to visit a Victorian port to submit a ballast water report form and log detailing the origin of all ballast water on board. No domestic ballast water discharge is permitted in Victorian waters unless approval has been granted by the EPA in writing.

If domestic ballast water is intended to be discharged within Victorian waters (12nm off the coast) and ports, it must be managed in accordance with the Victorian requirements which can be viewed and downloaded from the Victorian EPA website Victorian EPA Ballast Water.

The Victorian EPA maintains a 24 hour helpline for ballast water enquiries and can be contacted by phone on +61 3 9695 2547.

However, AQIS retains the responsibility for the regulation of foreign sourced ballast water in Victorian ports.

For every vessel visiting Australia, it is the Master's responsibility to ascertain what additional State / Territory Government ballast water management requirements, over and above the AQIS requirements must be met for each Australian port on their vessel's itinerary.

Ballast Water Management Options

The IMO Ballast Water Convention requires all vessels to have onboard a 'Ballast Water Management Plan' specifically for that vessel. The vessels' 'Ballast Water Management Plan' must provide detailed instructions for the ships' crew to manage ballast water safely with due regard to weather, vessel stresses and vessel stability and sloshing*. The management of all ballast water must be undertaken in accordance with that plan. The Convention also requires vessels to maintain a 'Ballast Water Record Book' to record the management of all ballast water taken up and discharged by the vessel.

Mariners may use any of the following ballast water management options which have been approved by AQIS.

1. Non-discharge of 'high-risk' ballast water in Australian ports or waters

Vessels that do not intend to discharge any ballast water in Australian waters are not legally required to carry out any management of foreign ballast water. The carriage of high-risk ballast water into the territorial sea is strongly discouraged by AQIS.

Mariners are cautioned that AQIS will only grant permission to discharge high-risk ballast inside Australian waters where there is a clear and immediate safety risk to the vessel and crew, and it is not possible for the vessel to be safely diverted beyond Australia's territorial sea to conduct a ballast water exchange. AQIS will assess such circumstances on a case by case basis.

Vessel Masters are advised to manage all ballast water on board a vessel as if it will have to be discharged in Australian waters. In the event of unforeseen circumstances, whereby it becomes necessary to discharge some ballast water, Masters must obtain written permission from AQIS prior to discharging any ballast water. Permission may be granted, provided the ballast water in question has been properly managed prior to arrival in Australian waters.

Vessels that repeatedly fail to manage all ballast water prior to entering the territorial sea may be required, at their own expense, to employ independent marine surveyors on arrival and departure, from every Australian port of call to formally certify that no high-risk ballast water has been discharged during the vessel's visit to Australia.

2. Tank-to-tank transfers

While the carriage of high risk ballast water into the Australian territorial sea is legal, AQIS strongly discourages vessel Masters from doing so. It is also permissible to move high-risk ballast water around between tanks within a vessel inside the territorial sea.

Masters of vessels who undertake tank to tank transfers of ballast water must be vigilant to ensure that the risk of unauthorised ballast discharging during the transfer operation is assessed and managed appropriately. Severe penalties apply under s78 of the *Quarantine Act 1908* for the unauthorised discharge of ballast water in Australian waters. Additional penalties may also apply under State Government EPA legislation.

Car Carriers

Australia recognises that purpose built car carriers and other specialist vessels may have difficulty in conducting exchanges of all ballast water due to stability / stress considerations. In recognition that car carriers would not usually need to discharge ballast water in Australian ports / waters, AQIS recommends that this type of vessel exchanges ballast water in the following types of tank.

- Tanks that need to be discharged inside Australia's territorial sea
- Tanks that may need to be transferred within the vessel to compensate for changes to trim or list caused by cargo operations. Both source and target tanks intended to be used for transfers must contain only low risk ballast water so that in the event of accidental overflows, only low-risk ballast water will escape into the Australian marine environment.

3. Full Ballast Water Exchange at Sea

- Sequential exchange (empty/refill) method
- Flow-through exchange method
- Dilution exchange method.

Each of the above methods have been tested and results demonstrate that if carried out correctly, are capable of achieving the necessary 95% (or better) volumetric exchange of high-risk ballast water. Ballast water exchanges must be conducted outside the Australian territorial sea. It is also recommended that ballast exchanges be conducted as far away as possible from any land mass and in water at least 200m deep.

Sequential Exchange (empty / refill) Method

This method involves emptying tanks (one or two or a few at a time) of high-risk ballast water at sea before refilling them with clean water from the deep ocean. It is important to ensure that the ballast mix achieved by this method contains no more than 5% of high-risk ballast water.

Not all ships are able to empty ballast tanks at sea due to considerations of stability, stress and sloshing[1]. Masters should verify that their ships' design parameters for stress, stability and sloshing will not be compromised at any stage of a planned sequential exchange operation.

The reduction in positive stability caused by free surface effect in slack tanks during sequential exchanges must be taken into account by mariners using this method.

Flow-through Exchange Method

At least 300% of a tank's maximum capacity[2] of clean water from the deep ocean must be pumped into each tank to achieve an acceptable 95% volumetric exchange.

Even when, at the start of a flow through operation, a tank is only partially filled with high-risk ballast water, at least 300% of the tank's maximum capacity* must still be pumped into the tank to comply with Australian requirements. The 300% capacity is measured from when water begins to flow into a tank. In the case of a tank that is not completely full at the commencement of a flow through operation, 300% of the tank's full capacity still starts to be measured from when pumping starts, not from when the tank starts to overflow.

1 ***Sloshing** – the official term for the movement of water in a slack tank. Such movement can be so violent as to cause damage to structural steelwork inside a vessels' tank.*

2 ***Maximum Capacity** – the volume contained by a tank when it is completely full. The IMO Convention refers to 'tank volume' and states that three times a tank's 'volume' must be flushed through. This has led to ambiguity and some vessels have only pumped in three times the 'contents' of a tank which is **not acceptable.***

Dilution Exchange Method

Some vessels, mainly tankers are fitted with extra piping / pumping arrangements. On some of these vessels, ballast may be pumped in through one side of a tank and out through the other side simultaneously (pumping in / pumping out, as opposed to pumping in / simply overflowing out).

This type of flushing using two pumps is acceptable. As for 'flow-through', at least 300% of each tank's maximum capacity must be flushed through for an acceptable exchange.

AQIS will verify that ballast exchanges have been carried out correctly in accordance with the law. The verification process involves an examination of real-time records about ballast exchange operations, which must be kept by the vessel.

Practical Considerations

Masters must pay attention to the following when conducting Sequential Exchanges

Soundings of tanks and corresponding residual volumes must be recorded at the end of the 'emptying phase' so that the make-up of the ballast mixture to be discharged in Australian waters can be verified by AQIS on arrival at an Australian port. The acceptable criterion for ballast water discharge is at least 95% managed water to a maximum of 5% unmanaged water in any mixture to be discharged.

Masters must pay attention to the following when conducting Flow-through Exchanges

Tanks may be flushed one at a time or in similar pairs. For example: Double Bottom Tanks 1 Port and Starboard may be pumped simultaneously using a single pressure source.

It is not acceptable to flush dissimilar pairs of tanks (e.g. DBT1 P and DBT 2S) together (see examples below).

The reason for this is that dissimilar tanks being flushed together using a single pressure source receive unequal quantities of water from the pump. Under these circumstances it is difficult to determine the volume of water supplied to each tank.

Flushing dissimilar tanks together does not comply with Australian requirements

Mariners should note that the use of two or more pumps simultaneously into common lines still constitutes a single pressure source!

Estimating the quantity of water flushed through each tank involves estimating the delivery rate of ballast pumps and timing the hours of running of those pumps. It should be noted that pumps do not deliver their rated capacity.

The actual delivery rate of a ship's ballast pump depends on the following factors:

- Wear and tear on pumps / pipes etc.
- Depth underwater of sea inlet (ship's draught)
- Horizontal and vertical distance of each tank from the pump (friction / gravity)
- Vessel trim (trim by stern = pump uphill = gravity to overcome)
- Variations in ballast main diameter.

To ensure that sufficient water has been flushed through a tank to satisfy Australian requirements, mariners must test and record their ballast pumps' delivery rates as follows:

The Fore Peak Tank (FPT) is the most distant tank from the ballast pumps on most vessels. Most FPTs have a portion above the waterline. Most ballast mains (pipes) incorporate a series of reductions in diameter and changes in direction between the pump and the FPT.

The combination of all of these factors leads to a particular pump on a particular vessel delivering less water per hour to the FPT than it would to any other tank on that vessel.

It is therefore recommended that mariners test their ballast pumps by filling the

forepeak from empty (as proven by a manual sounding) until it overflows, and timing the operation.

If more than one ballast pump is fitted, each pump should be tested separately. If two pumps are intended to be used together in flow through operations, a separate test using both pumps together should be conducted. The quantity delivered by two pumps operating together into a common line would usually be less than the sum of each pump's individual delivery rate. Since it would be unusual to use two pumps to fill up a FPT, the test of combined tanks would be acceptable if it is carried out on two other forward tanks, ideally above the waterline eg TSTs 1P and S.

Mariners are advised that if no acceptable pump testing has been documented, AQIS may deem a pump's delivery rate to be the original rated capacity minus 1% for every year of a ship's age.

A template for documenting ballast pump tests is available at Attachment 1.

Safety Considerations

Where full ballast water exchange has not been undertaken due to safety reasons (weather, sea conditions or operational impracticability), the Master should report this to AQIS as soon as possible prior to entering Australia's territorial sea. Under no circumstances should this information be sent to AQIS any later than the submission of the Quarantine Pre-Arrival Report (QPAR). The QPAR must be forwarded to AQIS between 12 and 96 hours prior to arrival from an overseas place at an Australian port. The QPAR is usually sent to AQIS via ships' local Australian agents.

Alternative Ballast Water Management Methods

Vessels wishing to use alternative methods for ballast water management that are not specified above should apply in writing to AQIS before the event. Vessels that cannot comply with the requirements due to design considerations should contact AQIS in writing before arrival in the territorial sea to seek further advice from the National Seaports Program Canberra.

Vessels arriving in Australian ports without having managed their ballast water by an approved method will be refused permission to discharge their ballast water in Australian ports or waters.

Ballast Water Reporting

All vessels arriving in Australia from international waters are required to submit a Quarantine Pre- Arrival Report (QPAR) to AQIS between 12-96 hours prior to entering Australian waters. The QPAR may be submitted electronically which is AQIS' preferred method of submission (eQPAR), or by email or fax (QPAR).

Masters / agents who do not submit the QPAR to AQIS will not be given formal quarantine clearance to enter port. This will cause delays to the vessel and additional AQIS charges will be incurred by the vessel.

The QPAR also requires Masters to declare whether or not they have complied with Australia's mandatory ballast water management requirements. All vessels require AQIS permission to discharge ballast water in Australian waters.

Masters must also complete the 'AQIS Ballast Water Management Summary' (AQIS form 26) with details about ballast water uptake ports, ocean exchanges and intended Australian discharge locations.

The AQIS Ballast Water Management Summary (ABWMS) is intended to summarise the real- time records of ballast water management conducted at sea. This form is required to be sent to AQIS pre-arrival with the QPAR if the vessel plans to discharge ballast water. Although not mandatory, AQIS prefers that ABWMS forms are also submitted with the QPAR to the Maritime National Coordination Centre (MNCC).

If details / intentions about the discharge of foreign sourced ballast water (as originally submitted to AQIS) changes for any reason, a revised ABWMS must be sent to the MNCC for verification prior to the vessel discharging any ballast water.

Once the ABWMS is received the MNCC will verify the ballast management of the vessel, and if compliant written permission to discharge will be granted by AQIS.

If the vessel Master / agent does not submit a completed ABWMS with the QPAR prior to arrival the vessel will not be permitted to discharge ballast in Australian waters until a physical inspection has occurred.

Completed originals of these forms including any comments by AQIS on the back of the form, must be retained on the vessel for a period of two years and provided to AQIS on request.

Verification Inspections

AQIS Officers will conduct ballast water verification inspections onboard vessels to ensure compliance with Australia's ballast water management requirements.

AQIS Officers will use the QPAR, the ABWMS and the vessel's deck, engineering and ballast water management logs to verify that the information supplied to AQIS is correct.

The verification inspection will take around 30 minutes to complete and in most cases will be conducted at the same time as a routine vessel inspection.

Tank stripping

Sediments from ballast tanks must not be discharged in Australian waters.

Ballast tank stripping using pumps that are permanent fixtures on a vessel is acceptable. The use of portable pumps to strip out ballast tanks is not permitted.

If ballast tank sediment is manually removed from tanks, the sedimentary material must not be dumped in Australian ports / waters. Sedimentary material from ballast tanks may be landed as quarantine waste in some Australian ports, or it can be dumped back into the sea in deep water, which is at least 200m deep and outside the 12nm limit but preferably beyond 200nm from land.

Ballast Water Exchange Calculations

Acceptable ballast water exchanges must achieve at least a 95% dilution of high-risk ballast water with clean seawater from the deep ocean.

1. Sequential Exchange (Empty / Refill) Operations

At least 95% of the water in a given tank must have been drawn from the deep ocean on arrival in Australia. Residual high-risk ballast that remains in a tank at the end of the 'emptying phase' of an exchange operation must be less than 5% of the total volume contained in the tank on arrival in Australian waters.

Masters must record a sounding and corresponding volume of residual water at the end of the 'emptying phase' of sequential exchange operations. Masters must also record times, dates, locations and methods used (gravity / pumps / combination of gravity and pumps) to empty and refill all tanks managed by this method.

2. Flow-through and Dilution Operations

300% of the full capacity of every tank exchanged by either of these methods must be pumped into the relevant tank using clean seawater from the deep ocean.

Critical to the efficiency of this method are the following:

- Only one similar pair of tanks may be flushed through simultaneously at any time
- Pumping hours to achieve the required 300% exchange should be calculated using the measured pumping rate of ballast pumps (as per the pump test described above) rather than the 'rated' pumping capacity of the new pumps as stated in manufacturers specifications. A pump's / piping system's efficiency usually decreases with age.

If a tank initially contains more than 5% of its full capacity of high-risk ballast water, 300% of the tanks full capacity must be pumped in to achieve the required 95% volumetric exchange.

Mariners are advised that 300% flushing is the minimum pumping requirement for ships using the flow-through or dilution methods. It is advisable to exceed the minimum requirement of 300% to be sure of achieving compliance with the requirements.

Further Advice & Information

Further information can be obtained by contacting AQIS.

Log on to our web site

Home page address: **www.aqis.gov.au/shipping**

Contact us

For further information on the process to manage ballast water in Australian waters please contact your local AQIS office.

Detailed Version History

The version information shown on the cover of this document relates to this version only. Previous document versions are outlined below:

ELECTRONIC LOCATION: INSERT FILE PATH TO ELECTRONIC LOCATION

VERSION	DATE	REASON FOR ISSUE	AUTHOR
5.3	1 August 2011	Review and update of document to reflect new BW management requirements.	Seaports Program
5.4	29 November 2011	Update 'Contact us' details	Seaports Program (Mila Jukic)

Attachment 1: Ballast Water Pump Test

Vessel Name:……..

Lloyds Number: Port of Registry: Date Launched: ……

ID of Ballast Pump(s) tested:……..

Original Rated Capacity of Pump(s) tested:

Details of Tank(s) used in test: ……

(Fore peak tank preferred for single pump tests, forward upper wing tanks preferred for testing combined pumps)

a) Maximum Tank Capacity (m3): ……

b) Initial contents (m3): ……..

c) Time start pumping: ……

d) Time tank overflowed: e) Hours Pumping (d – c): f) Volume pumped (a – b):

g) Pump's delivery rate: (f ÷ e) per Hour ……..

Master's Signature: ……

Chief Officer's Signature: ……

Ship's Stamp:

NOTE: Pumps must be tested at least every twelve months

Attachment 2: Examples of Ballast Water Exchange Calculations

Sequential Exchange

Calculation Example 1

A vessel has a Fore Peak ballast tank with full capacity 2000 m³. The vessel's Master wishes to arrive in an Australian port with the Fore Peak only half full (1000 m³). Regardless of how much 'high-risk' water is in the tank before the exchange, the water in the tank must be exchanged so that after refilling, not more than 5% of the resulting mixture in the tank is 'high-risk' water. After pumping out (when suction on the pump is lost), a sounding of the tank is taken and this shows that only 5 m³ remains.

In this situation, provided at least 95 m³ of deep ocean water is added to the FPT, the resultant mixture will be acceptable for discharge in Australian waters. The Master may fill the tank only to his desired volume of 1000 m³ and the ballast water in the tank requires no further management.

Calculation Example 2

A vessel has a centre line, double bottom tank beneath No.1 Cargo Hold (DB1C) with full capacity 6000 m³. The vessel's Master wishes to arrive in an Australian port with DB1C only filled to one third of its capacity (2000 m³).

After pumping out (when suction on the pump is lost), a sounding of the tank is taken and this shows that 250 m³ remains in the tank.

To achieve a 95% volumetric exchange in this tank, the Master has two options:

i) Fill the tank up to 5000 m³ and then pump out water until his desired level of 2000 m³ is reached.

ii) Strip the tank until only 100 m³ remains before refilling the tank to 2000 m³.

Flow-through / Dilution Calculations

A cape sized vessel (100,000 DWT) with nine cargo holds, has the following dedicated ballast tanks:

Tank / Hold	Capacity	Contents
Fore Peak	2000 m^3	1000 m^3
WBT 1P	3000 m^3	Full
WBT 1S	3000 m^3	Full
WBT 2P	4200 m^3	Full
WBT 2S	4200 m^3	Full
WBT 3P	3000 m^3	1200 m^3
WBT 3S	3000 m^3	Full
WBT 4P	4200 m^3	Full
WBT 4S	4200 m^3	Full
After Peak	1200 m^3	800 m^3

The ten-year-old vessel is fitted with two main ballast pumps each with a rated capacity of 2500 m^3/hr when the vessel was new. From pump tests, the Chief Officer is aware that each of these pumps now delivers about 2000 m^3/hr when used by itself or a total of 3700 m^3/hr when the pumps are used together.

Calculation Example 1

Fore peak tank (capacity 2000 m³) initially contains 1000 m³ of high-risk ballast water. Master wishes to exchange the tank's contents in mid-ocean using the flow through method.

300% of the tank's full capacity (i.e. 3 x 2000 m³) = 6000 m³.

Using only one pump, the Master must pump clean seawater into the tank for 3 hours. Using two pumps together, the required pumping time would be 6000 ÷ 3700 = 1.62hrs (1h 37mins)

1 Pump delivers 2000 m³/hr = 6000 m³ in 3 hrs = 300% of tank's FULL capacity.

2 Pumps deliver 3700 m³/hr = 6000 m³ in 1.62 hrs = 300% of tank's FULL capacity.

Calculation Example 2

Master wishes to use flow through method on WBT 1P, WBT 1S, WBT 2P and WBT 2S.

a) Acceptable

Using both ballast pumps together the master simultaneously flushes WBT 1P and 1S simultaneously for at least 4.86 hours (combined capacity of 1P&S = 6000 m³, 4.86 hours pumping @ 3700 m³/hr = 18000 m³ = 300% of each tank's full capacity).

After the ballast exchange in WBT 1P and S, those tanks are closed off and a new exchange begins on WBT 2P and S simultaneously. No.2s, with combined capacity of

8,400 m³ require a further 6.81 hrs flushing with both pumps simultaneously

b) Unacceptable

Master uses both pumps to flush WBT 1P&S and WBT 2P&S (combined capacity = 14,400) simultaneously for 11.68 hrs. The pumps deliver the same quantity of water in total but it is impossible to say how much water each tank received if this procedure is used. It is clear though that No.1s, being further from the pumps, will receive less than No.2s.