TAI CHONG CHEANG STEAMSHIP CO (SINGAPORE) PTE LTD

BALLAST WATER MANAGEMENT PLAN

M.V. "KHK VISION"
IMO No. 9323429
Singapore Flag

MANUAL REVISIONS

The following Revisions have been made to the Policy Manual which is indicated by the Revision Number and Date as shown on each page in the Header.

Revision Number	Revision Date	Pages Affected
Initial Version – 000 Revised	15-Oct-2020	Ballast Water Management Plan issued

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1.1 General

This plan is written in accordance with the requirements of regulation B-1 of the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (the convention) and the IMO 'Guidelines for Ballast Water Exchange (G6)' resolution MEPC.124(53) and 'Guidelines for Ballast Water Management and Development of Ballast Water Management Plan' resolution MEPC 127(53).

The purpose of the Manual 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.

1.2 Objective

The objective of this Plan is to provide safe and effective procedure to ballast water management onboard. To assist the ship Master and officers in minimizing the risk of introducing harmful aquatic organisms and pathogens from ships' ballast water and associated sediments, while maintaining ship safety.

To assist the Master and Officers onboard the ship in complying International and/or local regulations, about proper uptake of ballast water, exchanging ballast at sea and discharging of ballast water in port, either to reception facility or to over-board discharge.

1.3 Scope

This Ballast Water Management Plan applies to this specified vessel only.

1.4 Purpose

Ballast water is essential to control trim, list, draught, stability, or stresses of the ship. However, ballast water may contain aquatic organisms or pathogens, which, if introduced into the sea including estuaries, or into fresh water-courses, may create hazards to the environment, human health, property or resources, impair biological diversity or interfere with other legitimate uses of such areas.

Studies carried out in several countries have shown that many species of bacteria, plants and animals can survive in a viable form in the ballast water and sediment carried in ships, even after journeys of several weeks duration. Subsequent discharge of ballast water or sediment into the waters of port states may result in the establishment of colonies of harmful species and pathogens which can seriously upset the existing ecological balance. Although other methods have been identified by which organisms are transferred between geographically separated sea areas, ballast water discharge from ships appears to have been prominent among those identified.

The potential for ballast water discharge to cause harm has been recognised not only by the International Maritime Organization (IMO), but also by the World Health Organization, which is concerned about the role of ballast water as a medium for the spreading of epidemic disease bacteria.

The selected methods of ballast water management take into account the need to ensure that Ballast Water Management practices used to comply with this Convention do not cause greater harm than they prevent to the environment, human health, property or resources of any States and the safety of the ship.

It is estimated that at least 7,000 different species are being carried in ships' ballast tanks around the world. Studies carried out in several countries indicated that many species of bacteria, plants, and animals can survive in a viable form in the ballast water and sediment carried in ships, even after journeys of several months' duration.

Subsequent discharge of ballast water or sediment into the waters of port States may result in the establishment of harmful aquatic organisms and pathogens which may pose threats to indigenous human, animal and plant life, and the marine environment. When all factors are favourable, an introduced species by survive to establish a reproductive population in the host environment, it may even become invasive, out-competing native species and multiplying into pest proportions. Although other media have been identified as being responsible for transferring organisms between geographically separated water bodies, ballast water discharge from ships appears to have been among the most prominent.

As a result IMO has developed guidelines for the development and implementation of a Ballast Water Management on board ships aiming to assist Governments, appropriate authorities, ships masters, operators, owners and port authorities, as well as other interested parties, in preventing, minimising and ultimately eliminating the risk of introducing harmful aquatic organisms and pathogens from ships' ballast water and associated sediments while protecting ships' safety.

Good record keeping is critical to the success of a sound ballast water management program.

The appointed ballast water management officer is responsible for ensuring the maintenance of appropriate records and that ballast water management and/or treatment procedures are followed and recorded.

The function of the Ballast Water Management Plan is to assist in complying with IMO guidelines and quarantine measures intended to minimise the risk of transplanting harmful aquatic organisms and pathogens from ships' ballast water and associated sediments, while maintaining ship safety.

As part of this function the plan provides information to port state control and other authorised officers about a ship's ballast handling system, sampling points and ballast water management system.

The plan should not be used or regarded as a guide to ballasting.

1.5 Responsibility

It is the owners/operators or master's responsibility to regularly review the plan and ensure that the information contained therein is accurate and updated.

1.6 Revision

This Manual has been examined by vessel Class Society and no alteration or revision shall be made to any part of it without the prior approval of the Class.

This plan may be inspected on request by an authorised authority.

Changes to non-mandatory information in Appendices will not be required to be approved.

1.7 Exemption

Any exemption granted to vessel and what actions have been taken with regards to the vessel's ballast water must be recorded into the Ballast Water Reporting Book.

2.1 General

For the purpose of this Plan, the following definitions apply:

a) **Administration** means the Government of the State under whose authority the ship is operating.

b) **Convention** means International Convention for the Control and Management of Ships'Ballast Water and Sediments, 2004.

c) **Member States** means States that are members of the International Maritime Organization.

d) **Port State Authority** means any official or organization authorized by the Government of a port State to administer guidelines or enforce standard and regulation relevant to the implementation of national and international shipping control measures.

e) **Treatment** means a process or mechanical, physical, chemical or biological method to kill, remove or render infertile, harmful or potentially harmful organism within ballast water. (Not generally practiced by large vessels).

f) **Mid-Ocean** means waters that are more than **200 nautical miles from land and at least 200 meters deep.**

3.1 Ship's Brief Description

Name Of Vessel	M.T. "KHK VISION"
Official Number	391268
IMO Number	9323429
Call Sign	9 V D Z 4
Nationality/Flag	Republic of Singapore
Owner	Vanguard Carriers Pte. Ltd.
Operator or Manager	Tai Chong Cheang Steamship Co (Singapore) Pte Ltd 1 Raffles Place, #44-03 One Raffles Place, Singapore 048616
Charterer	Please refer to current charter party
Type Of Ship	Tanker
Hull Number	5268 - Daewoo Shipbuilding, Korea
Classification Society	American Bureau of Shipping (ABS)
Length Over-All (Loa)	332.0 meters
Length (Between Perpendicular)	320.0 meters
Breadth (Moulded)	58.0 meters
Depth (Moulded)	31.2 meters
Light Ballast Draft	F: 8.60 meters A: 11.00 meters
Deepest Ballast Draft (Emergency Ballast Condition)	F: 10.20 meters A: 13.35 meters
Summer Draft	20.8 meters
Summer Deadweight	306,000 Mtons
Gross Tonnage (G.R.T.)	158.557
Net Tonnage (N.R.T.)	110,072
Total Ballast Water Capacity	100,465.7 m^3
Cargo Oil Tank For Ballast	32,537.1 m^3, (Cargo Oil Tank No. 3-C)
Description Of Ballast Pumps	2 x 3,000 m^3 x 35MTH (Centrifugal Electric motor)
	400/600m^3/hr x110/45MTH (G.S. Pump)
Responsible Officer	Chief Officer (For ballast operation)
Main Ballast Water management method used.	Sequential Method

3.2 Ballast Tank Capacity

WATER BALLAST TANK CAPACITY			
Tank Description		Capacity m³	Total m³
Fore Peak Tank	C	4,071.50	4,071.50
Tank No. 1	P	8,575.60	17,151.20
Tank No. 1	S	8,575.60	
Tank No. 2	P	9,879.40	19,758.80
Tank No. 2	S	9,879.40	
Tank No. 3	P	9,969.00	19,938.00
Tank No. 3	S	9,969.00	
Tank No. 4	P	9,729.80	19,459.60
Tank No. 4	S	9,729.80	
Tank No. 5	P	8,913.90	17,866.60
Tank No. 5	S	8,952.70	
After Peak Tank	C	2,220.00	2,220.00
Total Water Ballast Onboard			100,465.7 m³

4.1 General

There is no need for ship's crew to take ballast sample before ship's arrival to the port. The Quarantine Officer of the arrival port shall decide whether a sample of currents ballast is needed. The crew shall assist in taking of samples.

It is recommended that the container to place the sample is clean and empty, free of any contaminants to ensure the quality of the sample.

A complete record must be entered in Ballast Water Handling Book which to includes the time and date, tank number, approximate quantity of samples taken from each sampling point. A receipt of the samples should be prepared and signed by Quarantine Officer and kept onboard.

The same record shall be entered into the Deck Log.

Taking ballast water sample from an enclosed space, the Responsible Officer, shall ensure that all safety procedures for "Entering in enclosed spaces" is observed, and the same safety warning should be advise to "authorized inspection officer" taking the sample.

Location of Sampling Point of this vessel is shown in the sketch of "Water Ballast Tank Arrangement" on Appendix X. The sample of ballast water can also be taken through the bilge sounding pipe, using specially designed "Sampling Tube". The location of these Bilge Sounding Pipes are shown in the drawing for "Air and Sounding System", Appendix XI.

4.2 Master's Obligation

The Master has a general obligation to provide reasonable assistance for the above monitoring and information pertaining to ballast arrangements and sampling points.

4.3 Port State

The Port State Authorities should indicate to the Master or responsible officer the purpose for which the sample is taken (i.e. monitoring, research or enforcement).

Port State Authorities may sample or require samples to analyse ballast water and sediment, before permitting a ship to discharge its ballast water.

When sampling for research or compliance monitoring, authorized officers (e.g. Port State Control) should give as much notice to the Master as possible that sampling will occur, to assist the Master in advance planning.

5.1 General

The necessity of pre-planning is to ensure that all safety considerations as addressed in Section 6 and 7 are in compliance with ballast exchange, ballast water treatment or other control options.

The need for ballast water exchange in open water shall be carefully examined and prepared in advance, in a similar manner and with the same degree of thoroughness to the preparation of a cargo plan.

All local and/or national regulations should be taken into consideration as they may specify other requirements such as different water depths and distances from land for carrying out the exchange.

A ship will not be required to deviate from its intended voyage or delay the voyage in order to comply with any particular requirement as stated above. In addition, if the master decides reasonably that an exchange would threaten the safety or stability of the ship, its crew or its passengers because of adverse weather, ship design or stress, equipment failure, or any other extraordinary condition, then, he is not required to comply with above paragraphs.

Requirements

The Convention requires that vessels should conduct ballast water exchange:

a) At least 200 miles from the nearest land and in water at least 200 m in depth; if this is not possible,

b) As far from the nearest land as possible, and in all cases at least 50 nm from the nearest land and in water at least 200 m in depth or

c) In sea areas designated by the Port State.

Methods of Ballast Water Exchange

There are three methods of Ballast Water exchange, which have been evaluated and accepted by the Organization. The three methods are the sequential method, the flow through method and the dilution method. The flow-through method and the dilution method are considered as “pump through” methods.

5.2 Preparation for Ballast Water Exchange

The Chief Officer shall prepare the ballast water exchange plan**,** specially for exchanging ballast water at sea, taking into account all safety concerns and requirement within the BWM. The completed plan shall be presented to Master for his guidance and/or approval.

In preparing the ballast water exchange plan, the ship’s approved loading instrument (Loading Computer) should be use to ensure that calculated shear forces and bending moments during every steps of ballast operations are always within the permissible strength limits of the ship.

Ballast water exchange operation shall be recorded in Ballast Water Reporting forms required by the Port State of arrival where the ballast water will be discharge.

Duration of ballast exchange should be computed and planned, that ballast operation shall be completed before the ship is affected by sudden change of weather, or is about to enter into an area where exchanging of ballast at sea is not allowed.

Forward draft should be greater than minimum forward draft of the loading manual. If this criteria is not fulfilled for some of the sequences during preparation of "Ballast Water Exchange Plan", the following note must be put on that plan for these sequences:

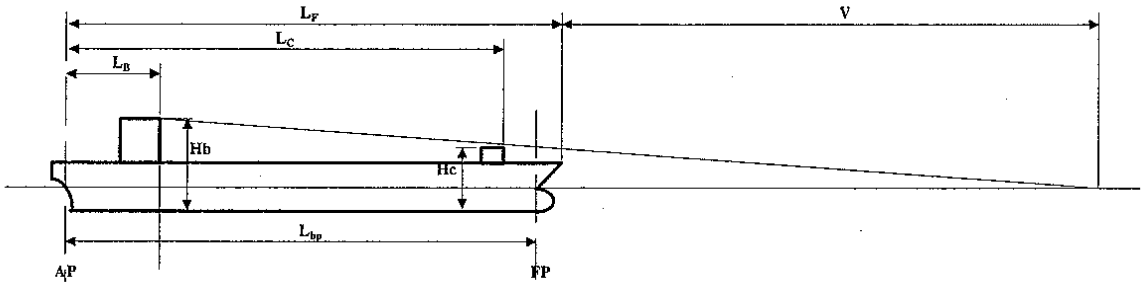
"Minimum forward draft is lower than minimum value of loading manual. The Master is to be advised that these sequences must be performed in calm conditions of weather. Routes to be chosen to absolutely avoid slamming".

Full immersion of the propeller should be ensured. If this criterion is not fulfilled for some sequences, the following note must be put on that plan for these sequences:

"Propeller immersion is not fulfilled. The master is to be advised that all necessary precautions will have to be taken during these sequences".

Bridge Visibility (Blind Forward Sector), as an indication of bridge visibility, the view of the sea surface forward of the bow from the conning position is to be not more than two ship lengths or **664** meters, which ever is the less. As per Panama Canal's Requirements, for ship in Ballast condition, to be not more than 1.5 ship lengths. It is recognized that not all ships can comply with SOLAS 1974, Chapter V Safety of Navigation, Regulation 22 Navigation bridge visibility. In such cases, ships are expected to comply in respect of forward view and blind sectors, as far as is practicable without structural alteration being required.

In the Ballast Water Notification form, when there is increased in the blind sector (Horizontal and/or vertical) vessel is to determine it is safe and if necessary to provide proper look lookout i.e. Stationed at the forecastle.



LOA	:	Length Overall (meters)
LBP	:	Length Between Perpendiculars (meters)
D	:	Depth meters (meters)
Dr	:	Draught at Amidship (meters)
LF	:	Horizontal distance from A.P. to vessel's forward end (meters)
LC	:	Horizontal distance from A.P. to forward and upper end of the foremost point (that effects the visibility) (meters)
LB	:	Horizontal distance from A.P. to forward point of Navigation Bridge (mtr)
Hb	:	Vertical distance from B.L. to the eyes of the Master in the Bridge (mtr)
Hc	:	Vertical distance from B.L. to forward, top side of the foremost point (mtr)
V	:	Forward Invisible Distance (meters)
Trim	:	Loading Condition Trim (meters)
LCF	:	Horizontal distance of Longitudinal Center of Flotation from Amidship(m)

Maximum allowable bridge invisible length forward, as per IMO Regulation V : 500 meters

Maximum allowable bridge invisible length forward, as per Panama Canal V : 274.48 meters

If SOLAS Chapter V, Reg. 22. criteria is not fulfilled for some sequences, the following note must be put on that plan for these sequences:

The master is to be advised that the visibility from the bridge will be reduced during the sequences and so the master, being aware of this point, will take the necessary action to compensate this problem.

5.3 Sequential Method

The '**Sequential Method**' is a process by which the ballast tank is first emptied (In pair to avoid excessive listing) and then refilled with replacement ballast water to achieve at least a 95 per cent volumetric exchange.

In each tank, all the ballast water shall be discharged until suction of the pump(s) is lost, and eductors should be used, if possible. This is to avoid a possible situation, where organisms are left in the bottom part of the tank, the tank is refilled with new water which may allow re-emergence of organisms.

During entire ballast operation, the vessel should be always in upright position. Tank sounding should be taken and recorded at regular interval.

The sequential method requires careful planning and monitoring by the ship's staff to mitigate risks to the ship in respect of:

- longitudinal strength
- dynamic loads
- excessive trim
- forward slamming
- propeller immersion
- intact stability; and
- bridge visibility

A detailed operational description of the ballast exchange sequence used is given in Section 8 and Appendix III. This section shall be consulted prior, during and after the exchange in addition to the safety considerations in Section 6 and 7. At the same time ship staff should be taking account of the ship's position in relation to the land, navigational hazards, shipping density, current and forecast weather, machinery performance and degree of crew fatigue, before proceeding to the next pair of steps/sequence. If any factors are considered unfavourable the ballast exchange should be suspended or halted.

5.4 Flow Through Method

The '**Flow through**' method is a process by which replacement ballast water is pumped into the ballast tank, allowing water to flow through and overflow or other arrangements to achieve at least 95 per cent volumetric exchange of ballast water. Pumping through three times the volume of each ballast water tank usually shall be considered to meet the standard described above. Pumping through less than three times the volume may be accepted provided the ship can demonstrate that at least 95 per cent volumetric exchange is met.

The flow through method has the advantage that it can be used in weather conditions which would be marginal for use of the sequential method, since there is little change to the condition of the ship and is relatively easy to follow by ships staff. However, the flow through method introduces certain other risks and problems which must be considered before using this procedure. Refer to safety procedures described in Section 6.

The disadvantages are that not all tanks are designed with a head to the top of the overflow. Moreover, some tank configurations can be difficult to flush through effectively, in particular cellular double bottom spaces and peak tanks. There is a danger of over pressurisation of tanks and there can be an accumulation of water on deck, which in sub zero temperature conditions make the method impractical and dangerous for crew. In addition pumps and piping will experience an increase in workload.

The above, in addition to the safety aspects addressed in Section 6 and 7 shall be carefully consulted and followed where applicable.

Where peak tanks are partially filled, the flow through method should be avoided unless any inadvertent exceedance of the design partial filling levels will not result in hull girder bending moments and shear forces exceeding the permissible values.

5.5 Ballast Water Treatment Systems

A Ballast Water Management System (BWMS) is any system, which processes ballast water such that it meets or exceeds the Ballast Water Performance Standard in Regulation D-2 of the Convention. The BWMS includes Ballast Water Treatment Equipment, all associated Control Equipment, Monitoring Equipment and Sampling Facilities.

Ballast Water Treatment Equipment is an equipment, which mechanically, physically, chemically, or biologically processes, either singularly or in combination, to remove, render harmless, or avoid the uptake or discharge of Harmful Aquatic Organisms and Pathogens within Ballast Water and Sediments. Ballast Water Treatment Equipment may operate at the uptake or discharge of ballast water, during the voyage, or at a combination of these events.

Ballast water management systems, if installed on board, should ensure in addition to compliance with the convention requirements, to be type approved and relevant certificates to be readily available on board.

When such a system is fitted on board it should be operated in accordance with the system design criteria and manufacturers operational and maintenance instructions as contained in the relevant booklet.

When the systems encounter failure and/or malfunctions, these are to be recorded in the ballast record book.

5.6 Precautionary Practices

Minimizing uptake of harmful aquatic organisms, pathogens and sediments.

When taking ballast, every effort should be made to avoid the uptake of potentially harmful aquatic organisms, pathogens and sediment that may contain such organisms.

The uptake of ballast water should be minimized or, where practicable, avoided in areas and situations such as the areas identified by the port State in connection with advice relating to:

a) areas with outbreaks, infestations or known populations of harmful organisms and pathogens;

b) areas with current phytoplankton blooms (algal blooms, such as red tides);

c) nearby sewage outfalls;

d) nearby dredging operations;

e) when a tidal stream is known to be the more turbid; and

f) areas where tidal flushing is known to be poor

g) In darkness when bottom-dwelling organisms may rise up in the water column;

h) in very shallow water; or

i) Where propellers may stir up sediment.

If it is necessary to take on and discharge ballast water in the same port to facilitate safe cargo operations, care should be taken to avoid unnecessary discharge of ballast water that has been taken up in another port.

Minimise departure and arrival ballast quantities but always within the constraints of safe navigation.

Non-release or minimal release of ballast water

In cases where ballast exchange or other treatment options are not possible, ballast water may be retained in tanks or holds. Should this not be possible, the ship should only discharge the minimum essential amount of ballast water in accordance with port States' contingency strategies.

Discharge to reception facilities

If reception facilities for ballast water and/or sediments are provided by a port State, they should, where appropriate, be utilized.

6.1 General Precaution

Ballast water exchange has a number of safety considerations these include but are not limited to:-

a) Avoidance of over and under-pressurization of ballast tanks, including avoiding action for damage to the float arrangement of the tank vent heads due to any pressure during the overflow

b) Sloshing loads in tanks that may be slack at any one time

c) Maintain adequate intact stability in accordance with an approved trim and stability booklet taking into account the free surface effects on stability

d) Permissible seagoing strength limits of shear forces and bending moments in accordance with an approved loading manual

e) Torsional forces

f) Forward and aft draughts and trim, with particular reference to bridge visibility

g) Propeller immersion

h) Minimum forward draft

i) Wave-induced hull vibrations when performing ballast water exchange

j) Watertight closures (e.g. tank entrances, air vent heads, manholes) which may have to be opened during ballast exchange must be re-secured; Crew safety is paramount during this operation. If the manholes are kept open, then provision for discharging pipe head arrangement on the manhole cover will be made

k) Maximum pumping/flow rates – to ensure the tank is not subjected to a pressure greater than that for which it has been designed

l) Internal transfers of ballast

m) Admissible weather conditions

n) Weather routeing in areas seasonably affected by cyclones, typhoons, hurricanes, or heavy icing conditions.

6.2 Exchange at Sea - Precaution

The exchange of ballast water in open sea has to be distinguished from ballast operations carried out in ports or in sheltered waters.

Ballast water operation at sea has the potential to be more hazardous than ballast water operations carried out in port.

The ballast exchange sequences (BEP) indicate sequences for the exchange of ballast water using the method(s) applicable to this ship.

A decision should be made at the completion of each sequence, taking account of factors such as the ship's position, weather forecast, machinery performance, stability, strength, degree of crew fatigue, before proceeding to the next sequence. If any factors are considered unfavourable for the ballast exchange, a decision should be made if exchange operations should be suspended until conditions become more favourable or halted.

Readiness of useful information including, but not limited to, Contingency procedures for situations which may affect ballast water exchange at sea, including deteriorating weather conditions, pump failure and loss of power; time to complete the ballast water exchange for each

tank or an appropriate sequence thereof; continual monitoring of the ballast water operation; monitoring should include pumps, levels in tanks, line and pump pressures, stability and stresses.

6.3 Sequential Method - Precautions

Hull girder damage due to insufficient longitudinal strength;

Adverse effects on ship's stability due to free surface effects resulting in a reduction of ship's GM while emptying ballast water tanks or holds originally in a filled or partially filled condition in order to achieve exchange;

Structural damage to ship bottom forward caused by insufficient forward draught;

Impairment of manoeuvrability and/or ability to make headway; caused by insufficient after draught, as a result of emptying after ballast water tanks or holds originally in a filled condition or filling partially filled forward water ballast tanks in order to achieve exchange;

Reduction of bridge visibility forward caused by insufficient forward draught, as a result of emptying forward ballast water tanks or holds originally in a filled condition or filling partially filled aft water ballast tanks in order to achieve exchange;

Structural damage to topside and hopper side tanks caused by inertia loading, as a result of a full ballast hold with empty adjacent wing tanks;

Structural damage to partially filled ballast water tanks or holds caused by sloshing as a result of resonance with ship motion.

6.4 Flow Through Method - Precautions

Accumulation of water on decks which can cause a safety hazard to crew working on deck.

All upper deck openings (tank entrances, manholes, air pipes etc) are re-secured after completion (or interruption) of the ballast exchange procedure.

Avoiding action for damage to tank vent head's float arrangement.

Crew are to be briefed as to the dangers to the personnel posed by the water cascading onto the deck. (Effects on the stability may be negligible).

6.5 Precautionary Advice for Exchange Operations

<u>Conditions under which ballast water exchange at sea should not be undertaken</u>

- These circumstances may result from critical situations of an exceptional nature or *force majeure* due to stress of weather, known equipment failures or defects, or any other circumstances in which human life or safety of the ship is threatened.
- Ballast water exchange at sea should be avoided in freezing weather conditions.
- However, when it is deemed absolutely necessary, particular attention should be paid to the hazards associated with the freezing of overboard discharge arrangements, air pipes, ballast system valves together with their means of control, and the build up of ice on deck.
- Consideration must always be given to personnel safety, including precautions, which may be required when personnel are required to work on deck at night, in heavy weather, when ballast water overflows the deck, and in freezing conditions. These concerns may be related to the risks to the personnel of falling and injury, due to the slippery wet surface of the deck

plate, when water is overflowing on deck, and to the direct contact with the ballast water, in terms of occupational health and safety.

Precautionary Advice to Masters When Undertaking Ballast Water Exchange Operations

- Master should take all necessary precautions when undertaking Ballast Water Exchange sequences that involve periods when the criteria for propeller immersion, minimum forward draft and bridge visibility cannot be met:
- During ballast water exchange sequences there may be times when, for a transitory period, one or more of the following criteria cannot be fully met or are found to be difficult to maintain:
  a) bridge visibility standards (SOLAS V/22);
  b) propeller immersion; and
  c) minimum draft forward.
  d) Emergency fire pump suction;
- In planning a Ballast Water Exchange operation that includes sequences which involve periods when the criteria for propeller immersion, minimum draft and or trim, the following should be taken into consideration:
  a) the duration(s) and time(s) during the operation that any of the criteria will not be met;
  b) the effect(s) on the navigational and manoeuvring capabilities of the ship; and
  c) the time to complete the operation.
- A decision to proceed with the operation should only be taken when it is anticipated that:
  a) the ship will be in open water;
  b) the traffic density will be low;
  c) an enhanced navigational watch will be maintained including if necessary an additional look out forward with adequate communications with the navigation bridge;
  d) the manoeuvrability of the vessel will not be unduly impaired by the draft and trim and or propeller immersion during the transitory period; and
  e) the general weather and sea state conditions will be suitable and unlikely to deteriorate.

7.1 General

A ballast plan for the voyage should be prepared in advance and with the same degree of thoroughness, in a similar manner to the preparation of a cargo plan for a loaded voyage. This pre-planning is necessary in order to maintain safety in case compliance with ballast exchange or other ballast water treatment or control options is required.

The safety information in Section 6 should be taken into account when preparing the 'Voyage Ballast Plan'. This section gives guidance on additional operational and safety ballast handling procedures to be followed at sea.

Additionally, operational limits defined for specific ballast exchange conditions must be adhered to during operation. Therefore, it is considered imperative to plan for and find the appropriate weather window to conduct safe sequential ballast exchange operations.

Ballast exchange operations are complex procedures and may last from several hours to days. All personnel engaged in ballast exchange should be trained to respond to routine and emergency procedures.

It should always be considered that while performing a ballast exchange at sea, failure of power system or any part of ballast pumping and piping system can take place. Such incidents should be brought immediately to the attention of the Company Safety department and emergency procedures should be activated to bring the ship back to her ballast seagoing condition as soon as possible. Such emergency procedures could be ballasting by gravity and even utilisation of the general service pump.

7.2 Procedures for Safe Tank Entry

Vessel is refer to Company SMS manual in Volume IV, Section 1 Charter 5 – Enclosed space entry permit.

This procedure includes a requirement that all Officers must be familiar with the relevant sections of ISGOTT.

For double-hulled vessels, special attention is required to refer to the appropriate section regarding the additional precautions required to be taken when entering double-hull ballast tanks.

Entry to any enclosed space will only be allowed when the Master considers it essential.

The Master and Chief Mate shall avoid entering any enclosed space, or spaces, for the initial entry, at the same time.

An Enclosed Space Entry Permit must be issued by a responsible officer prior to any personnel entering an enclosed space, and be signed by the Master.

One permit for each individual space (i.e. not a multiple space entry permit although such a permit may be issued by an independent gas chemist in certain circumstances).

If any of the conditions noted on the permit checklist change then the Permit is rendered invalid.

Regular atmosphere checks shall be carried out at all times when the personnel are within the enclosed space and a full range of tests should be undertaken prior to re-entry into the space after any break.

All personnel involved in the enclosed space entry are to report to the duty deck officer when entering and leaving the enclosed space.

8.1 Ballast Exchange Plan

- When exchanging ballast at sea, the safety and operational information and restrictions must be taken into account at all times.
- A Ballast Exchange Plan (BEP) contains step-by-step instructions for the safe exchange of ship's ballast water. A BEP indicates the status of the ballast tank with relevant assessment criteria.
- A BEP is prepared on the basis of ship's capabilities and contains specific advice and limitations, which need to be observed and adhered to.
- A BEP is intended for typical ballast conditions. It is at the discretion of the ship's master to follow one of the prepared BEPs or to prepare a new BEP for the ship's specific condition, taking into account the relevant assessment criteria. If in doubt the Master should seek assistance of shore management.
- The ship's position, sea state, weather forecast, equipment performance, hull condition and degree of crew fatigue should be considered before proceeding with ballast exchange. If any factors are considered unfavourable, the ballast exchange operation should not commence or should be suspended.
- Where practicable, ballast exchange should be conducted in deep water, in open ocean and as far as possible from shore. Where this is not possible, requirements developed within regional agreements may be in operation, particularly in areas within 200 nautical miles from shore.
- When following the overflow method, at least three times the tank volume shall be pumped through the tank.
- All stability and strength calculations contained in the Ballast Exchange Plans have been developed using the vessel's approved onboard loading program.
- Sloshing is not investigated in the BEP contained herein since all ballast tanks are either side tanks or peak tanks fitted with a centreline wash bulkhead or a centreline ring structure or horizontal ring structures, to minimise the sloshing effect.
- When applying the flow through method, the personnel engaged should ensure that all upper deck openings (tank entrances, manholes, air pipes etc.) are re-secured after completion (or interruption) of the ballast exchange procedure. Crew are to be briefed as to the dangers to personnel posed by the water cascading onto the deck if flow through method is adopted.
- Ballast exchange at sea should not be carried out or, if under progress, interrupted when wind strength exceeds beaufort 4 and sea state exceeds moderate.
- For steps/sequences where the bridge visibility forward criteria is not satisfied the Master is advised that bridge visibility forward will be reduced. In case of bridge visibility forward being reduced, extra lookouts to be posted till normal condition is restored.
- Vessel is to refer to the sample of Ballast exchange plan in the Appendix III of this plan for guidance.

9.1 General

- Where practicable, routine cleaning of the ballast tank to remove sediments shall be carried out in mid-ocean or under controlled arrangements in port or dry dock.
- When sediment have accumulated, consideration should be given to flushing tank bottoms and other surfaces when in suitable areas, i.e. outside 200 nautical miles from land and in water depths of over 200 meters.
- The volume of sediment in a ballast tank shall be monitored on a regular basis.
- Sediment in ballast tanks shall be removed in a timely basis and as found necessary, always taking into account safety and operational considerations addressed in this manual. The frequency and timing of removal will also depend on factors such as sediment build up, ship's trading pattern, availability of reception facilities, workload of the ship's personnel and safety considerations.
- Removal of sediment from ballast tank should preferably be undertaken under controlled conditions in port, at a repair facility or in dry dock. The removed sediment should preferably be disposed off in a sediment reception facility if available, reasonable and practicable.
- Flushing by using water movement within a tank to bring sediment into suspension, will only remove a part of the mud, depending on the configuration of an individual tank and its piping arrangement. Removal may be more appropriate on a routine basis during scheduled dry dockings. This is often needed for other reasons anyway.
- However, flushing at sea may be a useful tool on some occasions such as when a ship changes its trading area.
- When sediment is removed from the ship's ballast tanks and is to be disposed of by that ship at sea such disposal should only take place in areas outside 200 nautical miles from land and in water depths of over 200 meters.
- If it is necessary to take on and discharge ballast water in the same port to facilitate safe cargo operations, care should be taken to avoid unnecessary discharge of ballast water that has been taken up in another port.
- Minimise departure and arrival ballast quantities but always within the constraints of safe navigation.
- Take additional good house keeping measures to minimise the risk, such as rinse anchors and anchor chain when retrieving to remove organisms and sediment at their place of origin, remove fouling organisms from hull, piping and tanks on a regular basis.
- It is noted that these conditions are guidelines only. It is the responsibility of the ship's Master to ensure the safety of his crew is not jeopardised.
- Additionally, operational limits defined for specific ballast exchange conditions must be adhered to during operation.
- Ballast exchange operations are complex procedures and may last from several hours to days. All personnel engaged in ballast exchange should be well trained to respond to routine and emergency procedures.
- It should always be considered that while performing a ballast exchange at sea, failure of power system or any part of ballast pumping and piping system can take place. Such incidents should be brought immediately to the attention of the Company's Safety department and emergency procedures should be activated to bring the ship back to her ballast seagoing condition as soon as possible. Such emergency procedures could be ballasting by gravity and even utilisation of the general service pump.

- Where a Port State Authority requires that specific ballast water procedures and/or treatment option(s) be undertaken, and due to weather, sea conditions or operational impracticability such action cannot be taken, the ship's Master should report this fact to the Port State Authority as soon as possible and, where appropriate, prior to entering seas under its jurisdiction.

The uptake of ballast water should be minimized or, where practicable, avoided in areas and situations such as:

- Areas with outbreaks, infestations or known populations of harmful organisms and pathogens;
- Areas with current phytoplankton blooms (algal blooms, such as red tides);
- Nearby sewage outfalls;
- Nearby dredging operations;
- When a tidal stream is known to be the more turbid; and areas where tidal flushing is known to be poor;
- In darkness when bottom-dwelling organisms may rise up in the water column;
- In very shallow water; or
- Where propellers may stir up sediment.

IMO stipulates that Port State should not require any action of the Master which may imperil the lives of those on board or the safety of the ship.

10.1 General

- This section contains information to assist the Master in the procedures for co-ordinating in the discharge of ballast water with the coastal state, local government or other involved parties.
- The quick and effective communication between the ship and Coastal State or other involved parties becomes vital in mitigating the effects of an unnecessary delay for ships seeking entry to Port States.
- The requirements and roles of the various national and local authorities involved vary widely from state and even from port to port. Approaches to the responsibility for ballast water exchange also vary. In majority of coastal states, the responsibility for compliance with port state requirement is placed on the ship owner and the ship.
- Generic reports and Information can be found in section Appendix I and VII to assist the Master with organising a communication to ballast water exchange and treatment plan to a port state not having issued any specific requirements.
- Therefore the master, with the responsible officer, should timely obtain all necessary information and prepare the vessel accordingly tanking into consideration the safety and operational restriction as described in this plan and relevant sections. Information on specific port state procedures can be obtained either by referring to Appendix I and VII of this plan, consulting the company and/or local agent for latest information/requirements.

10.2 Coastal State Discharge Procedure

- Follow agreed reporting procedures;
- Contact ship's agent to ascertain the latest information/requirements on ballast discharge in the water of respective state;
- Advise/communicate with the company and request any other information they might hold on ballast water discharge;
- Ensure that you timely plan for all above actions and all safety and operational restrictions are consulted.

Actions where the coastal state has no specific procedures:

- Contact ships agent and/or company to obtain latest information on the discharge requirements at port state territory;
- Carry out discharge of ballast water as per approved ballast exchange sequence;
- Take into consideration safety and operational procedures related to respective discharge;
- Keep proper records and have them readily available for possible inspection.

The coastal state should be contacted for specific ballast water discharge requirements and reporting prior to vessel's arrival in port state territorial waters.

11.1 Role and Responsibility of Master

The Master must ensure that the Ballast Water Management Plan is clearly understood by the appointed Officer and by any other responsible Officer that may be involved and that the operations during execution strictly conform to the safety parameters at all times.

The overall responsibility for the execution of this Ballast Water Management Plan lies with the ship's Master.

The Master has the **overriding authority** to decide whether or not to carry out th ballast exchange operation at sea.

11.2 Role and Responsibility of Environmental Officer

The Chief Officer on board is nominated as Environmental Officer who shall be responsible for planning and the execution of exchanging ballast water at sea and/or in port. He will be assisted by Junior Officer(s) and Ratings in the operation of ballast exchange. His role and responsbility includes but not limited to the followings:

a) To brief all Officers and Ratings involve in BWM on the purpose, application and precautions of conducting the operation.

b) In-charge of conducting training to all personnel on board who are engage in the operation of ballast exchange, to be familiar of the operation.

c) Record of training must be kept on board for presentation to Port Authority upon request, and should be onboard for at least 2 years.

d) Responsible for planning and the execution of exchanging ballast water at sea and/or in port, to minimize the adverse impacts due to the transfer of harmful aquatic organisms and pathogens, in accordance to the specific procedure of BWM Plan.

e) Prepare ballast exchange plan (BWM Plan) taking into account all safety concerns / requirements within the BWM Plan. The completed plan shall be submitted to Master for final approval.

f) Where ballast exchange is required, follow the applicable Ballast Water Exchange Plan (BWEP), or develop a new BWEP on the basis of ship's assessment criteria, condition of hull and equipment and weather forecast, and acquire the Master's approval.

g) Comply with all documentation, reporting, and other procedures required by various states when visiting ports in that country.

h) Conducting training to all personnel on board engage in the operation of ballast exchange, to be familiar of the operation.

i) Ensure adequate and enough personnel and equipment available for the execution of the BWEP are followed in the prepared order.

j) Inform the shore management on commencement/interruption/completion of ballast water exchange, using the Notification Form.

k) Assist the port state control or quarantine officers for any sampling that may need to be undertaken.

l) Maintain Ballast Water reporting forms and printed book listed in Appendix VI of this plan.

m) The duty Officer must keep the Master advised on the progress of the plan from time to time. Should there be any doubt, or if the management plan does not keep to the schedule, Master shall be advised accordingly.

12.1 Reporting

All relevant ballast exchange operations will be recorded in the prescribed form as required by the port state. Useful information and reporting forms are contained in Appendix I & VII. However, vessel is to check with the port agents for the latest edition form or forms not enclosed in this appendix.

Besides the reporting form in the Port States format, the Environmental Officer is also responsible to maintain the following reporting form and printed book listed in Appendix VI as required by this plan.

Forms

- Flow Through Porcedure Record
- Ballast Water Exchange Notification
- Record of Removal of Sediment Ballast Water Tank and Tank Flushing Operation
- Ballast Water Management Plan

Printed Record Books

- Ballast Water Reporting Book
- Ballast Water Handling Log

12.2 Retention of Record

The Ballast Water records which includes form required by this plan and Port states and printed record are to be maintained on board for a minimum of **two years** in order to provide port state control or other authorised officers with information they may require concerning the on board ballast water.

13.1 Training

Ballast Water discharge from ship is a prominent cause of the establishment of harmful aquatic organisms and pathogens in ports which may posses threat to indigenous animals and plant life and marine environment. It is for this reason that vessel carrying ballast water from foreign port is required to carry a Ballast Water Management Plan.

Training for Masters and its Crews involving Ballast Water Management onboard is essential in order to ensure that the implementation of ballast water exchanges at sea is successful carried out to minimise the transfer of harmful organisms and pathogens into foreign ports. Officers and Rating engage in ballast water exchange at sea should be trained and familiarized with the following:

- Ship's pumping plan that shows ballast pumping arrangements and the position of associated air and sounding pipes, position of all compartment and tank suctions and pipelines connecting them to ship's ballast pumps and, in the case of use of the flow through method of ballast water exchange, the openings used for release of water from the top of the tank together with overboard discharge arrangement.

- Methods of ensuring that sounding pipes are clear, and that air pipes and their non return devices are in condition.

- The different times required to undertake the various ballast water exchange operations.

- Methods in use for ballast water exchange at sea if applicable with particular reference to required safety precautions mentioned in Section 6 and 7.

- Method of on-board ballast water record keeping, reporting and recording routine sounding.

A briefing is to be conducted to the crew involved in the operation prior carrying out the Ballast Water Exchange operation.

The Environmental Officer is to provide a scheduled training on Ballasting water exchange **every quarterly and to newly joined crew before the operation.**

13.2 Training Scope

All crews engage in ballast operation, are required to undergo familiarisation and training about Ballast Management of the ship.

The Masters opened the training session to explain the importance of ballast water management in compliance with International regulations. The Chief Officer (Environmental Officer) is to explain the methhod and procedure used for ballast water exchange operations including the safety precautions.

The training scopes shall encompass the following topics:

1. Ballast Management, is required by IMO Resolution A.868(20) requires all vessels carrying ballast must have a ballast management plan on board.

2. Two type of ballast exchange methods:

   a) Sequential or Empty and Refill method - This shall be done at mid-ocean, at least 200 miles from shore and at least 2000 meters depth.

   b) Flow through method - Ocean water is pump into a ballast tank full of water loaded from port and the allowing the excess water to over-follow through the openings on deck, such as Air vents and manholes. The operation shall continue until 3 times the water volume of the tank is exchanged.

3. Safety in performing “Sequential” (Empty and Refill) ballast operations. Ensure that all Air Vents are open to ensure free flow of air in-and-out of the tank, during pumping out and refilling of the tanks. By “Flow Through” method, air vents and manholes of ballast tank on deck shall be open, to prevent over-pressurization of the tank.

4. Minimize loading of ballast in areas identified to have outbreaks of infestations or known population of harmful organisms and pathogens; nearby sewage outfall and near by dredging operations; and in darkness or night time and shallow waters.

5. Reporting Forms: (Records of ballast operations shall be retain for **2 years** onboard)

   a) NBIC Ballast Reporting Form for U.S.A ports
   b) AQIS Ballast Water Reporting Form required in Australian Ports
   c) Anexo B Ballast Water Reporting Form (NORMAN-20/DPC) for Brazil Ports
   d) New Zealand Ballast Water Declaration
   e) ROPME (Sea Area) Ballast Water Reporting Form
   f) Canadian Ballast Water Reporting Form

After training, the Environmental Officer to maintain the training record in the form enclosed in Appendix VIII.

14.1 Ballasting Procedure

Unless absolutely necessary for the safety of the vessel during extreme sea condition the loading of ballast water into Cargo Oil Tank (COT) designated as Heavy Ballast Tank(s) of a tanker vessel must be avoided.

When necessary to taking Heavy Ballast for the safety of the ship at sea whilst enroute, the Master shall notify the Management of his intention and the reason to load ballast into **Cargo Oil Tank No.3 C,** designated as **Heavy Ballast Tank** in the ship's approved "Cargo Loading Manual". Although the Master has over-riding responsibility for the safety of the ship and crews, he may request confirmation from the management before commencing the ballasting operation.

Proper planning is required for safe ballasting operation onboard any vessel. Care should be taken that during the operation, vessel's stress and structural condition is maintained acceptable to the approved Cargo Loading Manual.

The following procedure shall be observed when ballasting the cargo tank:

- Enter into the ship's Cargo Loading Computer with all necessary data to secure calculation of ship's stresses, such as Shearing Force (SF), Bending Moment (BM), KG, GM, etc. Take the Print-Out and present to the Master for comment.

- Ballast water shall be loaded into the COT No. 3 C (designated Heavy Ballast Tank) passing through the valves at the Cargo Sea Chest connected to the suction crossover and to the appropriate cargo pump.

- Check to ensure that valves to other cargo tanks are shut (secured) except to the intended COT No. 3 C (designated heavy ballast tank)

- Ensure that I.G. branch line for COT No. 3 C is **opened.**

- To prevent accidental escape of oil to sea during operation, start the Cargo Pump to use until positive revolution is reach and then slowly open the cargo sea chest valve.

- After completion of loading ballast close and secure Sea Chest Valve, COT No. 3 C and other related valves according to standard practice.

The following procedure shall be observed when Deballasting the cargo tank:

<u>Discharge to shore reception facility</u>.

Heavy ballast water loaded into the ship's Cargo Oil Tank (COT) shall be considered oil contaminated water and as much as possible, shall be discharge to shore reception facility if available at the next port. The Master shall notify the Port Agent, Terminal and Management of the quantity of dirty water ballast to be discharge ashore.

<u>Discharging Heavy Ballast Water to sea</u>.

- The vessel is NOT within any special areas. (MARPOL 34, 1.1)
- Irrespective where the heavy ballast water was loaded, it should be discharge in open ocean at a distance of more than 50 nautical miles from the nearest land (MARPOL, Reg. 34, 1.2).

If ships route allows, the discharge shall be carried out at distance of lat least **200** nautical miles from the nearest land and at depth of at least **200** meters. (Refer to Section 12.2 (d) of BWMP)

- Using the cargo pump, the water should be discharge through the high overboard discharge line, passing through the oil discharge and monitoring equipment. Ensure that this equipment is operating at its controlled setting as approved by Class.
- Closely monitor the tank sounding until the water level approaches to about 3 meters, and then reduce the pumping rate to a minimum. Permanently assign a crew to monitor the color of discharge water over the ship's side. Deballasting shall be stop immediately when sign of oil or oil sheen is observe coming out with discharge water. Close and secure all valves related to deballasting operation according to standard practice.
- Transfer the remaining ballast water from COT No. 3 C (stripped) to available slop tank. Allow the water in the Slop Tank to settle down for a certain period in order that lighter oily water will rise and float on top inside the Slop Tank.
- Depending on the quantity of water in the Slop Tank and the sludge oil on top, decant the bottom water passing through the ODME until the contents of Slop Tank is reduced to acceptable quantity. Secure pumps and related valves according to standard practice onboard.
- The remaining dirty water in the Slop Tank can either be discharge to shore facility or to sludge ship/barge or to Load on Top Operation according to charterers' instruction.
- Accomplish proper documentation of the entire operation, including all required forms (Refer to Appendix VI) must be accomplished. Retain record onboard for at least 2 years.

APPENDIX CONTENT

Appendix I National and Local Requirements

Appendix II Normative Reference

Appendix III Ballast Water Exchange Plan - Sample

Appendix IV Stability Information

Appendix V Flow Through Ballast Exchange Record

Appendix VI Reporting Form and Book - Office

Appendix VII Reporting Form – Port States

Appendix VIII Ballast Water Management Training Record

Appendix IX WMO Definition of sea state

Appendix X Water Ballast Tank Arrangement and Sampling point

Appendix XI Ship's Plan

Summary of existing and proposed regional ballast water legislation

ARGENTINA

Authority:	Dirección de Prefectura Naval Argentina (DPMA)
Ports Affected:	All
Ships Affected:	All ships
Implementation:	Mandatory.
Date of Start:	1998
Acceptable Methods:	a) Ballast Water Exchange (BWE): BWE to be conducted in open-sea following on of the IMO approved methods, i.e. flow-through, over-flow or sequential exchange. Note that salinity levels following BWE must not be below 30mg/cm^3 b) Treatment System/Ballast Discharge Standard: Alternative methods are allowed under strict guidance and approval from either the IMO or the administration, details of which are found in Section 8 and Annex 1 of the ORDENANZA Nº 7-98.
Unwanted Organisms / Pathogens:	Not defined
Uptake Control:	Not known.
Sampling:	Random, by Argentine authorities.
Ballast water management plan , records and reporting	Ballast Water Management Plans: A ballast water management plan must be carried on board with a record/log of all ballast water exchange and operations to be maintained and available for inspection. No reporting or recording requirements specified
Alternatives to en route management procedures:	Not known
Procedure for unacceptable ballast water:	It is understood that ships may be required to treat ballast with chlorine
Notes:	The regulations apply to all ships entering the River Plate Basin and transiting the River Parana and its ports which the area delineated as: "The zone from Punta del Este (Republic of Uruguay) to Punta Rasa, Cape San Antonio (republic of Argentina). From there to a point located latitude 37° 32′ South, longitude 55° 23′ West. From there to a point located in latitude 36° 14′ South and longitude 53° 32′ West. From there back to Punta del Este"

ARGENTINA - Buenos Aires

Authority:	Local regulations
Ports Affected:	Buenos Aires
Ships Affected:	All ships
Implementation:	Mandatory.
Date of Start:	1990
Acceptable Methods:	In addition to national requirements above ships are required to treat ballast water with chlorine if ballast has been taken up in a WHO listed cholera high risk area. Chlorine dilution is specified as 50ltrs chlorine to 100tonnes of ballast water. It is understood that if the vessel has no chlorine it can be provided at the Racalada pilot station.

AUSTRALIA

National Authority:	Australian Quarantine and Inspection Service (AQIS)
Ports Affected:	All
Ships Affected:	All ships entering Australian ports from overseas territories. No exceptions specified.
Implementation:	Mandatory
Date of Start:	2001
Acceptable Methods of Ballast Water Management :	All vessels are to exchange all "high risk" ballast water intended to be discharged in Australian waters High risk ballast is deems all salt water from ports and coastal waters outside Australia's territorial sea. Acceptable exchange methods are : Ballast water exchange in deep ocean areas:- 1. Tanks to be drained until pump suction is lost. 2. Flow through method or dilution method to archive at least 3 x tank volume pumped through.
Alternatives to en route management procedures:	1. Normal discharge based on risk assessment taking into account type of vessel, origin, risk factors at port of entry, e.g. fish farms. 2. Withholding discharge until analysis of samples found to be free of harmful organisms. 3. Ship to proceed to designated area or open sea to exchange ballast.
Procedure for unacceptable ballast water:	Ship to proceed to designated area or open sea to exchange ballast.
Ballast Water Management Plan	The regulations strongly recommend a ship has a ballast water management plan endorsed by the ships classification society
Sampling:	Targeted, random and mandatory, under supervision of AQIS officer.
Reporting and Records:	All ships are required to submit a *Quarantine Pre-Arrival Report (QPAR)* to AQIS together with a declaration that the regulations have been complied with Records of ballast exchange are to be kept including a calculation to show the requirements above have been met
Notes:	See the following web site for full details and for copies of the reporting forms http://www.daff.gov.au/aqis/avm/vessels/ballast/requirements The sate of Victoria has slightly different requirements please se their web site for details http://www.epa.vic.gov.au/water/ballastwater/documents.asp

BRAZIL

National Authority:	Diretoria De Portos E Costas
Ports Affected:	All
Ships Affected:	All ships entering Brazilian ports with additional requirements for ships entering the Amazon and Para Rivers. No exceptions specified.
Implementation:	Mandatory
Date of Start:	2006
Acceptable Methods of Ballast Water Management	Sequential method Flow through method Dilution method. The exchange is to take place water exchange in an area no less than 200 nautical miles (nm) from any shore and in a water depth of 200 metres or more. If this is not possible exchange may take place 50 nm or more from land and in a water depth of 200 meters or more. Ships entering the Amazon River from international voyages or from other hydrographical region are required to undertake two water ballast exchanges as follows. The first exchange is to be as detailed above and the second to reduce the salinity of the water ballast between the isobaric of 20 metres and Macapá. When the ballast volume is less then 5000 cubic metres the limit will be the Jari river. In this second exchange it will be necessary only to pump the tank volume once. Ships entering the Para River from international voyages or from other hydrographical region are also required to undertake two water ballast exchanges The first exchange as detailed above and the second exchange must be between 70 nautical miles from Salinópolis until the Light of the Ponta do Chapéu Virado (Ilha do Mosqueiro)
Alternatives to en route management procedures:	When it is not possible to exchange the water ballast at sea, the ballast will have to be retained on board, being accepted a minimum discharge with the authorisation of the Maritime Authority that will have to record this occurrence. The master will have to formally justify with the necessary anticipation.
Procedure for unacceptable ballast water:	Ship to proceed to designated area or open sea to exchange ballast.
Ballast Water Management Plan	A Ballast Water Management Plan to be onboard and must be approved by the ships classification society
Sampling:	Targeted, random and mandatory,
Reporting and records:	Ships must send a ballast water report form to the Harbour Masters or their Agencies by the ship's masters or its Agents 24 hours prior arrival in Port. One copy of this report will have to be maintained on board for possible presentation to the any other authorities
Notes	Web site https://www.dpc.mar.mil.br/
	The site is in Portuguese only

CANADA

National Authority:	Transport Canada
Ports Affected:	All
Ships Affected:	All ships
Implementation:	Mandatory
Date of Start:	2000
Acceptable Methods of Ballast Water Management	a) Ballast Water Exchange (sequential, flow through or dilution method). Note that an onboard inspection may be undertaken to verify whether BWE has been conducted. If BWE has not been undertaken, clear proof as to why it could not be performed must be provided. b) b) Treatment System/Ballast Discharge Standard: The treatment standard is the same as that contained in the IMO Convention, Regulation D-2.
Alternatives to en route management procedures:	
Procedure for unacceptable or non exchanged or treated ballast water:	Should a vessel be unable to exchange or treat its ballast it may be requested to conduct exchange in the Scotian Shelf of the Gulf of Maine. Please refer to the text of the regulations and its guidance notes (linked below) for exact details.
Ballast Water Management Plan	A Ballast Water Management Plan to be onboard
Sampling:	
Reporting and records:	Ballast Water Reporting Requirements: A Reporting Form should be submitted, via email, prior to entry into Canadian waters. Email addresses are as follows: for ships proceeding to ports on the West Coast: rmic-pacific@pac.dfo-mpo.gc.ca or ships proceeding to ports in Eastern Canada North of 60 degrees North Latitude: atlanticballastwater@tc.gc.ca for ships proceeding to ports on the East Coast, in Quebec or in Ontario (Great Lakes): atlanticballastwater@tc.gc.ca
Notes	http://www.tc.gc.ca/marinesafety/oep/environment/ballastwater/menu.htm

CANADA -- VANCOUVER

National Authority:	Vancouver Port Corporation
Ports Affected:	Vancouver, Canada
Ships Affected:	All ships destined to arrive at the Port of Vancouver in ballast condition.
Implementation:	Mandatory application
Date of Start:	1st January 1998.
Acceptable Methods of Ballast Water Management	Ballast water exchange in mid ocean prior to entering Canadian waters. No ballast water to be discharged into harbour until samples have been taken and analysed by the harbourmaster's representative. Exemptions: • ships wishing to discharge less than 1000 metric tonnes • ships arriving from West Coast of USA, Canada and Alaska if the ballast water to be discharged originated from these waters. • stress of weather • stability or hull stress concerns
Alternatives to en route management procedures:	No information
Procedure for unacceptable ballast water:	Retention on board, or departure from port and exchange of ballast in outgoing current of the north side of the Strait of Juan de Fuca, west of Race Rocks
Ballast Water Management Plan	Required
Sampling:	No information.
Records:	A harbourmaster's representative will require to see either an entry (in English) in the logbook, an abstract of the logbook entry, or other formal record (company or administration). This must include the place where the original ballast was taken on, the position of exchange (latitude and longitude), the amount of ballast on board, and ballast tanks that have had water exchanged.
Notes:	Vancouver Port Corporation announcement, dated 10th February 1997, or contact the Harbour Master by telephone (+1 604 666 2405), facsimile (+1 604 666 1072) or E-mail harbour-master@portvancouver.com

CHILE

National Authority	Chilean Navy; Division for Maritime Territory and the Merchant Marine, Maritime Safety and Operations Department
Ports affected	All
Ships affected	All ships coming from abroad, ballasted with sea water. No exceptions are listed. All ships coming from zones affected by cholera or by any similar contagious epidemic.
Implementation	Mandatory
Date of start	1995
Acceptable Methods of Ballast Water Management	Ballast water exchange in deep water.
Procedures if en route management is not possible	In-tank treatment prior to discharge. Addition of 100 grams of powdered sodium hypochlorite, or 14 grams of powdered calcium hypochlorite, per tonne of ballast water, ensuring thorough mixing, and then allowing 24 hours before beginning to deballast.
Procedure if ballast water found to be unacceptable after sampling	No information
Ballast Water Management Plan	Required
Sampling required	No information
Reporting and Records	Entries in bridge and engine room logbooks, showing geographical co-ordinates, amount replaced and what percentage of total ballast capacity it represents.
Notes	Chilean Declaration DGTM. And MM. ORD. NO. 12600/228 VRS. Order for Preventative Measures to Avoid Transmission of Harmful Organisms and Epidemics by Ballast Water. 10th August 1995

GEORGIA

National Monitoring Authority	Georgian Environmental Protection Ministry
Ports affected	All Georgian ports
Ships affected	All
Implementation	Mandatory
Date of start	Unknown
Acceptable Methods of Ballast Water Management	Ballast Water Exchange (BWE): BWE must be conducted in the Black Sea. Ballst water treatment may be accepted however owners are advise to conform first with the intended port(s)
Procedures if en route management is not possible	No information
Procedure if ballast water found to be unacceptable after sampling	No information
Ballast Water Management Plan	Required
Sampling	No information
Reporting and Records	No information
Notes	

ISREAL

National Authority:	Ministry of Transport, Administration of Shipping and Ports.
Ports Affected:	All
Ships Affected:	All ships destined for Israeli ports, wishing to pump out ballast water while in port or while navigating along the coast of Israel. No exceptions are listed.
Implementation:	Mandatory application
Date of Start:	1994
Acceptable Methods of Ballast Water Management	Ballast water that has not been taken on in open ocean, must be exchanged in open ocean, beyond any continental shelf or fresh water current effect. Masters will be requested to provide ships' inspectors (pilots) with a completed ballast water exchange report. Ships bound for Eilat must exchange outside of the Red Sea, when practicable. Ships bound for Mediterranean ports must exchange in the Atlantic Ocean when practicable.
Alternatives to en route management procedures	Retention on board
Procedure for unacceptable ballast water:	Retention on board
Sampling:	Not defined.
Reporting and Records:	Israel has issued a format for recording the status of ballast. Please refer to the Authority directly – Israel Ministry of Transport, Administration of Shipping and Ports
Notes:	Israel Notice to Mariners No. 4/96 dated 19th April 1996, issued by the Israeli Administration of Shipping and Ports.

LITHUANIA - Butinge Oil Terminal, Klaipeda

National Authority:	
Ports Affected:	Port of Klaipeda and in particular Butinge Oil Terminal
Ships Affected:	All
Implementation:	Believed to be Mandatory
Date of Start:	Unknown
Acceptable Methods of Ballast Water Management:	Ballast Water Exchange (BWE): BWE should be conducted so as discharge into Butinge and/or Klaipeda is Baltic or North Sea water. No specific details on methodology are given although the IMO Guidelines are advised in the HELCOM recommendation.
Alternatives to en route management procedures	No information
Procedure for unacceptable ballast water:	No information
Ba	
Sampling:	No information
Reporting and Records:	While the Port Authority has not directly advised on reporting it does specify following the HELCOM recommendations which require the reporting of an IMO type ballast water reporting form prior to arrival. In addition, HELCOM recommend the carriage and implementation f a shipboard ballast water management plan.
Notes:	Full text of the HELCOM Recommendations can be downloaded from the link. Further information can be gained from the HELCOM site directly

NEW ZEALAND

National Authority:	New Zealand Ministry of Fisheries
Ports Affected:	All
Ships Affected:	All ships entering New Zealand territorial seas carrying ballast water loaded within the territorial water of another country. No exceptions are listed.
Implementation:	Mandatory
Date of Start:	1998 and updated 2005
Acceptable Methods:	Option 1 Demonstrating the ballast water has been exchanged en route to New Zealand in areas free from coastal influences, preferably 200 nautical miles from the nearest land and in water over 200m in depth. Accepted techniques are either emptying and refilling ballast tanks/ holds with an efficiency of 95% volumetric exchange or pumping through the tanks a water volume equal to at least three times the tank capacity. Tanks should be pumped no more than two at a time and, if two tanks are pumped together, they should be a symmetrical pair of tanks to ensure the safety of the vessel. Option 2 Demonstrating the ballast water is fresh water (not more than 2.5 parts per thousand sodium chloride). Option 3 Ballast water has been treated using a shipboard treatment system approved by MAF. Option 4 Ballast is discharged in an onshore treatment facility approved by MAF.
Unwanted Organisms / Pathogens:	Not defined
Uptake Control:	None specified. However, masters are expected to use their discretion and care when loading ballast water, avoiding where possible, taking ballast in shallow water, in areas where there are known to be active algal blooms or an outbreak of any disease communicable through ballast water, and in the vicinity of dredging operations.
Sampling:	Not defined.
Records and reporting:	A log must be kept of all ballast operations to include: • location and volume of ballast water loaded in other port • location, volume, method and duration of exchange at sea • location, volume and date of discharge in New Zealand A ballast water declaration must be completed see web site below
Alternatives to en route management procedures:	Until other treatment options are available, discharge will be permitted if it can be shown that weather conditions and/or vessel design precluded safe exchange, and the ballast water for discharge was not loaded in an area listed in Annex 1 of the Import Health Standard (currently Tasmania and Port Philip Bay, Australia).
Procedure for unacceptable ballast	Not Applicable

water:	
Detailed information:	New Zealand Import Health Standard for Ballast Water from All Countries. New Zealand Ballast Water and Ships Hull De-fouling: a Government Strategy January 1998.
Notes:	Further information can be found on http://www.biosecurity.govt.nz/enter/ships/ballast

Norway

National Authority:	Norwegian Maritime Directorate
Ports Affected:	All
Ships Affected:	All
Implementation:	Mandatory
Date of Start:	1 July 2010
Acceptable Methods:	Exchange, Ballast is to be exchanged in waters at least 200 metres deep and 200 nautical miles from the nearest land. If this is not possible, ballast may be exchanged in waters 200 metres deep and not less that 50 nautical miles from land. Ships are not required to deviate from their intended voyage to meet this requirement or Treat with an IMO approved system or Deliver to a shore reception facility The Norwegian Maritime Directorate may, in individual cases and upon written application, grant exemption from the requirements of this Regulation. There must be special reasons that make the exemption necessary and it must be justifiable in terms of safety.
Unwanted Organisms / Pathogens:	Not defined
Uptake Control:	All ballast water taken up **outside** the following areas: the Barents Sea, the Norwegian Sea, the North Sea, the Irish Sea, the Bay of Biscay and surrounding Iberian peninsular, and the northern part of the Atlantic Ocean
Sampling:	Not defined.
Records and reporting:	Ships must have a ballast water management plan approved in accordance with the IMO guidelines (MEPC.127(53) - Guidelines for Ballast Water Management and Development of Ballast Water Management Plans (G4) - (Adopted on 22 July 2005)) Ships must have a ballast water log book or record ballasting operations in the deck log book
Alternatives to en route management procedures:	If a ship cannot exchange ballast in the specified depth of water or at the required distance from land, it must be exchanged in one of three designated exchange zones off the Norwegian coast For details of these control areas please see the link below.
Procedure for unacceptable ballast water:	
Detailed information:	Regulation of 7 July 2009 No. 992 concerning the prevention of transfer of alien organisms via ballast water and sediments from ships (the Ballast Water Regulation)

Notes:	Further information can be found at: http://www.sjofartsdir.no/en/News_-_press_releases/New-Ballast-Water-Management-Regulation/

PANAMA

National Authority:	Panama Canal Authority
Ports Affected:	Panama Canal
Ships Affected:	All
Implementation:	Mandatory
Date of Start:	1999
Acceptable Methods:	No ballast to be discharged into the canal
Unwanted Organisms / Pathogens:	
Uptake Control:	
Sampling:	
Reporting and Records:	
Alternatives to en route management procedures:	
Procedure for unacceptable ballast water:	
Notes:	

Persian Gulf Area

National Authority:	
Ports Affected:	All
Ships Affected:	All
Implementation:	Mandatory
Date of Start:	1 November 2009
Acceptable Methods:	Exchange, In waters at least 200 metres deep and 200 nautical miles from the nearest land. If this is not possible, ballast may be exchanged in waters 200 metres deep and not less thant 50 nautical miles from land. Ships are not required to deviate from their intended voyage to meet this requirement or Treat with an IMO approved system
Unwanted Organisms / Pathogens:	Not defined
Uptake Control:	All ballast water taken up **outside** the following the ROPME area The ROPME Sea Area (RSA) is defined as extending between the following geographic latitudes and longitudes, respectively: 16°39'N, 53°3'30"E; 16°00'N, 53°25'E; 17°00'N, 56°30'E; 20°30'N, 60°00'E; 25°04'N, 61°25'E.
Sampling:	Not defined.
Records and reporting:	Ships must have a ballast water management plan approved in accordance with the IMO guidelines (MEPC.127(53) - Guidelines for Ballast Water Management and Development of Ballast Water Management Plans (G4) - (Adopted on 22 July 2005)) Ships must have a ballast water log book or record ballasting operations in the deck log book
Alternatives to en route management procedures:	If a ship cannot exchange ballast in the specified depth of water or at the required distance from land, it must be exchanged in one of three designated exchange zones off the Norwegian coast For details of these control areas please see the link below.
Procedure for unacceptable ballast water:	Not defined
Detailed information:	Not available
Notes:	-

PERU

National Authority:	General Directorate of Captainships and Coastguards acting as the Maritime Authority
Ports Affected:	All Peruvian ports
Ships Affected:	All ships
Implementation:	
Date of Start:	May 2006
Acceptable Methods:	a) Ballast Water Exchange (BWE): BWE must be undertaken 12nm from the Peruvian coast even if ballast taken up in a Peruvian port. b) Treatment System/Ballast Discharge Standard: None specified a) Ballast Water Management Plans: While referring to a 'Ballast Water Register Book' in the regulation, it is understood that this is equal to a Ballast Water Management Plan and as a consequence is required t be maintained on board.
Unwanted Organisms / Pathogens:	
Uptake Control:	
Sampling:	No information
Reporting and Records:	A 'Ballast Water Notification' should be submitted to the Maritime Authority.
Alternatives to en route management procedures:	If BWE was not undertaken, the harbourmaster must be notified. On notification of this the Harbourmaster must notify the master of an alternative ballast exchange area where the vessel will have to undertake BWE.
Procedure for unacceptable ballast water:	
Notes:	Local authorities are obligated to provide designated ballast exchange zones

RUSSIA - NOVOROSSIYSK,

Authority:	Novorossiysk Port Authority
Ports Affected:	Novorossiysk
Ships Affected:	All
Implementation:	
Date of Start:	2006
Acceptable Methods:	Ballast Water Exchange (BWE): de-ballasting will only be permitted if the ballast water has been taken (exchanged in) the Black Sea.
Sampling:	Not known
Reporting and Records:	Not known
Alternatives to en route management procedures:	Not known
Notes:	

UKRAINE

Authority:	
Ports Affected:	Odessa and Yuzhnyy
Ships Affected:	All ships
Implementation:	
Date of Start:	Date unknown but in force
Acceptable Methods:	All ships must exchange ballast with Black Sea water or Treatment System/Ballast Discharge Standard: Discharge standard is based on chemical properties with the following maximum limits specified: ▪ Iron 0.05mg/l Suspended Matter 1.75mg/l
Sampling:	Ballast may be sampled
Reporting and Records:	There is no requirement for a Ballast Water Management Plan however the authorities will require an entry in the oil record book and the log book detailing the exchange procedure The ships agent must be informed as to the amount of ballast water to be discharged in the port. Ships must then await approval of their ballast before discharging.
Alternatives to en route management procedures:	
Notes:	

UNITED STATES

National Authority	US Coast Guard
Ports Affected:	All
Ships Affected:	All ships carrying ballast and arriving from outside the US exclusive economic zone (EEZ). Except: 1. Passenger ships equipped with systems that can kill aquatic organisms in ballast water. 2. Crude oil tankers engaged in US coastwise trade.
Implementation:	Mandatory.
Date of Start:	2004
Acceptable Methods:	1. Ballast water exchange at sea, outside US EEZ. 2. Ballast water exchange in designated sea area within US EEZ. 3. Environmentally sound alternative ballast water management methods that can include modifications to a ship.
Unwanted Organisms / Pathogens:	Not defined
Uptake Control:	• Avoid ballast operations in or near marine sanctuaries, marine preserves, marine parks, or coral reefs. • Avoid or minimize ballast water uptake: Where infestation, harmful organisms and pathogens are located. Near sewage outfalls. Near dredging operations. Where tidal flushing is poor or when a tidal stream is known to be more turbid. In darkness when organisms may rise up in the water column. In shallow water or where propellers may stir up the sediment. Areas with pods of whales, convergence zones and boundaries of major currents • Clean ballast tanks to remove sediment regularly. • Only discharge minimal amounts of ballast water in coastal and internal waters. • Rinse anchors and anchor chains during retrieval to remove organisms and sediments at their place of origin. • Remove fouling organisms from hull, piping, and tanks on a regular basis and dispose of any removed substances in accordance with local, state and federal regulations. • Maintain a vessel specific ballast water management plan. Train vessel personnel in ballast water and sediment management and treatment procedures.

Discharge Standards	Federal regulation expected April 2011
Sampling:	Not defined.
Reporting and Records:	The master, owner, operator, person in charge, or vessel agent of any vessel equipped with ballast water tanks that is bound for ports or places of the United States, must ensure complete and accurate Ballast Water reporting Forms are submitted in accordance with 33 CFR 151.2041, and signed ballast water records the kept on board the vessel for a minimum of two years in accordance with 33 CFR 151.2045. Note - Different reporting requirements apply for the Great Lakes, Hudson River and all other US ports. The US has issued a format for recording the status of ballast. A copy can be obtained from http://www.uscg.mil/hq/g-m/mso/estandards.htm
Alternatives to en route management procedures:	Not known

Procedure for unacceptable ballast water:	The master of a vessel will not be prohibited from discharging unexchanged ballast, in areas other than the Great Lakes and the Hudson River, if the master decides the practices would be a threat to safety, stability, or security due to adverse weather, vessel design equipment failure, or any other extraordinary condition. All vessels, however, must discharge only the minimal amount of ballast water operationally necessary and ensure ballast water records accurately reflect any reasons for not complying with the mandatory requirements.
Detailed information:	For text of 33 CFR 151.2035(a) see http://www.gpoaccess.gov/ecfr/ Also see http://www.uscg.mil/hq/cg5/cg522/cg5224/bwm.asp

UNITED KINGDOM, ORKNEY ISLANDS

Monitoring Authority	Orkney Islands Council
Ports affected	Scapa Flow, 58°50'23"N; 03°06'25"W.
Ships affected	All ships wishing to discharge ballast at Flotta Terminal. Exemptions - Liquefied gas carrying tankers
Implementation	Mandatory application
Date of start	Prior to 1998
Methods acceptable	Discharge to shore reception facilities. Ballast water treatment plant has capacity to receive 40,000 barrels per hour
Unwanted aquatic organisms or pathogens	Not defined
Uptake control measures	None specified
Sampling required	None
Records required	Not specified
Procedures if en route management is not possible	Not applicable
Procedure if ballast water found to be unacceptable after sampling	Not applicable
For further information refer to	Flotta Terminal Port Information Book, issued by Elf Exploration UK plc.
Notes	Ballast from liquefied gas carrying tankers may be discharged into Scapa Flow if it has been taken on board within 24 hours, and at least 12 miles from shore. The master must provide the Harbor Authority with signed advice stating date, time and positions between which ballasting operations were carried out, quantity of ballast and tanks in which it is contained. Ballast samples will be taken by authorities to assess suitability for discharge.

US State requirements

California

Monitoring Authority	California States Land Commission
Ports affected	All
Ships affected	All 1)Vessels arriving to California Waters from a port or place *outside the Pacific Coast Region.* 2)Vessels arriving to California Waters from a port or place *within the Pacific Coast Region, with ballast water from the Pacific Coast Region.* **Pacific Coast Region (PCR) Definition:** All coastal waters (within 200 nm of land) on the Pacific Coast of North America east of 154 degrees W longitude and north of 25 degrees N latitude (Public Resources Code, Section 71200(k)). Excludes the Gulf of California.
Implementation	Mandatory application
Date of start	
Methods acceptable	1)Retain ballast water (no discharge). 2)Exchange ballast water in ***mid-ocean waters***(waters more than 200 nm from land at least 2,000 m deep): 3)Discharge ballast water at the *same location* where the ballast water originated. It must be demonstrated that the water was not mixed with ballast water taken on in an area other than mid-ocean waters. Same location = Within 1 nautical mile (6,000 ft) of the berth or within the recognized breakwater of a California port or place at which the ballast water was loaded. 3)Use an alternative, environmentally sound, Commission or US Coast Guard-approved method of treatment 4)Discharge to an approved reception facility (none currently exist). 5) Ships which have a ballast water ,treatment system onboard will be required to met the California discharge standard and complete the report forms available from the link below
Unwanted aquatic organisms or pathogens	Not defined
Uptake control measures	1)Discharge only the minimal amount of ballast water essential to operations 2)Minimize discharge and uptake in marine sanctuaries, marine preserves, marine parks, or coral reefs. 3)Minimize or avoid uptake of ballast water in: Areas with known infestations of

	non-indigenous organisms. •Areas near a sewage outfall. •Areas for which the master has been informed of the presence of a toxic algal bloom. •Areas of poor tidal flushing or high turbidity. •Periods of darkness when bottom dwelling organisms may rise up in the water column. •Areas where sediments have been disturbed (e.g. near dredging operations). 4)Clean ballast tanks regularly in mid-ocean waters or in port or drydock. 5)Rinse anchors and anchor chains to remove organisms and sediments at their place of origin. 6)Remove hull fouling organisms on a regular basis
Sampling required	None
Records required	Yes
Procedures if en route management is not possible	Under extraordinary circumstances, perform a ballast water exchange within an area agreed to in advance by the Commission.
Procedure if ballast water found to be unacceptable after sampling	unknown
For further information refer to	For further information see: http://www.slc.ca.gov/Spec_Pub/MFD/Ballast_Water/Laws_Regulations.html
California hull fouling requirements	
Requirements	With effect from January 2011 all ships calling at Californian ports will be required to complete and submit annually a Hull Husbandry Reporting form to the California State Lands Commission. The ships agents should supply the required form which is also available from the link above.

New York

Monitoring Authority	New York State Department of Environmental Conservation
Ports affected	All
Ships affected	All
Implementation	Mandatory application
Date of start	
Methods acceptable	All vessels entering New York waters must have the ability to measure salinity levels in each tank onboard the vessel so that salinities of at least 30 ppt can be ensured Any vessel whose voyage originates from within the exclusive economic zone and enters New York waters with ballast on board, shall conduct ballast water exchange at least 50 nautical miles from shore and in water at least 200 meters in depth. Such vessels that carry only residual amounts of ballast water and/or sediments shall conduct saltwater flushing of their ballast water tanks, at least 50 nautical miles from shore and in water at least 200 meters in depth. This does not apply to vessel(s): (i) that operate exclusively in the Great Lakes - St. Lawrence Seaway System upstream of Montreal, Quebec, or (ii) operating exclusively within waters of New York Harbour and Long Island Sound, or (iii) entering New York waters from ports of call within New Jersey and Connecticut waters which are included in the definition of "waters of New York Harbour and Long Island Sound," provided that the vessel has met the requirements of this condition prior to entering the waters of New York Harbour and Long Island Sound, or (iv) that have met the requirements of Condition #2 or Condition #3, or (v) that carry only permanent ballast water, all of which is in sealed tanks that are not subject to discharge, or (vi) of the Armed Forces, or (vii) of the National Defense Reserve Fleet that are scheduled to be disposed of through scrapping or sinking. **Not later than January 1, 2012**, each vessel that operates in New York waters, shall have a ballast water treatment system that meets the following standards, subject to the exceptions listed below. (A) *Standard for organisms 50 or more micrometers in minimum dimension*: Any ballast water discharged shall contain less than 1 living organism per 10 cubic meters. (B) *Standard for organisms less than 50 micrometers in minimum dimension and more than 10 micrometers in minimum dimension*: Any ballast water discharged shall contain less than 1 living organism per 10 milliliters. (C) *Standards for indicator microbes*: (i) Any ballast water discharged shall contain less than 1 colony-forming unit of toxicogenic *Vibrio cholera* (serotypes O1 and O139) per 100

	milliliters or less than 1 colony-forming unit of that microbe per gram of wet weight of zoological samples; (ii) Any ballast water discharged shall contain less than 126 colony-forming units of *escherichia coli* per 100 milliliters; and (iii) Any ballast water discharged shall contain less than 33 colony-forming units of intestinal enterococci per 100 milliliters. **Vessels constructed on or after January 1, 2013** and that operates in New York waters, shall have a ballast water treatment system that meets the following standards, subject to the exceptions listed below. (A) *Standard for organisms 50 or more micrometers in minimum dimension*: Any ballast water discharged shall contain no detectable living organisms. (B) *Standard for organisms less than 50 micrometers in minimum dimension and more than 10 micrometers in minimum dimension*: Any ballast water discharged shall contain less than 0.01 living organism per milliliter. (C) *Standards for indicator microbes*: (i) Any ballast water discharged shall contain less than 1 colony-forming unit of toxicogenic *Vibrio cholera* (serotypes O1 and O139) per 100 milliliters or less than 1 colony-forming unit of that microbe per gram of wet weight of zoological samples, (ii) Any ballast water discharged shall contain less than 126 colony-forming units of *escherichia coli* per 100 milliliters, and (iii) Any ballast water discharged shall contain less than 33 colony-forming units of intestinal enterococci per 100 milliliters.
Unwanted aquatic organisms or pathogens	Not defined
Uptake control measures	None specified
Sampling required	Not defined
Records required	Not specified – Vessels should keep a ballast water log
Procedures if en route management is not possible	
Procedure if ballast water found to be unacceptable after sampling	None specified
For further information refer to	http://www.dec.ny.gov/permits/72399.html

Notes	New York has permitted waivers from the requirement to treat ballast to the above standards – these waivers are valid to 1 August 2013

BALLAST WATER MANAGEMENT - USEFUL WEB SITES

The following is a selection of useful web sites which have information on national regulations or Ballast Water Management in general.

Lloyd's Register

http://www.lr.org/bwm

IMO

http://www.imo.org

http://globallast.imo.org

http://www.uscg.mil/hq/g-m/mso/estandards.htm

US EPA (Environmental Protection Agency)

http://www.epa.gov/owow/invasive_species/ballast_water.html

US – Smithsonian Environmental Research Centre

http://invasions.si.edu/ballast.htm

SOCP Ballast Water Management Information Centre

http://www.socp.org/ballast/bwm.htm

CQD Journal for the Maritime Environmental Industry

http://www.cqdjournal.com/html/cqd.html

http://www.cqdjournal.com/Hot_Events/Press_Releases/MEPC-47/mepc-47.htm

http://www.cqdjournal.com/Hot_Events/ballast-imo/ballast-tech/ballast-tech.htm

Normative Reference

1. IMO Resolution A.868 (20) - Guidelines for the control and management of ships' ballast water to minimize the transfer of harmful aquatic organisms and pathogens
2. IMO Resolution MEPC.124(53) – Guidelines for Ballast water exchange (G6)
3. IMO Resolution MEPC.127(53) – Guidelines for Ballast Water management and development of ballast water management plans (G4)

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1 December 1997
Original: ENGLISH

ASSEMBLY
20th session
Agenda item 11

RESOLUTION A.868(20)
adopted on 27 November 1997

GUIDELINES FOR THE CONTROL AND MANAGEMENT OF SHIPS' BALLAST WATER TO MINIMIZE THE TRANSFER OF HARMFUL AQUATIC ORGANISMS AND PATHOGENS

THE ASSEMBLY,

RECALLING Article 15(j) of the Convention on the International Maritime Organization concerning the functions of the Assembly in relation to regulations and guidelines concerning prevention and control of marine pollution from ships,

RECALLING ALSO resolution A.774(18) by which it recognized that the uncontrolled discharge of ballast water and sediment from ships has led to the transfer of harmful aquatic organisms and pathogens, causing injury to public health and damage to property and the environment, and accordingly adopted Guidelines for Preventing the Introduction of Unwanted Aquatic Organisms and Pathogens from Ships' Ballast Water and Sediment Discharges, and further that the Marine Environment Protection Committee (MEPC) and the Maritime Safety Committee (MSC) shall keep the ballast water issue and the application of the Guidelines under review with a view to further developing the Guidelines as a basis for a new Annex to MARPOL 73/78,

RECALLING FURTHER that the 1992 United Nations Conference on Environment and Development (UNCED), in its Agenda 21 requests IMO to consider the adoption of appropriate rules on ballast water discharge to prevent the spread of non-indigenous organisms, and further proclaims in its Declaration on Environment and Development that States shall widely apply the precautionary approach according to their capabilities,

BEARING IN MIND that MEPC/Circ.288 recognized that the existing Guidelines do not provide a complete solution towards the total prevention of the introduction of harmful aquatic organisms and pathogens, but urged that focus should be directed on measures aimed at minimizing the risks, emphasizing further that in applying the existing Guidelines, the ship's safety was of paramount importance,

NOTING the objectives of the Convention on Biological Diversity, 1992, and that the transfer and introduction of alien aquatic species with ballast water threatens the conservation and sustainable use of biological diversity,

NOTING FURTHER the status of work carried out by MEPC as requested by resolution A.774(18) concerning the development of legally binding provisions on ballast water management together with guidelines for their effective implementation, as well as the Guidance on Safety Aspects of Ballast Water Exchange at Sea prepared by the Sub-Committee on Ship Design and

Equipment, and distributed as MEPC/Circ.329 and MSC/Circ.806, both of 30 June 1997,

RECOGNIZING that several States have taken unilateral action by adopting legally binding provisions for local, regional or national application with a view to minimizing the risks of introducing harmful aquatic organisms and pathogens through ships entering their ports, and also that this issue, being of worldwide concern, demands action based on globally applicable regulation together with guidelines for their effective implementation and uniform interpretation,

HAVING CONSIDERED the recommendation of the MEPC at its fortieth session on this issue,

1. ADOPTS the Guidelines for the Control and Management of Ships' Ballast Water to Minimize the Transfer of Harmful Aquatic Organisms and Pathogens set out in the Annex to the present resolution;

2. REQUESTS Governments to take urgent action in applying these Guidelines, including the dissemination thereof to the shipping industry, to use them as a basis for any measures they adopt with a view to minimizing the risks of introducing harmful aquatic organisms and pathogens, and to report to the MEPC on any experience gained in their implementation;

3. REQUESTS ALSO the MEPC to work towards completion of legally binding provisions on ballast water management in the form of a new Annex to MARPOL 73/78, together with guidelines for their uniform and effective implementation with a view to their consideration and adoption in the year 2000;

4. REQUESTS FURTHER the MSC to include in its workplan the evaluation of information received from interested parties, particularly that relevant to 12.2 of the Guidelines adopted herewith, with a view to determining the hazards and potential consequences for various existing ship types and operations. The MSC is also requested to consider any other relevant issues concerning ballast water management as well as design objectives for new ships, with a view to minimizing to the extent possible risks of introducing harmful aquatic organisms and pathogens with ships' ballast water and sediments;

5. REVOKES resolution A.774(18).

ANNEX

GUIDELINES FOR THE CONTROL AND MANAGEMENT OF SHIPS' BALLAST WATER TO MINIMIZE THE TRANSFER OF HARMFUL AQUATIC ORGANISMS AND PATHOGENS

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1 Introduction

1.1 Studies carried out in several countries have shown that many species of bacteria, plants, and animals can survive in a viable form in the ballast water and sediment carried in ships, even after journeys of several months' duration. Subsequent discharge of ballast water or sediment into the waters of port States may result in the establishment of harmful aquatic organisms and pathogens which may pose threats to indigenous human, animal and plant life, and the marine environment. Although other media have been identified as being responsible for transferring organisms between geographically separated water bodies, ballast water discharge from ships appears to have been among the most prominent.

1.2 The potential for ballast water discharge to cause harm has been recognised not only by the International Maritime Organization but also by the World Health Organization, which is concerned about the role of ballast water as a medium for the spreading of epidemic disease bacteria.

1.3 These Guidelines are not to be regarded as a certain solution to the problem. Rather, each part of them should be viewed as a tool which, if correctly applied, will help to minimize the risks associated with ballast water discharge. As scientific and technological advances are made, the Guidelines will be refined to enable the risk to be more adequately addressed. In the interim, port States, flag States and other parties that can assist in mitigating this problem should exercise due care and diligence in an effort to conform to the maximum extent possible with the Guidelines.

1.4 The selection of appropriate methods of risk minimization will depend upon several factors, including the type or types of organisms being targeted, the level of risk involved, its environmental acceptability, the economic and ecological costs involved and the safety of ships.

2 Definitions

For the purposes of these Guidelines, the following definitions apply:

Administration means the Government of the State under whose authority the ship is operating.

Convention means MARPOL 73/78 (International Convention for the Prevention of Pollution from Ships, 1973, and the Protocol of 1978 related thereto).

Member States means States that are Members of the International Maritime Organization.

Organization means the International Maritime Organization (IMO).

Port State authority means any official or organisation authorized by the Government of a port State to administer guidelines or enforce standards and regulations relevant to the implementation of national and international shipping control measures.

Treatment means a process or mechanical, physical, chemical or biological method to kill, remove or render infertile, harmful or potentially harmful organisms within ballast water.

3 Application

The Guidelines are directed to Member States and can apply to all ships; however, a port State authority shall determine the extent to which they do apply.

4 Guideline objectives and background

4.1 The objectives of these Guidelines, developed under technical and scientific guidance, are intended to assist Governments and appropriate authorities, ship masters, operators and owners, and port authorities, as well as other interested parties, in minimizing the risk of introducing harmful aquatic organisms and pathogens from ships' ballast water and associated sediments while protecting ships' safety.

4.2 The Guidelines allow port States to exempt ships within the area under their jurisdiction from part or all of the relevant provisions. Notwithstanding, any administration wishing to apply restrictions to ballast water operations should still follow these Guidelines, when developing legislation or procedures.

4.3 In order that the Guidelines may be implemented in a standard and uniform manner, all Member State Governments, ship operators, other appropriate authorities and interested parties are requested to apply these Guidelines.

5 Dissemination of information

5.1 Administrations are encouraged to maintain and exchange information relevant to these Guidelines through the Organization. Accordingly, administrations are encouraged to provide the Organization with the following:

.1 Information on severe outbreaks or infestations of harmful aquatic organisms which may pose a risk;

.2 Copies of current domestic laws and regulations;

.3 Technical and research information;

.4 Education materials (such as audio and video tapes) and printed materials; and

.5 Location and terms of use of alternative exchange zones, contingency strategies, availability of shore reception facilities, fees, etc.

5.2 Member States, applying ballast water and sediment discharge procedures, should notify the Organization of specific requirements and provide to the Organization, for the information of other Member States and non-governmental organizations, copies of any regulations, standards, exemptions or guidelines being applied. Verification and detailed information concerning port State requirements should be obtained by the ship prior to arrival.

5.3 Port State authorities should provide the widest possible distribution of information on ballast water and sediment management and treatment requirements that are being applied to shipping. Failure to do so may lead to unnecessary delays for ships seeking entry to port States.

5.4 Shipping organizations and ships' managers should be familiar with the requirements of port State authorities with respect to ballast water and sediment management and treatment procedures, including information that will be needed to obtain entry clearance.

5.5 Member States are invited to provide the Organization with details of any research and

development studies that they carry out with respect to the impact and control of harmful aquatic organisms and pathogens in ships' ballast water and sediment.

5.6 Member States should provide to the Organization details of records describing reasons why existing requirements could not be complied with, e.g. force majeure, heavy weather, failure of equipment, or lack of information concerning port State requirements.

6 Training and education

6.1 Training for ships' masters and crews as appropriate should include instructions on the application of ballast water and sediment management and treatment procedures, based upon the information contained in these Guidelines. Instruction should also be provided on the maintenance of appropriate records and logs. Governments should ensure that their marine training organizations include this in the contents of their syllabus.

6.2 The application of processes and procedures concerning ballast water management are currently at the core of the solution to minimize the introduction of harmful aquatic organisms and pathogens.

6.3 Governments are encouraged to include knowledge of duties regarding the control of pollution of the sea by harmful aquatic organisms and pathogens in their training requirements for certificates.

7 Procedures for ships and port States

7.1 Procedures for ships

7.1.1 Every ship that carries ballast water should be provided with a ballast water management plan to assist in the minimization of transfer of harmful aquatic organisms and pathogens. The intent of the plan should be to provide safe and effective procedures for ballast water management.

7.1.2 The ballast water management plan should be specific to each ship.

7.1.3 The ballast water management plan should be included in the ship's operational documentation. Such a plan should address, *inter alia*:

- relevant parts of these Guidelines;
- approval documentation relevant to treatment equipment;
- an indication of records required; and
- the location of possible sampling points.

7.2 Procedures for port States

7.2.1 Reception and treatment facilities should be made available for the environmentally safe disposal of ballast tank sediments.

7.2.2 Discharge of ship's ballast water into port reception and/or treatment facilities may provide an acceptable means of control. Port State authorities wishing to utilize this strategy should ensure that the facilities are adequate.

8 Recording and reporting procedures

8.1 Procedures for ships

8.1.1 Where a port State authority requires that specific ballast water procedures and/or treatment option(s) be undertaken, and due to weather, sea conditions or operational impracticability such action cannot be taken, the master should report this fact to the port State authority as soon as possible and, where appropriate, prior to entering seas under its jurisdiction.

8.1.2 To facilitate the administration of ballast water management and treatment procedures on board each ship, a responsible officer should be appointed to maintain appropriate records and to ensure that ballast water management and/or treatment procedures are followed and recorded.

8.1.3 When taking on or discharging ballast water, as a minimum, the dates, geographical locations, ship's tank(s) and cargo holds, ballast water temperature and salinity as well as the amount of ballast water loaded or discharged should be recorded. A suitable format is shown in appendix 1. The record should be made available to the port State authority.

8.1.4 The location and suitable access points for sampling ballast or sediment should be described in the ship's ballast water management plan. This will allow crew members to provide maximum assistance when officers of the port State authority require a sample of the ballast water or sediment.

8.2 Procedures for port States

8.2.1 Consistent with 5.2 above, port States should provide ships with the following information:

- details of their requirements concerning ballast water management;
- location and terms of use of alternative exchange zones;
- any other port contingency arrangements; and
- the availability, location, capacities of and applicable fees relevant to reception facilities that are being provided for the environmentally safe disposal of ballast water and associated sediment.

8.2.2 To assist ships in applying the precautionary practices described in 9.1.1 below, port States should inform local agents and/or the ship of areas and situations where the uptake of ballast water should be minimized, such as:

- areas with outbreaks, infestations or known populations of harmful organisms and pathogens;
- areas with current phytoplankton blooms (algal blooms, such as red tides);
- nearby sewage outfalls;
- nearby dredging operations;
- when a tidal stream is known to be the more turbid; and

- areas where tidal flushing is known to be poor.

9 Ships' operational procedures

9.1 Precautionary practices

9.1.1 Minimizing uptake of harmful aquatic organisms, pathogens and sediments

When loading ballast, every effort should be made to avoid the uptake of potentially harmful aquatic organisms, pathogens and sediment that may contain such organisms. The uptake of ballast water should be minimized or, where practicable, avoided in areas and situations such as:

- areas identified by the port State in connection with advice relating to 8.2.2 above;
- in darkness when bottom-dwelling organisms may rise up in the water column;
- in very shallow water; or
- where propellers may stir up sediment.

9.1.2 Removing ballast sediment on a timely basis

Where practicable, routine cleaning of the ballast tank to remove sediments should be carried out in mid-ocean or under controlled arrangements in port or dry dock, in accordance with the provisions of the ship's ballast water management plan.

9.1.3 Avoiding unnecessary discharge of ballast water

If it is necessary to take on and discharge ballast water in the same port to facilitate safe cargo operations, care should be taken to avoid unnecessary discharge of ballast water that has been taken up in another port.

9.2 Ballast water management options

9.2.1 Ballast water exchange

Near-coastal (including port and estuarine) organisms released in mid-ocean, and oceanic organisms released in coastal waters, do not generally survive.

When exchanging ballast at sea, guidance on safety aspects of ballast water exchange as set out in appendix 2 should be taken into account. Furthermore, the following practices are recommended:

- where practicable, ships should conduct ballast exchange in deep water, in open ocean and as far as possible from shore. Where this is not possible, requirements developed within regional agreements may be in operation, particularly in areas within 200 nautical miles from shore. Consistent with 9.1.2 above, all of the ballast water should be discharged until suction is lost, and stripping pumps or eductors should be used if possible;
- where the flow-through method is employed in open ocean by pumping ballast water into the tank or hold and allowing the water to overflow, at least three times the tank volume

should be pumped through the tank;

- where neither form of open ocean exchange is practicable, ballast exchange may be accepted by the port State in designated areas; and

- other ballast exchange options approved by the port State.

9.2.2 Non-release or minimal release of ballast water

In cases where ballast exchange or other treatment options are not possible, ballast water may be retained in tanks or holds. Should this not be possible, the ship should only discharge the minimum essential amount of ballast water in accordance with port States' contingency strategies.

9.2.3 Discharge to reception facilities

If reception facilities for ballast water and/or sediments are provided by a port State, they should, where appropriate, be utilized.

9.2.4 Emergent and new technologies and treatments

9.2.4.1 If suitable new and emergent treatments and technologies prove viable, these may substitute for, or be used in conjunction with, current options. Such treatments could include thermal methods, filtration, disinfection including ultraviolet light, and other such means acceptable to the port State.

9.2.4.2 Results concerning the application and effectiveness of new ballast water management technologies and associated control equipment should be notified to the Organization with a view to evaluation and incorporation, as appropriate, into these Guidelines.

10 Port State considerations

The following is provided for the guidance of port State authorities in the implementation of their ballast water management programme, and to assess risks in relation to the ballast water containing harmful aquatic organisms and pathogens.

10.1 Highly disparate conditions between uptake and discharge ports

Significantly different conditions may exist between port(s) of origin and the port in which ballast water is discharged. Examples include freshwater ballast being released into highly saline ports. There may be organisms capable of surviving such extreme transfers; however, there is a lower probability of species establishment under such transport events.

10.2 Ballast water age

The length of time during which ballast water is within an enclosed ballast tank may also be a factor in determining the number of surviving organisms, because of the absence of light, decreasing nutrients and oxygen, changes of salinity and other factors. However, the maximum length of survival of organisms in ballast water varies, and in many cases is not known. Water of an age of 100 days should be considered the minimum for applying this consideration. Ballast water and sediments may contain dinoflagellate cysts and other organisms capable of surviving for a much longer length of time.

10.3 Presence of target organisms

10.3.1 Under certain circumstances it may be possible to determine if one or more target species are present in the water of a specific port and have been ballasted in a ship. In these circumstances, the receiving port State authority may invoke management measures accordingly. Even if such target species are not present, however, it should be noted that the ship may still be carrying many untargetted species which, if released in new waters, could be potentially harmful.

10.3.2 Port States are encouraged to carry out biological baseline surveys in their ports and to disseminate the results of their investigations.

11 Enforcement and monitoring by port states

11.1 Consistent with the precautionary approach to environmental protection, these Guidelines can apply to all ships unless specifically exempted by a port State authority within its jurisdiction. In accordance with 5.2 above, port State authorities should inform the Organization on how the Guidelines are being applied.

11.2 Member States have the right to manage ballast water by national legislation. However, any ballast discharge restrictions should be notified to the Organization.

11.3 In all cases, a port State authority should consider the overall effect of ballast water and sediment discharge procedures on the safety of ships and those on board. Guidelines will be ineffective if compliance is dependent upon the acceptance of operational measures that put a ship or its crew at risk. Port States should not require any action of the master which imperils the lives of seafarers or the safety of the ship.

11.4 It is essential that ballast water and sediment management procedures be effective as well as environmentally safe, practicable, designed to minimize costs and delays to the ship, and based upon these Guidelines whenever possible.

11.5 Any instructions or requirements of a ship should be provided in a timely manner and be clear and concise.

11.6 Port States should on request provide a visiting ship with any requested information relative to ballast water management and its potential effects with respect to harmful aquatic organisms and pathogens.

11.7 Any enforcement or monitoring activities should be undertaken in a fair, uniform and nationally consistent manner at all ports within the port State. Where there are compelling reasons whereby nationally consistent procedures cannot be followed, then deviations should be reported to the Organization.

11.8 Compliance monitoring should be undertaken by port State authorities by, for example, taking and analysing ballast water and sediment samples to test for the continued survival of harmful aquatic organisms and pathogens.

11.9 Where ballast water or sediment sampling for compliance or effectiveness monitoring is being undertaken, port State authorities should minimize delays to ships when taking such samples.

11.10 When sampling for research or compliance monitoring, the port State authority should give as much notice as possible to the ship that sampling will occur, to assist in planning staffing and operational resources.

11.11 The master has a general obligation to provide reasonable assistance for the above monitoring which may include provision of officers or crew, provision of the ship's plans, records pertaining to ballast arrangements and details concerning the location of sampling points.

11.12 Sampling methods for research and monitoring is the responsibility of the individual port State. The Organization welcomes information on new or innovative methods of sampling and/or analysis, and any relevant information should be provided to it.

11.13 Port State authorities should indicate to the master or responsible officer the purpose for which a sample is taken (i.e., monitoring, research or enforcement). Results of analyses of samples should be made available to ship's operators on request.

11.14 Port State authorities may sample or require samples to analyse ballast water and sediment, before permitting a ship to proceed to discharge its ballast water in environmentally sensitive locations. In the event that harmful aquatic organisms or pathogens are found to be present in the samples, a port State's contingency strategy may be applied.

12 Future considerations in relation to ballast water exchange

12.1 Research needs

Operational measures such as ballast water exchange may be appropriate in the short term; however, there is a clear need for further research. These Guidelines should be revised and adjusted in the light of results concerning new ballast water management options.

12.2 Long-term evaluation of safety aspects in relation to ballast water exchange

Recognizing the need to evaluate the hazards and potential consequences for various types of ships and operations, interested parties should carry out detailed studies and provide information relevant to:

- experience gained from carrying out ballast water exchange at sea, including any samples/model procedures;
- operational precautions and procedures implemented to avoid potential hazards and consequences that may arise during the ballast water exchange at sea;
- an evaluation of the safety margins between the actual metacentric height and stresses versus the allowable seagoing limits specified in the approved trim and stability booklet and loading manual, relevant to different types of ships and loading conditions;
- any hazards which may arise due to human element issues relative to the responsible execution of ballast water exchange at sea in a manner which may not be fully prudent;
- operational procedures carried out prior to initiating the ballast water exchange at sea and check points during the exchange;
- the extent of training and management necessary to ensure that the process of ballast water exchange at sea is effectively monitored and controlled on board;
- plan of action to incorporate any unique procedures should an emergency occur which may affect the exchange of ballast water at sea; and
- the decision-making process, taking into account relevant safety matters, including ship's position, weather conditions, machinery performance, ballast system inspection and maintenance, crew safety and availability.

13 Ballast system design

Builders, owners and classification societies should take these Guidelines into consideration when designing new ships or modifying existing ships.

APPENDIX 1

BALLAST WATER REPORTING FORM

(TO BE PROVIDED TO PORT STATE AUTHORITY UPON REQUEST)

1. VESSEL INFORMATION

Vessel Name:	Type:	IMO Number:	
Owner:	GT:	Call Sign:	
Flag:	Arrival Date:	Agent:	
Last Port and Country:			Arrival Port:
Next Port and Country:			

2. BALLAST WATER

Specify units: m^3, MT, LT, ST
Total Ballast Water on Board:
Total Ballast Water Capacity:

3. BALLAST WATER TANKS

BALLAST WATER MANAGEMENT PLAN ON BOARD? YES ____ NO ____ HAS THIS BEEN IMPLEMENTED? YES ____ NO ____

TOTAL NO. OF TANKS ON BOARD_____ NO. OF TANKS IN BALLAST_____ **IF NONE IN BALLAST GO TO NO. 5.**

NO. OF TANKS EXCHANGED_____ NO. OF TANKS NOT EXCHANGED_____

4. BALLAST WATER HISTORY: RECORD ALL TANKS THAT WILL BE DEBALLASTED IN PORT STATE OF ARRIVAL; IF NONE GO TO NO. 5.

Tanks/Holds (List multiple sources/tank separately)	BW SOURCE				BW EXCHANGE circle one: Empty/Refill or Flow Through					BW DISCHARGE			
	DATE DDMMYY	PORT or LAT. LONG.	VOLUME (units)	TEMP (units)	DATE DDMMYY	ENDPOINT LAT. LONG.	VOLUME (units)	% Exch.	SEA Hgt. (m)	DATE DDMMYY	PORT or LAT. LONG.	VOLUME (units)	SALINITY (units)

Ballast Water Tank Codes: Forepeak=FP, Aftpeak=AP, Double Bottom=DB, Wing=WT, Topside=TS, Cargo Hold=CH, O=Other

IF EXCHANGES WERE NOT CONDUCTED, STATE OTHER CONTROL ACTION(S) TAKEN:_____

IF NONE, STATE REASON WHY NOT. _____

5. IMO BALLAST WATER GUIDELINES ON BOARD (RES. A 20/868)? YES ____ NO ____

RESPONSIBLE OFFICER'S NAME AND TITLE (PRINTED) AND SIGNATURE_____

APPENDIX 2

GUIDANCE ON SAFETY ASPECTS OF BALLAST WATER EXCHANGE AT SEA

1 Introduction

1.1 This document is intended to provide guidance on the safety aspects of ballast water exchange at sea. The different types of ships which may be required to undertake ballast water exchange at sea make it presently impractical to provide specific guidelines for each ship type. Shipowners are cautioned that they should consider the many variables that apply to their ships. Some of these variables include type and size of ship, ballast tank configurations and associated pumping systems, trading routes and associated weather conditions, port State requirements and manning.

1.2 Ballast water exchange at sea procedures contained in relevant management plans should be individually assessed for their effectiveness from the environmental protection point of view as well as from the point of view of their acceptability in terms of structural strength and stability.

1.3 In the absence of a more scientifically based means of control, exchange of ballast water in deep ocean areas or open seas currently offers a means of limiting the probability that fresh water or coastal aquatic species will be transferred in ballast water. Two methods of carrying out ballast water exchange at sea have been identified:

.1 the sequential method, in which ballast tanks are pumped out and refilled with clean water; and/or

.2 the flow-through method, in which ballast tanks are simultaneously filled and discharged by pumping in clean water.

2 Safety precautions

2.1 Ships engaged in ballast water exchange at sea should be provided with procedures which account for the following, as applicable:

.1 avoidance of over and under-pressurization of ballast tanks;

.2 free surface effects on stability and sloshing loads in tanks that may be slack at any one time;

.3 admissible weather conditions;

.4 weather routeing in areas seasonably affected by cyclones, typhoons, hurricanes, or heavy icing conditions;

.5 maintenance of adequate intact stability in accordance with an approved trim and stability booklet;

.6 permissible seagoing strength limits of shear forces and bending moments in accordance with an approved loading manual;

.7 torsional forces, where relevant;

.8 minimum/maximum forward and aft draughts;

.9 wave-induced hull vibration;

.10 documented records of ballasting and/or de-ballasting;

.11 contingency procedures for situations which may affect the ballast water exchange at sea, including deteriorating weather conditions, pump failure, loss of power, etc.;

.12 time to complete the ballast water exchange or an appropriate sequence thereof, taking into account that the ballast water may represent 50 % of the total cargo capacity for some ships; and

.13 monitoring and controlling the amount of ballast water.

2.2 If the flow through method is used, caution should be exercised, since:

.1 air pipes are not designed for continuous ballast water overflow;

.2 current research indicates that pumping of at least three full volumes of the tank capacity could be needed to be effective when filling clean water from the bottom and overflowing from the top; and

.3 certain watertight and weathertight closures (e.g. manholes) which may be opened during ballast exchange, should be re-secured.

2.3 Ballast water exchange at sea should be avoided in freezing weather conditions. However, when it is deemed absolutely necessary, particular attention should be paid to the hazards associated with the freezing of overboard discharge arrangements, air pipes, ballast system valves together with their means of control, and the accretion of ice on deck.

2.4 Some ships may need the fitting of a loading instrument to perform calculations of shear forces and bending moments induced by ballast water exchange at sea and to compare with the permissible strength limits.

2.5 An evaluation should be made of the safety margins for stability and strength contained in allowable seagoing conditions specified in the approved trim and stability booklet and the loading manual, relevant to individual types of ships and loading conditions. In this regard particular account should be taken of the following requirements:

.1 stability to be maintained at all times to values not less than those recommended by the Organization (or required by the Administration);

.2 longitudinal stress values not to exceed those permitted by the ship's classification society with regard to prevailing sea conditions; and

.3 exchange of ballast in tanks or holds where significant structural loads may be generated by sloshing action in the partially filled tank or hold to be carried out in favourable sea

and swell conditions so that the risk of structural damage is minimized.

2.6 The ballast water management plan should include a list of circumstances in which ballast water exchange should not be undertaken. These circumstances may result from critical situations of an exceptional nature, *force majeure* due to stress of weather, or any other circumstances in which human life or safety of the ship is threatened.

3 Crew training and familiarization

3.1 The ballast water management plan should include the nomination of key shipboard control personnel undertaking ballast water exchange at sea.

3.2 Ships' officers and ratings engaged in ballast water exchange at sea should be trained in and familiarized with the following:

.1 the ship's pumping plan, which should show ballast pumping arrangements, with positions of associated air and sounding pipes, positions of all compartment and tank suctions and pipelines connecting them to ship's ballast pumps and, in the case of use of the flow through method of ballast water exchange, the openings used for release of water from the top of the tank together with overboard discharge arrangements;

.2 the method of ensuring that sounding pipes are clear, and that air pipes and their non-return devices are in good order;

.3 the different times required to undertake the various ballast water exchange operations;

.4 the methods in use for ballast water exchange at sea if applicable with particular reference to required safety precautions; and

.5 the method of on-board ballast water record keeping, reporting and recording of routine soundings.

ANNEX 2

RESOLUTION MEPC.124(53)

Adopted on 22 July 2005

GUIDELINES FOR BALLAST WATER EXCHANGE (G6)

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee conferred upon it by the international conventions for the prevention and control of marine pollution,

RECALLING ALSO that the International Conference on Ballast Water Management for Ships held in February 2004 adopted the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (the Ballast Water Management Convention) together with four Conference resolutions,

NOTING that Regulation A-2 of the Ballast Water Management Convention requires that discharge of ballast water shall only be conducted through Ballast Water Management in accordance with the provisions of the Annex to the Convention,

NOTING FURTHER that Regulation B-4 of the Annex to the Ballast Water Management Convention addresses the conditions under which ballast water exchange should be conducted, taking into account Guidelines developed by the Organization,

NOTING ALSO that resolution 1 adopted by the International Conference on Ballast Water Management for Ships invites the Organization to develop these Guidelines as a matter of urgency,

HAVING CONSIDERED the draft Guidelines for ballast water exchange developed by the Ballast Water Working Group and the recommendation made by the Sub-Committee on Bulk Liquids and Gases at its ninth session,

1. ADOPTS the Guidelines for ballast water exchange, as set out in the Annex to this resolution;

2. INVITES Governments to apply the Guidelines as soon as possible, or when the Convention becomes applicable to them; and

3. AGREES to keep the Guidelines under review.

ANNEX

GUIDELINES FOR BALLAST WATER EXCHANGE (G6)

1 INTRODUCTION

1.1 The purpose of these Guidelines is to provide shipowners and operators with general guidance on the development of ship specific procedures for conducting ballast water exchange. Whenever possible ship owner and operators should enlist the assistance of classification societies or qualified marine surveyors in tailoring ballast exchange practices for various conditions of weather, cargo and stability. The application of processes and procedures concerning ballast water management are at the core of the solution to prevent, minimize and ultimately eliminate the introduction of harmful aquatic organisms and pathogens. Ballast water exchange offers a means, when used in conjunction with good ballast water management practices, to assist in achieving this solution.

1.2 Ballast water exchange introduces a number of safety issues, which affect both the ship and its crew. These Guidelines are intended to provide guidance on the safety and operational aspects of ballast water exchange at sea.

1.3 Given that there are different types of ships, which may be required to undertake ballast water exchange at sea, it is impractical to provide specific guidelines for each ship type. Shipowners are cautioned that they should consider the many variables that apply to their ships. Some of these variables include type and size of ship, ballast tank configurations and associated pumping systems, trading routes and associated weather conditions, port State requirements and manning.

Application

1.4 The Guidelines apply to all those involved with ballast water exchange including, shipowners and operators, designers, classification societies and shipbuilders. Operational procedures and guidance reflecting the issues rose in these Guidelines should be reflected in the ships ballast water management plan.

2 DEFINITIONS

2.1 For the purposes of these Guidelines, the definitions in the International Convention for the Control and Management of Ships' Ballast Water and Sediments (the Convention) apply and:

.1 "Ballast Water Tank" – means any tank, hold, or space used for the carriage of ballast water.

3 RESPONSIBILITIES

3.1 Shipowners and operators should ensure, prior to undertaking ballast water exchange, that all the safety aspects associated with the ballast water exchange method or methods used onboard have been considered and that suitably trained personnel are onboard. A review of the safety aspects, the suitability of the exchange methods being used and the aspects of crew training should be undertaken at regular intervals.

3.2 The Ballast Water Management Plan is to include the duties of key shipboard control personnel undertaking ballast water exchange at sea. Such personnel should be fully conversant with the safety aspects of ballast water exchange and in particular the method of exchange used on board their ship and the particular safety aspects associated with the method used.

3.3 In accordance with Regulation B-4.4 of the Convention if the master reasonably decides that to perform ballast water exchange would threaten the safety or stability of the ship, its crew or its passengers, because of adverse weather, the ship's design, stress, equipment failure, or any other extraordinary condition a ship shall not be required to comply with Regulations B-4.1 and B-4.2.

.1 When a ship does not undertake ballast water exchange for the reasons stated in paragraph above, the reasons shall be entered in the Ballast Water Record Book.

.2 The port or coastal State concerned may require that the discharge of ballast water must be in accordance with procedures determined by them taking into account the Guidelines for additional measures including emergency situations (G13).

4 BALLAST WATER EXCHANGE REQUIREMENTS

4.1 Exchange of ballast water in deep ocean areas or open seas offers a means of limiting the probability that harmful aquatic organisms and pathogens be transferred in ships ballast water.

4.2 Regulation D-1 of the Convention requires that:

.1 ships performing ballast water exchange in accordance with this regulation shall do so with an efficiency of at least 95 per cent volumetric exchange of ballast water; and

.2 for ships exchanging ballast water by the pumping-through method, pumping through three times the volume of each ballast water tank shall be considered to meet the standard described in paragraph 1. Pumping through less than three times the volume may be accepted provided the ship can demonstrate that at least 95 per cent volumetric exchange is met.

4.3 There are three methods of Ballast Water exchange which have been evaluated and accepted by the Organization. The three methods are the sequential method, the flow-through method and the dilution method. The flow-through method and the dilution method are considered as "pump through" methods.

4.4 The three accepted methods can be described as follows:

Sequential method – a process by which a ballast tank intended for the carriage of ballast water is first emptied and then refilled with replacement ballast water to achieve at least a 95 per cent volumetric exchange.

Flow-through method – a process by which replacement ballast water is pumped into a ballast tank intended for the carriage of ballast water, allowing water to flow through overflow or other arrangements.

Dilution method – a process by which replacement ballast water is filled through the top of the ballast tank intended for the carriage of ballast water with simultaneous discharge from the bottom at the same flow rate and maintaining a constant level in the tank through out the ballast exchange operation.

5 SAFETY PRECAUTIONS ASSOCIATED WITH BALLAST WATER EXCHANGE

5.1 Three methods of carrying out ballast water exchange at sea have been identified as acceptable by the Organization. Each has particular safety aspects associated with it that should be considered when selecting the method(s) to be used on a particular ship.

5.2 When identifying the ballast water exchange method(s) for the first time for a particular ship, an evaluation should be made which should include:

.1 the safety margins for stability and strength contained in allowable seagoing conditions, as specified in the approved trim and stability booklet and the loading manual relevant to individual types of ships. Account should also be taken of the loading conditions and the envisaged ballast water exchange method or methods to be used;

.2 the ballast pumping and piping system taking account of the number of ballast pumps and their capacities, size and arrangements of ballast water tanks; and

.3 the availability and capacity of tank vents and overflow arrangements, for the flow through method, the availability and capacity of tank overflow points, prevention of under and over pressurization of the ballast tanks.

5.3 Particular account should be taken of the following:

.1 stability which is to be maintained at all times and not less than those values recommended by the Organization or required by the Administration;

.2 longitudinal stress, and where applicable torsional stress values, not to exceed permitted values with regard to prevailing sea conditions;

.3 exchange of ballast in tanks where significant structural loads may be generated by sloshing action in the partially filled tank to be carried out in favourable sea and swell conditions such that the risk of structural damage is minimized;

.4 wave-induced hull vibrations when carrying out ballast water exchange;

.5 limitations of the available methods of ballast water exchange in respect of sea and weather conditions;

.6 forward and aft draughts and trim, with particular reference to bridge visibility, slamming, propeller immersion and minimum forward draft; and

.7 additional work loads on the master and crew.

5.4 Having undertaken an evaluation for a particular ship and the exchange method or methods to be used, the ship should be provided with procedures, advice and information appropriate to the exchange method(s) identified and ship type in the Ballast Water Management Plan. The procedures, advice, and information in the Ballast Water Management Plan, may include but is not limited to the following:

.1 avoidance of over and under-pressurization of ballast tanks;

.2 free surface effects on stability and sloshing loads in tanks that may be slack at any one time;

.3 maintain adequate intact stability in accordance with an approved trim and stability booklet;

.4 permissible seagoing strength limits of shear forces and bending moments in accordance with an approved loading manual;

.5 torsional forces;

.6 forward and aft draughts and trim, with particular reference to bridge visibility, propeller immersion and minimum forward draft;

.7 wave-induced hull vibrations when performing ballast water exchange;

.8 watertight and weathertight closures (e.g. manholes) which may have to be opened during ballast exchange must be re-secured;

.9 maximum pumping/flow rates – to ensure the tank is not subjected to a pressure greater than that for which it has been designed;

.10 internal transfers of ballast;

.11 admissible weather conditions;

.12 weather routeing in areas seasonably affected by cyclones, typhoons, hurricanes, or heavy icing conditions;

.13 documented records of ballasting and/or de-ballasting and/or internal transfers of ballast;

.14 contingency procedures for situations which may affect ballast water exchange at sea, including deteriorating weather conditions, pump failure and loss of power;

.15 time to complete the ballast water exchange for each tank or an appropriate sequence thereof;

.16 continual monitoring of the ballast water operation; monitoring should include pumps, levels in tanks, line and pump pressures, stability and stresses;

.17 a list of circumstances in which ballast water exchange should not be undertaken. These circumstances may result from critical situations of an exceptional nature or

force majeure due to stress of weather, known equipment failures or defects, or any other circumstances in which human life or safety of the ship is threatened;

.18 ballast water exchange at sea should be avoided in freezing weather conditions. However, when it is deemed absolutely necessary, particular attention should be paid to the hazards associated with the freezing of overboard discharge arrangements, air pipes, ballast system valves together with their means of control, and the build up of ice on deck; and

.19 personnel safety, including precautions which may be required when personnel are required to work on deck at night, in heavy weather, when ballast water overflows the deck, and in freezing conditions. These concerns may be related to the risks to the personnel of falling and injury, due to the slippery wet surface of the deck plate, when water is overflowing on deck, and to the direct contact with the ballast water, in terms of occupational health and safety.

5.5 During ballast water exchange sequences there may be times when, for a transitory period, one or more of the following criteria cannot be fully met or are found to be difficult to maintain:

.1 bridge visibility standards (SOLAS V/22);

.2 propeller immersion; and

.3 minimum draft forward.

5.6 As the choice of acceptable ballast water exchange sequences is limited for most ships, it is not always practicable to dismiss from consideration those sequences where transitory non-compliance may occur. The practical alternative would be to accept such sequences provided an appropriate note is placed in the Ballast Water Management Plan to alert the ship's master. The note would advise the master of the nature of the transitory non-compliance, that additional planning may be required and that adequate precautions need to be taken when using such sequences.

5.7 In planning a ballast water exchange operation that includes sequences which involve periods when the criteria for propeller immersion, minimum draft and / or trim and bridge visibility cannot be met, the Master should assess:

.1 the duration(s) and time(s) during the operation that any of the criteria will not be met;

.2 the effect(s) on the navigational and manoeuvring capabilities of the ship; and

.3 the time to complete the operation.

5.8 A decision to proceed with the operation should only be taken when it is anticipated that:

.1 the ship will be in open water;

.2 the traffic density will be low;

.3 an enhanced navigational watch will be maintained including if necessary an additional look out forward with adequate communications with the navigation bridge;

.4 the manoeuvrability of the vessel will not be unduly impaired by the draft and trim and or propeller immersion during the transitory period; and

.5 the general weather and sea state conditions will be suitable and unlikely to deteriorate.

5.9 On oil tankers, segregated ballast and clean ballast may be discharged below the water line at sea by pumps if the ballast water exchange is performed under the provisions of Regulation D-1.1 of the International Convention for the Control and Management of Ships' Ballast Water and Sediments, provided that the surface of the ballast water has been examined either visually or by other means immediately before the discharge to ensure that no contamination with oil has taken place.

6 CREW TRAINING AND FAMILIARIZATION

6.1 Appropriate training for ships' masters and crews should include instructions on the safety issues associated with ballast water exchange based upon the information contained in these Guidelines. Instruction should be provided on the ships' Ballast Water Management Plan including the completion of required records.

6.2 Ships' officers and crew engaged in ballast water exchange at sea should be trained in and be familiar with the following as appropriate:

.1 the ship's ballast pumping and piping arrangements, positions of associated air and sounding pipes, positions of all compartment and tank suctions and pipelines connecting them to ship's ballast pumps and, in the case of use of the flow through method of ballast water exchange, the openings used for release of water from the top of the tank together with overboard discharge arrangements;

.2 the method of ensuring that sounding pipes are clear, and that air pipes and their non-return devices are in good order;

.3 the different times required to undertake the various ballast water exchange operations including the time to complete individual tanks;

.4 the method(s) in use for ballast water exchange at sea if applicable with particular reference to required safety precautions; and

.5 the need to continually monitor ballast water exchange operations.

7 FUTURE CONSIDERATIONS IN RELATION TO BALLAST WATER EXCHANGE

7.1 These Guidelines may be revised and updated in the light of possible technical evolutions with the ballast water exchange methods and of new ballast water management options.

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ANNEX 5

RESOLUTION MEPC.127(53)

Adopted on 22 July 2005

GUIDELINES FOR BALLAST WATER MANAGEMENT AND DEVELOPMENT OF BALLAST WATER MANAGEMENT PLANS (G4)

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee conferred upon it by the international conventions for the prevention and control of marine pollution,

RECALLING ALSO that the International Conference on Ballast Water Management for Ships held in February 2004 adopted the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (the Ballast Water Management Convention) together with four Conference resolutions,

NOTING that Regulation A-2 of the Ballast Water Management Convention requires that discharge of ballast water shall only be conducted through Ballast Water Management in accordance with the provisions of the Annex to the Convention,

NOTING FURTHER that Regulation B-1 of the Annex to the Ballast Water Management Convention provides that each ship shall have on board and implement a ballast water management plan approved by the Administration, taking into account Guidelines developed by the Organization,

NOTING ALSO that resolution 1 adopted by the International Conference on Ballast Water Management for Ships invites the Organization to develop these Guidelines as a matter of urgency,

HAVING CONSIDERED the draft Guidelines for ballast water management and development of ballast water management plans developed by the Ballast Water Working Group and the recommendation made by the Sub-Committee on Bulk Liquids and Gases at its ninth session,

1. ADOPTS the Guidelines for ballast water management and development of ballast water management plans, as set out in the Annex to this resolution;

2. INVITES Governments to apply the Guidelines as soon as possible, or when the Convention becomes applicable to them; and

3. AGREES to keep the Guidelines under review.

ANNEX

DRAFT GUIDELINES FOR BALLAST WATER MANAGEMENT AND THE DEVELOPMENT OF BALLAST WATER MANAGEMENT PLANS (G4)

1 INTRODUCTION

1.1 Ballast water is essential to control trim, list, draught, stability, or stresses of the ship. However, ballast water may contain aquatic organisms or pathogens which, if introduced into the sea including estuaries, or into fresh water courses, may create hazards to the environment, human health, property or resources, impair biological diversity or interfere with other legitimate uses of such areas.

1.2 The selection of appropriate methods of ballast water management should take into account the need ensure that Ballast Water Management practices used to comply with this Convention do not cause greater harm than they prevent to the environment, human health, property or resources of any States and the safety of ships.

1.3 The objectives of these Guidelines are to assist Governments, appropriate authorities, ships masters, operators and owners, and port authorities, as well as other interested parties, in preventing, minimizing and ultimately eliminating the risk of introducing harmful aquatic organisms and pathogens from ships' ballast water and associated sediments while protecting ships' safety in applying the International Convention for the Control and Management of Ships' Ballast Water and Sediments (hereinafter referred to as the "Convention").

1.4 These guidelines consist of two parts:

Part A – "Guidelines for Ballast Water Management", which contains guidance on the general principles of Ballast Water Management; and

Part B – "Guidelines for the development of Ballast Water Management Plans", which contains guidance on the structure and content of Ballast Water Management Plans required by Regulation B-1 of the Convention.

2 DEFINITIONS

2.1 For the purposes of these Guidelines, the definitions in the Convention apply.

2.2 Ballast Water Tank means any tank, hold, or space used for the carriage of ballast water.

3 APPLICATION

3.1 The Guidelines apply to all ships and to Flag Administrations, port States, coastal States, ship owners, ship operators, ships' personnel involved in Ballast Water Management, ship designers, ship builders, classification societies as well as other interested parties.

PART A – GUIDELINES FOR BALLAST WATER MANAGEMENT

1 SHIP OPERATIONAL PROCEDURES

1.1 Precautionary practices

Avoiding unnecessary discharge of ballast water

1.1.1 If it is necessary to take on and discharge ballast water in the same port to facilitate safe cargo operations, care should be taken to avoid unnecessary discharge of ballast water that has been taken up in another port.

1.1.2 Managed ballast water which is mixed with unmanaged ballast water is no longer in compliance is no longer in compliance with Regulations D-1 and D-2 of the Annex to the Convention.

Minimizing the uptake of harmful aquatic organisms, pathogens and sediments

1.1.3 When loading ballast, every effort should be made to avoid the uptake of potentially harmful aquatic organisms, pathogens, and sediment that may contain such organisms. The uptake of ballast water should be minimized or, where practicable, avoided in areas and situations such as:

.1 in areas identified by the port State in connection with advice provided by ports under paragraph 2.2.2;

.2 in darkness when organisms may rise up in the water column;

.3 in very shallow water;

.4 where propellers may stir up sediment; or

.5 where dredging is or recently has been carried out.

1.2 Ballast water management options

1.2.1 Ballast Water Exchange

1.2.1.1 Ballast water exchange is to be conducted in accordance with Regulation B-4 of the Convention and in accordance with the Guidelines for Ballast Water Exchange.

1.2.1.2 The voyage should be planned taking into account when ballast water exchange in accordance with Regulation B–4 of the Convention can be carried out.

1.2.1.3 Because of the possibility that partially exchange may encourage re-growth of organisms, ballast water exchange should only be commenced in any tank if there is sufficient time to complete the exchange to comply with the standard in Regulation D-1 and the ship can comply with the distance from land and minimum water depth criteria in Regulation B-4. As many complete tanks should be exchanged to the standard in Regulation D-1 as the time allows, if for any tank the standard in Regulation D-1 can not be fully met the exchange should not be commenced for that tank.

1.2.1.4 If ballast water exchange is not undertaken for the reasons in Regulation B-4.4, i.e. if the master reasonably decides that such exchange would threaten the safety or stability of the ship, its crew, or its passengers because of adverse weather, ship design or stress, equipment failure, or any other extraordinary condition, then details of the reasons ballast water exchange was not undertaken are to be recorded in the Ballast Water Record Book.

1.2.1.5 A port State may designate areas in which exchange may be conducted taking into account the Guidelines on designation of areas for ballast water exchange. Designated areas should only be used for those ballast water tanks that are intended to be discharged in the port of that State and that could not be exchanged in accordance with Regulation B-4.1 of the Convention.

1.2.2 Ballast Water Management Systems

1.2.2.1 Ballast Water Management Systems installed for compliance with Regulation B-3 are to be approved in accordance with Regulation D-3. Such systems are to be operated in accordance with the system design criteria and the manufacture's operational and maintenance instructions. The use of such systems should be detailed in the ship's Ballast Water Management Plan. All failures and malfunctions of the system are to be recorded in the Ballast Water Record Book.

1.2.3 Discharge to ballast water reception facilities

1.2.3.1 If ballast water reception facilities provided by a port State are utilized, Regulation B-3.6 applies.

1.2.4 Prototype ballast water treatment technologies

1.2.4.1 Prototype ballast water treatment technologies should be used within a programme approved by the Administration in accordance with Regulation D-4.

1.3 Sediment management

1.3.1 Regulation B-5 requires that all ships shall remove and dispose of sediments from spaces designated to carry ballast water in accordance with the ballast water management plan.

1.3.2 All practical steps should be taken during ballast uptake to avoid sediment accumulation, however, it is recognized that sediment will be taken on board and will settle on tank surfaces. When sediment has accumulated, consideration should be given to flushing tank bottoms and other surfaces when in suitable areas, i.e. areas complying with the minimum depth and distance described by Regulations B-4.1.1 and B-4.1.2.

1.3.3 The volume of sediment in a ballast tank should be monitored on a regular basis.

1.3.4 Sediment in ballast tanks should be removed in a timely basis in accordance with the Ballast Water Management Plan and as found necessary. The frequency and timing of removal will depend on factors such as sediment build up, ship's trading pattern, availability of reception facilities, work load of the ship's personnel and safety considerations.

1.3.5 Removal of sediment from ballast tanks should preferably be undertaken under controlled conditions in port, at a repair facility or in dry dock. The removed sediment should preferably be disposed of in a sediment reception facility if available, reasonable and practicable.

1.3.6 When sediment is removed from the ship's ballast tanks and is to be disposed of by that ship at sea, such disposal should only take place in areas outside 200 nm from land and in water depths of over 200 m.

1.3.7 Regulation B-5 requires that ships constructed in or after 2009 should, without compromising safety or operational efficiency, be designed and constructed with a view to minimize the uptake and undesirable entrapment of sediments, facilitate removal of sediments, and provide safe access to allow for sediment removal and sampling, taking into account the Guidelines for sediments control on ships (G12). This also applies to ships constructed prior to 2009, to the extent practicable.

1.4 Additional Measures

1.4.1 Ships to which additional measures apply, under Regulation C-1, should take them into account in the ships voyage planning. Actions taken to comply with any additional measures should be recorded in the Ballast Water Record Book.

1.5 Exemptions

1.5.1 Regulation A-4 provides that an exemption may be granted from the requirements of Regulations B-3 or C-1 by a Party or Parties to a ship in specific circumstances. Applications for and the granting of such exemptions should be completed in accordance with the Guidelines for risk assessment (G7).

1.5.2 Ships granted an exemption referred to in paragraph 1.5.1 above should record the exemption in the Ballast Water Record Book and what actions have been taken with regards to the ships ballast water.

2 RECORDING PROCEDURES

2.1 Procedures for ships

2.1.1 To facilitate the administration of ballast water management and treatment procedures on board each ship, a responsible officer is to be designated in accordance with Regulation B-1 to ensure the maintenance of appropriate records and to ensure that ballast water management and/or treatment procedures are followed and recorded.

2.1.2 When carrying out any ballast water operation the details are to be recorded in the Ballast Water Record Book together with any exemptions granted in accordance with Regulation B-3 or C-1.

2.1.3 Where a port State requires information on ships ballast operations, relevant documentation, which takes account of the information requirements of the Convention, should be made available to the port State.

2.2 Procedures for port States

2.2.1 Port States should provide ships with details of their requirements concerning ballast water management including:

.1 the location and terms of use of areas designated for ballast water exchange under Regulation B-4.2 of the Convention;

.2 any additional measures determined under Regulation C-1 of the Convention;

.3 warnings concerning ballast uptake and any other port contingency arrangements in the event of emergency situations; and

.4 the availability, location, capacities of reception facilities that are provided for the environmentally safe disposal of ballast water and/or sediments, under Article 5 and Regulation B-3.6.

2.2.2 To assist ships in applying the precautionary practices described in section 1.1 of Part A, port States are required by Regulation C-2 of the Convention to endeavour to notify mariners of area(s), where ships should not uptake Ballast Water due to known conditions. Similar notification should be given for areas where the uptake of ballast water should be minimized, such as:

.1 areas with outbreaks, infestations or known populations of harmful organisms and pathogens;

.2 areas with current phytoplankton blooms (algal blooms, such as red tides);

.3 nearby sewage outfalls;

.4 areas where a tidal stream is known to be the more turbid;

.5 areas where tidal flushing is known to be poor;

.6 nearby dredging operations; and

.7 nearby or in sensitive or estuarine sea areas.

3 TRAINING AND EDUCATION

3.1 Regulation B-6 requires that officers and crew shall be familiar with their duties in the implementation of Ballast Water Management particular to the ship on which they serve. Owners, managers, operators, and others involved in officer and crew training for ballast water management should consider the following:

3.2 Training for ships' masters and crews as appropriate should include instructions on the requirements of the Convention, the ballast water and sediment management procedures and the Ballast Water Record Book particularly having regard to matters of ship safety and maintenance of records in accordance with the information contained in these Guidelines.

3.3 The Ballast Water Management Plan should include training and education on ballast water management practices and the systems and procedures used onboard the ship.

PART B – GUIDELINES FOR THE DEVELOPMENT OF BALLAST WATER MANAGEMENT PLANS

1 INTRODUCTION

1.1 These Guidelines have been developed to assist with the preparation of a ship's Ballast Water Management Plan (hereafter referred to as the "Plan"). The Plan must be approved by the Administration in accordance with Regulation B-1 of the Convention.

1.2 This Part is comprised of three primary sections:

.1 General: this section provides the objectives and a general overview of the subject matter and introduces the reader to the basic concept of the Guidelines and the Plan that is expected to be developed from them. This section also contains guidance on updating and use of the Plan.

.2 Mandatory provisions: this section provides guidance to ensure that the mandatory provisions of Regulation B-1 of the Annex to the Convention are met.

.3 Non-mandatory provisions: this section provides guidance concerning the inclusion of other information in the Plan. This information, although not required under Regulation B-1 of the Convention, may be found useful by local authorities in ports visited by the ship, or may provide additional assistance to the ship's master.

1.3 The format for a Ballast Water Management Plan is given in Appendix 1.

2 GENERAL

2.1 Concept of the Guidelines

2.1.1 These Guidelines are intended to provide a basis for the preparation of the Plans for individual ships. The broad spectrum of ships for which Plans are required makes it impractical to provide specific guidelines for each ship type. For a Plan to be effective and to comply with Regulation B-1 of the Annex of the Convention, it must be carefully tailored to the particular ship for which it is intended. Properly used, the Guidelines will ensure that all appropriate issues that may be applicable to a particular ship are considered in developing the Plan.

2.1.2 The issues that may require consideration include but are not limited to: type and size of ship, volume of ballast carried and total capacity of tanks used for ballast, ballast pumping capacity, ship and crew safety issues, voyage type and length, the ship's typical operational requirements, and ballast water management techniques used on board.

2.2 Concept of the Plan

2.2.1 The Plan is required to be onboard the ship and available to guide personnel in safe operation of the Ballast Water Management system employed on a particular ship. Effective planning ensures that the necessary actions are taken in a structured, logical, and safe manner.

2.2.2 For the Plan to accomplish its purpose, it must be:

.1 realistic, practical, and easy to use;

.2 understood by ship's personnel engaged in ballast water management, both on board and ashore;

.3 evaluated, reviewed, and updated as necessary; and

.4 consistent with the operational ballasting requirements of the ship.

2.2.3 The Plan envisioned by Regulation B-1 of the Annex to the Convention is intended to be a simple document. Inclusion of extensive background information on the ship, its structure, etc., should be avoided, as this is generally available elsewhere. If such information is relevant, it should be kept in annexes, or an existing document or manual reference should be made to the location of the information.

2.2.4 The Plan is a document to be used on board by the ship's personnel engaged in ballast water management. The Plan must therefore be available in a working language of the ship's personnel. A change in the personnel and or the, working language or would require the issuance of the Plan in the new language(s).

2.2.5 The Plan should be readily available for inspection by officers authorized by a Party to the Convention.

2.3 Exemptions

2.3.1 Regulation A-4 allows that exemption may be granted to a ship from Regulation B-3 or C-1.

2.3.2 Details of exemptions should be retained with the Plan.

2.3.3 Any exemption granted is to be recorded in the Ballast Water Record Book.

2.4 Additional Measures

2.4.1 The Convention, in Regulation C-1 Additional Measures, gives a Party individually or jointly with other Parties, the right to introduce measures in addition to those in Section B. Such Additional Measures are to be communicated to the Organization at least 6 months prior to the projected date of implementation.

2.4.2 The Plan should be accompanied by a most recent list of Additional measures, as communicated by the Organization relevant to the ship's trade. The Plan should contain details and advice on the actions a ship must take to comply with any additional measures that may be required in accordance with Regulation C-1 and for any emergency or epidemic situations.

2.5 Review of the Plan

2.5.1 Regular review of the Plan by the owner, operator, or master should be conducted to ensure that the information contained is accurate and updated. A feedback system should be

employed which will allow quick capture of changing information and incorporation of it into the Plan.

2.5.2 Changes to the provisions of this Plan will need Administration approval.

3 MANDATORY PROVISIONS

3.1 This section provides individual guidelines for the seven mandatory provisions of Regulation B-1 of the Annex to the Convention. In addition, it provides information to assist ships personnel in managing ballast water and sediments.

3.2 Regulation B-1 of the Annex to the Convention provides that the Plan shall be specific to each ship and shall at least:

.1 detail safety procedures for the ship and the crew associated with Ballast Water Management as required by the Convention;

.2 provide a detailed description of the actions to be taken to implement the Ballast Water Management practices required by the Convention;

.3 detail the procedures for the disposal of sediments at sea and to shore;

.4 include the procedures for co-ordinating shipboard Ballast Water Management that involves discharge to the sea with the authorities of the State into whose waters such discharge will take place;

.5 designates the officer on board in charge of ensuring that the Plan is properly implemented;

.6 contain the reporting requirements for ships provided for under the Convention; and

.7 be written in the working language of the ship. If the language used is not English, French or Spanish, a translation into one of these languages should be provided.

3.3 The Ballast Water Management Plan should give guidance on the ballast handling procedures to be followed, including:

.1 uptake of ballast water;

.2 step-by-step procedures and sequences for the Ballast Water Management System used; and

.3 any operational or safety restrictions including those associated with the Ballast Water Management System used. This will also assist ship's personnel when responding to enquiries from inspection officers authorized by a Party.

3.4 Safety aspects of the Ballast Water Management system used should include, as applicable, guidance on:

.1 stability to be maintained at all times to values not less than those recommended by the Organization (or required by the Administration);

.2 approved longitudinal stress and, where applicable, torsional stress values are to be maintained within permitted values;

.3 transfer or exchange of ballast that can generate significant structural loads by sloshing action in partially-filled tanks. If these operations include partially-filled tanks, consideration should be given to carrying out the operation in favourable sea and swell conditions such that the risk of structural damage is minimized;

.4 wave-induced hull vibrations when carrying out ballast water exchange;

.5 forward and aft draughts and trim, with particular reference to bridge visibility, slamming and minimum forward draft;

.6 the effects of any potential hazards and occupational health that may affect ship's personnel shall also be identified together with any safety precautions that need to be taken; and

.7 the possible effects of tank over pressurization.

3.5 If a ship is able to complete at least 95 per cent volumatic exchange in less than three pumped volumes, documentation indicating that this ballast water exchange process has been approved under Regulation D-1.2 should be provided in the Plan.

3.6 The Plan should also include procedures for the disposal of sediments and in particular:

.1 on the sediment removal or reduction at sea, and when cleaning of the ballast tanks to remove sediments;

.2 regarding the safety consideration to be taken if tank entry is required to remove sediments; and

.3 regarding the use of port reception facilities for sediments.

3.7 The Plan should clearly identify the officer in charge of ballast water management and outline his/her duties which should include:

.1 ensuring that the Ballast Water Management performed follows the procedures in the Plan;

.2 ensuring that the Ballast Water Record Book and any other necessary documentation are maintained; and

.3 being available to assist the inspection officers authorized by a Party for any sampling that may need to be undertaken.

3.8 The Plan should contain guidance on the recording requirements according to ship's Ballast Water Record Book provided for under this Convention including details of exemptions granted to the ship.

3.9 In addition to the above, the Plan should include the following:

.1 A foreword which should provide the ship's crew with explanations on the need for ballast water management and for record keeping. The foreword should include a statement that, "This Plan must be kept available for inspection on request by an authorized authority".

.2 Ship particulars including at least:

.1 ships' name, flag, port of registry, Gross Tonnage, IMO number*, length (BP), beam, international call sign; deepest ballast drafts (normal and heavy weather);

.2 the total ballast capacity of the ship in cubic meters and other units if applicable to the ship;

.3 a brief description of the main ballast water management method(s) used on the ship; and

.4 identification (rank) of the officer in charge for implementing the Plan.

.3 Information on Ballast Water Management System used on board, including:

.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 on board, with references to operational and maintenance manuals held on board;

.6 installed ballast water treatment systems; and

.7 a plan and profile of the ship, or a schematic drawing of the ballast arrangement.

.4 Information on the ballast water sampling points, including:

.1 A list or diagrams indicating the location of sampling and access points in pipelines and ballast water tanks, to enable crew members to assist the authorized officers of a Party that have reason to obtain samples.

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

.2 This section should make clear that sampling of ballast water is primarily a matter for the authorized inspection officers, 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 inspection officers.

.3 The authorized inspection officers should be advised of all safety procedures to be observed when entering enclosed spaces.

.5 Provisions for crew training and familiarization, including:

.1 requirements of a general nature regarding Ballast Water Management;

.2 training and information on ballast water management practices;

.3 ballast water exchange;

.4 ballast water treatment systems;

.5 general safety considerations;

.6 the Ballast Water Record Book and maintenance of records;

.7 the operation and maintenance of installed ballast water treatment systems;

.8 safety aspects associated with the particular systems and procedures used onboard the ship which affect the safety or human health of crew and passengers and/or the safety of the ship;

.9 precautions for entering tanks for sediment removal;

.10 procedures for the safe handling and packaging of sediment; and

.11 storage of sediment.

4 NON-MANDATORY INFORMATION

4.1 In addition to the provisions required by Articles and regulations of the Convention, the owner/operator may include in the Plan, as appendices, additional information such as: provision of additional diagrams and drawings, shipboard equipment and reference materials. National or regional requirements that differ from the Convention may also be recorded for reference.

4.2 Non-mandatory information may also include manufactures manuals (either as extracts or complete) or reference to the location onboard of such manuals and other relevant material.

APPENDIX

STANDARD FORMAT FOR THE BALLAST WATER MANAGEMENT PLAN

PREAMBLE

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

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

INTRODUCTION

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

1 This Plan is written in accordance with the requirements of Regulation B-1 of the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (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 XX(YY) (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.

SHIP PARTICULARS

At least the following details should be included:

Ships' name;

Flag;

Port of registry;

Gross Tonnage;

IMO number*;

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; and

Identification (rank) of the appointed ballast water management officer.

INDEX

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

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.

PLANS/DRAWINGS OF THE BALLAST 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; and
7) a plan and profile of the ship, or a schematic drawing of the ballast arrangement.

DESCRIPTION OF THE BALLAST SYSTEM

A description of the ballast system.

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.

OPERATION OF THE BALLAST WATER MANAGEMENT SYSTEM

A detailed description of the operation of the Ballast Water Management System(s) used on board.

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

Information on general ballast water management precautionary practices.

SAFETY PROCEDURES FOR THE SHIP AND THE CREW

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

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.

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.

PROCEDURES FOR THE DISPOSAL OF SEDIMENTS

Procedures for the disposal of sediments at sea and to shore.

METHODS OF COMMUNICATION

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

DUTIES OF THE BALLAST WATER MANAGEMENT OFFICER

O*utline of the duties of the designated officer.*

RECORDING REQUIREMENTS

Details of the record-keeping requirements of the Convention.

CREW TRAINING AND FAMILIARIZATION

Information on the provision of crew training and familiarization.

EXEMPTIONS

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

APPROVING AUTHORITY

Details and stamp of approving authority.

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1. Sequence of Ballast Exchange

< Ballast Arrival Condition : Same as page 5 - 9 of Trim & Stability Booklet>

Step	FPT	1WB		2WB		3WB		4WB		5WB		APT	Draft		TRIM (m)	Max.(%)		Prop. Immer. (%)	Visib-ility(m)	Diff. of Water (M3)
	C	P	S	P	S	P	S	P	S	P	S	C	Aft	Fwd		SF	BM			
BALLAST ARR.COND.																				
0	F	F	F	F	F	F	F	F	F	F	F	F	11.63	8.87	2.77	43.0%	74.1%	106.9%	496.5	0
Deballasting : 2. STEP 1 - BALLAST EXCHANGE																				
1	E	E	F	F	F	F	F	F	F	F	E	F	11.37	6.45	4.91	41.5%	45.6%	103.8%.	628.5	21599.8
Ballasting : 3. STEP 2 - BALLAST EXCHANGE																				
2	E	F	F	F	F	F	F	F	F	F	F	F	12.42	7.70	4.72	34.3%	59.6%	114.6%	592	17528.3
Deballasting : 4. STEP 3 - BALLAST EXCHANGE																				
3	E	F	E	F	F	F	F	F	F	E	F	F	11.38	6.45	4.93	41.4%	45.7%	103.9%	629.4	17489.5
Ballasting : 5. STEP 4 - BALLAST EXCHANGE																				
4	E	F	F	F	F	F	F	F	F	F	F	F	12.42	7.70	4.72	34.3%	59.6%	114.6%	592	17489.5
Deballasting : 6. STEP 5 - BALLAST EXCHANGE																				
5	E	F	F	E	F	F	F	F	E	F	F	F	11.37	6.20	5.17	52.6%	84.9%	103.8%	646.3	19609.2
Ballasting : 7. STEP 6 - BALLAST EXCHANGE																				
6	E	F	F	F	F	F	F	F	F	F	F	F	12.42	7.70	4.72	34.3%	59.6%	114.6%	592	19609.2
Deballasting : 8. STEP 7 - BALLAST EXCHANGE																				
7	E	F	F	F	E	F	F	E	F	F	F	F	11.37	6.20	5.17	52.7%	84.9%	103.8%	646.3	19609.2
Ballasting : 9. STEP 8 - BALLAST EXCHANGE																				
8	E	F	F	F	F	F	F	F	F	F	F	F	12.42	7.70	4.72	34.3%	59.6%	114.6%	592	19609.2
Deballasting : 10. STEP 9 - BALLAST EXCHANGE																				
9	E	F	50%	F	F	E	F	F	F	F	50%	F	11.34	6.33	5.01	41.6%	68.3%	103.5%	635.9	18733.1
Ballasting : 11. STEP 10 - BALLAST EXCHANGE																				
10	E	F	F	F	F	F	F	F	F	F	F	F	12.42	7.70	4.72	34.3%	59.6%	114.6%	592	18733.1
Deballasting : 12. STEP 11 - BALLAST EXCHANGE																				
11	E	50%	F	F	F	F	E	F	F	50%	F	F	11.35	6.33	5.02	41.6%	68.4%	103.6%	636.5	18713.7
Ballasting : 13. STEP 12 - BALLAST EXCHANGE																				
12	E	F	F	F	F	F	F	F	F	F	F	F	12.42	7.70	4.72	34.3%	59.6%	114.6%	592	18713.7
Deballasting : 14. STEP 13 - BALLAST EXCHANGE																				
13	E	F	F	F	F	F	F	F	F	F	F	E	11.58	8.14	3.44	26.5%	42.9%	106.3%	533.3	2220.02
Ballasting : 15. STEP 14 - BALLAST ARR.COND.																				
14	F	F	F	F	F	F	F	F	F	F	F	F	11.63	8.87	2.77	43.0%	74.1%	106.9%	496.5	6291.5

Notes:

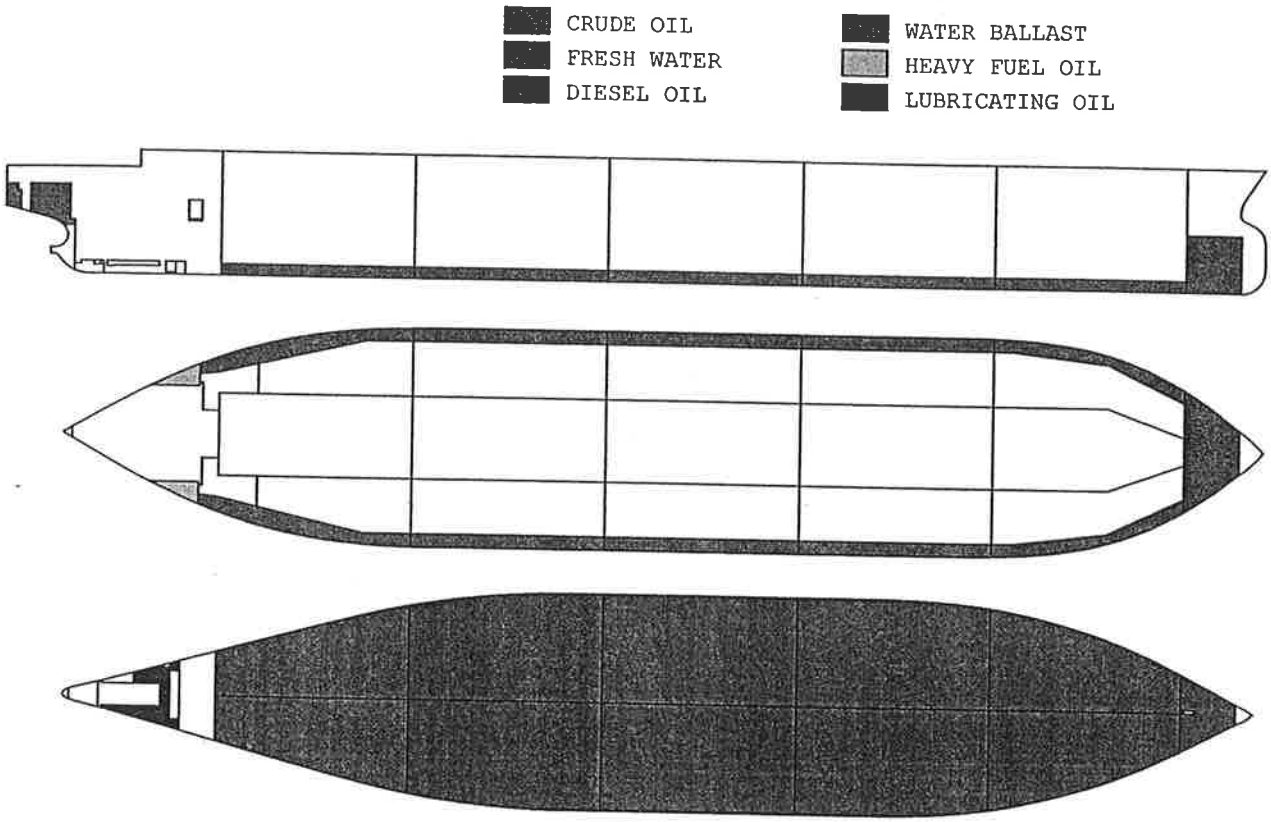
1. The conditions of Step 0, 14 are the same.
   The conditions of Step 2, 4, 6, 8, 10 and 12 are the same.
2. All conditions are made based on ballast Arrival Condition.
3. F indicates full filled. E indicates empty. xx% indicates xx% filled.
4. Visibility is the Invisible Distance according to SOLAS Visibility(Reg.22) : Less than 500.00 m

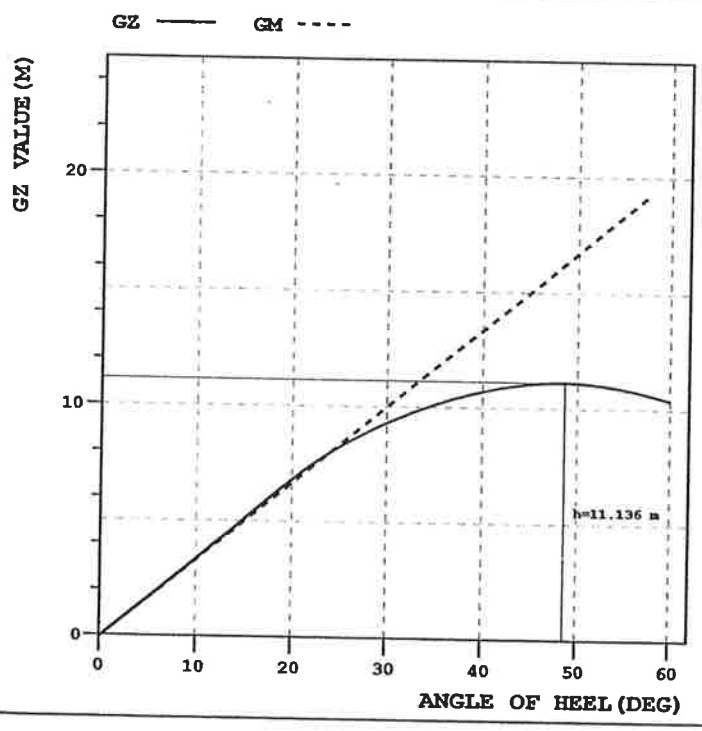
Legend

- ; Before Exchange
- ; Being Exchanged
- ; After Exchange

Enclosed the summary and printout of Sequential Method (Empty and Refill) taken from ship's approval loading manual. The form for preparing the sequential method of ballast water exchange is contained in Appendix VI of this plan.

1. STEP 0 - BALLAST ARR.COND.





DISPLACEMENT	146893 Ton
KGo=KG+GGo	12.005 m
FLOODING ANGLE	40.000 Degree

AREA UNDER GZ CURVE

CRITERIA	RESULT	REQUIREMENT
0 Up to 30	2.596	0.055 M-RAD
0 Up to Flooding Ang.	4.354	0.090 M-RAD
30 Up to Flooding Ang.	1.758	0.030 M-RAD

LEVER AFTER FREE SURFACE CORR.

CRITERIA	RESULT	REQUIREMENT
GZ at 30 Deg	9.296	0.200 M
GoM	19.218	0.150 M
Angle of MAX GZ	48.4	25.00 DEG
Maximum GZ	11.1	

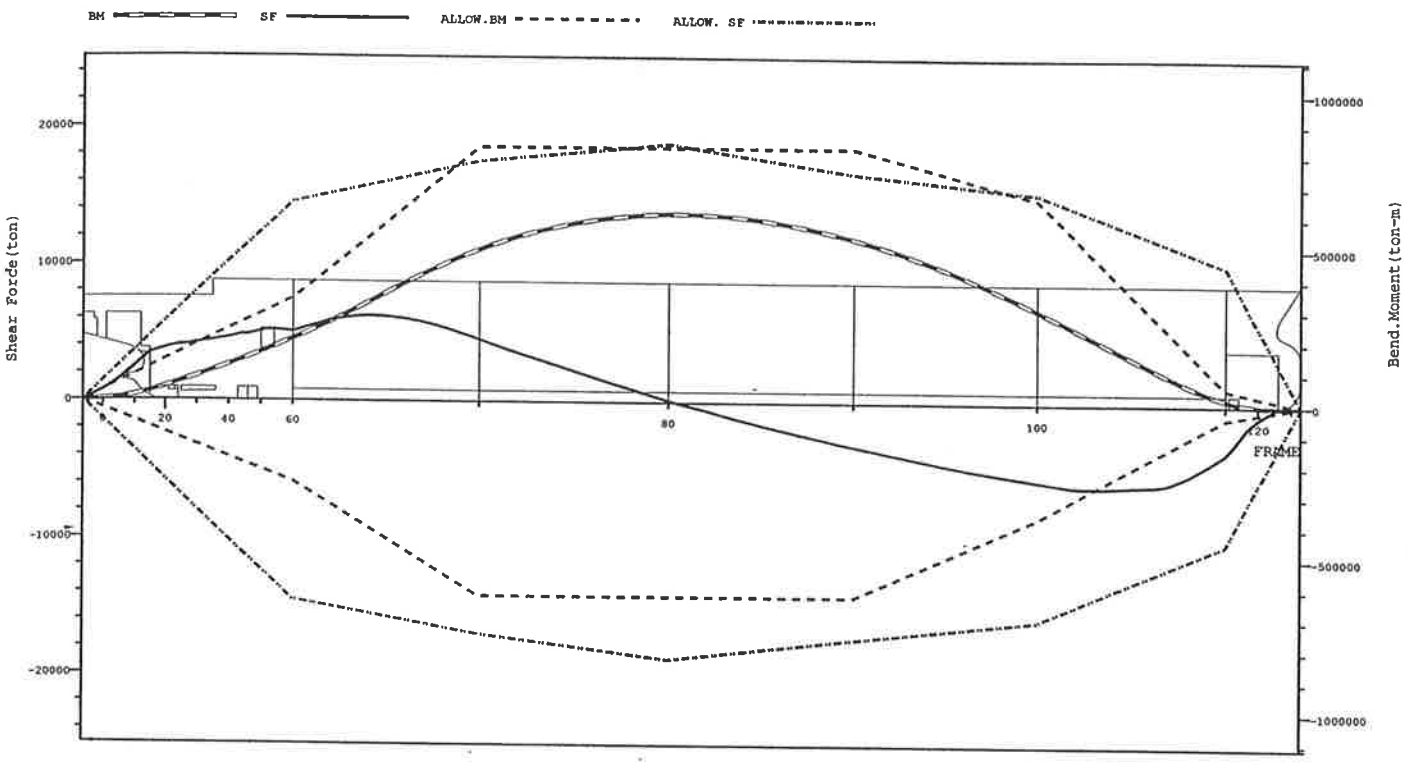
CONDITION 1. STEP 0 - BALLAST ARR.COND.

WEIGHT ITEMS	FILL. (%)	S.G	WEIGHT (MT)	L.C.G (M)	V.C.G (M)	T.C.G (M)	F.S.M (MT-M)
NO.1 W.B.TK(P)	100.0	1.0250	8790.0	279.870	11.198	18.224	0
NO.1 W.B.TK(S)	100.0	1.0250	8790.0	279.870	11.198	-18.224	0
NO.2 W.B.TK(P)	100.0	1.0250	10126.4	229.326	9.652	21.363	0
NO.2 W.B.TK(S)	100.0	1.0250	10126.4	229.326	9.652	-21.363	0
NO.3 W.B.TK(P)	100.0	1.0250	10218.2	178.500	9.593	21.421	0
NO.3 W.B.TK(S)	100.0	1.0250	10218.2	178.500	9.593	-21.421	0
NO.4 W.B.TK(P)	100.0	1.0250	9973.0	127.896	9.777	21.274	0
NO.4 W.B.TK(S)	100.0	1.0250	9973.0	127.896	9.777	-21.274	0
NO.5 W.B.TK(P)	100.0	1.0250	9136.8	75.928	11.734	19.496	0
NO.5 W.B.TK(S)	100.0	1.0250	9176.6	75.805	11.752	-19.503	0
F.P.TK	100.0	1.0250	4173.3	312.027	8.426	-0.001	0
A.P.TK	100.0	1.0250	2275.5	5.346	20.407	-0.025	0
TOTAL WATER BALLAST			102977.4	179.333	10.488	-0.009	0
F.W.TK(P)	10.0	1.0000	28.9	9.157	23.804	10.705	424
F.W.TK(S)	10.0	1.0000	20.6	8.409	23.803	-11.338	312
DIST.W.TK(S)	10.0	1.0000	8.3	11.050	23.807	-9.100	45
TOTAL FRESH WATER			57.8	9.161	23.804	0.004	782
NO.1 H.F.O.TK(P)	4.5	1.0000	110.6	41.999	11.394	14.507	2048
NO.1 H.F.O.TK(S)	4.5	1.0000	129.9	41.789	11.647	-14.598	2048
H.F.O.SETT.TK(P)	98.0	1.0000	235.5	39.651	17.685	14.679	78
H.F.O.SERV.TK(P)	98.0	1.0000	292.3	41.650	24.663	17.332	396
TOTAL HEAVY FUEL OIL			768.4	41.111	18.414	10.716	4570
D.O.STOR.TK(P)	10.0	0.8500	12.8	36.265	0.386	3.255	214
D.O.STOR.TK(S)	10.0	0.8500	16.7	35.642	0.451	-3.376	271
D.O.SETT.TK(S)	10.0	0.8500	3.2	43.350	21.748	-13.571	6
D.O.SERV.TK(S)	10.0	0.8500	6.3	40.800	21.748	-13.571	11
TOTAL DIESEL OIL			39.1	37.308	5.610	-3.678	503
M/E CYL.O.STOR.TK(P)	10.0	0.9000	7.4	44.200	14.430	4.095	24
M/E SYS.O.STOR.TK(S)	10.0	0.9000	7.4	44.200	14.430	-4.095	24
M/E SYS.O.SETT.TK(C)	10.0	0.9000	5.9	44.200	14.430	0.000	12
G/E L.O.STOR.TK(P)	10.0	0.9000	1.4	22.100	15.573	7.162	3
G/E L.O.SETT.TK(P)	10.0	0.9000	1.4	20.400	15.573	7.162	3
TOTAL LUBRICATING OIL			23.4	41.547	14.562	0.828	65
TOTAL DEADWEIGHT CONSTANT			427.0	66.630	10.135	0.000	0
TOTAL DEADWEIGHT			104293.1	177.675	10.552	0.069	5919
LIGHT SHIP			42600.0	152.000	15.425	0.029	0
TOTAL DISPLACEMENT			146893.1	170.229	11.965	0.058	5919

EQUIV. DRAFT(EXT)	= 10.131 M	:	M.T.C.	= 2947.85 MT-M
AFT. DRAFT(EXT)	= 11.630 M	:	T.P.C	= 155.46 MT/CM
FORE DRAFT(EXT)	= 8.865 M	:	K.M.T.	= 31.224 M
TRIM	= 2.765 M	:	V.C.G.	= 11.965 M
DISPLACEMENT	= 146893.1 MT	:	UNCORRECTED GM	= 19.259 M
L.C.G.	= 170.229 M	:	GGO	= 0.040 M
L.C.B.	= 170.161 M	:	CORRECTED GM(GOM)	= 19.218 M
L.C.F.	= 172.863 M	:	PROPELLER IMMER.	= 106.9 %
			BLIND DISTANCE	= 496.5 M

HEEL ANGLES(DEG.) =	0.000	5.000	10.000	15.000	20.000	30.000	40.000	50.000	60.000
GZ VALUE (M) =	-0.058	1.623	3.327	5.071	6.809	9.296	10.712	11.120	10.401
GZ AREA (M*RAD.) =	0.000	0.068	0.284	0.650	1.169	2.595	4.354	6.276	8.166

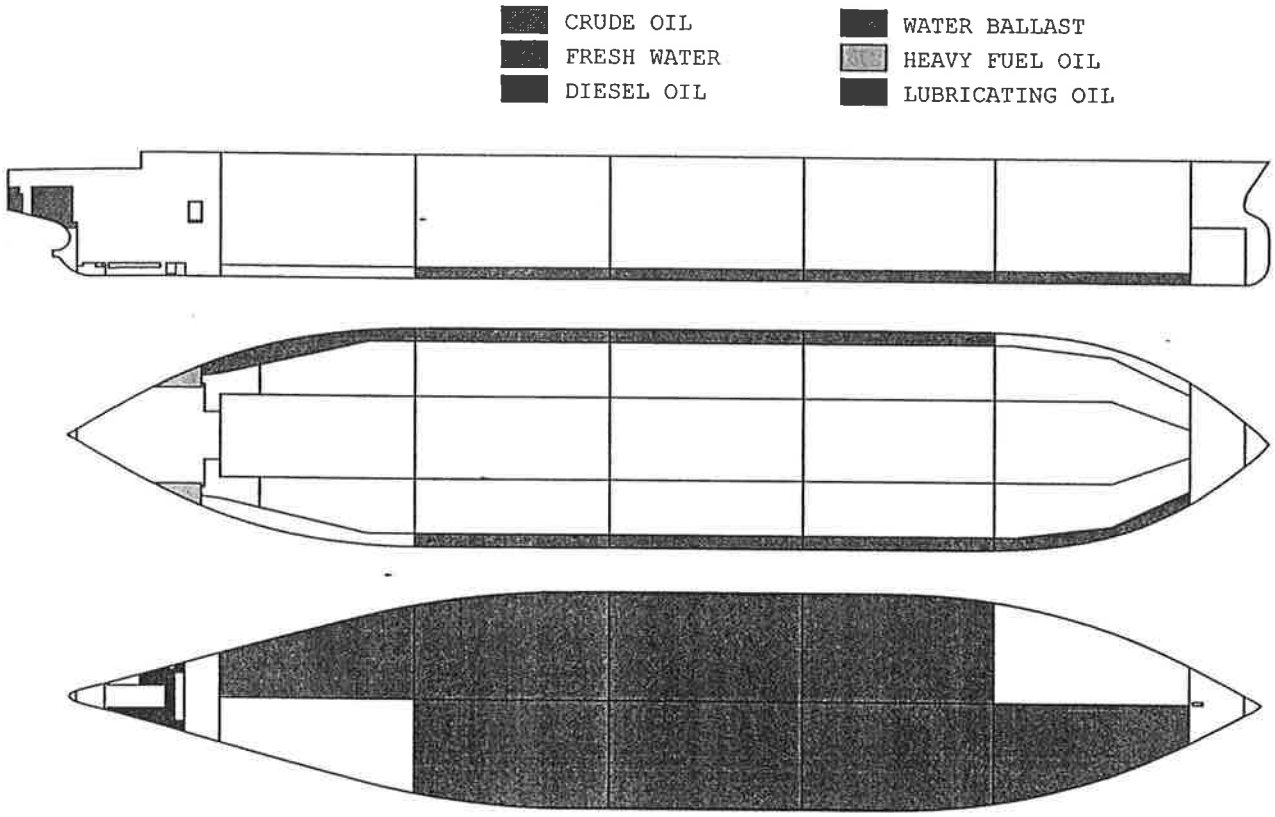
1. STEP 0 - BALLAST ARR.COND.

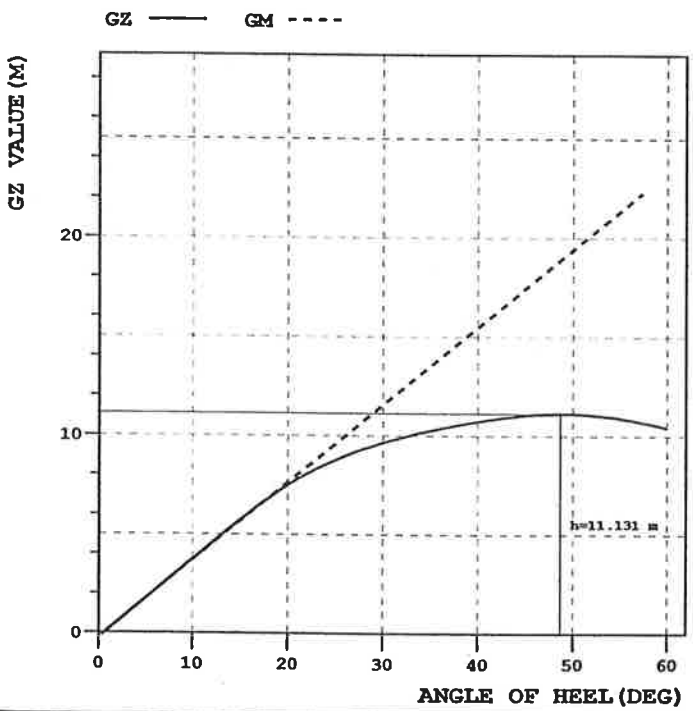


FR. NO.	DISTANCE M	SHEAR FORCE T	SHEAR FORCE %	BENDING MOMENT TM	BENDING MOMENT %	WEIGHT T/M	BOUY. T/M
-6	-5.500	0.0	-	0.0	-	93.9	0.0
0	-0.000	693.1	49.10	1936.2	6.03	168.6	18.8
60	51.000	5029.2	34.68	199074.1	60.33	324.9	341.0
70	102.000	4515.8	25.80	490573.8	59.83	499.8	594.4
80	153.000	162.9	0.87	607695.6	74.11	534.9	611.6
90	204.000	-3150.3	18.21	529522.6	64.58	529.2	585.2
100	255.000	-5622.1	35.36	302992.1	45.98	496.0	537.3
110	306.000	-3481.9	34.14	20353.1	37.69	421.5	232.7
133	326.500	0.0	-	-0.0	-	20.2	0.2

SHEAR FORCE (Negative) :	-6061 Ton (43.0%)	POSITION :	Fr103 + 0.87 m
SHEAR FORCE (Positive) :	6212 Ton (39.3%)	POSITION :	Fr 64 + 1.70 m
SAGGING MOMENT (Max.) :	-143 T-m (1.1%)	POSITION :	Fr125 + 0.50 m
HOGGING MOMENT (Max.) :	607924 T-m (74.1%)	POSITION :	Fr 80 + 3.10 m

2. STEP 1 - BALLAST EXCHANGE





DISPLACEMENT	124753 Ton
KGo=KG+GGo	12.201 m
FLOODING ANGLE	40.000 Degree

AREA UNDER GZ CURVE

CRITERIA	RESULT	REQUIREMENT
0 Up to 30	2.817	0.055 M-RAD
0 Up to Flooding Ang.	4.602	0.090 M-RAD
30 Up to Flooding Ang.	1.786	0.030 M-RAD

LEVER AFTER FREE SURFACE CORR.

CRITERIA	RESULT	REQUIREMENT
GZ at 30 Deg	9.638	0.200 M
GoM	22.478	0.150 M
Angle of MAX GZ	48.9	25.00 DEG
Maximum GZ	11.1	

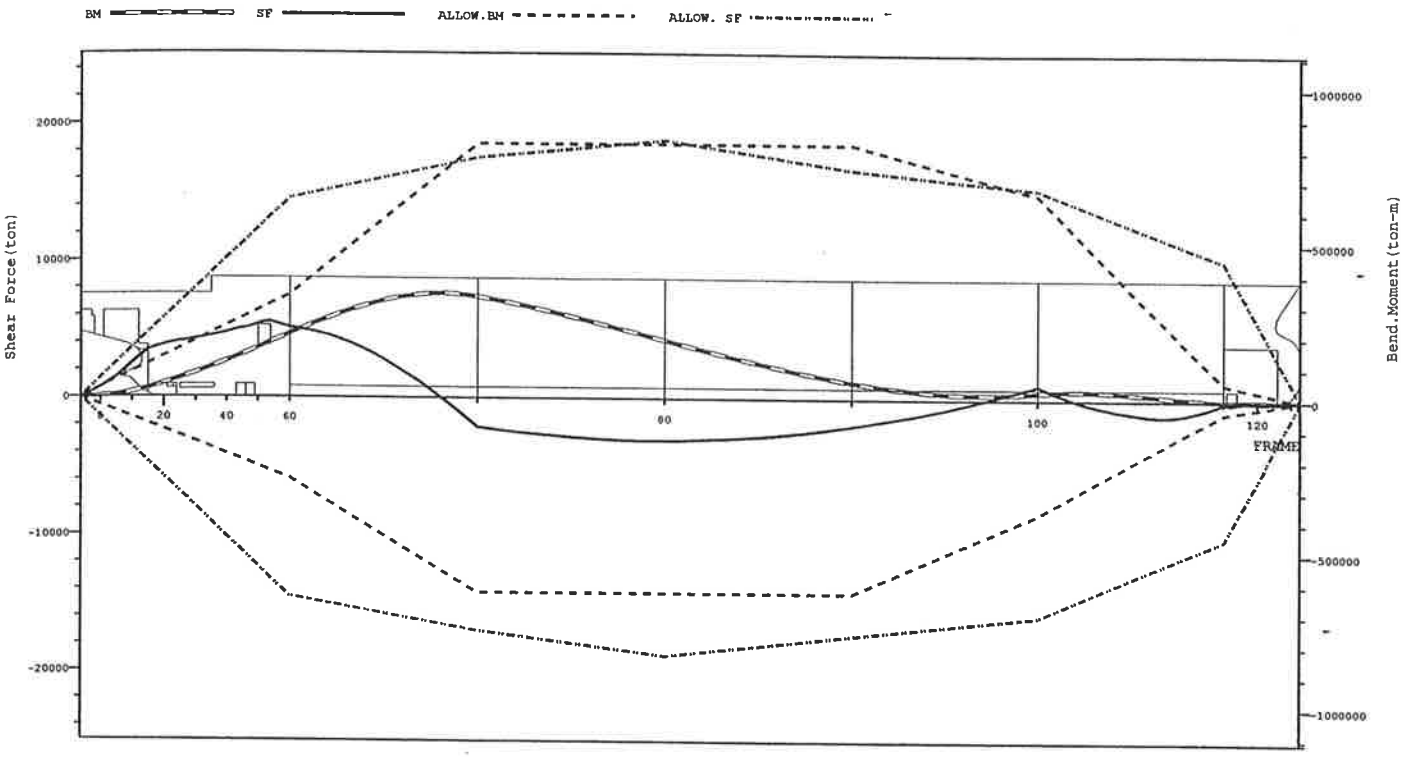
CONDITION 2. STEP 1 - BALLAST EXCHANGE

WEIGHT ITEMS	FILL. (%)	S.G	WEIGHT (MT)	L.C.G (M)	V.C.G (M)	T.C.G (M)	F.S.M (MT-M)
NO.1 W.B.TK(S)	100.0	1.0250	8790.0	279.870	11.198	-18.224	0
NO.2 W.B.TK(P)	100.0	1.0250	10126.4	229.326	9.652	21.363	0
NO.2 W.B.TK(S)	100.0	1.0250	10126.4	229.326	9.652	-21.363	0
NO.3 W.B.TK(P)	100.0	1.0250	10218.2	178.500	9.593	21.421	0
NO.3 W.B.TK(S)	100.0	1.0250	10218.2	178.500	9.593	-21.421	0
NO.4 W.B.TK(P)	100.0	1.0250	9973.0	127.896	9.777	21.274	0
NO.4 W.B.TK(S)	100.0	1.0250	9973.0	127.896	9.777	-21.274	0
NO.5 W.B.TK(P)	100.0	1.0250	9136.8	75.928	11.734	19.496	0
A.P.TK	100.0	1.0250	2275.5	5.346	20.407	-0.025	0
TOTAL WATER BALLAST			80837.5	173.303	10.374	0.221	0
F.W.TK(P)	10.0	1.0000	28.9	9.157	23.804	10.705	424
F.W.TK(S)	10.0	1.0000	20.6	8.409	23.803	-11.338	312
DIST.W.TK(S)	10.0	1.0000	8.3	11.050	23.807	-9.100	45
TOTAL FRESH WATER			57.8	9.161	23.804	0.004	782
NO.1 H.F.O.TK(P)	4.5	1.0000	110.6	41.999	11.394	14.507	2048
NO.1 H.F.O.TK(S)	4.5	1.0000	129.9	41.789	11.647	-14.598	2048
H.F.O.SETT.TK(P)	98.0	1.0000	235.5	39.651	17.685	14.679	78
H.F.O.SERV.TK(P)	98.0	1.0000	292.3	41.650	24.663	17.332	396
TOTAL HEAVY FUEL OIL			768.4	41.111	18.414	10.716	4570
D.O.STOR.TK(P)	10.0	0.8500	12.8	36.265	0.386	3.255	214
D.O.STOR.TK(S)	10.0	0.8500	16.7	35.642	0.451	-3.376	271
D.O.SETT.TK(S)	10.0	0.8500	3.2	43.350	21.748	-13.571	6
D.O.SERV.TK(S)	10.0	0.8500	6.3	40.800	21.748	-13.571	11
TOTAL DIESEL OIL			39.1	37.308	5.610	-3.678	503
M/E CYL.O.STOR.TK(P)	10.0	0.9000	7.4	44.200	14.430	4.095	24
M/E SYS.O.STOR.TK(S)	10.0	0.9000	7.4	44.200	14.430	-4.095	24
M/E SYS.O.SETT.TK(C)	10.0	0.9000	5.9	44.200	14.430	0.000	12
G/E L.O.STOR.TK(P)	10.0	0.9000	1.4	22.100	15.573	7.162	3
G/E L.O.SETT.TK(P)	10.0	0.9000	1.4	20.400	15.573	7.162	3
TOTAL LUBRICATING OIL			23.4	41.547	14.562	0.828	65
TOTAL DEADWEIGHT CONSTANT			427.0	66.630	10.135	0.000	0
TOTAL DEADWEIGHT			82153.3	171.294	10.456	0.316	5919
LIGHT SHIP			42600.0	152.000	15.425	0.029	0
TOTAL DISPLACEMENT			124753.3	164.706	12.153	0.218	5919

EQUIV. DRAFT(EXT)	= 8.698 M	:	M.T.C.	= 2872.20	MT-M
AFT. DRAFT(EXT)	= 11.367 M	:	T.P.C	= 153.80	MT/CM
FORE DRAFT(EXT)	= 6.455 M	:	K.M.T.	= 34.679	M
TRIM	= 4.912 M	:	V.C.G.	= 12.153	M
DISPLACEMENT	= 124753.3 MT	:	UNCORRECTED GM	= 22.526	M
L.C.G.	= 164.706 M	:	GGO	= 0.047	M
L.C.B.	= 164.589 M	:	CORRECTED GM(GOM)	= 22.478	M
L.C.F.	= 172.795 M	:	PROPELLER IMMER.	= 103.8	%
			BLIND DISTANCE	= 628.5	M

HEEL ANGLES(DEG.)	= 0.000	5.000	10.000	15.000	20.000	30.000	40.000	50.000	60.000
GZ VALUE (M)	= -0.219	1.746	3.728	5.720	7.494	9.638	10.725	11.123	10.431
GZ AREA (M*RAD.)	= 0.000	0.067	0.305	0.718	1.297	2.815	4.601	6.521	8.415

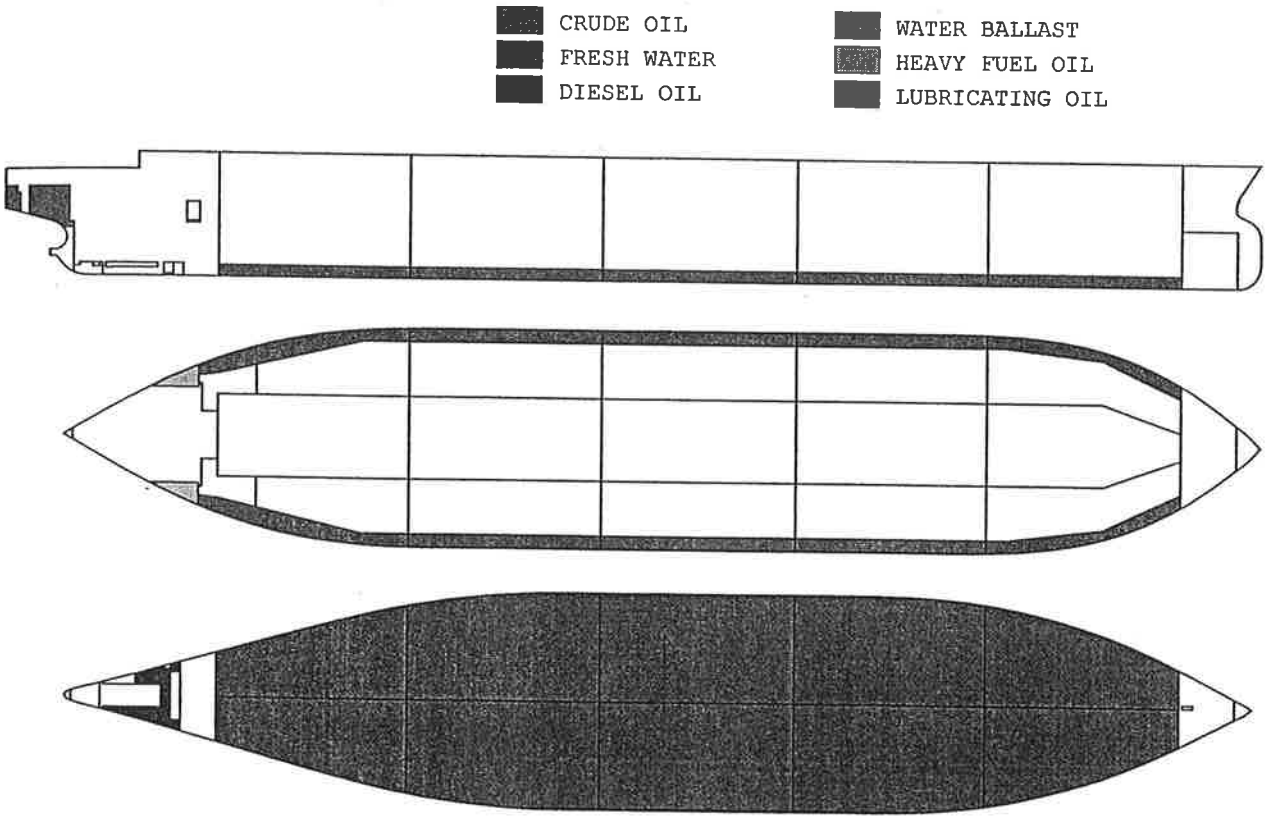
2. STEP 1 - BALLAST EXCHANGE

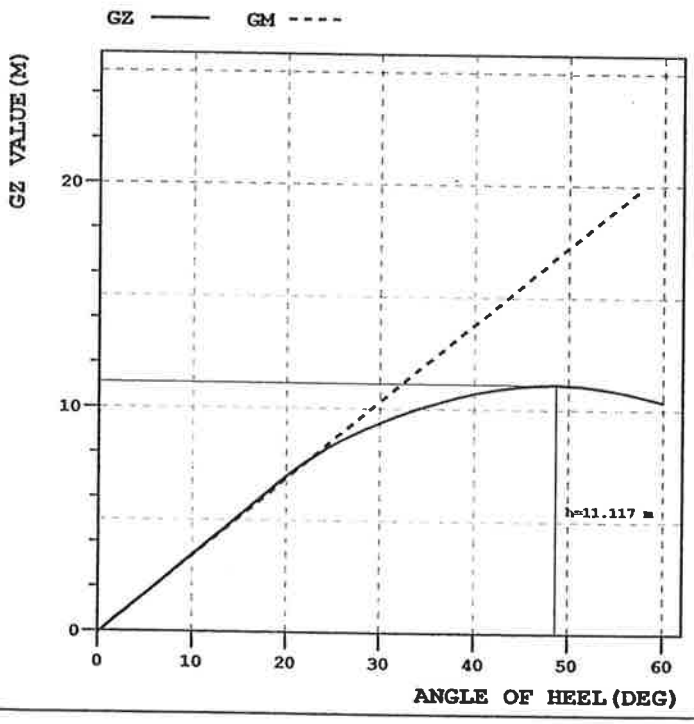


FR. NO.	DISTANCE M	SHEAR FORCE T	SHEAR FORCE %	BENDING MOMENT TM	BENDING MOMENT %	WEIGHT T/M	BOUY. T/M
-6	-5.500	0.0	-	0.0	-	93.9	0.0
0	-0.000	694.3	49.19	1999.9	6.23	168.5	18.3
60	51.000	5077.1	35.01	204366.0	61.93	240.5	316.7
70	102.000	-2109.2	12.41	326365.4	39.80	499.6	538.2
80	153.000	-3069.4	16.33	188276.4	22.96	534.7	534.8
90	204.000	-1950.9	11.28	54442.2	6.64	529.1	488.0
100	255.000	1043.2	6.82	24719.9	3.75	495.8	420.4
110	306.000	-140.2	1.37	883.4	1.64	270.1	159.3
133	326.500	0.0	-	-0.0	-	20.2	0.0

SHEAR FORCE (Negative) :	-3069 Ton (16.3%)	POSITION :	Fr 80 + 0.00 m
SHEAR FORCE (Positive) :	5468 Ton (41.5%)	POSITION :	Fr 54 +-0.00 m
SAGGING MOMENT (Max.) :	-60 T-m (0.8%)	POSITION :	Fr128 + 0.84 m
HOGGING MOMENT (Max.) :	336055 T-m (45.6%)	POSITION :	Fr 68 + 1.62 m

3. STEP 2 - BALLAST EXCHANGE





DISPLACEMENT	142720 Ton
KGo=KG+GGo	12.110 m
FLOODING ANGLE	40.000 Degree

AREA UNDER GZ CURVE

CRITERIA	RESULT	REQUIREMENT
0 Up to 30	2.651	0.055 M-RAD
0 Up to Flooding Ang.	4.415	0.090 M-RAD
30 Up to Flooding Ang.	1.764	0.030 M-RAD

LEVER AFTER FREE SURFACE CORR.

CRITERIA	RESULT	REQUIREMENT
GZ at 30 Deg	9.373	0.200 M
GoM	19.843	0.150 M
Angle of MAX GZ	48.4	25.00 DEG
Maximum GZ	11.1	

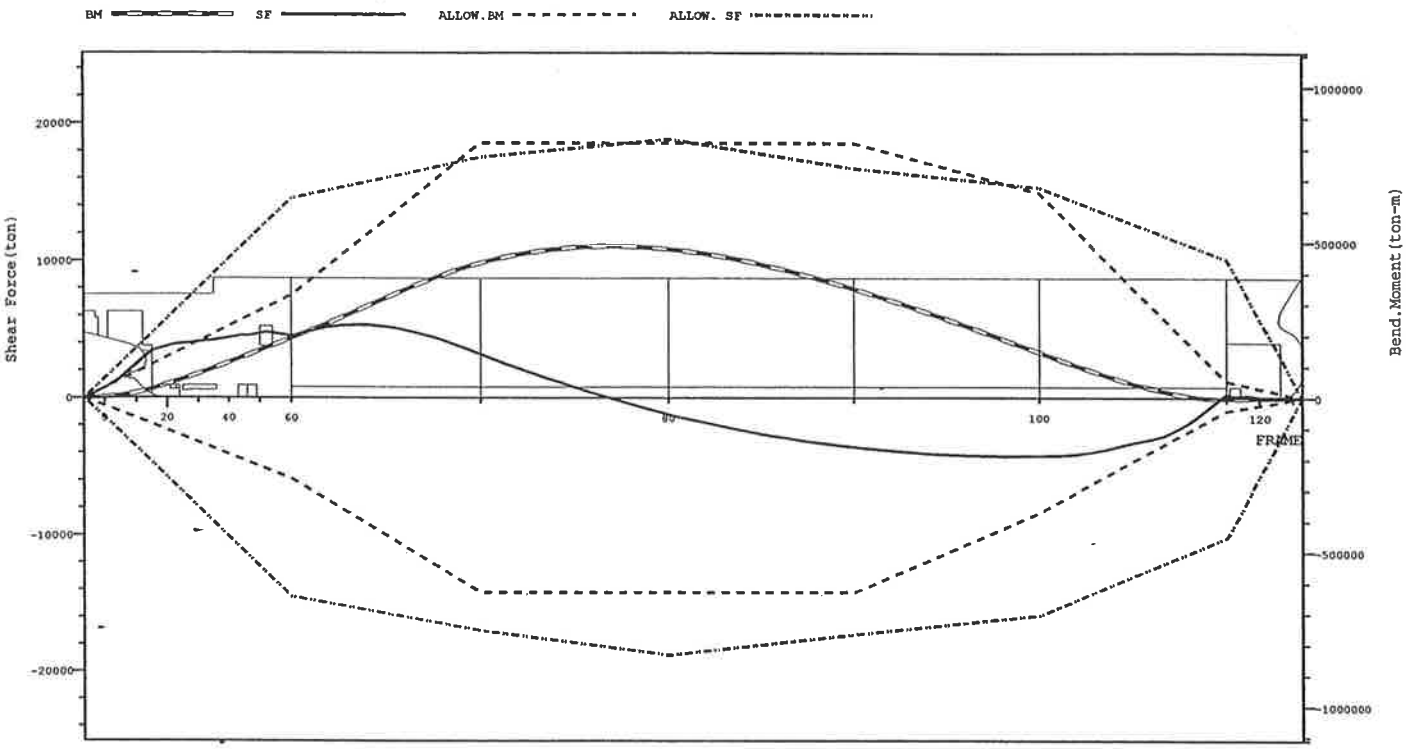
CONDITION 3. STEP 2 - BALLAST EXCHANGE

WEIGHT ITEMS	FILL. (%)	S.G	WEIGHT (MT)	L.C.G (M)	V.C.G (M)	T.C.G (M)	F.S.M (MT-M)
NO.1 W.B.TK(P)	100.0	1.0250	8790.0	279.870	11.198	18.224	0
NO.1 W.B.TK(S)	100.0	1.0250	8790.0	279.870	11.198	-18.224	0
NO.2 W.B.TK(P)	100.0	1.0250	10126.4	229.326	9.652	21.363	0
NO.2 W.B.TK(S)	100.0	1.0250	10126.4	229.326	9.652	-21.363	0
NO.3 W.B.TK(P)	100.0	1.0250	10218.2	178.500	9.593	21.421	0
NO.3 W.B.TK(S)	100.0	1.0250	10218.2	178.500	9.593	-21.421	0
NO.4 W.B.TK(P)	100.0	1.0250	9973.0	127.896	9.777	21.274	0
NO.4 W.B.TK(S)	100.0	1.0250	9973.0	127.896	9.777	-21.274	0
NO.5 W.B.TK(P)	100.0	1.0250	9136.8	75.928	11.734	19.496	0
NO.5 W.B.TK(S)	100.0	1.0250	9176.6	75.805	11.752	-19.503	0
A.P.TK	100.0	1.0250	2275.5	5.346	20.407	-0.025	0
TOTAL WATER BALLAST			98804.1	173.728	10.575	-0.009	0
F.W.TK(P)	10.0	1.0000	28.9	9.157	23.804	10.705	424
F.W.TK(S)	10.0	1.0000	20.6	8.409	23.803	-11.338	312
DIST.W.TK(S)	10.0	1.0000	8.3	11.050	23.807	-9.100	45
TOTAL FRESH WATER			57.8	9.161	23.804	0.004	782
NO.1 H.F.O.TK(P)	4.5	1.0000	110.6	41.999	11.394	14.507	2048
NO.1 H.F.O.TK(S)	4.5	1.0000	129.9	41.789	11.647	-14.598	2048
H.F.O.SETT.TK(P)	98.0	1.0000	235.5	39.651	17.685	14.679	78
H.F.O.SERV.TK(P)	98.0	1.0000	292.3	41.650	24.663	17.332	396
TOTAL HEAVY FUEL OIL			768.4	41.111	18.414	10.716	4570
D.O.STOR.TK(P)	10.0	0.8500	12.8	36.265	0.386	3.255	214
D.O.STOR.TK(S)	10.0	0.8500	16.7	35.642	0.451	-3.376	271
D.O.SETT.TK(S)	10.0	0.8500	3.2	43.350	21.748	-13.571	6
D.O.SERV.TK(S)	10.0	0.8500	6.3	40.800	21.748	-13.571	11
TOTAL DIESEL OIL			39.1	37.308	5.610	-3.678	503
M/E CYL.O.STOR.TK(P)	10.0	0.9000	7.4	44.200	14.430	4.095	24
M/E SYS.O.STOR.TK(S)	10.0	0.9000	7.4	44.200	14.430	-4.095	24
M/E SYS.O.SETT.TK(C)	10.0	0.9000	5.9	44.200	14.430	0.000	12
G/E L.O.STOR.TK(P)	10.0	0.9000	1.4	22.100	15.573	7.162	3
G/E L.O.SETT.TK(P)	10.0	0.9000	1.4	20.400	15.573	7.162	3
TOTAL LUBRICATING OIL			23.4	41.547	14.562	0.828	65
TOTAL DEADWEIGHT CONSTANT			427.0	66.630	10.135	0.000	0
TOTAL DEADWEIGHT			100119.8	172.074	10.640	0.072	5919
LIGHT SHIP			42600.0	152.000	15.425	0.029	0
TOTAL DISPLACEMENT			142719.9	166.082	12.069	0.059	5919

EQUIV. DRAFT(EXT)	= 9.862 M	:	M.T.C.	= 2936.77 MT-M
AFT. DRAFT(EXT)	= 12.417 M	:	T.P.C.	= 155.22 MT/CM
FORE DRAFT(EXT)	= 7.697 M	:	K.M.T.	= 31.953 M
TRIM	= 4.720 M	:	V.C.G.	= 12.069 M
DISPLACEMENT	= 142719.9 MT	:	UNCORRECTED GM	= 19.885 M
L.C.G.	= 166.082 M	:	GGO	= 0.041 M
L.C.B.	= 165.980 M	:	CORRECTED GM(GOM)	= 19.843 M
L.C.F.	= 172.070 M	:	PROPELLER IMMER.	= 114.6 %
			BLIND DISTANCE	= 592.0 M

HEEL ANGLES(DEG.)	= 0.000	5.000	10.000	15.000	20.000	30.000	40.000	50.000	60.000
GZ VALUE (M)	= -0.060	1.675	3.430	5.219	6.969	9.373	10.709	11.101	10.374
GZ AREA (M*RAD.)	= 0.000	0.070	0.293	0.670	1.203	2.651	4.415	6.334	8.221

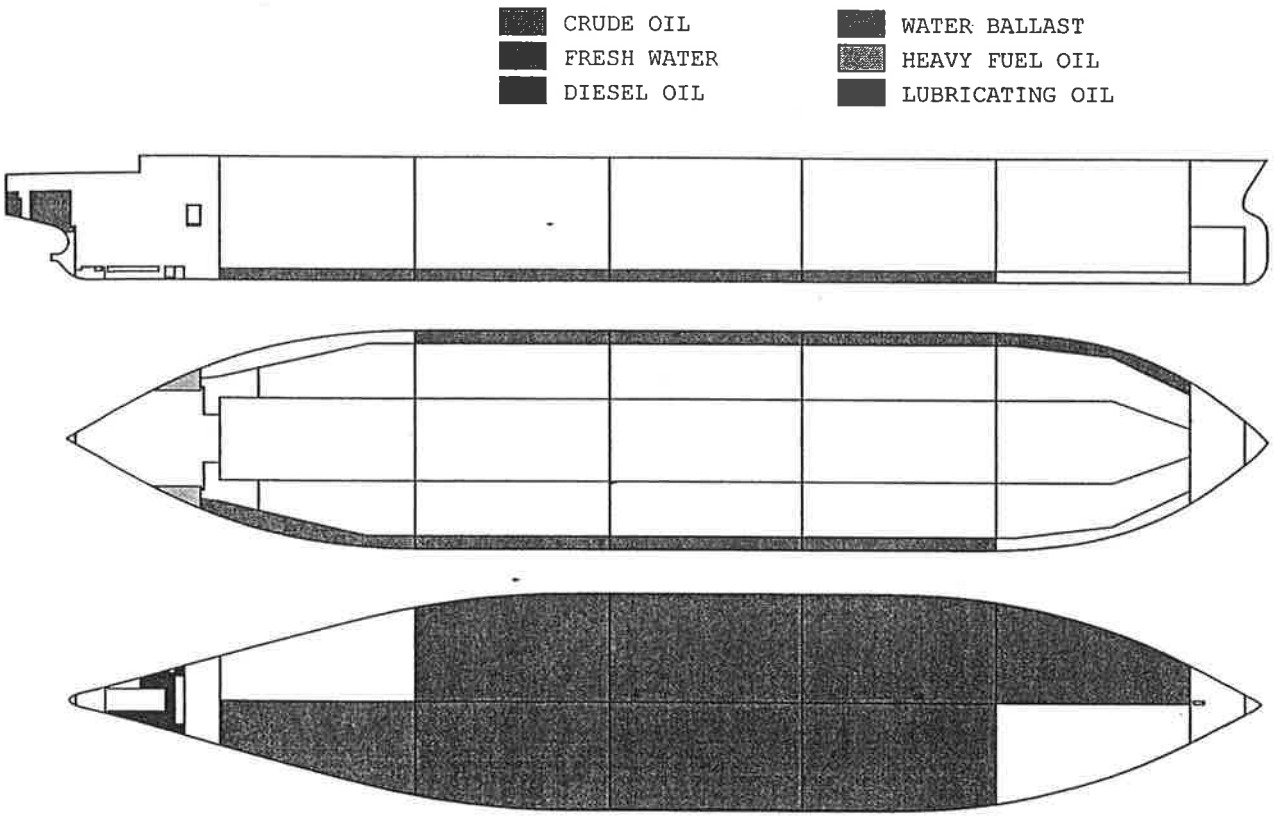
3. STEP 2 - BALLAST EXCHANGE

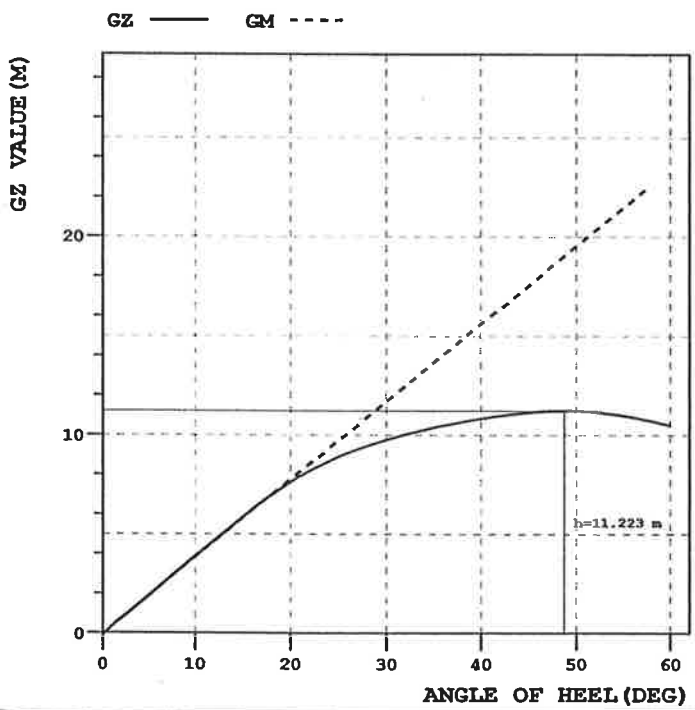


FR. NO.	DISTANCE M	SHEAR FORCE T	SHEAR FORCE %	BENDING MOMENT TM	BENDING MOMENT %	WEIGHT T/M	BOUY. T/M
-6	-5.500	0.0	-	0.0	-	93.9	0.0
0	-0.000	688.4	48.77	1984.7	6.18	168.6	20.2
60	51.000	4521.1	31.18	191749.5	58.11	324.9	360.3
70	102.000	3172.5	18.13	434341.9	52.97	499.7	604.0
80	153.000	-1203.4	6.40	478910.2	58.40	534.9	602.8
90	204.000	-3595.4	20.78	351083.3	42.82	529.2	557.8
100	255.000	-4202.8	26.43	145959.1	22.15	496.0	491.7
110	306.000	279.6	2.77	-2034.8	4.84	421.5	197.9
133	326.500	0.0	-	-0.0	-	20.2	0.1

SHEAR FORCE (Negative) :	-4241 Ton (26.2%)	POSITION :	Fr 98 + 0.59 m
SHEAR FORCE (Positive) :	5323 Ton (34.3%)	POSITION :	Fr 63 + 1.70 m
SAGGING MOMENT (Max.) :	-2242 T-m (4.2%)	POSITION :	Fr109 + 3.30 m
HOGGING MOMENT (Max.) :	488327 T-m (59.6%)	POSITION :	Fr 76 + 4.60 m

4. STEP 3 - BALLAST EXCHANGE





DISPLACEMENT	124793 Ton
KGo=KG+GGo	12.202 m
FLOODING ANGLE	40.000 Degree

AREA UNDER GZ CURVE

CRITERIA	RESULT	REQUIREMENT
0 Up to 30	2.887	0.055 M-RAD
0 Up to Flooding Ang.	4.692	0.090 M-RAD
30 Up to Flooding Ang.	1.806	0.030 M-RAD

LEVER AFTER FREE SURFACE CORR.

CRITERIA	RESULT	REQUIREMENT
GZ at 30 Deg	9.759	0.200 M
GoM	22.472	0.150 M
Angle of MAX GZ	48.7	25.00 DEG
Maximum GZ	11.2	

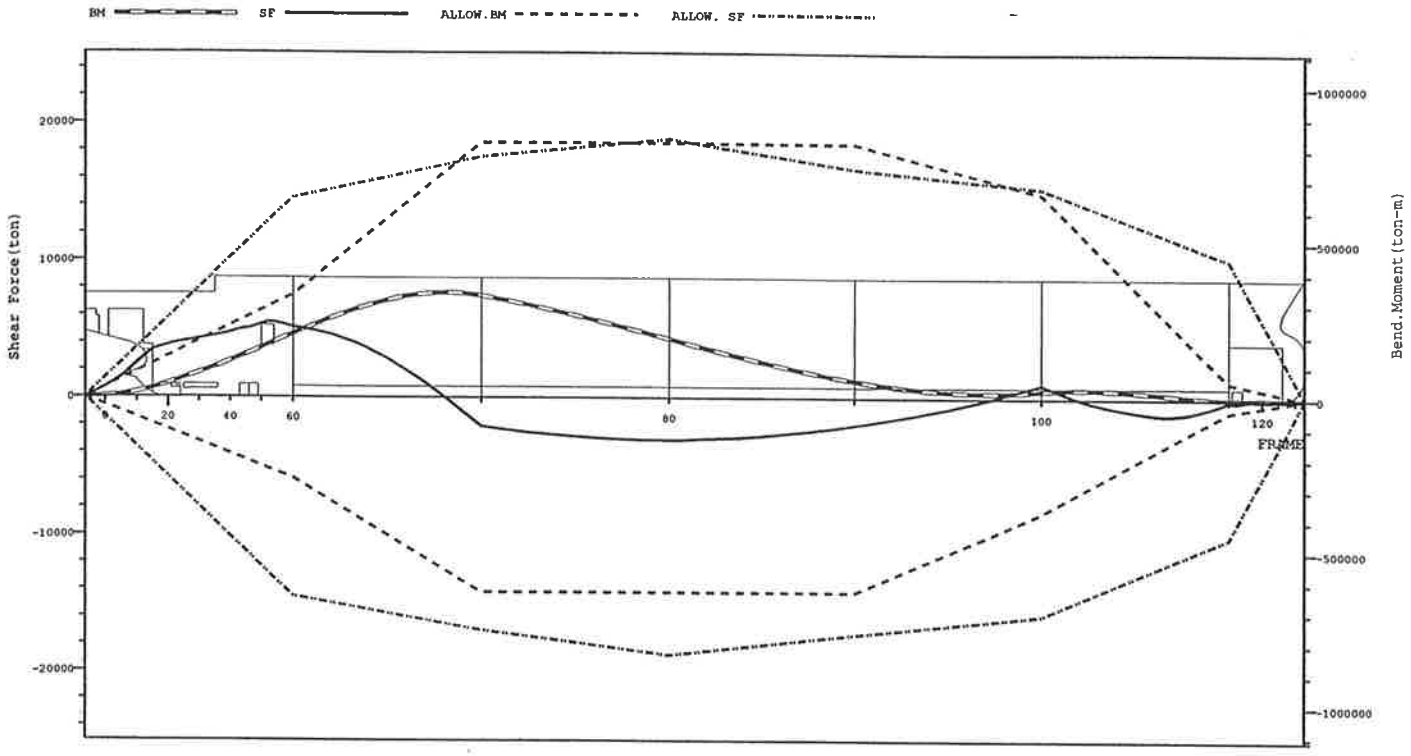
CONDITION 4. STEP 3 - BALLAST EXCHANGE

WEIGHT ITEMS	FILL. (%)	S.G	WEIGHT (MT)	L.C.G (M)	V.C.G (M)	T.C.G (M)	F.S.M (MT-M)
NO.1 W.B.TK(P)	100.0	1.0250	8790.0	279.870	11.198	18.224	0
NO.2 W.B.TK(P)	100.0	1.0250	10126.4	229.326	9.652	21.363	0
NO.2 W.B.TK(S)	100.0	1.0250	10126.4	229.326	9.652	-21.363	0
NO.3 W.B.TK(P)	100.0	1.0250	10218.2	178.500	9.593	21.421	0
NO.3 W.B.TK(S)	100.0	1.0250	10218.2	178.500	9.593	-21.421	0
NO.4 W.B.TK(P)	100.0	1.0250	9973.0	127.896	9.777	21.274	0
NO.4 W.B.TK(S)	100.0	1.0250	9973.0	127.896	9.777	-21.274	0
NO.5 W.B.TK(S)	100.0	1.0250	9176.6	75.805	11.752	-19.503	0
A.P.TK	100.0	1.0250	2275.5	5.346	20.407	-0.025	0
TOTAL WATER BALLAST			80877.3	173.241	10.377	-0.233	0
F.W.TK(P)	10.0	1.0000	28.9	9.157	23.804	10.705	424
F.W.TK(S)	10.0	1.0000	20.6	8.409	23.803	-11.338	312
DIST.W.TK(S)	10.0	1.0000	8.3	11.050	23.807	-9.100	45
TOTAL FRESH WATER			57.8	9.161	23.804	0.004	782
NO.1 H.F.O.TK(P)	4.5	1.0000	110.6	41.999	11.394	14.507	2048
NO.1 H.F.O.TK(S)	4.5	1.0000	129.9	41.789	11.647	-14.598	2048
H.F.O.SETT.TK(P)	98.0	1.0000	235.5	39.651	17.685	14.679	78
H.F.O.SERV.TK(P)	98.0	1.0000	292.3	41.650	24.663	17.332	396
TOTAL HEAVY FUEL OIL			768.4	41.111	18.414	10.716	4570
D.O.STOR.TK(P)	10.0	0.8500	12.8	36.265	0.386	3.255	214
D.O.STOR.TK(S)	10.0	0.8500	16.7	35.642	0.451	-3.376	271
D.O.SETT.TK(S)	10.0	0.8500	3.2	43.350	21.748	-13.571	6
D.O.SERV.TK(S)	10.0	0.8500	6.3	40.800	21.748	-13.571	11
TOTAL DIESEL OIL			39.1	37.308	5.610	-3.678	503
M/E CYL.O.STOR.TK(P)	10.0	0.9000	7.4	44.200	14.430	4.095	24
M/E SYS.O.STOR.TK(S)	10.0	0.9000	7.4	44.200	14.430	-4.095	24
M/E SYS.O.SETT.TK(C)	10.0	0.9000	5.9	44.200	14.430	0.000	12
G/E L.O.STOR.TK(P)	10.0	0.9000	1.4	22.100	15.573	7.162	3
G/E L.O.SETT.TK(P)	10.0	0.9000	1.4	20.400	15.573	7.162	3
TOTAL LUBRICATING OIL			23.4	41.547	14.562	0.828	65
TOTAL DEADWEIGHT CONSTANT			427.0	66.630	10.135	0.000	0
TOTAL DEADWEIGHT			82193.1	171.234	10.459	-0.131	5919
LIGHT SHIP			42600.0	152.000	15.425	0.029	0
TOTAL DISPLACEMENT			124793.1	164.668	12.154	-0.076	5919

EQUIV. DRAFT(EXT)	= 8.700 M	:	M.T.C.	= 2872.41 MT-M
AFT. DRAFT(EXT)	= 11.380 M	:	T.P.C	= 153.81 MT/CM
FORE DRAFT(EXT)	= 6.450 M	:	K.M.T.	= 34.674 M
TRIM	= 4.930 M	:	V.C.G.	= 12.154 M
DISPLACEMENT	= 124793.1 MT	:	UNCORRECTED GM	= 22.519 M
L.C.G.	= 164.668 M	:	GGO	= 0.047 M
L.C.B.	= 164.551 M	:	CORRECTED GM(GOM)	= 22.472 M
L.C.F.	= 172.786 M	:	PROPELLER IMMER.	= 103.9 %
			BLIND DISTANCE	= 629.4 M

HEEL ANGLES(DEG.) =	0.000	5.000	10.000	15.000	20.000	30.000	40.000	50.000	60.000
GZ VALUE (M) =	-0.075	1.888	3.868	5.856	7.627	9.759	10.833	11.213	10.500
GZ AREA (M*RAD.) =	0.000	0.079	0.330	0.755	1.346	2.886	4.692	6.630	8.538

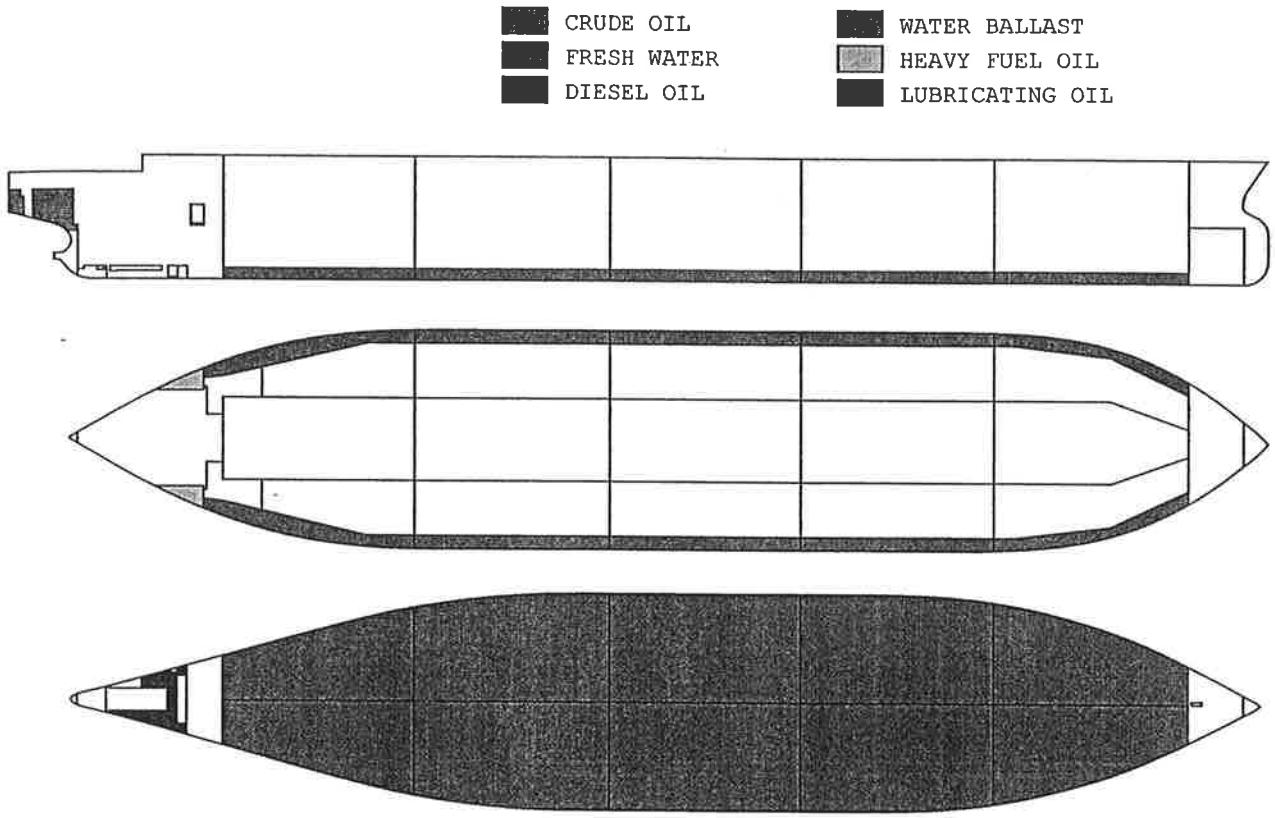
4. STEP 3 - BALLAST EXCHANGE

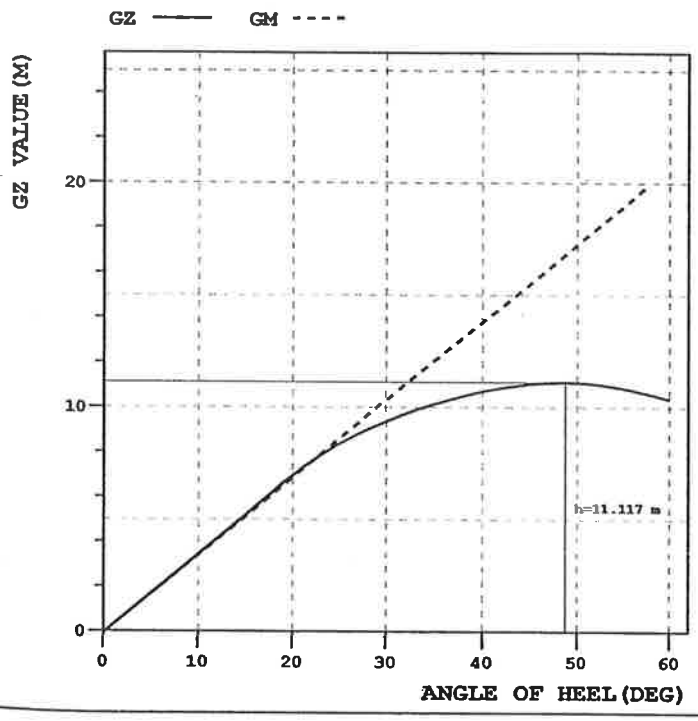


FR. NO.	DISTANCE M	SHEAR FORCE T	%	BENDING MOMENT TM	%	WEIGHT T/M	BOUY. T/M
-6	-5.500	0.0	-	0.0	-	93.9	0.0
0	-0.000	694.2	49.18	2023.3	6.30	168.5	18.3
60	51.000	5108.1	35.23	204615.6	62.00	240.5	317.1
70	102.000	-2100.1	12.35	327858.8	39.98	499.6	538.6
80	153.000	-3077.5	16.37	189976.9	23.17	534.7	535.0
90	204.000	-1967.6	11.37	55691.6	6.79	529.1	488.1
100	255.000	1026.2	6.71	25292.4	3.84	495.8	420.3
110	306.000	-150.5	1.48	969.4	1.80	270.1	159.2
133	326.500	0.0	-	0.0	-	20.2	0.0

SHEAR FORCE (Negative) :	-3078 Ton (16.4%)	POSITION :	Fr 80 + 0.00 m
SHEAR FORCE (Positive) :	5461 Ton (41.4%)	POSITION :	Fr 54 + 0.00 m
SAGGING MOMENT (Max.) :	-60 T-m (0.8%)	POSITION :	Fr128 + 0.84 m
HOGGING MOMENT (Max.) :	337419 T-m (45.7%)	POSITION :	Fr 68 + 1.62 m

5. STEP 4 - BALLAST EXCHANGE





DISPLACEMENT	142720 Ton
KGo=KG+GGo	12.110 m
FLOODING ANGLE	40.000 Degree

AREA UNDER GZ CURVE

CRITERIA	RESULT	REQUIREMENT
0 Up to 30	2.651	0.055 M-RAD
0 Up to Flooding Ang.	4.415	0.090 M-RAD
30 Up to Flooding Ang.	1.764	0.030 M-RAD

LEVER AFTER FREE SURFACE CORR.

CRITERIA	RESULT	REQUIREMENT
GZ at 30 Deg	9.373	0.200 M
GoM	19.843	0.150 M
Angle of MAX GZ	48.4	25.00 DEG
Maximum GZ	11.1	

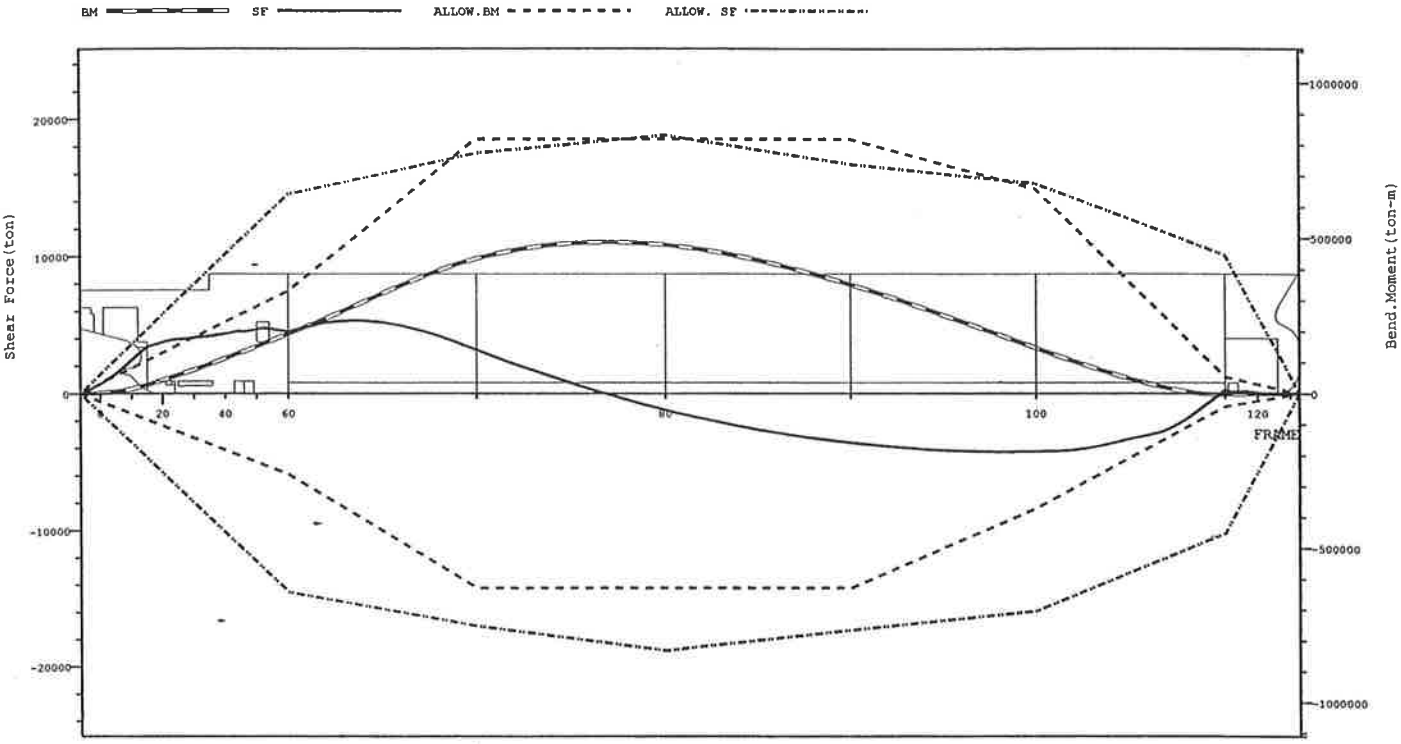
CONDITION 5. STEP 4 - BALLAST EXCHANGE

WEIGHT ITEMS	FILL. (%)	S.G	WEIGHT (MT)	L.C.G (M)	V.C.G (M)	T.C.G (M)	F.S.M (MT-M)
NO.1 W.B.TK(P)	100.0	1.0250	8790.0	279.870	11.198	18.224	0
NO.1 W.B.TK(S)	100.0	1.0250	8790.0	279.870	11.198	-18.224	0
NO.2 W.B.TK(P)	100.0	1.0250	10126.4	229.326	9.652	21.363	0
NO.2 W.B.TK(S)	100.0	1.0250	10126.4	229.326	9.652	-21.363	0
NO.3 W.B.TK(P)	100.0	1.0250	10218.2	178.500	9.593	21.421	0
NO.3 W.B.TK(S)	100.0	1.0250	10218.2	178.500	9.593	-21.421	0
NO.4 W.B.TK(P)	100.0	1.0250	9973.0	127.896	9.777	21.274	0
NO.4 W.B.TK(S)	100.0	1.0250	9973.0	127.896	9.777	-21.274	0
NO.5 W.B.TK(P)	100.0	1.0250	9136.8	75.928	11.734	19.496	0
NO.5 W.B.TK(S)	100.0	1.0250	9176.6	75.805	11.752	-19.503	0
A.P.TK	100.0	1.0250	2275.5	5.346	20.407	-0.025	0
TOTAL WATER BALLAST			98804.1	173.728	10.575	-0.009	0
F.W.TK(P)	10.0	1.0000	28.9	9.157	23.804	10.705	424
F.W.TK(S)	10.0	1.0000	20.6	8.409	23.803	-11.338	312
DIST.W.TK(S)	10.0	1.0000	8.3	11.050	23.807	-9.100	45
TOTAL FRESH WATER			57.8	9.161	23.804	0.004	782
NO.1 H.F.O.TK(P)	4.5	1.0000	110.6	41.999	11.394	14.507	2048
NO.1 H.F.O.TK(S)	4.5	1.0000	129.9	41.789	11.647	-14.598	2048
H.F.O.SETT.TK(P)	98.0	1.0000	235.5	39.651	17.685	14.679	78
H.F.O.SERV.TK(P)	98.0	1.0000	292.3	41.650	24.663	17.332	396
TOTAL HEAVY FUEL OIL			768.4	41.111	18.414	10.716	4570
D.O.STOR.TK(P)	10.0	0.8500	12.8	36.265	0.386	3.255	214
D.O.STOR.TK(S)	10.0	0.8500	16.7	35.642	0.451	-3.376	271
D.O.SETT.TK(S)	10.0	0.8500	3.2	43.350	21.748	-13.571	6
D.O.SERV.TK(S)	10.0	0.8500	6.3	40.800	21.748	-13.571	11
TOTAL DIESEL OIL			39.1	37.308	5.610	-3.678	503
M/E CYL.O.STOR.TK(P)	10.0	0.9000	7.4	44.200	14.430	4.095	24
M/E SYS.O.STOR.TK(S)	10.0	0.9000	7.4	44.200	14.430	-4.095	24
M/E SYS.O.SETT.TK(C)	10.0	0.9000	5.9	44.200	14.430	0.000	12
G/E L.O.STOR.TK(P)	10.0	0.9000	1.4	22.100	15.573	7.162	3
G/E L.O.SETT.TK(P)	10.0	0.9000	1.4	20.400	15.573	7.162	3
TOTAL LUBRICATING OIL			23.4	41.547	14.562	0.828	65
TOTAL DEADWEIGHT CONSTANT			427.0	66.630	10.135	0.000	0
TOTAL DEADWEIGHT			100119.8	172.074	10.640	0.072	5919
LIGHT SHIP			42600.0	152.000	15.425	0.029	0
TOTAL DISPLACEMENT			142719.9	166.082	12.069	0.059	5919

EQUIV. DRAFT(EXT)	= 9.862 M	:	M.T.C.	= 2936.77	MT-M
AFT. DRAFT(EXT)	= 12.417 M	:	T.P.C	= 155.22	MT/CM
FORE DRAFT(EXT)	= 7.697 M	:	K.M.T.	= 31.953	M
TRIM	= 4.720 M	:	V.C.G.	= 12.069	M
DISPLACEMENT	= 142719.9 MT	:	UNCORRECTED GM	= 19.885	M
L.C.G.	= 166.082 M	:	GGO	= 0.041	M
L.C.B.	= 165.980 M	:	CORRECTED GM(GOM)	= 19.843	M
L.C.F.	= 172.070 M	:	PROPELLER IMMER.	= 114.6	%
			BLIND DISTANCE	= 592.0	M

HEEL ANGLES(DEG.)	= 0.000	5.000	10.000	15.000	20.000	30.000	40.000	50.000	60.000
GZ VALUE (M)	= -0.060	1.675	3.430	5.219	6.969	9.373	10.709	11.101	10.374
GZ AREA (M*RAD.)	= 0.000	0.070	0.293	0.670	1.203	2.651	4.415	6.334	8.221

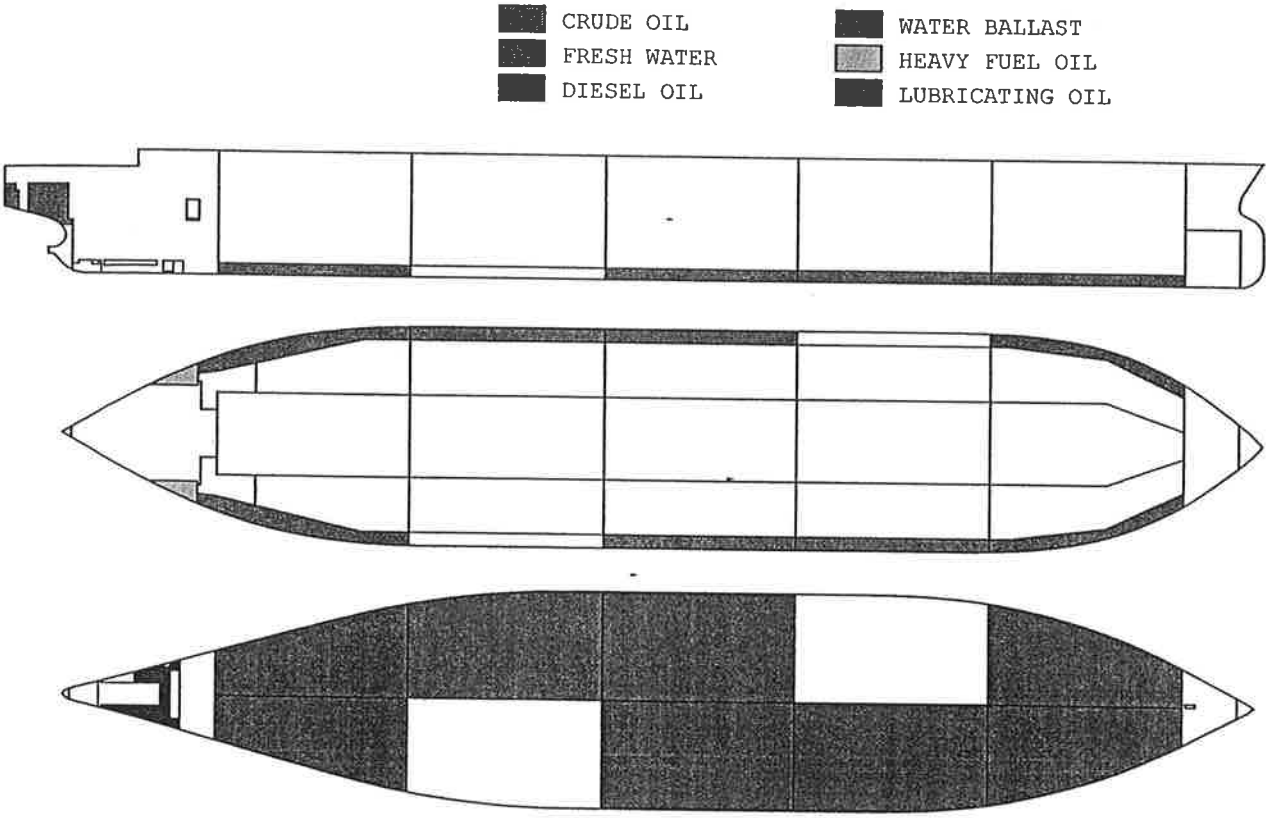
5. STEP 4 - BALLAST EXCHANGE

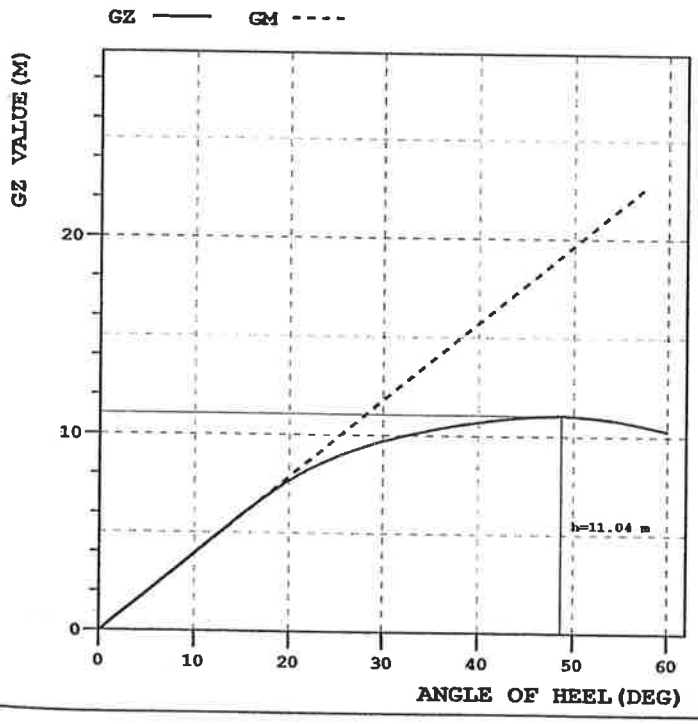


FR. NO.	DISTANCE M	SHEAR FORCE T	SHEAR FORCE %	BENDING MOMENT TM	BENDING MOMENT %	WEIGHT T/M	BOUY. T/M
-6	-5.500	0.0	-	0.0	-	93.9	0.0
0	-0.000	688.4	48.77	1984.7	6.18	168.6	20.2
60	51.000	4521.1	31.18	191749.5	58.11	324.9	360.3
70	102.000	3172.5	18.13	434341.9	52.97	499.7	604.0
80	153.000	-1203.4	6.40	478910.2	58.40	534.9	602.8
90	204.000	-3595.4	20.78	351083.3	42.82	529.2	557.8
100	255.000	-4202.8	26.43	145959.1	22.15	496.0	491.7
110	306.000	279.6	2.77	-2034.8	4.84	421.5	197.9
133	326.500	0.0	-	-0.0	-	20.2	0.1

SHEAR FORCE (Negative) :	-4241 Ton (26.2%)	POSITION :	Fr 98 + 0.59 m
SHEAR FORCE (Positive) :	5323 Ton (34.3%)	POSITION :	Fr 63 + 1.70 m
SAGGING MOMENT (Max.) :	-2242 T-m (4.2%)	POSITION :	Fr109 + 3.30 m
HOGGING MOMENT (Max.) :	488327 T-m (59.6%)	POSITION :	Fr 76 + 4.60 m

6. STEP 5 - BALLAST EXCHANGE





DISPLACEMENT	122620 Ton
KGo=KG+GGo	12.503 m
FLOODING ANGLE	40.000 Degree

AREA UNDER GZ CURVE

CRITERIA	RESULT	REQUIREMENT
0 Up to 30	2.902	0.055 M-RAD
0 Up to Flooding Ang.	4.691	0.090 M-RAD
30 Up to Flooding Ang.	1.789	0.030 M-RAD

LEVER AFTER FREE SURFACE CORR.

CRITERIA	RESULT	REQUIREMENT
GZ at 30 Deg	9.703	0.200 M
GoM	22.582	0.150 M
Angle of MAX GZ	48.4	25.00 DEG
Maximum GZ	11.0	

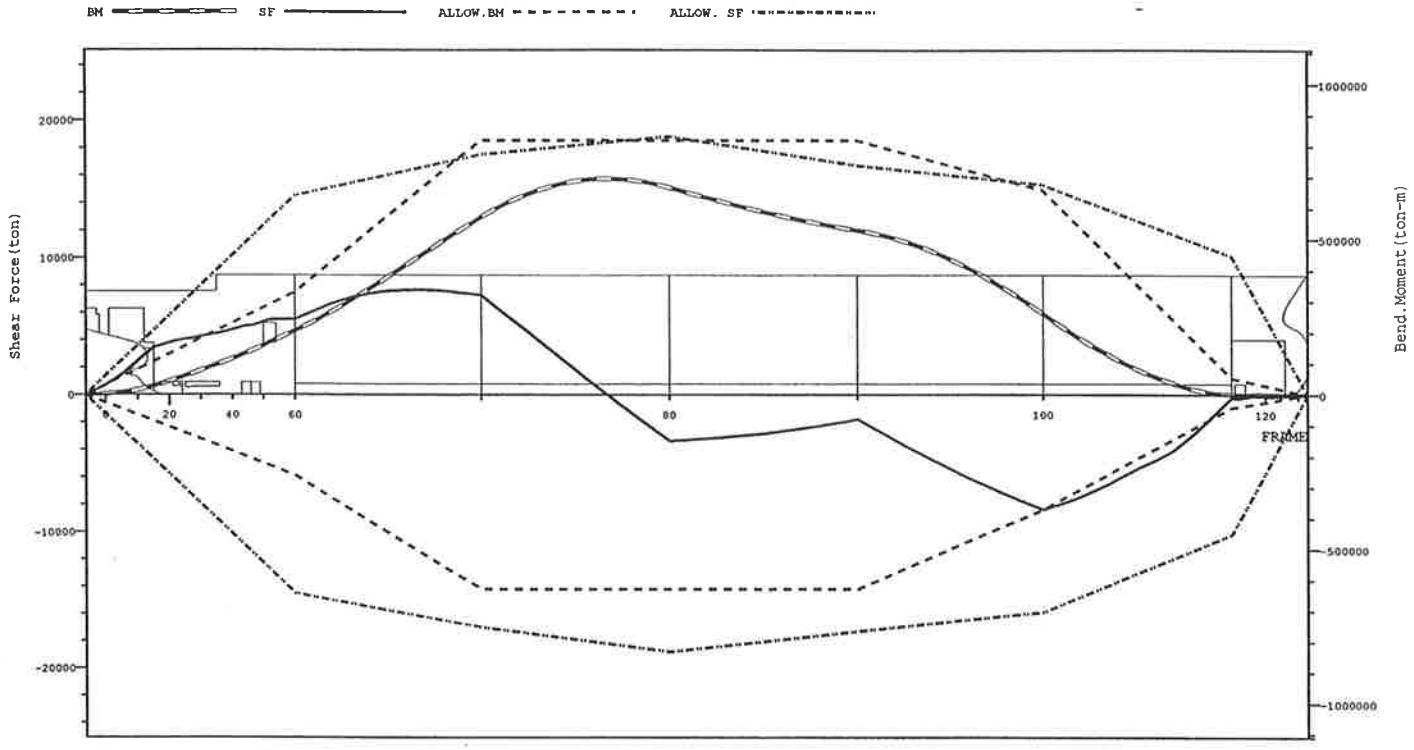
CONDITION 6. STEP 5 - BALLAST EXCHANGE

WEIGHT ITEMS	FILL. (%)	S.G	WEIGHT (MT)	L.C.G (M)	V.C.G (M)	T.C.G (M)	F.S.M (MT-M)
NO.1 W.B.TK(P)	100.0	1.0250	8790.0	279.870	11.198	18.224	0
NO.1 W.B.TK(S)	100.0	1.0250	8790.0	279.870	11.198	-18.224	0
NO.2 W.B.TK(S)	100.0	1.0250	10126.4	229.326	9.652	-21.363	0
NO.3 W.B.TK(P)	100.0	1.0250	10218.2	178.500	9.593	21.421	0
NO.3 W.B.TK(S)	100.0	1.0250	10218.2	178.500	9.593	-21.421	0
NO.4 W.B.TK(P)	100.0	1.0250	9973.0	127.896	9.777	21.274	0
NO.5 W.B.TK(P)	100.0	1.0250	9136.8	75.928	11.734	19.496	0
NO.5 W.B.TK(S)	100.0	1.0250	9176.6	75.805	11.752	-19.503	0
A.P.TK	100.0	1.0250	2275.5	5.346	20.407	-0.025	0
TOTAL WATER BALLAST			78704.6	172.382	10.795	-0.064	0
F.W.TK(P)	10.0	1.0000	28.9	9.157	23.804	-10.705	424
F.W.TK(S)	10.0	1.0000	20.6	8.409	23.803	-11.338	312
DIST.W.TK(S)	10.0	1.0000	8.3	11.050	23.807	-9.100	45
TOTAL FRESH WATER			57.8	9.161	23.804	0.004	782
NO.1 H.F.O.TK(P)	4.5	1.0000	110.6	41.999	11.394	14.507	2048
NO.1 H.F.O.TK(S)	4.5	1.0000	129.9	41.789	11.647	-14.598	2048
H.F.O.SETT.TK(P)	98.0	1.0000	235.5	39.651	17.685	14.679	78
H.F.O.SERV.TK(P)	98.0	1.0000	292.3	41.650	24.663	17.332	396
TOTAL HEAVY FUEL OIL			768.4	41.111	18.414	10.716	4570
D.O.STOR.TK(P)	10.0	0.8500	12.8	36.265	0.386	3.255	214
D.O.STOR.TK(S)	10.0	0.8500	16.7	35.642	0.451	-3.376	271
D.O.SETT.TK(S)	10.0	0.8500	3.2	43.350	21.748	-13.571	6
D.O.SERV.TK(S)	10.0	0.8500	6.3	40.800	21.748	-13.571	11
TOTAL DIESEL OIL			39.1	37.308	5.610	-3.678	503
M/E CYL.O.STOR.TK(P)	10.0	0.9000	7.4	44.200	14.430	4.095	24
M/E SYS.O.STOR.TK(S)	10.0	0.9000	7.4	44.200	14.430	-4.095	24
M/E SYS.O.SETT.TK(C)	10.0	0.9000	5.9	44.200	14.430	0.000	12
G/E L.O.STOR.TK(P)	10.0	0.9000	1.4	22.100	15.573	7.162	3
G/E L.O.SETT.TK(P)	10.0	0.9000	1.4	20.400	15.573	7.162	3
TOTAL LUBRICATING OIL			23.4	41.547	14.562	0.828	65
TOTAL DEADWEIGHT CONSTANT			427.0	66.630	10.135	0.000	0
TOTAL DEADWEIGHT			80020.4	170.335	10.873	0.038	5919
LIGHT SHIP			42600.0	152.000	15.425	0.029	0
TOTAL DISPLACEMENT			122620.4	163.965	12.455	0.035	5919

EQUIV. DRAFT(EXT)	= 8.559 M	:	M.T.C.	= 2865.29	MT-M
AFT. DRAFT(EXT)	= 11.369 M	:	T.P.C	= 153.65	MT/CM
FORE DRAFT(EXT)	= 6.200 M	:	K.M.T.	= 35.084	M
TRIM	= 5.169 M	:	V.C.G.	= 12.455	M
DISPLACEMENT	= 122620.4 MT	:	UNCORRECTED GM	= 22.630	M
L.C.G.	= 163.965 M	:	GGO	= 0.048	M
L.C.B.	= 163.837 M	:	CORRECTED GM(GOM)	= 22.582	M
L.C.F.	= 172.734 M	:	PROPELLER IMMER.	= 103.8	%
			BLIND DISTANCE	= 646.3	M

HEEL ANGLES(DEG.) =	0.000	5.000	10.000	15.000	20.000	30.000	40.000	50.000	60.000
GZ VALUE (M) =	-0.036	1.937	3.925	5.916	7.655	9.703	10.698	11.024	10.281
GZ AREA (M*RAD.) =	0.000	0.083	0.339	0.768	1.364	2.902	4.691	6.599	8.471

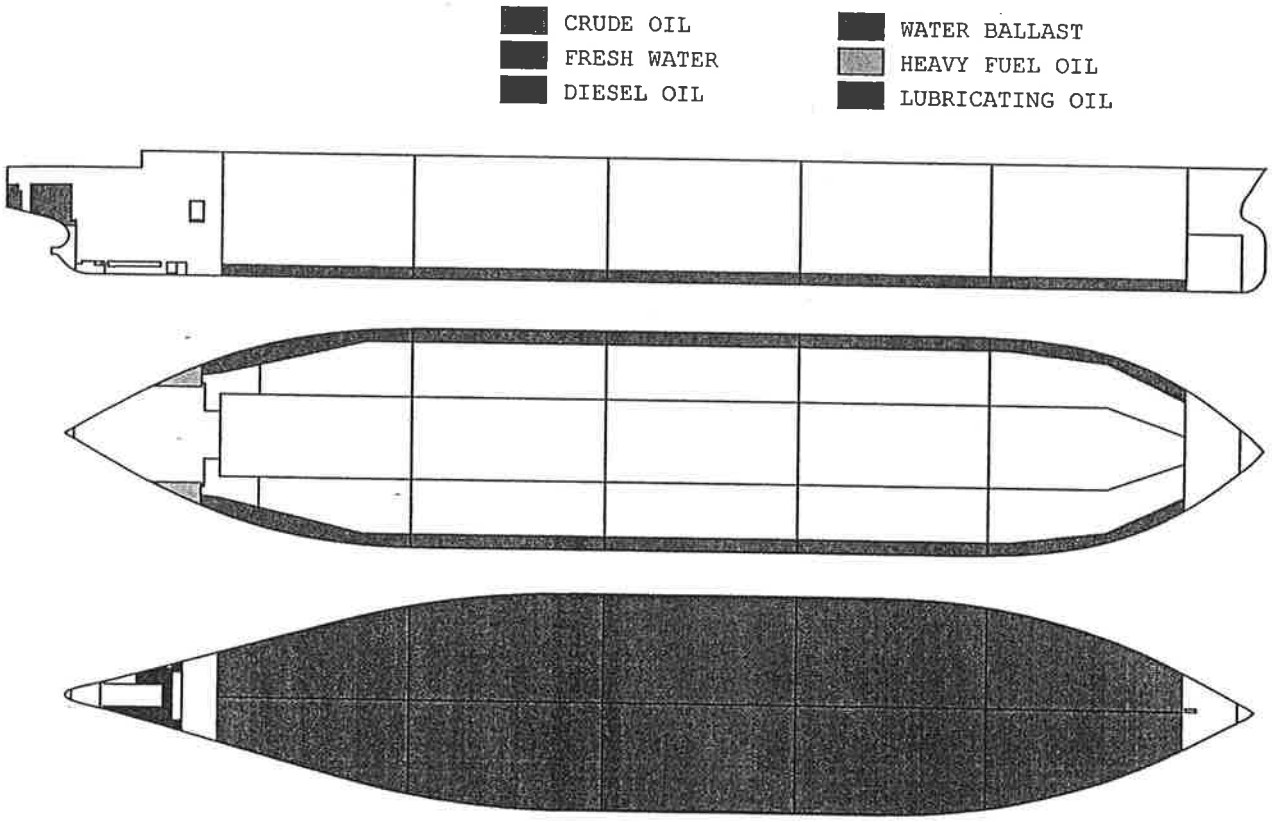
6. STEP 5 - BALLAST EXCHANGE

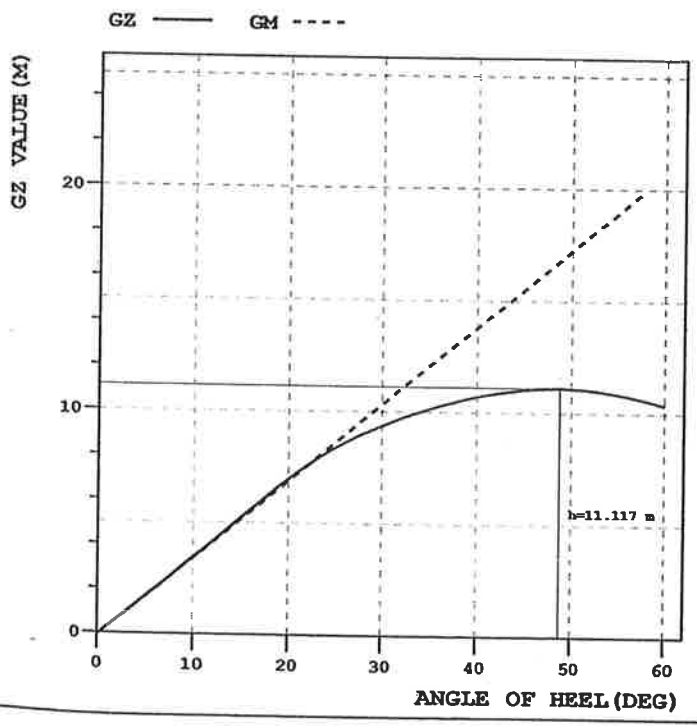


FR. NO.	DISTANCE M	SHEAR FORCE T	SHEAR FORCE %	BENDING MOMENT TM	BENDING MOMENT %	WEIGHT T/M	BOUY. T/M
-6	-5.500	0.0	-	0.0	-	93.9	0.0
0	-0.000	694.5	49.20	1958.7	6.10	168.6	18.3
60	51.000	5497.0	37.91	205258.4	62.20	324.9	315.1
70	102.000	7263.3	41.50	571277.3	69.67	320.2	533.4
80	153.000	-3355.8	17.85	667950.5	81.46	334.4	527.5
90	204.000	-1797.9	10.39	529802.9	64.61	529.2	478.3
100	255.000	-8367.7	52.63	261265.4	39.65	308.1	408.4
110	306.000	-224.7	2.20	1652.1	3.06	421.5	151.8
133	326.500	0.0	-	0.0	-	20.2	0.0

SHEAR FORCE (Negative) :	-8368 Ton (52.6%)	POSITION :	Fr100 + 0.00 m
SHEAR FORCE (Positive) :	7652 Ton (46.5%)	POSITION :	Fr 66 + 2.55 m
SAGGING MOMENT (Max.) :	-28 T-m (0.4%)	POSITION :	Fr128 + 0.84 m
HOGGING MOMENT (Max.) :	695810 T-m (84.9%)	POSITION :	Fr 76 + 4.60 m

7. STEP 6 - BALLAST EXCHANGE





DISPLACEMENT	142720 Ton
KGo=KG+GGo	12.110 m
FLOODING ANGLE	40.000 Degree

AREA UNDER GZ CURVE

CRITERIA	RESULT	REQUIREMENT
0 Up to 30	2.651	0.055 M-RAD
0 Up to Flooding Ang.	4.415	0.090 M-RAD
30 Up to Flooding Ang.	1.764	0.030 M-RAD

LEVER AFTER FREE SURFACE CORR.

CRITERIA	RESULT	REQUIREMENT
GZ at 30 Deg	9.373	0.200 M
GoM	19.843	0.150 M
Angle of MAX GZ	48.4	25.00 DEG
Maximum GZ	11.1	

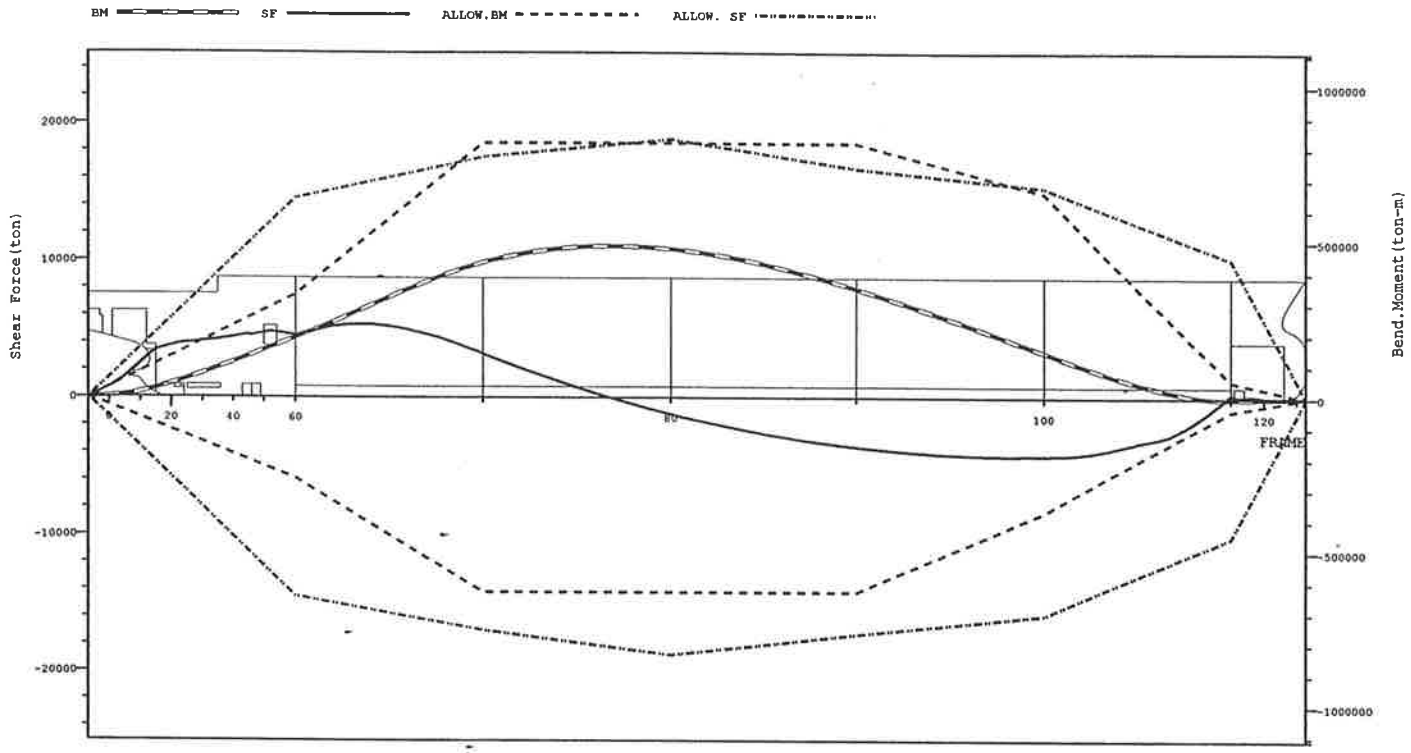
CONDITION 7. STEP 6 - BALLAST EXCHANGE

WEIGHT ITEMS	FILL. (%)	S.G	WEIGHT (MT)	L.C.G (M)	V.C.G (M)	T.C.G (M)	F.S.M (MT-M)
NO.1 W.B.TK(P)	100.0	1.0250	8790.0	279.870	11.198	18.224	0
NO.1 W.B.TK(S)	100.0	1.0250	8790.0	279.870	11.198	-18.224	0
NO.2 W.B.TK(P)	100.0	1.0250	10126.4	229.326	9.652	21.363	0
NO.2 W.B.TK(S)	100.0	1.0250	10126.4	229.326	9.652	-21.363	0
NO.3 W.B.TK(P)	100.0	1.0250	10218.2	178.500	9.593	21.421	0
NO.3 W.B.TK(S)	100.0	1.0250	10218.2	178.500	9.593	-21.421	0
NO.4 W.B.TK(P)	100.0	1.0250	9973.0	127.896	9.777	21.274	0
NO.4 W.B.TK(S)	100.0	1.0250	9973.0	127.896	9.777	-21.274	0
NO.5 W.B.TK(P)	100.0	1.0250	9136.8	75.928	11.734	19.496	0
NO.5 W.B.TK(S)	100.0	1.0250	9176.6	75.805	11.752	-19.503	0
A.P.TK	100.0	1.0250	2275.5	5.346	20.407	-0.025	0
TOTAL WATER BALLAST			98804.1	173.728	10.575	-0.009	0
F.W.TK(P)	10.0	1.0000	28.9	9.157	23.804	10.705	424
F.W.TK(S)	10.0	1.0000	20.6	8.409	23.803	-11.338	312
DIST.W.TK(S)	10.0	1.0000	8.3	11.050	23.807	-9.100	45
TOTAL FRESH WATER			57.8	9.161	23.804	0.004	782
NO.1 H.F.O.TK(P)	4.5	1.0000	110.6	41.999	11.394	14.507	2048
NO.1 H.F.O.TK(S)	4.5	1.0000	129.9	41.789	11.647	-14.598	2048
H.F.O.SETT.TK(P)	98.0	1.0000	235.5	39.651	17.685	14.679	78
H.F.O.SERV.TK(P)	98.0	1.0000	292.3	41.650	24.663	17.332	396
TOTAL HEAVY FUEL OIL			768.4	41.111	18.414	10.716	4570
D.O.STOR.TK(P)	10.0	0.8500	12.8	36.265	0.386	3.255	214
D.O.STOR.TK(S)	10.0	0.8500	16.7	35.642	0.451	-3.376	271
D.O.SETT.TK(S)	10.0	0.8500	3.2	43.350	21.748	-13.571	6
D.O.SERV.TK(S)	10.0	0.8500	6.3	40.800	21.748	-13.571	11
TOTAL DIESEL OIL			39.1	37.308	5.610	-3.678	503
M/E CYL.O.STOR.TK(P)	10.0	0.9000	7.4	44.200	14.430	4.095	24
M/E SYS.O.STOR.TK(S)	10.0	0.9000	7.4	44.200	14.430	-4.095	24
M/E SYS.O.SETT.TK(C)	10.0	0.9000	5.9	44.200	14.430	0.000	12
G/E L.O.STOR.TK(P)	10.0	0.9000	1.4	22.100	15.573	7.162	3
G/E L.O.SETT.TK(P)	10.0	0.9000	1.4	20.400	15.573	7.162	3
TOTAL LUBRICATING OIL			23.4	41.547	14.562	0.828	65
TOTAL DEADWEIGHT CONSTANT			427.0	66.630	10.135	0.000	0
TOTAL DEADWEIGHT			100119.8	172.074	10.640	0.072	5919
LIGHT SHIP			42600.0	152.000	15.425	0.029	0
TOTAL DISPLACEMENT			142719.9	166.082	12.069	0.059	5919

EQUIV. DRAFT(EXT)	= 9.862 M	:	M.T.C.	= 2936.77 MT-M
AFT. DRAFT(EXT)	= 12.417 M	:	T.P.C	= 155.22 MT/CM
FORE DRAFT(EXT)	= 7.697 M	:	K.M.T.	= 31.953 M
TRIM	= 4.720 M	:	V.C.G.	= 12.069 M
DISPLACEMENT	= 142719.9 MT	:	UNCORRECTED GM	= 19.885 M
L.C.G.	= 166.082 M	:	GGO	= 0.041 M
L.C.B.	= 165.980 M	:	CORRECTED GM(GOM)	= 19.843 M
L.C.F.	= 172.070 M	:	PROPELLER IMMER.	= 114.6 %
			BLIND DISTANCE	= 592.0 M

HEEL ANGLES(DEG.) =	0.000	5.000	10.000	15.000	20.000	30.000	40.000	50.000	60.000
GZ VALUE (M) =	-0.060	1.675	3.430	5.219	6.969	9.373	10.709	11.101	10.374
GZ AREA (M*RAD.) =	0.000	0.070	0.293	0.670	1.203	2.651	4.415	6.334	8.221

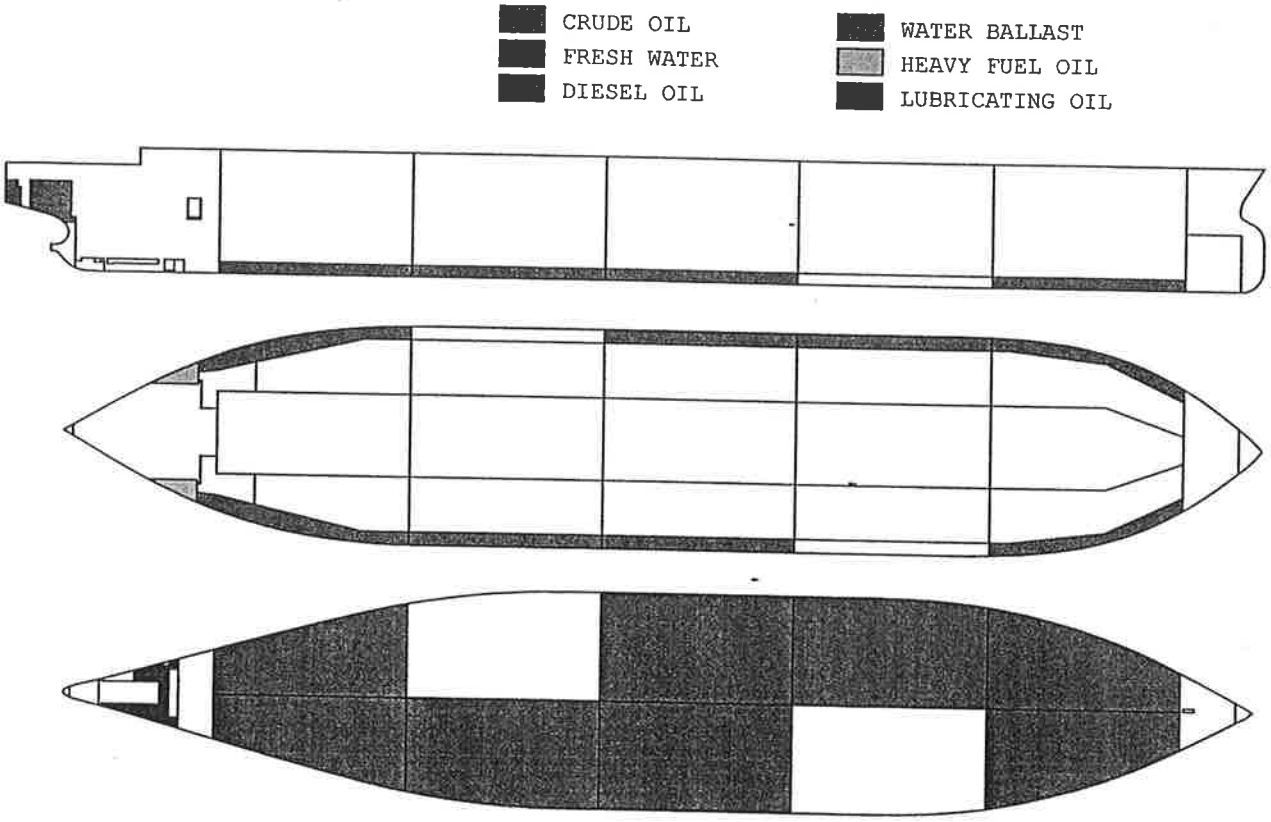
7. STEP 6 - BALLAST EXCHANGE

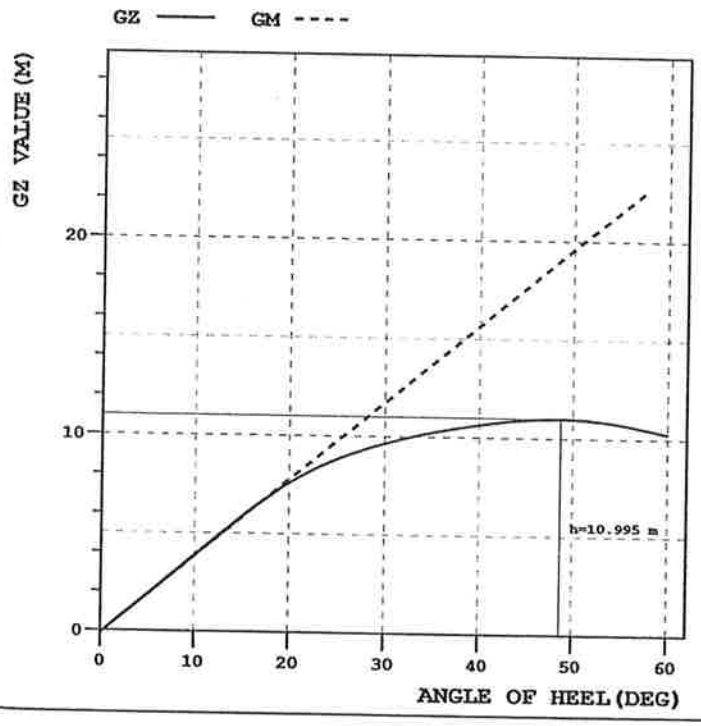


FR. NO.	DISTANCE M	SHEAR FORCE T	SHEAR FORCE %	BENDING MOMENT TM	BENDING MOMENT %	WEIGHT T/M	BOUY. T/M
-6	-5.500	0.0	-	0.0	-	93.9	0.0
0	-0.000	688.4	48.77	1984.7	6.18	168.6	20.2
60	51.000	4521.1	31.18	191749.5	58.11	324.9	360.3
70	102.000	3172.5	18.13	434341.9	52.97	499.7	604.0
80	153.000	-1203.4	6.40	478910.2	58.40	534.9	602.8
90	204.000	-3595.4	20.78	351083.3	42.82	529.2	557.8
100	255.000	-4202.8	26.43	145959.1	22.15	496.0	491.7
110	306.000	279.6	2.77	-2034.8	4.84	421.5	197.9
133	326.500	0.0	-	-0.0	-	20.2	0.1

SHEAR FORCE (Negative) :	-4241 Ton (26.2%)	POSITION :	Fr 98 + 0.59 m
SHEAR FORCE (Positive) :	5323 Ton (34.3%)	POSITION :	Fr 63 + 1.70 m
SAGGING MOMENT (Max.) :	-2242 T-m (4.2%)	POSITION :	Fr109 + 3.30 m
HOGGING MOMENT (Max.) :	488327 T-m (59.6%)	POSITION :	Fr 76 + 4.60 m

8. STEP 7 - BALLAST EXCHANGE





DISPLACEMENT	122620 Ton
KGo=KG+GGo	12.503 m
FLOODING ANGLE	40.000 Degree

AREA UNDER GZ CURVE

CRITERIA	RESULT	REQUIREMENT
0 Up to 30	2.868	0.055 M-RAD
0 Up to Flooding Ang.	4.647	0.090 M-RAD
30 Up to Flooding Ang.	1.779	0.030 M-RAD

LEVER AFTER FREE SURFACE CORR.

CRITERIA	RESULT	REQUIREMENT
GZ at 30 Deg	9.645	0.200 M
GoM	22.582	0.150 M
Angle of MAX GZ	48.5	25.00 DEG
Maximum GZ	11.0	

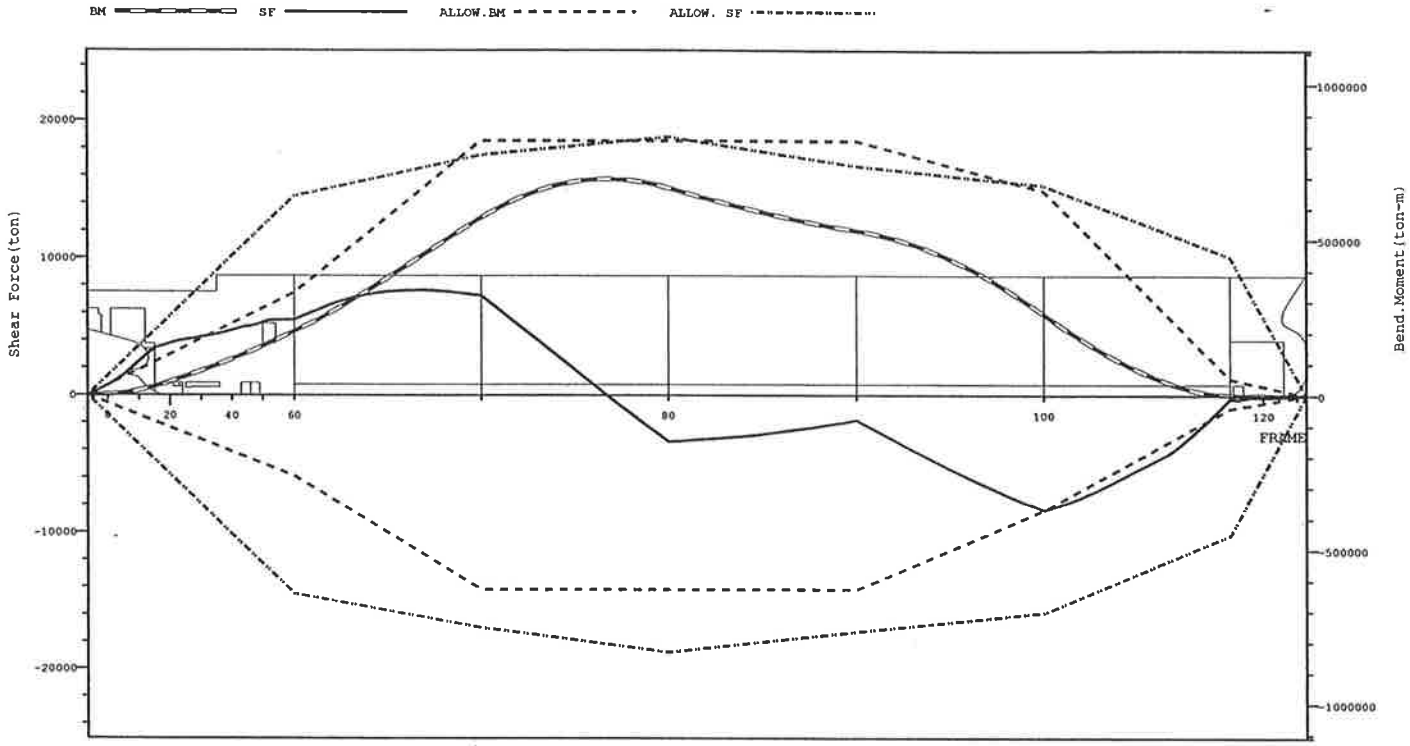
CONDITION 8. STEP 7 - BALLAST EXCHANGE

WEIGHT ITEMS	FILL. (%)	S.G	WEIGHT (MT)	L.C.G (M)	V.C.G (M)	T.C.G (M)	F.S.M (MT-M)
NO.1 W.B.TK(P)	100.0	1.0250	8790.0	279.870	11.198	18.224	0
NO.1 W.B.TK(S)	100.0	1.0250	8790.0	279.870	11.198	-18.224	0
NO.2 W.B.TK(P)	100.0	1.0250	10126.4	229.326	9.652	21.363	0
NO.3 W.B.TK(P)	100.0	1.0250	10218.2	178.500	9.593	21.421	0
NO.3 W.B.TK(S)	100.0	1.0250	10218.2	178.500	9.593	-21.421	0
NO.4 W.B.TK(S)	100.0	1.0250	9973.0	127.896	9.777	-21.274	0
NO.5 W.B.TK(P)	100.0	1.0250	9136.8	75.928	11.734	19.496	0
NO.5 W.B.TK(S)	100.0	1.0250	9176.6	75.805	11.752	-19.503	0
A.P.TK	100.0	1.0250	2275.5	5.346	20.407	-0.025	0
TOTAL WATER BALLAST			78704.6	172.382	10.795	0.042	0
F.W.TK(P)	10.0	1.0000	28.9	9.157	23.804	10.705	424
F.W.TK(S)	10.0	1.0000	20.6	8.409	23.803	-11.338	312
DIST.W.TK(S)	10.0	1.0000	8.3	11.050	23.807	-9.100	45
TOTAL FRESH WATER			57.8	9.161	23.804	0.004	782
NO.1 H.F.O.TK(P)	4.5	1.0000	110.6	41.999	11.394	14.507	2048
NO.1 H.F.O.TK(S)	4.5	1.0000	129.9	41.789	11.647	-14.598	2048
H.F.O.SETT.TK(P)	98.0	1.0000	235.5	39.651	17.685	14.679	78
H.F.O.SERV.TK(P)	98.0	1.0000	292.3	41.650	24.663	17.332	396
TOTAL HEAVY FUEL OIL			768.4	41.111	18.414	10.716	4570
D.O.STOR.TK(P)	10.0	0.8500	12.8	36.265	0.386	3.255	214
D.O.STOR.TK(S)	10.0	0.8500	16.7	35.642	0.451	-3.376	271
D.O.SETT.TK(S)	10.0	0.8500	3.2	43.350	21.748	-13.571	6
D.O.SERV.TK(S)	10.0	0.8500	6.3	40.800	21.748	-13.571	11
TOTAL DIESEL OIL			39.1	37.308	5.610	-3.678	503
M/E CYL.O.STOR.TK(P)	10.0	0.9000	7.4	44.200	14.430	4.095	24
M/E SYS.O.STOR.TK(S)	10.0	0.9000	7.4	44.200	14.430	-4.095	24
M/E SYS.O.SETT.TK(C)	10.0	0.9000	5.9	44.200	14.430	0.000	12
G/E L.O.STOR.TK(P)	10.0	0.9000	1.4	22.100	15.573	7.162	3
G/E L.O.SETT.TK(P)	10.0	0.9000	1.4	20.400	15.573	7.162	3
TOTAL LUBRICATING OIL			23.4	41.547	14.562	0.828	65
TOTAL DEADWEIGHT CONSTANT			427.0	66.630	10.135	0.000	0
TOTAL DEADWEIGHT			80020.4	170.335	10.873	0.142	5919
LIGHT SHIP			42600.0	152.000	15.425	0.029	0
TOTAL DISPLACEMENT			122620.4	163.965	12.455	0.103	5919

EQUIV. DRAFT(EXT)	= 8.559 M	:	M.T.C.	= 2865.28	MT-M
AFT. DRAFT(EXT)	= 11.368 M	:	T.P.C	= 153.64	MT/CM
FORE DRAFT(EXT)	= 6.200 M	:	K.M.T.	= 35.084	M
TRIM	= 5.168 M	:	V.C.G.	= 12.455	M
DISPLACEMENT	= 122620.4 MT	:	UNCORRECTED GM	= 22.630	M
L.C.G.	= 163.965 M	:	GGO	= 0.048	M
L.C.B.	= 163.837 M	:	CORRECTED GM(GOM)	= 22.582	M
L.C.F.	= 172.734 M	:	PROPELLER IMMER.	= 103.8	%
			BLIND DISTANCE	= 646.3	M

HEEL ANGLES(DEG.) =	0.000	5.000	10.000	15.000	20.000	30.000	40.000	50.000	60.000
GZ VALUE (M) =	-0.104	1.869	3.858	5.850	7.591	9.645	10.646	10.980	10.247
GZ AREA (M*RAD.) =	0.000	0.077	0.327	0.751	1.340	2.868	4.647	6.547	8.413

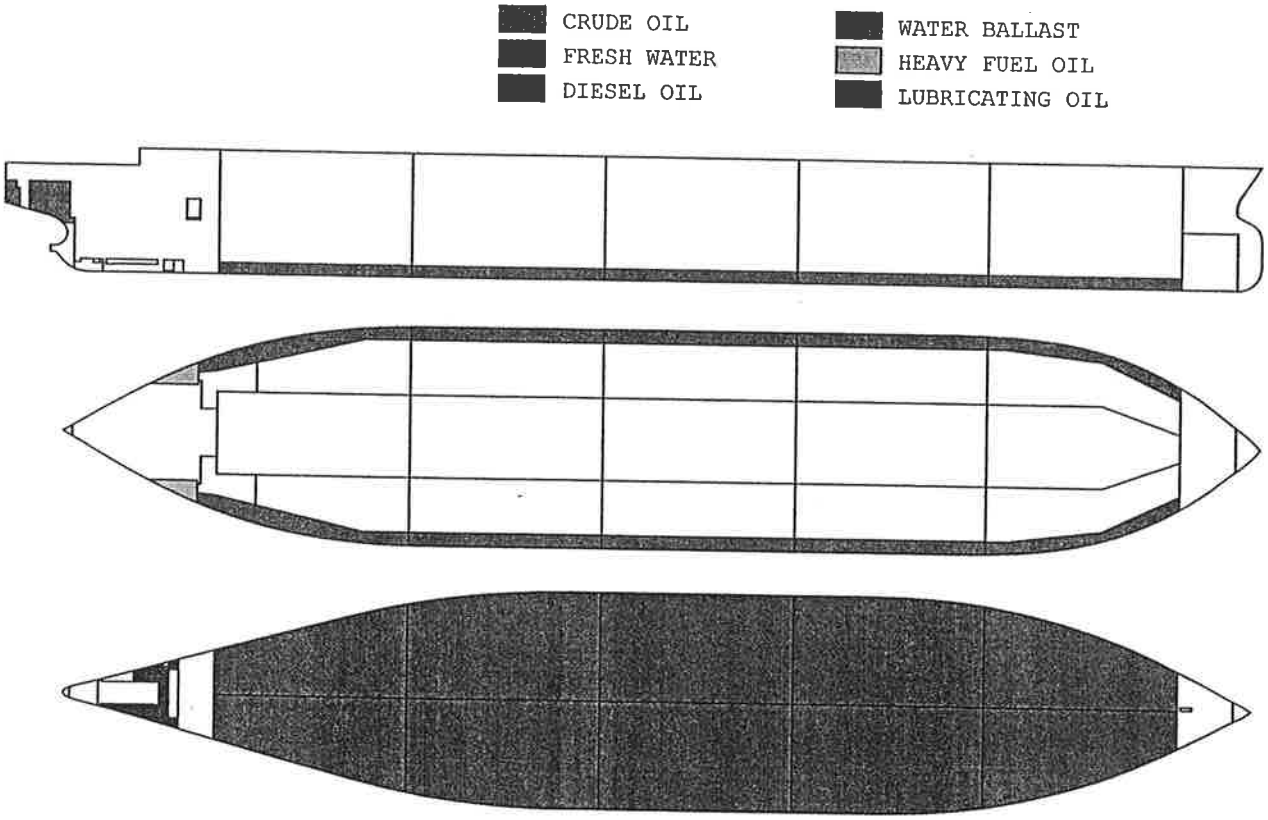
8. STEP 7 - BALLAST EXCHANGE

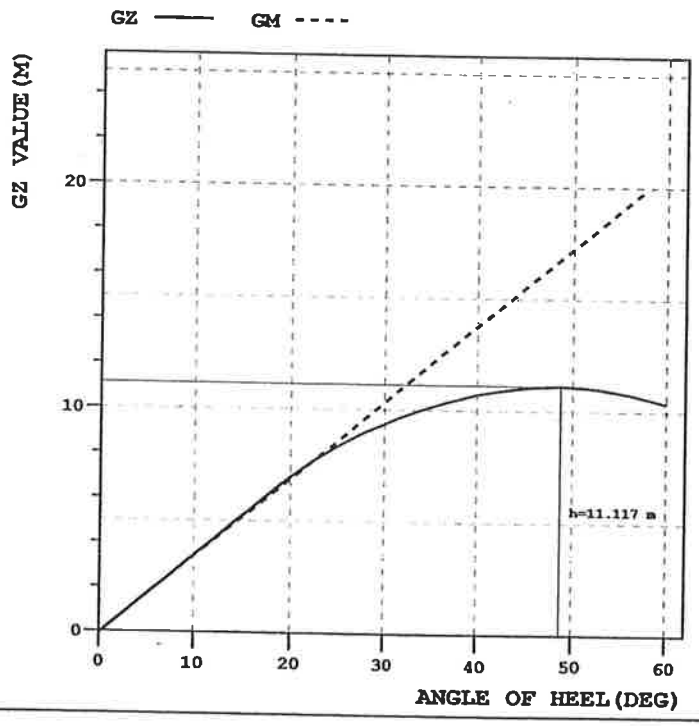


FR. NO.	DISTANCE M	SHEAR FORCE T	SHEAR FORCE %	BENDING MOMENT TM	BENDING MOMENT %	WEIGHT T/M	BOUY. T/M
-6	-5.500	0.0	-	0.0	-	93.9	0.0
0	-0.000	694.5	49.20	1979.3	6.16	168.6	18.3
60	51.000	5496.6	37.91	205463.8	62.26	324.9	315.2
70	102.000	7261.4	41.49	571618.4	69.71	320.2	533.4
80	153.000	-3359.4	17.87	668343.3	81.51	334.4	527.5
90	204.000	-1803.1	10.42	530161.5	64.65	529.2	478.3
100	255.000	-8374.4	52.67	261511.1	39.68	308.1	408.4
110	306.000	-232.3	2.28	1719.9	3.19	421.5	151.8
133	326.500	0.0	-	0.0	-	20.2	0.0

SHEAR FORCE (Negative) :	-8374 Ton (52.7%)	POSITION :	Fr100 + 0.00 m
SHEAR FORCE (Positive) :	7651 Ton (46.5%)	POSITION :	Fr 66 + 2.55 m
SAGGING MOMENT (Max.) :	-28 T-m (0.4%)	POSITION :	Fr128 + 0.84 m
HOGGING MOMENT (Max.) :	696196 T-m (84.9%)	POSITION :	Fr 76 + 4.60 m

9. STEP 8 - BALLAST EXCHANGE





DISPLACEMENT	142720 Ton
KGo=KG+GGo	12.110 m
FLOODING ANGLE	40.000 Degree

AREA UNDER GZ CURVE

CRITERIA	RESULT	REQUIREMENT
0 Up to 30	2.651	0.055 M-RAD
0 Up to Flooding Ang.	4.415	0.090 M-RAD
30 Up to Flooding Ang.	1.764	0.030 M-RAD

LEVER AFTER FREE SURFACE CORR.

CRITERIA	RESULT	REQUIREMENT
GZ at 30 Deg	9.373	0.200 M
GoM	19.843	0.150 M
Angle of MAX GZ	48.4	25.00 DEG
Maximum GZ	11.1	

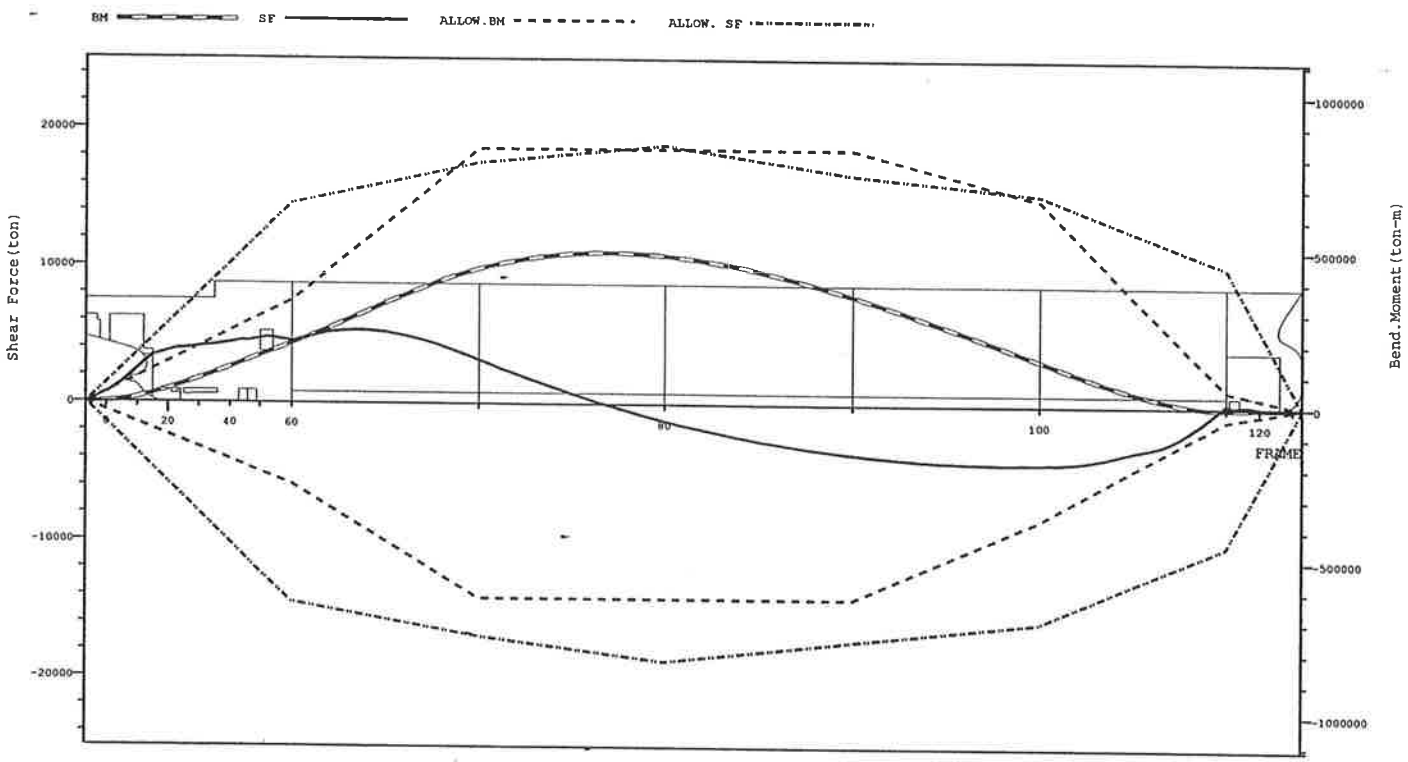
CONDITION 9. STEP 8 - BALLAST EXCHANGE

WEIGHT ITEMS	FILL. (%)	S.G	WEIGHT (MT)	L.C.G (M)	V.C.G (M)	T.C.G (M)	F.S.M (MT-M)
NO.1 W.B.TK(P)	100.0	1.0250	8790.0	279.870	11.198	18.224	0
NO.1 W.B.TK(S)	100.0	1.0250	8790.0	279.870	11.198	-18.224	0
NO.2 W.B.TK(P)	100.0	1.0250	10126.4	229.326	9.652	21.363	0
NO.2 W.B.TK(S)	100.0	1.0250	10126.4	229.326	9.652	-21.363	0
NO.3 W.B.TK(P)	100.0	1.0250	10218.2	178.500	9.593	21.421	0
NO.3 W.B.TK(S)	100.0	1.0250	10218.2	178.500	9.593	-21.421	0
NO.4 W.B.TK(P)	100.0	1.0250	9973.0	127.896	9.777	21.274	0
NO.4 W.B.TK(S)	100.0	1.0250	9973.0	127.896	9.777	-21.274	0
NO.5 W.B.TK(P)	100.0	1.0250	9136.8	75.928	11.734	19.496	0
NO.5 W.B.TK(S)	100.0	1.0250	9176.6	75.805	11.752	-19.503	0
A.P.TK	100.0	1.0250	2275.5	5.346	20.407	-0.025	0
TOTAL WATER BALLAST			98804.1	173.728	10.575	-0.009	0
F.W.TK(P)	10.0	1.0000	28.9	9.157	23.804	10.705	424
F.W.TK(S)	10.0	1.0000	20.6	8.409	23.803	-11.338	312
DIST.W.TK(S)	10.0	1.0000	8.3	11.050	23.807	-9.100	45
TOTAL FRESH WATER			57.8	9.161	23.804	0.004	782
NO.1 H.F.O.TK(P)	4.5	1.0000	110.6	41.999	11.394	14.507	2048
NO.1 H.F.O.TK(S)	4.5	1.0000	129.9	41.789	11.647	-14.598	2048
H.F.O.SETT.TK(P)	98.0	1.0000	235.5	39.651	17.685	14.679	78
H.F.O.SERV.TK(P)	98.0	1.0000	292.3	41.650	24.663	17.332	396
TOTAL HEAVY FUEL OIL			768.4	41.111	18.414	10.716	4570
D.O.STOR.TK(P)	10.0	0.8500	12.8	36.265	0.386	3.255	214
D.O.STOR.TK(S)	10.0	0.8500	16.7	35.642	0.451	-3.376	271
D.O.SETT.TK(S)	10.0	0.8500	3.2	43.350	21.748	-13.571	6
D.O.SERV.TK(S)	10.0	0.8500	6.3	40.800	21.748	-13.571	11
TOTAL DIESEL OIL			39.1	37.308	5.610	-3.678	503
M/E CYL.O.STOR.TK(P)	10.0	0.9000	7.4	44.200	14.430	4.095	24
M/E SYS.O.STOR.TK(S)	10.0	0.9000	7.4	44.200	14.430	-4.095	24
M/E SYS.O.SETT.TK(C)	10.0	0.9000	5.9	44.200	14.430	0.000	12
G/E L.O.STOR.TK(P)	10.0	0.9000	1.4	22.100	15.573	7.162	3
G/E L.O.SETT.TK(P)	10.0	0.9000	1.4	20.400	15.573	7.162	3
TOTAL LUBRICATING OIL			23.4	41.547	14.562	0.828	65
TOTAL DEADWEIGHT CONSTANT			427.0	66.630	10.135	0.000	0
TOTAL DEADWEIGHT			100119.8	172.074	10.640	0.072	5919
LIGHT SHIP			42600.0	152.000	15.425	0.029	0
TOTAL DISPLACEMENT			142719.9	166.082	12.069	0.059	5919

EQUIV. DRAFT(EXT)	= 9.862 M	:	M.T.C.	= 2936.77 MT-M
AFT. DRAFT(EXT)	= 12.417 M	:	T.P.C	= 155.22 MT/CM
FORE DRAFT(EXT)	= 7.697 M	:	K.M.T.	= 31.953 M
TRIM	= 4.720 M	:	V.C.G.	= 12.069 M
DISPLACEMENT	= 142719.9 MT	:	UNCORRECTED GM	= 19.885 M
L.C.G.	= 166.082 M	:	GGO	= 0.041 M
L.C.B.	= 165.980 M	:	CORRECTED GM(GOM)	= 19.843 M
L.C.F.	= 172.070 M	:	PROPELLER IMMER.	= 114.6 %
			BLIND DISTANCE	= 592.0 M

HEEL ANGLES(DEG.) =	0.000	5.000	10.000	15.000	20.000	30.000	40.000	50.000	60.000
GZ VALUE (M) =	-0.060	1.675	3.430	5.219	6.969	9.373	10.709	11.101	10.374
GZ AREA (M*RAD.) =	0.000	0.070	0.293	0.670	1.203	2.651	4.415	6.334	8.221

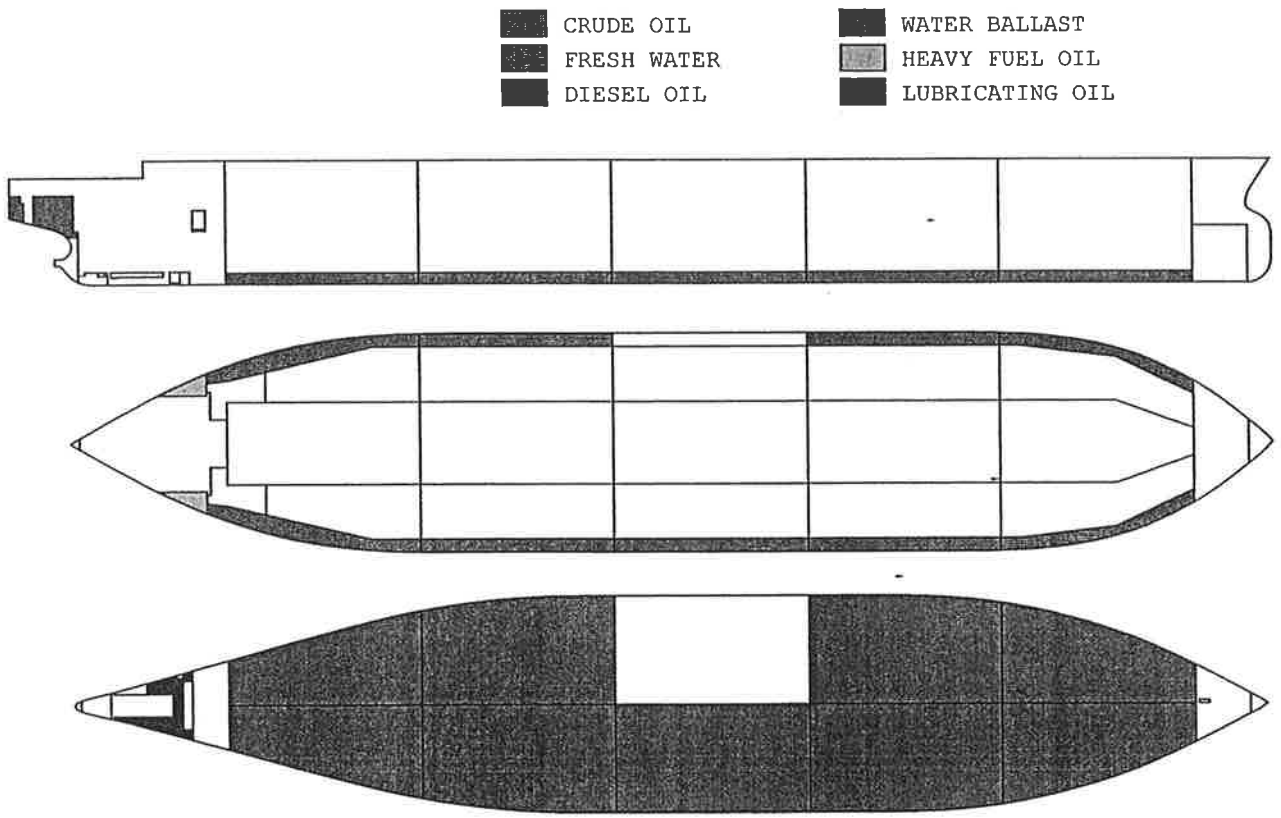
9. STEP 8 - BALLAST EXCHANGE

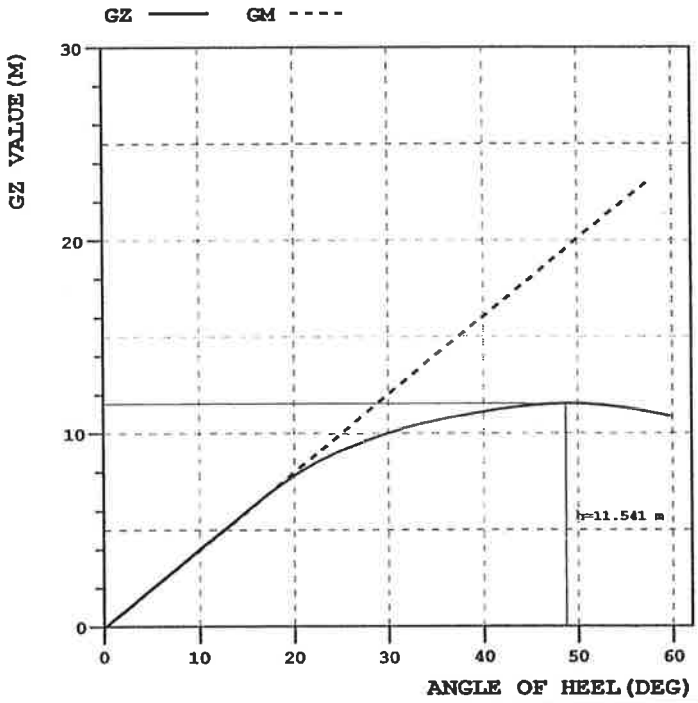


FR. NO.	DISTANCE M	SHEAR FORCE T	SHEAR FORCE %	BENDING MOMENT TM	BENDING MOMENT %	WEIGHT T/M	BOUY. T/M
-6	-5.500	0.0	-	0.0	-	93.9	0.0
0	-0.000	688.4	48.77	1984.7	6.18	168.6	20.2
60	51.000	4521.1	31.18	191749.5	58.11	324.9	360.3
70	102.000	3172.5	18.13	434341.9	52.97	499.7	604.0
80	153.000	-1203.4	6.40	478910.2	58.40	534.9	602.8
90	204.000	-3595.4	20.78	351083.3	42.82	529.2	557.8
100	255.000	-4202.8	26.43	145959.1	22.15	496.0	491.7
110	306.000	279.6	2.77	-2034.8	4.84	421.5	197.9
133	326.500	0.0	-	-0.0	-	20.2	0.1

SHEAR FORCE (Negative) :	-4241 Ton (26.2%)	POSITION :	Fr 98 + 0.59 m
SHEAR FORCE (Positive) :	5323 Ton (34.3%)	POSITION :	Fr 63 + 1.70 m
SAGGING MOMENT (Max.) :	-2242 T-m (4.2%)	POSITION :	Fr109 + 3.30 m
HOGGING MOMENT (Max.) :	488327 T-m (59.6%)	POSITION :	Fr 76 + 4.60 m

10. STEP 9 - BALLAST EXCHANGE





DISPLACEMENT	123518 Ton
KGo=KG+GGo	11.826 m
FLOODING ANGLE	40.000 Degree

AREA UNDER GZ CURVE

CRITERIA	RESULT	REQUIREMENT
0 Up to 30	2.968	0.055 M-RAD
0 Up to Flooding Ang.	4.820	0.090 M-RAD
30 Up to Flooding Ang.	1.852	0.030 M-RAD

LEVER AFTER FREE SURFACE CORR.

CRITERIA	RESULT	REQUIREMENT
GZ at 30 Deg	10.007	0.200 M
GoM	23.081	0.150 M
Angle of MAX GZ	49.0	25.00 DEG
Maximum GZ	11.5	

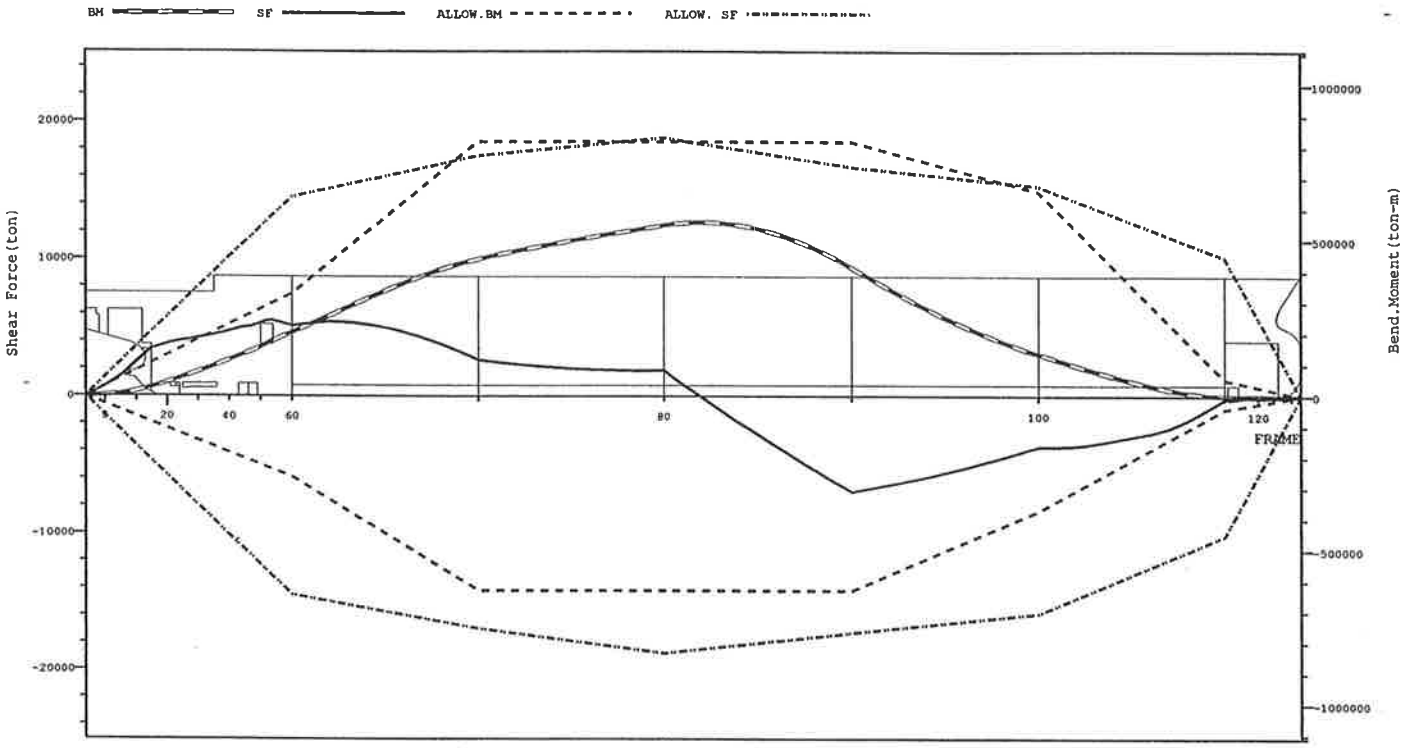
CONDITION 10. STEP 9 - BALLAST EXCHANGE

WEIGHT ITEMS	FILL. (%)	S.G	WEIGHT (MT)	L.C.G (M)	V.C.G (M)	T.C.G (M)	F.S.M (MT-M)
NO.1 W.B.TK(P)	100.0	1.0250	8790.0	279.870	11.198	18.224	0
NO.1 W.B.TK(S)	50.0	1.0250	4395.0	278.199	2.826	-13.541	5327
NO.2 W.B.TK(P)	100.0	1.0250	10126.4	229.326	9.652	21.363	0
NO.2 W.B.TK(S)	100.0	1.0250	10126.4	229.326	9.652	-21.363	0
NO.3 W.B.TK(S)	100.0	1.0250	10218.2	178.500	9.593	-21.421	0
NO.4 W.B.TK(P)	100.0	1.0250	9973.0	127.896	9.777	21.274	0
NO.4 W.B.TK(S)	100.0	1.0250	9973.0	127.896	9.777	-21.274	0
NO.5 W.B.TK(P)	100.0	1.0250	9136.8	75.928	11.734	19.496	0
NO.5 W.B.TK(S)	50.0	1.0250	4588.3	78.083	3.390	-13.553	3380
A.P.TK	100.0	1.0250	2275.5	5.346	20.407	-0.025	0
TOTAL WATER BALLAST			79602.6	172.939	9.655	-0.029	8707
F.W.TK(P)	10.0	1.0000	28.9	9.157	23.804	10.705	424
F.W.TK(S)	10.0	1.0000	20.6	8.409	23.803	-11.338	312
DIST.W.TK(S)	10.0	1.0000	8.3	11.050	23.807	-9.100	45
TOTAL FRESH WATER			57.8	9.161	23.804	0.004	782
NO.1 H.F.O.TK(P)	4.5	1.0000	110.6	41.999	11.394	14.507	2048
NO.1 H.F.O.TK(S)	4.5	1.0000	129.9	41.789	11.647	-14.598	2048
H.F.O.SETT.TK(P)	98.0	1.0000	235.5	39.651	17.685	14.679	78
H.F.O.SERV.TK(P)	98.0	1.0000	292.3	41.650	24.663	17.332	396
TOTAL HEAVY FUEL OIL			768.4	41.111	18.414	10.716	4570
D.O.STOR.TK(P)	10.0	0.8500	12.8	36.265	0.386	3.255	214
D.O.STOR.TK(S)	10.0	0.8500	16.7	35.642	0.451	-3.376	271
D.O.SETT.TK(S)	10.0	0.8500	3.2	43.350	21.748	-13.571	6
D.O.SERV.TK(S)	10.0	0.8500	6.3	40.800	21.748	-13.571	11
TOTAL DIESEL OIL			39.1	37.308	5.610	-3.678	503
M/E CYL.O.STOR.TK(P)	10.0	0.9000	7.4	44.200	14.430	4.095	24
M/E SYS.O.STOR.TK(S)	10.0	0.9000	7.4	44.200	14.430	-4.095	24
M/E SYS.O.SETT.TK(C)	10.0	0.9000	5.9	44.200	14.430	0.000	12
G/E L.O.STOR.TK(P)	10.0	0.9000	1.4	22.100	15.573	7.162	3
G/E L.O.SETT.TK(P)	10.0	0.9000	1.4	20.400	15.573	7.162	3
TOTAL LUBRICATING OIL			23.4	41.547	14.562	0.828	65
TOTAL DEADWEIGHT CONSTANT			427.0	66.630	10.135	0.000	0
TOTAL DEADWEIGHT			80918.4	170.905	9.750	0.072	14625
LIGHT SHIP			42600.0	152.000	15.425	0.029	0
TOTAL DISPLACEMENT			123518.4	164.385	11.707	0.057	14625

EQUIV. DRAFT(EXT)	= 8.617 M	:	M.T.C.	= 2868.08	MT-M
AFT. DRAFT(EXT)	= 11.342 M	:	T.P.C	= 153.71	MT/CM
FORE DRAFT(EXT)	= 6.330 M	:	K.M.T.	= 34.907	M
TRIM	= 5.012 M	:	V.C.G.	= 11.707	M
DISPLACEMENT	= 123518.4 MT	:	UNCORRECTED GM	= 23.200	M
L.C.G.	= 164.385 M	:	GGO	= 0.118	M
L.C.B.	= 164.273 M	:	CORRECTED GM(GOM)	= 23.081	M
L.C.F.	= 172.789 M	:	PROPELLER IMMER.	= 103.5	%
			BLIND DISTANCE	= 635.9	M

HEEL ANGLES(DEG.)	= 0.000	5.000	10.000	15.000	20.000	30.000	40.000	50.000	60.000
GZ VALUE (M)	= -0.058	1.959	3.992	6.030	7.831	10.007	11.117	11.536	10.857
GZ AREA (M*RAD.)	= 0.000	0.083	0.342	0.780	1.388	2.968	4.820	6.810	8.778

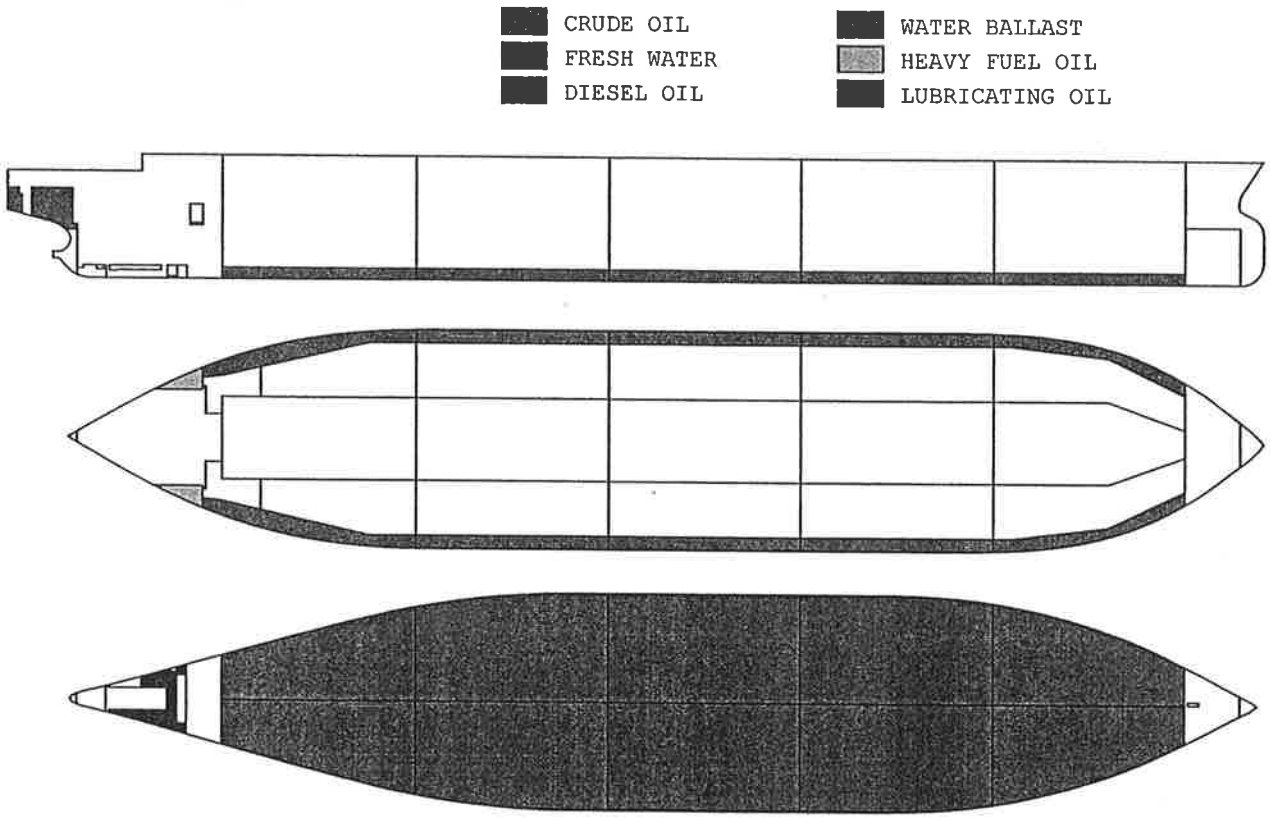
10. STEP 9 - BALLAST EXCHANGE

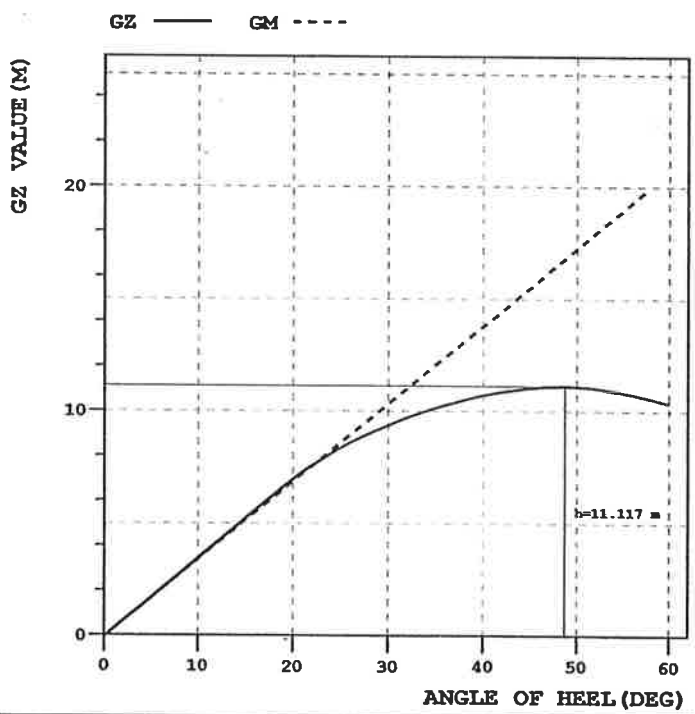


FR. NO.	DISTANCE M	SHEAR FORCE T	%	BENDING MOMENT TM	%	WEIGHT T/M	BOUY. T/M
-6	-5.500	0.0	-	0.0	-	93.9	0.0
0	-0.000	694.5	49.20	1973.8	6.14	168.6	18.3
60	51.000	5126.6	35.36	204574.1	61.99	244.8	315.1
70	102.000	2644.1	15.11	441629.3	53.86	499.7	534.8
80	153.000	1883.5	10.02	550595.2	67.15	534.8	530.4
90	204.000	-6972.3	40.30	414563.3	50.56	328.7	482.7
100	255.000	-3682.3	23.16	135851.0	20.61	495.9	414.2
110	306.000	-191.0	1.87	1456.0	2.70	325.6	155.6
133	326.500	0.0	-	-0.0	-	20.2	0.0

SHEAR FORCE (Negative) :	-6972 Ton (40.3%)	POSITION :	Fr 90 + 0.00 m
SHEAR FORCE (Positive) :	5493 Ton (41.6%)	POSITION :	Fr 54 +-0.00 m
SAGGING MOMENT (Max.) :	-25 T-m (0.4%)	POSITION :	Fr128 + 0.84 m
HOGGING MOMENT (Max.) :	560247 T-m (68.3%)	POSITION :	Fr 81 + 4.00 m

11. STEP 10 - BALLAST EXCHANGE





DISPLACEMENT	142720 Ton
KGo=KG+GGo	12.110 m
FLOODING ANGLE	40.000 Degree

AREA UNDER GZ CURVE

CRITERIA	RESULT	REQUIREMENT
0 Up to 30	2.651	0.055 M-RAD
0 Up to Flooding Ang.	4.415	0.090 M-RAD
30 Up to Flooding Ang.	1.764	0.030 M-RAD

LEVER AFTER FREE SURFACE CORR.

CRITERIA	RESULT	REQUIREMENT
GZ at 30 Deg	9.373	0.200 M
GoM	19.843	0.150 M
Angle of MAX GZ	48.4	25.00 DEG
Maximum GZ	11.1	

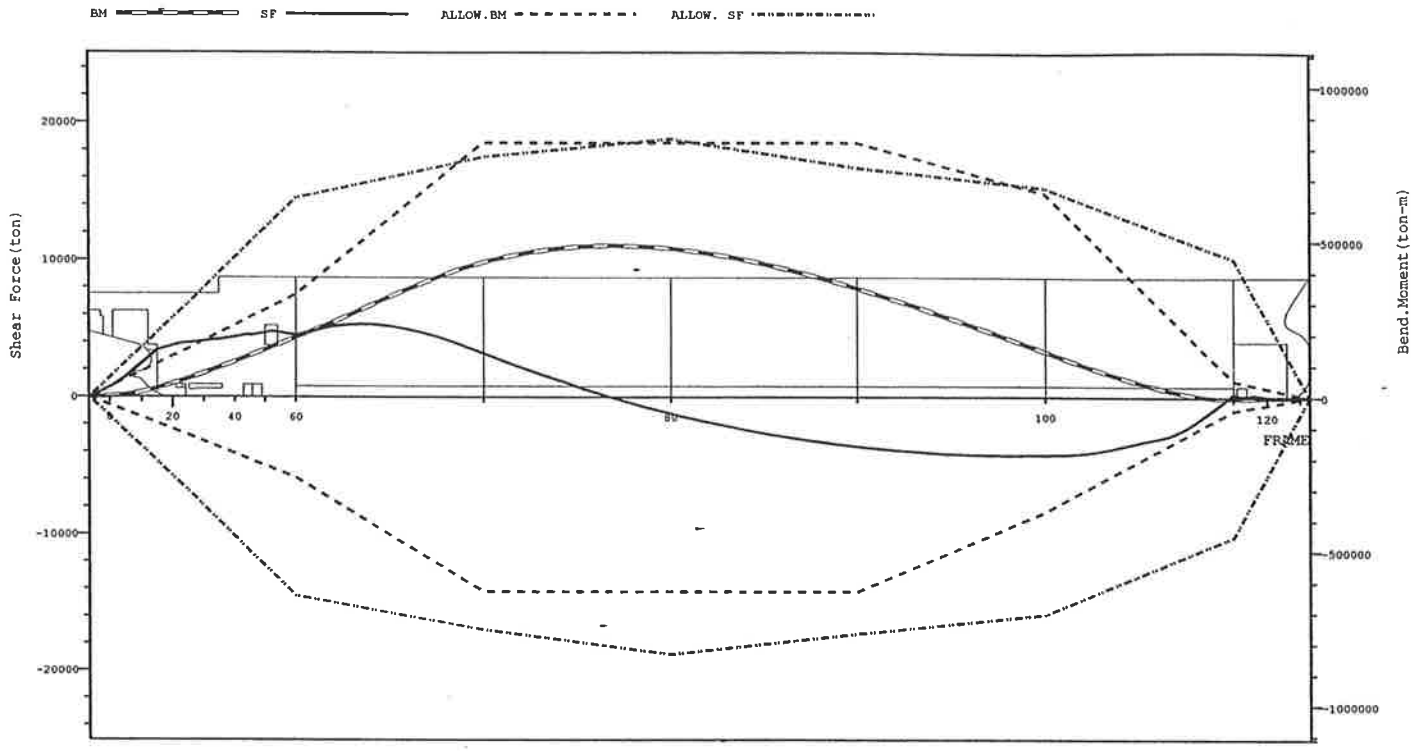
CONDITION 11. STEP 10 - BALLAST EXCHANGE

WEIGHT ITEMS	FILL. (%)	S.G	WEIGHT (MT)	L.C.G (M)	V.C.G (M)	T.C.G (M)	F.S.M (MT-M)
NO.1 W.B.TK(P)	100.0	1.0250	8790.0	279.870	11.198	18.224	0
NO.1 W.B.TK(S)	100.0	1.0250	8790.0	279.870	11.198	-18.224	0
NO.2 W.B.TK(P)	100.0	1.0250	10126.4	229.326	9.652	21.363	0
NO.2 W.B.TK(S)	100.0	1.0250	10126.4	229.326	9.652	-21.363	0
NO.3 W.B.TK(P)	100.0	1.0250	10218.2	178.500	9.593	21.421	0
NO.3 W.B.TK(S)	100.0	1.0250	10218.2	178.500	9.593	-21.421	0
NO.4 W.B.TK(P)	100.0	1.0250	9973.0	127.896	9.777	21.274	0
NO.4 W.B.TK(S)	100.0	1.0250	9973.0	127.896	9.777	-21.274	0
NO.5 W.B.TK(P)	100.0	1.0250	9136.8	75.928	11.734	19.496	0
NO.5 W.B.TK(S)	100.0	1.0250	9176.6	75.805	11.752	-19.503	0
A.P.TK	100.0	1.0250	2275.5	5.346	20.407	-0.025	0
TOTAL WATER BALLAST			98804.1	173.728	10.575	-0.009	0
F.W.TK(P)	10.0	1.0000	28.9	9.157	23.804	10.705	424
F.W.TK(S)	10.0	1.0000	20.6	8.409	23.803	-11.338	312
DIST.W.TK(S)	10.0	1.0000	8.3	11.050	23.807	-9.100	45
TOTAL FRESH WATER			57.8	9.161	23.804	0.004	782
NO.1 H.F.O.TK(P)	4.5	1.0000	110.6	41.999	11.394	14.507	2048
NO.1 H.F.O.TK(S)	4.5	1.0000	129.9	41.789	11.647	-14.598	2048
H.F.O.SETT.TK(P)	98.0	1.0000	235.5	39.651	17.685	14.679	78
H.F.O.SERV.TK(P)	98.0	1.0000	292.3	41.650	24.663	17.332	396
TOTAL HEAVY FUEL OIL			768.4	41.111	18.414	10.716	4570
D.O.STOR.TK(P)	10.0	0.8500	12.8	36.265	0.386	3.255	214
D.O.STOR.TK(S)	10.0	0.8500	16.7	35.642	0.451	-3.376	271
D.O.SETT.TK(S)	10.0	0.8500	3.2	43.350	21.748	-13.571	6
D.O.SERV.TK(S)	10.0	0.8500	6.3	40.800	21.748	-13.571	11
TOTAL DIESEL OIL			39.1	37.308	5.610	-3.678	503
M/E CYL.O.STOR.TK(P)	10.0	0.9000	7.4	44.200	14.430	4.095	24
M/E SYS.O.STOR.TK(S)	10.0	0.9000	7.4	44.200	14.430	-4.095	24
M/E SYS.O.SETT.TK(C)	10.0	0.9000	5.9	44.200	14.430	0.000	12
G/E L.O.STOR.TK(P)	10.0	0.9000	1.4	22.100	15.573	7.162	3
G/E L.O.SETT.TK(P)	10.0	0.9000	1.4	20.400	15.573	7.162	3
TOTAL LUBRICATING OIL			23.4	41.547	14.562	0.828	65
TOTAL DEADWEIGHT CONSTANT			427.0	66.630	10.135	0.000	0
TOTAL DEADWEIGHT			100119.8	172.074	10.640	0.072	5919
LIGHT SHIP			42600.0	152.000	15.425	0.029	0
TOTAL DISPLACEMENT			142719.9	166.082	12.069	0.059	5919

EQUIV. DRAFT(EXT)	= 9.862 M	:	M.T.C.	= 2936.77	MT-M
AFT. DRAFT(EXT)	= 12.417 M	:	T.P.C	= 155.22	MT/CM
FORE DRAFT(EXT)	= 7.697 M	:	K.M.T.	= 31.953	M
TRIM	= 4.720 M	:	V.C.G.	= 12.069	M
DISPLACEMENT	= 142719.9 MT	:	UNCORRECTED GM	= 19.885	M
L.C.G.	= 166.082 M	:	GGO	= 0.041	M
L.C.B.	= 165.980 M	:	CORRECTED GM(GOM)	= 19.843	M
L.C.F.	= 172.070 M	:	PROPELLER IMMER.	= 114.6	%
			BLIND DISTANCE	= 592.0	M

HEEL ANGLES(DEG.)	= 0.000	5.000	10.000	15.000	20.000	30.000	40.000	50.000	60.000
GZ VALUE (M)	= -0.060	1.675	3.430	5.219	6.969	9.373	10.709	11.101	10.374
GZ AREA (M*RAD.)	= 0.000	0.070	0.293	0.670	1.203	2.651	4.415	6.334	8.221

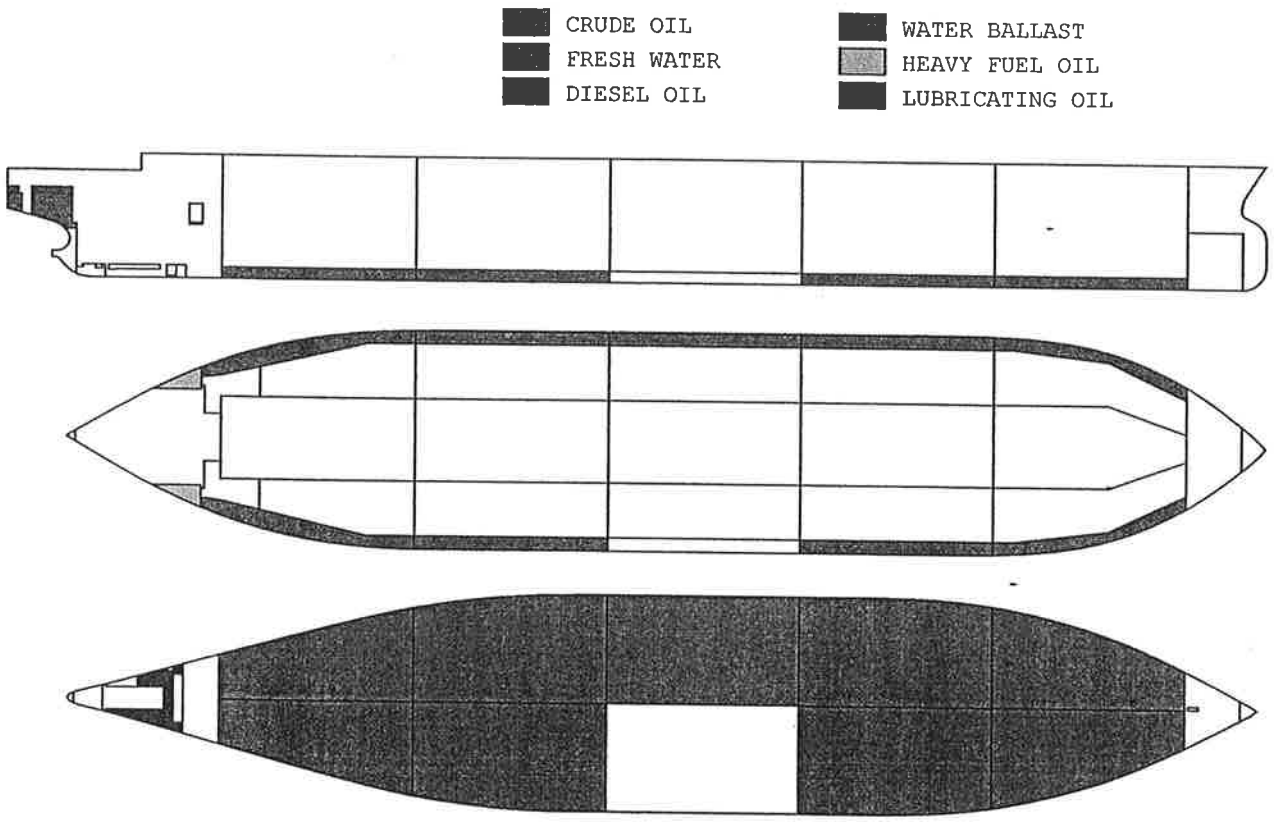
11. STEP 10 - BALLAST EXCHANGE

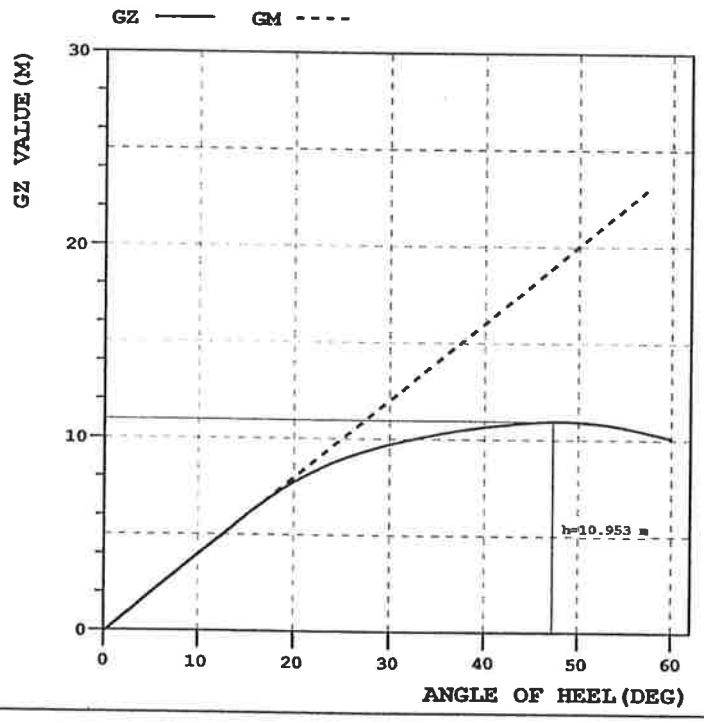


FR. NO.	DISTANCE M	SHEAR FORCE T	SHEAR FORCE %	BENDING MOMENT TM	BENDING MOMENT %	WEIGHT T/M	BOUY. T/M
-6	-5.500	0.0	-	0.0	-	93.9	0.0
0	-0.000	688.4	48.77	1984.7	6.18	168.6	20.2
60	51.000	4521.1	31.18	191749.5	58.11	324.9	360.3
70	102.000	3172.5	18.13	434341.9	52.97	499.7	604.0
80	153.000	-1203.4	6.40	478910.2	58.40	534.9	602.8
90	204.000	-3595.4	20.78	351083.3	42.82	529.2	557.8
100	255.000	-4202.8	26.43	145959.1	22.15	496.0	491.7
110	306.000	279.6	2.77	-2034.8	4.84	421.5	197.9
133	326.500	0.0	-	-0.0	-	20.2	0.1

SHEAR FORCE (Negative) :	-4241 Ton (26.2%)	POSITION :	Fr 98 + 0.59 m
SHEAR FORCE (Positive) :	5323 Ton (34.3%)	POSITION :	Fr 63 + 1.70 m
SAGGING MOMENT (Max.) :	-2242 T-m (4.2%)	POSITION :	Fr109 + 3.30 m
HOGGING MOMENT (Max.) :	488327 T-m (59.6%)	POSITION :	Fr 76 + 4.60 m

12. STEP 11 - BALLAST EXCHANGE





DISPLACEMENT	123538 Ton
KGo=KG+GGo	11.828 m
FLOODING ANGLE	40.000 Degree

AREA UNDER GZ CURVE

CRITERIA	RESULT	REQUIREMENT
0 Up to 30	2.920	0.055 M-RAD
0 Up to Flooding Ang.	4.706	0.090 M-RAD
30 Up to Flooding Ang.	1.786	0.030 M-RAD

LEVER AFTER FREE SURFACE CORR.

CRITERIA	RESULT	REQUIREMENT
GZ at 30 Deg	9.714	0.200 M
GoM	23.077	0.150 M
Angle of MAX GZ	47.9	25.00 DEG
Maximum GZ	11.0	

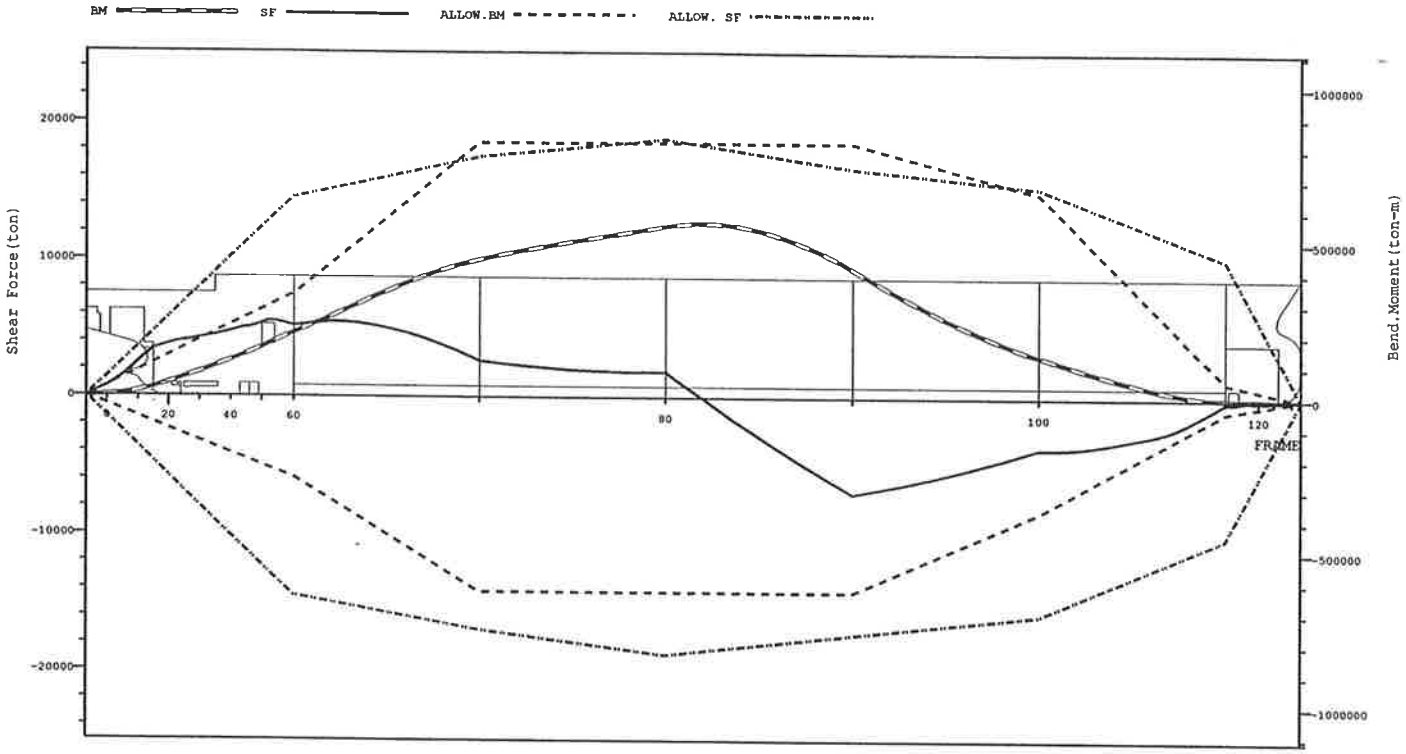
CONDITION 12. STEP 11 - BALLAST EXCHANGE

WEIGHT ITEMS	FILL. (%)	S.G	WEIGHT (MT)	L.C.G (M)	V.C.G (M)	T.C.G (M)	F.S.M (MT-M)
NO.1 W.B.TK(P)	50.0	1.0250	4395.0	278.199	2.826	13.541	5327
NO.1 W.B.TK(S)	100.0	1.0250	8790.0	279.870	11.198	-18.224	0
NO.2 W.B.TK(P)	100.0	1.0250	10126.4	229.326	9.652	21.363	0
NO.2 W.B.TK(S)	100.0	1.0250	10126.4	229.326	9.652	-21.363	0
NO.3 W.B.TK(P)	100.0	1.0250	10218.2	178.500	9.593	21.421	0
NO.4 W.B.TK(P)	100.0	1.0250	9973.0	127.896	9.777	21.274	0
NO.4 W.B.TK(S)	100.0	1.0250	9973.0	127.896	9.777	-21.274	0
NO.5 W.B.TK(P)	50.0	1.0250	4568.4	78.100	3.364	13.516	3427
NO.5 W.B.TK(S)	100.0	1.0250	9176.6	75.805	11.752	-19.503	0
A.P.TK	100.0	1.0250	2275.5	5.346	20.407	-0.025	0
TOTAL WATER BALLAST			79622.5	172.901	9.658	0.012	8754
F.W.TK(P)	10.0	1.0000	28.9	9.157	23.804	10.705	424
F.W.TK(S)	10.0	1.0000	20.6	8.409	23.803	-11.338	312
DIST.W.TK(S)	10.0	1.0000	8.3	11.050	23.807	-9.100	45
TOTAL FRESH WATER			57.8	9.161	23.804	0.004	782
NO.1 H.F.O.TK(P)	4.5	1.0000	110.6	41.999	11.394	14.507	2048
NO.1 H.F.O.TK(S)	4.5	1.0000	129.9	41.789	11.647	-14.598	2048
H.F.O.SETT.TK(P)	98.0	1.0000	235.5	39.651	17.685	14.679	78
H.F.O.SERV.TK(P)	98.0	1.0000	292.3	41.650	24.663	17.332	396
TOTAL HEAVY FUEL OIL			768.4	41.111	18.414	10.716	4570
D.O.STOR.TK(P)	10.0	0.8500	12.8	36.265	0.386	3.255	214
D.O.STOR.TK(S)	10.0	0.8500	16.7	35.642	0.451	-3.376	271
D.O.SETT.TK(S)	10.0	0.8500	3.2	43.350	21.748	-13.571	6
D.O.SERV.TK(S)	10.0	0.8500	6.3	40.800	21.748	-13.571	11
TOTAL DIESEL OIL			39.1	37.308	5.610	-3.678	503
M/E CYL.O.STOR.TK(P)	10.0	0.9000	7.4	44.200	14.430	4.095	24
M/E SYS.O.STOR.TK(S)	10.0	0.9000	7.4	44.200	14.430	-4.095	24
M/E SYS.O.SETT.TK(C)	10.0	0.9000	5.9	44.200	14.430	0.000	12
G/E L.O.STOR.TK(P)	10.0	0.9000	1.4	22.100	15.573	7.162	3
G/E L.O.SETT.TK(P)	10.0	0.9000	1.4	20.400	15.573	7.162	3
TOTAL LUBRICATING OIL			23.4	41.547	14.562	0.828	65
TOTAL DEADWEIGHT CONSTANT			427.0	66.630	10.135	0.000	0
TOTAL DEADWEIGHT			80938.3	170.868	9.753	0.112	14672
LIGHT SHIP			42600.0	152.000	15.425	0.029	0
TOTAL DISPLACEMENT			123538.3	164.362	11.709	0.083	14672

EQUIV. DRAFT(EXT)	= 8.619 M	:	M.T.C.	= 2868.17 MT-M
AFT. DRAFT(EXT)	= 11.349 M	:	T.P.C	= 153.71 MT/CM
FORE DRAFT(EXT)	= 6.327 M	:	K.M.T.	= 34.905 M
TRIM	= 5.022 M	:	V.C.G.	= 11.709 M
DISPLACEMENT	= 123538.3 MT	:	UNCORRECTED GM	= 23.195 M
L.C.G.	= 164.362 M	:	GGO	= 0.119 M
L.C.B.	= 164.249 M	:	CORRECTED GM(GOM)	= 23.077 M
L.C.F.	= 172.782 M	:	PROPELLER IMMER.	= 103.6 %
			BLIND DISTANCE	= 636.5 M

HEEL ANGLES(DEG.) =	0.000	5.000	10.000	15.000	20.000	30.000	40.000	50.000	60.000
GZ VALUE (M) =	-0.084	1.932	3.960	5.984	7.728	9.714	10.657	10.926	10.098
GZ AREA (M*RAD.) =	0.000	0.081	0.338	0.772	1.374	2.919	4.706	6.602	8.451

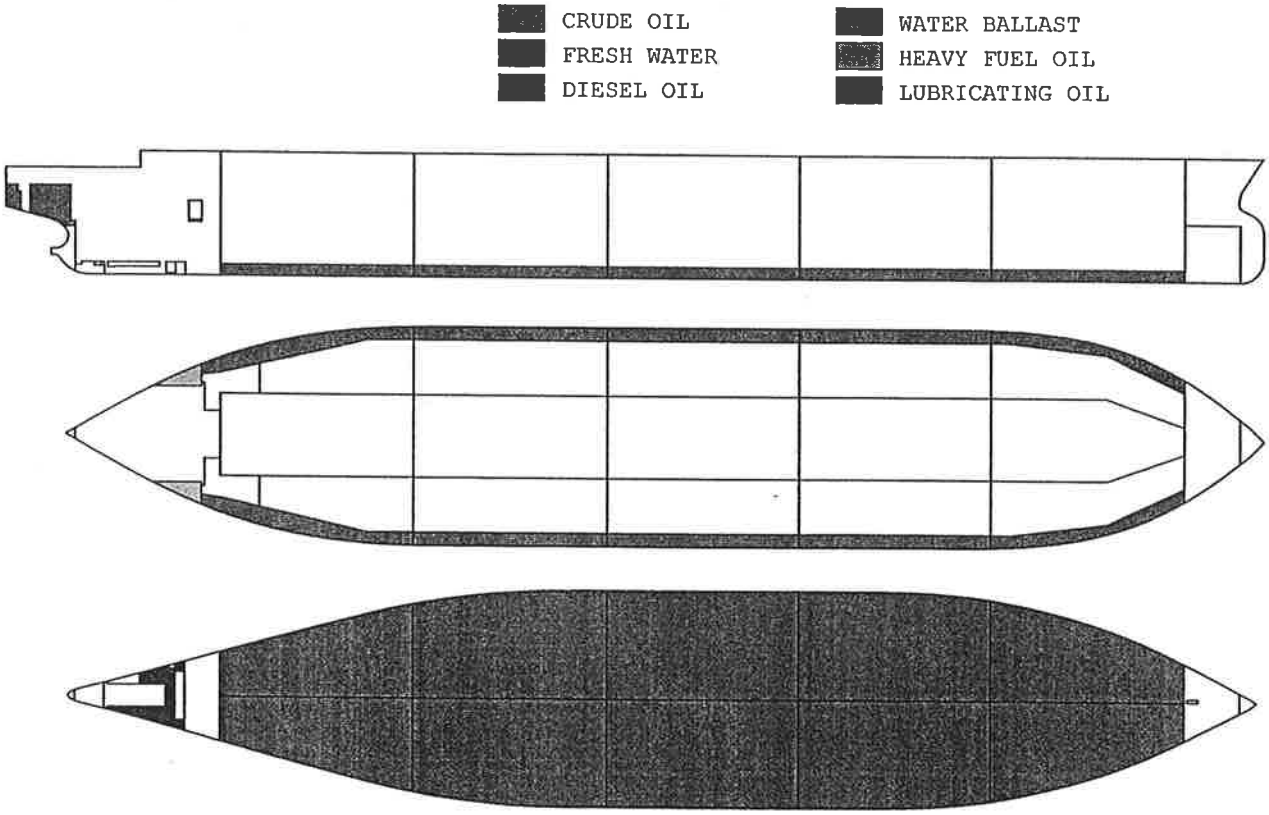
12. STEP 11 - BALLAST EXCHANGE

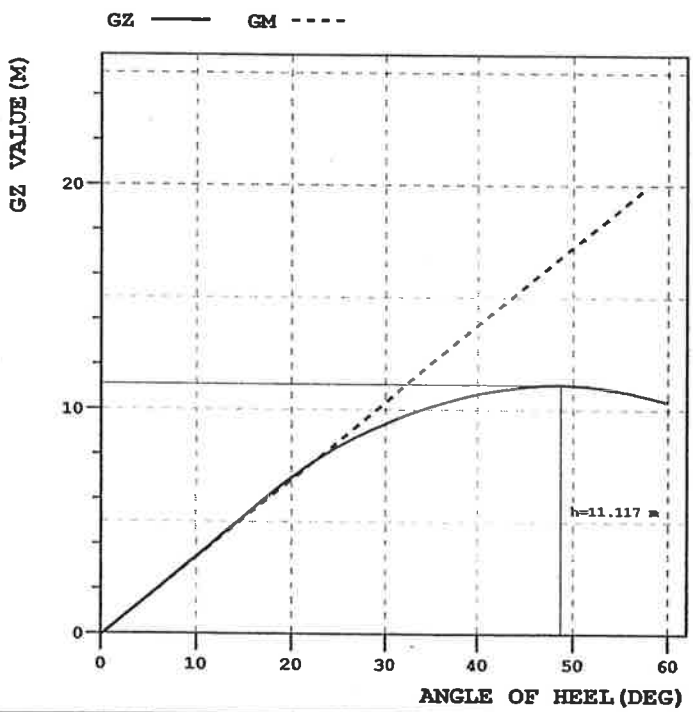


FR. NO.	DISTANCE M	SHEAR FORCE T	SHEAR FORCE %	BENDING MOMENT TM	BENDING MOMENT %	WEIGHT T/M	BOUY. T/M
-6	-5.500	0.0	-	0.0	-	93.9	0.0
0	-0.000	694.5	49.20	1971.8	6.14	168.6	18.3
60	51.000	5160.6	35.59	204620.7	62.01	244.5	315.3
70	102.000	2647.7	15.13	442606.5	53.98	499.7	535.0
80	153.000	1879.0	9.99	551510.8	67.26	534.8	530.5
90	204.000	-6980.0	40.35	415127.1	50.63	328.7	482.7
100	255.000	-3688.2	23.20	136029.8	20.64	495.9	414.1
110	306.000	-191.4	1.88	1457.6	2.70	325.6	155.5
133	326.500	0.0	-	-0.0	-	20.2	0.0

SHEAR FORCE (Negative) :	-6980 Ton (40.3%)	POSITION :	Fr 90 + 0.00 m
SHEAR FORCE (Positive) :	5489 Ton (41.6%)	POSITION :	Fr 54 + 0.00 m
SAGGING MOMENT (Max.) :	-25 T-m (0.4%)	POSITION :	Fr128 + 0.84 m
HOGGING MOMENT (Max.) :	561113 T-m (68.4%)	POSITION :	Fr 81 + 4.00 m

13. STEP 12 - BALLAST EXCHANGE





DISPLACEMENT	142720 Ton
KGo=KG+GGo	12.110 m
FLOODING ANGLE	40.000 Degree

AREA UNDER GZ CURVE

CRITERIA	RESULT	REQUIREMENT
0 Up to 30	2.651	0.055 M-RAD
0 Up to Flooding Ang.	4.415	0.090 M-RAD
30 Up to Flooding Ang.	1.764	0.030 M-RAD

LEVER AFTER FREE SURFACE CORR.

CRITERIA	RESULT	REQUIREMENT
GZ at 30 Deg	9.373	0.200 M
GoM	19.843	0.150 M
Angle of MAX GZ	48.4	25.00 DEG
Maximum GZ	11.1	

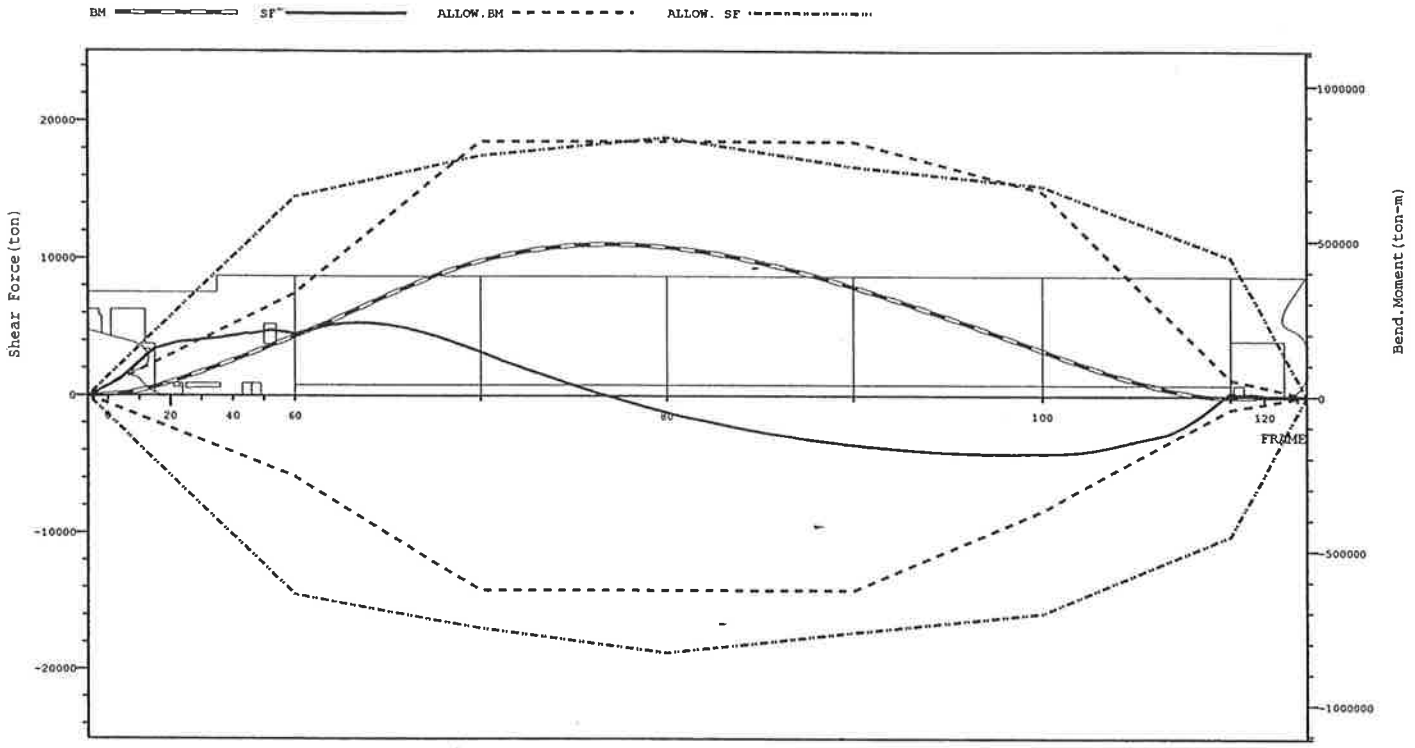
CONDITION 13. STEP 12 - BALLAST EXCHANGE

WEIGHT ITEMS	FILL. (%)	S.G	WEIGHT (MT)	L.C.G (M)	V.C.G (M)	T.C.G (M)	F.S.M (MT-M)
NO.1 W.B.TK(P)	100.0	1.0250	8790.0	279.870	11.198	18.224	0
NO.1 W.B.TK(S)	100.0	1.0250	8790.0	279.870	11.198	-18.224	0
NO.2 W.B.TK(P)	100.0	1.0250	10126.4	229.326	9.652	21.363	0
NO.2 W.B.TK(S)	100.0	1.0250	10126.4	229.326	9.652	-21.363	0
NO.3 W.B.TK(P)	100.0	1.0250	10218.2	178.500	9.593	21.421	0
NO.3 W.B.TK(S)	100.0	1.0250	10218.2	178.500	9.593	-21.421	0
NO.4 W.B.TK(P)	100.0	1.0250	9973.0	127.896	9.777	21.274	0
NO.4 W.B.TK(S)	100.0	1.0250	9973.0	127.896	9.777	-21.274	0
NO.5 W.B.TK(P)	100.0	1.0250	9136.8	75.928	11.734	19.496	0
NO.5 W.B.TK(S)	100.0	1.0250	9176.6	75.805	11.752	-19.503	0
A.P.TK	100.0	1.0250	2275.5	5.346	20.407	-0.025	0
TOTAL WATER BALLAST			98804.1	173.728	10.575	-0.009	0
F.W.TK(P)	10.0	1.0000	28.9	9.157	23.804	10.705	424
F.W.TK(S)	10.0	1.0000	20.6	8.409	23.803	-11.338	312
DIST.W.TK(S)	10.0	1.0000	8.3	11.050	23.807	-9.100	45
TOTAL FRESH WATER			57.8	9.161	23.804	0.004	782
NO.1 H.F.O.TK(P)	4.5	1.0000	110.6	41.999	11.394	14.507	2048
NO.1 H.F.O.TK(S)	4.5	1.0000	129.9	41.789	11.647	-14.598	2048
H.F.O.SETT.TK(P)	98.0	1.0000	235.5	39.651	17.685	14.679	78
H.F.O.SERV.TK(P)	98.0	1.0000	292.3	41.650	24.663	17.332	396
TOTAL HEAVY FUEL OIL			768.4	41.111	18.414	10.716	4570
D.O.STOR.TK(P)	10.0	0.8500	12.8	36.265	0.386	3.255	214
D.O.STOR.TK(S)	10.0	0.8500	16.7	35.642	0.451	-3.376	271
D.O.SETT.TK(S)	10.0	0.8500	3.2	43.350	21.748	-13.571	6
D.O.SERV.TK(S)	10.0	0.8500	6.3	40.800	21.748	-13.571	11
TOTAL DIESEL OIL			39.1	37.308	5.610	-3.678	503
M/E CYL.O.STOR.TK(P)	10.0	0.9000	7.4	44.200	14.430	4.095	24
M/E SYS.O.STOR.TK(S)	10.0	0.9000	7.4	44.200	14.430	-4.095	24
M/E SYS.O.SETT.TK(C)	10.0	0.9000	5.9	44.200	14.430	0.000	12
G/E L.O.STOR.TK(P)	10.0	0.9000	1.4	22.100	15.573	7.162	3
G/E L.O.SETT.TK(P)	10.0	0.9000	1.4	20.400	15.573	7.162	3
TOTAL LUBRICATING OIL			23.4	41.547	14.562	0.828	65
TOTAL DEADWEIGHT CONSTANT			427.0	66.630	10.135	0.000	0
TOTAL DEADWEIGHT			100119.8	172.074	10.640	0.072	5919
LIGHT SHIP			42600.0	152.000	15.425	0.029	0
TOTAL DISPLACEMENT			142719.9	166.082	12.069	0.059	5919

EQUIV. DRAFT(EXT)	= 9.862 M	:	M.T.C.	=	2936.77 MT-M
AFT. DRAFT(EXT)	= 12.417 M	:	T.P.C	=	155.22 MT/CM
FORE DRAFT(EXT)	= 7.697 M	:	K.M.T.	=	31.953 M
TRIM	= 4.720 M	:	V.C.G.	=	12.069 M
DISPLACEMENT	= 142719.9 MT	:	UNCORRECTED GM	=	19.885 M
L.C.G.	= 166.082 M	:	GGO	=	0.041 M
L.C.B.	= 165.980 M	:	CORRECTED GM(GOM)	=	19.843 M
L.C.F.	= 172.070 M	:	PROPELLER IMMER.	=	114.6 %
			BLIND DISTANCE	=	592.0 M

HEEL ANGLES(DEG.)	= 0.000	5.000	10.000	15.000	20.000	30.000	40.000	50.000	60.000
GZ VALUE (M)	= -0.060	1.675	3.430	5.219	6.969	9.373	10.709	11.101	10.374
GZ AREA (M*RAD.)	= 0.000	0.070	0.293	0.670	1.203	2.651	4.415	6.334	8.221

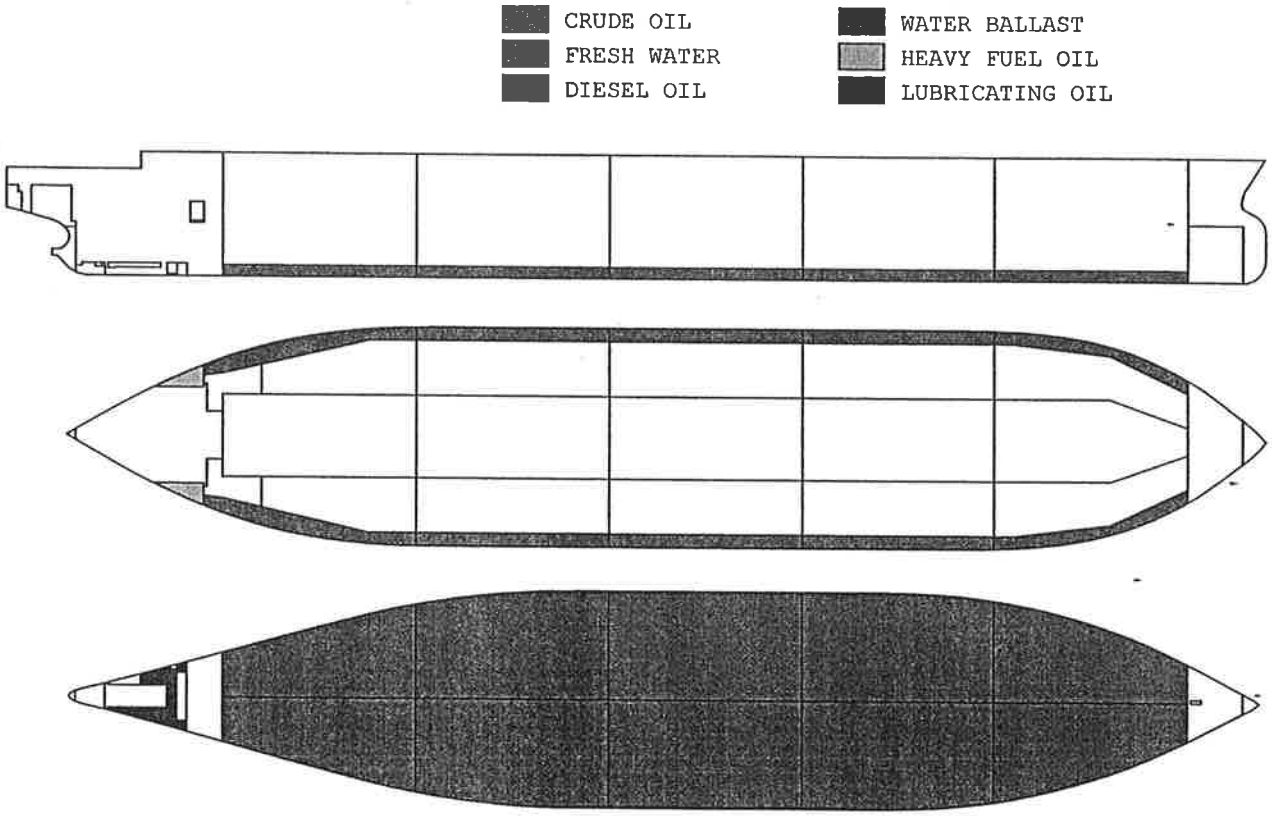
13. STEP 12 - BALLAST EXCHANGE

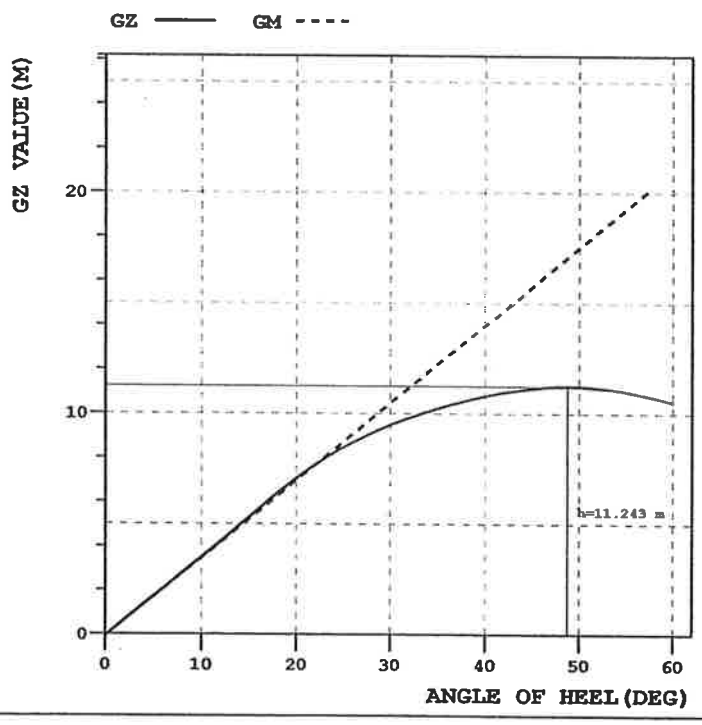


FR. NO.	DISTANCE M	SHEAR FORCE T	SHEAR FORCE %	BENDING MOMENT TM	BENDING MOMENT %	WEIGHT T/M	BOUY. T/M
-6	-5.500	0.0	-	0.0	-	93.9	0.0
0	-0.000	688.4	48.77	1984.7	6.18	168.6	20.2
60	51.000	4521.1	31.18	191749.5	58.11	324.9	360.3
70	102.000	3172.5	18.13	434341.9	52.97	499.7	604.0
80	153.000	-1203.4	6.40	478910.2	58.40	534.9	602.8
90	204.000	-3595.4	20.78	351083.3	42.82	529.2	557.8
100	255.000	-4202.8	26.43	145959.1	22.15	496.0	491.7
110	306.000	279.6	2.77	-2034.8	4.84	421.5	197.9
133	326.500	0.0	-	-0.0	-	20.2	0.1

SHEAR FORCE (Negative) :	-4241 Ton (26.2%)	POSITION :	Fr 98 + 0.59 m
SHEAR FORCE (Positive) :	5323 Ton (34.3%)	POSITION :	Fr 63 + 1.70 m
SAGGING MOMENT (Max.) :	-2242 T-m (4.2%)	POSITION :	Fr109 + 3.30 m
HOGGING MOMENT (Max.) :	488327 T-m (59.6%)	POSITION :	Fr 76 + 4.60 m

14. STEP 13 - BALLAST EXCHANGE





DISPLACEMENT	140444 Ton
KGo=KG+GGo	11.976 m
FLOODING ANGLE	40.000 Degree

AREA UNDER GZ CURVE

CRITERIA	RESULT	REQUIREMENT
0 Up to 30	2.687	0.055 M-RAD
0 Up to Flooding Ang.	4.468	0.090 M-RAD
30 Up to Flooding Ang.	1.781	0.030 M-RAD

LEVER AFTER FREE SURFACE CORR.

CRITERIA	RESULT	REQUIREMENT
GZ at 30 Deg	9.473	0.200 M
GoM	20.145	0.150 M
Angle of MAX GZ	48.7	25.00 DEG
Maximum GZ	11.2	

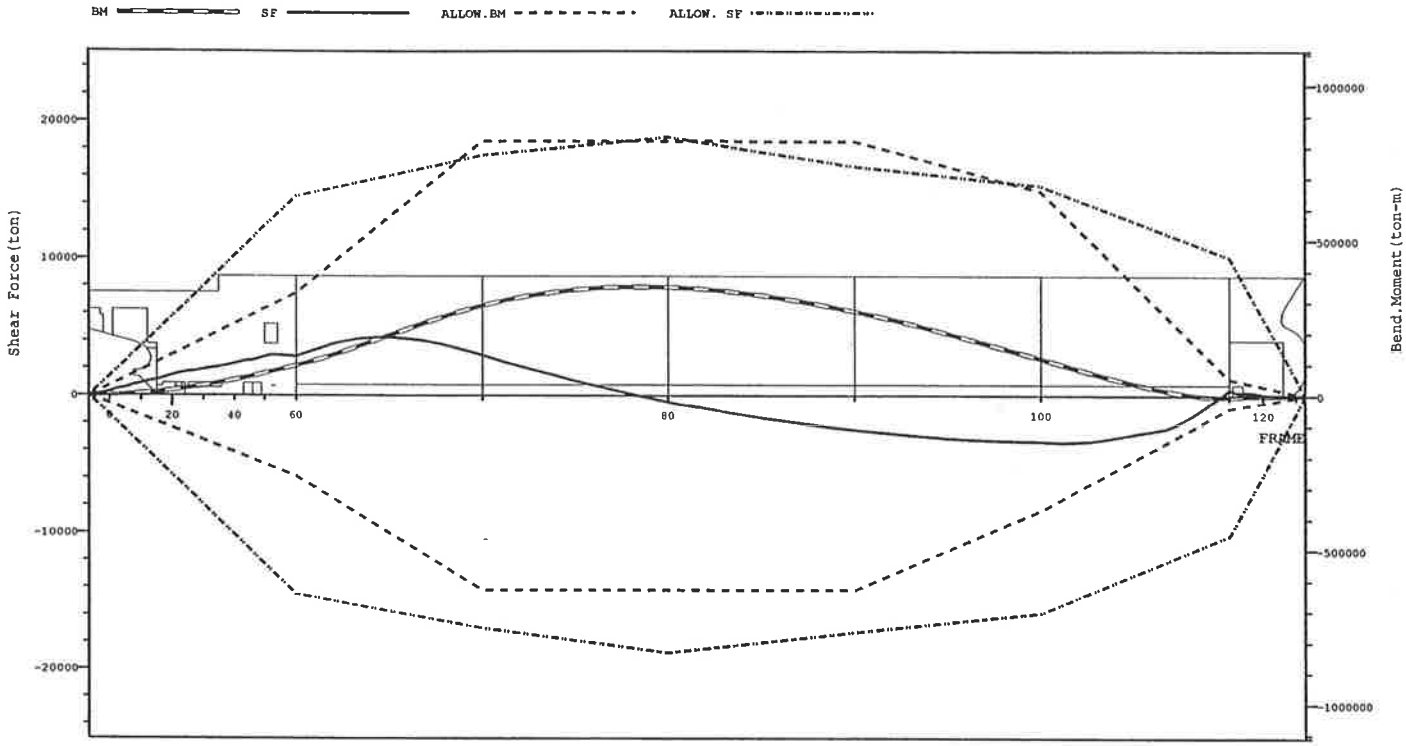
CONDITION 14. STEP 13 - BALLAST EXCHANGE

WEIGHT ITEMS	FILL. (%)	S.G	WEIGHT (MT)	L.C.G (M)	V.C.G (M)	T.C.G (M)	F.S.M (MT-M)
NO.1 W.B.TK(P)	100.0	1.0250	8790.0	279.870	11.198	18.224	0
NO.1 W.B.TK(S)	100.0	1.0250	8790.0	279.870	11.198	-18.224	0
NO.2 W.B.TK(P)	100.0	1.0250	10126.4	229.326	9.652	21.363	0
NO.2 W.B.TK(S)	100.0	1.0250	10126.4	229.326	9.652	-21.363	0
NO.3 W.B.TK(P)	100.0	1.0250	10218.2	178.500	9.593	21.421	0
NO.3 W.B.TK(S)	100.0	1.0250	10218.2	178.500	9.593	-21.421	0
NO.4 W.B.TK(P)	100.0	1.0250	9973.0	127.896	9.777	21.274	0
NO.4 W.B.TK(S)	100.0	1.0250	9973.0	127.896	9.777	-21.274	0
NO.5 W.B.TK(P)	100.0	1.0250	9136.8	75.928	11.734	19.496	0
NO.5 W.B.TK(S)	100.0	1.0250	9176.6	75.805	11.752	-19.503	0
TOTAL WATER BALLAST			96528.6	177.697	10.344	-0.009	0
F.W.TK(P)	10.0	1.0000	28.9	9.157	23.804	10.705	424
F.W.TK(S)	10.0	1.0000	20.6	8.409	23.803	-11.338	312
DIST.W.TK(S)	10.0	1.0000	8.3	11.050	23.807	-9.100	45
TOTAL FRESH WATER			57.8	9.161	23.804	0.004	782
NO.1 H.F.O.TK(P)	4.5	1.0000	110.6	41.999	11.394	14.507	2048
NO.1 H.F.O.TK(S)	4.5	1.0000	129.9	41.789	11.647	-14.598	2048
H.F.O.SETT.TK(P)	98.0	1.0000	235.5	39.651	17.685	14.679	78
H.F.O.SERV.TK(P)	98.0	1.0000	292.3	41.650	24.663	17.332	396
TOTAL HEAVY FUEL OIL			768.4	41.111	18.414	10.716	4570
D.O.STOR.TK(P)	10.0	0.8500	12.8	36.265	0.386	3.255	214
D.O.STOR.TK(S)	10.0	0.8500	16.7	35.642	0.451	-3.376	271
D.O.SETT.TK(S)	10.0	0.8500	3.2	43.350	21.748	-13.571	6
D.O.SERV.TK(S)	10.0	0.8500	6.3	40.800	21.748	-13.571	11
TOTAL DIESEL OIL			39.1	37.308	5.610	-3.678	503
M/E CYL.O.STOR.TK(P)	10.0	0.9000	7.4	44.200	14.430	4.095	24
M/E SYS.O.STOR.TK(S)	10.0	0.9000	7.4	44.200	14.430	-4.095	24
M/E SYS.O.SETT.TK(C)	10.0	0.9000	5.9	44.200	14.430	0.000	12
G/E L.O.STOR.TK(P)	10.0	0.9000	1.4	22.100	15.573	7.162	3
G/E L.O.SETT.TK(P)	10.0	0.9000	1.4	20.400	15.573	7.162	3
TOTAL LUBRICATING OIL			23.4	41.547	14.562	0.828	65
TOTAL DEADWEIGHT CONSTANT			427.0	66.630	10.135	0.000	0
TOTAL DEADWEIGHT			97844.3	175.952	10.413	0.074	5919
LIGHT SHIP			42600.0	152.000	15.425	0.029	0
TOTAL DISPLACEMENT			140444.3	168.687	11.933	0.061	5919

EQUIV. DRAFT(EXT)	= 9.715 M	:	M.T.C.	= 2925.43	MT-M
AFT. DRAFT(EXT)	= 11.581 M	:	T.P.C	= 154.98	MT/CM
FORE DRAFT(EXT)	= 8.142 M	:	K.M.T.	= 32.121	M
TRIM	= 3.439 M	:	V.C.G.	= 11.933	M
DISPLACEMENT	= 140444.3 MT	:	UNCORRECTED GM	= 20.187	M
L.C.G.	= 168.687 M	:	GGO	= 0.042	M
L.C.B.	= 168.613 M	:	CORRECTED GM(GOM)	= 20.145	M
L.C.F.	= 172.870 M	:	PROPELLER IMMER.	= 106.3	%
			BLIND DISTANCE	= 533.3	M

HEEL ANGLES(DEG.) =	0.000	5.000	10.000	15.000	20.000	30.000	40.000	50.000	60.000
GZ VALUE (M) =	-0.061	1.700	3.482	5.300	7.071	9.473	10.803	11.232	10.519
GZ AREA (M*RAD.) =	0.000	0.072	0.297	0.680	1.221	2.687	4.468	6.407	8.318

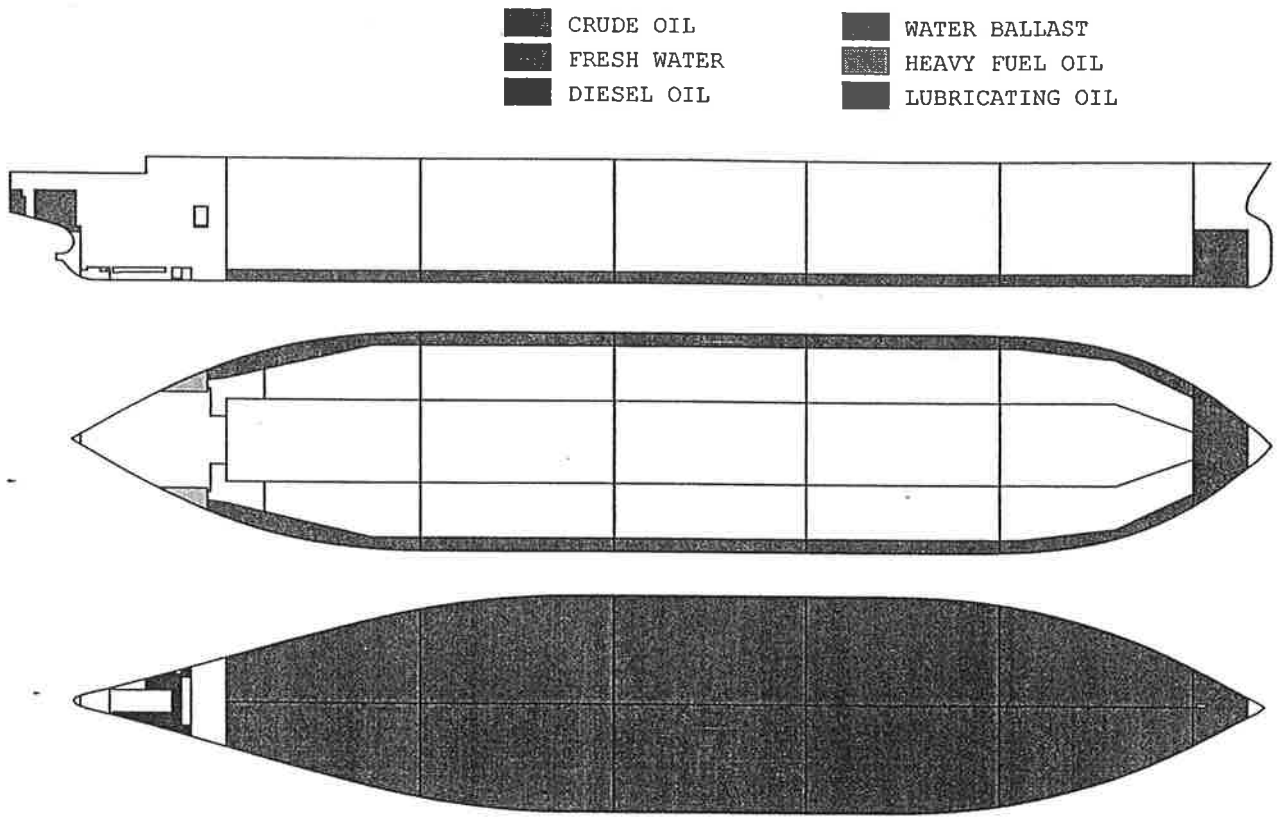
14. STEP 13 - BALLAST EXCHANGE

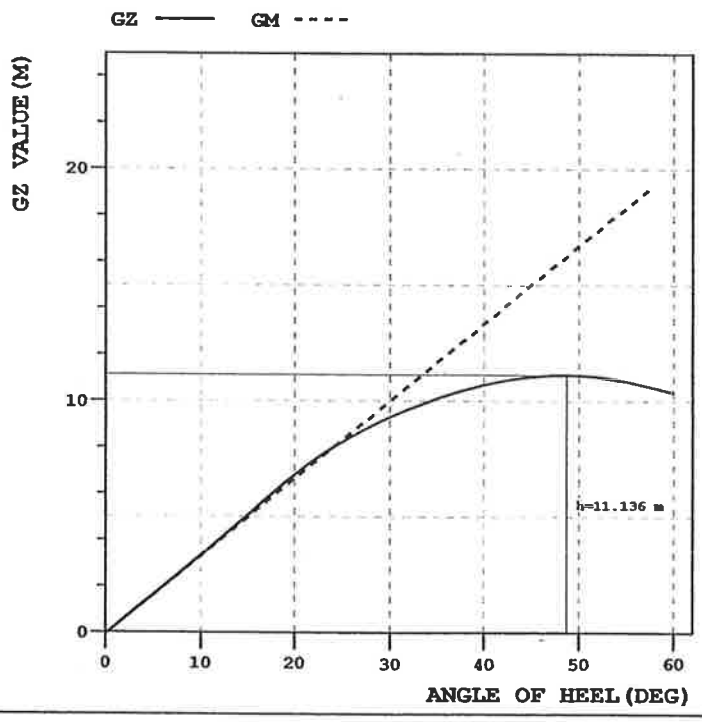


FR. NO.	DISTANCE M	SHEAR FORCE T	SHEAR FORCE %	BENDING MOMENT TM	BENDING MOMENT %	WEIGHT T/M	BOUY. T/M
-6	-5.500	0.0	-	0.0	-	35.5	0.0
0	-0.000	289.0	20.47	894.8	2.79	86.5	18.7
60	51.000	2863.7	19.75	96604.1	29.27	324.9	334.6
70	102.000	2929.1	16.74	290531.3	35.43	499.8	578.7
80	153.000	-459.2	2.44	350086.7	42.69	534.9	589.5
90	204.000	-2483.4	14.35	271820.5	33.15	529.2	556.7
100	255.000	-3342.9	21.02	119200.3	18.09	496.0	502.7
110	306.000	428.1	4.24	-3003.1	7.15	421.5	210.4
133	326.500	0.0	-	-0.0	-	20.2	0.1

SHEAR FORCE (Negative) :	-3402 Ton (22.8%)	POSITION :	Fr101 + 3.40 m
SHEAR FORCE (Positive) :	4239 Ton (26.5%)	POSITION :	Fr 64 + 5.02 m
SAGGING MOMENT (Max.) :	-3484 T-m (6.5%)	POSITION :	Fr109 + 3.30 m
HOGGING MOMENT (Max.) :	351721 T-m (42.9%)	POSITION :	Fr 78 + 2.58 m

15. STEP 14 - BALLAST ARR.COND.





DISPLACEMENT	146893 Ton
KGo=KG+GGo	12.005 m
FLOODING ANGLE	40.000 Degree

AREA UNDER GZ CURVE

CRITERIA	RESULT	REQUIREMENT
0 Up to 30	2.596	0.055 M-RAD
0 Up to Flooding Ang.	4.354	0.090 M-RAD
30 Up to Flooding Ang.	1.758	0.030 M-RAD

LEVER AFTER FREE SURFACE CORR.

CRITERIA	RESULT	REQUIREMENT
GZ at 30 Deg	9.296	0.200 M
GoM	19.218	0.150 M
Angle of MAX GZ	48.4	25.00 DEG
Maximum GZ	11.1	

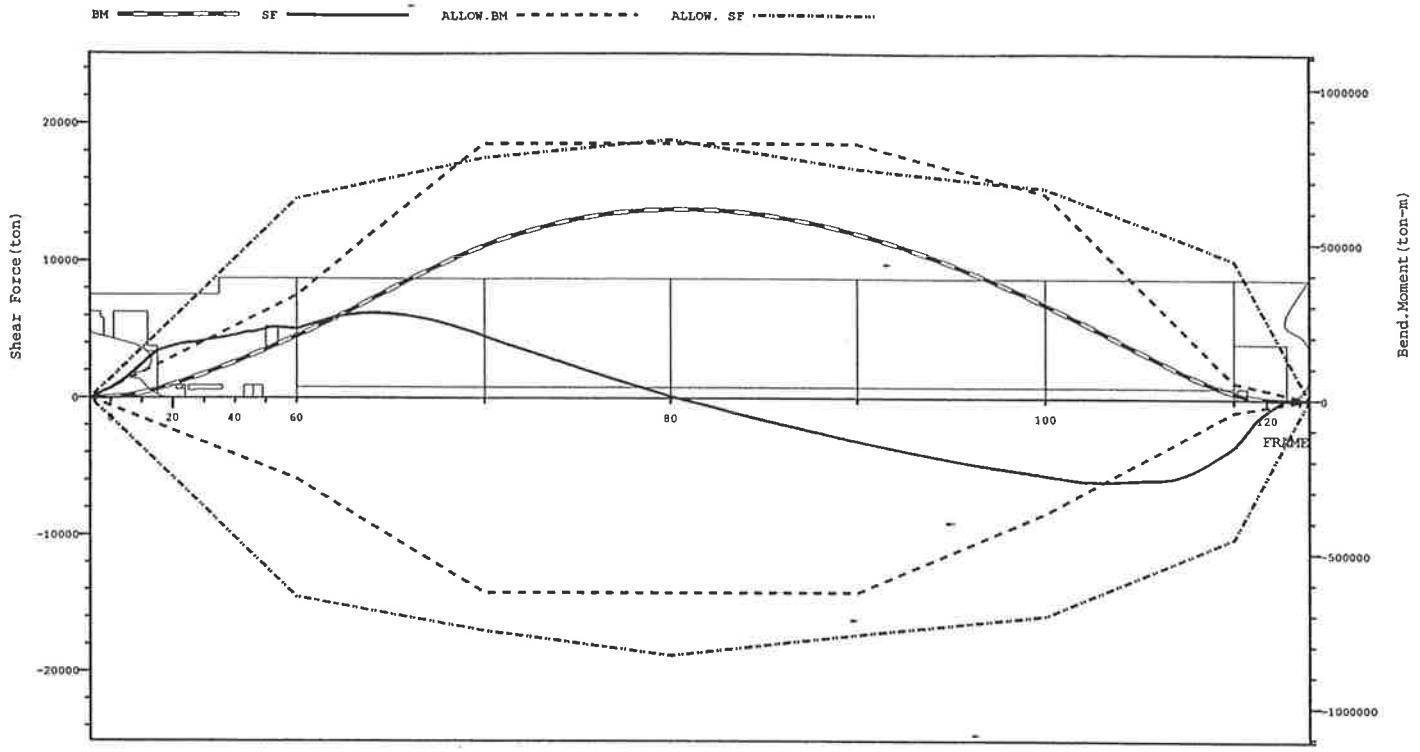
CONDITION 15. STEP 14 - BALLAST ARR.COND.

WEIGHT ITEMS	FILL. (%)	S.G	WEIGHT (MT)	L.C.G (M)	V.C.G (M)	T.C.G (M)	F.S.M (MT-M)
NO.1 W.B.TK(P)	100.0	1.0250	8790.0	279.870	11.198	18.224	0
NO.1 W.B.TK(S)	100.0	1.0250	8790.0	279.870	11.198	-18.224	0
NO.2 W.B.TK(P)	100.0	1.0250	10126.4	229.326	9.652	21.363	0
NO.2 W.B.TK(S)	100.0	1.0250	10126.4	229.326	9.652	-21.363	0
NO.3 W.B.TK(P)	100.0	1.0250	10218.2	178.500	9.593	21.421	0
NO.3 W.B.TK(S)	100.0	1.0250	10218.2	178.500	9.593	-21.421	0
NO.4 W.B.TK(P)	100.0	1.0250	9973.0	127.896	9.777	21.274	0
NO.4 W.B.TK(S)	100.0	1.0250	9973.0	127.896	9.777	-21.274	0
NO.5 W.B.TK(P)	100.0	1.0250	9136.8	75.928	11.734	19.496	0
NO.5 W.B.TK(S)	100.0	1.0250	9176.6	75.805	11.752	-19.503	0
F.P.TK	100.0	1.0250	4173.3	312.027	8.426	-0.001	0
A.P.TK	100.0	1.0250	2275.5	5.346	20.407	-0.025	0
TOTAL WATER BALLAST			102977.4	179.333	10.488	-0.009	0
F.W.TK(P)	10.0	1.0000	28.9	9.157	23.804	10.705	424
F.W.TK(S)	10.0	1.0000	20.6	8.409	23.803	-11.338	312
DIST.W.TK(S)	10.0	1.0000	8.3	11.050	23.807	-9.100	45
TOTAL FRESH WATER			57.8	9.161	23.804	0.004	782
NO.1 H.F.O.TK(P)	4.5	1.0000	110.6	41.999	11.394	14.507	2048
NO.1 H.F.O.TK(S)	4.5	1.0000	129.9	41.789	11.647	-14.598	2048
H.F.O.SETT.TK(P)	98.0	1.0000	235.5	39.651	17.685	14.679	78
H.F.O.SERV.TK(P)	98.0	1.0000	292.3	41.650	24.663	17.332	396
TOTAL HEAVY FUEL OIL			768.4	41.111	18.414	10.716	4570
D.O.STOR.TK(P)	10.0	0.8500	12.8	36.265	0.386	3.255	214
D.O.STOR.TK(S)	10.0	0.8500	16.7	35.642	0.451	-3.376	271
D.O.SETT.TK(S)	10.0	0.8500	3.2	43.350	21.748	-13.571	6
D.O.SERV.TK(S)	10.0	0.8500	6.3	40.800	21.748	-13.571	11
TOTAL DIESEL OIL			39.1	37.308	5.610	-3.678	503
M/E CYL.O.STOR.TK(P)	10.0	0.9000	7.4	44.200	14.430	4.095	24
M/E SYS.O.STOR.TK(S)	10.0	0.9000	7.4	44.200	14.430	-4.095	24
M/E SYS.O.SETT.TK(C)	10.0	0.9000	5.9	44.200	14.430	0.000	12
G/E L.O.STOR.TK(P)	10.0	0.9000	1.4	22.100	15.573	7.162	3
G/E L.O.SETT.TK(P)	10.0	0.9000	1.4	20.400	15.573	7.162	3
TOTAL LUBRICATING OIL			23.4	41.547	14.562	0.828	65
TOTAL DEADWEIGHT CONSTANT			427.0	66.630	10.135	0.000	0
TOTAL DEADWEIGHT			104293.1	177.675	10.552	0.069	5919
LIGHT SHIP			42600.0	152.000	15.425	0.029	0
TOTAL DISPLACEMENT			146893.1	170.229	11.965	0.058	5919

EQUIV. DRAFT(EXT)	= 10.131 M	:	M.T.C.	= 2947.85 MT-M
AFT. DRAFT(EXT)	= 11.630 M	:	T.P.C	= 155.46 MT/CM
FORE DRAFT(EXT)	= 8.865 M	:	K.M.T.	= 31.224 M
TRIM	= 2.765 M	:	V.C.G.	= 11.965 M
DISPLACEMENT	= 146893.1 MT	:	UNCORRECTED GM	= 19.259 M
L.C.G.	= 170.229 M	:	GGO	= 0.040 M
L.C.B.	= 170.161 M	:	CORRECTED GM(GOM)	= 19.218 M
L.C.F.	= 172.863 M	:	PROPELLER IMMER.	= 106.9 %
			BLIND DISTANCE	= 496.5 M

HEEL ANGLES(DEG.)	= 0.000	5.000	10.000	15.000	20.000	30.000	40.000	50.000	60.000
GZ VALUE (M)	= -0.058	1.623	3.327	5.071	6.809	9.296	10.712	11.120	10.401
GZ AREA (M*RAD.)	= 0.000	0.068	0.284	0.650	1.169	2.595	4.354	6.276	8.166

15. STEP 14 - BALLAST ARR.COND.



FR. NO.	DISTANCE M	SHEAR FORCE T	SHEAR FORCE %	BENDING MOMENT TM	BENDING MOMENT %	WEIGHT T/M	BOUY. T/M
-6	-5.500	0.0	-	0.0	-	93.9	0.0
0	-0.000	693.1	49.10	1938.6	6.03	168.6	18.8
60	51.000	5029.2	34.68	199099.2	60.33	324.9	341.0
70	102.000	4515.8	25.80	490620.1	59.83	499.8	594.4
80	153.000	162.6	0.86	607755.5	74.12	534.9	611.6
90	204.000	-3150.9	18.21	529584.2	64.58	529.2	585.2
100	255.000	-5623.0	35.36	303039.8	45.98	496.0	537.3
110	306.000	-3483.1	34.15	20367.9	37.72	421.5	232.7
133	326.500	0.0	-	-0.0	-	20.2	0.2

SHEAR FORCE (Negative) :	-6062 Ton (43.0%)	POSITION :	Fr103 + 0.87 m
SHEAR FORCE (Positive) :	6212 Ton (39.3%)	POSITION :	Fr 64 + 1.70 m
SAGGING MOMENT (Max.) :	-140 T-m (1.1%)	POSITION :	Fr125 + 0.50 m
HOGGING MOMENT (Max.) :	607984 T-m (74.1%)	POSITION :	Fr 80 + 3.10 m

Appendix V – Flow Through Ballast Exchange Record

Vessel is to make reference to the sample given in the Flow Through Ballast Exchange record as enclosed in this appendix.

The form is located in Appendix VI – Reporting Form office.

Flow-Through Ballast Water Exchange

(Total volumetric Quantity and Pumping Time)

Tank Description	Tank Capacity	Tank Volume x 3 (m³)	Pump Capacity (m³ / Hr)	Total Pumping Time (Hrs-Min)
Fore Peak Tank (Center)	4,071.50	Empty-Refill method	1 x 3,000	2 hrs 43 min
Tank No. 1 - P	8,575.60	25,726.80	2 x 3000	4 hrs 17 min
Tank No. 1 - S	8,575.60	25,726.80	2 x 3000	4 hrs 17 min
Tank No. 2 - P	9,879.40	29,638.20	2 x 3000	4 hrs 56 min
Tank No. 2 - S	9,879.40	29,638.20	2 x 3000	4 hrs 56 min
Tank No. 3 - P	9,969.00	29,907.00	2 x 3000	5 hrs 00 min
Tank No. 3 - S	9,969.00	29,907.00	2 x 3000	5 hrs 00 min
Tank No. 4 - P	9,729.80	29,189.40	2 x 3000	4 hrs 52 min
Tank No. 4 - S	9,729.80	29,189.40	2 x 3000	4 hrs 52 min
Tank No. 5 - P	8,913.90	26,741.70	2 x 3000	4 hrs 28 min
Tank No. 5 - S	8,952.70	26,858.10	2 x 3000	4 hrs 29 min
After Peak Tank (Center)	2,220.00	Empty-Refill method	GSPump 400/600m³/hr X 110/45MTH	3 hrs 42 min (600 m³)
TOTAL	100,465.70	288,697.10		53 hrs 54 min

METHODS OF BALLAST WATER EXCHANGE AT SEA	
1	**Sequential Method, a** process by which a ballast tank intended for the carriage of ballast water is first emptied and then refilled with replacement ocean water to achieve at least 95 per cent volumetric exchange..
2	**Flow-Through Method,** a process by which replacement ocean ballast water is pumped into the ballast tank intended for carriage of ballast waster, allowing water to flow through overflow or other arrangement, until the quantity of water pump-in is equal or more than 3 times the volumetric capacity of the tank.
3	**Dilution method,** a process by which replacement ocean ballast water is filled through the top of the ballast tank intended for the carrieage of ballast water with simultanious discharge from the bottom at the same flow rate and maintaining a constant level in the tank through out the ballast exchange operation. The total quantity of replacement ballast water is equal or over 3 times the volumetric capacity of the tank.
Emergency Ballast Condition = Ballast water exchange is not applicable to Emegency Ballast Condition	

1. Reporting Forms

   a) Flow Through Ballast Exchange Record – This form is used to plan the ballast exchange using the flow through method. All the crew involved in this operation is briefed and instructed to strictly comply with the plan.

   b) Ballast Water Notification Form – This form is used to notify the MSD divison after the ballast water exchange operation carried out prior arrival the next port.

   c) Record of Ballast Water Tank Sediment Removal and Flushing – The record for sediment removed and tank flushing carried out on board is to be maintained in order to provide to the Port Qurantine Officers with the historical information.

   d) Ballast Water Plan – This plan provides step-to-step calculation on the stability and stress encountered at the given stage of the ballast exhange operation.

2. Printed Record Books

   a) Ballast Water Reporting Form – This record book is used when making reporting of the ballast water management to the national and/or local authority that request such information in advance.

      Before completing this reporting book, the Environmental Officer or Master is to check to if there is appropriate form required by the port state.

   b) Ballast Water Handling Log – This record book is to be maintained is to provide to any proper authority when requested to verify and examine the historial record for the ballast water operation carried out on board (In port or At sea).

3. Enclosed the forms used for Ballast water exhange operation which is incorporated in the SMS Manual Volume VIII.

   a) SM044 - Flow Through Procedure Record
   b) SM045 - Ballast Water Notification Form
   c) SM046 - Record of Ballast Water Tank Sediment Removal and Flushing
   d) SM047 – Ballast Exchange Plan

Flow Through Procedure Plan

Vessel: _____ **IMO No.** _____ **Flag:** _____

Voyage No. _____ **Last Port:** _____ **Next Port:** _____

FLOW-THROUGH BALLAST EXCHANGE RECORDS								
BALLAST TANK Discription		PORT SIDE TANKS				STARBOARD SIDE TANKS		
		Capacity (m^3)	Pumps Used	Time for 3 x Volume (Hrs)		Capacity (m^3)	Pumps Used	Time for 3 x Volume (Hrs)
FORE PEAK (Center)			Empty and Refill Method only					
TANK NO-1	TST							
	DBT							
TANK NO-2	TST							
	DBT							
TANK NO-3	TST							
	DBT							
TANK NO-4	TST							
	DBT							
TANK NO-5	TST							
	DBT							
TANK NO-6	TST							
	DBT							
TANK NO-7	TST							
	DBT							
TANK NO-8	TST							
	DBT							
TANK NO-9	TST							
	DBT							
AFT PEAK (Center)			Empty and Refill Method only					
Ballast Hold No.		N.A.	Empty and Refill Method only. (Refer to safety procedure No. 4)					

BALLAST PUMP DATA			
Pump	Rated Capacity (m^3 / Hr)	Type	Location onboard
Pump No. 1			
Pump No. 2			

Safety procedures during Flow-through Method of ballast water exchange

1. Pumping water quantity equivalent to Three (3) times the volumetric capacity of tank. Excess water is allowed to overflow through Over-Flow pipe and/or open manholes on deck.

2. Only One (1) Ballast Pump must be use during the entire Flow-Through operation, to prevent over-pressurization of the tank.

3. Ensure that deck manholes are opened during entire operation to prevent over-pressurization of tank.

4 Cargo Ballast Hold must be Empty-Refill method, except during unfavorable weather condition.

BALLAST WATER NOFITIFCATION FORM

VESSEL: _____ IMO NO: _____ VOY NO: _____ DATE: _____

TO: _____
ATTN: _____

FROM: BALLAST WATER MANAGEMENT OFFICER

NOTIFICATION OF BALLAST WATER EXCHANGE/TREATMENT PRIOR ARRIVAL AT DESTINATION: NEXT PORT: _____ ETA: _____

LOCATION FOR BALLAST WATER EXCHANGE: /TREATMENT
FROM: LATITUDE: _____ LONGITUDE: _____
TO: LATITUDE: _____ LONGITUDE: _____

BALLAST WATER EXCHANGE METHOD (Select boxes as appropriate) : **SEQUENTIAL** ☐ / **FLOW-THROUGH** ☐ / **TREATMENT** ☐

BALLAST WATER EXCHANGE/TREATMENT DURATION:
COMMENCE AT: _____
INTERRUPTED AT (IF APPLICABLE): _____
COMPLETED AT: _____

COMMENTS WITH RESPECT TO SHIP SAFETY, IF ANY:
_____
_____
_____

	YES	NO	NA
ANY INCREASED IN THE BLIND SECTOR OR REDUCED HORIZONTAL FIELD OF VISION			
IF YES, DOES VESSEL DETERMINES IT IS SAFE AND PROVIDE PROPER LOOKOUT DURING THE EXCHANGE OPERATION?			
ANY MALFUNCTION OF THE BALLAST WATER MANAGEMENT SYSTEM (IF FITTED)			

IF YES, VESSEL TO PROVIDE THE FOLLOWING INFORMATION:
DATE OF THE FAILURE/MALFUNCTION: _____ _____
ELABORATE AND DESCRIBE THE FAILURE/MALFUNCTION: _____
IF APPLICABLE, ACTION TAKEN FOR RECTIFICATION: _____

NOTE: SEND THIS NOTIFICATION TO TCCS (MSD) AFTER EACH BALLAST WATER EXCHANGE/TREATMENT OPERATION.

CHIEF OFFICE NAME: _____ SIGNATURE: _____

RECORD OF BALLAST WATER TANK SEDIMENT REMOVAL AND FLUSHING

Vessel: _____ Voyage No. _____ Date: _____

Nos.	Inclussive Dates of Sediment Removal or Tank Flusshing	Location of Removal / Tank Flushing (At Sea/In port/Drydock)	Approximate Quantity Sediment Removed (M^3)	Method of Sediment Disposal (At sea / In port)	Authorized Person attending the Removal & Disposal

BALLAST EXCHANGE PLAN

Vessel: _____ IMO No. _____ Flag: _____

	Ballast Water Tank														Draft Fwd	Trim	Draft Aft	S.W B.M.	S.W. S.F.	Prop. Imm.	Blind Sector	Stability Criteria	Estimated Time	Remarks
	APT	No.6		No.5		No.4		No.3		No.2		No.1		FPT										
STEPS	C	P	S	P	S	P	S	P	S	P	S	P	S	C	m	m	m	%	%	>50%	>		Hrs.	
Initial Condition = Full Ballast/Light Ballast																								
STEP 1:																								
STEP 2:																								
STEP 3:																								
Step 4																								
STEP 5:																								
STEP 6:																								
STEP 7:																								
STEP 8:																								

F	Full	E	Empty	C	Change Ballast Water	Min. Values								Total	
						Max. Values								Time Hrs.	

Note 1: The Master advised that the propeller will not be fully immersed during this step / sequence.
Note 2: The Master is advised that bridge visibioity forward will be reduced during this step / sequence.
Note 3: This step / sequence is to be carried out within the acceeptable sea state as defined in the attached operation envelope
Note 4: This step / sequence is to be carried out in calm seas, i.e. zero sea state.
Note 5: The Master is advised that in the critical fill range 70% -95% this step / sequence is to be carried out in calm seas, i.e. zero sea state.
Note 6: The Master is advised that this step / sequence can be carried out provided the diminution levels described in the ballast inertia assessment have not be exceeded.
Note 7: The Master is advised to verify that tanks shown as "E" are totally empty and tanks shown as "F" are toatlly full, at the start and end of the step / sequence, in order to avoid adverse free surface effects.
Note 8: The indicative times for ballast exchange by flow-through methid of ____ Tank(s) ID ____ are provided separately.

	Stabiity Criteria meet IMO Requirements
	Stability Criteria fail to meet IMO requiremer

	Ballast Pumps m³/hrs.	
Tank ID	3 x Vol.	4 x Vol.

BALLAST WATER REPORTING FORM

1. VESSEL INFORMATION

Vessel Name:	
IMO Number:	
Owner:	
Type:	
Gross Tonnage:	
Call Sign:	
Flag:	

2. VOYAGE INFORMATION

Arrival Port:		
Arrival Date:		
Agent:		
Last Port:	Country of last port:	
Next Port:	Country of next port:	

3. WATER BALLAST USAGE AND CAPACITY

Specify units below (m3; MT: LT: ST:)

Total Water Ballast On Board		
Volume	Units	No. of Tanks in Ballast
	m3	

Total Water Ballast Capacity		
Volume	Units	Total No. of Tanks on Ship
	m3	

4. BALLAST WATER MANAGEMENT

Total No. of Ballast Water Tanks to be discharged ☐

Of tanks to be discharge, how many: Underwent exchange: ☐ Underwent alternate Management: ☐

Please identify alternate method(s) used, if any:

If no ballast treatment conducted, state reason why not:

Ballast management plan on board? Yes ☐ No ☐ Management plan implemented? Yes ☐ No ☐

IMO ballast water guidelines on board [A.868(20)]? Yes ☐ No ☐

5. BALLAST WATER HISTORY:

Record tanks to be deballasted in port state of arrival:

Tank Holds List multiple source/tanks separately	BW SOURCES				BW MANAGEMENT PRACTICES						BW DISCHARGES			
	DATE DD/MM/YY	PORTS or LAT. / LONG.	VOLUME (Units)	TEMP (Units)	DATE DD/MM/YY	ENDPORT LAT. / LONG.	VOLUME (Units)	% Each	METHOD (ER/TF/ ALT)	SEA HT (M)	DATE DD/MM/YY	PORTS or LAT. / LONG.	VOLUME (Units)	SALINITY (Units)
			m3	C			m3						m3	sg
			m3	C			m3						m3	sg
			m3	C			m3						m3	sg

Appendix VI - Ballast Water Handling Log - Sample

Vessel: _____ IMO No. _____ Flag: _____

Tank No.	Date	Initial Content (M^3)	Final Content (M^3)	Geographic Location (Port or Lat & Long)	Pumps used or Gravitate	Duration of Operation	Salinity	Signature of Environmental Officer	Rank

Appendix VII – Reporting Form - Port States

Enclosed in this Appendix contains the prescribed forms requried by the Port States for calling vessel. Vessel is to check with the Port agent for latest edition of the form.

For the forms not listed, vessel is to request from the Port agent.

1. USA - Ballast Water Management Report (including BWM Reporting Form Instructions)

2. Austraia - Ballast Water Reporting Form (including Ballast Water Reporting MARS quick reference guide)

3. Brazil - Anexo B Ballast Reporting Form (NORMAN-20/DPC)

4. New Zealand - Biofouling and Ballast Water Declaration: Parts 1-3

5. ROPME (Sea Area) - Ballast Water Reporting Form

6. Canadian - Ballast Water Reporting Form

Ballast Water Management Reporting Form Instructions

NOTE: Adobe Acrobat or Adobe Reader, version 9 or later, is required to use the PDF BWMR form. Adobe Reader can be downloaded from adobe.com.

VESSEL INFORMATION

Vessel name: The name of the vessel. For tug and barge combinations, please enter both vessel names, separated by a hyphen (-).

ID number: Select "IMO Number" or "Official Number" from the pull-down menu, and enter the vessel identification number into the adjacent field. For tug and barge combinations, please list multiple vessel numbers separated by a hyphen.

Country of Registry: Choose from the country pull-down menu.

Owner/operator: Name of the registered owner(s) of the vessel. If under charter, enter operator name.

Type: Select a vessel type from the pull-down menu. If the exact vessel type is not available, select "Other".

Gross Tonnage: The Gross Tonnage of the vessel. If reporting a tug-barge combo, report total combined gross tonnage.

Ballast water volume units: Select cubic meters, metric tons, or gallons from the pull-down menu. NOTE: this volume unit will be applied to all volume entries on the BWMR.

Total ballast water capacity: The maximum total volume of ballast water that can be carried in the vessel according to its Ballast Water Management Plan. If reporting a tug-barge combo, report the total combined ballast water capacity.

Number of tanks on ship: The total number of ballast water tanks, cargo holds, and other spaces that are used for carrying ballast water.

Onboard BW Management System: If the vessel is equipped with an approved ballast water management system, enter the US Coast Guard designated system identification number:

- For USCG Type Approved systems, the US Coast Guard Approval Number is on the certificate plate installed on BWMS and looks like: 162.060/#/#.
- For USCG accepted Alternative Management Systems the AMS ID is in the AMS Acceptance Letter and looks like: AMS-20##-XXX...XXX-001.

- For vessels enrolled in the Shipboard Technology Evaluation Program, enter “STEP Vessel”.
- Otherwise, enter “None”.

Last dry dock date: The date the vessel was last in dry dock.

VOYAGE INFORMATION

Arrival port (port and state): The name of the port or place that is the destination for this voyage. No abbreviations please. Select the matching state or territory from the pull-down menu.

Arrival date: Date of arrival to the arrival port. Use European date format (DD/MM/YYYY).

Last port (port and country): Name of the last location at which the vessel called, either outside the US EEZ or the previous US location. No abbreviations please. Select the Country or US territory of the last port from the pull-down menu.

Next port (port and country): Name of the next location at which the vessel plans to arrive. Select the Country or US territory of the next port from the pull-down menu.

Total ballast water on board: Total volume of ballast water on board upon arrival into the arrival port. Do not count potable water. If reporting a tug-barge combo, report the total combined ballast water on board.

Number of tanks in ballast: Total number of ballast water tanks, cargo holds, and other spaces that are carrying ballast water upon arrival to the Arrival port.

Number of tanks discharged: Total number of ballast water tanks, cargo holds, and other spaces carrying ballast water discharged at, or en route to, the Arrival port.

CERTIFICATE OF ACCURATE INFORMATION

Certificate of accurate information: By checking this box, you attest to the accuracy of the information provided and that the activities were in accordance with the ballast water management plan required by CFR 151.2050(g).

Responsible Officer's name and title: Name and title of the individual (i.e., master, owner, operator, agent or person in charge) responsible for the information provided on this form. A typed name in combination with the certificate of accurate information constitutes an official signature.

Report type: Choose "New report" or "Corrected report" from the pull-down menu. Choose "New report" for the initial report for a particular arrival. Choose "Corrected Report" if a prior report was already submitted for this arrival, including instances of port rotations, information updates or error corrections.

If an arrival is CANCELLED after a report is sent to NBIC, please email nbic@ballastreport.org, noting the vessel ID, arrival port and arrival date of the report to cancel.

Submitted by and **Contact information:** Enter the name of and contact information for the individual (i.e., master, owner, operator, agent, person in charge) submitting the BWMR to the NBIC.

BALLAST WATER HISTORY

Record all tanks discharged inside coastal waters (12nm) of the US, either en route to or at the arrival port.

Ballast Water History is reported on an “event” basis. For each tank, report events in descending date order, with the most recent ballast water discharge at the top.

If onboard treatment is combined with the discharge, exhchange or intake of ballast water, select the appropriate combined event type from the pull-down menu.

Illustrated examples are attached at the end of this document

NOTE: US Coast Guard NOBOB policy also requires vessels entering the Great Lakes and Hudson River (north of the George Washington Bridge) after operating beyond the U.S. EEZ to report the Ballast Water History of empty BW tanks that underwent an alternative management (e.g., Salt Water Flush, conducted a mid-ocean exchange the last time the tanks contained ballast water).

TANK INFORMATION

Tank name/number: Enter the specific name and number of the tank, including its location and side (center, port or starboard), e.g. WT 1P.

Tank capacity: The maximum volume that the tank or hold can carry.

BALLAST WATER EVENTS

1. Discharge Events

Event: Select either "Discharge to US waters" or "Discharge to facility" from the pull-down menu in the top line of the tank block.

Date: The date that ballast water was discharged, using DD/MM/YYYY format.

Location: The port or place name (including state, territory, or country), or latitude and longitude of the location where ballast water was discharged.

Volume: The volume of ballast water that was discharged.

2. Management Events

• For discharge to a shore-based facility or another vessel for treatment select "Discharge to facility" in the **Discharge Events** section above.

• For ballast water from a US Public Water System select "Source from PWS" in the **Source Events** section below.

• If ballast water management was **NOT CONDUCTED**, skip to the **Source Events** section below.

OTHERWISE, select a management event:

Event: Select "Empty-refill exchange", "Flow-through exchange", "Onboard treatment" or "Salt Water Flush" from the "Select event" pull-down menu.

> *NOTE: "Salt Water Flush" is a US Coast Guard's Best Management Practice for vessels with empty ballast water tanks entering the Great Lakes and Hudson River (north of the George Washington Bridge). Salt water flushing is defined as the addition of mid-ocean water to empty ballast water tanks; the mixing of the flush water with residual water and sediment through the motion of the vessel; and the discharge of the mixed water.*

Date: For "Onboard Treatment" enter the date treatment was started. For "Empty-refill exchange", "Flow-through exchange" or "Salt Water Flush" enter the date on which BW Management was completed.

Location(s): If BW was managed by "Empty-refill exchange", "Flow-through exchange" or "Salt Water Flush" while underway, enter the latitude and longitude of both the start point and end point, separated by a "/". Do not include locations for "Onboard Treatment".

Volume: Enter the full volume of ballast water that was pumped and/or gravitated INTO the tank during "Empty-refill exchange", "Flow-through exchange" or "Salt Water Flush". For "Onboard Treatment" enter the volume treated.

3. Source Events

Event: Select either "Source" or "Source from PWS" from the "Select event" pull-down menu. "Source from PWS" indicates that a US public water system was used. If there were multiple sources for a tank, report each one on a separate line.

Date: Date on which the ballast water was taken into the tank (DD/MM/YYYY format).

Location: The port or place name (with state or territory, and country) or latitude and longitude where ballast water was taken into the tank.

Volume: Volume of water that taken into the tank from the source location.

NOTE: If there was more than one source for a tank, report the largest sources, up to three. If the five lines in a tank block are not enough to report all of the ballast water events for a single tank, please use the on-line reporting application, which supports unlimited tank events.

If BW Management was *not* conducted for this tank, select one of the following reasons: If ballast water management did not occur on water discharged into the waters of the United States, select from "Equipment failure", "Regulatory exemption", "Route exemption", "Safety - weather", "Safety - design limit" or "Mid-ocean source".

SUBMIT THE BWMR FORM TO NBIC

Send the completed Ballast Water Management Report to NBIC using one of the following methods:

Option #1: The **"Submit report via e-mail"** button on the first page of the form will automatically prepare an e-mail with an attachment that contains the data you entered. This attachment is much smaller than the form itself -- just 10 to 15 KB. NOTE: this button may not work with all shipboard e-mail systems.

Option #2: Clicking the **"Submit report on-line"** button will send the data from the report directly to NBIC, and return a PDF-format receipt.

Paperwork Reduction Act Notice

An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number.

The Coast Guard estimates that the average burden per response is 40 minutes for a Ballast Water Management Report. You may submit any comments concerning the accuracy of this burden estimate or any suggestions for reducing the burden to: Commandant (CG-OES), U.S. Coast Guard Stop 7509, 2703 Martin Luther King Jr Ave SE, Washington, DC 20593-7509 or Office of Management and Budget, Paperwork Reduction Project (1625-0069), Washington, DC 20503.

Privacy Act Statement

Authority: 16 U.S.C. 4711; Pub. L. 104-332; 33 CFR 151 subpart D §§151.2060 and 151.2080.

Purpose: The Coast Guard will use the information provided on ballast water reporting forms to evaluate vessel ballast water management practices.

Routine Uses: Authorized Coast Guard personnel will use this data in efforts to reduce discharge of aquatic nuisance species into U.S. waters from vessels and to prevent future damage caused by such discharges. Any external disclosures of information within this record will be made in accordance with DHS/USCG-013, Marine Information for Safety and Law Enforcement (MISLE), 74 Federal Register 30305 (June 25, 2009).

Disclosure: Furnishing this information is mandatory; failure to furnish the requested information is a violation and may incur civil penalties.

This document contains eight examples illustrating some of the common events reported in the ballast water history section of the BW Management Reporting Form.

Ballast Water History

1. Discharge, BW Management, and Source

Tank name/number **1 Wing P** Tank capacity **1000**

Event	Date	Location(s) (for Management event include Start pt / End pt	Volume
Discharge to US waters	15-Sep-2016	Baltimore, MD	1000
Empty-refill exchange	10-Sep-2016	45 10 N 35 40 W / 45 05 N 35 30 W	1000
Source	08-Sep-2016	Hamburg, Germany	1000
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

2. Discharge and Source, but No BW Management

Tank name/number **5 DB S** Tank capacity **1000**

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters	15-Sep-2016	Baltimore, MD	1000
Source	08-Sep-2016	Houston, TX	1000
Select event			
Select event			
Select event			

Need to provide reason for No BW Management

If BW management was *not* conducted for this tank, select one of the following reasons **Route exemption**

3. Mid-ocean source in empty tank

Tank name/number **7 Wing S** Tank capacity **1000**

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters	15-Sep-2016	Baltimore, MD	800
Source	10-Sep-2016	46 15 N 37 20 W	800
Select event			
Select event			
Select event			

Since tank was empty and mid-ocean water was the source, there is not management

If BW management was *not* conducted for this tank, select one of the following reasons **Mid-ocean source**

4. Multiple Source Ports

Tank name/number **6 DB P** Tank capacity **1000**

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters	15-Sep-2016	Baltimore, MD	800
Empty-refill exchange	10-Sep-2016	45 10 N 35 40 W / 45 05 N 35 30 W	800
Source	08-Sep-2016	Hamburg, Germany	300
Source	05-Sep-2016	Copenhagen, Denmark	500
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Each event must include event type, date, location(s), and volume

Ballast Water History

5. Use of an onboard BW Treatment System

Tank name/number **4 Wing S** Tank capacity **1000**

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters	15-Sep-2016	Baltimore, MD	1000
Onboard treatment	08-Sep-2016		1000
Source	08-Sep-2016	Hamburg, Germany	1000
Select event			
Select event			

If BW management was *not* conducted for this tank, s

Onboard treatment systems need event type, date, volume, and specific treatment system (e.g., AMS ID) must be reported on page 1

6. Press up with mid-ocean source after BWE

Tank name/number **2 Wing P** Tank capacity **1000**

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters	15-Sep-2016	Baltimore, MD	1000
Source	10-Sep-2016	45 05 N 35 30 W	200
Flow-through exchange	10-Sep-2016	45 10 N 35 40 W / 45 05 N 35 30 W	3000
Source	05-Sep-2016	Copenhagen, Denmark	800
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

7. BWE and BW Treatment before discharge

Tank name/number **2 Wing S** Tank capacity **1000**

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters	20-Sep-2016	Duluth, MN	1000
Onboard treatment	15-Sep-2016		1000
Empty-refill exchange	14-Sep-2016	45 10 N 35 40 W / 45 05 N 35 30 W	1000
Source	12-Sep-2016	Copenhagen, Denmark	1000
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

When more than 1 management event is conducted, list all events.

8. BW Tanks that are NOT discharged may remain blank

Tank name/number **10 Wing S** Tank capacity **1000**

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			0
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

OMB number 1625-0069
Exp. date: 31-July-2023

Ballast Water Management Report

Vessel Information

Vessel name

ID number IMO number

Country of Registry Select country

Owner/operator

Type Select vessel type Gross Tonnage

Ballast water volume units Select units

Total ballast water capacity Number of tanks on ship

Onboard BW Management System

Last dry dock date

Voyage Information

Arrival port (port and state) Select state

Arrival date

Last port (port and country) Select country

Next port (port and country) Select country

Total ballast water on board Number of tanks in ballast

Number of tanks discharged

Certificate of accurate information

By checking this box, I attest to the accuracy of the information provided and that ballast water management activities were in accordance with the ballast water management plan required by CFR 151.2050(g). ☐

Responsible Officer's name and title

Report type Select report type

Submitted by Contact information

Ballast Water History

On the following page(s), provide the ballast water history for each tank discharged into the waters of the United States or to a reception facility, en route to or at the arrival port. Vessels entering the Great Lakes or Hudson River (north of George Washington Bridge) from beyond the US EEZ must also provide the history for empty tanks that underwent alternative management.

Submit report via e-mail Submit report on-line

Ballast Water History

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Ballast Water History

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Ballast Water History

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Ballast Water History

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Ballast Water History

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

OMB number 1625-0069
Exp. date: 31-July-2023

Ballast Water Management Report

Vessel Information

Vessel name

ID number IMO number

Country of Registry Select country

Owner/operator

Type Select vessel type Gross Tonnage

Ballast water volume units Select units

Total ballast water capacity Number of tanks on ship

Onboard BW Management System

Last dry dock date

Voyage Information

Arrival port (port and state) Select state

Arrival date

Last port (port and country) Select country

Next port (port and country) Select country

Total ballast water on board Number of tanks in ballast

Number of tanks discharged

Certificate of accurate information

By checking this box, I attest to the accuracy of the information provided and that ballast water management activities were in accordance with the ballast water management plan required by CFR 151.2050(g). ☐

Responsible Officer's name and title

Report type Select report type

Submitted by Contact information

Ballast Water History

On the following page(s), provide the ballast water history for each tank discharged into the waters of the United States or to a reception facility, en route to or at the arrival port. Vessels entering the Great Lakes or Hudson River (north of George Washington Bridge) from beyond the US EEZ must also provide the history for empty tanks that underwent alternative management.

Submit report via e-mail Submit report on-line

Ballast Water History

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Ballast Water History

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Ballast Water History

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Ballast Water History

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Tank name/number | Tank capacity

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Tank name/number | Tank capacity

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Discharge to US waters			
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Select event			

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Select event			
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Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

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Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
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If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Ballast Water History

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
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Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

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Discharge to US waters			
Select event			
Select event			
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Select event			

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Discharge to US waters			
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If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Ballast Water History

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
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Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
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Ballast Water History

Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
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Tank name/number | Tank capacity

Event	Date	Location(s) (for Management event include Start pt. / End pt.)	Volume
Discharge to US waters			
Select event			
Select event			
Select event			
Select event			

If BW management was *not* conducted for this tank, select one of the following reasons **Select reason**

Australian Government
Department of Agriculture and Water Resources

May 2017

QRG 04

Ballast Water Reporting
MARS quick reference guide

Biosecurity

Ballast water must be managed in accordance with the Australian Ballast Water Requirements (available at agriculture.gov.au/biosecurity/avm/vessels/ballast) and International Maritime Organization (IMO) Regulations to ensure that exchange and discharge inside Australian seas is managed in an approved manner.

What must you do

Ballast water reporting informs the biosecurity risk assessment of the vessel's ballast water. Every tank must be reported. Where a tank or tanks have been exchanged after being reported (where vessel ballast status has changed), a revised ballast water report must be submitted.

When to do it

Ballast Water (BW) Reports should be submitted no later than 12 hours before a vessel enters Australia.

How to do it

From the MARS home screen, the BW Report can be accessed either from the **Submit Applications** drop down menu or by clicking on the **Ballast Water Report** shortcut. BW Reports may be completed manually in MARS by direct data entry or by uploading an XML data file. Both options are described in the steps below. *For detailed steps on how to submit a BW Report refer to the **MARS User Guide**.*

1. Access the department's online web services at online.agriculture.gov.au/selfservice/
2. Sign in with the User ID and Password. The MARS Terms of Use must be accepted to complete the sign in.
3. Click on the MARS icon.
4. Click on the **Ballast Water Report** icon on the MARS home screen.

Ballast Water Report

5. Review the **Legal Details** tab, and then go to the **Upload File** or **Select Vessel** tab.
6. Select **Yes** to complete the application with data from a saved offline form (*Go to Step 7*), or a responsible officer may select **No** for direct data entry (*Go to Step 12*).

7 The offline form (a PDF document) can be downloaded from the MARS offline forms website. You must complete all the details on the form.

8 At the end of the form you will be instructed to click on the **Send to Agency** button; this will attach the form in XML format to an email. You can then send the email to your nominated agent.

9 Once the email has been received, the agent should save the XML to their computer.

10 The agent must click on the **Choose File** button and navigate to the location where the file is saved on the computer. Once the file is selected the data will be automatically uploaded to MARS.

11 The agent should navigate through each of the tabs in sequential order to verify that all the fields have been completed correctly (*Go to Step 19*).

12 If the vessel has ballast tanks or cargo holds being used as ballast tanks then select **Yes** to the question **Does the vessel have Ballast/Heeling tanks or cargo holds being used as ballast tanks**? If **No** is selected the Responsible Officer will be informed that the BW Report does not need to be submitted.

13 The Responsible Officer will be prompted to either **Search and select a Vessel** already registered in MARS (*Go to Step 14*) or **Complete a Ballast Water report for a new vessel** (*Go to Step 15*).

14 Selecting the vessel name from the search field will open the **Vessel Particulars** tab without any pre-populated details of the vessel. Verify the vessel details are correct (*Go to Step 16*).

15 Selecting the **Complete Ballast Water report for new vessel** button will open the **Vessel Particulars** tab without any pre-populated information. Complete the vessel details.

16 Complete the details in the **Arrival Details** tab.

17 Complete all the questions in the **Ballast Water Questions** tab.

18 Complete the ballast water management details in the **Tank Information** tab.

19 In the **Declaration and Submit** tab, read the privacy notice, check the acknowledgement box and submit the application.

20 A confirmation message will be displayed if the ballast water report was submitted successfully.

Note: Any changes in circumstances must be reported to the department as soon as practicable.

What now?

1 The BW Report will be assessed by the department. Where there are no identified risk factors, you will receive a Biosecurity Status Document (BSD) which communicates the department's biosecurity conditions and expectations. The BSD will be emailed to the agent. The vessel's email address must be included in the **Vessel Details** section of the PAR for the master to receive a copy of the BSD.

2 You can search and check the status of your vessel biosecurity clearance in MARS by using one of these information icons.

Vessel

Application/
Service Request

3 For urgent issues, you can follow up on the report by phoning the Maritime National Coordination Centre.

4 The department's service responsibilities and standard of service commitment are detailed in the Client Service Charter available at agriculture.gov.au/about/commitment/client-service-charter

NOTE: Screenshots provided in these guides are accurate at the time of printing and may look different in MARS.

Contact 1300 004 605
(free call in Australia and is in English)

Outside Australia +61 8 8201 6185

agriculture.gov.au/biosecurity/avm/vessels
maritimencc@agriculture.gov.au

Facebook: Australian biosecurity
Twitter: @DeptAgNews

BIO2589_0716

Australian Government
Department of Agriculture, Water and the Environment

Ballast Water Report

Required fields denoted by *

1. Vessel Particulars | 2. Arrival Details | 3. Ballast Water Questions | 4. Tank Information | 5. Submit

Vessel Particulars

Vessel Name *

IMO *

☐ Tick this if the vessel does **NOT** have an IMO

The IMO must be provided if the vessel has one. Otherwise the Call Sign OR the Registration/Official # must be provided.

Call Sign

Registration/Official #

Country of Registry *

Vessel Type *

Responsible Officer *

Vessel E-mail

The e-mail provided will be used to send communications to the vessel.
Please leave this field blank if the vessel is unable to receive e-mails with attachments.

Tank Details *(All ballast tanks must be listed, including empty tanks)*

BALLAST WATER TANK CODES:
Forepeak = FPT, Aftpeak = APT, Double bottom = DB, Bottom tank = BT, Bottom side tank = BST, Deep tank = DT, Wing tank = WT, Top side tank = TST, Cargo hold = CH, Heeling tank = HT, Water ballast tank = WBT, Port = P, Starboard = S, Centre = C, Bilge = BGT, Other = O (specify)

Tank Name	Tank Capacity(m^3)	Add
		Delete

Continue below to fill in Pump Details

T +61 8 8201 6185
F +61 8 8201 6176
E maritimencc@awe.gov.au

Pump Details *(All Pumps must be listed)*

Pump Name	Current Delivery Capacity(m^3 /hr)	Date Last Verified	Add
			Delete

Next ->

Arrival Details

Voyage # *

Agency to which approvals/rejections will be sent *

<- Previous

Next ->

Ballast Water Questions

1) Does the vessel have an approved Ballast Water Management Certificate on board? * ◯ Yes ◯ No ◯ Not applicable

2) Does the vessel have an approved Ballast Water Management Plan on board? * ◯ Yes ◯ No

3) Does the vessel have either a ballast water record system or accurate ballast water records on board? * ◯ Yes ◯ No

4) Does the vessel intend to dispose ballast tank sediment in Australia? * ◯ Yes ◯ No

5) Is the vessel using an IMO Type Approved Ballast Water Management System to manage ballast water? * ◯ Yes ◯ No

6) Is the vessel claiming an Exception for this voyage? * ◯ Yes ◯ No

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Next ->

Ballast Water Management Summary

(You must click on a pump name to select it. To select multiple pumps - when using Flow Through/Dilution or Empty Refill - press the 'Control' key on the keyboard and select the pumps using the mouse. Also, you can change the total pump capacity to be less than the sum of the individual capacities if the pumps are not used at full capacity.)

Tank Name	Management Method	Uptake Location (Comments) / Latitude (deg,min) / Longitude	Uptake Date / Volume(m3)	Start Latitude (deg,min)	End Latitude (deg,min)	Start Date/Time	Pumps Used	Residual volume after emptying cycle (m^3)	Final Volume on Arrival (m^3)	Intent to Disch-arge
	Comments	Discharge Location	Discharge Date	Start Longitude (deg,min)	End Longitude (deg, min)	End Date/Time	Total Pump Capacity (m3)			
TANK DETAIL	**MANAGEMENT DETAILS**	**UPTAKE LOCATION DETAILS**		**EXCHANGE LOCATION DETAILS**			**PUMP DETAILS**	**RESIDUE DETAILS**	**FINAL VOLUME DETAILS**	
Tank Name	Management Method	Uptake Location (Comments) / Latitude (deg,min) / Longitude	Uptake Date / Volume(m3)	Start Latitude (deg,min)	End Latitude (deg,min)	Start Date/Time	Pumps Used	Residual volume after emptying cycle (m^3)	Final Volume on Arrival (m^3)	Intent to Disch-arge
	Comments	Discharge Location	Discharge Date	Start Longitude (deg,min)	End Longitude (deg, min)	End Date/Time	Total Pump Capacity (m3)			
			m3							◯ Yes ◯ No

Depth at which exchange occurred (in metres)

Min Max

Additional Comments

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Submitting the Ballast Water Report

Ballast Water Report includes information for the department to assess biosecurity risks. It is mandatory for vessels intending to discharge ballast while in Australian seas to submit the Ballast Water Report.

A Biosecurity Status Document (BSD) will follow after this report is assessed and provide guidance on which tanks have been managed in accordance with the department's requirements. Giving false or misleading information is a serious offence and may lead to a civil penalty.

Step 1: Enter information into the report and ensure all mandatory fields are complete.
Step 2: Click on the button `Send to Agency' to commence the process of lodging your report data to your nominated shipping agent. Shipping agents are responsible for submitting ballast water summary reports and communicating required biosecurity conditions to manage your arrival at port.
Step 3: Add the shipping agency email address.
Step 4: Attach any additional documents that your shipping agency may require.
Step 5: Send the email to your agent and ensure it is received.

Send to Agency

Note: If you experience problems sending this form, verify that all mandatory fields have been filled. Contact your agent if problems continue. If you are an agent, refer to the User Guide or contact the Maritime National Coordination Centre.

In submitting this information, I warrant that the above information is true and correct. If acting as an agent for the vessel, I warrant that the above information is a true and correct representation of information provided by the operator of the vessel and any changes to the information provided have been confirmed with the vessel operator. I acknowledge that providing false or misleading information to a Commonwealth entity is a serious offence under the *Criminal Code Act 1995*.
Note: Where a Ballast Water Report is being submitted, I confirm that ballast water has not and will not be exchanged in the Australian Great Barrier Reef Marine Park.

What happens next?

- You or your nominated shipping agent must upload the Ballast Water Report into MARS and review each tab for accuracy. A Ballast Water Report has not been submitted to the depatment until the MARS application is complete.
- Upon submission, MARS will generate a BSD, containing the directions and expectations for the vessel.
- The BSD will be transmitted electronically by return email to the shipping agent and master (where a vessel email address was provided).

MARS Admin only: Exp Imp

Legal Advice

The operator of a vessel must report if the vessel intends to discharge ballast water in Australian seas, in accordance with the Biosecurity Act 2015, Chapter 5. Giving false or misleading information is a serious offence and may lead to a civil penalty.

Where the operator of a vessel finds the ballast water report was incomplete or incorrect, the operator must give additional or corrected information in accordance with the Biosecurity Act 2015, Section 268.

For more information on how to comply with biosecurity requirements for ballast water, refer to the department's Australian Ballast Water Reporting Requirements webpages.

For more information:

Email: Maritime National Coordination Centre (MNCC): maritimencc@awe.gov.au

Phone: 1300 004 605 or +61 8 8201 6185 (outside of Australia)

Fax:1300 005 882 or +61 8 8201 6176 (outside of Australia)

Privacy Notice

Personal information means information or an opinion about an identified individual, or an individual who is reasonably identifiable.

Personal information that is collected under or in accordance with the *Biosecurity Act 2015* is also 'protected information' under the Biosecurity Act.

The Department of Agriculture, Water and the Environment (the department) collects your 'protected information' including personal and sensitive information in relation to this form under the Biosecurity Act 2015 for the purposes of assessing and managing the potential biosecurity risks on vessels coming to Australia and related purposes. If you fail to provide some or all of the relevant personal information requested in this form the department may be unable to assess the biosecurity risk associated with your vessel. Information collected by the department will only be used or disclosed as authorised under the Biosecurity Act.

The department may disclose your personal information to relevant State and Australian Government agencies responsible for administering biosecurity; immigration and border protection; maritime safety; and human health laws. It will not usually be disclosed overseas. In every case it will only be disclosed if authorised by the Biosecurity Act.

See our Privacy Policy (http://www.awe.gov.au/about/privacy) to learn more about accessing or correcting personal information or making a complaint. Alternatively, telephone the department on +61 2 6272 3933.

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ANEXO B

BALLAST WATER REPORTING FORM

1. SHIP INFORMATION | **2. BALLAST WATER**

Vessel Name:	Type:	IMO Number:	Specify Units: M^3, MT
Owner:	Gross Tonnage:	Call Sign:	Total Ballast Water on Board:
Flag:	Arrival Date:	Agent:	
Last Port and Country:		Arrival Port:	Total Ballast Water Capacity:
Next Port and Country:			

3. BALLAST WATER TANKS Ballast Water Management Plan on board? YES _____ Management Plan Implemented? YES NO

Total number of ballast tanks on board: _____ No. of tanks in ballast: _____ IF NONE IN BALLAST GO TO No. 5.

No. of tanks exchanged: _____ No. of tanks not exchanged: _____

4. BALLAST WATER HISTORY: RECORD ALL TANKS THAT WILL BE DEBALLASTED IN PORT STATE OF ARRIVAL; IF NONE GO TO No. 5.

Tanks/ Holds (List multiple sources per tank separately)	BALLAST WATER SOURCE					BALLAST WATER EXCHANGE Dilution (1), Flow Through (2) or Empty/Refill (3)						BALLAST WATER DISCHARGE			
	DATE DDMMYY	Port or Lat/Long*	Volume (units)	Temp (units)	Salinity (units)	DATE DDMMYY	Endpoint Lat/Long.	Volume (units)	% Exch	Depth (m)	BW exchange method	DATE DDMMYY	Port or Lat/Long*	Volume (units)	Salinity (units)

Ballast Water Tank Codes: Forepeak = FP, Aftpeak = AP; Dou2ble Bottom = DB; Wing = WT; Topside = TS; Cargo Hold = CH; Other = O

IF EXCHANGES WERE NOT CONDUCTED, STATE OTHER CONTROL ACTION(S) TAKEN:_____

IF NONE STATE REASON WHY NOT:_____

5: INTERNATIONAL CONVENTION FOR THE CONTROL AND MANAGEMENT OF SHIPS' BALLAST WATER AND SEDIMENTS, 2004 ON BOARD? YES_____

IMO BALLAST WATER GUIDELINES ON BOARD (RES. A.868(20))? YES_____

RESPONSIBLE OFFICER'S NAME AND TITLE (PRINTED) AND SIGNATURE: _____

*Fulfil with Port's name, preferably.

New Zealand (NZ) Biofouling and Ballast Water Declaration: Parts 1 and 2

TO BE COMPLETED FOR ALL VESSELS ARRIVING IN NEW ZEALAND

Vessel Name:	IMO Number:	Voyage Number:	Arrival Date:	Arrival Port:

PART 1: BIOFOULING			
1	Do you have a biofouling management plan on board?	☐ Yes or ☐ No or ☐ Unknown	
2	Do you keep a biofouling record book?	☐ Yes or ☐ No or ☐ Unknown	
3	When was the vessel built?	Build Date:	
4	When was the last renewal of anti-fouling coating to the hull?	Antifouling Date:	
	A. Do you have a certificate of treatment?	☐ Yes or ☐ No	
	B. What date is the anti-fouling coat effective until?	Date:	
5	In the last year how many times was the vessel moored or laid up in one location for 10 days or more, 20 days or more, and 30 days or more?	≥10 days:	≥20 days: ≥30 days:
6	When is the next haul out/dry dock intended for this vessel and in what location?	Date:	Location:

PART 2: BALLAST WATER			
1	Do you have a ballast water management plan on board?	☐ Yes or ☐ No	
2	Is the vessel carrying any ballast water?	☐ Yes or ☐ No	
3	Do you have a ballast water log?	☐ Yes or ☐ No	
4	What is your ballast status on arrival in NZ?	Number of tanks in ballast:	Volume: m^3
5	What is the maximum ballast capacity of this vessel?	Total number of tanks:	Maximum volume: m^3
6	Are any ballast tanks intended for discharge, or possible discharge, in New Zealand ports or territorial waters?	☐ Yes: Complete 'Part 3' of this declaration and sign this form. **OR** ☐ No: Sign this form and no further detail is required.	

MASTER TO MAKE DECLARATION HERE	MPI Officer signature	BW discharge permitted:
I state the declaration (Part 1, Part 2, and Part 3 as relevant) is true in every particular. Master's Name:		☐ Yes ☐ No
Signature:		

No ballast water discharge is permitted without written authority by MPI

MPI Officer Comments:

New Zealand (NZ) Biofouling and Ballast Water Declaration: Part 3

Vessel Name:	Voyage Number:

All vessels intending to discharge ballast water or with contingency tanks for possible discharge in NZ territorial waters must complete this part.
All ballast water tank volumes must be recorded in m^3. (For more information see the NZ Import Health Standard for Ballast Water from all Countries).

How will you comply with NZ's ballast water requirements? Check the box(es) indicating the ballast water management option used.

☐ FW Discharging fresh water	☐ TS Treating ballast water using an MPI-approved shipboard system	☐ E/R or F/T Exchanging the ballast water at mid-ocean (at least 200 NM from the nearest land and in water of over 200m in depth) by **Empty/Refill (E/R)** (with an efficiency of 95% volumetric exchange) or **Flow-Through (F/T)** (at least three times the maximum tank capacity).
	Treatment system:	Maximum combined pump capacity (all ballast water pumps): m^3/hr

Exemption applied for ☐

If you were unable to complete the mid-ocean exchange because it would have caused unacceptable risk to the crew or vessel due to adverse conditions you will need to complete details in the following table identifying the tanks and source of the ballast water for all tanks that the exemption is applied for.

Specific details of why the exemption is required:

TANKS Use tank codes listed below		**BW SOURCE** Prior to mid-ocean exchange or treatment **OR** source of FW ballast **OR** "Empty tank".			**MANAGE-MENT METHOD**	**E/R TANKS & REFILL of Empty**	**F/T TANKS**	**MID-OCEAN FLOW-THROUGH EXCHANGE (F/T) or REFILL (R)** *For E/R or filling empty tanks, only record REFILL (R) detail*				
Tank Name	Max. tank capacity	Date (d/mmm/yy)	"Empty Tank" or Uptake port Lat/Long	Volume in tank before exchange or treatment	FW, TS, E/R or F/T	Residual volume when empty	Volume pumped through		Details at start and end of refill (R) or F/T: Lat / Long (degrees minutes)	Date (d/mmm/yy)	Time (24 HR)	Final volume in tank on arrival in NZ
	m^3			m^3		m^3	m^3	Start	° ' N ° ' E			m^3
			° ' N ° ' E					End	° ' N ° ' E			
	m^3			m^3		m^3	m^3	Start	° ' N ° ' E			m^3
			° ' N ° ' E					End	° ' N ° ' E			
	m^3			m^3		m^3	m^3	Start	° ' N ° ' E			m^3
			° ' N ° ' E					End	° ' N ° ' E			
	m^3			m^3		m^3	m^3	Start	° ' N ° ' E			m^3
			° ' N ° ' E					End	° ' N ° ' E			
	m^3			m^3		m^3	m^3	Start	° ' N ° ' E			m^3
			° ' N ° ' E					End	° ' N ° ' E			
	m^3			m^3		m^3	m^3	Start	° ' N ° ' E			m^3
			° ' N ° ' E					End	° ' N ° ' E			

Ballast tank codes: Forepeak (FP), Afterpeak (AP), Double Bottom (DB), Deep Tank (DT), Wing Tank (WT), Topside Tank (TS), Port (P), Starboard (S), Upper (U), Lower (L)
BW Management Method codes: Freshwater (FW), Empty then Refill (E/R), Flow-Through (F/T), Treatment System (TS)

New Zealand (NZ) Biofouling and Ballast Water Declaration: Part 3

TANKS Use tank codes listed below		BW SOURCE Prior to mid-ocean exchange or treatment OR source of FW ballast OR "Empty tank".			MANAGE-MENT METHOD	E/R TANKS & REFILL of Empty	F/T TANKS	MID-OCEAN FLOW-THROUGH EXCHANGE (F/T) or REFILL (R) *For E/R or filling empty tanks, only record REFILL (R) detail*				
Tank Name	Max. tank capacity	Date (d/mmm/yy)	"Empty Tank" or Uptake port Lat/Long	Volume in tank before exchange or treatment	FW, TS, E/R or F/T	Residual volume when empty	Volume pumped through	Details at start and end of refill (R) or F/T	Lat / Long (degrees minutes)	Date (d/mmm/yy)	Time (24 HR)	Final volume in tank on arrival in NZ
	m^3			m^3		m^3	m^3	Start	° ′N ° ′E			m^3
			° ′N ° ′E					End	° ′N ° ′E			
	m^3			m^3		m^3	m^3	Start	° ′N ° ′E			m^3
			° ′N ° ′E					End	° ′N ° ′E			
	m^3			m^3		m^3	m^3	Start	° ′N ° ′E			m^3
			° ′N ° ′E					End	° ′N ° ′E			
	m^3			m^3		m^3	m^3	Start	° ′N ° ′E			m^3
			° ′N ° ′E					End	° ′N ° ′E			
	m^3			m^3		m^3	m^3	Start	° ′N ° ′E			m^3
			° ′N ° ′E					End	° ′N ° ′E			
	m^3			m^3		m^3	m^3	Start	° ′N ° ′E			m^3
			° ′N ° ′E					End	° ′N ° ′E			
	m^3			m^3		m^3	m^3	Start	° ′N ° ′E			m^3
			° ′N ° ′E					End	° ′N ° ′E			
	m^3			m^3		m^3	m^3	Start	° ′N ° ′E			m^3
			° ′N ° ′E					End	° ′N ° ′E			
	m^3			m^3		m^3	m^3	Start	° ′N ° ′E			m^3
			° ′N ° ′E					End	° ′N ° ′E			
	m^3			m^3		m^3	m^3	Start	° ′N ° ′E			m^3
			° ′N ° ′E					End	° ′N ° ′E			
	m^3			m^3		m^3	m^3	Start	° ′N ° ′E			m^3
			° ′N ° ′E					End	° ′N ° ′E			
	m^3			m^3		m^3	m^3	Start	° ′N ° ′E			m^3
			° ′N ° ′E					End	° ′N ° ′E			

Ballast tank codes: Forepeak (FP), Afterpeak (AP), Double Bottom (DB), Deep Tank (DT), Wing Tank (WT), Topside Tank (TS), Port (P), Starboard (S), Upper (U), Lower (L)
BW Management Method codes: Freshwater (FW), Empty then Refill (E/R), Flow-Through (F/T), Treatment System (TS)

New Zealand (NZ) Biofouling and Ballast Water Declaration: Part 3

TANKS Use tank codes listed below		BW SOURCE Prior to mid-ocean exchange or treatment OR Source of FW ballast OR "Empty tank".			MANAGE-MENT METHOD	E/R TANKS & REFILL of Empty tank	F/T TANKS	MID-OCEAN FLOW-THROUGH EXCHANGE (F/T) or REFILL (R) *For E/R or filling empty tanks, only record REFILL (R) detail*				
Tank Name	Max. tank capacity	Date (d/mmm/yy)	"Empty Tank" or Uptake port Lat/Long	Volume in tank before exchange or treatment	FW, TS, E/R or F/T	Residual volume when empty	Volume pumped through	Details at start and end of refill (R) or F/T	Lat / Long (degrees minutes)	Date (d/mmm/yy)	Time (24 HR)	Final volume in tank on arrival in NZ
	m³			m³		m³	m³	Start	° ′N ° ′E			m³
			° ′N ° ′E					End	° ′N ° ′E			
	m³			m³		m³	m³	Start	° ′N ° ′E			m³
			° ′N ° ′E					End	° ′N ° ′E			
	m³			m³		m³	m³	Start	° ′N ° ′E			m³
			° ′N ° ′E					End	° ′N ° ′E			
	m³			m³		m³	m³	Start	° ′N ° ′E			m³
			° ′N ° ′E					End	° ′N ° ′E			
	m³			m³		m³	m³	Start	° ′N ° ′E			m³
			° ′N ° ′E					End	° ′N ° ′E			
	m³			m³		m³	m³	Start	° ′N ° ′E			m³
			° ′N ° ′E					End	° ′N ° ′E			
	m³			m³		m³	m³	Start	° ′N ° ′E			m³
			° ′N ° ′E					End	° ′N ° ′E			
	m³			m³		m³	m³	Start	° ′N ° ′E			m³
			° ′N ° ′E					End	° ′N ° ′E			
	m³			m³		m³	m³	Start	° ′N ° ′E			m³
			° ′N ° ′E					End	° ′N ° ′E			
	m³			m³		m³	m³	Start	° ′N ° ′E			m³
			° ′N ° ′E					End	° ′N ° ′E			
	m³			m³		m³	m³	Start	° ′N ° ′E			m³
			° ′N ° ′E					End	° ′N ° ′E			
	m³			m³		m³	m³	Start	° ′N ° ′E			m³
			° ′N ° ′E					End	° ′N ° ′E			

Ballast tank codes: Forepeak (FP), Afterpeak (AP), Double Bottom (DB), Deep Tank (DT), Wing Tank (WT), Topside Tank (TS), Port (P), Starboard (S), Upper (U), Lower (L)
BW Management Method codes: Freshwater (FW), Empty then Refill (E/R), Flow-Through (F/T), Treatment System (TS)

New Zealand Government. Pursuant to section 22 of the Biosecurity Act 1993. Revised May 2016.

KUWAIT OIL CO.
MARINE OPERTIONS TEAM

ROPME (SEA AREA) BALLAST WATER REPORTING FORM (RBWRF)

[To be completed (except item 4C) and sent by all vessels BEFORE arriving in Kuwaiti waters. Prior to sailing, item **4C** to be filled & original to be handed over to Pilot]

1. VESSEL INFORMATION

Vessel Name:	Type:	IMO Number:
Owner:	GT:	Call Sign:
Last Port and Country:	Flag:	Agent:
Next Port and Country:	Arrival Date:	Arrival Port:

2. BALLAST WATER

Intended Port of discharge of BW:
Specify Units (m³, MT, LT, ST):
Total Ballast Water on Board:
Total Ballast Water Capacity:

3. BALLAST WATER TANKS

(A) Is Ballast Water Management Plan available on board (*)	YES ☐	NO ☐	(B) Has this been implemented (*)	YES ☐ NO ☐
(C) Total No. of ballast tanks on board			(D) Total No. of Tanks with ballast	(**)
(E) Total No. of Tanks where ballast exchanged			(F) Total No. of tanks not exchanged	(***)
(G) If Exchange was not conducted, state other IMO approved control action(s) taken;				
(H) If none, state reasons why not: (***)				

NOTES:
(*) If answer to 3(A) or 3(B) is "No", no de-ballasting allowed, tick items No. 5(B) & 5(C)
(**) If no ballast in tanks, or if no ballast intended to be discharged at Kuwait, tick items No. 5(A) & 5 ©
(***) If Ballast Water could not be exchanged or treated as per IMO regulations, vessels not allowed to de-ballast such tanks, tick items No. 5(B) & 5(C)

4. BALLAST WATER HISTORY:

Record all tanks that will be deballasted in the port of arrival in the State of Kuwait : (If none, please go to item No. 5)

Tanks/Holds 1. Tanks with single source to be listed in the same row 2. Multiple sources separately	(A) BW SOURCE				(B) BW EXCHANGE CARRIED OUT : Tick one: Empty ☐ Refill ☐ Flow Through ☐					(C) ACTUAL DISCHARGE OF BW (This section to be filled-in after deballasting. Signed & stamped copy to be handed over to Pilot before sailing)			
	DATE ddmmyy	PORT or Lat / Long	VOLUME (units)	TEMP (units)	DATE ddmmyy	ENDPOINT Lat / Long	VOLUME (units)	% Exch.	SEA Hgt. (m)	DATE ddmmyy	PORT or Lat / Long	VOLUME (units)	SALINITY (units)

Ballast Water Tank Codes: Forepeak=FP, Aftpeak=AP, Double Bottom=DB, Wing=WT, Topside=TS, Cargo Hold=CH, O=Other

5. IS THE BALLAST WATER MANAGEMENT - IMPLEMENTED CORRECTLY:

(A) YES	
(B) NO	
(C) No de-ballasting operation in Kuwait	

Master's Name:	Ship's Stamp
Signature	
Date:	

(For KOC Marine Oprns use only)

If item 5(B) is ticked, HM to inform Govt Surveyor, record his action, sign and send the form to TLMO, without delay

Govt. Surveyour Name:	HM Name:
Govt. Surveyor Action:	HM Signature:
Date:	Date:

PROCEDURE:

Before Arrival into Kuwaiti Waters:
1. Master to send completed form (except item 4C) to Agent
2. Agent to send the completed form to HM
3. For complying vessels - HM to send all completed forms to Marine with month-end papers

Unauthorized discharge of BW
6. If there is evidence of unauthorized discharged of BW, HM to immediately inform TLMO, TL-HSE-E&M, Agent & Govt. Surveyor who will initiate appropriate procedings
7. HM to record G. Surveyor action & send the form to TLMO

After deballsating:
8. Master to comlete item 4(C) and handover the signed & stamped form to Pilot before sailing

Transport Canada | Transports Canada

St. Lawrence Seaway | Voie maritime du Saint-Laurent

CANADIAN BALLAST WATER REPORTING FORM (20 TANKS)

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	
						Total number of tanks	Total number of holds
Flag:	Next port (3):	Country:			m^3		

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:

Canada

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			Volume (m³) on arrival	BW MANAGEMENT PRACTICES									PROPOSED BW DISCHARGE			
	Tank capacity (m³)	Date (yyyy-mm-dd)	Port or latitude & longitude		Date (yyyy-mm-dd)	Start point [1] latitude & longitude	End point [1] latitude & longitude	Used [1] Volume (m³)	% [1] Exch	D-1 Method	D-2 √	Wave height (m)	Salinity (units) ppt	Date (yyyy-mm-dd)	Port or latitude & longitude	Volume (m³)	Salinity (units) ppt
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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.

Canada

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 (m³)	Date (yyyy-mm-dd)	Port or latitude & longitude	Volume (m³) on arrival	Date (yyyy-mm-dd)	Start point [1] latitude & longitude	End point [1] latitude & longitude	Used [1] Volume (m³)	% [1] Exch	D-1 Method	D-2 √	Wave height (m)	Salinity (units) ppt	Date (yyyy-mm-dd)	Port or latitude & longitude	Volume (m³)	Salinity (units) ppt
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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.

Canada

For the training conducted to the crew as required in Section 13 of this plan, the record must be maintained in the SMS Form – SM054.

Vessel is to make reference to the form sample enclosed in this appendix.

BALLAST WATER MANAGEMENT TRAINING RECORD

Vessel: _____ Date: _____

Port / Location: _____ Purpose of training: _____

The below-mentioned crew whose job scope required them to assist and/or supervise the ballast water exchange operation are trained on board by the Environmental Officer. The training requirements and scopes are in accordance to Section 13 – Training of this manual.

Description and summary of the briefing and training conducted:

No.	Name	Rank	Date	Signature

Environmental Officer: _____ Master: _____

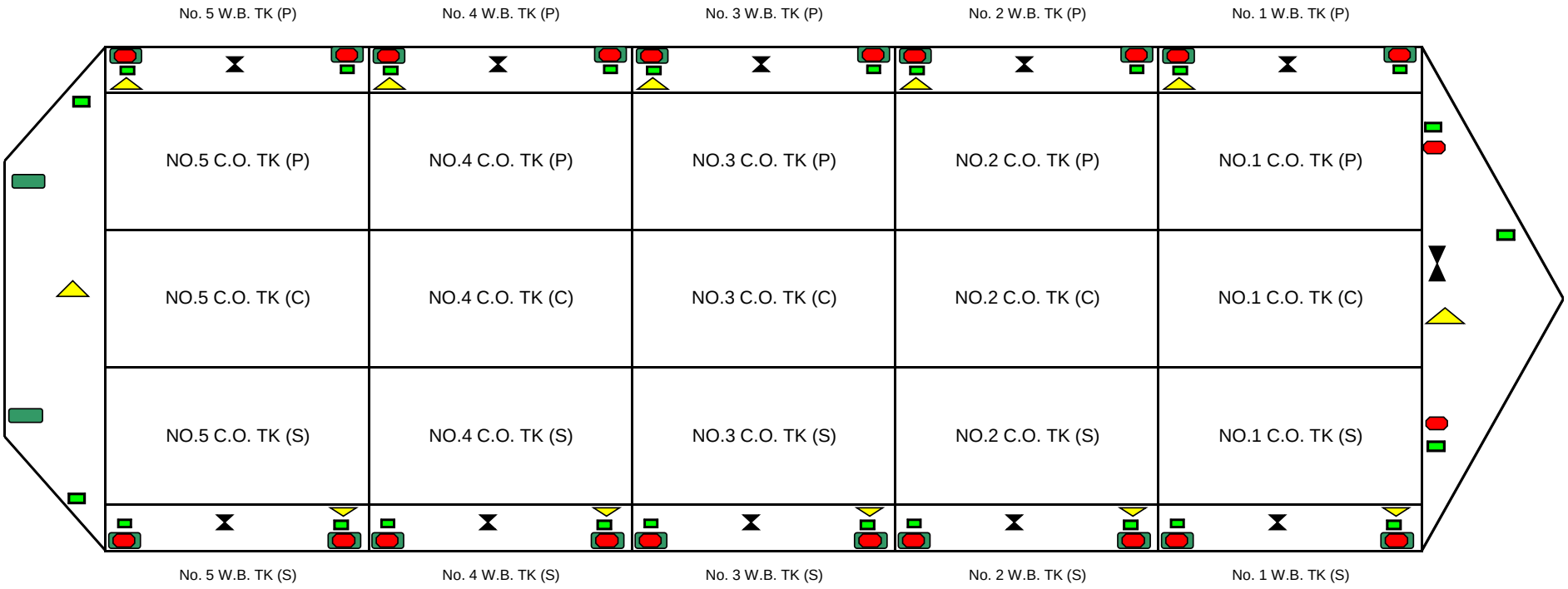
Signature: _____ Signature: _____

Appendix IX - World Meteorological Organization (Sea State Code)

Sea State Code	Significant Wave Height (Meters)		Sea Description	Percentage of probability of encountering a wave		
	Range	Mean		World Wide	North Atlantic	Northern North Atlantic
0	0.00	0.00	Calm (glassy)	11.25	8.31	6.06
1	0.00 – 0.10	0.05	Calm (rippled)	11.25	8.31	6.06
2	0.10 – 0.50	0.30	Smooth (wavelets)	11.25	8.31	6.06
3	0.50 – 1.25	0.875	Slight	31.69	28.20	21.37
4	1.25 – 2.50	1.875	Moderate	40.19	42.03	40.99
5	2.50 – 4.00	3.25	Rough	12.80	15.44	21.24
6	4.00 – 6.00	5.00	Very Rough	3.03	4.29	7.01
7	6.00 – 9.00	7.50	High	0.93	1.50	2.69
8	9.00 – 14.00	11.50	Very High	0.12	0.23	0.43
9	Over 14.00	Over 14.00	Phenomenal	0.001	0.002	0.004

WATER BALLAST TANK ARRANGEMENT

Vessel: **KHK VISION** IMO No. **9323429** Flag: **Singapore**



LEGEND

- SOUNDING PIPE
- MAN HOLE (APT MANHOLE AT STEERING PLAT)
- AIR VENT
- SAMPLING
- GAS SAMPLING
- IG CONNECTION

List of Ship's Plan

1. Standard Symbol, Valve, Cock, Stranier, Pipe Fitting and Instrument

2. Ballast Tank Arrangement

3. Ballast Water Piping System

4. Ballast Water Air & Sounding System

For full details of the above plans, the vessel is to refer the ship's drawing and plan.

STANDARD SYMBOL
VALVE, COCK, STRAINER, PIPE FITTING AND INSTRUMENT

	GLOBE STOP STR.
	GLOBE STOP ANGLE
	GLOBE SDNR STR.
	GLOBE SDNR ANGLE
	GATE RISING
	GATE NON RISING
	FLAP CHECK
	SWING CHECK
	LIFT CHECK STR.
	LIFT CHECK ANGLE
	BALL CHECK WITHOUT SPRING
	BALL CHECK WITH SPRING
	BUTTERFLY LUG
	BUTTERFLY WAFER
	BUTTERFLY FLANGE
	HOSE CONN. GLOBE STR.
	HOSE CONN. GLOBE ANGLE
	SAFETY STR.
	SAFETY ANGLE
	SELF CLOSING STR. SPRING
	SELF CLOSING ANG. SPRING
	NEEDLE STR.
	NEEDLE ANGLE
	NEEDLE 3-WAY TEST
	COCK 2-WAY
	COCK 3-WAY L-TYPE
	COCK 3-WAY T-TYPE
	COCK 4-WAY
	PRESS CONTROL REDUCING
	QUICK CLOSING STR.
	QUICK CLOSING ANG.

	FLOW CONT. 2-WAY DISC/DIAL
	REMOTE HYD. B'FLY LUG
	REMOTE HYD. B'FLY WAFER
	REMOTE HYD. B'FLY FLANGE
	REMOTE PNEU. B'FLY LUG
	REMOTE PNEU. B'FLY WAFER
	REMOTE PNEU. B'FLY FLANGE
	REMOTE ELEC. B'FLY LUG
	REMOTE ELEC. B'FLY WAFER
	REMOTE ELEC. B'FLY FLANGE
	SURFACE DROP
	PRESS. VACUUM
	PRESS. VACUUM HIGH VELOCITY
	PRESS. VACUUM BREAKER
	GAS FREEING COVER
	FLAME ARRESTER
	ORIFICE PLATE
	ORIFICE VALVE
	STRAINER SIMPLEX STR.
	STRAINER SIMPLEX LA
	STRAINER SIMPLEX LB
	MUD BOX STR.
	MUD BOX ANGLE
	ROSE BOX
	STEAM TRAP WITH DRAIN VALVE
	SOUNDING CAP S/C WEIGHT
	SOUNDING CAP NORMAL
	SOUNDING CAP DECK PIECE
	AIR PIPE GOOSE NECK
	AIR VENT FLOAT A SCR.
	AIR VENT FLOAT A

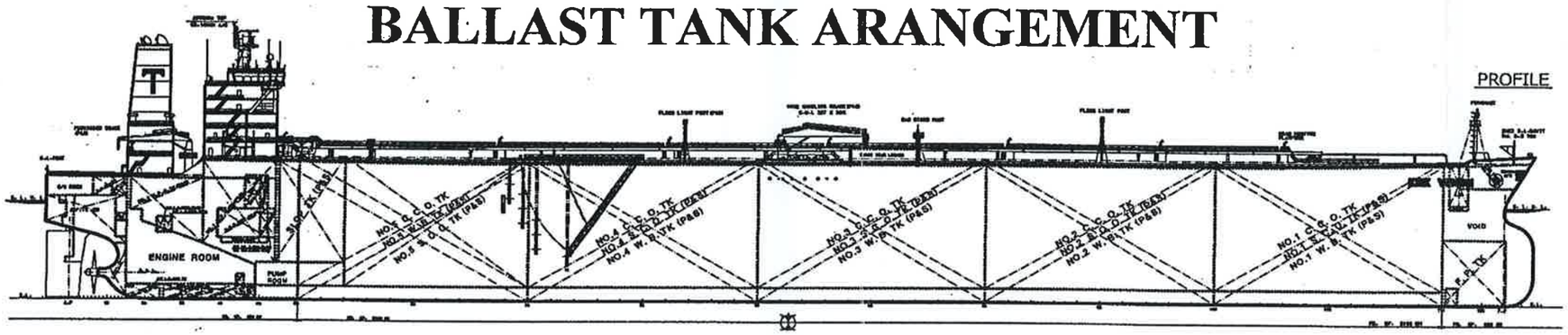
STANDARD SYMBOL
VALVE, COCK, STRAINER, PIPE FITTING AND INSTRUMENT

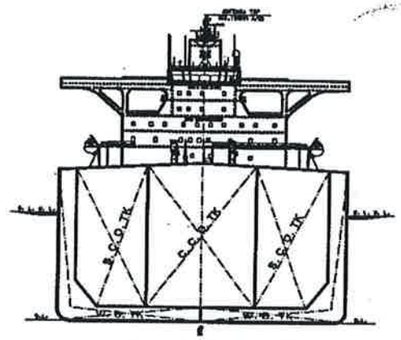
	AIR VENT FLOAT B SCR.
	AIR VENT FLOAT B
	COUPLING DRESSER
	COUPLING SLEEVE
	COUPLING FLANGED DRESSER
OPEN CLOSE	SPECTACLE FLANGE
	FLANGED BLIND
	BELL MOUTH
	SPOOL PIECE
	REDUCER
	EJECTOR
	HAND PUMP
	OFF PAGE CONNECTOR
	CENTRIFUGAL PUMP
	SCUPPER PIECE
	DECK STAND NORMAL
	DECK STAND LOCAL HYD.
	FULL DISCHARGE OVERBOARD
	NOT CONN. CROSSING PIPE
	CONNECTED CROSSING PIPE
	BOSS
	BOSS WITH PLUG
	PRESSURE INDICATOR
	COMPOUND GAUGE
	PRESSURE TRANSMITTER
	THERMOMETER
LHA	LEVEL ALARM HIGH
LAL	LEVEL ALARM LOW
	HOSE BALL VALVE

DSME DAEWOO SHIPBUILDING & MARINE ENGINEERING CO.,LTD.

BALLAST TANK ARANGEMENT

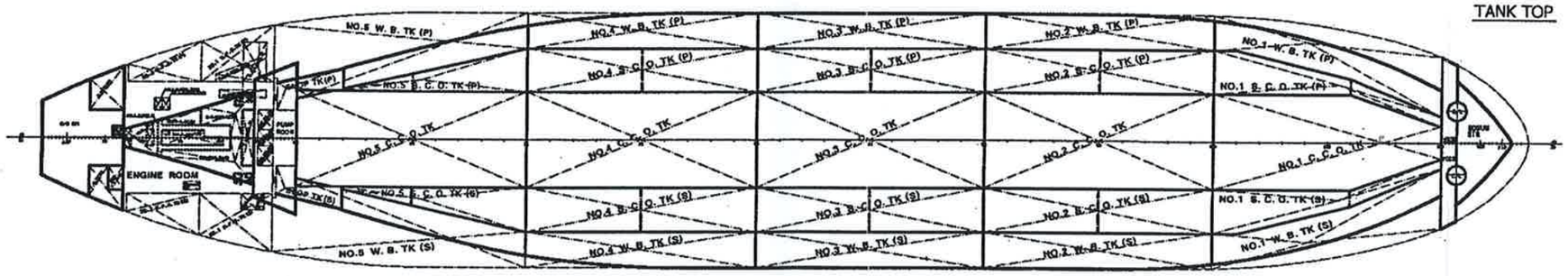
PROFILE





MIDSHIP SECTION

TANK TOP



PRINCIPAL PARTICULARS

LENGTH O. A.		approx.	332.0 M
LENGTH B. P.			320.0 M
BREADTH	(MLD)		58.0 M
DEPTH	(MLD)		31.2 M
DRAFT DESIGN	(MLD)		20.8 M
DRAFT SCANT.	(MLD)		22.4 M

SERVICE SPEED 15.2 knots at designed draft

MAIN ENGINE
TYPE : MAN 7S60MC x 1SET
MCR : 34,650 PS x 79.0 RPM
NCR : 29,480 PS x 74.8 RPM

COMPLEMENT : 34 persons (incl. Suez crew: 6 persons)

CLASSIFICATIONS
ABS(American Bureau of Shipping)
+A1(E), "Oil Carrier", SH, SHCM, +AMS, +ACCU,
RM, with the descriptive notes of ESP, UWILD, TCM.

5368	VANGUARD CARRIERS 306,000 TDW CRUDE OIL TANKER		
DRAWN BY W.HUNDER		TITLE BALLAST TANK ARRANGEMENT	
CHECKED BY S.S.LEE			
APPROVED BY K. E. HAN			
DATE INTEGRATED DESIGN TEAM	DATE 2006.06.22	SCALE 1/500	DWG. NO. 5A1613004

NOTES

1. Sliding type couplings shall be provided to allow expansion/contraction of pipes.
2.
3. Filling and discharging of ballast water in aft peak tank shall be carried out by both bilge fire & G/S pumps in E/R. : See page 20/48.
4. Zinc anodes(about 2.5kg X 4ea) shall be fitted in each strainer of ballast pump.
5. Ballast overboard discharge pipe passing through the slop tank/ ballast tank shall be arranged in pipe tunnel.
6. Double plate shall be provided below the suction bellmouth in double bottom water ballast tanks (i.e., except F.P.tanks, A.P.tanks) except for stripping bellmouthes.
7. Rigid thrust stopper shall be provided for ballast main forward part to prevent movement of ballast mains due to the water hammering effect.
8. Body material of the shipside valve shall be of cast steel.
9. The caution plate shall be provided for connection inert gas to ballast tank as caution plate for the inerting operating on the cargo console.

No	MAT'L No	DESCRIPTION	Q'TY	TYPE	MAKER	REMARK
2		BALLAST EDUCTOR	2	300 m^3/h (FCD body/SUS316 nozzle)		
1		BALLAST PUMP	2	3000 m^3/h X 35MTH, CENTRIFUGAL, ELECTRIC MOTOR DRIVEN		

EQUIPMENT LIST

FILENAME : DA800D101-BS

SPECIFICATION OF PIPING SYSTEM

SERVICE		FLUID(DESIGN) PRESS (Kg/CM^2)	FLUID(DESIGN) TEMP (°C)	NOM. DIA.	PIPE MAT'L	PIPE TREAT-MENT	VALVE MATERIAL BODY	VALVE MATERIAL DISC	VALVE TYPE	PIPE CONN. TYPE	PIPE CONN. GASKET	PIPE CONN. BOLT /NUT	HYD. TEST P (Kg/CM^2) SHOP	HYD. TEST P (Kg/CM^2) SHIP	REM-ARKS
BALLAST SYSTEM	IN TANK	4.9	AMB.	200-600	G.R.P	INSIDE TAR FREE EPOXY COAT'G (EXCEPT FOR G.R.P APPLIED PARTS) OUTSIDE SAME AS SURR-OUND'G	CAST IRON	AL-BRONZE	B'FLY V/V	DOUBLE O-RING	O-RING		7.0	4.9	
				200	STPG370 ERW SCH.80					JIS5K FLANGE BUTT WELD.	NON-ASBES.	HEX. S45C GALV. (SEE GENERAL NOTE 9)	NOT APPLIED		
				250-600	STPG370 ERW 12.7T										
	IN P/R	4.9		250-600	STPG370 ERW 12.7T	ABOVE D/BTM: INSIDE TAR FREE EPOXY COAT'G (EXCEPT FOR G.R.P/ POLYETHYL-ENE APPLIED PARTS) BELOW D/BTM: POLYETHYL-ENE (EXCEPT FOR SHIPSIDE & WALL/BHD PENET. PIECES)									
				650-700	STPY400 SAW 12.7T										

NO.	ITEM	ITEM NO.	CANCELLED NO.	REMARK
2	VALVE	BA401 - BA423		
		BA501 - BA533		
1	PIPE	BA41 - BA67		
		BA01 - BA21		

PROJECT 5268

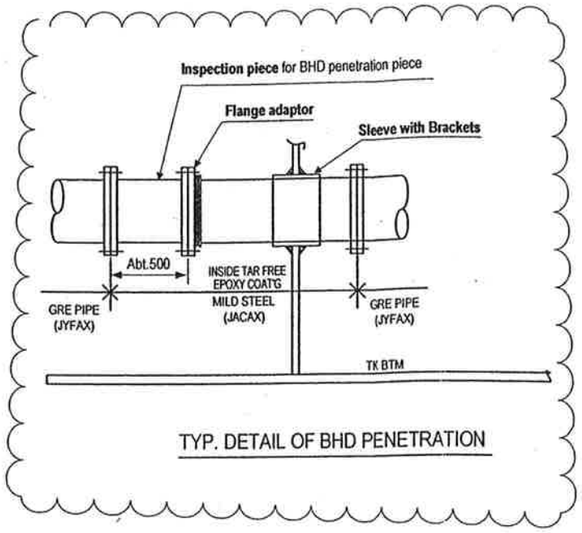
TITLE P/D OF BALLAST SYSTEM

DSME DAEWOO SHIPBUILDING & MARINE ENGINEERING CO.,LTD.

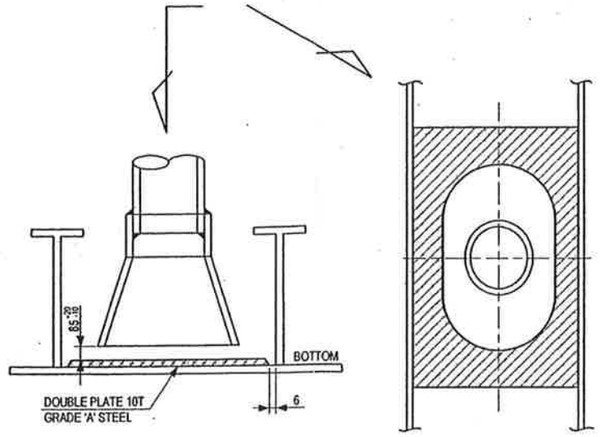
DWG TITLE : P/D OF BALLAST SYSTEM

NOTE!

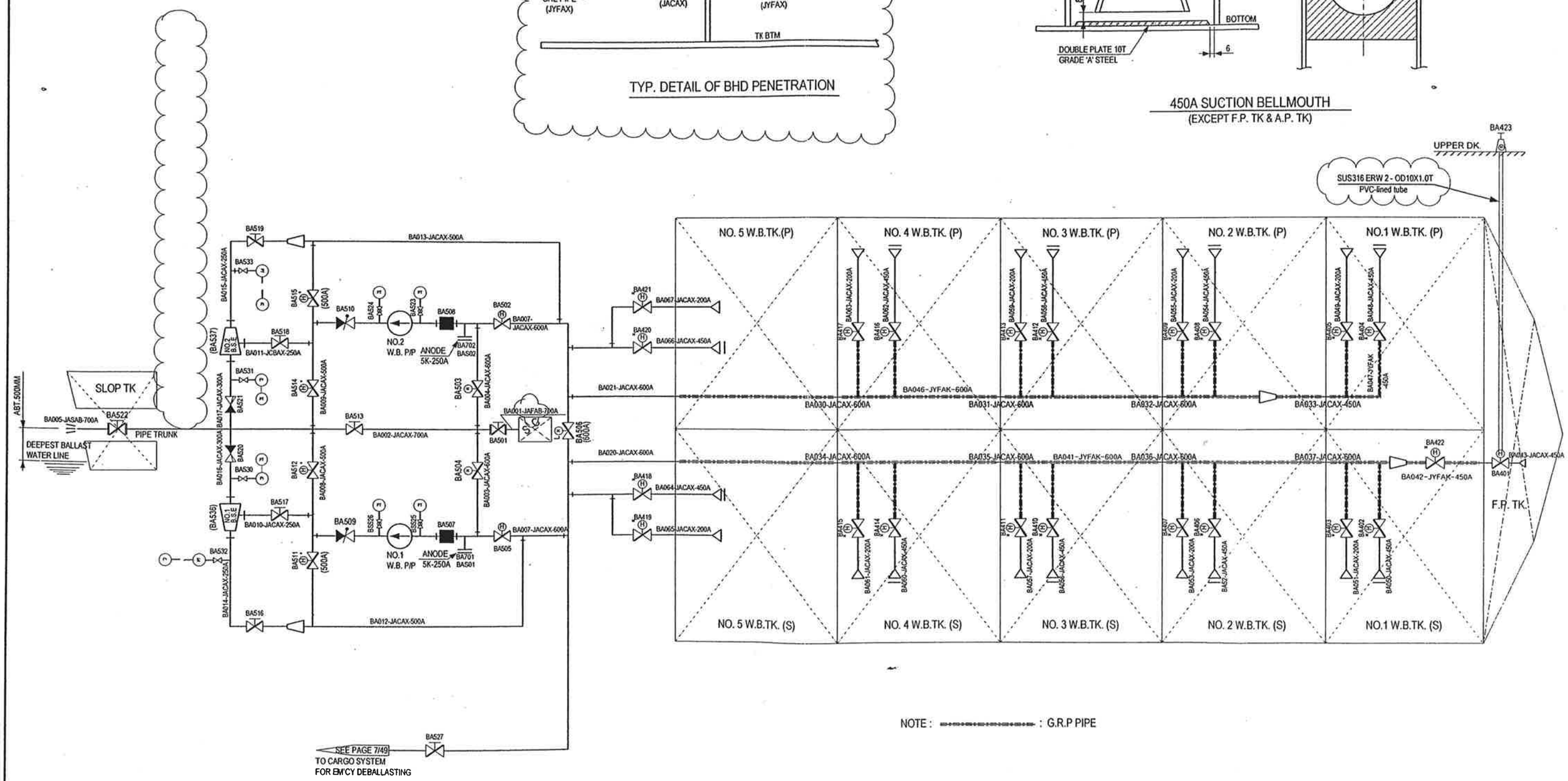
-.The valve(**BA506**) located in P/R D/B to be local-hydraulically operated.
See page 32/48 for the detail.



TYP. DETAIL OF BHD PENETRATION



450A SUCTION BELLMOUTH
(EXCEPT F.P. TK & A.P. TK)



DSME DAEWOO SHIPBUILDING & MARINE ENGINEERING CO.,LTD.

NOTES

1. Sleeve joint shall be used for sounding pipe passing through decks.
2. Air pipes shall be fitted at the highest part of the tank and self drained under normal trim condition.
3. Two(2) sounding tapes with plumb shall be furnished as deck inventory.
4. The sea chest for water ballast/cargo pumps shall have air venting through holes on the shell plate instead of venting pipe, but air vent pipe shall be provided for sea chest of em'cy fire pump up to open deck.
5. Air vent heads for water ballast tanks (No.1~No.5 W.B.TK, F.P.TK) and void adjacent to cargo tank shall be fitted with fire proof screen.
6. Float disc type air vent head which have the following flow capacity under 2500mm WC hyd.resistant pressure shall be applied for the ballast tanks.

SIZE	65A	80A	100A	125A	150A	200A	250A	300A	350A	400A
FLOW CAPACITY (m^3/H)	37	53	94	109	171	302	496	607	970	1265

TABLE OF AIR PIPE AND FILLING PIPE

TANK NAME	AIR ESCAPE PIPE			FILLING PIPE			PUMP CAPACITY FOR FILLING PURPOSE (M^3/H)	RATIO (A/B)
	N.D	THICKNESS	IN AREA A (cm^2)	N.D	THICKNESS	IN AREA B (cm^2)		
F.P. TK	350A X 3	12.7T	2569	450A	16T	1420	3000	1.8
NO.1,2,3,4,5 W.B. TK (P/S)	350A X 3	12.7T	2569	450A 200A	16T 12.7T	1706.2	3000	1.5
A.P. TK	250A X 1 200A X 1	12.7T 12.7T	746	250A	12.7T	460	600	1.62

7. No air and sounding pipes shall be provided for the compartment of echo sounder/speed log. But the drain plug shall be provided for confirming the compartment is not flooded.

No	MAT'L No	DESCRIPTION	Q'TY	TYPE	MAKER	REMARK

EQUIPMENT LIST

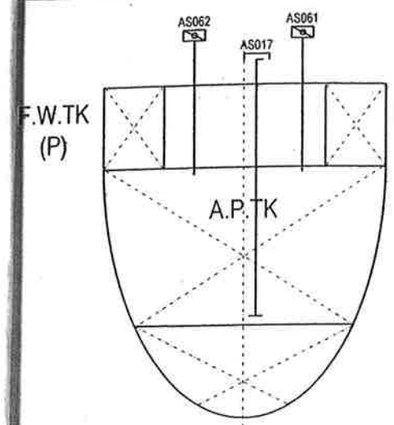
SPECIFICATION OF PIPING SYSTEM

SERVICE	FLUID(DESIGN)		NOM. DIA.	PIPE		VALVE			PIPE CONN.			HYD. TEST P (Kg/CM^2)		REM-ARKS
	PRESS (Kg/CM^2)	TEMP (°C)		MAT'L	TREAT-MENT	MATERIAL BODY	MATERIAL DISC	TYPE	TYPE	GASKET	BOLT /NUT	SHOP	SHIP	
AIR VENTING	ATM.	AMB.	80 - 200	STPG370 SMLS SCH.80	GALV.	—	—	—	JIS5K FLANGE OR SLEEVE	NON-ASBES.	HEX. S45C GALV. (SEE GENERAL NOTE 9)	N/A	N/A	
			250 - 400	STPG370 SMLS 12.7T										
SOUNDING	ATM.	NOR.	40 - 50	STPG370 SMLS SCH.80	GALV.	—	—	—	SLEEVE	—	—	—	—	

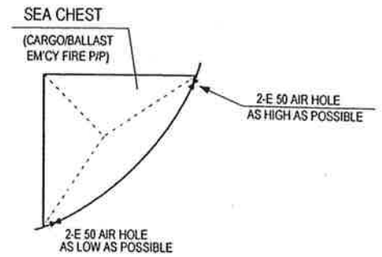
PROJECT	TITLE
5268	P/D OF AIR AND SOUNDING SYSTEM

DSME DAEWOO SHIPBUILDING & MARINE ENGINEERING CO.,LTD.

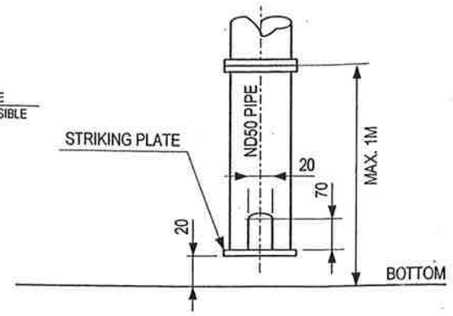
DWG TITLE : P/D OF AIR AND SOUNDING SYSTEM



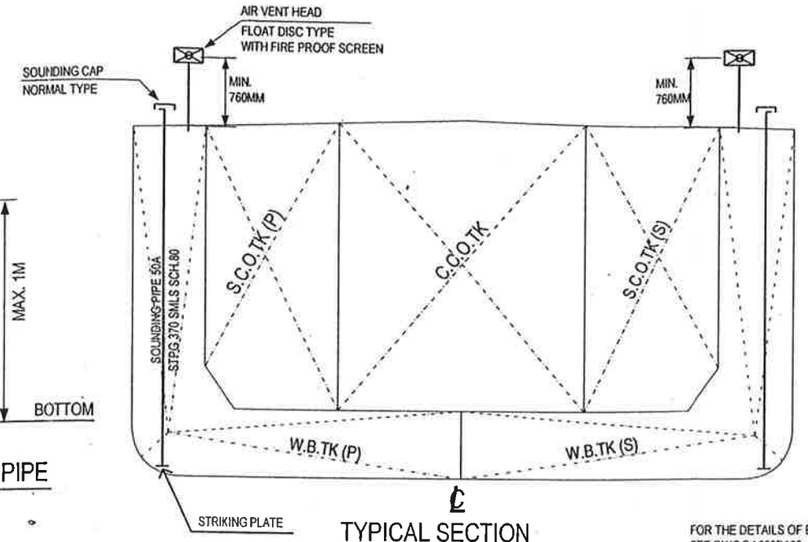
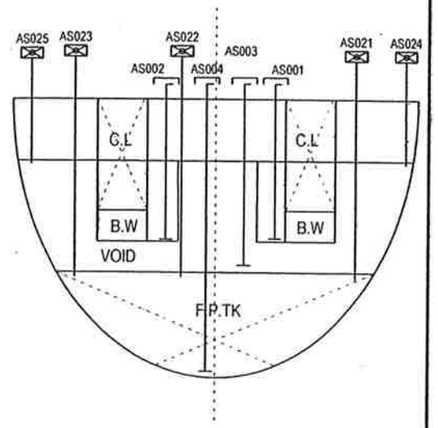
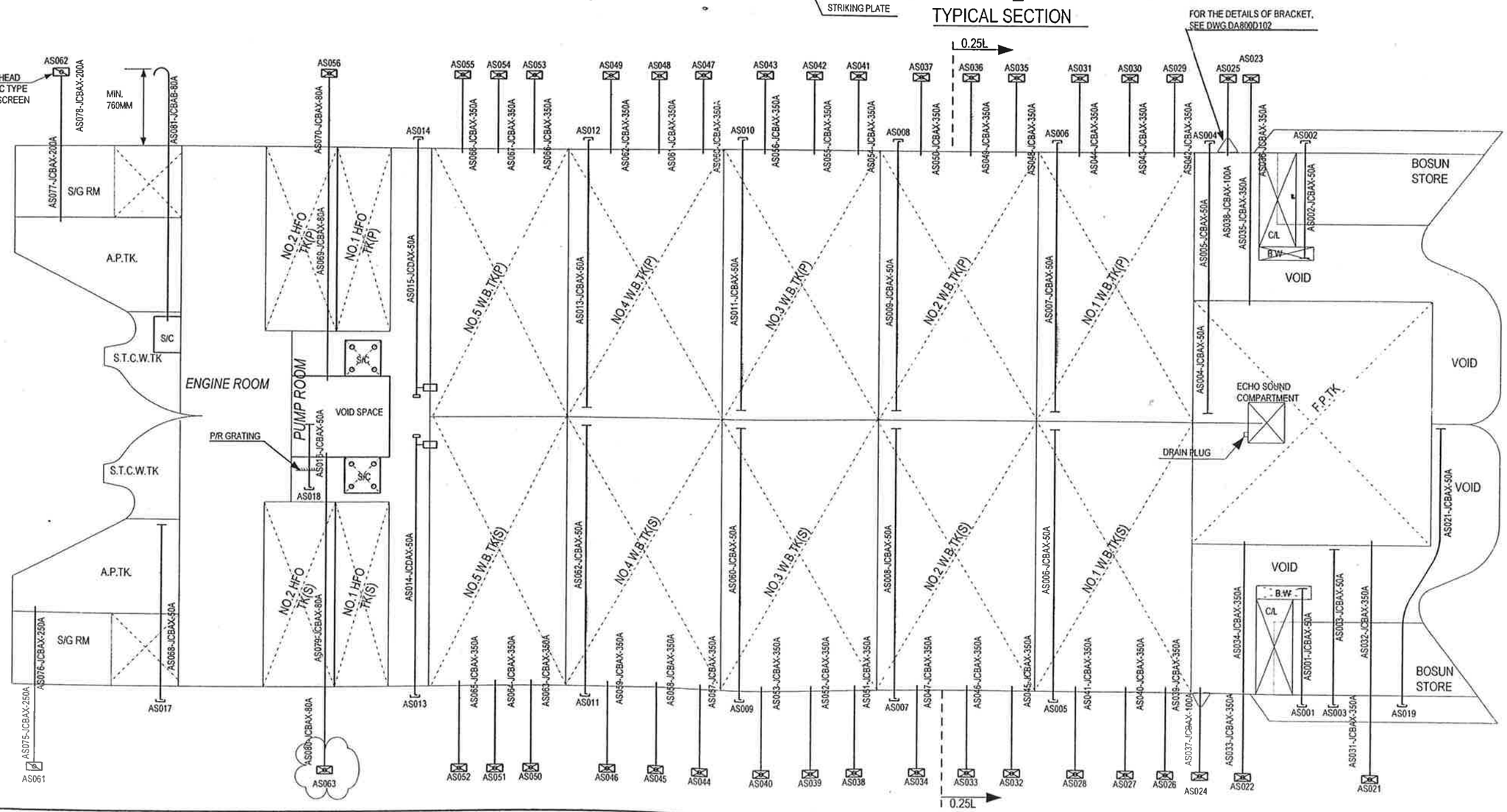
NOTE !
AIR & SOUNDING PIPES FOR OIL TANKS IN E/R
=> REFER TO P & ID IN E/R (DA700M001)



DETAIL OF SEA CHEST



END OF SOUNDING PIPE



TYPICAL SECTION