

Rural & Regional Affairs and Transport Legislation Committee

ANSWERS TO QUESTIONS ON NOTICE

Budget Estimates 2017 - 2018

Infrastructure and Regional Development

Committee Question Number: 171

Departmental Question Number: SQ17-000350

Program: n/a

Division/Agency: Australian Maritime Safety Authority

Topic: Inspection of Maeve Anne documentation

Proof Hansard Page: 10 (23 May 2017)

Senator Cameron, Doug asked:

Senator CAMERON: Can you provide me all documentation in relation to the inspections and the exemptions and the prohibitions that were issued by AMSA in relation to the Maeve Anne?

Mr Kinley: Yes, Senator, we can do that.

Answer:

Under the *Privacy Act 1988*, the Australian Maritime Safety Authority (AMSA) is bound by Australian Privacy Principle 6 which states that an entity that holds personal information about an individual that was collected for a particular purpose, must not use or disclose the information for another purpose, unless with that persons consent or compelled to disclose that information by a court or law.

As AMSA is releasing this information outside the Freedom of Information Act 1982 process, and to ensure it is not in breach of APP 6, AMSA has provided redacted versions of all documents, removing all personal information (names, addresses, phone numbers and signatures).

All documentation relating to inspections, exemptions and prohibitions for the *Maeve Anne* are at Attachment A.

Attachments

- Attachment A – documentation relating to *Maeve Anne*.

Maeve Anne documents as at 20 July 2017

Part 1

- Vessel Safety Management System

Part 2

- Steel Construction Trim and Stability Booklet
- Trim and Stability Book Addendum dated 3 May 2016

Part 3

- Stability and Strength Assessment for Operation with Kobelco CKE 2500 Crane dated 14 July 2015
- Granville letter to Bernard Reeves Stability Addendum dated 3 June 2016
- Granville B Reeves Stability Addendum dated 3 June 2016

Part 4

- International Oil Pollution Prevention Certificate dated 7 June 2016 valid until 2 November 2016
- International Oil Pollution Prevention Certificate dated 7 June 2016 valid until 3 November 2016
- Record of Construction and Equipment for Ships other than Oil Tankers dated 7 June 2016
- National Regulator Recommendation Schedule dated 3 June 2016
- Prohibition Notice dated 30 May 2016
- Temporary Operations Permit dated 31 May 2016
- Specific Exemption dated 6 October 2016
- Certificates of Operation and Survey dated 21 October 2016.
- Document of Compliance for Load Line dated 10 July 2015
- Attested/Accredited Marine Surveyors Recommendation to the National Regulator dated 3 June 2016:
 - NSCV
- Attested/Accredited Marine Surveyors Recommendation to the National Regulator dated 14 July 2015:
 - Deck Strength – ABS Barge Rules
 - Stability – NSCV Part CBA
- Attested/Accredited Marine Surveyors Recommendation to the National Regulator dated 3 June 2016:
 - NSCV – C6
 - Stability Addendum covers only specific crane operations
- Certificate of Class dated 7 June 2016 – 100AN Pontoon, Extended Protected Waters Service at the port of Port Jackson
- Certificate of Class dated 10 July 2015 – 100AN Pontoon, Extended Protected Waters Service at the port of Port Macquarie, Australia
- Certificate of Operation dated 17 September 2015
- Certificate of Registration dated 13 April 2012
- Direction Notice dated 6 April 2017
- Document of Compliance for Load Line dated 7 June 2016
- Survey Report and Recommendation dated 6 June 2016
- Interim Certificate dated 10 July 2015 – Port Macquarie
- Interim Certificate dated 20 July 2015 – Port Macquarie
- Interim Certificate dated 7 June 2016 – Port of Sydney

Vessel Safety Management System

Vessel Profile and Name "MAEVE ANNE"

TYPE: Deck Barge Construction

YEAR BUILT: 1982

FLAG: Australian

CLASSIFICATION / NO: Lloyds / 8127737. 100A1

PORT OF REGISTRY: Cairns

LENGTH OVERALL: 48m

BREADTH MOULDED: 24m

DEPTH MOULDED: 2.2m

OPERATING DRAFT: 1.3m

GRT / NRT: 654 / 196

DEADWEIGHT: 552.67 tonnes

CLASS: 2C, 2D, 2E

REGISTRATION NUMBER: 28812 QD

MAX PERSON CAPACITY: 14



Revision Summary

Revision	Date	Description	Prepared by	Signature	Authorised by	Signature
A	02/07/2015	Internal Review				
A	29/01/2016	For Project Submission				
B	23/02/16	Added supervisor duties within sec 16.22				
Section Changed:	1.1.3	Reason for Change: Clarification for PC				
Section Changed:	16.19 & 16.23	Reason for Change: Project Specifics				
Section Changed:	16.22	Reason for Change: Added Supervisor to shut down common plant in plan				

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1. Introduction

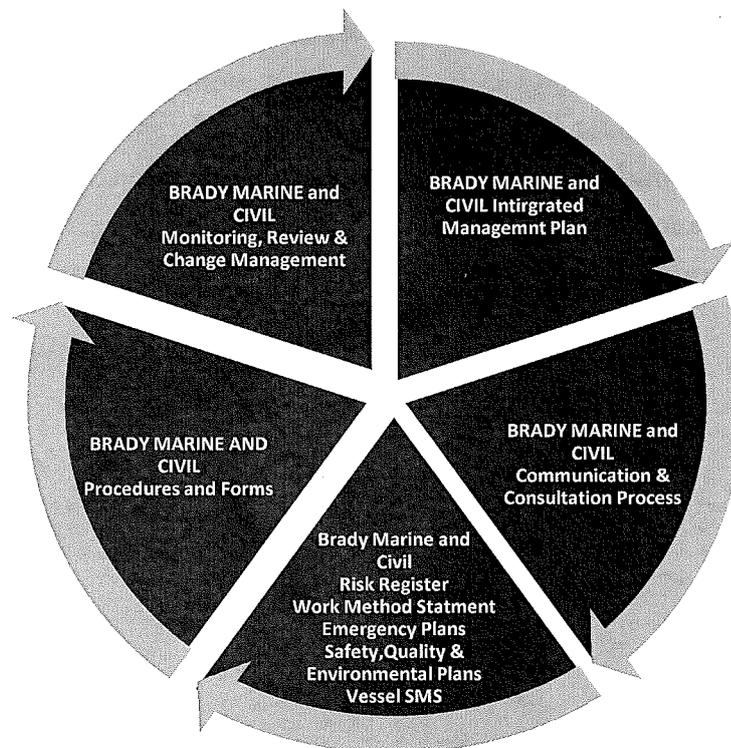
1.1 Purpose and Application

1.1.1 Overview of this Vessel Safety Management System

This Vessel Safety Management System (SMS) outlines the system elements used by Brady Marine and Civil for the implementation and execution of the Maeve Anne pilling barge.

The Vessel Safety Management System (SMS) in conjunction with the Brady Marine and Civil Integrated Management Plan, Construction Safety Management Plan, Quality Management Plan, Environmental Management Plan and Emergency Response Plans shall form the WHSMS for this Workplace.

This Vessel Safety Management System addresses key identified risks associated with Maeve Anne. It also addresses legislative and contract requirements and provides guidance in a suitable framework to facilitate the successful implementation of marine management practices. The aims of which is to ensure the achievement and monitoring of uniform WH&S management standards on-board Maeve Anne.



Due diligence in relation to ensuring health and safety is defined in the WHS Act 2011 section 27.5. The above diagram shows the documents and process relationship between the Brady Marine and Civil's Management System framework which complies with, and demonstrates BMC's Due Diligence Cycle.

1.1.2 How to use this Management SMS

The core function of this SMS is to provide guidance to all workplace stakeholders in the conduct and compliance of health safety and vessel requirements in the workplace. It is not the intention of the SMS to repeat guidance as provided in individual references.

1.1.3 Definitions and Abbreviations

Abbreviation	Definition
SMS	Safety Management System
Domestic Commercial Vessel	Means, a vessel that is for use in connection with a commercial, governmental or research activity.
Muster Point	A space on a vessel designated for assembly of persons in the event of an emergency or incident
Crew	Means individuals employed or engaged in any capacity on board the vessel on the business of the vessel, other than the Master of the vessel or a pilot.
Tender Boat	is used only to transport goods or people between the shore and its parent vessel or between its parent vessel and another vessel; and (b) does not operate further from its parent vessel than 1 nautical mile, or another distance determined by the National Regulator; and (c) Is less than 7.5 m long, or another length determined by the National Regulator.
Distress Signals	Internationally or Nationally recognised signals for indicating distress, and emergency or danger
Emergency Station	A pre-assigned location, responsibility and/or action undertaken by a crew member in response to, or in preparation for, an emergency
Master (if required)	Is responsible for the safety of the Vessel and all on board. (If required)
Certificated crew (if required)	means crew members, including the Master, each of whom hold a certificate to which <i>Marine Order 505 (Certificates of competency — national law) 2013</i> applies This vessel is non-propelled therefore is not required to have licenced (certified) crew on board. However, the vessel is 'appropriate crewed to mitigate the risk associated with the vessels operations'. An appropriate crew has been determined by BMC in accordance with NSCV Part E - Schedule 2 - section 6 - para 6. Compliance to NSCV Part E, ensures that the owner/operator have 'appropriate crew' on-board procedures in place to mitigate the risk associated with the vessels operations.
Marine Incident	An event causing or involving any of the following in connection with the operation of vessel a) The death of, serious injury to, any person on board a vessel, or caused by a vessel. b) the loss of a person from a vessel c) the abandonment, loss or presumed loss of a vessel d) the collision of a Vessel with another Vessel, or with an object e) the grounding, sinking, flooding, or capsizing of a vessel

	<ul style="list-style-type: none"> f) a fire or explosion on board a Vessel g) loss of stability affecting the safety of a Vessel h) structure failure of a Vessel i) close quarters/near miss
Passenger	Persons not billeted to a vessel as crew nor appointed seamanship duties on a vessel.
Serious Injury	An injury requiring admission to hospital. (Does not include attendance at emergency room or medial practice for treatment).
Vessel	Water craft requiring registration
Worker	In the context of Brady Marine and Civil controlled workplaces, worker refers to Brady Marine and Civil workers, contractors and any person engaged to participate in work activities at the workplace.
Workplace	For the purpose this SMS, workplace is also known as 'Vessel'
SWMS	A Safe Work Method Statement is a documented risk assessment process
PFD	Personal Flotation Devise
BMC	Brady Marine and Civil

2 Overview

2.1 Scope of works conducted by the "MAEVE ANNE"

The Maeve Anne is a pilling barge and as such has the provisions for the following plant and equipment;

- 1) 250 tonne crawler crane mounted on a 20m x 10m area of strengthened deck at bow.
- 6 x 20T capacity hydraulic mooring winches c/w 300m x 32mm dia. wire and 6T anchors, diesel powered power pack
- 12m high fully hydraulic pile leader can be mounted in either of the forward corners for driving piles in diameter ranging from 550 to 1200mm at a maximum 1:4 rake in any direction.
- Pilling and Vibro Hammer and power pack
- Office, crib room and ablution block
- Generator for power supply
- Pile storage
- Storage container
- Excavator
- Elevated Work Platform
- Bunkering
- Using Hazardous Substances
- Tender boat/s

The above barge and equipment is used to place and drive steel piles into the sea bed/river floor for the construction of bridges, pontoons and other over/under water structures.

2.2 Legal and Other References

The Information contained within this SMS has been referenced from the below documents;

- National Standard for Commercial Vessels Part E Operations
- Marine Safety (Domestic Commercial Vessel) National Law Act 2012 No. 121, 2012
- Work Health and Safety Act 2011
- Work Health and Safety Regulation 2011
- Workplace Injury Management and Workers Compensation Act 1998
- Transport Operations (Marine Safety) Regulations 2004
- Protection of the Environment Operations Act 1997 (POEO Act)
- Marine Safety Act 1998
- Navigation Act 1912
- Project Construction Safety Plan BR 100-PLN-001

The Vessel Safety Management System SMS and other relevant references will comply with legislation to ensure the health and safety of Brady Marine and Civil Staff, Contractors, Workers, Visitors and all other stakeholders and public, in or near the Workplace.

2.3 Policies

Below is the Brady Marine and Civil Safety Policy Document. Other Policy documents include;

- Quality
- Environmental
- Drug and Alcohol
- Return to Work

These Policy documents can be found in all BRADY MARINE AND CIVIL offices or crib rooms.



**HEALTH & SAFETY
POLICY STATEMENT**

Brady Marine and Civil Pty Ltd specialises in the delivery of technically demanding civil projects, predominantly marine infrastructure.

The objective of the company and its management is to implement and actively maintain a positive commitment to health and safety in all aspects of our business to ensure the protection of all our personnel, visitors and stakeholders.

Additionally the company will establish measurable objectives and targets annually to ensure prevention and elimination of injury and ill health and continual improvement of our health and safety management and performance.

We will ensure that the company undertakes all construction works in full compliance with the relevant statutory requirements through the implementation of a integrated management system to identify and control hazards, document standards achieved, improve efficiency and work methods, raise competency and performance of all employees, and enhance the company's reputation in the industry.

The Brady Marine and Civil objectives in respect to health and safety include:

- *Establish open and positive relationships with our Clients which encourage working together to agreed standards for our mutual benefit*
- *Develop, use and update management procedures which comply with the requirements of AS/NZS 4801:2001 and OHSAS 18001:2007*
- *Operate in compliance with all contractual and relevant statutory obligations*
- *Maintain a high standard of ethics in all facets of our business*
- *Regularly review our performance against objectives and targets and take appropriate action when necessary.*
- *Communicate our goals and objectives effectively within the organisation*
- *Adequately address training needs to enhance the level of skill and competence within our organisation*
- *Review this policy on a regular basis to ensure that it is both adequate and effective*

The company management is committed to the development and implementation of the integrated management system and continually improving its effectiveness.

We will incorporate these objectives into every aspect of our business activities and monitor our performance to ensure we are delivering projects in accordance with these principles.

Managing Director:

Date:

28/01/2016

3 Responsibilities

The below table lists the responsibilities of stakeholders regarding this SMS.

Position Title	Overall Description of Position Activities
Shore-Based Manager (Project Manager)	Manage shore-based elements of the emergency response plans and training. Responsible for all on and off shore-based operations against the project assigned to and other responsibilities as outlined in the job description and elsewhere in the safety management system.
Vessel Master (Not required on this project)	Maintain orderliness and discipline. Authority and responsibility to make decisions with respect to the safety of the Vessel and pollution prevention and to request the owner's assistance as necessary. Ensure safety of passengers, crew and the cargo and safe operation of the Vessel. Implement the Safety Management System aboard the Vessel including crew and passenger participation in emergency response procedures. Assign organizational duties for Vessel's operation, navigation and maintenance. Operate the Vessel within its capability considering sea-state conditions, weather and stability limitations. Identify crew (appropriate number, qualifications and role) required for emergency response procedures (minimum crew) and key operating procedures (adequate crew) for the Vessel and its safe operation. Identify key operating procedures for the Vessel, duties for each crew member and manage fatigue. Maintain a complete record of the Vessel's operations which must be held for a period of at least five years. Monitor the sufficiency of safety and pollution prevention equipment and procedures. Ensure appropriate resources and shore support are provided to the Vessel.
Crew	Work under the direction of the Master (If required) and barge supervisor. Watch keeping duties as authorised by the Master including direct supervision of any unlicensed persons while on watch. Participate and contribute to emergency response SMS training.
Owner	Provide strategic direction for the Business. Register and insure the Vessel. Develop long-term business plans for the Vessel. Appoint the designated person. Assist in the decision making of the vessel if asked.
Designated Person/ Construction manager (if different from owner)	Act as the representative of the Vessel's owner. Maintain Vessel accounts, finance and banking. Recruit and appoint the Master (with owner). Appoint the shore-based manager and manage their performance. Ensure all crew qualifications and maintain crew records. Ensure supply of equipment and machinery to operate the Vessel safely. Report to the owner.
Passenger/Visitor	Follow all instructions provided by the Master of the vessel and crew. For the purpose of BMC, construction workers report to the Construction Supervisor for construction related duties.
Barge Supervisor	Overall responsible for the operational requirements of the barge and construction activity. Consults with the Master of the vessel in the respect to the safety of the vessel and marine pollution requirements.

4 Vessel Contact Details



EMERGENCY CONTACT DETAILS

Project Name: Barangaroo Ferry Hub	Date Issued: 29/01/18
Location: Sydney	State: NSW

Brady Marine & Civil Pty Ltd			
Contact	Name	Office	Mobile
Managing Director			
General Manager			
Construction Manager			
Safety Manager			
Site Engineer			
Foreman			
Project Manager			
Project Manager			

Client Contacts			
Contact	Name	Office	Mobile
Emergency Coordinator (MCD)			
Safety representative (MCD)			
Environmental representative (MCD)			
Project Engineer (MCD)			
Senior Project Engineer (MCD)			

Emergency Services			
Contact	Address	Emergency No.	General No.
Ambulance		000	
Police		000	
Police - water		000	
Fire Service		000	
Rozelle Medical Centre	870 Darling St, Rozelle NSW	(02) 9818 1355	(02) 9818 1355
Regional/District Council Environmental Emergency Hotline			
RMS Marine Safety			0427 435 957
RMS Environmental and General Number			13 12 56

5 Risk Assessment

FORMS
SF-012 HAZARDOUS SUBSTANCE RISK ASSESSMENT
SF-022 SAFE WORK METHOD STATEMENT TEMPLATE
SF-029 PROJECT RISK REGISTER
SF-052 PLANT RISK ASSESSMENT
SF-076 BARGE BUNKERING CHECKLIST
SF-074 WORK BOX PERMIT AND CHECKLIST

An assessment of all activities will be carried out and captured within the BMC Risk Register. A SWMS shall be developed for all high risk construction tasks incorporating the key operations of the vessel. The SWMS will identify the following:

- any potential risks involved in the conduct of any key operation task that may expose the following to unacceptable risks:
- the vessel;
- the operational environment of the vessel;
- persons on or near the vessel;
- the appropriate crew for the vessel;
- a person/s to be responsible for ensuring that actions needed to correct any identified potential risk are carried out.

The SWMS must be reviewed if:

- The vessel undertakes an operation that differs from that normally undertaken by the vessel;
or
- The supervisor and Master (not required on this project) of the vessel considers that the risk to the safe operation of the vessel may have increased or decreased.

Each task performed on the vessel will have a SWMS completed which the crew member/s undertaking the tasks have helped developed and or reviewed and signed.

Once a risk has been identified and the risk assessed, removing or minimising the hazard through control strategies is a priority. Risk control measures adopted as a result of the assessment should be considered and implemented in the following order, referred to as the **“Hierarchy of Control”**.

Elimination; the complete elimination of the hazard achieved by removing the hazardous plant, equipment, substances etc. or by discontinuing the work.

Substitution; this is achieved by replacing hazardous plant, equipment, substances etc. with a safer alternate (i.e. substituting sulphuric acid with an alternate chemical not as hazardous, but one that will still do the job).

Engineering; this is achieved by isolating the hazard by guarding or enclosing it. E.g. fitting guards, mechanical aids, barricading etc.

Administrative Controls; this is achieved by introducing or changing the work method to reduce the risk exposure. It may also include limiting the time of exposure, providing routine maintenance, additional supervision, training, re-training, providing procedures and enforcing correct work practices.

Personal Protection Equipment (PPE); this is a short term or last resort control measure. It is used when other means of controlling the hazard are not adequate or feasible. This is achieved by providing suitable PPE or impact minimisation equipment such as spill clean-up material or dust suppression measures.

Appropriate Crew; A risk assessment to determine the appropriate crew for each type of operation for the vessel has been undertaken and is contained below in appendix 26. By evaluating the risks to the vessel, the environment and all persons who will be on or near the vessel BMC have determined the appropriate number of crew in which to control and execute on board vessel operations safely.

6 Owner's responsibility and authority statement

The owner and Managing Director of Brady Marine and Civil is _____ I is also the owner of the "MAEVE ANNE" Barge and has overall control of the barge and its work. _____ has given authority to _____, the Construction Manager of Brady Marine and Civil to execute the works the barge and crew will undertake. _____ contact numbers are contained in the Emergency Contact Form SF006 in section three of this SMS.

7 Designated persons and authority statement

_____ owner of the MAEVE ANNE has designated _____ who has direct access to himself to be responsible for monitoring the safety and pollution prevention of the MAEVE ANNE and ensuring appropriate resources and shore support are provided to the MAEVE ANNE at all times.

_____ has overall responsibility of the day to day construction activities including all BMC employees. _____ is also the onshore contact for all marine works inclusive of the barges. The communication process for crew is that they are to raise all requests/concerns with the on-board supervisor in consultation with the Master (where necessary) who in turn will communicate with the Project Manager, in turn with _____

Alternatively the crew and Master are aware that they can communicate directly with _____ through phone or face to face. _____ contact numbers are contained in the Emergency Contact Form SF006 in section three of this SMS

8 Master's responsibility and authority statement

If required, the Master has responsibility and authority to ensure and to verify that the operation requirements within the SMS and to the applicable legislations are being complied with and to take the necessary actions to ensure there are no risks to life, environment or property.

The Master has responsibility and authority and may request the owner _____ or designated person _____ assistance in making decisions for the operation, navigation and safety of the vessel and pollution prevention to ensure compliance with the operation requirements.

9 Resources and personnel training

FORMS
SF-002 SITE INDUCTION REGISTER
SF-003 SITE INDUCTION PEROCEDURE
SF-004 WORKER INDUCTION RECORD
SF-006 EMERGENCY CONTACT LIST
SF-010 TRAINING RECORD
SF0-32 SKILLS MATRIX
SF-033 VERIFICATION OF COMPETENCY
APPROPRIATE CREW RISK EVALUATION FOR VESSEL OPERATIONS

The Project Manager with input from the Construction Manager and Master will determine appropriateness of the crew while keeping in line with the legislative requirements. When deciding on the crew the following considerations will be taken into account;

- The tasks or activities of the vessel and any particular demands on the crew
- The number of persons to be carried on the vessel and to complete the tasks
- The design characteristics of the vessel, including its general arrangements, machinery and equipment
- The competency required
- The area of operation
- Potential fatigue of the Master and crew members
- Emergency Response and preparedness

Training of the on-board procedures eg; (barge induction) will be given by the Master, barge supervisor or by a crew member who the Master/barge supervisor considers has the skills and knowledge to provide the training or by an accredited training assessor. All training undertaken will be documented and kept on file for five years.

All crew members and Visitors will receive the following applicable training as soon as practicable after joining the vessel and before commencing vessel duties:

- The person's presence and duties on board the vessel and how to undertake them safely
- Training in all emergency procedures contained within this SMS.
- Vessel Induction

A risk assessment to determine the appropriate crew for each type of operation for the vessel has been undertaken and is contained below in appendix 26. By evaluating the risks to the vessel, the environment and all persons who will be on or near the vessel BMC have determined the appropriate number of crew in which to control and execute on board vessel operations safely.

10 Procedures for on-board operations

FORMS
SF-041 VESSEL INDUCTION REGISTER
SF-042 VESSEL INDUCTION PEROCEDURE
SF-043 VESSEL CREW TRAINING REGISTER
SF-044 VESSEL CREW QUALIFICATION RECORD

There has been a number of identified key on-board operations for which procedures have been developed. Each crew member will be trained in all key on-board operations to ensure he/she has the skills and knowledge to perform that task. Once trained, each crew will be assigned key on-board tasks.

A record of the key on-board procedures is to be kept on-board the vessel ensuring easy access by any crew member and are attached as Appendixes 1-15.

Each task performed on the vessel will have a SWMS completed which the crew member/s undertaking the tasks have helped developed and or reviewed and signed.

11 Documentation

Processes for the management and the control of documents and records have been established and are maintained to the Brady Marine and Civil and legislative requirements.

Brady Marine and Civil will ensure that documents and records are able to be identified, tracked and found in a timely manner and that confidential documents are kept secure and in accordance with relevant confidentiality and privacy legislation.

Types of documentation and records may include, but not limited to:

- Vessels Profile
- Certificate of Compliance - Safety Equipment
- Certificate of Compliance - Survey
- Certificate of Compliance – Build
- Certificate of Compliance – Load line certificate
- Certificate of Compliance – Stability
- Certificate of Compliance – Design
- Certificate for Electrical Inspection
- Certificate for Fire – extinguishing equipment service
- Positive Floatation Statement
- Positive Floatation Statement for the Tender
- Vessel Survey Checklist
- Certificate of Survey Report
- Record of Inspection by Vessel Inspector
- Section 18a exemption/s
- Marine Incident Reports
- Maintenance Records
- Slipping Records
- Emergency Drill Register

12 Follow-up on hazardous occurrences and non-conformances

FORMS
SF-063 HAZARD REPORT
SF0-051 INCIDENT REPORTING DEFINITIONS
SF-047 WITNES STATEMENT
SF-016 INCIDENT AND INVESTIGATION REPORT
SF-MSQ- MARINE INCIDENT REPORT FORM

The purpose of hazard and incident reporting and investigation is to determine the root causes and identify the means to prevent future recurrence of the incident. The investigation shall be limited to the gathering of facts.

Employees are required to report all incidents, near misses or hazards to the supervisor and Master immediately. The Project Manager shall verbally notify the client as soon as practicable within 24 hours after the occurrence of an incident.

The Project Manager shall forward a written report to the Construction and Safety Manager within 24 hours of the incident occurring. The Project Manager is responsible to ensure that incidents are thoroughly investigated and reported, and all action items are closed out within required timeframes.

The report shall include the following information as applicable:

- Root cause;
- Corrective and/or preventative actions;
- Description of the incident;
- Issues deemed relevant to the incident;
- Medical condition of the injured person;
- Personal details of the involved person/s; and
- Witness Statements.

Incidents and near misses shall be recorded in the incident Investigation form SF016 and recorded on the project Incident Register.

Once the report is completed it will be given to the client and all other stakeholders.

In order to save valuable time and to capture the maximum information the below questions should be used as prompts:

Name of ship	Ships position (Lat/Long, port/berth)
Ports to and from	Nature of casualty (collision, grounding, fire)
Nature and extent of damage	Name Company with any contact numbers
Name of vessels involved,	Any casualties or fatalities
Nature of any services required	Services already summoned
State of weather and water conditions	
Date and time of report.	

In the event of a spillage of cargo or bunkers the following items should be added:

Type of oil or cargo spilled	Cause of incident, if known.
Estimate of quantity spilled	Estimated current rate of spillage
Whether clean-up has been attempted	

An information sheet/Guidance Note relating to the legislative reporting requirements shall be followed for applicable reports and timeframes regarding the vessels and is attached as Appendix 16.

It is recommended that the information sheet be printed out and posted in the office and crib rooms for referral.

13 Maintenance of vessel and equipment

FORMS
SF-052 PLANT RISK ASSESSMENT
SF0-017 PLANT PRE-DELIVERY INSPECTION CHECKSHEET
SF-028 PLANT PRE-START CHECKLIST
SF-062 VESSEL MOUNTED CRANE INTREGRITY INSPECTION
SF-025 SITE PLANT REGISTER
PL-002 SERVICE HOURS
PL-009 MECHANICAL REPAIR SHEET

Brady Marine and Civil has a vessel, plant and equipment documented maintenance program in place which is overseen by the BMC Plant Manager. All Maintenance is undertaken to the manufactures and BMC requirements.

All plant and equipment including vessels undergo a daily documented pre-start check conducted by a competent person to identify any deficiencies prior to operation. If found, the Master and supervisor inform the plant manager and the issue is repaired/rectified back to the original approved state by a competent person.

All servicing, maintenance and repairs to BMC vessels, plant and equipment is recorded and documented.

13.1 Working On or Near Water

The Project Manager shall ensure that a Marine Works (Above and/or On Water) SWMS BMC 005 has been developed and implemented referring to and using the PRA.

All hazards have been identified and assessed by competent personnel (including assessment of environmental conditions) taking into account:

- Workplace and vessel inductions
- Work Vessels
- Materials and equipment
- Communication and emergency preparedness
- Personal Protective Equipment
- Environmental requirements and reporting of incidents
- Training and competency requirements
- Tasks and activities carried out by the vessel and
- The plant, equipment and materials contained on and used on the vessel

13.2 Personal Protective Equipment (PPE)

FORMS
SF-031 PPE ISSUE REGISTER

Personal Protective Equipment (PPE) shall be used to protect individuals from actual or potential health and safety risks where the hazard cannot be eliminated and/or engineered out.

PPE is an important inclusion of the vessel maintenance and operations. It can include eye protection (normal safety glasses, prescription safety glasses, face shields etc.), hand protection, headwear, face shields, footwear, breathing equipment, hearing protection, full body protection (survival suits), high visibility clothing, respirators and sun protection materials.

Brady Marine and Civil will be responsible for the selection, introduction, maintenance, training and use of PPE for Brady Marine and Civil workers. Contractor management are responsible for the provision of their PPE in accordance with the contract provisions.

Brady Marine and Civil and Contractor workers (including visitors to the Workplace) will be introduced to basic PPE requirements through the Site Induction program and through other training regimes (e.g., Area Specific Inductions, Toolbox Talk, specialized training etc.).

The selection of PPE will be determined by a risk assessment and through manufacturer or supplier material and documentation and comply with the relevant Australian Standards. Worn, faded or PPE which is damaged must be discarded and suitably replaced.

13.3 Medical First Aid

FORMS
SF-075 DOCTOR LETTER
SF-050 MEDICAL AUTHORITY RELEASE FORM

SF-048 INJURY NOTIFICATION FORM
SF-047 WITNESS STATEMENT
SF-049 RETURN TO WORK PLAN
SF-MSQ MARINE INCIDENT REPORT FORM
PFC-013-01 INJURY RESPONSE FLOWCHART

The Vessel will have at least one qualified first aider on board while the vessel is undergoing work activities and that will maintain all First Aid supplies working with both the Master and Supervisor. Portable radio communication means will be set up between shore based operations and Master/supervisor. A second form of communication will be by way of mobile phone.

On receipt of an injury or serious illness report, inform the Master and call the following to the location of the casualty the method for transporting casualty to land will be by stretcher and tender boat. An awaiting land based ambulance will be at the tender boat landing area to transport the injured to hospital.

A fact sheet of scale “G” which refers to the list of the minimum first aid requirements this vessel requires according to its class is attached at Appendix 17.

13.4 Safety Equipment Requirements

Safety equipment this vessel requires according to its class can be found in APENDIX 18. All safety equipment needs to be inspected by a competent person (eg; the Vessel Master) to ensure that all is in good repair and in date.

14 Emergency Preparedness

14.1 Overview

FORMS
SF-006 EMERGENCY CONTACT DETAILS
SF-027 EMERGENCY RESCUE PLANS
SF-027D SPILL RESPONSE PLAN
SF-054 EMERGENCY DRILL RECORD
Sf-MSQ MARINE INCIDENT REPORT FORM

Provisions have been made for identified emergency situation where the safety of life, the ship, or marine environment is threatened, the Master has the responsibility to take the action he/she sees fit to minimise the risks and to save life.

Masters must summon assistance as soon as possible in the event that the ship is in danger. The rescue authorities and other ships can be alerted using the "Distress" or "Urgency" signal May Day, May Day, May Day or for construction activities, EMERGENCY, EMERGENCY, EMERGENCY.

If tug assistance is required when the ship is in no immediate danger, the Master shall contact the Barge Supervisor, Project Manager or designated person.

A barge lay-out plane showing all response equipment the first aid facility and assembly station is within Appendix 18.

Rescue plans have been developed with assigned actions that need to be followed if the named event was to accrue. These plans can be found in Appendixes 19-24

The rescue plans will form part of the on-board training requirements and need to be displayed.

15 Verification, audit and review

FORMS
SF-073 WEEKLY MARINE BARGE INSPECTION
SF-021 MONTHLY SITE AUDIT REPORT
SF-020 SITE SAFETY AND ENVIRONMENTAL INSPECTION
SF-068 STANDARD HANDRAIL CHECKLIST
SF-045 SWMS REVIEW CHECKLIST

BMC has a document review and record system in place. This systems captures the initial review and approval of documents, any changes made, the section the changes relates to and date of change, are signed by the person making and approving the changes.

BMC documents are reviewed annually with a re-approval and a record of those reviews are recorded.

Project Management and the vessel Master shall review the status and adequacy of this Vessel Safety Management System and all associated documents within and it refers to, to ensure that it complies with current Client and Company requirements as well as relevant legal and other obligations.

This SMS or parts within will be audited monthly. This compliance audit shall form part of the continual improvement process as documented in the Integrated Management Plan. Inspections will also be carried out as part of the continual improvement process.

The following personnel should be involved in the audit:

- Project Manager
- Supervisor

- Master
- Project Engineer
- Construction Manager
- Safety Manager

The SMS shall be amended for compliance as and when required during the course of the contract when the following situations arise:

- Client recommendations for changes (particularly following initial review)
- Changes to the Company's standard system or to legislation changes.
- Where opportunities for improvement or deficiencies are found within the systems

16 Appendices

16.1 Appendix 1: Managing Stability

	Actions	By Who
13.	Ensure the vessel's stability condition is within the stability book criteria.	Master
13.	Instruct the crew on the cargo loading routine and safe handling practices.	Master
13.	Train the crew on cargo lashing operation and safe practices.	Master
13.	Ensure fuel and water tanks are at a safe level and the vessel is trim.	Master
13.	If required, Ensure all bilges are dry.	Crew 1
13.	Load cargo/plant and equipment evenly to maintain the vessel in reasonable trim.	Master
13.	On completion of loading the cargo, plant /equipment ensure the cargo is secured against the anticipated movement of the vessel for the duration of the voyage.	Master/ Crew1
13.	Ensure the vessel's stability condition is within the stability book criteria, or to good seaman vessel practices.	Master
13.	Close all watertight doors and hatches and make ready for operations.	Crew 1 and 2
13.	Confirm that the cargo plant equipment manifest is correct.	Master
13.	Enter the Vessel's stability condition in the Vessel's log.	Master

16.2 Appendix 2: Managing Watertight Integrity

Action	By who
1 Follow the maintenance and inspection regime to ensure all openings are functioning.	Construction Manager
Prior to departure/operations	
2 Check that hatches, deadlights, portholes and windows that allow water ingress while underway are shut.	Crew
3 Check that appropriate valves, bungs, and watertight doors are shut.	Crew
4 Check that deck hoses and engine water cooling outlets can flow freely over the side.	Crew
5 Check cone bungs are tethered to hull through fittings every six months.	Construction Manager
6 Check bilge level and that bilge pumps and alarms work.	Crew
Check storms boards are stowed near access to below decks.	Crew

16.3 Appendix 3: Cargo Operations

	Action	By who
1.	Cargo handling/lifting operating signals confirmed:	Operator/Rigger/Dogger
2.	voice commands, two-way radio Hand signals.	
3	Safety signage and barriers in place.	Master/Crew
4	Crew to have all personal protective equipment, (site requirements).	Master
5	Lifting equipment, wires and slings inspected and tested.	Rigger/Dogger
6	Observe Occupational Health and Safety standards and safe practices: loading and unloading cargo cargo categorised, stowed and secured using good seaman Vessel practices Cargo on deck secured, using good seaman Vessel practices.	Rigger/Crew
7	Vessel stability and trim is corrected to comply with the Vessel's stability booklet before putting to voyage.	Master
8	Vessel is compliant with approved load line requirements and authorities legislation.	Master
9	Warning signals or lights are displayed where required.	Master
10	Radio warning given to other Vessels before manoeuvring in confined areas.	Master
11	Authorities notified and documentation completed for carriage of dangerous cargo.	Project Manager/Master

16.4 Appendix 4: Prepare for Voyage

Action	By who
1. Check forecast weather conditions and tides.	Master
2. Plot the proposed voyage track on a current chart.	Master
3. Develop a trip SMS for the voyage and lodge with a shore base.	Master
4. Draw up and implement a crew duties roster and crew briefing.	Master
5. Check the Vessels ballast and trim.	Master/Supervisor
6. Close all watertight doors and hatches.	Master/Supervisor
7. Secure any 'No Passengers' areas.	Crew
8. Clear decks and stow all loose items.	Crew
9. Board passengers and seat them as soon as possible.	Crew
10. Passenger manifest check.	Master
11. Remove boarding gangways and secure handrail gates.	Crew
12. Announce the Vessel's readiness to depart.	Master
13. Check Vessel is clear to depart.	Master
14. Let go mooring lines and stow in lockers.	Crew
15. Deliver passenger safety briefing.	Master

16.5 Appendix 5: Mooring and Berthing

Action	Who	By
Prepare mooring lines.	Crew	
Let crew know which side you are bringing alongside.	Master	
Place fenders (against rubbing strake at stern quarter, mid Vessels and forward quarter) and set up mooring lines and springer's (lay bitter end of bow line along gunnel to mid Vessels).	Crew	
Crew positions themselves on foredeck with forward springer.	Crew	
Bring Vessel alongside.	Master	
Tie forward springer to marina cleat in line with stern or mid Vessels.	Crew	
Crew calls "Springer set".		
Vessel in forward gear idle (steering away from berth).	Master	
From wharf, Stern mooring line is tied off to stern marina cleat.	Crew	
From wharf, line at mid Vessel is tied off for forward marina cleat.	Crew	
Crew calls "Mooring lines set".	Crew	
Engines are Killed.	Master	
Aft springer is set.	Crew	
Mooring lines Checked before leaving Vessel.	Master	
Leaving the berth		

After pre-departure check and so on, start engines.

Master/Crew

Crew told if leaving stern or bow first.

Master

Signal given to let go moorings.

Master

Reverse of the above mooring process.

Crew

Check for wear on mooring lines and deals with appropriately.

Crew

Stow mooring lines and fenders.

Crew

16.6 Appendix 6: Anchoring

Action	By who
1. Select a suitable anchorage.	Master
2. Pre start winches and check ground tackle while running out.	Master/Crew
3. Crane/Tug to place anchors	Master/Crew operator
4. Ensure the anchorage is well clear of Vessel channels.	Master
5. Ensure the anchorage will be safe in changing conditions.	Master
6. Drop anchor and set into seabed.	Crew/Master
7. Check the anchor is secure.	Master/Crew
8. Check the Vessel has sufficient swing room.	Master
9. Set anchor watch and secure Vessel.	Master
Weighing anchor	
1. Check position of anchor.	Master
2. Hook up anchor line from tender boat	Crew
3. Crane/tug to lift Anchor (if required)	Master/Crew
4. Watch while Vessel moves up to or while winching in anchor cable.	Master/Crew
5. Anchor on-board and secure.	Crew
6. Secure anchor locker hatch.	Crew
7. Secure anchor winch.	Crew

Anchoring SWMS to be reviewed signed and in place.

16.7 Appendix 7: Vessel Towing

Action	By who
1. Ensure the Tow Vessel is within the capabilities	Master
2. Ensure the Tow Vessel has adequate fuel available?	Master
3. Lay out and inspect towing equipment, Tow hawser, or rope bridle with running block.	Master/crew
4. Flake out the towing hawser along the deck so it will pay-out smoothly.	Crew
5. Attach the hawser to a bollard or Sampson post on the Vessel's centreline, forward of the propeller and rudder.	Crew
6. Rig the rope bridle to several cleats or bollards down each side of the Vessel, with a running block forming a bridle at the stern, attach the hawser to the block.	Crew
7. Keep the hawser clear of bulwarks and handrails and attach the throwing line to the eye of the hawser.	Crew
8. Manoeuvre to within throwing distance of the Vessel, with the throwing line pass the tow hawser to the distressed Vessel.	Master/crew
9. Keep persons feet and hands clear of the hawser while it is being paying out to prevent entanglement and injury.	Master
10. With the tow secured on-board the Vessel, take up the slack of the tow hawser.	Master
11. Set the length of the tow to two wave crests apart, (depending on sea conditions) and secure the hawser to the towing point.	Crew
12. Test the tow at slow speed, when satisfied all is well, increase to a safe speed.	Master
13. Ensure emergency release equipment is at hand (cable cutters and axe).	Crew
14. Keep all persons clear of the tow hawser while it is under load.	Master
15. Set a towing watch/lookout.	Master

16.8 Appendix 8: Transferring People to and from the Vessel (Stationary)

Action	By who
Vessel to wharf/Vessel gangway, with handrails.	
1. Assess sea conditions are safe to transfer people to the wharf/vessel.	Master
2. Ensure the gangway, Ladders and handrails are safe and securely attached to the Vessel and pontoons.	Master/crew
3. Place a life buoy and line at the gangway or vessel ladder.	Crew
4. Safety briefing for persons leaving for the Vessel.	Master
5. Safety briefing/Induction for persons boarding the Vessel.	Crew
6. Ensure the gangway and ladders are suitably lit, if necessary.	Master/crew
7. Ensure all crew involved are adequately trained in this people transfer operation and rescue procedures.	Owner/Master
8. Ensure a person overboard can be rescued from the water immediately.	Master/crew
9. Ensure people do not over crowd the gangway.	Crew
10. Ensure all persons are wearing a PFD.	Master/crew

16.9 Appendix 9: Operating Small Boats

Action	By who
1. Ensure operator is correctly licensed and trained.	Master
2. Check sea conditions are safe before launching a small boat or tender.	Master
3. Confirm that all safety, emergency equipment and adequate fuel are on board.	Crew
4. Ensure the boat is not overloaded with people or equipment	Crew/Master/Supervisor
5. Check motor is operating properly by undertaking the daily pre-start.	Crew
6. When safe launch boat or tender and secure alongside.	Crew
7. Boat to operate within capacity and operating area limits.	Master/crew
8. Maintain clear communication links with the mother Vessel.	Master/crew
9. Boat to be operated only with Master's permission and recorded in log.	Master
10. Boat, motor and equipment to be included in maintenance program.	Master/crew/Supervisor

16.10 Appendix 10: Working with Lines

	Action	By who
1	Address all relevant work place health and safety concerns/issues.	Master/Crew
2	Inspect cord and wire ropes for damage and deterioration.	Master/Crew
3	Keep clear of lines under load.	Master/Crew
4	Wear personal protected gloves when working with lines.	Master/Crew
5	Keep feet and hands clear of lines and cables coiled on deck.	Crew
6	Keep fingers and hands clear when tailing lines off capstans.	Crew
7	Keep clear of lines when shooting away.	Crew
8	Maintain rope handling skills, knot tying, splicing and whipping.	Master/Crew

16.11 Appendix 11: Fuelling, Oil Pollution Prevention and Response

	Action	By who
	Fuel tanker to Vessel delivery	
1	Secure Vessel alongside wharf, pontoon or barge to minimise movement.	Master
2	Display 'bravo' flag and warning signs.	Master
3	Establish amount of fuel oil required.	Supervisor
4	Complete deck preparations to accept fuel oil.	Crew
5	Establish voice communications with the fuel tanker operator.	Supervisor/Master
6	Attach grounding wire from fuel tanker to Vessel.	Supervisor
7	Test fuel tanker delivery pump, emergency shut off system.	Tanker operator
8	Monitor fuelling operations.	Supervisor/Master
	(A Bunkering SWMS will be Developed for the task where specific controls will be found)	
	In the event of a fuel oil spill	
	Responding and Reporting the spill	
1	Control/Stop fuelling operations immediately (emergency fuel oil shut off).	Tanker operator
2	Contain spilt fuel oil on deck. Clean spill	All All
3	Notify harbour authorities.	Master/Project Manager
4	Contain any fuel oil spilt overboard with absorbent sheets.	All

SF 027 appendix 25 Spill response plan to be reviewed, tool boxed, tested by way of spill response drill and recorded on skills matrix.

16.12 Appendix 12: Disposal of Garbage

	Action	By who
1	No garbage to be thrown overboard (including cigarette butts, plastic bags, bottles, cans, discarded fishing gear and so on).	Everyone on board
2	All garbage to be contained in secure bins or garbage bags on Vessel and disposed of appropriately when in port.	Master/Crew/Supervisor
3	Vermin proof on-board garbage, rubbish and food scraps storage bins and bags.	Crew
4	Use reusable plates and cutlery with wash up facilities provided.	Supervisor/Master/Crew
5	If garbage accidentally ends up in the water, retrieve immediately from tender boat.(2x persons in boat)	Master/Crew
6	Train/advising crew and passengers not to dispose of anything overboard	Master/Crew

16.13 Appendix 13: Disposal of Waste Oil and Oily Bilge Water

	Action	By who
1	Pump sump oil from engine or save-alls into holding tank or sealable containers.	Crew
2	Decant waste oil into manageable labelled sealable containers and transport to a waste oil disposal facility ashore or engage a waste oil disposal company to extract the waste oil from holding tank and transport it to a waste oil disposal facility.	Supervisor/ Master/Crew
3	Enter quantity of oil taken ashore, in oil record book or Vessel's log.	Master
	Action – managing oily bilge water	By who
1.	Turn off automatic bilge when in marinas or harbours.	Master
2.	Do not put bilge cleaners or detergents into bilge if the bilges will be pumped over the side.	
3.	Place oil absorbent pads under the engine, plant or hose connections and change when nearing saturation then take ashore and dispose of in the oil waste area.	Master/Crew
4.	Place an oil absorbent sock/pillow in the bilge or save-alls so that it will float — secure so that it doesn't interfere with the bilge pump or switch.	Master/Crew
5.	Change regularly and dispose of ashore in oil waste area. If the bilge contains fuel or oil, divert the bilge pump to internal containers then take ashore and dispose of in the oil waste area or manually pump the bilge into labelled containers on the Vessel.	Master/crew
6.	Record waste disposal actions in Vessels log.	Master/crew
7.	Report all spills as to the SF027 spill response plan	Master/ Supervisor

16.14 Appendix 14: Disposal of Sewage

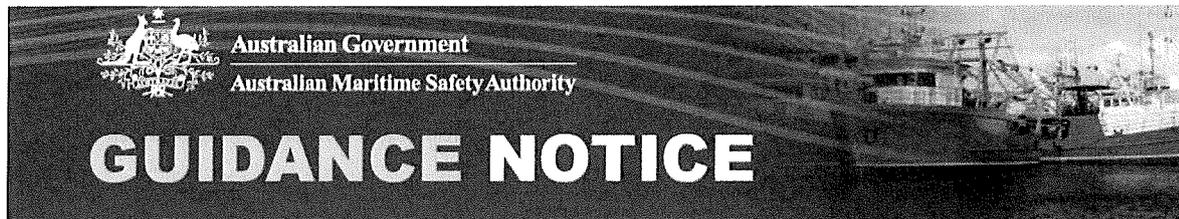
	Action On-board system	By who
1	Operate sewage treatment system to manufacture's specifications.	Master/Crew
2	Maintain system to manufacturer's maintenance schedule.	Master/Crew
3	Treatment and holding tank venting and filters to be inspected/serviced weekly.	Master/Crew
4	System and alarms to be checked weekly.	Master/Crew
5	Close sewage discharge valve while within nil-discharge areas.	Master/Crew
6	Pump out holding tank to shore based facility or tanker for disposal ashore.	Master/Tank Operator
7	Record all sewage discharge and pump out movements in record book or Vessel's log.	Master
8	All system tests and maintenance to be entered in record book or Vessel's log.	Master
	Off board system	
1.	Ensure port-a-Loo is secured during voyages	Master/Crew
2.	Keep port-a-Loo clean at all times	Master/Crew
3.	When ¾ full request Loo to be emptied	Crew/Master
4.	Call for supply barge to come along side	Master/Supervisor
5.	Lift and exchange with new port-a-Loo	Dogger/Rigger
6.	Record all sewage discharge in Log book. (Based on tank holding capacity)	Master
	Pump out system	
1.	When ¾ full request Loo to be emptied	Crew/Master
2.	Call for supply barge to come along side	Master/Supervisor
3	Run Hoses across from vessel to vessel	Crew/Master
4.	Pump out holding tank	Tanker Operator
5.	Record all sewage discharge in Log Book.	Master

16.15 Appendix 15: Minimising Noise Pollution

	Action	By who
1	Keep sound proofing materials on bulkheads, exhausts and so on well maintained.	Master
2	Wear hearing protection in machinery spaces.	All
3	Reduce volume of sound systems when nearing occupied anchorages or harbours.	Master/Crew
4	Monitor noise effect on crew fatigue levels.	Master/Supervisor
5	Monitor noise effect on watch keeper's ability to hear sound signals and radio calls.	Master/Supervisor
6	Reduce engine noise levels in harbour.	Master
7	Reduce engine noise levels when anchored in sensitive environmental areas and only work to project nominated hours.	Master/Supervisor

16.16 Appendix 16: Guidance Notice

The RMS incident report can be found on the BMC project server under plant and equipment/Barges



Marine Incident Reporting

Purpose

To guide you through your obligations for the reporting of Marine Incidents involving Domestic Commercial Vessels (DCV) in Australia.

Who

The *Marine Safety (Domestic Commercial Vessel) National Law Act 2012, Schedule 1* (National Law) requires that both the owner and master of a DCV that is involved in a marine incident report the incident within the time frames provided for by the National Law, to the National Regulator.

What

The National Law defines a Marine Incident as:

- a. a death of, or injury to, a person associated with the operation or navigation of a domestic commercial vessel;
- b. the loss or presumed loss of a domestic commercial vessel;
- c. a collision of a domestic commercial vessel with another vessel;
- d. a collision by a domestic commercial vessel with an object;
- e. the grounding, sinking, flooding or capsizing of a domestic commercial vessel;
- f. a fire on board a domestic commercial vessel;
- g. a loss of stability of a domestic commercial vessel that affects the safety of the vessel;
- h. the structural failure of a domestic commercial vessel;
- i. a close quarters situation;
- j. an event that results in, or could have resulted in:
 - i. the death of, or injury to, a person on board a domestic commercial vessel; or
 - ii. the loss of a person from a domestic commercial vessel; or
 - iii. a domestic commercial vessel becoming disabled and requiring assistance;

- k. the fouling or damaging by a domestic commercial vessel of:
 - i. any pipeline or submarine cable; or
 - ii. any aid to navigation within the meaning of the Navigation Act 2012 of the Commonwealth;
- l. a prescribed incident involving a domestic commercial vessel.

When

Initial Report:

All incidents that involve the following must be reported to the National Regulator as soon as reasonably practicable (initial report) after becoming aware of the incident. (Sections 88(1)(a) and 89(1)(a) of Schedule 1 of the National Law)

- the death of a person; or
- serious injury to a person; or
- the loss of a vessel; or
- the loss of a person from a vessel; or
- significant damage to a vessel.

When making an initial report of a marine incident the minimum details required for the report are:

- The incident details (date, time, location, type of incident and incident description explaining what happened);
- Details for vessel 1 (domestic commercial vessel); and
- Details of persons involved (owner/master and if available, the injured person details).

The initial report must be communicated to your local Marine Safety Agency (National Regulator delegate) via phone, email, faxed letter. The initial report does not need to be on the marine incident report form but can be if you wish.

Written Report

An incident report is a detailed written record of the marine incident involving a domestic commercial vessel, therefore, the primary vessel (vessel 1 details) recorded on the incident report form must be a Domestic Commercial Vessel.

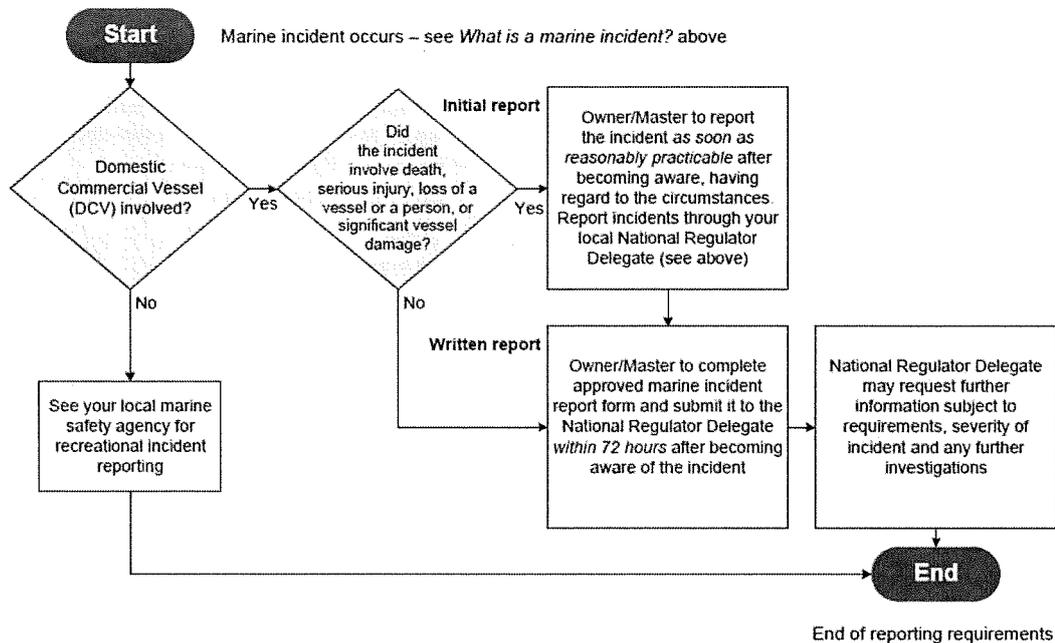
Sections 88(2) and 89(2) of the National Law state that a written marine incident report is required to be

sent to the National Regulator within 72 hours of the owner/master becoming aware of the incident and it must be made in the form approved by the National Regulator. The completed marine incident report form must then be sent to your local Marine Safety Agency (National Regulator delegate) with any supporting documents as required.

A Marine Incident Report Form is available from your local marine safety agency at :

VICTORIA	Transport Safety Victoria
QUEENSLAND	Maritime Safety Queensland
NEW SOUTH WALES	Roads and Maritime Services
NORTHERN TERRITORY	NT Department of Transport
SOUTH AUSTRALIA	SA Department of Planning, Transport and Infrastructure
TASMANIA	Marine and Safety Tasmania
WESTERN AUSTRALIA	WA Department of Transport

MARINE INCIDENT REPORTING PROCESS FLOW



Further information is available at www.nationalsystem.amsa.gov.au

16.17 Appendix 17: First Aid Requirements

National Standard for Commercial Vessels (NSCV)
First Aid Requirements
Table H.3 – Scales G and F

Description	Quantity		Notes	Comments
	Scale G	Scale F		
Bandage, conforming 5cm	1	2		secure dressing and support injured parts
Bandage, conforming 10cm	1	2		secure dressing and support injured parts
Bandage, heavy crepe 7.5cm	2	2		support bandage
Bandage, heavy crepe 10cm	-	1		support bandage, wide
Bandage, triangular	4	4		sling
Dressing, combine 10 x 10 cm, sterile	3	3	*	bleeding control
Dressing, combine 10 x 20 cm, sterile	2	5	*	bleeding control, Large
Dressing, non-adherent 10 x 10cm or similar	5	10	*	wound cover
Dressing, hydroactive (10 x 10cm or similar)	1	2	*	blisters, burns and minor exudate wounds
Wound dressing, combination, large	2	3		major wounds
Wound dressing, combination, small	2	2		major wounds
Adhesive roll non-woven fabric 5cm x 10m	1	1		securing dressings
Dressings, elastic fabric strips	50	50		minor wound cover
Gauze swabs, sterile (single use pkt of 3)	3	9	*	cleansing/dressing wound
Eye pad, sterile	2	4	*	eye cover
Wound closure strips, wide, 6 x 38mm	1	3	*	securing wound sides
Tape surgical waterproof 2.5cm x 5m	1	1		secure dressing
Tape surgical waterproof 5cm x 5m	1	1		secure dressing
Towels, disposable, pkt of 2	2	3		
Plastic bag set (3 asst L, M and S)	1	2		amputated parts
Plastic bag	2	2		disposal of soiled dressings
Gloves, disposable, large	10	10		
Safety pins, stainless, assorted pkt of 12	1	1		
Blanket, emergency thermal	1	1		hypothermia and shock
Ice pack, instant	1	1		
Resuscitation mask, disposable	1	1		
Resuscitation mask, pocket	-	1		
Splinter probes, sterile, disposable	5	10		
Splinter forceps, 12.5cm	1	1		
Shears, stainless, 19cm minimum	1	1		
Scalpel, disposable	-	2		
Splint malleable, universal	1	2		
Normal saline, sterile 30ml polyamp	6	10	*	eye irrigation/ wound cleaning
Povidone iodine swabs (single use)	10	20	*	antiseptic
Anaesthetic + antiseptic cream 30g	1	1	*	
Hydrocortisone 1% cream 30g	-	1	*	rashes and bites
Paracetamol 500mg tabs or caps	24	2x24	*	mild pain relief
Paracetamol 500mg/Codeine 8mg	-	24	*	moderate pain relief
Ibuprofen 200mg tablets	-	24	*	anti-inflammatory
Hyoscine hydrobromide 0.3mg tablets	10	10	*	seasickness
Loperimide 2mg tablets	16	16	*	diarrhoea
Loratadine HCl 10mg or Fexofenadine HCl 120mg tablets	-	10	*	antihistamine (non-sedating)
Antacid tablets	12	50	*	
CPR instruction chart or card	1	1		
Australian First Aid book	1	1		
SAE Defibrillator (Laerdal First Aid unit or similar)	-	Optional		recommended for Class 1 vessels
Stretcher for helicopter evacuation/ship board use	-	Optional		recommended for Class 1 vessels
First Aid Oxygen Unit (Oxyport or equal)	-	Optional		recommended for Class 1 vessels

REQUIRED FIRST AID EQUIPMENT

Safety equipment requirements National Standard for Commercial Vessels (NSCV) – Part C7A

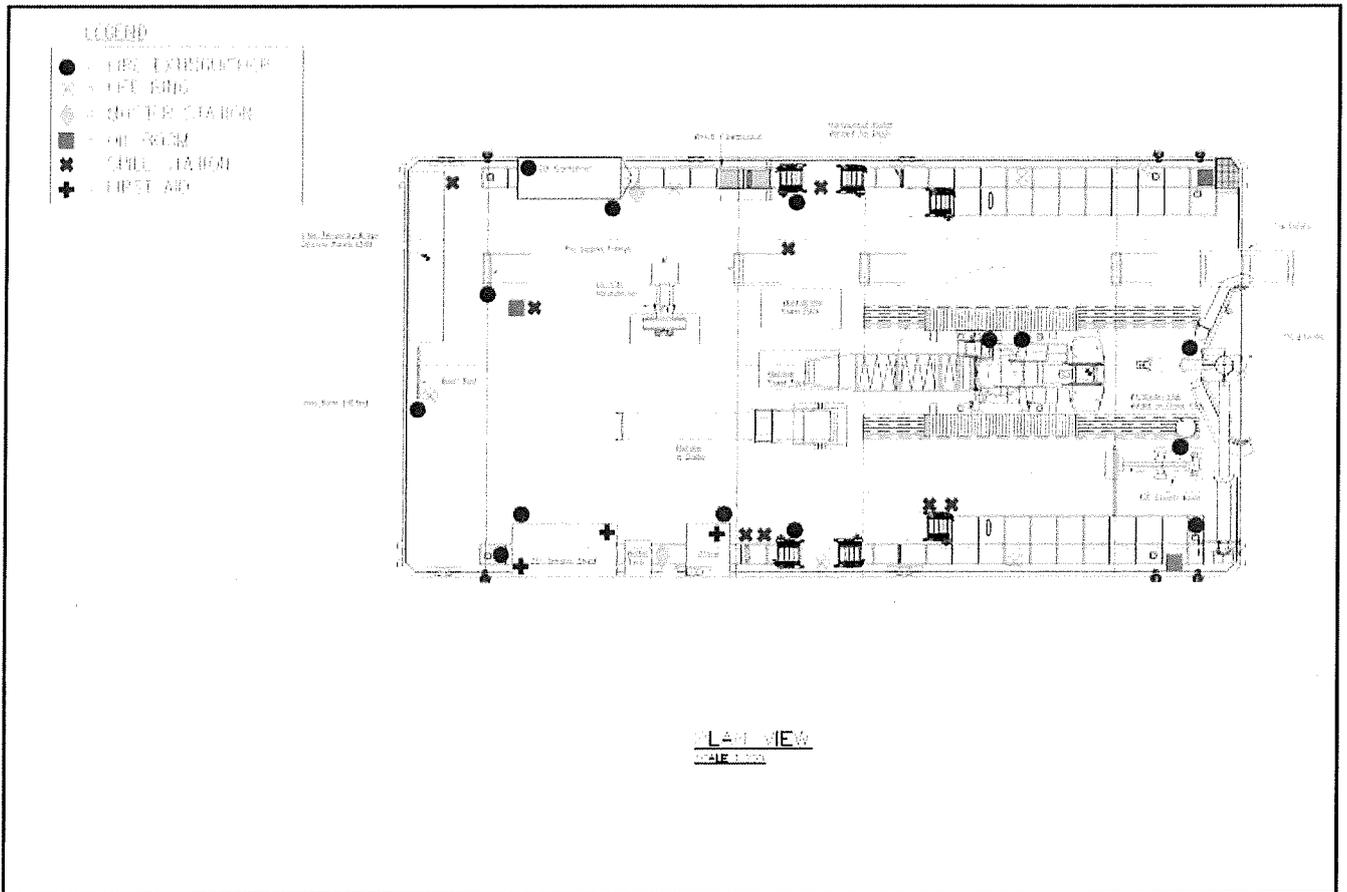
Class 2D non-passenger vessels – 25 metres or longer

Sheltered waters non-passenger vessel, 25 metres or longer, for use in partially smooth and smooth waters only.

Partially smooth water operations: operations within specified geographical limits designated as 'partially smooth waters' or 'smooth waters'.

<p>Dinghy and buoyant appliances (general)</p> 	<p>A dinghy plus sufficient buoyant appliances and/or lifebuoys for 100% of allowable crew and any other people on board:</p> <ul style="list-style-type: none"> • Each lifebuoy is expected to provide support for two people. • A reduction in buoyant appliance capacity may be allowable in accordance with Part B of the NSCV.
<p>Lifebuoys</p> 	<p>Two lifebuoys – one with a light, one with a buoyant line.</p> <ul style="list-style-type: none"> • These lifebuoys can be included in buoyant appliances (general)
<p>Life jackets</p> 	<p>Coastal life jacket for 100% of allowable crew and any other people on board.</p>
<p>Distress signals</p> 	<ul style="list-style-type: none"> • Three parachute distress rockets. • Two red hand-held flares. • One orange hand-held smoke flare.
<p>On board communications and alarms systems</p> 	<p>General emergency system alarm.</p>
<p>Emergency lighting (hand held)</p> 	<p>One battery operated torch for each crew member.</p>
<p>Medical supplies</p> 	<p>Annex H: Scale G of Table H.3</p> <ul style="list-style-type: none"> • The quantity of medical supplies identified in Annex H is based on incidents involving one or two people only. • Medical supplies will need to be expanded in accordance with the particular risks inherent to the voyage and the number of people on board.

16.18 Appendix 18: Barge Layout



16.20 Appendix 20: Fire On-Board Action

Form No SF027-a Rev A	1 Fire On-board Emergency Rescue Plan							
This form is to be completed by following the instructions outlined in the "Instructions for Use" "To be amended to suit project specific needs"								
Project: Brangaroo Ferry Hub		Project Number: BR181						
Location: NSW		Date: 19/01/16						
Supervisor:		Contact No:						
1. Define Emergency Procedure	Raise alarm when fire evident. flame, smoke, heat alarm sounds (if fitted) Shut down machinery if safe to do so. Muster to station and conduct roll call, visitors and crew. Identify type of fire and specific location. Assess severity. Position vessel to reduce wind or oxygen to fire (if powered vessel) Assess whether to release the engine room suppression system. (if fitted) Prepare lifesaving equipment and personal flotation devices for deployment. Run out hoses and start fire pump or retrieve fire extinguishers Contact fire department ashore.							
2. Define Rescue Route	Crew person (1) to Run out hoses and start fire pump or retrieve fire extinguishers and extinguish fire if safe to do so. Crew Person (2) Prepare tender boat and personal flotation devices for deployment Master to assess severity, coordinate with on-shore support and emergency services If you have to abandon ship, make the call early and go to secondary muster point located at public pontoon at Mac Dows site office. Follow 3.7. Abandon Vessel Action							
3. Emergency Equipment Required	Life Ring, PFD's, Work boat. Engine room suppression system. (if fitted) Fire Fighting Equipment							
4. Communication Equipment Required	Visual/pointing/verbal, mobile phone, two way radios							
5. Reporting Process	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;">1. Project Engineer to contact emergency services if required</td> <td style="width: 50%; border: none;">2. Contact Client Emergency Controller -</td> </tr> <tr> <td style="border: none;">3. BMC Project Manager -</td> <td style="border: none;">4. BMC Site Engineer -</td> </tr> </table>				1. Project Engineer to contact emergency services if required	2. Contact Client Emergency Controller -	3. BMC Project Manager -	4. BMC Site Engineer -
1. Project Engineer to contact emergency services if required	2. Contact Client Emergency Controller -							
3. BMC Project Manager -	4. BMC Site Engineer -							
6. Emergency Contact Nos	RMS Marine Safety/Enviro 13 12 56 Emergency Services: 000							
7. Define Site Alarm System	Radio	Phone	Verbal	Air Horn				
8. Identify Assistance Personnel	Name	Location	Name	Location				
	CREW1			Barge				
	CREW2			Barge				
	CREW2			Tender Boat				
9. Stand by Observers	Name:	Name:	Name:					
	1.	2.	3.					
Step 11.	Name	Signature		Date				
Prepared By:				19/01/16				
Approved By:				19/01/16				

Form SF027a Rev A

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16.21 Appendix 21: Adverse and Severe Weather or Water Condition

Form No SF027-a Rev B	1. Adverse and Severe Weather Emergency Plan							
This form is to be completed by following the instructions outlined in the "Instructions for Use" "To be amended to suit project specific needs"								
Project: Barangaroo Ferry Hub		Project Number: BR181						
Location: NSW		Date: 10/05/16						
Supervisor:		Contact No:						
1. Define Emergency Procedure	Monitor meteorological forecasts and changes in weather observations. Secure and stow all equipment on deck and throughout the Vessel. Check Vessel stability book to ensure Vessel's capabilities in conditions. Communicate with onshore support Check all anchor and mooring lines Seek assistance if required and relocate to safe haven. On Masters word, report to muster point and leave vessel if weather or conditions are too rough Record event in Vessel's log							
2. Define Rescue Route	Crew person (1) to Secure and stow all equipment on deck and throughout the Vessel Crew Person (2) Check all anchor and mooring lines Crew Person (3) to prepare tender boat and personal flotation devices for deployment Supervisor to monitor weather conditions and check vessel stability book. Supervisor to coordinate with on-shore support. Supervisor to advise if all are to leave vessel.							
3. Emergency Equipment Required	Life Ring, PFD's, Work boat. Engine room suppression system. (if fitted) Fire Fighting Equipment							
4. Communication Equipment Required	Visual/pointing/verbal, mobile phone, two way radios							
5. Reporting Process	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">1. Project Engineer to contact emergency services if required</td> <td style="width: 50%;">2. Contact Client Emergency Controller - ...</td> </tr> <tr> <td>3. BMC Project Manager -</td> <td>4. BMC Site Engineer -</td> </tr> </table>				1. Project Engineer to contact emergency services if required	2. Contact Client Emergency Controller - ...	3. BMC Project Manager -	4. BMC Site Engineer -
1. Project Engineer to contact emergency services if required	2. Contact Client Emergency Controller - ...							
3. BMC Project Manager -	4. BMC Site Engineer -							
6. Emergency Contact Nos	RMS Marine Safety/Enviro 13 12 56 Emergency Services: 000							
7. Define Site Alarm System	Radio	Phone	Verbal	Air Horn				
8. Identify Assistance Personnel	Name	Location	Name	Location				
		Barge		Barge				
		Barge		Barge				
9. Stand by Observers	Name:	Name:	Name:					
	1.	2.	3.					
Step 11.	Name	Signature		Date				
Prepared By:				10/05/16				
Approved By:				10/05/16				

Form SF027a Rev A

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Appendix 22: Collision, Grounding and/ or Flooding Action

Form No SF027-a Rev B	1. Collision, Grounding and/or Flooding Emergency Plan	
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**This form is to be completed by following the instructions outlined in the "Instructions for Use"
"To be amended to suit project specific needs"**

Project: Barangaroo Ferry Hub	Project Number: BR181
Location: NSW	Date: 10/05/16
Supervisor:	Contact No:

1. Define Emergency Procedure	If possible all personnel brace for impact. Tend to injured. Assess damage to own Vessel. If flooding, Shout, FLOOD, FLOOD, FLOOD Control ingress of water by pumping or shoring Assist other Vessel if needed and possible. Make radio call as necessary Control and report any pollution. Muster crew at emergency stations and conduct head count Prepare tender boat and personal flotation devices for deployment Abandon ship on Masters word
--	--

2. Define Rescue Route	Crew person (1) to tend to injured Crew Person (2) if possible, Control ingress of water by pumping or shoring Crew Person (3) to prepare tender boat and personal flotation devices for deployment Supervisor to make radio call as necessary and coordinate with on-shore support Supervisor to conduct head count Supervisor to advise to Abandon ship
-----------------------------------	--

3. Emergency Equipment Required	Life Ring, PFD's, Work boat. First Aid kit
--	---

4. Communication Equipment Required	Visual/pointing/verbal, mobile phone, two way radios
--	--

5. Reporting Process	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;">1. Project Engineer to contact emergency services if required</td> <td style="width: 50%; border: none;">2. Contact Client Emergency Controller -</td> </tr> <tr> <td style="border: none;">3. BMC Project Manager -</td> <td style="border: none;">4. BMC Site Engineer -</td> </tr> </table>	1. Project Engineer to contact emergency services if required	2. Contact Client Emergency Controller -	3. BMC Project Manager -	4. BMC Site Engineer -
1. Project Engineer to contact emergency services if required	2. Contact Client Emergency Controller -				
3. BMC Project Manager -	4. BMC Site Engineer -				

6. Emergency Contact Nos	RMS Marine Safety/Enviro 13 12 55 Emergency Services: 000
-------------------------------------	--

7. Define Site Alarm System	<table style="width: 100%; border: none;"> <tr> <td style="width: 25%; border: none;">Radio</td> <td style="width: 25%; border: none;">Phone</td> <td style="width: 25%; border: none;">Verbal</td> <td style="width: 25%; border: none;">Air Horn</td> </tr> </table>	Radio	Phone	Verbal	Air Horn
Radio	Phone	Verbal	Air Horn		

8. Identify Assistance Personnel	<table style="width: 100%; border: none;"> <tr> <td style="width: 25%; border: none;">Name</td> <td style="width: 25%; border: none;">Location</td> <td style="width: 25%; border: none;">Name</td> <td style="width: 25%; border: none;">Location</td> </tr> <tr> <td style="border: none;"></td> <td style="border: none;">Barge</td> <td style="border: none;"></td> <td style="border: none;">Barge</td> </tr> <tr> <td style="border: none;"></td> <td style="border: none;">Barge</td> <td style="border: none;"></td> <td style="border: none;">Barge</td> </tr> <tr> <td style="border: none;"></td> <td style="border: none;">Tender Boat</td> <td style="border: none;"></td> <td style="border: none;">Tender Boat</td> </tr> </table>	Name	Location	Name	Location		Barge		Barge		Barge		Barge		Tender Boat		Tender Boat
Name	Location	Name	Location														
	Barge		Barge														
	Barge		Barge														
	Tender Boat		Tender Boat														

9. Stand by Observers	<table style="width: 100%; border: none;"> <tr> <td style="width: 33%; border: none;">Name:</td> <td style="width: 33%; border: none;">Name:</td> <td style="width: 33%; border: none;">Name:</td> </tr> <tr> <td style="border: none;">1.</td> <td style="border: none;">2.</td> <td style="border: none;">3.</td> </tr> </table>	Name:	Name:	Name:	1.	2.	3.
Name:	Name:	Name:					
1.	2.	3.					

Step 11.	Name	Signature	Date
Prepared By:			10/05/16
Approved By:			10/05/16

16.22 Appendix 23: Abandon Vessel Action

Form No SF027-a Rev B	1. Abandon Vessel Emergency Plan	
--------------------------	---	---

This form is to be completed by following the instructions outlined in the "Instructions for Use" "To be amended to suit project specific needs"							
Project: Barangaroo Ferry Hub		Project Number: BR181					
Location: NSW		Date: 23/02/16					
Supervisor:		Contact No:					
1. Define Emergency Procedure	Signal to abandon Vessel. Radio Mayday Mayday Mayday Disengage propeller (if propelled) Mustering at station and conduct roll call Position crew and visitors for transfer into tender boat. Grab bag and Vessel's EPIRB. (If on-board) Set off EPIRB. (If on-board) Board tender boat when directed by Master. When in tender boat set course for public pontoon at Mac Dows site office.						
2. Define Rescue Route	Crew person (1) to conduct roll call Crew Person (2) Position crew and visitors for transfer into tender boat and prepare and access tender boat for deployment Supervisor to make radio call as necessary Supervisor to signal to abandon vessel and coordinate with on-shore support Supervisor to inspect area and shut down office generator and any other common plant left running and then he himself access the tender boat						
3. Emergency Equipment Required	Life Ring, PFD's, Work boat.						
4. Communication Equipment Required	Visual/pointing/verbal, mobile phone, two way radios						
5. Reporting Process	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">1. Project Engineer to contact emergency services if required</td> <td style="width: 50%;">2. Contact Client Emergency Controller – TBA</td> </tr> <tr> <td>3. BMC Project Manager -</td> <td>4. BMC Site Engineer –</td> </tr> </table>			1. Project Engineer to contact emergency services if required	2. Contact Client Emergency Controller – TBA	3. BMC Project Manager -	4. BMC Site Engineer –
1. Project Engineer to contact emergency services if required	2. Contact Client Emergency Controller – TBA						
3. BMC Project Manager -	4. BMC Site Engineer –						
6. Emergency Contact Nos	RMS Marine Safety/Enviro 13 12 56 Emergency Services: 000						
7. Define Site Alarm System	Radio	Phone	Verbal				
8. Identify Assistance Personnel	Name	Location	Name				
		Barge	Master				
		Barge					
		Tender Boat					
			Tender Boat				
9. Stand by Observers	Name:	Name:	Name:				
	1	2.	3.				
Step 11.	Name	Signature	Date				
Prepared By:			06/01/16				
Approved By:			06/01/16				

16.23 Appendix 24: Personal Injury or other Medical Emergency Action

Form No SFD27-a Rev A	1. Personal Injury or other Medical Emergency Plan	
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**This form is to be completed by following the instructions outlined in the "Instructions for Use"
"To be amended to suit project specific needs"**

Project: Barangaroo Ferry Hub	Project Number: BR181
Location: NSW	Date: 29/01/16
Supervisor:	Contact No: 0408 781 835

1. Define Emergency Procedure	First person on the scene — DRABCD. Emergency radio calls on channel 16 Report Incident to Supervisor/Master Call for First Aider Crew report to master for instructions unless involved in DRABCD. Notify Shore Base Manager or (Designated Person) of event Evacuate injured back to shore in tender boat to receive treatment. Log all actions in the Vessel's log.						
2. Define Rescue Route	Crew person (1) Report Incident to Supervisor/Master Crew Person (2) Crew report to master for instructions unless involved in DRAB and evacuate injured back to shore by: (a) Move Barge close to Barangaroo side of land to use crane and stretcher, or, Lower injured into tender boat Via Crane and travel to Wharfs 1-5 On Barangaroo side to receive treatment. (b) Non-Critical - Lower injured into tender boat Via Crane and travel to Whites bay to receive treatment from Project approved Medical Centre. Master to make radio call VTS and update as necessary						
3. Emergency Equipment Required	First Aid Kit PFD's, Work boat. Crane, Stretcher, Radios						
4. Communication Equipment Required	Visual/pointing/verbal, mobile phone, two way radios						
5. Reporting Process	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;">1. Project Engineer to contact emergency services if required</td> <td style="width: 50%; border: none;">2. Contact Client Emergency Controller – TBA</td> </tr> <tr> <td style="border: none;">3. BMC Project Manager -</td> <td style="border: none;">4. BMC Site Engineer –</td> </tr> </table>			1. Project Engineer to contact emergency services if required	2. Contact Client Emergency Controller – TBA	3. BMC Project Manager -	4. BMC Site Engineer –
1. Project Engineer to contact emergency services if required	2. Contact Client Emergency Controller – TBA						
3. BMC Project Manager -	4. BMC Site Engineer –						
6. Emergency Contact Nos	RMS Marine Safety/Enviro 13 12 56 Emergency Services: 000						
7. Define Site Alarm System	Radio	Phone	Verbal	Air Horn			
8. Identify Assistance Personnel	Name	Location	Name	Location			
		Barge	Master	Barge			
		Tender Boat	Crane Operator	Barge			
9. Stand by Observers	Name:	Name:	Name:				
		2.	3.				
Step 11.	Name	Signature	Date				
Prepared By:			29/01/16				
Approved By:			29/01/16				

16.24 Appendix 25 Spill Response

Form No SF027-d Rev B	Emergency Spill Response Plan			
This form is to be completed by following the instructions outlined in the "Instructions for Use" "To be amended to suit project specific needs"				
Project: Barangaroo Ferry Hub		Project Number: BR181		
Location: Sydney, NSW		Date: 10/05/18		
Supervisor:		Contact No:		
1. Define Emergency Procedure	<p>Workers are not to place themselves at unnecessary risk to undertake a rescue Raise alarm in your work crew to get assistance Report it immediately to your supervisor. Control Stop the source of the leak CAUTION: Be aware in case oil is hot Contain the spread of the spill with contents from the spill kit or earth bund If the spill spreads to or is in the water deploy tender boat and roll out hydrocarbon boom to circle the spill (Minimum two to the boat) Nominated person 1 or land assistance person to contact and update BMC Project Manager and Supervisor Clean up & dispose of waste by placing waste in a contaminated waste bag and into the contaminated waste bin. If oil is not, leave contained and monitor containment until cool enough to clean</p>			
2. Define Rescue Route	<p>Nominated assistance 1 person to clear working area and response boat landing area of unnecessary personnel Nominated assistance person 2, Spill kits to be brought as close to location as possible and clean up spill. Nominated person 3 to encircle spill with boom if in water</p>			
3. Emergency Equipment Required	<p>Digging plant if required to create earth bund Spill Kit / Equipment Rescue / tender boat</p>			
4. Communication Equipment Required	<p>Visual / pointing / verbal Mobile phone Two Way radios</p>			
5. Reporting Process	<p>1. Project Engineer to contact emergency services if required 2. Contact Client Emergency Controller - 3. BMC Project Manager - 4. BMC Project Engineer -</p>			
6. Emergency Contact Nos	<p>RMS Marine Safety/Enviro 13 12 56 Emergency Services: 000</p>			
7. Define Site Alarm System	Radio	Phone	Verbal	
8. Identify Assistance Personnel	Name:	Name:	Name:	Location:
				Barge
				Tender Boat
9. Stand by Observers	Name:	Name:	Name:	
	1.	2.	3.	
	Name	Signature	Date	
Prepared By:			10/05/18	
Approved By:			10/05/18	

Form SF027 Rev A

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16.26 Appendix 26: APPROPRIATE CREW RISK EVALUATION FOR VESSEL OPERATIONS

Factors taken into account to determine appropriate crew numbers	Vessel Operations													
	Anchor Handling		Piling		Boat Operations		Emergency Response		Winch Operation		Hot Works		Bunkering Re-Fuelling	
A; The tasks or activities of the vessel and any particular demands on the crew that will impose in addition to the safe navigation of the vessel	Nil Unpowered. No navigation required.		Nil Unpowered. No navigation required.		Nil Unpowered. No navigation required.		Nil Unpowered. No navigation required.		Nil Unpowered. No navigation required.		Nil Unpowered. No navigation required.		Nil Unpowered. No navigation required.	
	Appropriate Crew	0	Appropriate Crew	0	Appropriate Crew	0	Appropriate Crew	0	Appropriate Crew	0	Appropriate Crew	0	Appropriate Crew	0
B; The number of persons to be carried on the vessel	As to the certificate to operate. 12		As to the certificate to operate. 12		As to the certificate to operate. 12		As to the certificate to operate. 12		As to the certificate to operate. 12		As to the certificate to operate. 12		As to the certificate to operate. 12	
	Appropriate Crew	4	Appropriate Crew	4	Appropriate Crew	4	Appropriate Crew	4	Appropriate Crew	4	Appropriate Crew	4	Appropriate Crew	4
C; The design characteristics of the vessel, general arrangements, machinery and equipment	Boat operator winch operator crane operator spotter		Crane operator Rigger Supervisor power pack operator		One to operate boat and one to offside		As to SF027 procedures within the SMS		One to operate the winch and one to spot		One conducting the works		One to control the nozzle and one to man the pump	
	Appropriate Crew	4	Appropriate Crew	4	Appropriate Crew	2	Appropriate Crew	4	Appropriate Crew	2	Appropriate Crew	1	Appropriate Crew	2
D; The competency required for the use of technological aids to safety in addition to the mandatory requirements	Radio operations		Radio operations		Radio operations		Radio operations		Radio operations		Nil		Radio operations	
	Appropriate Crew	4	Appropriate Crew	4	Appropriate Crew	4	Appropriate Crew	4	Appropriate Crew	4	Appropriate Crew	4	Appropriate Crew	4
E; The area of operation and expected conditions	Smooth Waters Only		Smooth Waters Only		Smooth Waters Only		Smooth Waters Only		Smooth Waters Only		Smooth Waters Only		Smooth Waters Only	



F; The duration of the voyage	Nil	Nil	Nil	Nil	Nil	Nil	Nil
G; The potential fatigue of master/crew members	Nil, Nominated project hours only	Nil, Nominated project hours only	Nil, Nominated project hours only	Nil, Nominated project hours only	Nil, Nominated project hours only	Nil, Nominated project hours only	Nil, Nominated project hours only
Factors taken into account to determine appropriate crew numbers	Vessel Operations						
	Anchor Handling	Piling	Boat Operations	Emergency Response	Winch Operation	Hot Works	Bunkering Re-Fuelling
H; The requirements for the vessel's emergency preparedness and emergency plan	As to SF027 procedures within the SMS	As to SF027 procedures within the SMS	As to SF027 procedures within the SMS	As to SF027 procedures within the SMS	As to SF027 procedures within the SMS	As to SF027 procedures within the SMS	As to SF027 procedures within the SMS
	Appropriate Crew 4	Appropriate Crew 4	Appropriate Crew 4	Appropriate Crew 4	Appropriate Crew 4	Appropriate Crew 4	Appropriate Crew 4
I; The state of repair of the vessel machinery and equipment	Pre-starts on plant and equipment	Pre-starts on plant and equipment	Pre-starts on plant and equipment	Pre-starts on plant and equipment	Pre-starts on plant and equipment	Pre-starts on plant and equipment	Pre-starts on plant and equipment
	Appropriate Crew 1	Appropriate Crew 4	Appropriate Crew 2	Appropriate Crew 4	Appropriate Crew 1	Appropriate Crew 1	Appropriate Crew 2
J; The need for safe and timely evacuation of all people in an emergency	All Crew as to the ERP within the SMS	All Crew as to the ERP within the SMS	All Crew as to the ERP within the SMS	All Crew as to the ERP within the SMS	All Crew as to the ERP within the SMS	All Crew as to the ERP within the SMS	All Crew as to the ERP within the SMS
	Appropriate Crew 4	Appropriate Crew 4	Appropriate Crew 4	Appropriate Crew 4	Appropriate Crew 4	Appropriate Crew 4	Appropriate Crew 4
K; The risks to the environment and all persons who will be on or near the vessel	Exclusion Zones Spill Response and follow SMS	Exclusion Zones Spill Response and follow SMS	Exclusion Zones Spill Response and follow SMS	follow SMS	Exclusion Zones Spill Response and follow SMS	Exclusion Zones Spill Response and follow SMS	Exclusion Zones Spill Response and follow SMS
	Appropriate Crew 2	Appropriate Crew 4	Appropriate Crew 2	Appropriate Crew 4	Appropriate Crew 2	Appropriate Crew 1	Appropriate Crew 2
L; The qualifications and competencies of crew, including circumstances	Master (Tug Boat) operations	Crane Operator Rigger	Coxswain	Coxswain On-board training as to the SMS	Supervisor	Coded/certified approved welder	Operator Rigger



where the master is the only crew member holding mandated engineering qualifications	Appropriate Crew 1	Appropriate Crew 2	Appropriate Crew 1	Appropriate Crew 4	Appropriate Crew 1	Appropriate Crew 1	Appropriate Crew 2
M; The external support available to the vessel and its crew	On shore Support PM, CM, SM Appropriate Crew 3	On shore Support PM, CM, SM Appropriate Crew 3	On shore Support PM, CM, SM Appropriate Crew 3	On shore Support PM, CM, SM Client Appropriate Crew 4	On shore Support PM, CM, SM Appropriate Crew 3	On shore Support PM, CM, SM Appropriate Crew 3	On shore Support PM, CM, SM Appropriate Crew 3
N; Key on-board operations and identified potential risks	As to the SMS and applicable Task SWMS Risk Assessment Appropriate Crew 4	As to the SMS and applicable Task SWMS Risk Assessment Appropriate Crew 4	As to the SMS and applicable Task SWMS Risk Assessment Appropriate Crew 4	As to the SMS Appropriate Crew 4	As to the SMS and applicable Task SWMS Risk Assessment Appropriate Crew 4	As to the SMS and applicable Task SWMS Risk Assessment Appropriate Crew 4	As to the SMS and applicable Task SWMS Risk Assessment Appropriate Crew 4

Page	1 of 1
Document number	SPA26369
Issue number	0

DESIGN APPRAISAL DOCUMENT

Date 2 June 2003	Quote this reference on all future communications SPA/237923/BL/D01 O-22602
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**"STEEL CONSTRUCTOR" LR NO. 8127737
TRIM & STABILITY BOOKLET**

1. The plan listed in Paragraph 1 of the attached Appendix has been examined as follows:
2. The plan "R1350(02) Rev. A" has been examined for compliance with Chapter I General and Regulation 10(2) Annex I of the International Convention on Load Lines 1966 based on the basic data contained therein and found in order subject to the following:
 - 2.1 When deck cargo carried, the static angle of heel due to a uniformly distributed wind load of 0.54kpa (wind speed 30m/s) should not exceed an angle corresponding to half the freeboard for the relevant loading condition. See amendments made on page 10 of the booklet.

The loading conditions Nos. 2, 3 and 4 included in the booklet have been examined for compliance with the above mentioned wind criteria assuming a mean height of deck cargo of 10 metres and found to comply.

Surveyor
Shanghai Plan Approval Services

APPENDIX to DAD Numbered SPA26369

1. The Documents listed below have been examined and assigned appraisal status as indicated.

Drawing No.	Rev.	Title	Appraisal Status	Date
R1350(02)	A	Trim & Stability Booklet	AM	2 June 2003

Appraisal Status Key

AM Approved as amended - and provided the installation is to Lloyd's Register's Surveyor's satisfaction.

TRIM AND STABILITY BOOKLET

STEEL CONSTRUCTOR

Prepared by:

G.A. Glanville & Co.
(Naval Architects) Pty Ltd
277 Little Spence Street,
P.O. Box 642,
CAIRNS QLD 4870

Telephone Number: (07) 40 351 488
Facsimile Number: (07) 40 351 403

Date: 8th April, 2003

R1350(02) Rev. A



LR No. 8127737

APPROVED

for and on behalf of the Government of the vessel's Registration as complying with the Regulations stated below. No amendment is to be made to this document without the prior consent of Lloyd's Register of Shipping.

STABILITY INFORMATION

The information contained in this stability manual is in an approved form in accordance with the terms of Chapter I General and Regulation 10(2) of Annex I of the International Convention on Load Lines 1966.

The sea-going conditions of loading incorporated in this document have been verified using the ship's basic data and meet the minimum stability criteria given herein.

**THE PROVISION OF ADEQUATE STABILITY, AT ALL TIMES,
REMAINS THE MASTER'S RESPONSIBILITY.**

No alteration or revision shall be made to any part of this plan without prior approval by Lloyd's Register.

Number of pages: 44

Associated documents:-none

Signed
for Lloyd's Register of Shipping

Place:- Shanghai, China

Date:-2 June 2003

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1. General Information	2
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5. Limiting Deck Cargo VCG	10
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1.0 GENERAL INFORMATION

Name of Vessel: STEEL CONSTRUCTOR

Type of Vessel: Barge

Official Number:

L.O.A.: 48.00 m

Breadth Moulded: 24.00 m

Depth Moulded: 2.20 m

Draft Mark Position: - FR 1
- FR 18

Draft Mark Datum: USK

Midship Position: FR 10

Frame Spacing: 2400 mm throughout

Assigned Summer Loadline: 1.17 metres below top of deck plate.

Loadline Assigned by: Lloyds Register of Shipping

Corresponding Draft to Baseline: 1.04 m

Displacement to Summer Loadline: 1178 tonnes

Maximum Deck Loading:

Item	Mass (tonnes)	t/m ²	Location
Misc. Deck Cargo	100	0.096	Evenly distributed between 21.6 m aft and 21.6 m forward of amidships
Crawler Crane	200	-	Between 18.4 m and 10.4 m forward of amidships on centreline
Misc. Deck Cargo	200	3.33	Distributed over reinforced deck between 4.8 m aft and 7.2 m fwd of midships within 5 m of vessel centerline (P & S)

Datums:

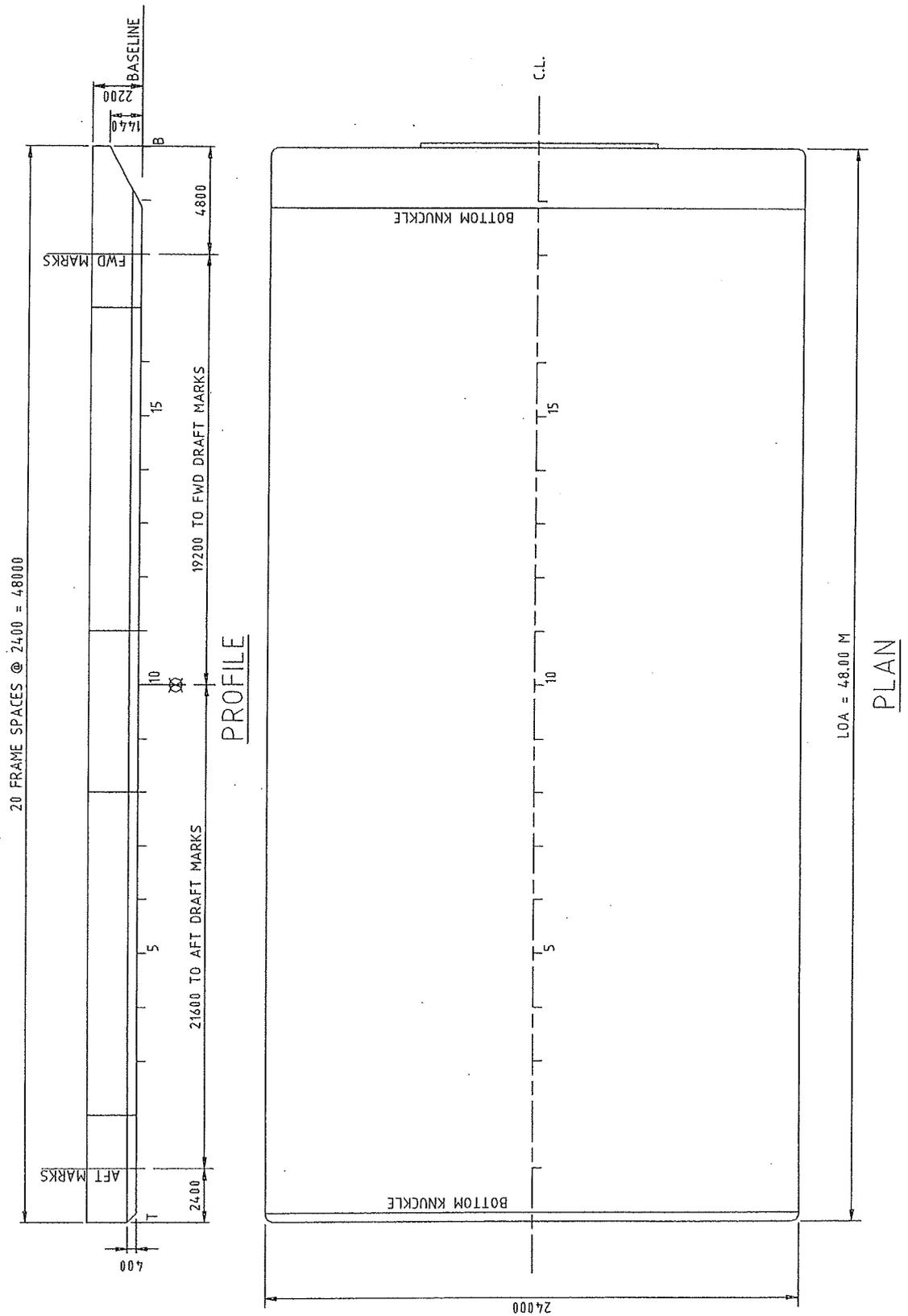
Sign conventions used in this booklet as follows:

Vertical - measured +ve above baseline
Longitudinal - measured +ve fwd of amidships
Trim - measured +ve bow up

Survey:

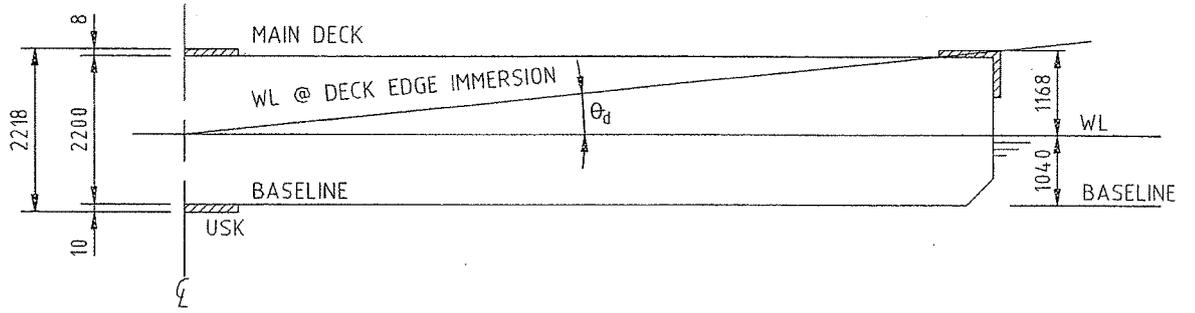
Australian Maritime Safety Authority

2.0 FRAME SPACING AND DRAFT MARK DIAGRAM



Note: Draft Mark Datum = USK

3.0 FREEBOARD DIAGRAM



4.0 INSTRUCTIONS FOR THE MASTER AND PERSON RESPONSIBLE FOR LOADING THE SHIP

4.1 Safety Information

4.1.1 General

The following matters are of importance to the safety of this vessel.

4.1.2 Angle Of Flooding

The angle of flooding is the angle of immersion of the sill or coaming of the opening in or above the freeboard deck (through which progressive down flooding can occur) which first reaches the water level as the ship heels.

4.1.3 Watertight Closing Appliance Than Cannot Be Kept Closed

If this opening has a weather tight closing appliance which cannot be kept closed and secured at all times when the ship is under way (e.g. engine room air supply trunk) or has no weather tight closing appliance, progressive downflooding will occur when the sill of the opening becomes immersed. This is the actual angle of flooding and is denoted by θ_f . This angle is to be marked on the G_fZ curve if it comes within the apparent positive range of the G_fZ curve, and the G_fZ curve terminates at this angle, i.e. the actual angle of flooding becomes the range of the G_fZ curve.

4.1.4 Weathertight Closing Appliance That Can Be Kept Closed

If an opening is fitted with a weathertight closing appliance which can be kept closed and secured at all times when the ship is underway, progressive downflooding can only occur throughout the opening if its closing appliance is not closed and secured. The angle of immersion of the lower sill of this opening is a 'potential' angle of flooding, and is denoted by θ_{pf} .

If any of these closing appliances are not closed and secured, downflooding will occur when the lower sill of this opening reaches water level.

4.1.5 Containers

It is emphasised to those making up the loading conditions that the correct verified weight and centre of gravity for every container in each section of the ship is to be entered in the loading table. The loading conditions shown in the stability book are for guidance only as, for simplicity, the containers in each section are assumed to have an equal weight. Where detailed information on container loading is not available, the vertical centre of gravity may be assumed to be at one half of the height of the container.

4.2 Stability Book To Be Kept On Ship

An approved copy of the Stability Book shall be kept on board the ship to which it relates.

4.3 Loading Conditions

The loading conditions shown in this book are typical for the intended service of the ship. Limiting KG curves are contained at Section 5 for use when deck cargo only is carried. It should be ensured that all conditions of loading conform with the limiting KG requirements.

4.4 Aspects of Loading

The following matters must also be taken into account when making up loading conditions and when handling tanks at sea.

4.4.1 Tank Usage and Free Surface Effects

At all times, tanks which are not in use must, where practicable, be either completely empty or fully pressed up, to minimise the effects of free surface. The free surface correction for any slack tank must be that corresponding to the maximum free surface moment of the tank.

4.4.2 Hydrostatics and Cross Curves of Stability

Hydrostatics and cross curves of stability are calculated for a ship at its designed level trim, but if the ship departs from the trim so calculated, the values of the hydrostatic elements and righting levers will vary from those at level trim and so over estimate the stability. When making up voyage conditions it is essential to keep the ship close to its designed level trim.

4.4.3 Deck Cargo (General)

When deck cargo is loaded, verified weights and realistic values for the vertical centres of gravity of the items must be used in the loading condition calculation.

Water can be entrapped in the deck cargo and, in the case of certain cargoes, (e.g. timber), can be absorbed by it. Allowance for the added weight of water shall be made in the load calculation.

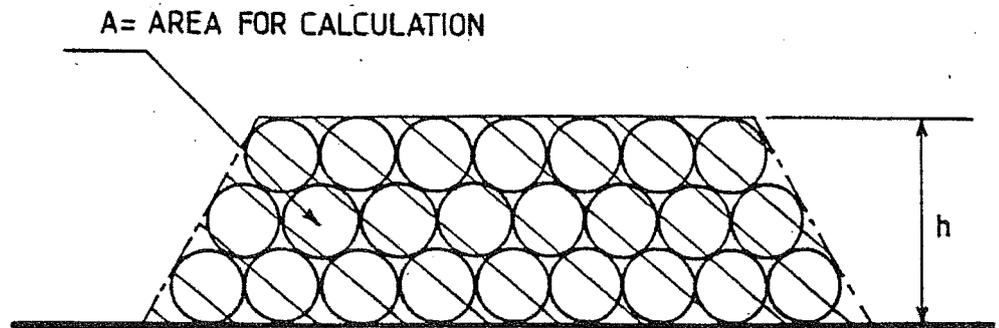
The maximum allowable deck cargo loading is limited by strength requirements and shall be restricted as follows.

Item	Mass (tonnes)	t/m ²	Location
Misc. Deck Cargo	100	0.096	Evenly distributed between 21.6 m aft and 21.6 m forward of amidships
Crawler Crane	200	-	Between 18.4 m and 10.4 m forward of amidships on centreline
Misc. Deck Cargo	200	3.33	Distributed over reinforced deck between 4.8 m aft and 7.2 m fwd of midships within 5 m of vessel centerline (P & S)

4.4.4 Pipe Deck Cargo

In the case of supply vessels carrying pipe deck cargoes, the following specific allowances for entrapped water must be made:

- (a) The volume of entrapped water is to be a percentage of the net volume in and around the pipes. The percentage is 25% in the case of this ship. The nett volume should be taken as the internal volume of the pipes plus the volume between the pipes.
- (b) The area for calculation = A in square metres, and the height of the deck cargo = h in square metres, are shown in the diagram below:



Note: The volume of entrapped water is A x (length of pipe cargo) x percentage obtained in accordance with this provision and the height of the centre of gravity of the water above the deck is h/2.

- (c) The weight and moment of the entrapped water, as calculated above, are to be added to the loaded displacement of the vessel for that loading condition (in many cases, the addition of this entrapped water will lead to the overloading of the vessel while the water is on board. But this is accepted in the same way as is the water on deck for any other fully loaded vessel).

- (d) The GFZ curves for loading conditions including entrapped water must fulfil all the minimal criteria of the International Maritime Organization in the usual way. If any curves do not fulfil these minimal criteria, the necessary adjustments must be made to the deck cargoes.
- (e) In the calculation of entrapped water for the loading conditions in the stability book, the pipes of the deck cargo are to be considered to be not plugged.

Note: The required weight of entrapped water and its centre of gravity include an allowance for the free surface effect of the entrapped water so that no further allowance for the free surface effect of the entrapped water need be made.

4.4.5 Pipe Loading Condition

The pipe loading condition included in the stability book of this vessel is intended to give an indication of the worst anticipated condition of stability when pipes are stowed on deck, whenever either the mass or the height above deck of pipes carried exceeds that in the calculated condition, a new pipe loading condition is to be calculated.

4.5 Order Of Accuracy

4.5.1 Object of Stability Calculations

The object of the stability calculations is to establish the stability of the ship to a realistic and satisfactory accuracy. This objective will be achieved in the loading table if the following are used:

Weights:	To the nearest (0.1) tonnes
Centres of Gravity:	To the nearest (0.01) metres
Moments:	To the nearest (0.01) t.m.

4.6 Stability Criteria

The vessel shall comply with the following criteria in all conditions of loading:

1. The area under the righting lever curve shall be:
 - a) Not less than 6.30 metre-degrees up to an angle of heel of 15° when the maximum righting lever occurs at 15°;
 - b) Not less than 4.30 metre-degrees up to an angle of 20° when the maximum righting lever occurs at 20°, or
 - c) Not less than 3.15 metre-degrees up to an angle of 30° when the maximum righting lever occurs at 30° or an angle greater than 30°, or

- d) An area, when the maximum righting lever occurs at angles between 15° and 20° or 20° and 30°, up to the angle of maximum righting lever, obtained by the linear interpolation; and
- e) Not less than 1.72 metre-degrees between the angles of heel of 30° and 40° or between 30° and the angle of flooding if less than 40°.

Note: The angle of flooding is the angle of heel at which openings in the hull, superstructures or deckhouses which cannot be closed weathertight commence to immerse. In applying this criterion, small openings through which progressive flooding cannot take place need not be considered as open.

- 2. The maximum righting lever which shall occur at an angle of heel not less than 15°, shall be at least 0.2 metres.
- 3. The initial transverse metacentric height shall be not less than 0.15 metres.

4.7 Reduction of Stability Due to Steady Angle of Heel

4.7.1 Effect of Heeling

A steady angle of heel, however caused, reduces the stability of a ship to below that shown on the G_Z curve for that loading condition. Thus it is essential to strive to keep the ship upright at all times.

4.8 Margin Of Safety

Where possible, all service loading conditions should be arranged to give a good margin over the stability criteria minimum, to allow for unusually heavy weather or unforeseen contingencies. It should be noted, however, that very high stability i.e. the "very stiff ship", is also undesirable, as the higher acceleration forces are wearing on the ship's company, are detrimental to the cargo carried, induce higher stresses in the structure and increase the likelihood of synchronous rolling.

5.0 LIMITING DECK CARGO VCG

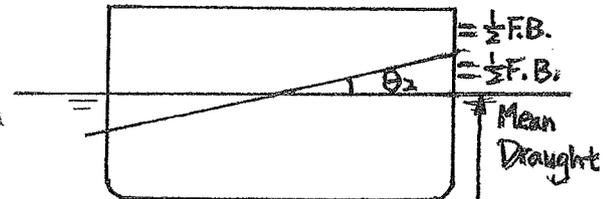
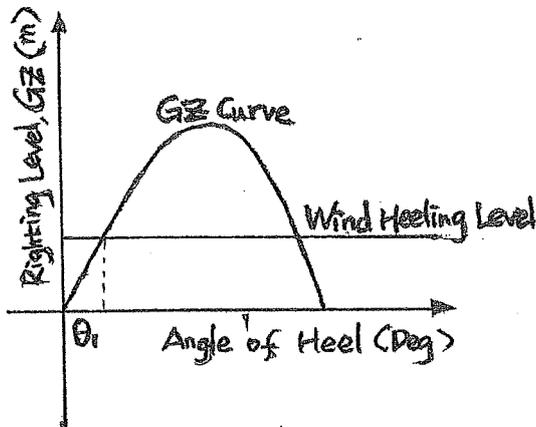
When tanks are dry, deck cargo VCG should not exceed 10 metres above the deck. If it is proposed to carry deck cargo with VCG in excess of 10 metres above deck, then a full stability analysis should be made in accordance with Section 8 of this stability book.

- 6.0 When deck cargo carried, the static angle of heel due to a uniformly distributed wind load of 0.54Kpa (wind speed 30m/s) should not exceed an angle corresponding to half the freeboard for the relevant loading condition, where the level of wind heeling moment is measured from the centroid of the windage area to half the mean draught.

$$\text{Wind Heeling Lever} = 0.0592 \times A \times Z / \text{Displacement (m)}$$

Where: A = Projected lateral area of the portion of the ship and deck cargo above the waterline

Z = Vertical distance from the center of A to a point at half of the mean draught

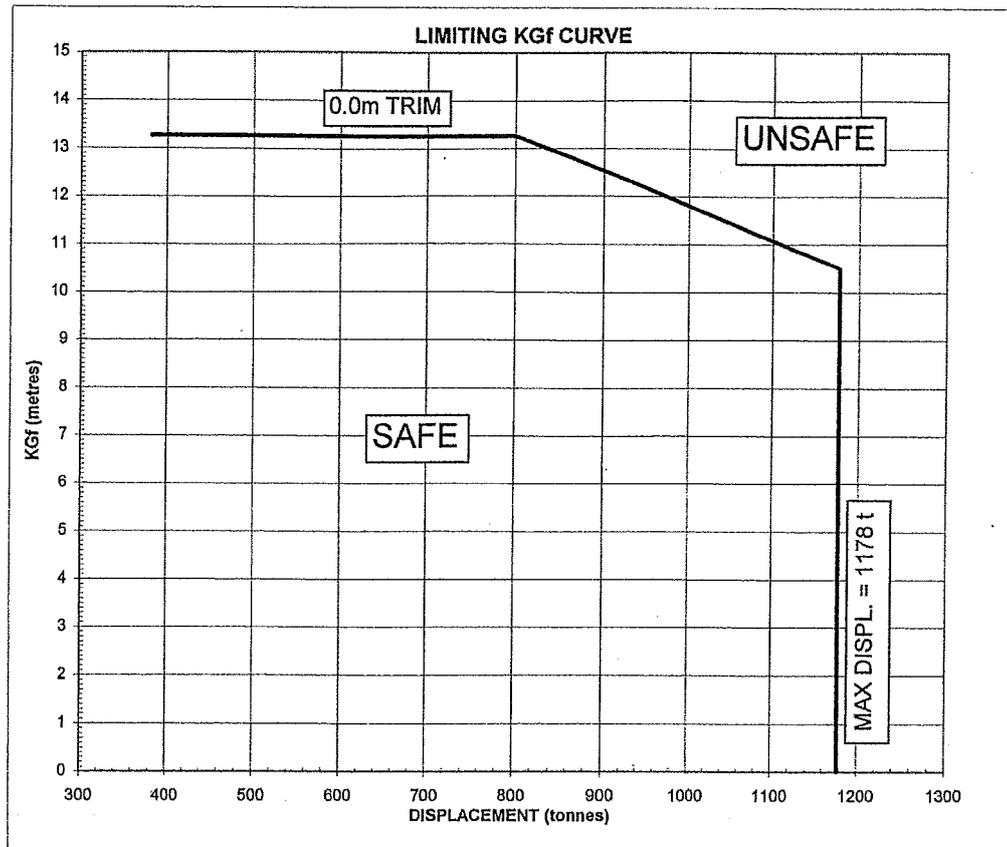


Θ1 = the state angle of heel due to wind
 Θ2 = the angle corresponding to half the freeboard for the relevant loading condition

Θ1 should not be greater than Θ2.

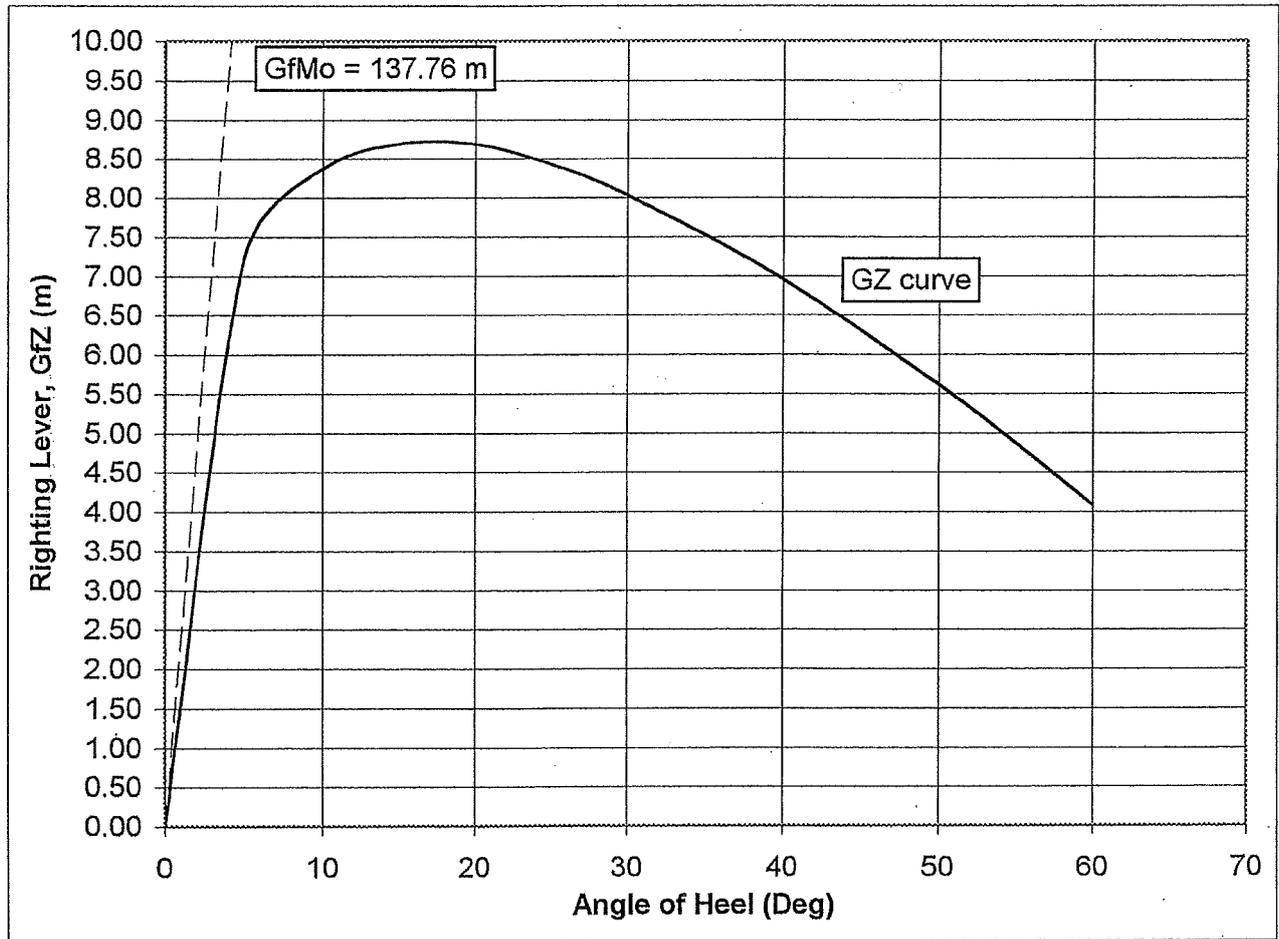


6.0 LIMITING KGf CURVE



Displacement (tonnes)	KGf (m)
382	13.26
800	13.26
900	12.53
1000	11.80
1178	10.49

ANGLE	0	5	10	15	20	25	30	40	50	60
SIN THETA	0.000	0.087	0.174	0.259	0.342	0.423	0.500	0.643	0.766	0.866
KN	0.000	7.429	8.757	9.266	9.437	9.359	9.129	8.368	7.302	5.993
KGf SIN THETA	0.000	0.192	0.382	0.569	0.752	0.930	1.100	1.414	1.685	1.905
GZ	0.000	7.237	8.375	8.697	8.684	8.429	8.029	6.954	5.617	4.088



CRITERIA	REQ'D	ACTUAL	COMMENTS
ANGLE OF MAX GZ >	15 Degrees	18 Degrees	COMPLIES
AREA 0 TO GZMAX >	5.10 m.Deg	139.09 m.Deg	COMPLIES
AREA 30 TO 40 DEGREES >	1.72 m.Deg	74.92 m.Deg	COMPLIES
GfZ @ 15 DEG OR MORE >	0.20 metres	8.70 metres	COMPLIES
GfMo >	0.15 metres	137.76 metres	COMPLIES

LOADING CONDITION

No.2

SHIP NAME : STEEL CONSTRUCTOR
 CONDITION : OUTFITTED BARGE
 DESCRIPTION : 100 TONNES DECK CARGO + CRAWLER CRANE +
 CRANE LIFT + 100% W.B. AFT (P&S)

ITEM	MASS	V.C.G.	V.MOM	L.C.G.	L.MOM	F.S.M.
	tonnes	metres	t.m	metres	t.m	t.m
W.B. TANK AFT (P)	147.90	1.11	164.17	-12.00	-1774.80	130.10
W.B. TANK AFT (S)	147.90	1.11	164.17	-12.00	-1774.80	130.10
W.B. TANK FWD (P)	0.00	0.00	0.00	0.00	0.00	
W.B. TANK FWD (S)	0.00	0.00	0.00	0.00	0.00	
SLUDGE 1 (P)	0.00	0.00	0.00	0.00	0.00	
SLUDGE 2 (P)	0.00	0.00	0.00	0.00	0.00	
SLUDGE 3 (P)	0.00	0.00	0.00	0.00	0.00	
			0.00		0.00	
CRAWLER CRANE	178.00	4.70	836.60	13.00	2314.00	
3 X ANCHORS	18.00	3.20	57.60	-20.00	-360.00	
EMERGENCY ANCHOR	6.00	3.20	19.20	21.00	126.00	
4 X WINCHES	17.60	3.40	59.84	0.00	0.00	
POWER PACK	2.00	3.40	6.80	0.00	0.00	
BOOM REST	0.50	4.00	2.00	-24.00	-12.00	
MISC DECK CARGO	8.10	2.70	21.87	1.00	8.10	
WALKWAY	0.50	2.40	1.20	21.00	10.50	
TUGGER WINCH	1.20	3.20	3.84	16.00	19.20	
PILE HAMMER STAND	1.90	3.20	6.08	16.00	30.40	
PILE GATE	2.00	2.70	5.40	12.00	24.00	
2 X CRANE RAMPS	22.20	2.58	57.28	-15.40	-341.88	
2 X CRANE MATS	10.00	2.35	23.50	10.65	106.50	
SITE CONTAINER	10.00	4.25	42.50	-15.40	-154.00	
			0.00		0.00	
CRANE LIFT	22.00	47.00	1034.00	13.00	286.00	

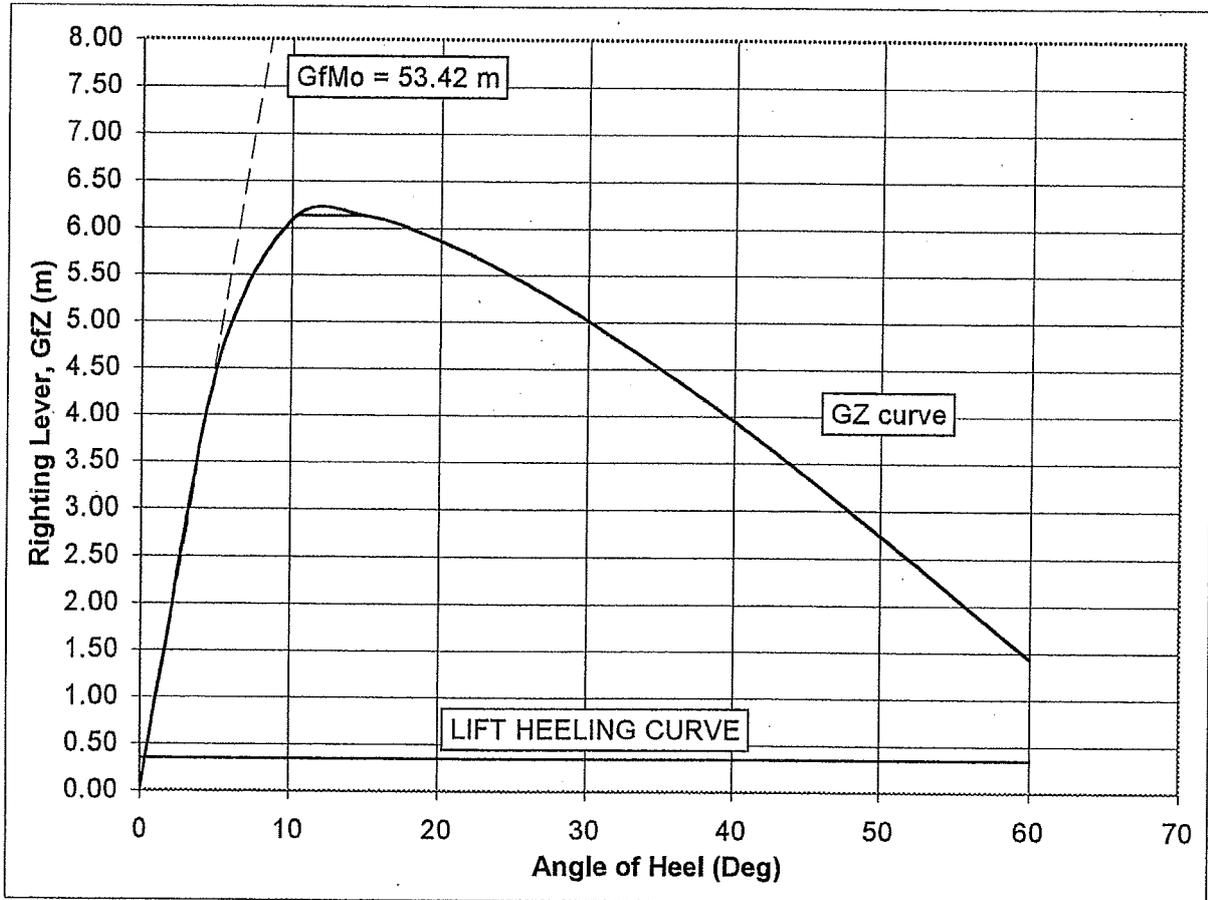
Dead Weight	595.80		2506.04		-1492.78
Light Ship	381.86	2.20	840.09	1.65	630.72
Resultant Vessel	977.66	3.42	3346.14	-0.88	-862.06

KG fluid	3.69	260.20
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FROM HYDROSTATICS (0.0m Trim)		TRIM & DRAFTS	
K-M trans.	57.11 metres	L.B.P.	48.00 metres
G-M fluid	53.42 metres	L.B.P. / 75	0.64 metres
Draft @ L.C.F. (baseline)	0.86 metres	Trim between marks	-0.01 metres
L.C.F.	-0.56 metres	Draft AP baseline	0.86 metres
L.C.B.	-0.96 metres	Draft FP baseline	0.87 metres
M.C.T. 1cm between marks	51.82 t.m./cm.	Draft Aft Marks	0.87 metres
		Draft Fwd Marks	0.88 metres

LIFT RADIUS 15.50 m.
 MAX. LIFT AT THIS RADIUS 22.00 t.
 LIFT MOMENT 341.00 t.m.

ANGLE	0	5	10	15	20	25	30	40	50	60
SIN THETA	0.000	0.087	0.174	0.259	0.342	0.423	0.500	0.643	0.766	0.866
KN	0.000	4.821	6.725	7.087	7.128	7.037	6.862	6.319	5.563	4.631
KGf SIN THETA	0.000	0.321	0.641	0.955	1.262	1.559	1.844	2.371	2.826	3.195
GZ	0.000	4.499	6.085	6.132	5.866	5.478	5.018	3.948	2.737	1.437
LIFT HEEL ARM	0.349	0.349	0.349	0.349	0.349	0.349	0.349	0.349	0.349	0.349



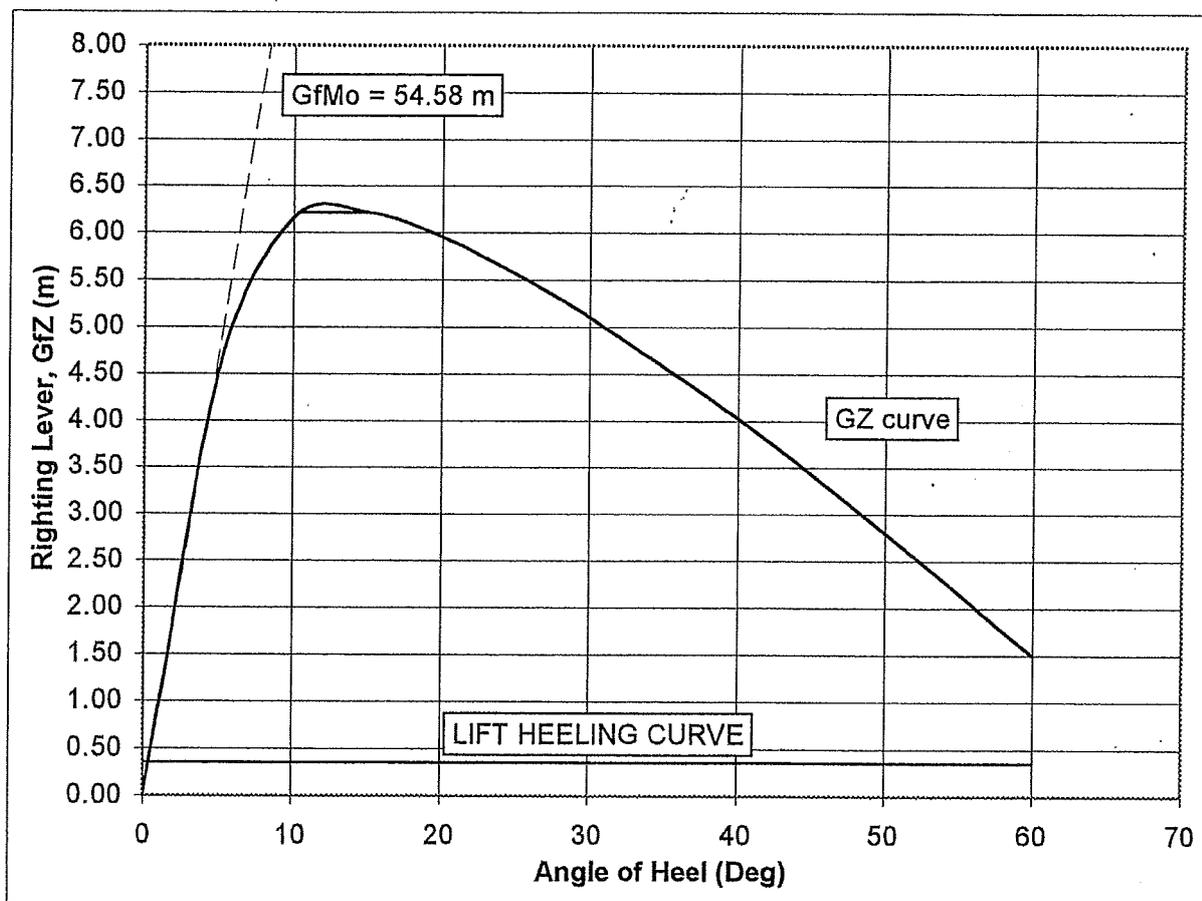
CRITERIA	REQ'D	ACTUAL	COMMENTS
ANGLE OF MAX GZ >	15 Degrees	15 Degrees	SEE NOTE
AREA 0 TO GZMAX >	6.30 m.Deg	70.83 m.Deg	COMPLIES
AREA 30 TO 40 DEGREES >	1.72 m.Deg	44.83 m.Deg	COMPLIES
GfZ @ 15 DEG OR MORE >	0.20 metres	6.13 metres	COMPLIES
GfMo >	0.15 metres	53.42 metres	COMPLIES
ANGLE OF HEEL DUE TO CRANE LIFT <	5.00 Degrees	0.37 Degrees	COMPLIES

NOTE: CURVE TRUNCATED AT 15 DEGREES

CONDITION No.3

LIFT RADIUS 15.50 m.
 MAX. LIFT AT THIS RADIUS 22.00 t.
 LIFT MOMENT 341.00 t.m.

ANGLE	0	5	10	15	20	25	30	40	50	60
SIN THETA	0.000	0.087	0.174	0.259	0.342	0.423	0.500	0.643	0.766	0.866
KN	0.000	4.893	6.803	7.171	7.213	7.119	6.942	6.390	5.623	4.678
KGf SIN THETA	0.000	0.321	0.639	0.953	1.259	1.556	1.841	2.366	2.820	3.188
GZ	0.000	4.572	6.163	6.218	5.954	5.564	5.101	4.023	2.803	1.490
LIFT HEEL ARM	0.356	0.356	0.356	0.356	0.356	0.356	0.356	0.356	0.356	0.356



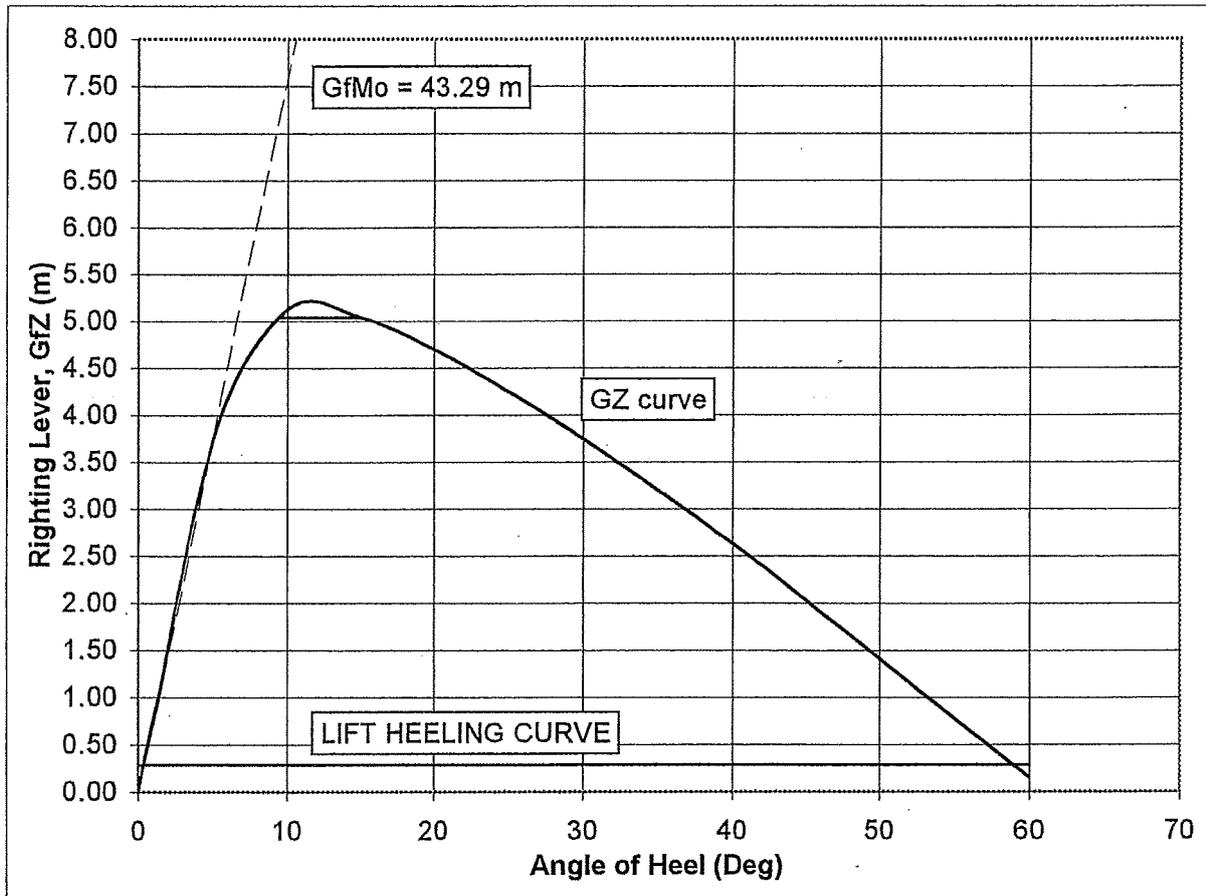
CRITERIA	REQ'D	ACTUAL	COMMENTS
ANGLE OF MAX GZ >	15 Degrees	15 Degrees	SEE NOTE
AREA 0 TO GZMAX >	6.30 m.Deg	71.80 m.Deg	COMPLIES
AREA 30 TO 40 DEGREES >	1.72 m.Deg	45.62 m.Deg	COMPLIES
GfZ @ 15 DEG OR MORE >	0.20 metres	6.22 metres	COMPLIES
GfMo >	0.15 metres	54.58 metres	COMPLIES
ANGLE OF HEEL DUE TO CRANE LIFT <	5.00 Degrees	0.37 Degrees	COMPLIES

NOTE: CURVE TRUNCATED AT 15 DEGREES

CONDITION No.4

LIFT RADIUS 15.50 m.
 MAX. LIFT AT THIS RADIUS 22.00 t.
 LIFT MOMENT 341.0 t.m.

ANGLE	0	5	10	15	20	25	30	40	50	60
SIN THETA	0.000	0.087	0.174	0.259	0.342	0.423	0.500	0.643	0.766	0.866
KN	0.000	4.145	5.932	6.242	6.283	6.212	6.069	5.613	4.970	4.168
KGf SIN THETA	0.000	0.404	0.805	1.200	1.586	1.960	2.319	2.981	3.553	4.017
GZ	0.000	3.740	5.127	5.042	4.697	4.252	3.750	2.632	1.417	0.152
LIFT HEEL ARM	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290



CRITERIA	REQ'D	ACTUAL	COMMENTS
ANGLE OF MAX GZ >	15 Degrees	15 Degrees	SEE NOTE
AREA 0 TO GZMAX >	6.30 m.Deg	58.75 m.Deg	COMPLIES
AREA 30 TO 40 DEGREES >	1.72 m.Deg	31.91 m.Deg	COMPLIES
GfZ @ 15 DEG OR MORE >	0.20 metres	5.04 metres	COMPLIES
GfMo >	0.15 metres	43.29 metres	COMPLIES
ANGLE OF HEEL DUE TO CRANE LIFT <	5.00 Degrees	0.38 Degrees	COMPLIES

NOTE: CURVE TRUNCATED AT 15 DEGREES

8.0 SAMPLE CALCULATION

Sample Calculation

Loading Condition No. 3

Page No. 16

Open Ended Piles & Entrapped Water

8.1 Preparation

Draw up a loading table with the appropriate headings, similar to that shown on page 16.

8.2 Calculation of Deadweight

8.2.1 Determination of Tanks Containing Liquid

Determine the tanks which are to contain liquid, and the nature of the contents. Determine the weights and centres of gravity of the liquids in the tanks.

Note that longitudinal levers and moments are positive forward and negative aft of midship.

8.2.2 Tank Summary Table

The Tank Summary Table is on page 33.

8.2.3 Partly Filled Tanks

Where tanks are partly filled (i.e slack), the required information is to be taken from the tank calibration tables on pages 34 to 38.

8.2.4 Free Surface Moments

Where the tanks involved are slack, read off the maximum free surface moment for each tank from the tank summary table. This must also be done for tanks which may become slack shortly after departure.

8.2.5 Values for the Loading Table

Enter the values from 8.2.1 and 8.2.4 into the loading table.

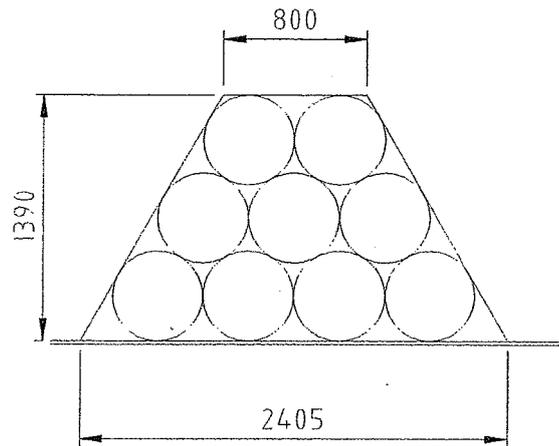
8.2.6 Weights and Centres of Gravity for Loading Table

Determine the weights and centres of gravity of the cargo and stores to be carried and enter these into the loading table.

8.2.7 Additional Loading Calculations due to Pipe Cargo

IMO stability criteria require the following specific allowance to be made for entrapped water when carrying pipe deck cargoes:

Assume pipe cargo profile in condition 3.



Assumed cargo of 9 pipes.

Pipes 508 mm OD x 34.60 m length = 6.67 t per pipe.

	No. Pipes	Weight	KG (m)	Mmt (t.m)
Tier 1	4	26.68	2.46	65.63
Tier 2	3	20.01	2.90	58.03
Tier 3	2	13.34	3.34	44.56
		60.03	2.80	168.22

$$\text{Area} = \frac{(2.41 + 0.80) \times 1.39}{2} = 2.23 \text{ m}^2$$

$$\text{Length of pipes} = 34.60 \text{ metres}$$

$$\begin{aligned} \text{Total Volume} &= 2.23 \times 34.60 \\ &= 77.07 \text{ m}^3 \end{aligned}$$

$$\begin{aligned} \text{Assuming entrapped water} &= 25 \% \times 77.07 \\ &= 19.27 \text{ m}^3 \end{aligned}$$

$$\begin{aligned} \text{Weight of entrapped water} &= 19.27 \times 1.025 \\ &= 19.75 \text{ tonne} \end{aligned}$$

$$\begin{aligned} \text{Height of centre of entrapped water} &= \frac{h}{2} \\ &= \frac{1.39}{2} \text{ m above deck} \\ &= 0.70 \text{ m above deck} \end{aligned}$$

= 0.70 + 2.21 m above baseline

= 2.91 m above baseline

Hence:

Weight of pipes	=	60.03 tonnes
KG pipes	=	2.80 m
LCG pipes	=	0.00 m
Weight of entrapped water	=	19.75 tonne
KG entrapped water	=	2.91 m
LCG entrapped water	=	0.00 m

Enter these values in load table.

- Note: 1. IMO stability criteria allow this condition to exceed loadline draft provided all stability criteria are met.
2. No free surface is required on this water as this is accounted for in weight calculation.

8.3 Calculation of Displacement, VCG and LCG

8.3.1 Calculating the Moments

Multiply the weights and levers in the loading table to obtain the moments.

8.3.2 Summing the factors

Sum the weights (575.58 tonnes), the vertical moments (2424.49 tonne metres) and the longitudinal moments (-949.60 tonne metres).

(Note: +ve fwd of amidships)

8.3.3 Inserting the Lightship Particulars

Insert the lightship particulars, from page 43 in the table.

i.e. Lightship Displacement	=	381.86 tonnes
Vertical Moment	=	840.09 tonne - metres
Longitudinal Moment	=	630.72 tonne - metres (fwd of amidship)

8.3.4 Summing of Deadweight and Lightship Values

Sum the deadweight and lightship values to obtain the characteristics for the loading condition. The loaded displacement is:

$$575.58 + 381.86 = 957.44 \text{ tonnes}$$

8.3.5 Corresponding Total Vertical Moment

Corresponding total vertical moment is:

$$2424.49 + 840.09 = 3264.59 \text{ tonne - metres}$$

and the loaded vertical centre of gravity is:

$$3264.59 \text{ t-m} / 957.44 \text{ tonnes} = 3.41 \text{ metres}$$

8.3.6 Corresponding Nett Longitudinal Moment

Corresponding nett longitudinal moment is:

$$-949.60 \text{ t.m} + 630.72 \text{ t-m fwd} = -318.88 \text{ t-m}$$

and the loaded longitudinal centre of gravity is:

$$-318.88 \text{ t-m} / 957.44 \text{ tonnes} = -0.33 \text{ metres} \\ \text{(aft of amidships)}$$

8.4 Calculation of Trim

8.4.1 Hydrostatic Tables

The hydrostatic tables are plotted against the draft above the baseline at the longitudinal centre of flotation (LCF) for the ship at level trim.

8.4.2 Designed Rake of Keel

This ship does not have a designed rake of keel.

8.4.3 When Trimmed, Draft at LCF is Unchanged

When the ship trims, it does so about the LCF, so that the draft at the LCF applies to both the level and trimmed conditions.

8.4.4 When the LCG Does Not Coincide with LCB

When the calculated longitudinal centre of gravity (LCG) for any load condition does not coincide with the position of the longitudinal centre of buoyancy (LCB) for the ship at its designed level trim, the ship will trim about the LCF.

In this loading condition:

Displacement	=	957.44 tonnes
LCG	=	-0.33 metres (-ve aft, +ve forward)

8.4.5 The Hydrostatic Tables

Enter the hydrostatic tables at the displacement (957.44 tonnes) by interpolating between the next highest and lowest displacements in the table to find the corresponding draft above the baseline at the LCF. At this draft (0.84 metres) the hydrostatic properties can be found by interpolation:

$$\begin{aligned} \text{LCB} &= -0.96 \text{ metres fwd (-ve aft, +ve fwd)} \\ \text{LCF} &= -0.58 \text{ metres fwd (-ve aft, +ve fwd)} \\ \text{MCT 1 cm} &= 51.69 \text{ tonne-metres between marks.} \end{aligned}$$

8.4.6 Trimming Lever

The lever causing the trim is the distance between the LCG as loaded and the LCB at designed level trim, i.e.

$$\begin{aligned} \text{Trimming lever} &= \text{LCB} - \text{LCG} \\ &= -0.96 - -0.33 \\ &= -0.63 \text{ metres} \end{aligned}$$

Note 1: Care is required with the sign of the position of the LCG and LCB about midships.

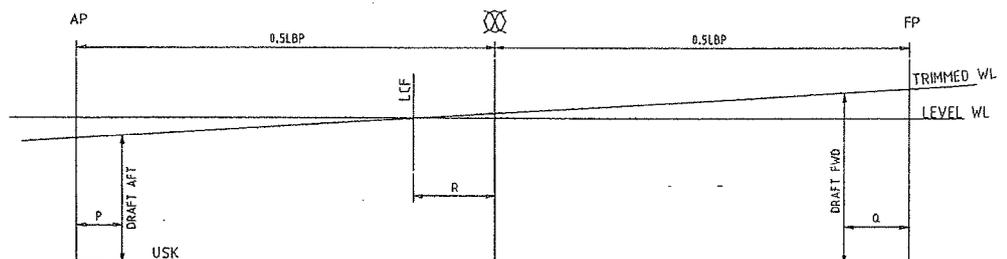
Note 2: Since the LCG is fwd of the LCB the trimming moment will cause the ship to trim by the bow.

$$\begin{aligned} \text{Thus, trimming moment} &= \text{Trimming Lever} \times \text{Loaded Displacement} \\ &= -0.63 \times 957.44 \text{ tonne-metres} \\ &= -603.19 \text{ tonne-metres} \end{aligned}$$

$$\begin{aligned} \text{Trim} &= \frac{\text{Trimming Moment}}{\text{MCT1 cm} \times 100} \\ &= -603.19 / (51.69 \times 100) \\ &= -0.117 \text{ metres (by the bow)} \end{aligned}$$

8.4.7 Total Trim of the Baseline

This is the total trim of the baseline over the LBP and, as the ship trims about the LCF, the trim is proportioned to determine the drafts as shown below:



8.4.8 Calculation of Draft Aft

To calculate the draft aft, take the proportion of the trim relating to the distance from the LCF to the AP. Since the trim is by the stern, add this proportion of the trim to the draft at the LCF, i.e.

$$\begin{aligned}\text{Trim Aft to AP} &= \frac{(0.5 \text{ LBP} + \text{"R"}) \times \text{Trim in metres}}{\text{LBP}} \\ &= \frac{(0.5 \times 48 + -0.58) \times -0.117}{48} \\ &= -0.06 \text{ metres}\end{aligned}$$

$$\begin{aligned}\text{Draft Aft AP} &= \text{Draft LCF} + \text{Trim Aft} \\ \text{(above baseline)} &= 0.84 - 0.06 \\ &= 0.78 \text{ metres above baseline.}\end{aligned}$$

To calculate the draft at the aft draft marks, take the proportion of the trim relating to the distance from the LCF to the draft marks aft, which are "P" metres fwd of the AP. Since the trim is by the stern, add this proportion of the trim to the draft at the LCF, i.e.

$$\begin{aligned}\text{Trim Aft to Marks} &= \frac{(0.5 \text{ LBP} + \text{"R"} - \text{"P"}) \times \text{Trim in metres}}{\text{LBP}} \\ &= \frac{(0.5 \times 48 + -0.58 - 2.4) \times -0.117}{48} \\ &= -0.05 \text{ metres}\end{aligned}$$

$$\begin{aligned}\text{Draft Aft Marks} &= \text{Draft LCF} + \text{Trim Aft} \\ \text{(above baseline)} &= 0.84 - 0.05 \\ &= 0.79 \text{ metres above baseline.}\end{aligned}$$

Correcting for keel thickness:

$$\begin{aligned}\text{Draft aft Marks} &= 0.79 + 0.01 \\ \text{(above USK)} &= 0.80 \text{ metres}\end{aligned}$$

8.4.9 Calculation of Draft Forward

$$\text{Trim Fwd to FP} = \frac{(0.5 \text{ LBP} - \text{"R"}) \times \text{Trim in metres}}{\text{LBP}}$$

$$= \frac{(0.5 \times 48 - 0.58) \times -0.117}{40.8}$$

$$= -0.06 \text{ metres}$$

$$\text{Draft Forward (above baseline)} = \text{Draft LCF} - \text{Trim Fwd}$$

$$= 0.84 - (-0.06)$$

$$= 0.90 \text{ metres above baseline}$$

$$\text{Trim Fwd to Marks} = \frac{(0.5 \text{ LBP} - \text{"R"} - \text{"Q"}) \times \text{Trim in metres}}{\text{LBP}}$$

$$= \frac{(0.5 \times 48 - 0.58 - 4.8) \times -0.117}{40.8}$$

$$= -0.05 \text{ metres}$$

$$\text{Draft Forward Marks (above baseline)} = \text{Draft LCF} - \text{Trim Fwd}$$

$$= 0.84 - (-0.05)$$

$$= 0.89 \text{ metres above baseline}$$

Correcting for keel thickness:

$$\text{Draft Fwd Marks (above USK)} = 0.89 + 0.01$$

$$= 0.90 \text{ metres}$$

8.5 Calculation of Stability

8.5.1 Information from the Loading Table

From the loading table.

$$\text{Displacement} = 957.44 \text{ tonnes}$$

$$\text{VCG above baseline} = 3.41 \text{ metres}$$

$$\text{Deadweight} = 575.58 \text{ tonnes}$$

$$\text{Deadweight Vertical Moment} = 2424.49 \text{ t-m}$$

8.5.2 Deadweight Centre of Gravity

$$\begin{aligned}\text{Deadweight VCG} &= \frac{\text{Deadweight Vertical Moment}}{\text{Deadweight}} \\ &= \frac{2424.49}{575.58} \\ &= 4.21 \text{ metres above baseline} \\ \text{VCG above deck} &= 4.21 - 2.21 \\ &= 2.00 \text{ metres above deck}\end{aligned}$$

8.5.3 Comparison with Limiting KG Curve (DECK CARGO ONLY)

When deck cargo only is carried the curve of Limiting Deck Cargo vs VCG at Section 5 may be used. (Otherwise continue to 8.5.4).

The allowable VCG for the actual deadweight (575.58 tonnes) should be read from the curve (Allowable VCG = 10 metres).

The calculated deadweight VCG must be less than the allowable VCG.

In this case the actual (2.00 m above deck) is less than the allowable (10 metre above deck).

NOTE THAT SINCE BALLAST IS CARRIED IN THIS CONDITION THE LOAD CONDITION DOES NOT QUALIFY AS "DECK CARGO ONLY" AND A FULL CALCULATION SHOULD BE MADE.

8.5.4 Free Surface Correction

Allowance must be made for any slack tanks using the tank data from Section 10.

Summate the free surface moment for all slack tanks.

In this instance there are no slack tanks, however the W.B. Tanks Aft (p & s) are conservatively assumed to have a free surface.

$$\begin{aligned}\Sigma \text{ FS Mmt} &= 260.2 \\ \text{Free surface correction} &= \frac{\Sigma \text{ FS Mmt}}{\text{Load Displacement}} \\ &= \frac{260.2}{957.44} \\ &= 0.27 \text{ m}\end{aligned}$$

$$\begin{aligned}
 \text{Corrected VCG above baseline} &= \text{VCG} + \text{FS Correction} \\
 &= 3.41 + 0.27 \\
 &= 3.68 \text{ metres.}
 \end{aligned}$$

8.5.5 Height of Transverse Metacentre

From the hydrostatic tables, at draft above baseline at LCF = 0.84 metres, the height of the transverse metacentre above the baseline,

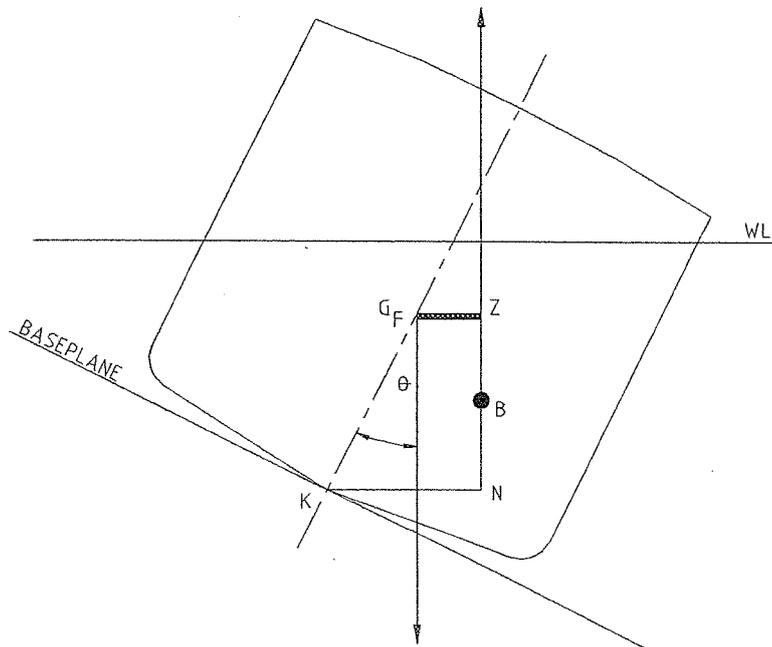
$$KM_o = 58.26 \text{ metres}$$

Metacentric Height corrected for free surface,

$$\begin{aligned}
 G_f M_o &= KM_o - KG_f \\
 &= 58.26 - 3.68 \\
 &= 54.58 \text{ metres}
 \end{aligned}$$

8.5.6 Righting Lever Diagram

Diagram illustrating righting lever, $G_f Z$:



$$G_f Z = KN - KG_f \sin \theta$$

Where:

KG_f = Height of VCG, corrected for free surface, above the baseline; and

KN = Righting lever at angle θ when the ship's centre of gravity is assumed to be at K.

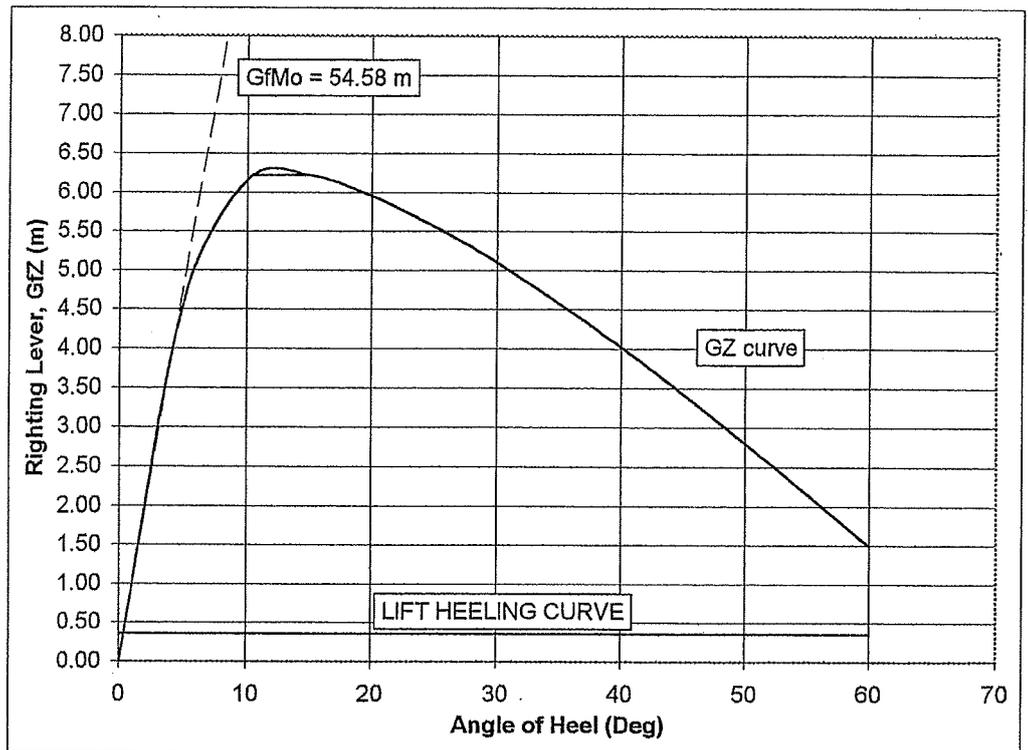
8.5.7 KN Values for Each Angle Of Heel

Enter the KN curves at the load displacement = 957.44 tonnes, and lift off the KN value for each angle of heel. Values to be interpolated from tabulated data.

Angle of Heel θ°	Sin θ	KN	$KG_f \times \text{Sin } \theta = G_fZ$	
5	0.087	4.893	0.321	4.571
10	0.174	6.803	0.639	6.163
15	0.259	7.171	0.953	6.218
20	0.342	7.213	1.259	5.954
25	0.423	7.119	1.556	5.564
30	0.500	6.942	1.841	5.101
40	0.634	6.390	2.366	4.023
50	0.766	5.623	2.820	2.803
60	0.866	4.678	3.188	1.490

8.5.8 Plot the GZ Curve

Plot the G_fZ curve:



8.5.9 Data to be Plotted on the G_fZ Curve

Plot the following on the G_fZ curve:

- G_fM_o . θ line - plot the value of G_fM_o at an angle of one radian (57.3 degrees), and join this point to the origin.

8.5.10 Comparison with Stability Criteria

Check to ensure that the G_fZ curve meets all the elements of the appropriate criteria:

- a) Determine the angle of maximum G_fZ, θ_{max} , from inspection of the plotted G_fZ curve. Record the angle and compare with the required criterion value.

In this condition θ_{max} occurs at 10.5 degrees which is less than the criterion value of 15 degrees.

As there are ample reserves of stability the G_fZ curve can be truncated as shown in the graph. Note that the area above the truncation must not be included in the area calculation.

- b) Calculate the area under the G_fZ curve from $0^\circ - 30^\circ$ or from $0^\circ - \theta_{max}^\circ$ if θ_{max} is less than 30° .

Note: The area from 0 to 30 degrees is calculated as follows:

Angle of Heel (degrees)	G_fZ (m)	SM	Product
0	0.000	1	0.00
10	6.163	3	18.49
20	5.954	3	17.86
30	5.101	1	5.10
f(A) =			41.45

$$\text{Area} = 0.375 \times 10^\circ \times f(A) = 155.4 \text{ m - degrees.}$$

Note: For Calculation of Area 0 – 15 degrees:

Angle of Heel (degrees)	G_fZ (m)	SM	Product
0	0.000	1	0.00
5	4.571	3	13.71
10	6.163	3	18.49
15	6.218	1	6.22
f(A) =			38.42

$$\text{Area} = 0.375 \times 5^\circ \times f(A) = 72.04 \text{ m - degrees.}$$

Note: For Calculation of Area 0 – 20 degrees:

Angle of Heel (degrees)	G _f Z (m)	SM	Product
0	0.000	1	0.000
5	4.571	4	18.284
10	6.163	2	12.326
15	6.218	4	24.872
20	5.954	1	5.954
f(A) =			61.436

$$\text{Area} = 0.333 \times 5^\circ \times f(A) = 102.29 \text{ m} - \text{degrees.}$$

The area from 0 - θ max is calculated as follows:

The area under the G_fZ curve is calculated to the 5 deg angle of heel nearest θ max using the Simpson's Rules as shown above. The area between that angle of heel and θ max is then approximated and the area from 0 - θ max calculated accordingly.

$$\text{In this condition } \theta \text{ max} = 15 \text{ (note curve truncated)}$$

$$\text{Area } 0 - 15 = 72.04 \text{ m deg (as above)}$$

$$\text{Less area above truncation} \approx 0.67 (15 - \text{intercept}) (GZ_{\text{max}} - GZ_{15})$$

$$\begin{aligned} \text{From graph } GZ_{\text{max}} &= 6.30 \text{ m} \\ 1^{\text{st}} \text{ Intercept} &= 10.5 \text{ degrees} \\ GZ_{15} &= 6.218 \end{aligned}$$

$$\begin{aligned} \text{Thus area above truncation} &\approx 0.67 (15 - 10.5) (6.3 - 6.218) \\ &= 0.25 \text{ m.deg} \end{aligned}$$

$$\begin{aligned} \text{Thus Area } 0 - \theta \text{ max} &= 72.04 - 0.25 \\ &= 71.80 \text{ m deg} \end{aligned}$$

c) Calculate the area under the G_fZ curve from 30° - 40°

$$G_{fZ_{30}} = 5.101 \text{ m}$$

$$G_{fZ_{40}} = 4.023 \text{ m}$$

$$\begin{aligned} \text{Area } 30^\circ - 40^\circ &= 0.5 \times (5.101 + 4.023) \times 10 \\ &= 45.62 \text{ m.deg} \end{aligned}$$

Compare this value with the criterion requirement.

- d) The largest value of the righting lever G_fZ is lifted from the G_fZ curve. (Note when the curve has been truncated the modified GZ curve is used)

In this condition:

Actual value = 6.22 metres
at θ max = 15 degrees

Compare this value with the required criterion value of 0.20 m.

- e) The initial metacentric height G_fM_o is 54.58 metres.

Compare this value with the required criterion value of 0.15 m.

9.0 CRANE USAGE

When a crane is carried, the effect of crane use on the vessel heel is to be determined.

Assume the crane load in Loading Condition No. 3.

The weight that the crane is lifting is to be included in the loading condition table.

To calculate the effect of the crane usage on heel determine the maximum weight to be lifted and the maximum lift radius.

$$\begin{aligned}\text{Maximum Lift} &= 22 \text{ tonnes} \\ \text{Maximum Lift Radius} &= 15.5 \text{ m}\end{aligned}$$

$$\begin{aligned}\text{Thus, the lifting moment} &= \text{Maximum Lift} \times \text{Maximum Lift Radius} \\ &= 22 \times 15.5 \\ &= 341 \text{ tonne-metres.}\end{aligned}$$

To determine the lift heeling lever divide the lifting moment by the full load displacement for the given load condition.

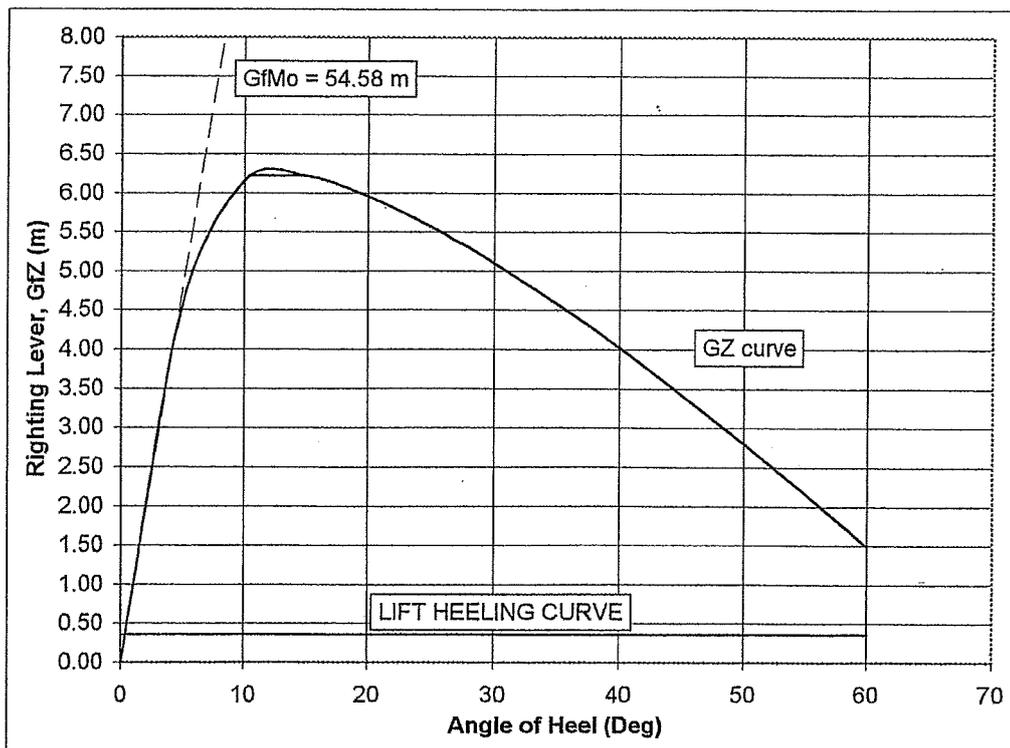
$$\begin{aligned}\text{Lift Heeling Moment} &= \text{Lifting Moment} / \text{Full Load Displacement} \\ &= 341 / 957.44 \\ &= 0.36 \text{ m}\end{aligned}$$

Plot the lift heeling lever on the G_fZ curve for 0 to 60 degrees.

The maximum vessel heel due to the crane lift is determined from the intersection of the G_fZ curve and the lift heeling curve.

The maximum allowable vessel heel due to the crane lift is 5 degrees.

In Loading Condition 3, the actual heel (0.37 degrees) is less than the allowable heel.

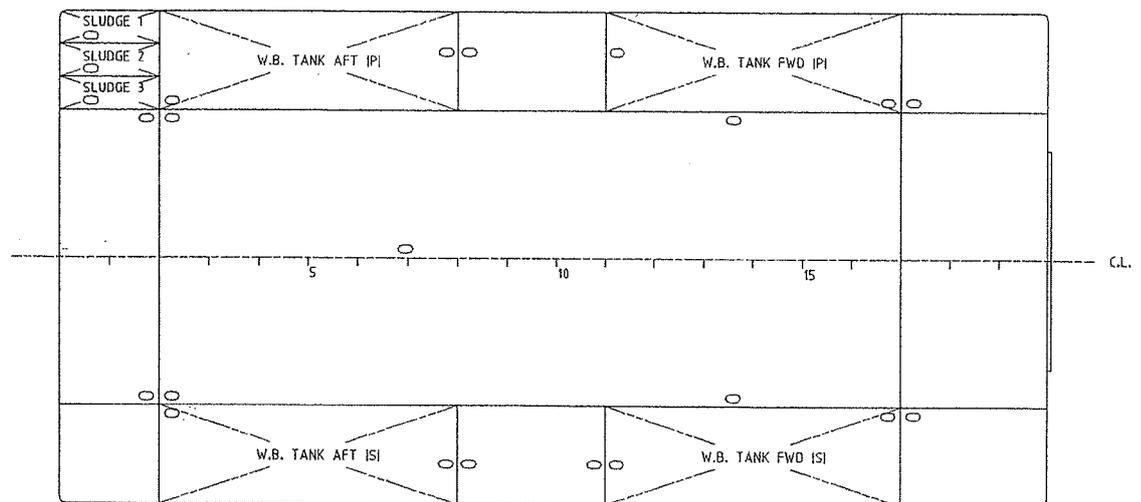


10.0 TANKAGE INFORMATION

10.1 Tank Summary

Tank	Contents	Location	Capacity (Litres) 100%	VCG (m)	LCG (m)	FSM (t.m)
W.B. Tank Fwd (P)	F.W.	FR 11 - FR 17	147900	1.11	9.60	130.1
W.B. Tank Fwd (S)	F.W.	FR 11 - FR 17	147900	1.11	9.60	130.1
W.B. Tank Aft (P)	F.W.	FR 2 - FR 8	147900	1.11	-12.00	130.1
W.B. Tank Aft (S)	F.W.	FR 2 - FR 8	147900	1.11	-12.00	130.1
Sludge No. 1 (P)	F.W.	TR - FR 2	10380	1.50	-21.57	1.60
Sludge No. 2 (P)	F.W.	TR - FR 2	10540	1.50	-21.60	1.65
Sludge No. 3 (P)	F.W.	TR - FR 2	10540	1.50	-21.60	1.65

10.2 Tank Plan



PLAN

10.3 Tank Calibrations

Vessel Name: STEEL CONSTRUCTOR
 Tank Name: W.B. TANK AFT (P&S)
 Contents: FRESH WATER
 Specific Gravity: 1.00

Sounding (m)	Volume (Itrs.)	Weight (MT)	LCG (m)	VCG (m)	FSM (MT-m)
0.00	0	0.00	0.000	0.000	0.00
0.10	6305	6.30	12.000a	0.050	107.20
0.20	12709	12.71	12.000a	0.101	114.48
0.30	19264	19.26	12.000a	0.152	122.10
0.40	25967	25.97	12.000a	0.203	130.06
0.50	32740	32.74	12.000a	0.254	130.06
0.60	39514	39.51	12.000a	0.305	130.06
0.70	46288	46.29	12.000a	0.355	130.06
0.80	53061	53.06	12.000a	0.406	130.06
0.90	59835	59.84	12.000a	0.456	130.06
1.00	66609	66.61	12.000a	0.506	130.06
1.10	73384	73.38	12.000a	0.556	130.06
1.20	80156	80.16	12.000a	0.607	130.06
1.30	86930	86.93	12.000a	0.657	130.06
1.40	93704	93.70	12.000a	0.707	130.06
1.50	100477	100.48	12.000a	0.757	130.06
1.60	107251	107.25	12.000a	0.807	130.06
1.70	114025	114.03	12.000a	0.857	130.06
1.80	120799	120.80	12.000a	0.907	130.06
1.90	127572	127.57	12.000a	0.957	130.06
2.00	134346	134.35	12.000a	1.007	130.06
2.10	141120	141.12	12.000a	1.057	130.06
FULL	147897	147.90	12.000a	1.107	0.00

Vessel Name: STEEL CONSTRUCTOR
 Tank Name: W.B. TANK FWD (P&S)
 Contents: FRESH WATER
 Specific Gravity: 1.00

Sounding (m)	Volume (ltrs.)	Weight (MT)	LCG (m)	VCG (m)	FSM (MT-m)
0.00	0	0.00	0.000	0.000	0.00
0.10	6305	6.30	9.600f	0.050	107.20
0.20	12709	12.71	9.600f	0.101	114.48
0.30	19264	19.26	9.600f	0.152	122.10
0.40	25966	25.97	9.600f	0.203	130.06
0.50	32740	32.74	9.600f	0.254	130.06
0.60	39514	39.51	9.600f	0.305	130.06
0.70	46288	46.29	9.600f	0.355	130.06
0.80	53061	53.06	9.600f	0.406	130.06
0.90	59835	59.84	9.600f	0.456	130.06
1.00	66609	66.61	9.600f	0.506	130.06
1.10	73384	73.38	9.600f	0.556	130.06
1.20	80156	80.16	9.600f	0.607	130.06
1.30	86930	86.93	9.600f	0.657	130.06
1.40	93704	93.70	9.600f	0.707	130.06
1.50	100478	100.48	9.600f	0.757	130.06
1.60	107251	107.25	9.600f	0.807	130.06
1.70	114025	114.03	9.600f	0.857	130.06
1.80	120799	120.80	9.600f	0.907	130.06
1.90	127572	127.57	9.600f	0.957	130.06
2.00	134346	134.35	9.600f	1.007	130.06
2.10	141120	141.12	9.600f	1.057	130.06
FULL	147897	147.90	9.600f	1.107	0.00

Vessel Name: STEEL CONSTRUCTOR
 Tank Name: SLUDGE NO.1 (P)
 Contents: SLUDGE
 Specific Gravity: 1.025

Sounding (m)	Volume (ltrs.)	Weight (MT)	LCG (m)	VCG (m)	FSM (MT-m)
0.00	0	0.00	0.000	0.000	0.00
0.10	741	0.76	21.566a	0.850	1.60
0.20	1483	1.52	21.566a	0.900	1.60
0.30	2224	2.28	21.566a	0.950	1.60
0.40	2965	3.04	21.566a	1.000	1.60
0.50	3707	3.80	21.566a	1.050	1.60
0.60	4448	4.56	21.566a	1.100	1.60
0.70	5189	5.32	21.566a	1.150	1.60
0.80	5931	6.08	21.566a	1.200	1.60
0.90	6672	6.84	21.566a	1.250	1.60
1.00	7414	7.60	21.566a	1.300	1.60
1.10	8155	8.36	21.566a	1.350	1.60
1.20	8896	9.12	21.566a	1.400	1.60
1.30	9638	9.88	21.566a	1.450	1.60
FULL	10379	10.64	21.566a	1.500	0.00

Vessel Name: STEEL CONSTRUCTOR
 Tank Name: SLUDGE NO.2 (P)
 Contents: SLUDGE
 Specific Gravity: 1.025

Sounding (m)	Volume (ltrs.)	Weight (MT)	LCG (m)	VCG (m)	FSM (MT-m)
0.00	0	0.00	0.000	0.000	0.00
0.10	753	0.77	21.600a	0.850	1.65
0.20	1505	1.54	21.600a	0.900	1.65
0.30	2258	2.31	21.600a	0.950	1.65
0.40	3011	3.09	21.600a	1.000	1.65
0.50	3764	3.86	21.600a	1.050	1.65
0.60	4516	4.63	21.600a	1.100	1.65
0.70	5269	5.40	21.600a	1.150	1.65
0.80	6022	6.17	21.600a	1.200	1.65
0.90	6775	6.94	21.600a	1.250	1.65
1.00	7527	7.72	21.600a	1.300	1.65
1.10	8280	8.49	21.600a	1.350	1.65
1.20	9033	9.26	21.600a	1.400	1.65
1.30	9786	10.03	21.600a	1.450	1.65
FULL	10538	10.80	21.600a	1.500	0.00

Vessel Name: STEEL CONSTRUCTOR
 Tank Name: SLUDGE NO.2 (P)
 Contents: SLUDGE
 Specific Gravity: 1.025

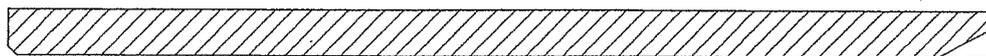
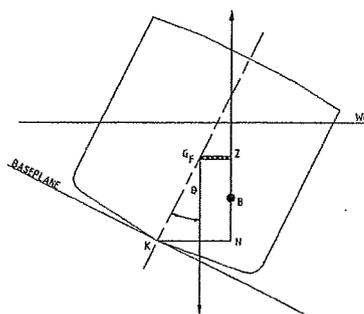
Sounding (m)	Volume (ltrs.)	Weight (MT)	LCG (m)	VCG (m)	FSM (MT-m)
0.00	0	0.00	0.000	0.000	0.00
0.10	753	0.77	21.600a	0.850	1.65
0.20	1505	1.54	21.600a	0.900	1.65
0.30	2258	2.31	21.600a	0.950	1.65
0.40	3010	3.09	21.600a	1.000	1.65
0.50	3763	3.86	21.600a	1.050	1.65
0.60	4516	4.63	21.600a	1.100	1.65
0.70	5268	5.40	21.600a	1.150	1.65
0.80	6021	6.17	21.600a	1.200	1.65
0.90	6773	6.94	21.600a	1.250	1.65
1.00	7526	7.71	21.600a	1.300	1.65
1.10	8278	8.49	21.600a	1.350	1.65
1.20	9031	9.26	21.600a	1.400	1.65
1.30	9784	10.03	21.600a	1.450	1.65
FULL	10536	10.80	21.600a	1.500	0.00

11.0 HYDROSTATIC DATA - Level Trim

LCF Draft (m)	Displ (MT)	LCB (m)	VCB (m)	LCF (m)	TPcm (MT/cm)	MTcm (MT-m/cm)	KML (m)	KMT (m)
0.320	359.913	1.164a	0.157	1.078a	11.18	47.68	540.452	147.557
0.340	382.300	1.159a	0.167	1.067a	11.21	47.94	511.665	139.810
0.360	404.752	1.154a	0.177	1.059a	11.24	48.20	485.849	132.861
0.380	427.273	1.149a	0.187	1.049a	11.28	48.47	462.830	126.668
0.400	449.857	1.143a	0.197	1.034a	11.30	48.68	441.532	120.867
0.420	472.470	1.138a	0.207	1.013a	11.31	48.81	421.537	115.205
0.440	495.104	1.131a	0.218	0.993a	11.32	48.95	403.358	110.057
0.460	517.758	1.125a	0.228	0.973a	11.33	49.08	386.760	105.357
0.480	540.433	1.118a	0.238	0.952a	11.34	49.21	371.545	101.050
0.500	563.127	1.111a	0.248	0.931a	11.35	49.35	357.550	97.088
0.520	585.841	1.104a	0.258	0.911a	11.36	49.49	344.634	93.431
0.540	608.576	1.096a	0.268	0.890a	11.37	49.62	332.677	90.046
0.560	631.331	1.088a	0.279	0.869a	11.38	49.76	321.570	86.903
0.580	654.106	1.080a	0.289	0.849a	11.39	49.89	311.207	83.970
0.600	676.901	1.072a	0.299	0.829a	11.40	50.03	301.535	81.233
0.620	699.716	1.064a	0.309	0.808a	11.41	50.16	292.487	78.672
0.640	722.551	1.056a	0.319	0.788a	11.42	50.30	284.004	76.272
0.660	745.406	1.047a	0.329	0.768a	11.43	50.43	276.035	74.018
0.680	768.281	1.039a	0.340	0.748a	11.44	50.57	268.536	71.896
0.700	791.175	1.030a	0.350	0.728a	11.45	50.70	261.465	69.896
0.720	814.087	1.021a	0.360	0.707a	11.46	50.84	254.788	68.007
0.740	837.023	1.012a	0.370	0.687a	11.47	50.97	248.471	66.221
0.760	859.978	1.003a	0.380	0.667a	11.48	51.11	242.488	64.529
0.780	882.953	0.994a	0.390	0.647a	11.49	51.25	236.811	62.924
0.800	905.947	0.985a	0.400	0.627a	11.50	51.39	231.419	61.400
0.820	928.962	0.976a	0.411	0.606a	11.51	51.52	226.291	59.950
0.840	951.997	0.967a	0.421	0.586a	11.52	51.66	221.408	58.570
0.860	975.052	0.958a	0.431	0.566a	11.53	51.80	216.752	57.254
0.880	998.126	0.948a	0.441	0.546a	11.54	51.94	212.308	55.999
0.900	1021.220	0.939a	0.451	0.526a	11.55	52.08	208.063	54.799
0.920	1044.334	0.930a	0.461	0.505a	11.56	52.22	204.003	53.652
0.940	1067.469	0.920a	0.472	0.485a	11.57	52.36	200.117	52.555
0.960	1090.623	0.911a	0.482	0.465a	11.58	52.50	196.393	51.503
0.980	1113.797	0.901a	0.492	0.445a	11.59	52.64	192.821	50.494
1.000	1136.990	0.892a	0.502	0.424a	11.60	52.78	189.393	49.527
1.020	1160.204	0.882a	0.512	0.404a	11.61	52.92	186.101	48.597
1.040	1183.438	0.873a	0.522	0.384a	11.62	53.06	182.935	47.704
1.060	1206.691	0.863a	0.533	0.364a	11.63	53.20	179.890	46.844
1.080	1229.963	0.854a	0.543	0.344a	11.64	53.35	176.959	46.017
1.100	1253.257	0.844a	0.553	0.323a	11.65	53.49	174.134	45.220
1.120	1276.570	0.834a	0.563	0.303a	11.66	53.63	171.411	44.452
1.140	1299.903	0.824a	0.573	0.283a	11.67	53.78	168.785	43.711
1.160	1323.256	0.815a	0.583	0.263a	11.68	53.92	166.249	42.996
1.180	1346.629	0.805a	0.594	0.243a	11.69	54.06	163.800	42.306
1.200	1370.022	0.795a	0.604	0.222a	11.70	54.21	161.434	41.639
1.220	1393.434	0.785a	0.614	0.202a	11.71	54.35	159.146	40.994
1.240	1416.867	0.776a	0.624	0.182a	11.72	54.50	156.932	40.370
1.260	1440.319	0.766a	0.634	0.162a	11.73	54.64	154.789	39.766
1.280	1463.792	0.756a	0.645	0.142a	11.74	54.79	152.713	39.181
1.300	1487.285	0.746a	0.655	0.121a	11.75	54.94	150.702	38.615
1.320	1510.797	0.736a	0.665	0.101a	11.76	55.08	148.753	38.066
1.340	1534.329	0.726a	0.675	0.081a	11.77	55.23	146.862	37.534

12.0 RIGHTING LEVER (KN) DATA - 0.00 m Initial Trim

Displ (MT)	5.000	10.000	15.000	20.000	25.000	30.000	40.000	50.000	60.000
350	7.612	8.881	9.360	9.533	9.465	9.238	8.471	7.390	6.063
400	7.325	8.687	9.213	9.382	9.298	9.067	8.310	7.252	5.953
450	7.055	8.504	9.072	9.216	9.121	8.890	8.146	7.111	5.842
500	6.799	8.332	8.919	9.039	8.937	8.707	7.978	6.967	5.729
550	6.557	8.167	8.754	8.854	8.748	8.521	7.809	6.823	5.616
600	6.325	8.010	8.578	8.663	8.555	8.332	7.637	6.678	5.502
650	6.103	7.859	8.395	8.468	8.360	8.141	7.465	6.531	5.387
700	5.889	7.707	8.206	8.269	8.162	7.949	7.291	6.384	5.272
750	5.682	7.547	8.011	8.068	7.962	7.755	7.117	6.237	5.157
800	5.483	7.378	7.813	7.864	7.761	7.560	6.943	6.090	5.041
850	5.289	7.201	7.612	7.659	7.558	7.364	6.768	5.942	4.926
900	5.101	7.019	7.408	7.452	7.355	7.168	6.592	5.794	4.811
950	4.919	6.831	7.202	7.244	7.150	6.971	6.416	5.645	4.695
1000	4.741	6.640	6.994	7.034	6.945	6.774	6.240	5.497	4.580
1050	4.567	6.445	6.784	6.824	6.740	6.576	6.064	5.349	4.464
1100	4.397	6.246	6.573	6.614	6.534	6.377	5.887	5.200	4.348
1150	4.232	6.045	6.360	6.401	6.327	6.179	5.711	5.052	4.232
1200	4.074	5.841	6.147	6.188	6.120	5.980	5.534	4.903	4.117
1250	3.927	5.636	5.932	5.976	5.913	5.781	5.357	4.754	4.001
1300	3.791	5.429	5.717	5.761	5.705	5.581	5.179	4.605	3.885
1350	3.664	5.219	5.502	5.549	5.498	5.383	5.002	4.456	3.769
1400	3.537	5.009	5.285	5.335	5.289	5.183	4.826	4.307	3.653
1450	3.409	4.797	5.067	5.120	5.081	4.983	4.648	4.159	3.537
1500	3.280	4.584	4.849	4.905	4.872	4.783	4.471	4.010	3.422



PORTION OF VESSEL USED IN CALCULATION OF KN DATA

13.0 DISPLACEMENT CHECK REPORT

Name of Vessel : Steel Constructor

Date of Experiment : 30th September, 2002

Place: Smiths Creek, Cairns

Present : - Naval Architect
- Lloyds Surveyor

Weather: Fine

Wind Strength: SE - 10-20 knots

Sea: Slight Chop

Total No. of Persons Aboard : Nil

Water Density : 1023 kg/m³

Tank Summary :

Tank	Capacity (litres)	Sounding (mm)	Contents (litres)
WB Tank Aft (P)	147900	DRY	0
WB Tank Aft (S)	147900	DRY	0
WB Tank Fwd (P)	147900	DRY	0
WB Tank Fwd (S)	147900	DRY	0

Drafts above USK:

	Port (m)	Stbd (m)	Mean (m)	
Fwd	0.505	0.464	0.485	(at Fwd Marks)
Midships	0.395	0.370	0.383	(at loadline disc, 1310 mm above USK)
Aft	0.264	0.245	0.255	(at Aft Marks)

Drafts above Baseline : (-0.010 baseline draft corr'n fwd)
(-0.010 baseline draft corr'n aft)

FWD Marks = 0.475 m (19.20 m fwd Amidship)

AFT Marks = 0.245 m (21.60 m aft Amidship)

Trim between Marks = -0.230 m (+ve by Stern)

Distance between Marks = 40.80 m

Measured Draft Amidship = 0.373 a.b
 Calculated Draft Amidship = 0.367 a.b

Hence hog / sag negligible

From as Measured Hydrostatics

Displacement = 405.68 t
 LCG = LCB = 1.583 m

Weights ON

Nil

Weights Moved

Nil

Weights OFF

Item	Weight (t)	LCG (m)	Mmt (t-m)
Winch 1	8.80	0.00	0.00
Winch 2	3.00	0.00	0.00
Winch 3	8.85	0.00	0.00
Genset 1	1.30	21.80	28.34
Genset 2	0.50	23.60	11.80
Oxyset	0.15	0.00	0.00
Chain	1.22	-23.50	-28.67
	23.82	0.48	11.47

LIGHTSHIP DERIVATION :

Item	Weight (t)	LCG (m)	L.Mmt (t-m)
Vessel "As meas"	405.68	1.58	642.19
Weights ON	0.00	-	0.00
Weights Moved	0.00	-	0.00
Weights OFF	-23.82	0.48	-11.47
LIGHTSHIP	381.86	1.65	630.72

KG ESTIMATION:

Assume conservatively the lightship KG of the vessel to be at deck level. (2.2m above baseline)

LIGHTSHIP PARTICULARS:

The lightship particulars used in this stability booklet are obtained by using the LCG from the displacement check and the conservative estimation of VCG as determined above.

The lightship particulars used in this stability book are as follows:

DISPL	=	381.86 tonnes
KG	=	2.20 metres (above baseline)
V.Mmt	=	840.09 tonne-metres
LCG	=	1.65 metres
L.Mmt	=	630.72 tonne-metres



DOMESTIC COMMERCIAL VESSEL
Accredited Surveyor Plan
and Stability Approval

APPROVED

The undersigned surveyor declares that they have examined the document to which this stamp is affixed in accordance with the requirements of the *Marine Safety (Domestic Commercial Vessel) National Law Act 2012* and found it to satisfy the requirements to be approved.

For any comments see approval letter number Dated 03.05.16
C-0500-SRN-030516

Accredited Surveyor

Name: Aurora Marine Pty Ltd <

ID:

Signature

.. Date 03.05.16

Maeve Anne
DUMB BARGE

TRIM AND STABILITY
BOOK ADDENDUM
PILING OPERATIONS: BARANGAROO FERRY HUB 2016

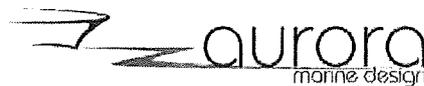
March 01, 2016
Doc No: C-0592-115-S2

PREPARED FOR:

BRADY MARINE AND CIVIL

PO Box 5338
West End
QLD 4101

PREPARED BY:



www.auroramarinedesign.com
E: info@auroramarinedesign.com
P: +61 7 5502 3260

PO Box 383 Burleigh Heads QLD Australia 4220
4 / E52 Gold Coast City Marina, Coomera QLD Australia 4209

Document Control

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INFORMATION ON THE CALCULATIONS

1. Aurora Marine design is not responsible for any errors in the construction or operation of the vessel.
2. Lightship particulars have been obtained from the original stability booklet.
3. Deck layout, equipment weights and operational details have been supplied by Brady Marine and Civil.
4. This document is to cover piling operations at the Barangaroo Ferry Hub. Separate calculations are required for any other more onerous lifting conditions to be undertaken.
5. It is the operator's responsibility to ensure that the crane is kept within the limits provided by the crane manufacturer at all times.
6. Information on the crane weight breakdown has been taken from the manufacturer's specifications. Crane hook and rigging weights are included in the total lift weight shown.
7. This document should be read in conjunction with the original stability book dated 8th April 2003.

VESSEL INFORMATION**PRINCIPLE DIMENSIONS**

Vessel Name : Maeve Anne
Length Overall : 48.0 m
Beam Moulded : 24 m
Depth Moulded : 2.2 m
Survey : AMSA

REFERENCE POINTS

Vertical : Keel Plate (+ve above)
Longitudinal : AP (+ve forward)
Underside of Keel : baseline

CRANE

Type : Kobelco CKE2500-2
Counterweight : 90 tonnes
Carbody Weights : 24 tonnes
Total Crane Weight : 214 tonnes (approx)

BALLAST

Aft Ballast Tank Port : 151 tonnes fresh water (100%, pressed full)
Aft Ballast tank Stbd : 151 tonnes fresh water (100%, pressed full)

(Tanks to be pressed full at all times. See arrangement drawing for tank locations)

INFORMATION FOR MASTER AND CREW

1. Stability conditions have been prepared for smooth water operations, class 2E. Criteria are to NSCV section C6A, section 5D and 6D. Vessel shows compliance with these criteria.
2. Crane lifting guidance is to be followed for crane operation at all times. In no case should these parameters be exceeded.
3. Bilge's should be kept as dry as practical at all times in order to reduce the free surface effect.
4. Any ballast tanks in use, as indicated in the loading conditions, are to be fully pressed at all times, to ensure there are no free surface moment effects.
5. Conditions shown are for the normal operation of this vessel. Separate calculations are required for any other conditions of loading.
6. Vessel heel and trim is to be constantly monitored to ensure the crane charts are not exceeded.
7. A list of steady angle of heel, however caused, reduces the vessel's stability. It is therefore essential to keep the vessel upright at all times.
8. Weathertight closing appliances are to be as far as possible kept closed while vessel is at sea. If openings are required to be opened at sea for normal operation of vessel, this shall be controlled by master or authorised crew member.
9. Compliance with Stability Criteria does not ensure immunity against capsizing regardless of the circumstances or absolve the master from his responsibilities. Masters should therefore exercise prudence and good seamanship having regard to the season of the year, experience of crew, weather forecasts and navigational zone and should take appropriate action as warranted by the prevailing conditions.

INTACT STABILITY CRITERIA

Ref: NSCV Section 6A – Intact Stability

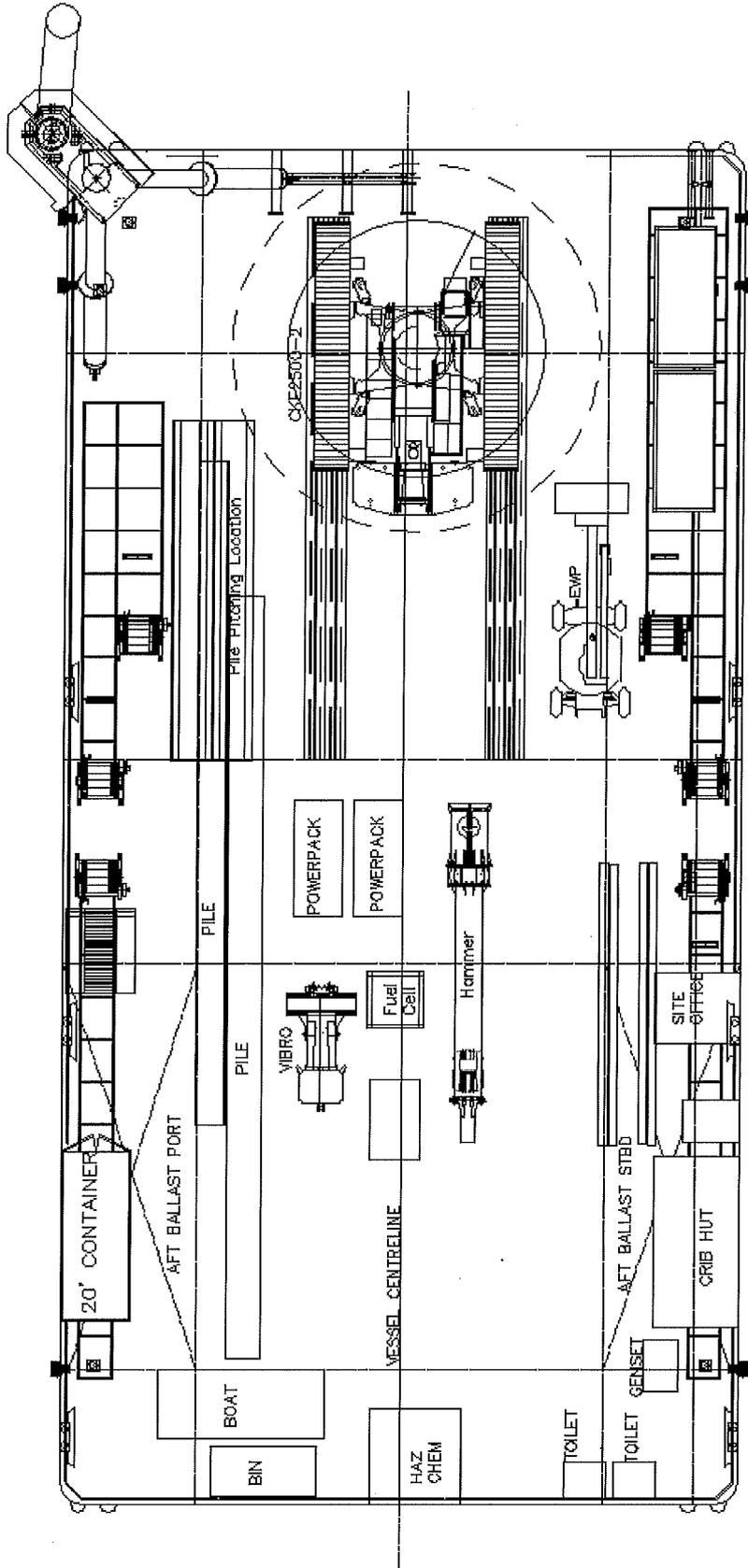
Chapter 5D – Alternative Criteria for Dumb Barges

Criterion	Limits to application	Description
5D.1a	Seagoing Barges in Operational Areas A, B, C	Not Applicable
5D.1b	Sheltered Water Barges Operational Areas D, E	The area beneath the G_{FZ} curve measured between 0 degrees and the angle of maximum righting arm G_{FZmax} , the downflooding angle θ_f , or 40 degrees, whichever angle is smallest shall not be less than 3.05 metre-degrees.

Chapter 6 – Additional Comprehensive Stability Criteria for Special Operations

Criterion	Limits to application	Description
6D.1	All Vessels	The residual area A_R beneath the <i>righting lever curve</i> and above the <i>heeling lever curve</i> up to 40 degrees angle of heel (or up to the angle of downflooding, f degrees, if this angle is less than 40 degrees) shall not be less than 40 per cent of the total area under the modified <i>righting lever curve</i> from 0 degrees to 40 degrees (or from 0 degrees to f degrees).
6D.2	All Vessels	The angle of heel h shall not exceed s degrees (see Table 4) when the load heeling lever is applied.

VESSEL PLAN - GENERAL LAYOUT



CONDITION SUMMARY TABLE

LOADCASE	PILES ON DECK	LIFT (t)	LIFT ANGLE (°)	CRANE RADIUS (m)	HEEL (°)	TRIM (mm)	DECK INCLINATION (°)	STABILITY CRITERIA
LC1 – Impact Hammer Pickup	0	33	154	18.0	0	-487	0.584	PASS
LC2a – Impact Hammer Slew (port)	1	33	270	18.0	-0.3	-537	0.722	PASS
LC2b – Impact Hammer Slew (stbd)	0	33	270	18.0	0.3	-562	0.741	PASS
LC3 – Impact Hammer Place	0	33	45	18.0	-0.1	-597	0.724	PASS

Notes:

1. Heel angle is measured in degrees, -ve angle indicates heel to port
2. Trim is measured in millimetres, +ve values indicate a trim by the stern
3. As the heel exceeds 1% inclination, a 1 degree crane chart is to be adhered to.
4. The above loadcases represent the worst anticipated lifting conditions for the piling operations.

LC 1 – IMPACT HAMMER LIFT

Damage Case - Intact

Free to Trim

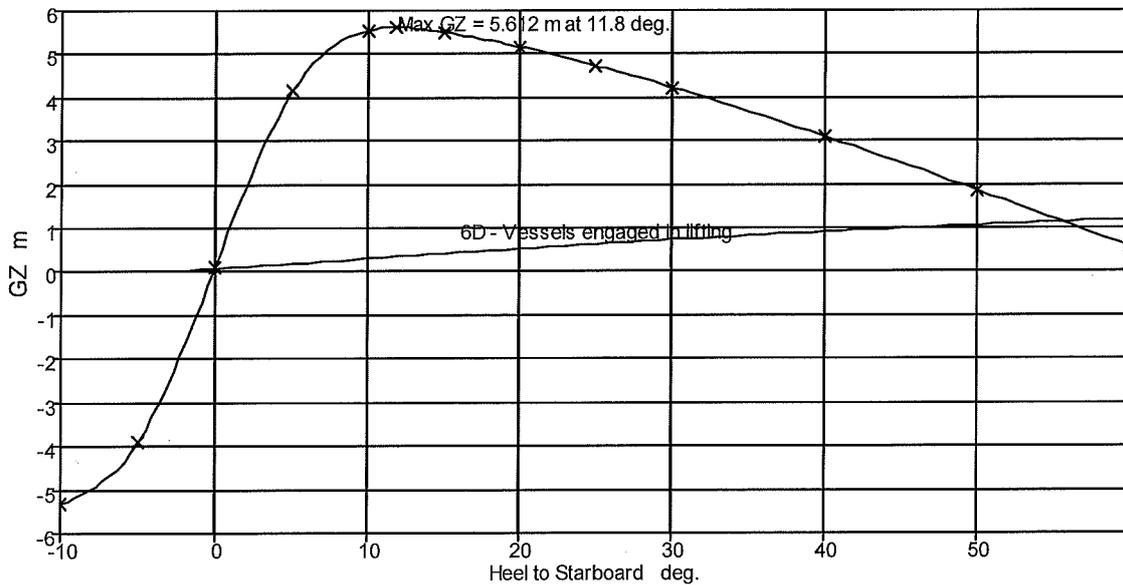
Specific gravity = 1.025; (Density = 1.025 tonne/m³)

Fluid analysis method: Use corrected VCG

Item Name	Quantity	Unit Mass tonne	Total Mass tonne	Long. Arm m	Trans. Arm m	Vert. Arm m	Total FSM tonne.m
Lightship	1	381.860	381.860	25.650	0.000	2.200	0.000
Crane Plate	1	25.000	25.000	36.000	0.380	2.370	0.000
Crane Boom Support	1	2.500	2.500	2.400	4.100	5.500	0.000
Deck Beams	1	1.000	1.000	46.800	-2.125	2.750	0.000
Crane Mats	1	10.000	10.000	36.300	0.000	2.400	0.000
20' Container - storage	1	2.000	2.000	9.556	-10.520	3.500	0.000
20' Container - crib hut	1	2.000	2.000	9.550	10.080	3.500	0.000
Haz Chem Container	1	3.000	3.000	1.500	0.525	3.200	0.000
Bin	1	1.000	1.000	0.950	-4.810	2.950	0.000
Toilets	2	0.100	0.200	0.850	7.480	3.500	0.000
Water Tank	1	1.000	1.000	12.850	10.100	2.950	0.000
Fuel Tank	1	2.000	2.000	17.880	0.000	3.200	0.000
Office	1	1.500	1.500	17.826	10.100	3.500	0.000
Platforms general	1	2.000	2.000	24.000	0.000	2.500	0.000
Hammer Sleeve	1	2.000	2.000	13.650	0.000	3.500	0.000
Junntan Powerpack	1	10.000	10.000	22.910	-0.875	3.200	0.000
Junntan 16S IH	0	30.500	0.000	19.675	2.340	3.200	0.000
ICE Vibro Powerpack	1	10.000	10.000	22.910	-3.000	3.200	0.000
Ice Vibro Hammer	1	7.000	7.000	16.500	-2.900	3.000	0.000
Genset	1	4.500	4.500	4.930	9.250	3.200	0.000
Welder	1	1.500	1.500	12.000	-5.460	3.200	0.000
Bridge Headstock 1	1	4.500	4.500	17.750	7.350	3.700	0.000
Bridge Headstock 2	1	4.500	4.500	17.750	8.750	3.700	0.000
Work boat	1	1.500	1.500	3.570	-5.625	2.950	0.000
Pile Pitching Beams	1	2.000	2.000	32.400	-6.890	2.500	0.000
EWP JLG860SJ	1	17.200	17.200	30.750	6.700	4.200	0.000
Piling Leader	1	20.000	20.000	47.000	-11.000	8.200	0.000
Pile on deck	1	22.000	22.000	18.700	-5.575	3.000	0.000
Crane Tracks	2	20.700	41.400	41.000	0.380	2.850	0.000
Carbody CW	1	24.000	24.000	41.000	0.380	3.100	0.000
Base Machine	1	44.900	44.900	42.789	0.184	5.100	0.000
Counterweight	1	90.000	90.000	45.573	-0.120	5.400	0.000
Boom	1	13.465	13.465	31.415	1.435	27.995	0.000
Lift	1	33.000	33.000	23.107	2.338	50.940	0.000
Aft Ballast Port	100%	150.912	150.912	12.000	9.583	1.107	0.000
Aft Ballast Stbd	100%	150.912	150.912	12.000	-9.583	1.107	0.000
Total Loadcase			1090.349	25.259	-0.040	4.349	0.000
FS correction						0.000	
VCG fluid						4.349	

Draft Amidships m	0.966
Displacement t	1090
Heel deg	0.0
Draft at FP m	1.210
Draft at AP m	0.723
Draft at LCF m	0.965
Trim (+ve by stern) m	-0.487
WL Length m	47.637
Beam max extents on WL m	24.000
Wetted Area m ²	1218.795
Waterpl. Area m ²	1143.277
Block coeff. (Cb)	0.956
LCB from aft perp. (+ve fwd) m	25.298
LCF from aft perp. (+ve fwd) m	23.817
KB m	0.498
KG fluid m	4.349
BMt m	51.589
BML m	203.241
GMt corrected m	47.737
GML m	199.389
KMt m	52.084
KML m	203.728
Immersion (TPc) tonne/cm	11.719
MTc tonne.m	45.292
RM at 1deg = GMt.Disp.sin(1) tonne.m	908.386
Max deck inclination deg	0.5837
Trim angle (+ve by stern) deg	-0.5816

Key point	Type	Freeboard m
DE Aft (p)	Immersion Point	1.467
DE Aft (s)	Immersion Point	1.487
DE Fwd (p)	Immersion Point	0.980
DE Fwd (s)	Immersion Point	1.000



Heel to Starboard deg	-10.0	0.0	10.0	20.0	30.0	40.0	50.0	60.0
GZ m	-5.330	0.111	5.549	5.167	4.228	3.099	1.861	0.566
Area under GZ curve from zero heel m.deg	34.3063	0.1007	36.6611	91.2462	138.4415	175.1520	200.0382	212.1938
Displacement t	1090	1090	1090	1090	1090	1090	1090	1090
Draft at FP m	1.239	1.210	1.238	1.398	1.669	2.120	2.843	4.027
Draft at AP m	0.391	0.723	0.392	-0.398	-1.382	-2.705	-4.601	-7.577
WL Length m	48.007	47.620	48.007	48.030	48.073	48.142	48.238	48.349
Beam max extents on WL m	12.669	24.000	12.669	7.119	5.974	5.250	4.587	3.861
Wetted Area m ²	1098.468	1218.391	1098.481	1103.226	1104.929	1105.891	1106.543	1107.061
Waterpl. Area m ²	597.829	1142.873	597.829	303.646	207.824	161.734	135.690	119.857
Prismatic coeff. (Cp)	0.805	0.783	0.806	0.804	0.794	0.782	0.768	0.757
Block coeff. (Cb)	2.147	0.956	2.147	6.228	25.926	0.000	0.000	0.000
LCB from aft perp. (+ve fwd) m	25.337	25.298	25.334	25.448	25.601	25.789	25.983	26.160
LCF from aft perp. (+ve fwd) m	23.640	23.809	23.640	23.641	23.645	23.658	23.684	23.725
Max deck inclination deg	10.0490	0.5817	10.0488	20.0970	30.1497	40.2011	50.2367	60.2387
Trim angle (+ve by stern) deg	-1.0117	-0.5817	-1.0096	-2.1433	-3.6371	-5.7405	-8.8158	-13.5899

Key point	Type	Immersion angle deg
DE Aft (p)	Immersion Point	Not immersed in positive range
DE Aft (s)	Immersion Point	8
DE Fwd (p)	Immersion Point	Not immersed in positive range
DE Fwd (s)	Immersion Point	4.8

Criteria	Value	Units	Actual	Status
5D.1b - Area to max GZ, df or 40				Pass
from the greater of				
spec. heel angle	0.0	deg	0.0	
to the lesser of				
spec. heel angle	40.0	deg		
angle of max. GZ	11.8	deg	11.8	
first flooding angle of the DownfloodingPoints	n/a	deg		
shall be greater than (>)	3.0481	m.deg	46.8598	Pass
6D - Vessels engaged in lifting				Pass
Lifting of mass arm = $M (h \cos(\phi) + v \sin(\phi)) / \text{disp.}$				
mass being lifted: M =	33.000	tonne		
vertical separation of suspension point from stowage position: v =	43.960	m		
horizontal separation of suspension point from stowage position: h =	2.338	m		
Area1 integrated from the greater of				
angle of equilibrium (with heel arm)	0.0	deg	0.0	
to the lesser of				
spec. heel angle	40.0	deg	40.0	
first flooding angle of the DownfloodingPoints	n/a	deg		
angle of vanishing stability (with heel arm)	55.6	deg		
Area2 integrated from the greater of				
angle of equilibrium (ignoring heel arm)	-0.1	deg	-0.1	
to the lesser of				
spec. heel angle	40.0	deg	40.0	
first flooding angle of the DownfloodingPoints	n/a	deg		
angle of vanishing stability (ignoring heel arm)	60.0	deg		
Angle for GZ(max) in GZ ratio, the lesser of:				
spec. heel angle	0.0	deg	0.0	
Select required angle for angle of steady heel ratio:	MarginlineImmersionAngle			
Criteria:				Pass
Angle of steady heel shall not be greater than (<=)	5.0	deg	0.0	Pass
Area1 / Area2 shall not be less than (>=)	40.00	%	88.33	Pass
Intermediate values				
Heel arm constant			0.0303	
amplitude of cos component		m	2.338	
amplitude of sin component		m	43.960	
Area1 (under GZ), from 0.0 to 40.0 deg.		m.deg	175.1560	
Area1 (under HA), from 0.0 to 40.0 deg.		m.deg	20.4433	
Area1, from 0.0 to 40.0 deg.		m.deg	154.7127	
Area2, from -0.1 to 40.0 deg.		m.deg	175.1586	

LC 2a- IMPACT HAMMER SLEW (PORT) 18M RADIUS

Damage Case - Intact

Free to Trim

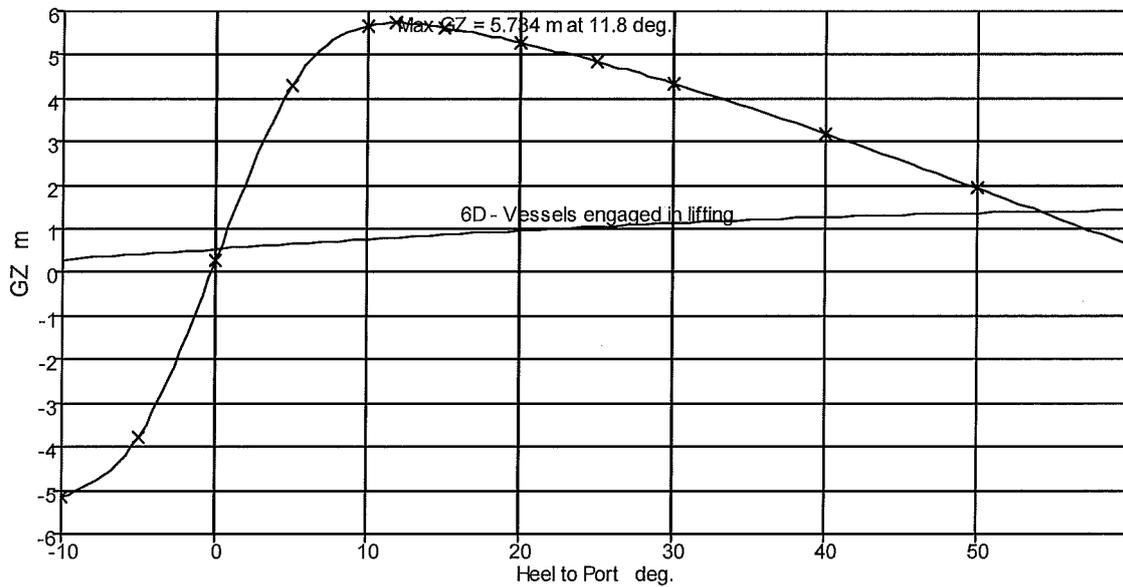
Specific gravity = 1.025; (Density = 1.025 tonne/m³)

Fluid analysis method: Use corrected VCG

Item Name	Quantity	Unit Mass tonne	Total Mass tonne	Long. Arm m	Trans. Arm m	Vert. Arm m	Total FSM tonne.m
Lightship	1	381.860	381.860	25.650	0.000	2.200	0.000
Crane Plate	1	25.000	25.000	36.000	0.380	2.370	0.000
Crane Boom Support	1	2.500	2.500	2.400	4.100	5.500	0.000
Deck Beams	1	1.000	1.000	46.800	-2.125	2.750	0.000
Crane Mats	1	10.000	10.000	36.300	0.000	2.400	0.000
20' Container - storage	1	2.000	2.000	9.556	-10.520	3.500	0.000
20' Container - crib hut	1	2.000	2.000	9.550	10.080	3.500	0.000
Haz Chem Container	1	3.000	3.000	1.500	0.525	3.200	0.000
Bin	1	1.000	1.000	0.950	-4.810	2.950	0.000
Toilets	2	0.100	0.200	0.850	7.480	3.500	0.000
Water Tank	1	1.000	1.000	12.850	10.100	2.950	0.000
Fuel Tank	1	2.000	2.000	17.880	0.000	3.200	0.000
Office	1	1.500	1.500	17.826	10.100	3.500	0.000
Platforms general	1	2.000	2.000	24.000	0.000	2.500	0.000
Hammer Sleeve	1	2.000	2.000	13.650	0.000	3.500	0.000
Junntan Powerpack	1	10.000	10.000	22.910	-0.875	3.200	0.000
Junntan 16S IH	0	30.500	0.000	19.675	2.340	3.200	0.000
ICE Vibro Powerpack	1	10.000	10.000	22.910	-3.000	3.200	0.000
Ice Vibro Hammer	1	7.000	7.000	16.500	-2.900	3.000	0.000
Genset	1	4.500	4.500	4.930	9.250	3.200	0.000
Welder	1	1.500	1.500	12.000	-5.460	3.200	0.000
Bridge Headstock 1	1	4.500	4.500	17.750	7.350	3.700	0.000
Bridge Headstock 2	1	4.500	4.500	17.750	8.750	3.700	0.000
Work boat	1	1.500	1.500	3.570	-5.625	2.950	0.000
Pile Pitching Beams	1	2.000	2.000	32.400	-6.890	2.500	0.000
EWP JLG860SJ	1	17.200	17.200	30.750	6.700	4.200	0.000
Piling Leader	1	20.000	20.000	47.000	-11.000	8.200	0.000
Pile on deck	1	22.000	22.000	18.700	-5.575	3.000	0.000
Crane Tracks	2	20.700	41.400	41.000	0.380	2.850	0.000
Carbody CW	1	24.000	24.000	41.000	0.380	3.100	0.000
Base Machine	1	44.900	44.900	41.000	2.180	5.100	0.000
Counterweight	1	90.000	90.000	41.000	4.980	5.400	0.000
Boom	1	13.465	13.465	41.000	-9.320	27.995	0.000
Lift	1	33.000	33.000	41.000	-17.620	50.940	0.000
Aft Ballast Port	100%	150.912	150.912	12.000	9.583	1.107	0.000
Aft Ballast Stbd	100%	150.912	150.912	12.000	-9.583	1.107	0.000
Total Loadcase			1090.349	25.467	-0.274	4.349	0.000
FS correction							0.000
VCG fluid							4.349

Draft Amidships m	0.966
Displacement t	1090
Heel deg	-0.3
Draft at FP m	1.235
Draft at AP m	0.698
Draft at LCF m	0.965
Trim (+ve by stern) m	-0.537
WL Length m	47.777
Beam max extents on WL m	24.000
Wetted Area m ²	1221.535
Waterpl. Area m ²	1146.637
Block coeff. (Cb)	0.955
LCB from aft perp. (+ve fwd) m	25.511
LCF from aft perp. (+ve fwd) m	23.886
KB m	0.501
KG fluid m	4.349
BMt m	51.742
BML m	205.031
GMt corrected m	47.893
GML m	201.182
KMt m	52.239
KML m	205.516
Immersion (TPc) tonne/cm	11.753
MTc tonne.m	45.699
RM at 1deg = GMt.Disp.sin(1) tonne.m	911.361
Max deck inclination deg	0.7217
Trim angle (+ve by stern) deg	-0.6409

Key point	Type	Freeboard m
DE Aft (p)	Immersion Point	1.432
DE Aft (s)	Immersion Point	1.571
DE Fwd (p)	Immersion Point	0.895
DE Fwd (s)	Immersion Point	1.034



Heel to Port deg	-10.0	0.0	10.0	20.0	30.0	40.0	50.0	60.0
GZ m	-5.162	0.259	5.674	5.283	4.331	3.185	1.929	0.615
Area under GZ curve from zero heel m.deg	32.7440	0.2358	38.0523	93.8454	142.1422	179.8032	205.4619	218.1994
Displacement t	1090	1090	1090	1090	1090	1090	1090	1090
Draft at FP m	1.290	1.235	1.289	1.513	1.867	2.440	3.349	4.842
Draft at AP m	0.341	0.698	0.342	-0.509	-1.575	-3.017	-5.090	-8.368
WL Length m	48.009	47.662	48.009	48.038	48.093	48.182	48.306	48.452
Beam max extents on WL m	12.669	24.000	12.669	7.405	6.263	5.534	4.851	4.090
Wetted Area m ²	1098.595	1218.791	1098.607	1103.365	1105.077	1106.047	1106.756	1107.231
Waterpl. Area m ²	597.851	1143.874	597.851	303.690	207.886	161.805	135.745	119.859
Prismatic coeff. (Cp)	0.789	0.769	0.789	0.786	0.775	0.761	0.747	0.733
Block coeff. (Cb)	2.145	0.955	2.145	5.966	24.225	0.000	0.000	0.000
LCB from aft perp. (+ve fwd) m	25.554	25.510	25.551	25.682	25.857	26.073	26.298	26.510
LCF from aft perp. (+ve fwd) m	23.640	23.829	23.640	23.641	23.646	23.660	23.689	23.737
Max deck inclination deg	10.0614	0.6416	10.0612	20.1228	30.1903	40.2568	50.3034	60.3083
Trim angle (+ve by stern) deg	-1.1327	-0.6416	-1.1310	-2.4119	-4.1023	-6.4858	-9.9709	-15.3869

Key point	Type	Immersion angle deg
DE Aft (p)	Immersion Point	8.2
DE Aft (s)	Immersion Point	Not immersed in positive range
DE Fwd (p)	Immersion Point	4.7
DE Fwd (s)	Immersion Point	Not immersed in positive range

Criteria	Value	Units	Actual	Status
5D.1b - Area to max GZ, df or 40				Pass
from the greater of				
spec. heel angle	0.0	deg	0.0	
to the lesser of				
spec. heel angle	40.0	deg		
angle of max. GZ	11.8	deg	11.8	
first flooding angle of the DownfloodingPoints	n/a	deg		
shall be greater than (>)	3.0481	m.deg	48.4763	Pass
6D - Vessels engaged in lifting				Pass
Lifting of mass arm = $M (h \cos(\phi) + v \sin(\phi)) / \text{disp.}$				
mass being lifted: M =	33.000	tonne		
vertical separation of suspension point from stowage position: v =	43.960	m		
horizontal separation of suspension point from stowage position: h =	17.620	m		
Area1 integrated from the greater of				
angle of equilibrium (with heel arm)	0.3	deg	0.3	
to the lesser of				
spec. heel angle	40.0	deg	40.0	
first flooding angle of the DownfloodingPoints	n/a	deg		
angle of vanishing stability (with heel arm)	54.1	deg		
Area2 integrated from the greater of				
angle of equilibrium (ignoring heel arm)	-0.3	deg	-0.3	
to the lesser of				
spec. heel angle	40.0	deg	40.0	
first flooding angle of the DownfloodingPoints	n/a	deg		
angle of vanishing stability (ignoring heel arm)	60.0	deg		
Angle for GZ(max) in GZ ratio, the lesser of:				
spec. heel angle	0.0	deg	0.0	
Select required angle for angle of steady heel ratio:	MarginInImmersionAngle			
Criteria:				Pass
Angle of steady heel shall not be greater than (<=)	5.0	deg	0.3	Pass
Area1 / Area2 shall not be less than (>=)	40.00	%	79.17	Pass
Intermediate values				
Heel arm constant			0.0303	
amplitude of cos component		m	17.620	
amplitude of sin component		m	43.960	
Area1 (under GZ), from 0.3 to 40.0 deg.		m.deg	179.6826	
Area1 (under HA), from 0.3 to 40.0 deg.		m.deg	37.3113	
Area1, from 0.3 to 40.0 deg.		m.deg	142.3712	
Area2, from -0.3 to 40.0 deg.		m.deg	179.8393	

LC 2b- IMPACT HAMMER SLEW (STBD) 18M RADIUS

Damage Case - Intact

Free to Trim

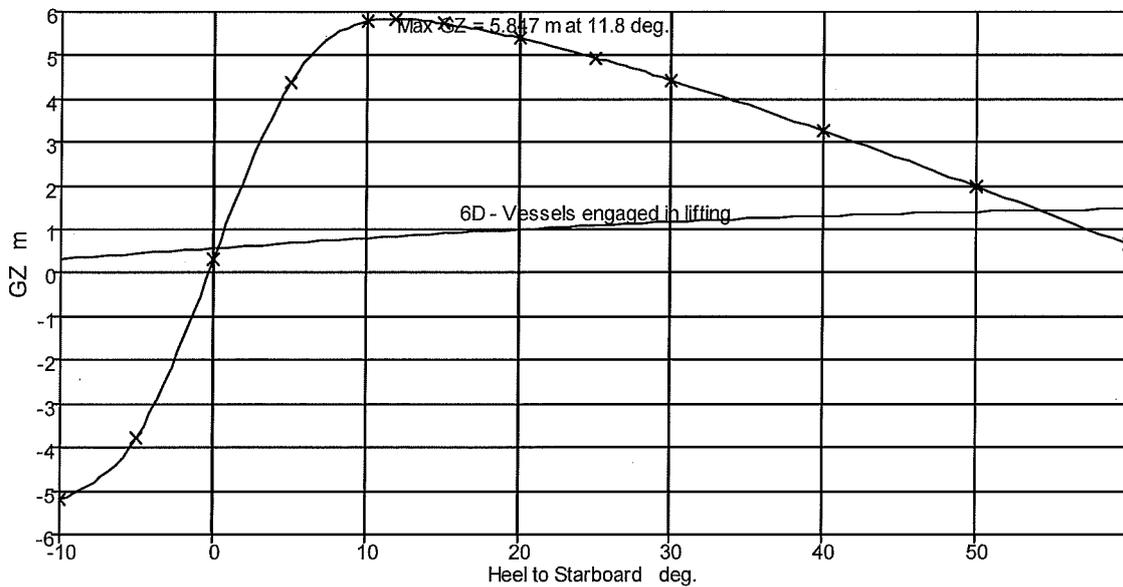
Specific gravity = 1.025; (Density = 1.025 tonne/m³)

Fluid analysis method: Use corrected VCG

Item Name	Quantity	Unit Mass tonne	Total Mass tonne	Long. Arm m	Trans. Arm m	Vert. Arm m	Total FSM tonne.m
Lightship	1	381.860	381.860	25.650	0.000	2.200	0.000
Crane Plate	1	25.000	25.000	36.000	0.380	2.370	0.000
Crane Boom Support	1	2.500	2.500	2.400	4.100	5.500	0.000
Deck Beams	1	1.000	1.000	46.800	-2.125	2.750	0.000
Crane Mats	1	10.000	10.000	36.300	0.000	2.400	0.000
20' Container - storage	1	2.000	2.000	9.556	-10.520	3.500	0.000
20' Container - crib hut	1	2.000	2.000	9.550	10.080	3.500	0.000
Haz Chem Container	1	3.000	3.000	1.500	0.525	3.200	0.000
Bin	1	1.000	1.000	0.950	-4.810	2.950	0.000
Toilets	2	0.100	0.200	0.850	7.480	3.500	0.000
Water Tank	1	1.000	1.000	12.850	10.100	2.950	0.000
Fuel Tank	1	2.000	2.000	17.880	0.000	3.200	0.000
Office	1	1.500	1.500	17.826	10.100	3.500	0.000
Platforms general	1	2.000	2.000	24.000	0.000	2.500	0.000
Hammer Sleeve	1	2.000	2.000	13.650	0.000	3.500	0.000
Junntan Powerpack	1	10.000	10.000	22.910	-0.875	3.200	0.000
Junntan 16S IH	0	30.500	0.000	19.675	2.340	3.200	0.000
ICE Vibro Powerpack	1	10.000	10.000	22.910	-3.000	3.200	0.000
Ice Vibro Hammer	1	7.000	7.000	16.500	-2.900	3.000	0.000
Genset	1	4.500	4.500	4.930	9.250	3.200	0.000
Welder	1	1.500	1.500	12.000	-5.460	3.200	0.000
Bridge Headstock 1	1	4.500	4.500	17.750	7.350	3.700	0.000
Bridge Headstock 2	1	4.500	4.500	17.750	8.750	3.700	0.000
Work boat	1	1.500	1.500	3.570	-5.625	2.950	0.000
Pile Pitching Beams	1	2.000	2.000	32.400	-6.890	2.500	0.000
EWP JLG860SJ	1	17.200	17.200	30.750	6.700	4.200	0.000
Piling Leader	1	20.000	20.000	47.000	-11.000	8.200	0.000
Pile on deck	0	22.000	0.000	18.700	-5.575	3.000	0.000
Crane Tracks	2	20.700	41.400	41.000	0.380	2.850	0.000
Carbody CW	1	24.000	24.000	41.000	0.380	3.100	0.000
Base Machine	1	44.900	44.900	41.000	-1.420	5.100	0.000
Counterweight	1	90.000	90.000	41.000	-4.220	5.400	0.000
Boom	1	13.465	13.465	41.000	10.080	27.995	0.000
Lift	1	33.000	33.000	41.000	18.380	50.940	0.000
Aft Ballast Port	100%	150.912	150.912	12.000	9.583	1.107	0.000
Aft Ballast Stbd	100%	150.912	150.912	12.000	-9.583	1.107	0.000
Total Loadcase			1068.349	25.607	0.266	4.377	0.000
FS correction						0.000	
VCG fluid						4.377	

Draft Amidships m	0.948
Displacement t	1068
Heel deg	0.3
Draft at FP m	1.229
Draft at AP m	0.667
Draft at LCF m	0.946
Trim (+ve by stern) m	-0.562
WL Length m	47.761
Beam max extents on WL m	24.000
Wetted Area m ²	1218.609
Waterpl. Area m ²	1146.250
Block coeff. (Cb)	0.955
LCB from aft perp. (+ve fwd) m	25.652
LCF from aft perp. (+ve fwd) m	23.878
KB m	0.493
KG fluid m	4.377
BMt m	52.789
BML m	209.042
GMt corrected m	48.904
GML m	205.157
KMt m	53.278
KML m	209.518
Immersion (TPc) tonne/cm	11.749
MTc tonne.m	45.662
RM at 1deg = GMt.Disp.sin(1) tonne.m	911.831
Max deck inclination deg	0.7410
Trim angle (+ve by stern) deg	-0.6706

Key point	Type	Freeboard m
DE Aft (p)	Immersion Point	1.599
DE Aft (s)	Immersion Point	1.467
DE Fwd (p)	Immersion Point	1.037
DE Fwd (s)	Immersion Point	0.905



Heel to Starboard deg	-10.0	0.0	10.0	20.0	30.0	40.0	50.0	60.0
GZ m	-5.190	0.302	5.786	5.393	4.426	3.262	1.985	0.649
Area under GZ curve from zero heel m.deg	32.8502	0.2746	39.0077	95.9314	145.2601	183.7852	210.1085	223.2959
Displacement t	1068	1068	1068	1068	1068	1068	1068	1068
Draft at FP m	1.278	1.229	1.277	1.490	1.839	2.410	3.328	4.826
Draft at AP m	0.280	0.667	0.282	-0.636	-1.782	-3.328	-5.556	-9.058
WL Length m	48.010	47.652	48.010	48.042	48.102	48.201	48.338	48.499
Beam max extents on WL m	12.669	24.000	12.669	7.732	6.574	5.818	5.102	4.289
Wetted Area m ²	1078.227	1216.002	1078.226	1083.082	1084.792	1085.787	1086.449	1086.939
Waterpl. Area m ²	597.863	1143.623	597.862	303.712	207.918	161.839	135.772	119.861
Prismatic coeff. (Cp)	0.778	0.758	0.778	0.775	0.764	0.749	0.734	0.720
Block coeff. (Cb)	2.199	0.954	2.199	6.573	117.260	0.000	0.000	0.000
LCB from aft perp. (+ve fwd) m	25.701	25.652	25.695	25.834	26.022	26.252	26.497	26.719
LCF from aft perp. (+ve fwd) m	23.640	23.824	23.640	23.641	23.647	23.664	23.699	23.754
Max deck inclination deg	10.0679	0.6712	10.0675	20.1358	30.2105	40.2837	50.3358	60.3400
Trim angle (+ve by stern) deg	-1.1911	-0.6712	-1.1880	-2.5366	-4.3145	-6.8170	-10.4849	-16.1322

Key point	Type	Immersion angle deg
DE Aft (p)	Immersion Point	Not immersed in positive range
DE Aft (s)	Immersion Point	8.6
DE Fwd (p)	Immersion Point	Not immersed in positive range
DE Fwd (s)	Immersion Point	4.7

Criteria	Value	Units	Actual	Status
5D.1b - Area to max GZ, df or 40				Pass
from the greater of				
spec. heel angle	0.0	deg	0.0	
to the lesser of				
spec. heel angle	40.0	deg		
angle of max. GZ	11.8	deg	11.8	
first flooding angle of the DownfloodingPoints	n/a	deg		
shall be greater than (>)	3.0481	m.deg	49.6372	Pass
6D - Vessels engaged in lifting				Pass
Lifting of mass arm = $M (h \cos(\phi) + v \sin(\phi)) / \text{disp.}$				
mass being lifted: M =	33.000	tonne		
vertical separation of suspension point from stowage position: v =	43.960	m		
horizontal separation of suspension point from stowage position: h =	18.380	m		
Area1 integrated from the greater of				
angle of equilibrium (with heel arm)	0.3	deg	0.3	
to the lesser of				
spec. heel angle	40.0	deg	40.0	
first flooding angle of the DownfloodingPoints	n/a	deg		
angle of vanishing stability (with heel arm)	54.2	deg		
Area2 integrated from the greater of				
angle of equilibrium (ignoring heel arm)	-0.3	deg	-0.3	
to the lesser of				
spec. heel angle	40.0	deg	40.0	
first flooding angle of the DownfloodingPoints	n/a	deg		
angle of vanishing stability (ignoring heel arm)	60.0	deg		
Angle for GZ(max) in GZ ratio, the lesser of:				
spec. heel angle	0.0	deg	0.0	
Select required angle for angle of steady heel ratio:	MarginlineImmersionAngle			
Criteria:				Pass
Angle of steady heel shall not be greater than (<=)	5.0	deg	0.3	Pass
Area1 / Area2 shall not be less than (>=)	40.00	%	78.72	Pass
Intermediate values				
Heel arm constant			0.0309	
amplitude of cos component		m	18.380	
amplitude of sin component		m	43.960	
Area1 (under GZ), from 0.3 to 40.0 deg.		m.deg	183.6591	
Area1 (under HA), from 0.3 to 40.0 deg.		m.deg	38.9442	
Area1, from 0.3 to 40.0 deg.		m.deg	144.7149	
Area2, from -0.3 to 40.0 deg.		m.deg	183.8334	

LC 3- IMPACT HAMMER PLACE ON PILE - 18M RADIUS

Damage Case - Intact

Free to Trim

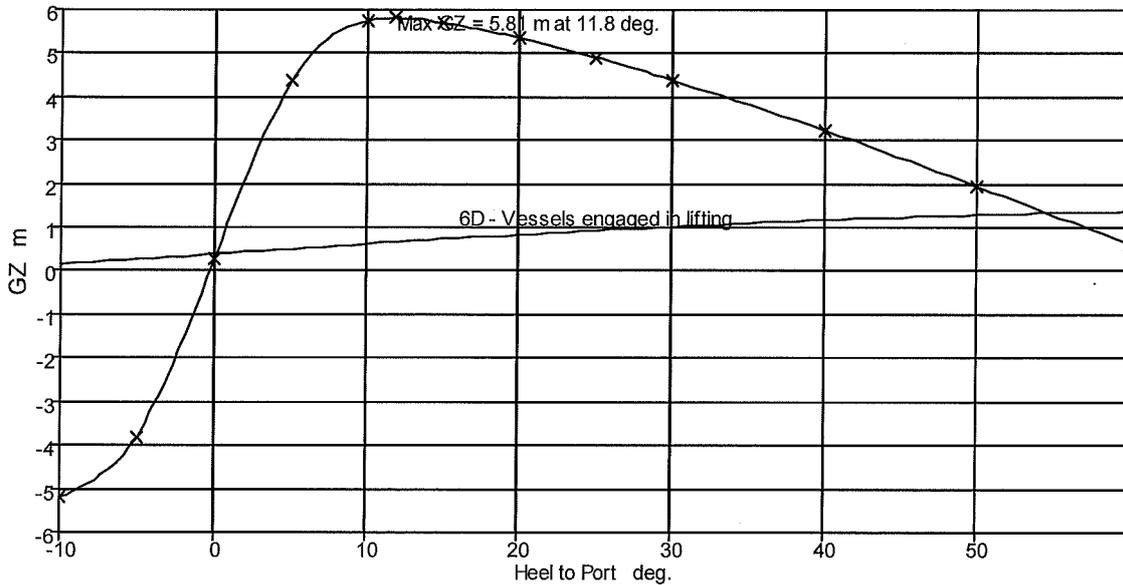
Specific gravity = 1.025; (Density = 1.025 tonne/m³)

Fluid analysis method: Use corrected VCG

Item Name	Quantity	Unit Mass tonne	Total Mass tonne	Long. Arm m	Trans. Arm m	Vert. Arm m	Total FSM tonne.m
Lightship	1	381.860	381.860	25.650	0.000	2.200	0.000
Crane Plate	1	25.000	25.000	36.000	0.380	2.370	0.000
Crane Boom Support	1	2.500	2.500	2.400	4.100	5.500	0.000
Deck Beams	1	1.000	1.000	46.800	-2.125	2.750	0.000
Crane Mats	1	10.000	10.000	36.300	0.000	2.400	0.000
20' Container - storage	1	2.000	2.000	9.556	-10.520	3.500	0.000
20' Container - crib hut	1	2.000	2.000	9.550	10.080	3.500	0.000
Haz Chem Container	1	3.000	3.000	1.500	0.525	3.200	0.000
Bin	1	1.000	1.000	0.950	-4.810	2.950	0.000
Toilets	2	0.100	0.200	0.850	7.480	3.500	0.000
Water Tank	1	1.000	1.000	12.850	10.100	2.950	0.000
Fuel Tank	1	2.000	2.000	17.880	0.000	3.200	0.000
Office	1	1.500	1.500	17.826	10.100	3.500	0.000
Platforms general	1	2.000	2.000	24.000	0.000	2.500	0.000
Hammer Sleeve	1	2.000	2.000	13.650	0.000	3.500	0.000
Junntan Powerpack	1	10.000	10.000	22.910	-0.875	3.200	0.000
Junntan 16S IH	0	30.500	0.000	19.675	2.340	3.200	0.000
ICE Vibro Powerpack	1	10.000	10.000	22.910	-3.000	3.200	0.000
Ice Vibro Hammer	1	7.000	7.000	16.500	-2.900	3.000	0.000
Genset	1	4.500	4.500	4.930	9.250	3.200	0.000
Welder	1	1.500	1.500	12.000	-5.460	3.200	0.000
Bridge Headstock 1	1	4.500	4.500	17.750	7.350	3.700	0.000
Bridge Headstock 2	1	4.500	4.500	17.750	8.750	3.700	0.000
Work boat	1	1.500	1.500	3.570	-5.625	2.950	0.000
Pile Pitching Beams	1	2.000	2.000	32.400	-6.890	2.500	0.000
EWP JLG860SJ	1	17.200	17.200	30.750	6.700	4.200	0.000
Piling Leader	1	20.000	20.000	47.000	-11.000	8.200	0.000
Pile on deck	0	22.000	0.000	18.700	-5.575	3.000	0.000
Crane Tracks	2	20.700	41.400	41.000	0.380	2.850	0.000
Carbody CW	1	24.000	24.000	41.000	0.380	3.100	0.000
Base Machine	1	44.900	44.900	39.752	1.677	5.100	0.000
Counterweight	1	90.000	90.000	37.811	3.695	5.400	0.000
Boom	1	13.465	13.465	47.725	-6.609	27.995	0.000
Lift	1	33.000	33.000	53.480	-12.591	50.940	0.000
Aft Ballast Port	100%	150.912	150.912	12.000	9.583	1.107	0.000
Aft Ballast Stbd	100%	150.912	150.912	12.000	-9.583	1.107	0.000
Total Loadcase			1068.349	25.756	-0.105	4.377	0.000
FS correction						0.000	
VCG fluid						4.377	

Draft Amidships m	0.948
Displacement t	1068
Heel deg	-0.1
Draft at FP m	1.247
Draft at AP m	0.649
Draft at LCF m	0.946
Trim (+ve by stern) m	-0.597
WL Length m	47.724
Beam max extents on WL m	24.000
Wetted Area m ²	1217.304
Waterpl. Area m ²	1145.352
Block coeff. (Cb)	0.954
LCB from aft perp. (+ve fwd) m	25.804
LCF from aft perp. (+ve fwd) m	23.860
KB m	0.494
KG fluid m	4.377
BMt m	52.747
BML m	208.557
GMt corrected m	48.863
GML m	204.673
KMt m	53.236
KML m	209.034
Immersion (TPc) tonne/cm	11.740
MTc tonne.m	45.554
RM at 1deg = GMt.Disp.sin(1) tonne.m	911.058
Max deck inclination deg	0.7235
Trim angle (+ve by stern) deg	-0.7128

Key point	Type	Freeboard m
DE Aft (p)	Immersion Point	1.525
DE Aft (s)	Immersion Point	1.576
DE Fwd (p)	Immersion Point	0.927
DE Fwd (s)	Immersion Point	0.979



Heel to Port deg	-10.0	0.0	10.0	20.0	30.0	40.0	50.0	60.0
GZ m	-5.190	0.284	5.751	5.357	4.390	3.227	1.952	0.622
Area under GZ curve from zero heel m.deg	32.9521	0.2584	38.7526	95.3179	144.2872	182.4559	208.4374	221.3215
Displacement t	1068	1068	1068	1068	1068	1068	1068	1068
Draft at FP m	1.314	1.247	1.314	1.570	1.974	2.623	3.654	5.330
Draft at AP m	0.245	0.649	0.245	-0.713	-1.914	-3.535	-5.872	-9.548
WL Length m	48.012	47.681	48.012	48.048	48.118	48.231	48.389	48.573
Beam max extents on WL m	12.669	24.000	12.669	7.930	6.771	6.007	5.273	4.431
Wetted Area m ²	1078.319	1216.283	1078.302	1083.175	1084.896	1085.901	1086.570	1087.037
Waterpl. Area m ²	597.881	1144.324	597.881	303.747	207.967	161.894	135.814	119.863
Prismatic coeff. (Cp)	0.767	0.748	0.767	0.763	0.751	0.736	0.720	0.706
Block coeff. (Cb)	2.198	0.954	2.198	6.391	106.162	0.000	0.000	0.000
LCB from aft perp. (+ve fwd) m	25.856	25.804	25.856	25.999	26.200	26.445	26.705	26.941
LCF from aft perp. (+ve fwd) m	23.640	23.838	23.640	23.641	23.648	23.666	23.703	23.762
Max deck inclination deg	10.0778	0.7131	10.0778	20.1563	30.2424	40.3263	50.3855	60.3895
Trim angle (+ve by stern) deg	-1.2758	-0.7131	-1.2757	-2.7222	-4.6309	-7.3111	-11.2260	-17.2216

Key point	Type	Immersion angle deg
DE Aft (p)	Immersion Point	8.8
DE Aft (s)	Immersion Point	Not immersed in positive range
DE Fwd (p)	Immersion Point	4.6
DE Fwd (s)	Immersion Point	Not immersed in positive range

Criteria	Value	Units	Actual	Status
5D.1b - Area to max GZ, df or 40				Pass
from the greater of				
spec. heel angle	0.0	deg	0.0	
to the lesser of				
spec. heel angle	40.0	deg		
angle of max. GZ	11.8	deg	11.8	
first flooding angle of the DownfloodingPoints	n/a	deg		
shall be greater than (>)	3.0481	m.deg	49.3157	Pass
6D - Vessels engaged in lifting				Pass
Lifting of mass arm = $M (h \cos(\phi) + v \sin(\phi)) / \text{disp.}$				
mass being lifted: M =	33.000	tonne		
vertical separation of suspension point from stowage position: v =	43.960	m		
horizontal separation of suspension point from stowage position: h =	12.591	m		
Area1 integrated from the greater of				
angle of equilibrium (with heel arm)	0.1	deg	0.1	
to the lesser of				
spec. heel angle	40.0	deg	40.0	
first flooding angle of the DownfloodingPoints	n/a	deg		
angle of vanishing stability (with heel arm)	54.7	deg		
Area2 integrated from the greater of				
angle of equilibrium (ignoring heel arm)	-0.3	deg	-0.3	
to the lesser of				
spec. heel angle	40.0	deg	40.0	
first flooding angle of the DownfloodingPoints	n/a	deg		
angle of vanishing stability (ignoring heel arm)	60.0	deg		
Angle for GZ(max) in GZ ratio, the lesser of:				
spec. heel angle	0.0	deg	0.0	
Select required angle for angle of steady heel ratio:	MarginlineImmersionAngle			
Criteria:				Pass
Angle of steady heel shall not be greater than (<=)	5.0	deg	0.1	Pass
Area1 / Area2 shall not be less than (>=)	40.00	%	82.16	Pass
Intermediate values				
Heel arm constant			0.0309	
amplitude of cos component		m	12.591	
amplitude of sin component		m	43.960	
Area1 (under GZ), from 0.1 to 40.0 deg.		m.deg	182.4176	
Area1 (under HA), from 0.1 to 40.0 deg.		m.deg	32.4785	
Area1, from 0.1 to 40.0 deg.		m.deg	149.9391	
Area2, from -0.3 to 40.0 deg.		m.deg	182.4985	