Abruzzo Costiero S.r.l.

Deposito di Pescara

Progetto di realizzazione del nuovo sealine e del campo boe per lo scarico di gasolio e benzina da navi petroliere al largo del Porto di Pescara

Relazione tecnica - Chiarimenti volontari del Proponente nell'ambito della Procedura Istruttoria VIA

ALLEGATO 16 – Estratto "ISGOTT 5th edition"

Marzo 2014

Id: Allegato_16

ICARO

Chapter 11

SHIPBOARD OPERATIONS

This Chapter provides information on the full range of shipboard operations, including loading and discharging of cargo, hose clearing, tank cleaning and gas freeing, ballasting ship to ship transfers and mooring.

The Chapter also includes information on the safe handling of particular cargoes, such as static accumulator oils, those having a high vapour pressure, and those containing hydrogen sulphide.

Other operations that are addressed include the use of vapour emission control systems, crude oil washing and ship to ship transfers.

11.1 CARGO OPERATIONS

11.1.1 GENERAL

All cargo operations must be carefully planned and documented well in advance of their execution. The details of the plans must be discussed with all personnel, both on the ship and at the terminal. Plans may need to be modified following consultation with the terminal and following changing circumstances, either onboard or ashore. Any changes must be formally recorded and brought to the attention of all personnel involved with the operation. Chapter 22 contains details of cargo plans and communications regarding them.

11.1.2 SETTING OF LINES AND VALVES

Before commencement of any loading or discharging operation, the ship's cargo pipelines and valves should be set as per the required loading plan by a responsible officer and checked, independently, by other personnel.

11.1.3 VALVE OPERATION

To avoid pressure surges, valves at the downstream end of a pipeline system should not, as a general rule, be closed against the flow of liquid, except in an emergency. This should be stressed to all personnel responsible for cargo handling operations, both on the ship and at the terminal. (See Section 11.1.4 below)

In general, where pumps are used for cargo transfer, all valves in the transfer system (both ship and shore) should be open before pumping begins, although the discharge valve of a centrifugal pump may be kept closed until the pump is up to speed and the valve then opened slowly. In the case of ships loading by gravity, the final valve to be opened should be that at the shore tank end of the system.

If the flow is to be diverted from one tank to another, either the valve on the second tank must be opened before the valve on the first tank is closed, or pumping should be stopped while the change is being made. Valves that control liquid flow should be closed slowly. The time taken for power operated valves to move from open to shut, and from shut to open, should be checked regularly at their normal operating temperatures.

11.1.12.9 Training

It is important that all ship's personnel in charge of transfer operations complete a structured training programme covering the particular vapour emission control system installed onboard their ship.

11.1.12.10 Communications

The introduction of vapour emission control reinforces the importance of good cooperation and communications between the ship and shore. Pre-transfer discussions should provide both parties with an understanding of each others' operating parameters. Details such as maximum transfer rates, maximum allowable pressure drops in the vapour collection system, and alarm and shut-down conditions and procedures, must be agreed before operations commence. (See Section 26.3 - Ship/Shore Safety Check List).

A summary of the terminal's vapour emission control system should be included in the terminal information booklet.

11.1.13 GENERAL DISCHARGING PROCEDURES

11.1.13.1 Operation of Pumps and Valves

Throughout pumping operations, no abrupt changes in the rate of flow should be made.

Reciprocating main cargo pumps can set up excessive vibration in metal loading/discharging arms which, in turn, can cause leaks in couplers and swivel joints, and even mechanical damage to the support structure. Where possible, such pumps should not be used. If they are, care must be taken to select the least critical pump speed or, if more than one pump is used, a combination of pump speeds to achieve an acceptable level of vibration. A close watch should be kept on the vibration level throughout the cargo discharge.

Centrifugal pumps should be operated at speeds which do not cause cavitation. This effect may damage the pump and other equipment on the ship or at the terminal.

11.1.13.2 Closed Discharging

Vessels correctly operating their inert gas systems may be considered to be conducting 'closed' discharging operations.

Discharge should normally take place on non-inerted vessels with all ullage, sounding and sighting ports closed. Air should be admitted to the tanks by the dedicated venting system.

Where the design of the vessel does not allow admittance of air via the vapour system at a satisfactory rate, air may be admitted via a sighting or ullage port, provided it is fitted with a permanent flame screen.

When cargo is being run between tanks during discharge operations, care should be taken to ensure that vapours are vented to deck via the deck apertures protected by flame screens.

11.1.13.3 Inert Gas Procedures

Ships using an inert gas system must have the system fully operational and producing good quality (i.e. low oxygen content) inert gas at the commencement of discharge. The inert gas system must be fully operational and working satisfactorily throughout the discharge of cargo or deballasting. Section 7.1 gives details on the operation of the IGS.

Cargo discharge must not be started until:

- All relevant cargo tanks, including slop tanks, are common with the IG main.
- All other cargo tank openings, including vent valves, are securely closed.

- The inert gas main is isolated from the atmosphere and, if a cross connection is fitted, also from the cargo main.
- The inert gas plant is operating.
- The deck isolating valve is open.

A low but positive inert gas pressure after completion of discharge will permit the draining of the manifold driptray into a tank and, if required, allow manual dipping of each tank.

11.1.13.4 Pressurising of Cargo Tanks

When high vapour pressure petroleum (e.g. natural gasoline and certain crude oils) reaches a low level in cargo tanks, the head of liquid is sometimes insufficient to keep cargo pumps primed. If an inert gas system is installed, it can be used for pressurising cargo tanks in order to improve pump performance.

11.1.13.5 Crude Oil Washing

If the ship needs to crude oil wash all or some of its tanks during discharge, the responsible officer should incorporate a crude oil washing plan in the required discharge plan set out in Section 22.6.

A full description of the requirements relating to crude oil washing is given in Section 11.5.

11.1.13.6 Commencement of Discharge Alongside a Terminal

Shore valves must be fully open to receiving tanks before the tanker's manifold valves are opened. If there is a possibility that, owing to the elevation of the shore tanks above the level of the ship's manifold, pressure might exist in the shore line and no non-return (check) valves are fitted in the shore line, the ship must be informed and the tanker's manifold valves should not be opened until an adequate pressure has been developed by the pumps.

Discharge should start at a slow rate and only be increased to the agreed rate once both parties are satisfied that the flow of oil to and from designated tanks is confirmed.

11.1.13.7 Commencement of Discharge at an Offshore Terminal

Before commencing discharge at an offshore terminal, communications between ship and shore should be tested and fully understood. The ship must not open its manifold valves or start its pumps until a clear signal has been received from the shore that the terminal is ready. Discharge must be started slowly until the system has been tested and then gradually brought up to the maximum agreed flow rate or pressure. A close watch should be kept on the sea in the vicinity of the hoses to detect leaks. During darkness, a bright light should, where safe and practicable, be shone on the water in the vicinity of the hoses.

11.1.13.8 Commencement of Discharge through a Stern Discharge Line

Before commencing discharge through a stern discharge line, a dangerous area extending not less than 3 metres from the manifold valve should be clearly marked and no unauthorised personnel should be allowed within this area during the entire discharge operation.

A close watch must be maintained for any leakage and all openings, air inlets and doors to enclosed spaces should be kept tightly closed.

Fire fighting equipment must be laid out and ready for use in the vicinity of the stern discharge manifold.

11.1.13.9 Periodic Checks during Discharge

Throughout discharging, the ship should monitor and regularly check all full and empty tanks to confirm that cargo is only leaving the designated cargo tanks and that there is no

escape of cargo into pumprooms or cofferdams, or through sea and overboard discharge valves.

The ship should check tank ullages hourly and calculate a discharge rate. Cargo figures and rates should be compared with shore figures to identify any discrepancy. These checks should, where possible, include the observations and recording of the shear forces, bending moments, draught and trim and any other relevant stability requirements particular to the ship. This information should be checked against the required discharging plan to see that all safe limits are adhered to and that the discharging sequence can be followed, or amended, as necessary. Any discrepancies should be immediately reported to the responsible officer.

Any drop in pressures or any marked discrepancy between tanker and terminal estimates of quantities could indicate pipeline or hose leaks, particularly in submarine pipelines, and require that cargo operations be stopped until investigations have been made.

The ship should carry out frequent inspections of the cargo deck and pumproom to check for any leaks. Overside areas should likewise be regularly checked. During darkness, where safe and practical, the water around the vessel should be illuminated.

11.1.13.10 Fluctuations in Discharge Rate

During discharge, the flow of cargo should be controlled by the tanker in accordance with the agreement reached with the terminal.

The discharge rate should not be substantially changed without informing the terminal.

11.1.13.11 Simultaneous Ballast and Cargo Handling

If ballasting of cargo tanks is carried out simultaneously with the discharge of cargo, vapours may be emitted from the tanks being ballasted, in which case proper precautions should be taken.

Section 11.5.8 should be referred to for guidance on the control of emissions during and after crude oil washing.

11.1.13.12 Failure of the Inert Gas System during Cargo Discharge

Reference should be made to the guidance provided in Section 7.1.12 regarding actions to be taken in the event of failure of the inert gas system during cargo discharge.

11.1.13.13 Stripping and Draining of Cargo Tanks

If, during the discharge of the main bulk of cargo, a slop tank or other selected tank is used to receive the drainings of tanks being stripped, personnel should be alert to the fact that the ullage in the receiving tank will be decreasing. In these circumstances, great care should be taken to avoid an overflow and proper precautions taken in respect of any vapours emitted.

11.1.13.14 Discharge of Static Accumulator Cargoes

As air and/or gas bubbles in a liquid can generate static electricity, stripping pumps and eductors should be operated to avoid, as far as possible, the entrapment of air or gas into the liquid stream.

11.1.14 PIPELINE AND HOSE CLEARING FOLLOWING CARGO OPERATIONS

11.1.14.1 General

The procedure for clearing the pipelines and hoses or arms between the shore valve and ship's manifold will depend on the facilities available and whether these include a slop tank or other receptacle. The relative heights of the ship and shore manifolds may also influence procedures.

escape of cargo into pumprooms or cofferdams, or through sea and overboard discharge valves.

The ship should check tank ullages hourly and calculate a discharge rate. Cargo figures and rates should be compared with shore figures to identify any discrepancy. These checks should, where possible, include the observations and recording of the shear forces, bending moments, draught and trim and any other relevant stability requirements particular to the ship. This information should be checked against the required discharging plan to see that all safe limits are adhered to and that the discharging sequence can be followed, or amended, as necessary. Any discrepancies should be immediately reported to the responsible officer.

Any drop in pressures or any marked discrepancy between tanker and terminal estimates of quantities could indicate pipeline or hose leaks, particularly in submarine pipelines, and require that cargo operations be stopped until investigations have been made.

The ship should carry out frequent inspections of the cargo deck and pumproom to check for any leaks. Overside areas should likewise be regularly checked. During darkness, where safe and practical, the water around the vessel should be illuminated.

11.1.13.10 Fluctuations in Discharge Rate

During discharge, the flow of cargo should be controlled by the tanker in accordance with the agreement reached with the terminal.

The discharge rate should not be substantially changed without informing the terminal.

11.1.13.11 Simultaneous Ballast and Cargo Handling

If ballasting of cargo tanks is carried out simultaneously with the discharge of cargo, vapours may be emitted from the tanks being ballasted, in which case proper precautions should be taken.

Section 11.5.8 should be referred to for guidance on the control of emissions during and after crude oil washing.

11.1.13.12 Failure of the Inert Gas System during Cargo Discharge

Reference should be made to the guidance provided in Section 7.1.12 regarding actions to be taken in the event of failure of the inert gas system during cargo discharge.

11.1.13.13 Stripping and Draining of Cargo Tanks

If, during the discharge of the main bulk of cargo, a slop tank or other selected tank is used to receive the drainings of tanks being stripped, personnel should be alert to the fact that the ullage in the receiving tank will be decreasing. In these circumstances, great care should be taken to avoid an overflow and proper precautions taken in respect of any vapours emitted.

11.1.13.14 Discharge of Static Accumulator Cargoes

As air and/or gas bubbles in a liquid can generate static electricity, stripping pumps and eductors should be operated to avoid, as far as possible, the entrapment of air or gas into the liquid stream.

11.1.14 PIPELINE AND HOSE CLEARING FOLLOWING CARGO OPERATIONS

11.1.14.1 General

The procedure for clearing the pipelines and hoses or arms between the shore valve and ship's manifold will depend on the facilities available and whether these include a slop tank or other receptacle. The relative heights of the ship and shore manifolds may also influence procedures.

11.1.14.2 Line Displacement with Water

On tankers that have a segregated ballast system, the practice of using cargo pumps on a sea suction should be avoided if at all possible. However, some terminals will require the ship to displace the contents of the hoses or arms, and perhaps also the shore pipelines, with water on completion of cargo operations. Due to the added risk of pollution, this practice should only be undertaken if it is essential and must be carefully planned and executed. Prior to commencing the displacement, the ship and terminal should reach agreement on the procedures to be adopted, particularly the amount to be pumped and the pumping rate.

Particular attention must be paid to venting the cargo pumps and guaranteeing that no outflow of oil occurs when opening the sea valve.

Reference should be made to the ICS/OCIMF publication 'Prevention of Oil Spillages through Cargo Pumproom Sea Valves'.

11.1.14.3 Line Draining

On completion of loading, the ship's cargo deck lines should be drained into appropriate cargo tanks to ensure that thermal expansion of the contents of the lines cannot cause leakage or distortion. The hoses or arms, and perhaps a part of the pipeline system between the shore valve and the ship's manifold, are also usually drained into the ship's tanks. Sufficient ullage must be left in the final tanks to accept the product drained from hoses or arms and ship or shore lines.

On completion of discharge, the ship's cargo deck lines should be drained into an appropriate tank and then be discharged ashore or into a slop tank.

When draining is complete, and before hoses or arms are disconnected, the ship's manifold valves and shore valves should be shut and the drain cocks at the vessel's manifold should be opened to drain into fixed drain tanks or portable drip trays. Cargo manifolds and arms or hoses should be securely blanked after being disconnected. The contents of portable or fixed drip trays should be transferred to a slop tank or other safe receptacle.

11.1.14.4 Clearing Hoses and Loading Arms to the Terminal

If hoses or arms have to be cleared to the terminal using compressed air or inert gas, the following precautions should be strictly observed in order to avoid the possible creation of a hazardous static electrical charge or mechanical damage to tanks and equipment:

- The procedure to be adopted must be agreed between ship and terminal.
- There must be adequate ullage in the reception tank.
- To ensure that the amount of compressed air or inert gas is kept to a minimum, the operation must be stopped when the line has been cleared.
- The inlet to the receiving tank should be located well above any water that may be in the bottom of the tank.
- The line clearing operation must be continuously supervised by a responsible person.

11.1.14.5 Clearing Hoses and Loading Arms to the Ship

The clearing of hoses and loading arms to the ship using compressed air should not be undertaken due to the risks of:

- Static charge generation.
- Compromising inert gas quality.
- Over-pressurisation of tanks or pipelines.

- Oil mists emanating from tank vents.

11.1.14.6 Clearing Ship's Cargo Pipelines

When compressed air or inert gas is used to clear ship's pipelines, for example, when evacuating the liquid column above a deep well pump, similar hazards to those identified above may arise and similar precautions must be observed. Line clearing operations must be undertaken in accordance with the operating procedures previously established for the particular ship.

11.1.14.7 Gas Release in the Bottom of Tanks

A strong electrostatic field can be generated by blowing air or inert gas into the bottom of a tank containing a static accumulator oil. If water or particulate matter is present in the cargo, the effect is made worse, as the rising gas bubbles will disturb the particulates and water droplets. The settling contaminants will generate a static charge within the cargo. Therefore, a settling period of 30 minutes should be observed after any blowing of lines has taken place into a tank.

Precautions should be taken to minimise the amount of air or inert gas entering tanks containing static accumulator oils. However, it is best to avoid the practice of blowing lines back to tanks containing cargo.

Whenever possible, cargo lines should be drained by gravity.

11.1.14.8 Receiving Nitrogen from Shore

If there is a requirement to use shore supplied nitrogen, for example for purging tanks, padding cargo or clearing lines, the ship should be aware that this may be at high pressure (up to 10 bar) and at a high flow rate and that it can therefore be potentially hazardous because of the risk of over-pressurisation of the cargo tanks. A risk assessment should be carried out and the operation should only proceed if appropriate risk responses are in place and operating. As a very minimum, the precautions detailed in Section 11.1.14.4 must be observed.

One method of reducing the risk of over-pressure is to ensure that the tank has vents with a greater flow rate capacity than the inlet, so that the tank cannot be over-pressurised. Where vapour control and emission regulations require closed operation, the incoming flow of nitrogen must be restricted to a rate equal to, or less than, the maximum flow of vapour possible through the vapour return line. Positive measures to ensure this should be agreed. A small hose or reducer prior to the manifold can be used to restrict the flow rate, but pressure must be controlled by the terminal. A gauge will permit the ship to monitor the pressure.

It is not appropriate to attempt throttling a gas flow by using a ship's manifold valve that is designed to control liquid flow. However, the manifold can, and should, be used as a rapid safety stop in an emergency. It should be noted that the effect of pressure surge in a gas is not as violent as in a liquid.

Sensitive cargoes, for example some highly specialised lubricating oils, may have to be carried under a pad or blanket of nitrogen supplied from ashore. In such cases, it is preferable to purge the entire cargo tank before loading. After such purging has been completed, loading the cargo in a closed condition will create the required pad within the tank. This significantly reduces the risk of over-pressurisation that is present when padding with shore supplied nitrogen as a separate procedure on completion of loading.

Special care is necessary when nitrogen as a gas is supplied to a ship direct from evaporating liquid nitrogen, sometimes delivered by a road tanker fitted with a vaporiser. The volume and flow rate may be difficult to control and the agreed delivery rates may be unexpectedly and suddenly exceeded. The vaporisation ratio of nitrogen from its liquid form to gaseous form is 1:640. Should any of this expansion occur in the delivery pipeline, the flow rate will become uncontrolled and high pressures may be reached extremely

Chapter 13

HUMAN ELEMENT CONSIDERATIONS

This Chapter describes, in general terms, some basic human element considerations for providing and maintaining a safe working environment on ships.

Guidance on manning levels, the management of fatigue and the control of drugs and alcohol are contained in this Chapter.

13.1 MANNING LEVELS

The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and SOLAS 74/78 as amended, require the flag State to issue each ship with a Minimum Safe Manning Certificate.

It is the shipowner's responsibility to ensure that the manning of each ship is maintained at all times, to at least the levels specified in the safe manning certificate. It is the master's responsibility to ensure that the ship does not proceed to sea unless the manning level complies with at least the statutory minimum.

At all times during the ship's stay at a terminal, a sufficient number of personnel should be present on board to deal with any emergency.

13.2 TRAINING AND EXPERIENCE

The STCW Code and its amendments establish standards of training and experience for seafarers. The Code contains specific requirements for personnel serving on oil tankers, chemical tankers and gas carriers. These requirements define the training and experience levels needed by senior officers and watchkeepers. They also establish a minimum level of fire fighting training for ship's personnel, according to their duties and responsibilities.

13.3 HOURS OF REST

13.3.1 STATUTORY REQUIREMENTS

The STCW Code requires tanker personnel to have sufficient hours of rest to ensure that they are 'fit for duty' and are therefore able to carry out their duties safely. The Code clearly states the number of hours of rest to be provided by specifying the hours of rest that must be provided within certain fixed periods of time. The definition of the rest period enables some flexibility of operation to be achieved.

The senior staff on the tanker are responsible for managing the rest periods of ship's staff in the most efficient manner. However, when complex or protracted operations are undertaken, in order to comply with Code's provisions, it may be necessary to suspend operations to provide an adequate rest period for those personnel most heavily engaged in the operation.

Where intense or prolonged operations are expected, the ship's operator should consider the provision of additional personnel if this is necessary to avoid the suspension of operations. Any additional personnel involved with the operations must be competent and familiar with the risks associated with handling petroleum.

13.3.2 FATIGUE

All parties involved with ship operations should be aware of the factors that can contribute to fatigue and take appropriate measures to reduce the potential for fatigue when planning and managing personnel's activities and working times.

Guidance on fatigue mitigation and management is contained in IMO MSC Circular 1014, dated 12th June 2001.

13.4 DRUG AND ALCOHOL POLICY

13.4.1 INDUSTRY GUIDELINES

The international oil tanker industry has operated a voluntary Drug and Alcohol Policy for a number of years and guidance for operators is provided in publications, such as:

- Guidelines for the Control of Drugs and Alcohol Onboard Ship (OCIMF).
- Drug Trafficking and Drug Abuse: Guidelines for Owners and Masters on Prevention Detection and Recognition (International Chamber of Shipping).

The implementation of policies and operating procedures aimed at providing a work place with personnel unaffected by drugs and alcohol, will greatly improve operational safety and employee's health.

Drug and alcohol policies should be established and be clearly communicated to all personnel.

13.4.2 CONTROL OF ALCOHOL

The consumption of alcohol should be controlled to ensure no person is intoxicated while on board.

The standards that are used to define intoxication are laid down in published industry guidelines, which define limiting levels of alcohol and the method of determining these levels.

Controls on consumption should ensure that personnel are able to carry out scheduled duties free from the effects of alcohol.

Scheduled duties include, but are not limited to, standing of a deck or engine watch, the commencement of day-work for day-workers, arrival at a pilot station, going to mooring stations, or any other duty (including overtime work) scheduled at a specific time.

On vessels operating with an Unmanned Machinery Space (UMS), the officer on standby duty, on call to answer UMS alarms, is considered to be on duty.

No person should be allowed to consume alcohol while on watch or during the performance of any shipboard duties.

The issue of alcohol onboard should be carefully controlled under the guidelines set out in the company's policy and should be monitored by the master.

13.4.3 DRUG AND ALCOHOL TESTING PROGRAMS

To ensure that the drug and alcohol policy is effective, operators should have a published testing programme in place to prevent the use of illegal drugs and the misuse of alcohol.

Tests may be performed for the following reasons:

- Reasonable suspicion.
- Post Accident.

Chapter 22

COMMUNICATIONS

This Chapter deals with communications required between the tanker and the shore including pre-arrival communications between the tanker and local Authorities and between the tanker and the terminal. It addresses communication exchanges between the ship and the terminal before berthing and before and during cargo, ballast or bunkering operations, including emergency communication procedures.

22.1 PROCEDURES AND PRECAUTIONS

22.1.1 COMMUNICATIONS EQUIPMENT

Telephone, portable VHF/UHF and radiotelephone systems should comply with the appropriate safety requirements.

The provision of adequate means of communication, including a back-up system between ship and shore, is the responsibility of the terminal.

Communication between the responsible officer and the terminal representative should be maintained in the most efficient way.

When telephones are used, the telephones, both on board and ashore, should be continuously manned by persons who can immediately contact their superior. Additionally, it should be possible for that superior to override all calls.

When VHF/UHF or radiotelephone systems are used, units should preferably be portable and carried by the responsible officer on duty and the responsible person ashore, or by persons who can contact their respective superior immediately. Where fixed systems are used, the above guidance for telephones should be followed.

The selected system of communication, together with the necessary information on telephone numbers and/or channels to be used, should be recorded on an appropriate form. This form should be signed by both ship and shore representatives.

22.1.2 COMMUNICATIONS PROCEDURES

To ensure the safe control of operations at all times, it should be the responsibility of both parties to establish, agree in writing and maintain a reliable communications system.

Before loading or discharging commences, the system should be adequately tested. A secondary stand-by system should also be established and agreed. Allowance should be made for the time required for action in response to signals.

These systems should include signals for:

- Identification of vessel, berth and cargo.
- Stand by.
- Start loading or start discharging.
- Slow down.
- Stop loading or stop discharging.
- Emergency stop.

Any other necessary signals should be agreed and understood.

When different products or grades are to be handled, their names and descriptions should be clearly understood by the ship and shore personnel on duty during cargo handling operations.

The use of one VHF/UHF channel by more than one ship/shore combination should be avoided.

Where there are difficulties in verbal communication, these can be overcome by appointing a person with adequate technical and operational knowledge and a sufficient command of a language understood by both ship and shore personnel.

22.1.3 COMPLIANCE WITH TERMINAL AND LOCAL REGULATIONS

Terminals should have security, safety and pollution regulations, which must be complied with by both tanker and terminal personnel. All tankers at the terminal should be made aware of such regulations, together with any other regulations relating to the safety of shipping, which the appropriate port authority may issue.

22.2 PRE-ARRIVAL EXCHANGE OF INFORMATION

Before the tanker arrives at the terminal there should be an exchange of information on matters, such as the following.

22.2.1 EXCHANGE OF SECURITY INFORMATION

Security protocols need to be agreed between the ship and the port or terminal security officer. Pre-arrival communications should establish who performs these functions and how this will be carried out.

22.2.2 TANKER TO APPROPRIATE COMPETENT AUTHORITY

The tanker should provide information as required by international, regional, and national regulations and recommendations.

22.2.3 TANKER TO TERMINAL

Wherever possible, the following information should be sent at least 24 hours prior to arrival:

- Name and call sign of vessel.
- Country of registration.
- Overall length and beam of vessel and draught on arrival.
- Estimated time of arrival at designated arrival point, for example, pilot station or fairway buoy.
- Ship's displacement on arrival. If loaded, type of cargo and disposition.
- Maximum draught expected during and upon completion of cargo handling.
- If fitted with an inert gas system, confirmation that the ship's tanks are in an inert condition and that the system is fully operational.
- Any requirement for tank cleaning and/or gas freeing.
- Any defects that could adversely affect safe operations or delay commencement of cargo handling.
- Whether crude oil washing is to be employed and, if so, confirmation that the pre-arrival checklist has been satisfactorily completed.

- Ship's manifold details, including type, size, number, distance between centres of connections to be presented. Also products to be handled at each manifold, numbered from forward.
- Advance information on proposed cargo handling operations, including grades, sequence, quantities and any rate restrictions.
- Information, as required, on quantity and nature of slops and dirty ballast and of any contamination by chemical additives. Such information must include identification of any toxic components, such as H_2S.
- Quantities and specifications of bunkers required, if applicable.

22.2.4 TERMINAL TO TANKER

The terminal should ensure that the tanker has been provided with relevant port information as soon as practicable. For example:

- Depth of water at chart datum and range of salinity that can be expected at the berth.
- Maximum draft and maximum air draft.
- Availability of tugs and mooring craft together with any terminal requirements on their usage.
- Details of any shore moorings that will be provided.
- Which side to be moored alongside.
- Number and size of hose connections/manifolds.
- Whether Vapour Emission Control System is in use.
- Inert gas requirements for cargo measurement.
- Closed loading requirements.
- For jetty berths, arrangement of gangway landing space or availability of terminal access equipment.
- Advance information on proposed cargo specification, handling operations or changes in existing plans for cargo operations.
- Any restriction on crude oil washing procedures, tank cleaning and gas freeing, if applicable.
- Advice on environmental and displacement restrictions applicable to the berth.
- Facilities for the reception of slops, oily ballast residues and garbage.
- Security levels in effect within the port.

22.3 PRE-BERTHING EXCHANGE OF INFORMATION

22.3.1 TANKER TO TERMINAL AND/OR PILOT

On arrival off the port, the tanker master will establish direct communications with the terminal and/ or the pilot station. The following information should be exchanged:

- Details of any deficiencies or incompatibilities in the vessel's equipment which might affect the safety of the mooring.
- Identity of the chocks, bollards and strong points that can be used for towing.
- The SWL of any equipment to be used for towing.

- The number and placement of areas on the ship's hull that are strengthened or suitable for pushing and relevant identification marks employed.

22.3.2 TERMINAL AND/OR PILOT TO TANKER

Before berthing, the terminal should provide the master, through the pilot or berthing master, with details of the mooring plan. The procedure for mooring the vessel should be specified and this should be reviewed by the master and pilot or berthing master and agreed between them.

Information should include:

For all types of berth:

- The plan for approaching the berth, including turning locations, environmental limits and maximum speeds.
- The number of tugs to be used.
- The type of tugs to be used and their bollard pull(s).
- If escorting, the maximum towline forces that the tug may generate at escort speeds.

For jetty berths:

- Minimum number of tanker's moorings.
- Number and position of bollards or quick release hooks.
- Number and location of jetty manifold connections or hard arms.
- Limitations of the fendering system and of the maximum displacement, approach velocity and angle of approach, for which the berth and the fendering system have been designed.
- Details of any berthing aids, such as doppler radar or laser equipment.
- Any particular feature of the berth which it is considered essential to bring to the prior notice of the master.

For conventional multi-buoy moorings

- Minimum number of shackles of cable required on each anchor that may be used during the course of mooring.
- Number and position of mooring lines, shackles and other mooring equipment likely to be needed.

For all sea berths and SPMs:

- Required Safe Working Load (SWL) of the ship's hose handling derrick.
- Number and flange size of the hoses to be connected and details of any equipment that the ship must provide to assist in hose handling.

For Single Point Moorings (SPMs):

- Diameter of the chafe chain links used in the mooring.
- Weight of each of the moorings which has to be lifted on board.
- Length and size of any messenger lines which have to be used to pick up the moorings.
- Minimum requisite dimension of bow chock or lead required.
- Method used to make the SPM fast to the tanker and details of any equipment that must be provided by the tanker.

Any deviation from the agreed mooring plan made necessary by changing weather conditions should be given to the Master as soon as possible.

22.4 PRE -TRANSFER EXCHANGE OF INFORMATION

Completion of safe and efficient cargo, ballast and bunkering operations is dependent upon effective cooperation and co-ordination between all parties involved. This section covers information that should be exchanged before those operations begin.

22.4.1 TANKER TO TERMINAL

Before transfer operations commence, the responsible officer should inform the terminal of the general arrangement of the cargo, ballast and bunker tanks, and should have available the information listed below:

22.4.1.1 Information in Preparation for Loading Cargo and Bunkers:

- Details of last cargo carried, method of tank cleaning (if any) and state of the cargo tanks and lines.
- Where the vessel has part cargo on board on arrival, grade, volume and tank disposition.
- Maximum acceptable loading rates and topping off rates.
- Maximum acceptable pressure at the ship/shore cargo connection during loading.
- Cargo quantities acceptable from terminal nominations.
- Proposed disposition of nominated cargo and preferred order of loading.
- Maximum acceptable cargo temperature (where applicable).
- Maximum acceptable true vapour pressure (where applicable).
- Proposed method of venting.
- Quantities and specifications of bunkers required.
- Disposition, composition and quantities of ballast together, if relevant, with time required for discharge and maximum light freeboard.
- Quantity, quality and disposition of slops.
- Quality of inert gas (if applicable).

22.4.1.2 Information in Preparation for Cargo Discharge:

- Cargo specifications.
- Whether or not the cargo includes toxic components, for example H2S, benzene, lead additives, mercaptans.
- Any other characteristics of the cargo requiring special attention, for example, high true vapour pressure (TVP).
- Flashpoint (where applicable) of products and their temperatures upon arrival, particularly when the cargo is non-volatile.
- Distribution of cargo on board by grade and quantity.
- Quantity and distribution of slops.
- Any unaccountable change of ullage in ship's tanks since loading.
- Water dips in cargo tanks (where applicable).
- Preferred order of discharge.
- Maximum attainable discharge rates and pressures.
- Whether tank cleaning, including crude oil washing, is required.

- Approximate time of commencement and duration of ballasting into permanent ballast tanks and cargo tanks.

22.4.2 TERMINAL TO TANKER

The following information should be made available to the responsible officer:

22.4.2.1 Information in Preparation for Loading Cargo and Bunkers

- Cargo specifications and preferred order of loading.
- Whether or not the cargo includes toxic components, for example H2S, benzene, lead additives, mercaptans.
- Tank venting requirements.
- Any other characteristics of the cargo requiring attention, for example high true vapour pressure.
- Flashpoints (where applicable) of products and their estimated loading temperatures, particularly when the cargo is non-volatile.
- Bunker specifications including H2S content.
- Proposed bunker loading rate.
- Nominated quantities of cargo to be loaded.
- Maximum shore loading rates.
- Standby time for normal pump stopping.
- Maximum pressure available at the ship/shore cargo connection.
- Number and sizes of hoses or arms available and manifold connections required for each product or grade of the cargo and VECS, if appropriate.
- Communication system for loading control, including the signal for emergency stop.
- Limitations on the movement of hoses or arms.
- Material Safety Data Sheets for each product to be handled.

22.4.2.2 Information in Preparation for Discharge:

- Order of discharge of cargo acceptable to terminal.
- Nominated quantities of cargo to be discharged.
- Maximum acceptable discharge rates.
- Maximum pressure acceptable at ship/shore cargo connection.
- Any booster pumps that may be on stream.
- Number and sizes of hoses or arms available and manifold connections required for each product or grade of the cargo and whether or not these arms are common with each other.
- Limitations on the movement of hoses or arms.
- Any other limitations at the terminal.
- Communication system for discharge control including the signal for emergency stop.

22.5 AGREED LOADING PLAN

On the basis of the information exchanged, an operational agreement should be made in writing between the responsible officer and the terminal representative covering the following, as appropriate:

- Ship's name, berth, date and time.
- Name and signature of ship and shore representative.
- Cargo distribution on arrival and departure.
- The following information on each product:

  Quantity.

  Ship's tank(s) to be loaded.

  Shore tank(s) to be discharged.

  Lines to be used ship/shore.

  Cargo transfer rate.

  Operating pressure.

  Maximum allowable pressure.

  Temperature limits.

  Venting system.
- Restrictions necessary because of:

  Electrostatic properties.

  Use of automatic shut-down valves.

This agreement should include a loading plan indicating the expected timing and covering the following:

- The sequence in which ship's tanks are to be loaded, taking into account:

  Deballasting operations.

  Ship and shore tank change over.

  Avoidance of contamination of cargo.

  Pipeline clearing for loading.

  Other movements or operations that may affect flow rates.

  Trim and draught of the tanker.

  The need to ensure that permitted stresses will not be exceeded.
- The initial and maximum loading rates, topping off rates and normal stopping times, having regard to:

  The nature of the cargo to be loaded.

  The arrangement and capacity of the ship's cargo lines and gas venting system.

  The maximum allowable pressure and flow rate in the ship/shore hoses or arms.

  Precautions to avoid accumulation of static electricity.

  Any other flow control limitations.
- The method of tank venting to avoid or reduce gas emissions at deck level, taking into account:

The true vapour pressure of the cargo to be loaded.

The loading rates.

Atmospheric conditions.

- Any bunkering or storing operations.
- Emergency stop procedure.

A bar diagram is considered to be one of the best means of depicting this plan.

22.6 AGREED DISCHARGE PLAN

On the basis of the information exchanged, an operational agreement should be made in writing between the responsible officer and the terminal representative covering the following:

- Ship's name, berth, date and time.
- Names and signatures of ship and shore representatives.
- Cargo distribution on arrival and departure.
- The following information on each product:

  Quantity.

  Shore tank(s) to be filled.

  Ship's tank(s) to be discharged.

  Lines to be used ship/shore.

  Cargo transfer rate.

  Operating pressure.

  Maximum allowable pressure.

  Temperature limits.

  Venting systems.

- Restrictions necessary because of:

  Electrostatic precautions.

  Use of automatic shut-down valves.

The discharge plan should include details and timing of the following: -

- Crude Oil Washing
- Planned slowdowns or stoppages
- Expected trim and freeboard conditions

22.7 REPAIRS

22.7.1 REPAIRS ON THE TANKER

When any repair or maintenance is to be done on board a tanker moored at a berth, the responsible officer must inform the terminal representative. Agreement should be reached on the safety precautions to be taken, with due regard to the nature of the work.

22.7.1.1 Immobilisation of the Tanker

Repairs and other work that may immobilise the tanker should not be undertaken at a berth without prior, written agreement with the terminal.

Before carrying out any repairs that may immobilise the tanker, it may also be necessary to obtain permission from the local port authority. Certain conditions may have to be met before permission can be granted.

22.7.1.2 Hot Work on the Tanker

Hot work on board the tanker must be prohibited until all applicable regulations and safety requirements have been met and a permit to work has been issued. (See Section 9.3). This may involve the master, operator, chemist, shore contractor, terminal representative and port authority, as appropriate.

When alongside a terminal, no hot work should be allowed until the terminal representative and, where appropriate, the port authority has been consulted and approval obtained.

A hot work permit should only be issued after obtaining a gas free certificate from an authorised chemist.

22.7.2 REPAIRS ON THE TERMINAL

No construction, repair, maintenance, dismantling or modification of facilities should be carried out on a tanker berth without the permission of the terminal manager. If a tanker is moored at the berth, the agreement of the master should also be obtained by the terminal representative.

22.7.3 USE OF TOOLS ON THE TANKER OR TERMINAL

No hammering, chipping, or grit blasting should take place, nor should any power tool be used, outside the engine room, or accommodation spaces on a tanker, or on a terminal at which a tanker is berthed, without agreement between the terminal representative and the responsible officer, and unless a permit to work has been issued.

In all cases, the terminal representative and the responsible officer should satisfy themselves that the area is gas free, and remains so while the tools are in use. The precautions in Section 4.5 should be observed.

Chapter 23

MOORING

This Chapter deals with the physical preparations and procedures necessary to provide and maintain an efficient mooring arrangement whilst the ship is berthed at a jetty or buoy mooring. Exchange of information between the tanker and the terminal on matters relating to mooring arrangements is dealt with in Chapter 22.

The use of mooring equipment is described in detail in the OCIMF publication 'Mooring Equipment Guidelines'. Descriptions of good operational practice for mooring operations are given in the OCIMF publication 'Effective Mooring'. Ship, terminal and berth operators are strongly recommended to be aware of the detailed information contained in these documents and to bring the relevant information to the attention of their workforces to ensure that the combined mooring operation can be safely undertaken.

23.1 PERSONNEL SAFETY

Mooring and unmooring operations, including tug line handling, are dangerous operations. It is important that everybody concerned is fully aware of the hazards and takes appropriate precautions to prevent accidents.

23.2 SECURITY OF MOORINGS

Any excessive movement, or the breaking adrift of a tanker from the berth, owing to inadequate moorings could cause severe damage to the jetty installations and the vessel. For all tankers above 16,000 tonnes deadweight intended for general worldwide trading, the mooring restraint available on board the ship as permanent equipment should satisfy the following conditions: -

60 knots wind from any direction simultaneously with either:

- 3 knots current from directly ahead or astern (0 degrees or 180 degrees); or
- 2 knots current at 10 degrees or 170 degrees; or
- 0.75 knots current from the direction of maximum beam current loading.

Note: Terminal operators should recognise that vessels below 16,000 deadweight tonnes, and some older vessels above 16,000 deadweight tonnes, may not be able to comply with the above mooring advice.

The above criteria are intended to cover conditions that could readily be encountered on worldwide trade, but they cannot possibly cater for the most extreme combination of environmental conditions at every terminal. At exposed terminals, or those where for some reason the criteria are likely to be exceeded, the ship's mooring restraint should be supplemented with appropriate shore-based equipment.

Although responsibility for the adequate mooring of a tanker rests with the master, the terminal has an interest in ensuring that vessels are securely and safely moored. Cargo hoses or arms should not be connected until both the terminal representative and the master are satisfied that the ship is safely moored.

23.3 PREPARATIONS FOR ARRIVAL

23.3.1 TANKER'S MOORING EQUIPMENT

Before arrival at a port or berth, all necessary mooring equipment should be ready for use. Anchors should be ready for use if required, unless anchoring is prohibited. There should always be an adequate number of personnel available to handle the moorings.

23.3.2 USE OF TUGS

Before tugs come alongside to assist a tanker, all cargo and ballast tank lids and ullage ports should be closed, no matter what grade of oil is being or has been carried, unless all the cargo tanks are tested and proven free of hydrocarbon vapour. Tugs and other craft must not be permitted to come alongside before the master has satisfied himself that it is safe for them to do so.

Tugs should be adequately fendered to avoid causing damage to the tanker's hull and should push the tanker at designated 'strong points', which should be indicated by markings.

Tugs should switch off their radar systems when approaching a tanker.

Except in an emergency, tugs should not be allowed to come alongside or remain alongside a tanker while it is loading or discharging volatile petroleum or is ballasting tanks containing hydrocarbon vapour. Any intent by the master, or request from the shore, for tugs to remain alongside during any such cargo or ballast activities, should be treated as non-routine and must not be undertaken without the full agreement of all parties concerned, and only after a risk assessment has been carried out.

23.3.3 EMERGENCY USE OF TUGS

Occasionally, severe environmental conditions may place excessive strain on the moorings with consequent risk of mooring line failure and movement of the tanker in or off the berth. In such circumstances, tugs can perform a very useful function in holding the ship against the berth in order to reduce the strain on the moorings. If tugs are to be used for this purpose, cargo operations should be immediately suspended, hoses or loading arms should be disconnected and engines placed on standby.

23.4 MOORING AT JETTY BERTHS

Effective ship mooring management requires a sound knowledge of mooring principles, information about the mooring equipment installed on the ship, proper maintenance of this equipment and regular tending of mooring lines.

The safety of the vessel and hence its proper mooring is the prime responsibility of the master. However, the terminal has local knowledge of the operating environment at the site and knows the capabilities of shore equipment, and should therefore be in the best position to advise the master regarding mooring line layout and operating limitations.

23.4.1 TYPE AND QUALITY OF MOORING LINES

The mooring lines used to secure the tanker should preferably all be of the same material and construction. Ropes with low elastic elongation properties are recommended for larger tankers as they limit the tanker's movement at the berth. High modulus synthetic fibre ropes are a viable replacement for winch stowed steel wire ropes for the mooring of large tankers to terminals, other than single point moorings, provided that the recommendations contained in the OCIMF publication 'Guidelines on the Use of High Modulus Synthetic Fibre Ropes as Primary Mooring Lines on Large Tankers' are followed.

Moorings composed entirely of high elasticity ropes are not recommended as they can allow excessive movement from strong wind or current forces, or through interaction from

passing ships. Within a given mooring pattern, ropes of different elasticity should never be used together in the same direction.

It should be realised that mooring conditions and regulations may differ from port to port.

Where dynamic (shock) loading on moorings can be caused by swell conditions or the close passing of ships, fibre tails on the ends of mooring wires and high-modulus synthetic fibre mooring ropes can provide sufficient elasticity to prevent failure of the mooring and other components in the mooring system. Such tails, whose length should not exceed one third of the distance between the ship's fairlead and the shore mooring bollard, may be provided by the tanker or the terminal.

Because fibre tails will deteriorate more rapidly than the wires or high modulus synthetic fibre ropes to which they are attached, they should be at least 25% stronger than the line to which they are attached. They should be inspected frequently, particularly in way of their connection to the wire, and be replaced at regular intervals.

23.4.2 MANAGEMENT OF MOORINGS AT ALONGSIDE BERTHS

23.4.2.1 Tending of Moorings

Ship's personnel are responsible for the frequent monitoring and careful tending of the tanker's moorings, but suitably qualified shore personnel should check the moorings periodically to satisfy themselves that they are being properly tended.

When tending moorings which have become slack or too taut, an overall view of the mooring system should be taken so that the tightening or slackening of individual lines does not allow the tanker to move or place undue loads on other lines. The tanker should maintain contact with the fenders and moorings should not be slackened if the tanker is lying off the fenders.

23.4.2.2 Use of Standby Tugs

The possibility of using tugs to maintain position should be considered whenever the following conditions exist or are expected:

- Significant increase in wind speed or change in wind direction, particularly if the tanker has substantial freeboard.
- Excessive swell.
- Periods of maximum tidal flow.
- Limited under keel clearance (UKC).
- The close passing of other ships.

23.4.2.3 Tension Winches

Self tensioning winches fitted with automatic rendering and hauling capability should not be used in the automatic mode while the vessel is moored. In automatic mode, such winches, by definition, will render under load and will allow the vessel to move out of position, with consequent risk to cargo arms or hoses.

23.4.2.4 Self Stowing Mooring Winches

Because their weight and size make manual handling difficult, mooring wires used by tankers are normally stored on self-stowing mooring winches which may be either single drum or split drum.

A number of features of these winches need to be clearly understood by ships' personnel in order to avoid vessels breaking adrift from berths as the result of slipping winch brakes.

The holding power of the brake depends on several factors, the first being its designed holding capacity. This may either have been specified by the shipowner or be the standard design of the winch manufacturer. Some winches have brakes which are designed to slip

or render under loads which are less than 60% of the breaking load of the mooring line (MBL) handled. Every ship's officer should be aware of the designed brake holding capacity of the self-stowing mooring winches installed on the vessel.

In addition, deterioration of the brake holding capacity will be caused by wear down of the brake linings or blocks, and it should therefore be tested at regular intervals, not exceeding twelve months. A record, both of regular maintenance and inspections and tests, should be kept on the vessel. If the deterioration is significant, particularly if the initial designed holding capacity was low in relation to the breaking load of the mooring, the linings or blocks must be renewed.

Some of the newer self-stowing mooring winches are fitted with disc brakes, which are less affected by wear.

Kits are available for testing winch brake holding capacity which can be placed on board for use by the crew.

There are also a number of operational procedures that can seriously reduce the holding capacity of winch brakes if they are not correctly carried out. These include:

The number of layers of wire on the drum.
The holding capacity of a winch brake is in inverse proportion to the number of layers of the mooring wire or rope on the drum. The designed holding capacity is usually calculated with reference to the first layer and there is a reduction in the holding capacity for each additional layer. This can be substantial - as much as an 11% reduction for the second layer.

If the rated brake holding capacity of a split drum winch is not to be reduced, only one layer should be permitted on the working drum.

The direction of reeling on the winch drum.
On both undivided and split drum winches, the holding power of the brake is decreased substantially if the mooring line is reeled on the winch drum in the wrong direction. Before arrival at the berth, it is important to confirm that the mooring line is reeled so that its pull will be against the fixed end of the brake strap, rather than the pinned end. Reeling in the contrary direction can seriously reduce the brake holding capacity, in some cases by as much as 50%. The correct reeling direction to assist the brake should be permanently marked on the drum to avoid misunderstanding.

Winches fitted with disc brakes are not subject to this limitation.

The condition of brake linings and drum.
Oil, moisture or heavy rust on the brake linings or drum can seriously reduce the brake holding capacity. Moisture may be removed by running the winch with the brake applied lightly, but care must be taken not to cause excessive wear. Oil impregnation cannot be removed, so contaminated linings will need to be renewed.

The application of the brake.
Brakes must be adequately tightened to achieve the designed holding capacity. The use of hydraulic brake applicators or a torque wrench showing the degree of torque applied is desirable. If brakes are applied manually, they should be checked for tightness.

23.4.2.5 Shore Moorings

At some terminals, shore moorings are used to supplement the tanker's moorings. Where shore personnel handle shore moorings, they must be fully aware of the hazards of the operation and should adopt accepted safe working practices.

If the adjustable ends of the shore mooring are on board the tanker, the moorings should be tended by the tanker's personnel in conjunction with its own moorings. If shore based wires with winches are provided, agreement should be reached over the responsibility for tending. If shore based pulleys are provided, the tanker should tend the mooring since both ends of the line are on board. For the avoidance of doubt, there should be clear

agreement between the responsible officer and the terminal representative with regard to who will take responsibility for tending any moorings provided by the terminal.

23.4.2.6 Anchors

Whilst moored alongside, anchors not in use should be properly secured by brake and guillotine, but otherwise be available for immediate use.

23.5 BERTHING AT BUOY MOORINGS

All the normal precautions taken during berthing alongside a jetty should also be taken when berthing at a buoy mooring.

At terminals with buoy moorings for ocean going tankers it is desirable to have professional advice on those aspects of safety related to the marine operations. This may be by the assignment of a berthing master (mooring master) to the terminal, or by consultation with a port or pilotage authority, if available.

23.5.1 MOORING AT CONVENTIONAL MULTI BUOY MOORINGS

At conventional buoy moorings, good communication between bridge and poop is essential to avoid moorings or mooring boats being caught up in the ship's propeller.

Severe loads can sometimes develop in certain mooring lines during the mooring operation. It is essential that good quality moorings of adequate length are used and personnel are closely supervised so as to ensure their safety.

23.5.2 MOORING AT SINGLE POINT MOORINGS (SPM)

Complicated and non-standard mooring arrangements at SPMs frequently lead to dangerous and protracted operations. Therefore the fitting, both on ships and on SPMs, of well designed and, in the case of the ship, accurately positioned, items of standard equipment will considerably reduce the risk of injury to personnel. The proper fitting of such equipment will also provide a more efficient method of securing ships to SPMs at offshore terminals.

OCIMF has produced guidelines for SPM mooring equipment entitled 'Recommendations for Equipment Employed in the Mooring of Ships at Single Point Moorings' and it is recommended that these are adopted by all SPM terminals and the ships using them.

A storage drum should be used to heave in the SPM pick-up rope prior to connection of the chafing chain to the stopper. A warping end should never be used for this purpose.

Ship and terminal operators should refer to the OCIMF publication 'Single Point Mooring Maintenance and Operations Guide' for detailed information regarding SPM operations.

23.5.3 MANAGEMENT OF MOORINGS AT BUOY BERTHS

While the tanker is at a conventional multi-buoy mooring, frequent and regular inspection is essential to ensure that mooring lines are kept taut and that movement of the tanker is kept to a minimum. Excessive movement may cause rupture of the cargo connections.

At single point moorings, a watchman should be stationed on the forecastle head to report any failure or imminent failure of moorings or leakage of oil. The watchman should also report immediately if the tanker 'rides up' to the buoy and should be equipped with appropriate means to communicate with the officer of the watch.

23.5.4 ADDITIONAL MOORINGS

At many conventional buoy mooring berths, the ship's moorings are supplemented by shore moorings run from the buoys or by ground moorings. These wires are often heavy and the handling of them around the warping drum of a winch should therefore only be undertaken by experienced personnel.

24.3.4 TANK WASHING OPENINGS

During tank cleaning or gas freeing operations, tank washing cover plates should only be removed from the tanks in which these operations are taking place and should be replaced as soon as these operations are completed. Any openings in the deck should be covered by gratings. Other tank washing covers may be loosened in preparation, but they should be left in their fully closed position.

24.4 INSPECTION OF SHIP'S CARGO TANKS BEFORE LOADING

Where possible, inspection of ship's tanks before loading cargo should be made without entering the tanks.

A tank inspection can be made from the deck using ullage or sighting ports with, where applicable, the inert gas within the tank maintained at its minimum positive pressure. The person inspecting should take care not to inhale vapours or inert gas when inspecting tanks which have not been gas freed.

Frequently, tank atmospheres which are, or which have been, inerted have a blue haze which, together with the size of the tanks, makes it difficult to see the bottom even with the aid of a powerful torch or strong sunlight reflected by a mirror. Other methods such as dipping and measuring the heel, or having the stripping line or eductors opened in the tank and listening for suction, may have to be used. It may sometimes be necessary to remove tank cleaning opening covers to sight parts of the tank not visible from the ullage or sighting ports, but this should only be done when the tank is gas free, and the covers must be replaced and secured immediately after the inspection.

If, because the cargo to be loaded has a critical specification, it is necessary for the inspector to enter a tank, all the precautions contained in Section 10.5 must be followed.

Before entering a tank which has been inerted, it must be gas freed for entry and, unless all tanks are gas freed and the inert gas system is completely isolated, each individual tank to be entered for inspection must be isolated from the inert gas system. (See Sections 7.1.6.11 and 7.1.6.12).

24.5 SEGREGATED BALLAST TANK LIDS

Segregated ballast tank lids may be opened before discharge of ballast is commenced to allow the surface of the ballast to be inspected for contamination.

Segregated ballast tank lids should be kept closed when cargo or ballast is being handled, as petroleum gas could be drawn into these tanks.

Segregated ballast tank lids must be clearly marked to indicate the tank they serve.

24.6 SHIP AND SHORE CARGO CONNECTIONS

24.6.1 FLANGE CONNECTIONS

Flanges for ship to shore cargo connections, at the end of the terminal pipelines and on the ship's manifold, should be in accordance with the OCIMF publication 'Recommendations for Oil Tanker Manifolds and Associated Equipment'.

Flange faces, gaskets and seals should be clean and in good condition. When in their storage location, flanges faces should be suitably protected from corrosion/pitting.

Where bolted connections are made, all bolt holes should be used. Care should be taken in tightening bolts as uneven or over tightened bolts could result in leakage or fracture.

Improvised arrangements using 'G' clamps or similar devices must not be used for flange connections.

24.6.2 REMOVAL OF BLANK FLANGES

Each tanker and terminal manifold flange should have a removable blank flange, made of steel or other approved material such as phenol resin, and preferably fitted with handles.

Precautions should be taken to ensure that, prior to the removal of blanks from tanker and terminal pipelines, the section between the last valve and blank does not contain oil under pressure. Precautions must also be taken to prevent any spillage.

Blank flanges shall be capable of withstanding the working pressure of the line / system to which they are connected. Blank flanges should normally be of a thickness equal to that of the end flange to which they are fitted.

24.6.3 REDUCERS AND SPOOLS

Reducers and spools should be made of steel and be fitted with flanges that conform with ANSI B16.5, Class 150 or equivalent. Ordinary cast iron should not be used. (See OCIMF 'Recommendations for Oil Tanker Manifolds and Associated Equipment'.)

There should be an exchange of information between the ship and terminal when manifold reducers or spools are made of any material other than steel, since particular attention is necessary in their manufacture to achieve the equivalent strength of steel and to avoid the possibility of fracture.

Manifold pressure gauges should be fitted to the spool pieces/reducers on the outboard side of the manifold valves.

24.6.4 LIGHTING

During darkness, adequate lighting should be arranged to cover the area of the ship to shore cargo connection and any hose handling equipment, so that the need for any adjustment can be seen in good time and any leakage or spillage of oil can be quickly detected.

24.6.5 EMERGENCY RELEASE

A special release device may be used for the emergency disconnection of cargo hoses or arms.

If possible, the hoses or arms should be drained, purged or isolated as appropriate before emergency disconnection, so that spillage is minimised.

Periodic checks should be made to ensure that all safety features are operational.

24.7 ACCIDENTAL OIL SPILLAGE AND LEAKAGE

24.7.1 GENERAL

Ship and shore personnel should maintain a close watch for the escape of oil at the commencement of and during cargo transfer operations. In particular, care should be taken to ensure that pipeline valves, including drop valves, are closed when not in use.

Cargo or bunker tanks which have been topped up should be checked frequently during the remaining loading operations to avoid an overflow.

On double hull vessels where there may be a reduced GM, due care shall be taken when deballasting double bottom tanks after other cargo tanks have been topped off. It is possible that any list / loll that may result could cause an overflow of cargo.

If leakage occurs from a pipeline, valve, hose or metal arm, operations through that connection should be stopped until the cause has been ascertained and the defect has been rectified. If a pipeline, hose or arm bursts, or if there is an overflow or other spill, all cargo and bunker operations should be stopped immediately and should not be restarted until the fault has been rectified and all hazards from the released oil have been eliminated. If there is any possibility of the released oil or of petroleum gas entering an engine room or accommodation space intake, appropriate preventive measures must be taken quickly.

Means should be provided for the prompt removal of any spillage on deck. Any oil spill should be reported to the terminal and port authorities and the relevant ship and shore oil pollution emergency plans should be activated.

Harbour authorities and any adjacent ship or shore installations should be warned of any potential hazard caused by the spill.

24.7.2 SEA AND OVERBOARD DISCHARGE VALVES

At the start of and at regular intervals throughout loading, discharging, ballasting and tank washing, a watch should be kept to ensure that oil is not escaping though sea valves.

When not in use, sea and overboard discharge valves connected to the cargo and ballast systems must be securely closed and lashed and may be sealed. In-line blanks should be inserted where provided. When lashing is not practical, as with hydraulic valves, some suitable means of marking should be used to indicate clearly that the valves are to remain closed.

For further information on this subject, reference should be made to the ICS/OCIMF publication 'Prevention of Oil Spillages through Cargo Pumproom Sea Valves'.

24.7.3 SCUPPER PLUGS

Before cargo handling commences, all deck scuppers and, where applicable, open drains on the jetty, must be effectively plugged to prevent spilled oil escaping into the water around the tanker or terminal. Accumulations of water should be drained periodically and scupper plugs replaced immediately after the water has been run off. Oily water should be transferred to a slop tank or other suitable receptacle.

24.7.4 SPILL CONTAINMENT

A permanently fitted spill tank, provided with suitable means of draining, should be fitted under all ship and shore manifold connections. Should no permanent means be provided, drip trays should be placed under each connection to retain any leakage.

24.7.5 SHIP AND SHORE CARGO AND BUNKER PIPELINES NOT IN USE

The tightness of valves should not be relied upon to prevent the escape or seepage of oil. All shore pipelines, loading arms and hoses not in use at a berth must be securely blanked.

All ship's cargo and bunker pipelines not in use must be securely blanked at the manifold. The stern cargo pipelines should be isolated from the tanker's main pipeline system forward of the aft accommodation by blanking or by the removal of a spool piece.

24.8 FIRE FIGHTING EQUIPMENT

When a tanker is alongside a berth, fire fighting equipment is to be ready for immediate use.