Section 11A

Cargo Operations – Tanker vessels
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11.1 **GENERAL**
The safety of the vessel and all personnel must be of prime consideration at all times. To achieve this, the precautions and recommendations for all operations laid down in the following instructions are to be considered an extension of:

a) Tanker Safety Code (Petroleum) I.C.S.
b) International Oil Tanker and Terminal Safety Guides.
c) The various International Chamber of Shipping Guides appertaining to Tanker Operations and/or other recognized government bodies such as USCG.
d) Any additional publications as may be supplied by the Owners, Operators or Charterers.

The Safety Codes and applicable Guides held on every Company operated vessel, must be studied by all concerned.

Cargo handling is considered to be a critical operation as this is defined in the DNV Rules for Management of Safe Ship Operation and Pollution Prevention (SEP). Accordingly, it is FSMHK policy to have a qualified individual in charge of all cargo operations at all times. This individual is the Chief Mate.

The procedures in this chapter, including the checklists provided in Form Manuals section 11 will be followed during all cargo handling operations.

11.1.1 **Responsibilities**
The ship's responsibilities with reference to the cargo, are vested in the Master who in turn is directly responsible to the Owners, and if applicable, through the Owners to the Charterers.

The main responsibilities are:

a) To ensure the suitability of cargo tanks, and cargo equipment for the handling and carriage of cargo.
b) To ensure proper care of the cargo whilst on board, both in respect of quality and quantity.
c) To load and discharge cargo as efficiently and expeditiously as possible.

to co-operate fully with representatives of Oil Companies, Agents and port officials in order to minimize port turn round time.

Above all Master of the vessel is responsible for Safety of life, safety of the vessel, environment and Cargo.

11.1.2 **Knowledge of Cargo Systems**
The Master and all Deck Officers must have an intimate knowledge of all cargo pumps, pipeline systems, instrumentation and ancillary equipment on the vessel. All officers and rating should be familiar and aware of the requirements of following but not limited to:

- Vessel cargo system, including emergency discharge arrangements where applicable
- Cargo, ballast and stripping pumps, eductors and their associated instrumentation
- Temperature monitoring and recording of pumps and system
- For framo pumps and deep well pumps fitted, column and cofferdam purging routines with the pump leakage and its tolerable limits
- Location of cargo pump emergency stops
- Cargo system ullage/temp gauges with operation of vapour lock and UTI Tapes.
- Primary and secondary venting system, its setting, locking arrangements and requirements.
- Inert gas system, its requirement and action in the event of IGS Failure.

11.1.3 **Operation of Valves**
The manipulation of tank, deck line and pump room valves is the responsibility of the Chief Mate assisted by other Officers. The opening, closing and locking of sea valves is an
operation to which the Chief Mate must give his personal attention at all times. He must give explicit instructions that such valves shall only be operated on his direction. The time taken for power operated valves to move from close to open and open to close, should be checked regularly at their normal operating temperature and recorded.

11.1.4 Maintenance of Cargo Equipment
The Chief Engineer is responsible for the maintenance of the cargo pumping system, instrumentation, valves, automatic gauging, fixed tank washing machines, etc., and any malfunction of such equipment must be reported to him immediately. Cargo equipment Status report form 11.11 must be filled and sent to office every quarter.
11.1.5 Joint Planning and Monitoring
In all operations connected with cargo, ballast, tank cleaning, bunkering etc., it is the responsibility of all Senior Officers to ensure sound joint planning and control so that maximum co-operation amongst the various departments is achieved in order that the operation may be brought to an expeditious and successful conclusion, compatible with safety. Cargo Plan shall be made in form 11.13. Operation superintendent shall monitor cargo and ballast plan and proper implementation of company procedures. During the ship visit superintendent shall verify the implementation.

11.1.6 Chief Mate's Instructions
The Chief Mate should keep a Cargo Order Book for the benefit of the Watch Officer. This book should contain written instructions of the procedures to be followed during periods when the Chief Mate is not on deck. The Watch Officer shall sign the Cargo Order Book to acknowledge his understanding of these instructions.

Additionally, Deck Officers should be given a plan of the load/discharge pattern to be followed indicating tanks, pipelines and pumps involved and the sequence of operations, as agreed in consultation with the Master. A Crude Oil Washing plan, where applicable, must also be prepared and reviewed with Watch Officers.

Information on Maximum permissible loading rate, discharging rates, venting capacity, for each cargo and Ballast tank and, where tanks have a combined venting system, for each group of cargo and ballast tanks. It is aimed to ensuring that tanks are not over or under pressurised by exceeding the capacity of venting system, including any installed secondary venting system. This information shall be displayed in the cargo control position.

Legible and up to date pipeline and or mimic diagram of cargo, inert gas, venting system, crude oil washing or tank cleaning washing system, Ballast system as applicable should be available and displayed in pump rooms(s) and cargo control area. Cargo pumps performance curve should be readily available in cargo control area.

Standard Format of Cargo Plan as per Form 11.12 of Cargo plan shall be followed.
Standard Format of Tank Cleaning / Cow Plan as per Form 11.13 of Cargo plan shall be followed.

11.1.7 Progress Reports
The Chief Mate is to keep the Master and the Chief Engineer advised of the progress of loading/discharging and specifically the estimated time of completion to facilitate engine readiness for departure and co-ordination of pilot and tugs etc.

11.1.8 Loading/Discharging Instructions
Instructions regarding quantities, grades and ports for loading/discharging are to be acknowledged promptly. In the event of the vessel being issued with instructions, which appear unacceptable due to quantity, incompatibility, unacceptable trim or stress, the sender of the instructions must be immediately informed of the difficulties and suggested changes. If serious differences arise the Superintendent must also be contacted for guidance and advice. All vessels loading Crude Oil, other cargoes containing H2S or cargoes the vapours of which are otherwise injurious to health, are to be loaded & discharged at all times in the 'Closed mode', as defined in ISGOTT.

11.1.9 Preparation of Cargo Tanks
All tanks, pipelines, pumps etc., must be thoroughly cleaned in accordance with the requirements of the intended cargo. Care should be taken in stripping tanks during the cargo discharge, as efficient stripping reduces cleaning time. Tankers trading on regular runs where the cargo nomination is known in advance, should only clean tanks which will be carrying a different grade to the previous loading or in accordance with charterer’s voyage instructions. However, strict attention must be paid to the gas-freeing of tanks, even when tank cleaning is not required. The draining of the whole system after cleaning and again after ballast discharge is essential. In normal circumstances for vessels carrying out crude washing procedures, minimum 25% of cargo capacity shall be crude oil washed every voyage and 100% of the tank capacity shall be covered within a period of 3 months.

While carrying out tank cleaning / COW operations forms 11.14,11.15,11.16 and 11.17 must be complied with as applicable.

11.1.10 Ballast Voyage Maintenance
On passages which permit general maintenance to be carried out, cargo tank hatches, tank washing openings, valves etc will be inspected overhauled and new packing fitted where required. Cargo pump strainers etc should be opened up and cleaned on a regular basis and written records kept of such maintenance and overhaul.

11.1.11 Heating Coils
In vessels so fitted, heating coils should be tested and any defects rectified during the ballast voyage.

11.1.12 Pressure/Vacuum (P/V) Valves and Inert Gas Lines
Prior to loading & discharging, inert gas lines and P/V valves to each compartment must be inspected and checked to ensure correct and efficient function. Flame screens in P/V valves are to be inspected at frequent intervals to ensure clarity, particularly in crude carriers, where crude oil carry over may choke the screen. In vessels fitted with inert gas systems, products of combustion may choke and hamper the flow through the screen, which could result in blow-out of the gas at high loading rates. Frequent removal of the screen for cleaning is therefore essential.

If stop valves are fitted which permit isolation of individual tank from the common venting system, they should be provided with positive locking arrangement and the keys shall be under control of the person who is over all in-charge of the cargo operation. Master key system for locking arrangement should be avoided.

11.1.13 Preparations Prior to Arrival
In the interests of minimum delay and maximum safety, the following information should be obtained and the preliminaries carried out:

a) "Side to" the vessel will be moored.
b) Required reducers fitted on manifold.
c) Cranes or booms rigged.
d) Manifolds marked to show grades.
e) Pilot ladder or hoist ready.
f) Accommodation ladder or gangway ready if required.
g) Sufficient mooring lines and/or wires, messengers, heaving lines, etc.
h) Firefighting equipment ready for immediate use.
i) Scuppers plugged.
j) Number and size of shore hoses or arms.
k) If not provided in charterer's or agent's messages, confirmation of cargo.
nominations and API should be requested at loading ports.

l) Ship shore information exchange must be carried out as per form 11.1.

If at any time the vessel is unable to carry out the cargo orders, the Superintendent must be advised immediately with full details.

11.1.14 Cargo Tank Inspection

Inspection After Loading
As soon as practicable after completion of loading the Chief Mate should check that all valves in the cargo system are closed, that all appropriate tank openings are closed and that Inert Gas System and P/V valves are correctly set. After loading checklist form 11.5 must be filled.

Inspection Prior To and After Loading and After Discharging
Prior to loading and upon completion of discharging the cargo tanks shall be inspected to ascertain their condition and readiness for receiving cargo, or to determine whether tanks have been properly drained after discharge.

These inspections shall be made by the Chief Mate or a Deck Officer designated by him who shall be accompanied by a responsible terminal representative and an independent surveyor. After the tanks have been inspected, it shall be the responsibility of the Watch Officer to ensure that the inspector has signed a dry receipt/OBQ sheet.

Ullage shall be taken and properly recorded after loading, before discharge, or upon completion of discharge if cargo has only been partly discharged.

When ullage are taken by shore personnel, a Deck Officer shall accompany the individual taking the ullage, temperature and presence for water. The accuracy of the ullage readings will be the responsibility of the officer witnessing the readings. These requirements shall also be followed after cargo has been discharged and tanks are being inspected for dryness.

Inspection While Loading Cargo of Different Grades
If doubt exists as to the tightness of divisional bulkheads when scheduled to carry two or more grades, only one grade shall be loaded at a time. The nominated cargo tanks and adjacent tanks shall be sounded and examined before loading the second grade of cargo.

Inspection of Cargo Tanks, Pipelines Before Loading or Discharging
Prior to loading, the cargo tanks shall be inspected to ensure that they have been properly drained and are in all respects ready to receive the nominated cargo. Pipelines shall be properly drained of water or oil, sea valves and overboard connected to cargo and ballast system must be securely closed, lashed and sealed. In line blanks should be inserted where provided. When lashing is not practicable, as with hydraulic valves, suitable means of marking or placard should be used to indicate clearly that the valves are to be remain closed. A device such as pressure vacuum gauge shall be available to determine the liquid make up section of the pipeline which lies between the inboard and outboard sea valve. Pipeline valves shall be properly set and in good working order. This work shall be carried out under the direction and supervision of the Chief Mate.

All master valves shall be frequently inspected and tested and proved to be in good working order either by vacuum or pressure testing.

Prior cargo transfer operations in U.S. Waters or in U.S. designated offshore lighterage areas / Deepwater Ports, the requirements of 33 CFR 156 shall be observed.

Pressure testing of cargo transfer piping to 1.5 times maximum allowable working pressure.
(same as the piping’s design pressure) shall be done during periodic dry-dockings and Underwater Inspections in Lieu of Dockings and certificated. Pipelines should be visually examined and subjected to routine pressure test to verify the condition. Pressure test should be hydrostatic test, and should not use compressed air or inert gas.

The cargo pipelines shall be tested to 1.25 times the maximum allowable working pressure annually and the pipelines should be marked accordingly with the date the test was carried out and the pressure the pipeline tested to. The cargo Discharge piping of all tank vessels shall be tested annually for tightness, at the maximum working pressure.

Pressure testing of cargo piping to the maximum pressure expected during the discharging operation shall be done prior arrival at the discharge port. Such test shall be documented in the appropriate log book. When carrying out the Pressure test vessels to check the P/V valves for proper operation and any defect to be rectified prior to carrying out the operation.

11.1.15 Cargo operation checklist:
The following checklist shall be followed before during and after the cargo operations as per the form manual:
All Officers and Ratings should be familiarized with ship shore safety checklist and the requirements of checklists.

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<td>Vsl</td>
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<tr>
<td>11.2</td>
<td>Ship-Shore safety check list</td>
<td>Every operation</td>
<td>Ch/off</td>
<td>M61</td>
<td>Vsl</td>
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<td>11.3</td>
<td>Before loading check list</td>
<td>Every operation</td>
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<td>11.4</td>
<td>During loading check list</td>
<td>Every operation</td>
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<td>11.5</td>
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<td>11.6</td>
<td>Before discharge check list</td>
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<td>11.7</td>
<td>During discharging check list</td>
<td>Every operation</td>
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<td>Vsl</td>
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<td>11.8</td>
<td>After discharging check list</td>
<td>Every operation</td>
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<td>M61</td>
<td>Vsl</td>
<td>3 yrs</td>
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<tr>
<td>11.9</td>
<td>Upon completion of all port operations</td>
<td>Every operation</td>
<td>Ch/off</td>
<td>M61</td>
<td>Vsl</td>
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</tr>
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<td>11.10</td>
<td>Port Information Report</td>
<td>Every unusual port</td>
<td>Master</td>
<td>M62</td>
<td>Vsl/Sqm</td>
<td>3 yrs</td>
</tr>
<tr>
<td>11.11</td>
<td>Cargo equipment status report</td>
<td>Every quarter</td>
<td>Ch/off</td>
<td>M63</td>
<td>Vsl/Sqm</td>
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### 11.12 Cargo Plan

<table>
<thead>
<tr>
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<th>Ch/off</th>
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### 11.13 Tank cleaning Plan

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<th>Vsl</th>
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### 11.14 Before arrival Cow/ tank cleaning checklist

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<th>Operation</th>
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### 11.15 Before Cow/tank cleaning checklist

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### 11.16 During tank cleaning check list

<table>
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<tr>
<th>Operation</th>
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### 11.17 After tank cleaning check list

<table>
<thead>
<tr>
<th>Operation</th>
<th>Ch/off</th>
<th>Vsl</th>
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</table>

### 11.18 Ship to Ship Transfer Procedure

- Pre Fixture Information
- Before Operations Commence
- Before Run-in and Mooring
- Before Cargo Transfer
- Before Unmooring

### 11.19 Cargo heating log

<table>
<thead>
<tr>
<th>Operation</th>
<th>Ch/off</th>
<th>Vsl</th>
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### 11.20 Checklist before using VECS

<table>
<thead>
<tr>
<th>Operation</th>
<th>Ch/off</th>
<th>Vsl</th>
<th>3 yrs</th>
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<tr>
<td>Every</td>
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### 11.21 Inert gas operation log / maintenance log

<table>
<thead>
<tr>
<th>Operation</th>
<th>Ch/off</th>
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### 11.1.16 MSDS

Prior arrival at the load port, the Shipper / Terminal is to be asked to provide the MSDS for the grade/s of cargo to be loaded. All efforts are to be made to obtain the MSDS. The MSDS must be prominently displayed prior to the transfer operation and the attention of all relevant staff must be drawn to the information contained therein. Some MSDS are provided for reference in section 11.16.

### 11.1.17 Tank atmosphere monitoring equipment

a) All vessels must have on board the below mentioned minimum gas detection equipment

1. Oxygen analyzer - 2 nos
2. Explosimeter - 2 nos
3. Tank scope - 2 nos
4. Personal multigas detector (4 gas) - 2 nos
5. Vapor detection tubes with pump - 2 pumps + 2 extension hoses

(For all cargoes carried on board)

b) Vessel must always have enough of stock of calibration gases, together with sufficient set of calibration gases.
spares, present on board.

c) All gas detection equipment should be calibrated onboard by a responsible officer every month and record for same to be maintained. The gas detection equipment must be landed ashore for calibration by approved shore facilities annually.

d) The manufacturers recommended interval for servicing the equipment must be observed, replacement of parts such as filters, at manufacturers recommended interval must be complied.

e) Use of self test facility does not necessarily means that an analyzer is operating correctly. The only way to be sure that a machine is operating satisfactorily is to use a sample check gas. Before each operation and use of portable equipment, this should be checked with proper gas to ascertain is proper operation.

f) There should be an adequate supply of chemical indicator tube (e.g. dragger tubes) or other electronic equivalent specific to the cargo being carried and they should be within their expiry dates. An up to date inventory of chemical indicator tubes should be maintained and send to office every month in form 3.28

g) Vessel equipped with inert gas/ Nitrogen padding should carry two analyzers capable of measuring hydrocarbon content in an inert condition/atmosphere. Person in charge and person operating should ensure that the analyzer being used for measuring hydrocarbon content in an inert gas atmosphere is in fact capable of doing so accurately. Analyzers which measure hydrocarbon using an infra-red principle are design for use in oxygen deficient atmospheres. In case where a vessel is not fitted with an inert gas system but does employ nitrogen blanketing these instruments must be provided.

h) Cargo and Bunker fuels should not be treated as free of H2s or benzene until after they have been loaded and the absence of H2s has been confirmed by both the results of monitoring and the relevant MSDS information

11.1.17 LOADING COMPUTER

Ship of more than 100 m in length are required by class to be provided with an approved loading instrument and operational manual is always to be provided for the loading instrument. The loading instrument should be capable of calculating sheer forces and bending moment in any load or ballast condition at specified read out points and should indicate the permissible value. Stability instrument should be capable of handling both intact and damage stability (ship constructed on or after 1 Jan 2016, ship constructed before 1 Jan 2016- by the first renewal survey on or after 1 Jan 2016, but before 1 Jan 2021)

At each annual and special survey the loading instrument is to be checked for accuracy and approved loading guidance information conformed as being available on-board. Class approved data should be used and test should be carried out in presence of the attending surveyor at the annual survey.

Regular on-board testing should take place and records attesting to this should be maintained. The test should involve physically entering the data for each tank into the computer and verifying the result. It is not acceptable to simply retrieve a stored test condition from the computer and compare this against the official condition. On board test should be performed at-least once in three months.

All officers must be aware of test requirements including damage stability.
<table>
<thead>
<tr>
<th>FLEET OPERATION MANUAL</th>
<th>Section <strong>11A.1</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>GENERAL</td>
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</table>
11.2 CARGO DOCUMENTS

11.2.1 Charter Parties
The Charter Party governing the ship's trading will be studied in detail and must be fully understood by the Master. As Charter Parties and Bills of Lading are the most important documents with which the Master has to deal in his relations with third parties, any doubt of the contents of these documents must be clarified with the FAREAST SHIPMANAGEMENT HONGKONG. The cargo must be named in all documents as it is described on the Bill of Lading.

11.2.2 Time Charters
In vessels that are Time Chartered the Master will obtain a certificate, signed by the Charterer's Representative and himself, showing the Date and time of delivering the vessel to the Charterers and the quantity of bunkers, domestic and boiler water on board at that time. A copy of this "on hire" delivery receipt must be sent to FSMHK Office.

On the termination of the Charter, a similar certificate must be obtained upon re-delivery of the ship.

11.2.3 Voyage Orders
A ship on Time Charter will normally receive orders giving cargo details and destinations direct to the vessel from the Time Charterer's Operation Dept. It is important that immediately on receipt of voyage orders, that the FAREAST SHIPMANAGEMENT HONGKONG is advised of the vessel's destinations, nominated agents, cargo nomination, etc. Normally, queries regarding voyage orders, cargo quantities etc., will be directed to the Time Charterers.

On Voyage Charters, all instructions are relayed from the Charterers, through the Brokers to the Owners then to the ship. All replies and queries must therefore be directed to FAREAST SHIPMANAGEMENT HONGKONG Office, as well as details of cargo quantities lifted. It will always be the duty of the Master to ensure that a full cargo is carried, in accordance with the Charter Party after allowing for the necessary deductions.

11.2.4 Estimated Times of Arrival (ETAs)
ETAs must be submitted punctually as required by the Charter Party. If sent directly to the Charterers, the FAREAST SHIPMANAGEMENT HONGKONG Office should also be notified.

11.2.5 Notice of Readiness
On arrival at a port where cargo is to be worked, the Master will immediately present the Notice of Readiness on the appropriate form 10.1, advising that the vessel is ready to load or discharge, whether the vessel is in berth or not.

If no berth is available or ready, for any reason, the Notice of Readiness should be tendered on arrival at the customary anchorage, even if the vessel is not anchored.

If owing to the position of the vessel the NOR cannot be given in writing, notice should be sent by radio, either to the Agents or direct to the Shippers or Consignees, and confirmation on the proper form given at the first opportunity.

If the vessel is delayed in berthing on account of repairs to be carried out or cargo tanks to be prepared etc., Notice of Readiness will be given when the vessel is ready to berth.
When loading or discharging at more than one berth in the same port, if there is only one Shipper/Consignee involved, only one NOR is required. If different Shippers/Consignees at the different berths, then a new NOR must be tendered for each berth at "hoses off" time departing one berth for the next succeeding one.

11.2.6 **Bills of Lading**  
The Master must ensure that every detail on the Bill of Lading is correct before he signs them. In the event the B/L are not ready prior to departure from berth the Master may authorize the agent to sign on his behalf subject to the following:
- The final B/L figures are telexed to the Master for his scrutiny and agreement before the B/L’s are released.
- Any difference between ship and B/L figures is noted in a formal protest.

It is customary on occasions when the Bill of Lading figure differs substantially from the ship's figures, that the Master must write a Letter of Protest and **NOT** endorse the Bill of Lading until a new round of ship and shore gauges has been taken and verified. If differences still exist the B/L should be signed and a protest in writing lodged noting the difference.

11.2.7 **Early Departure Procedure**  
The Early Departure Procedure (EDP) was introduced to avoid the often considerable delay awaiting the completion of the cargo documents. With some product cargoes a substantial amount of delay has been incurred awaiting the results of laboratory tests on cargo samples. In many cases, consignees still require such tests to be completed before the vessel can be released to sail.

Subject to such facilities being available to the vessel, Masters should avail themselves of the EDP but only if authorized by Charterers and confirmed by owners.

The procedure is that on arrival, the Master will indicate his acceptance of the EDP. **DO NOT** accept EDP unless Charterers voyage orders authorize you to do so.

The Bill of Lading and Cargo Manifest will be prepared in advance, (except for Cargo figures) and will be presented to the Master for signature. The Master will sign a document authorizing the Agent to sign all other documents on his behalf. (At some ports this authority must be cabled to the Shippers).

Copies of the Bill of Lading and the Cargo Manifest will be retained on board.
Before the vessel is released to sail, a comparison will be made by the Shippers of the ship/shore figures and within acceptable limits, the vessel will be permitted to sail. The Master must still, however, submit written protest noting any differences.
On receipt of the relevant cargo figures from the Shippers, the Master must fill in the details on the forms in his keeping.

The Master retains the right to protest again by cable for any difference between the final ship and shore figures, and the agent authorized to sign the B/L on his behalf must only do so after the protest is lodged with the shipper and charterer.

11.2.8 **Cargo Documents**

The following documents must be forwarded to FSMHK Office from each port:
- Statement of facts
- Ullage Reports
11.2.9 Statement of Facts

For vessels on Voyage Charters, it is necessary that a statement of facts be drawn up and forwarded to FSMHK Office, who will copy this to the Charterers. Time Charter vessels will complete the relevant Charterer's document and forward a copy to the Office.

The basic information required in a Statement of Facts is:
- Time of arrival at the port
- Anchoring times, if applicable
- Time Pilot boards and his name
- Names of tugs in attendance and times employed
- Time of commenced mooring
- Time of completed mooring
- Notice of Readiness time
- Hoses connected
- Time of any delays in berthing or cargo operations and party responsible for the delay

11.2.9.1 At Loading Ports
- Time tanks inspected and passed
- Time commenced loading
- Time completion of loading
- Time hoses disconnected
- Departure time

11.2.9.2 At Discharge Ports
- Time commenced discharge
- Discharge pressure with details of times and reasons when not maintained
- Time completion of discharge
- Time tank inspection
- Time hoses disconnected
- Time commenced ballasting
- Departure time
- Time devoted to Crude Oil Washing and tanks crude oil washed

All delays between operations are to be mentioned and also whether attributable to the vessel or the shore.

It is recommended that any pollution observed is recorded and reported to the appropriate authority, noting the position and direction of drift. Such observations may be invaluable if the vessel is later accused of causing pollution.

All times and events must agree exactly with the Deck Log Book and whenever possible agree with the Terminal Operators records. Where differences between ship times and shore
times occur, considerable amounts of time can be wasted reconciling these differences, when settling demurrage claims. The Statement of Facts/Port Log should be signed by Master, Agent and Terminal representative.

**NOTE:** In vessels with the capability of loading coincidentally with ballast discharge, when the vessel commences discharging whilst awaiting the shore to commence loading, the fact that the vessel is prepared to carry out both operations together must be recorded on the ship and shore time sheets.

Requests for reductions in the loading rates for topping off are not to be recorded in Statement of Facts, but any rate reductions by the shore must be recorded.

11.2.10 **Petroleum Inspectors**

Cargo transfer is frequently attended by licensed petroleum inspectors. Their function is to see that tankage receiving the cargo is clean and ready for it, and to measure and record the quantity and quality of the cargo transferred. A copy of their reports should be sent to the Office together with other cargo documents and another copy retained in the vessel's voyage file.
11.3 CARGO PLANNING

All cargo operations should be carefully planned and documented well in advance of their execution the details of plan should 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 should be formally recorded and brought to the attention of all personnel involved with the operation. The cargo plan should be completed by Responsible officer ie: Chief officer, prior to the commencement of operation and verified and approved by the Master.

During the planning process all factors must be thoroughly considered for every stage of the loading, as well as for the voyage. These factors include:

- Quantity and grade of each parcel.
- Density temperature and other relevant properties
- A plan of the distribution, lines and pumps to be used
- Transfer rate and maximum allowable pressure
- Critical stages of operation
- Notice of rate changes
- Venting requirements
- Stability and stress information
- Draft and trims
- Ballast operations
- Emergency stop procedures
- Emergency spill procedures and spill containment.
- Hazards of the particular cargoes
  - And also as required
- Precautions against static generation
- Initial start up rates
- Control of cargo heating systems
- Line cleaning
- Crude oil washing procedures
- Under keel clearance limitations
- Bunkering and special precautions required for the particular operation
- Inert gas operations.

11.3.1 Stresses
Bending moments and sheer forces should always be within the acceptable limits as stated in the vessel loading manual and/or obtained by loading computer. Every effort must be made to ensure that the cargo is distributed so that the stresses are minimal.

11.3.2 Compliance with Load Line Regulations
Masters must strictly observe the regulations of the International Load Line Convention and maintain the assigned freeboard. Failure to do so may lead to prosecution and possible refusal by the local authorities to grant clearance for the vessel to sail.

11.3.3 Stability
The cargo plan must always satisfy SOLAS and IMO rules pertaining to stability. Master and chief officer should be aware of the worst case damage condition for the existing cargo onboard. Vessel shall have prompt access to computerised shore based damage stability and residual structural strength calculation programme (eg sers, DNV-GL-ERS)
A sailing condition should be approved if filling of each cargo and ballast tank lies within 1% of the weight of the approved condition. And GMF lies within 2cm of the approved condition GMF. Vessel should comply with damage stability requirement and calculation/printouts of stability instruments should be retained on board for minimum 3 years.

11.3.4 Draft Restrictions

Some ports and canals have draft restrictions which must be strictly adhered to. The controlling factor in this case is the maximum draft regardless of whether it is located fore-, aft-, or mid-ships. This deepest draft must never exceed the local restrictions. Every effort should be made for the vessel to depart or arrive at a "restricted draft" port or canal without list, on even keel, and without hull deformation. This is the only way for the vessel to lift the maximum cargo under the circumstances.

11.3.5 Density of Sea Water

Masters are requested to ensure that the density of the water is measured by taking a sample at least three times:

a) Before commencing loading
b) Before completion of loading in order to determine the exact draft at which to stop loading
c) At the completion of loading

Failure to do so may cause the vessel to be overloaded or underloaded. When the vessel is to proceed to a draft restricted port or canal, the density of the water of the port or canal must be considered before determining the cargo your vessel is to lift.

11.3.6 Cargo Plan should take into account the prevailing Environmental conditions and any proximity of berth from the traffic movements. Mooring configuration for the vessel should be confirmed from the terminal/Pilot. Mooring lines to be attended and monitored throughout port operations. Sufficient crew should be on duty to handle any anticipated conditions.

11.3.7 : COMMUNICATION EQUIPMENTS AND PROCEDURES

Telephone and Portable VHF/UHF and radio telephone systems should comply with the approved safety requirements. Communication between the responsible officer and the terminal representative should be maintained in the most efficient way. The selected system of communication, together with the necessary information on telephone number and / or channels to be used, should be recorder in Ship shore exchange form 11.1. A reliable communication system should be maintained with agreed in writing, Before Loading and Discharging commences, The system should be tested. Secondary system should also be established and agreed. Allowance should be made for time required for action in response and signal. Signal should be agreed for:

- Identification of ship, berth and cargo,
- Standby, Start loading or Discharging
- Slow down,
- Stop loading or stop discharging and Emergency Stop.

While different product and grades are handled, their name and description should be clearly understood. Use of VHF/UHF channel by more than 1 ship/shore combination should be avoided.

While difficulty in verbal communication can be overcome by Appointing a person with
adequate technical and operational knowledge, with sufficient command of English language.

11.3.8 : CARGO LOG BOOK

Vessel should maintain record of all activities during cargo operation or while vessel at berth, this should include details of all major activities and events including starting and stopping of main cargo and ballast pumps, tanks being worked, opening and closing of valves, any changes of tanks while loading, critical operations, starting and stopping of crude oil washing, notice of rate changes, initial start up time with initial tanks and lines used, Sequence of Topping off and stripping of tanks, use and start/stop of eductors and any deviation from the original plan. This list is not exhaustive, all timings which ascertain the effect on operation should be recorded without any doubts.
11.4 LOADING/DISCHARGING OF TANKERS

11.4.1 General
When transferring oil in port, Company vessels must comply strictly with Company instructions, with the Port state and Flag state regulations and the terminal requirements.

   a) Adequate and well trained crews
   b) Proper securing of the vessel to the terminal
   c) Operation in accord with check-off lists
   d) Specific fuelling and ballast handling procedures
   e) Continuous inspections of cargo hoses, pipeline systems, tanks, equipment and the water around the vessel
   f) Instructions for emergencies or potential hazardous situations
   g) The establishment of lines of authority and responsibility

11.4.2 Pre Cargo Conference
A full discussion before operations start between the personnel in charge of the vessel and the men in charge of the terminal must be held in order that each will fully understand the obligations and duties of the other. The operations usually agreed upon during a pre-cargo conference are:

- Cargo Sequence
- Standby time
- Signals and Communications
- Emergency Procedures

Form 11.2 must be filled during the pre cargo transfer. Emergency procedures for evacuation in port and break away from jetty should be agreed upon and form 7.35 and 7.33 should be used in cases of emergencies.

11.4.3 Oil Spillage

In the event of a spill involving a vessel in any way, prompt notification must be made to the DPA, port/terminal/harbour authorities, P & I representative and in USA the coast guard, National Response center and qualified individual of the casualty. All of this can normally be most expeditiously accomplished through vessel's agent in the port. The Master should refer to the FSMHK Emergency Response Plan, which has been provided to each ship.

Masters and those others concerned are cautioned to refrain from employing chemical dispersants until such time as approval for their use has been received from the local environmental control agency.

The Federal Water Pollution Control Act as amended requires the "person in charge" of a vessel to immediately notify the appropriate federal agency of the discharge of oil or any hazardous substance from the vessel into surrounding water. Failure to comply with this requirement is, upon conviction, punishable by a personal fine or imprisonment for not more than one year, or both.

Accordingly, in the event of a discharge of oil or hazardous substance into or upon the navigable waters of the United States and adjoining shorelines, or into or upon the waters of the contiguous zone, notice thereof should be given as soon as possible by the most expeditiously means available to the appropriate federal agency, i.e., the Coast Guard. A careful and accurate record should be made of the name of the person notifying the Coast Guard; the fact that he is doing so on behalf of the ship owner and Master; the Date and time of the notification; and, the name and title of the federal official to whom the notice was given.
Where appropriate, an accurate entry may be made in the vessel's deck log.

The U.S. Coast Guard has established the following procedure for reporting a discharge:

Any person in charge of a vessel or an onshore or offshore facility shall, as soon as he has knowledge of any vessel or facility in violation of section 311 (b) (3) of the Act, immediately notify by telephone, radio telecommunications, or a similar means of rapid communication, to the following person:

Duty Officer, National Response Center
U.S. Coast Guard
400 Seventh Street S.W.
Washington, D.C. 20590
Telephone No. 800-424-8802 (toll free)

The local Coast Guard office should also be notified.

11.4.4 Discharge Pressure Restrictions
Frequently, discharging terminals restrict the discharging pressure at the manifold to certain stipulated values. Usually such restrictions are given verbally. To avoid future disputes with Charterers you are requested to immediately prepare in duplicate the appropriate statement, have both the original and the copy signed by the terminal representative who ordered you to restrict backpressure. Whenever your vessel's discharging rate has been restricted, include detailed information concerning such restrictions in your departure message. Form 10.3 must be filled for each delay caused.

11.4.5 Cargo Samples
On product carriers samples should be taken from every cargo loaded. Samples should taken as follows:

a) From the shore line
b) From the manifold, when loading starts

c) From the tank (either singly or a composite) when one foot of cargo has been loaded
d) From the tank (either singly or a composite) when loading is complete.

Samples are to be permanently sealed in appropriate containers and labelled with the following information:

a) Name of vessel
b) Type of cargo
c) Port of loading and discharge.
d) Tank number into which cargo was loaded.
e) Date sample taken, and name of person who took sample.

These samples are to be retained on board for a period of three months from the Date of discharge after which they may be properly discarded, either into the slop tanks aboard or to a shoreside facility.

11.4.6 Entrained Water
In the event that there is entrained water detected in cargo, FSMHK policy requires that Masters issue a Letter of Protest upon completion of loading for any water measured in cargo, reserving the right to extend the protest for additional in-transit water gain due to settling while en route to the discharge port.

This is particularly important on vessels carrying crude oils or petroleum products, which historically have been shown to carry entrained water. Additionally, on crude carriers, and on
product carriers where water has been detected in cargo on completion of loading, water cuts are to be taken and results reported to the FAREAST SHIPMANAGEMENT HONGKONG Office and to charterers 3 days after loading and one day prior to arrival. On voyages of more than 10 days duration, this report should be provided every 7 days.

In this way, responsibility for water in cargo can be properly documented, avoiding future claims against FSMHK or the charterers.

On ships fitted with engine room oily water separators, bilge slops are not to be transferred to cargo tanks, but are to be handled in accordance with the procedures provided in Section 13: ENVIRONMENT PROTECTION.

11.4.7 Level and Temperature Measurement

Level Measurement
Remote Cargo ullaging, pressure and temperature measuring equipment shall be verified for accuracy during every loading operation prior to topping off by comparing with an independent means such as UTI or Whessoe. A record of the comparison must be maintained and any deviation in excess of 1% must be corrected by re-calibration and recertified by an approved authority.
Remote Cargo ullaging, pressure and temperature measuring equipment shall be calibrated and certified by an approved authority in line with manufacturers instructions but at least every 2.5 years for LNG/LPG vessels and every 5 years for oil/chemical vessels.
Vapour locks for remote ullaging must be calibrated and certified by a RO.
Independent ullaging and temperature measuring equipment including MMC's, UTI's and Whessoes shall be calibrated and certified by an approved authority in line with manufacturer’s instructions but at least annually.
Oil/chemical ships shall maintain a minimum of 2 portable ullage, temperature, and Interface measurement instruments.

High-Level Alarms
Cargo High-Level alarms must always be the active mode when liquid is being transferred via loading /discharge operations or condensate return. High-level alarms may only be inhibited by the Chief Officer with the permission of the Master. If a high-level alarm fails then the Managing office is to be advised and risk mitigating measures instigated.
The high-level and shutdown systems must be tested at regular intervals not exceeding 3 month or before arrival at cargo port whichever is the shortest interval.
The inhibiting of high-level alarms and ESD systems must be clearly documented in the logbook. Person who is authorized to do this, must also be posted in the CCR.
11.5 TRANSFER PRECAUTIONS

11.5.1 Action in Doubt or Emergency
Transfer should immediately be stopped and, if necessary, the hose or loading arm disconnected until the condition has been corrected, if the Officer in Charge:

- Is in doubt as to whether the proper procedure is being followed
- Considers transfer to be dangerous

The Superintendent will always support a vessel officer who slows or stops transfer for reasons of safety.

11.5.2 Transfer Prohibited

11.5.2.1 General
Neither oil, dirty ballast, nor decanted ballast may be transferred, nor crude oil washing be done:

a) When a fire occurs on or near the vessel
b) During thunder and lightning storms.
c) When there is danger of a moving ship hitting the vessel.
d) When there is a heavy or dangerous vapor accumulation on deck.

11.5.2.2 Class A Products Only
No Class A products may be transferred when fixed or moving sources of ignition are within 100 feet (30 meters) of the vessel. Examples of such sources are:

a) Fires or engines on vessels such as towboats or piledrivers.
b) Vehicles such as automobiles or forklift trucks, unless fitted with an approved spark arrestor.
c) Open lights.
d) Hot work.

This rule need not be followed if both terminal representative and vessel Officer in Charge agree that there is no danger and all potential sources of vapor have been inspected and verified tight.

11.5.3 Valve Operation and Settings

11.5.3.1 Keeping Valves Closed
When not transferring oil or ballast, or venting lines or tanks, all cargo system valves must be closed, unless completely segregated.

11.5.3.2 Loading Through Drops
Cargo should be loaded, if possible, through drop lines and not through the pump room. If cargo must be loaded through the pump room, pump isolation valves must be kept closed and the pump room inspected at more frequent intervals.

11.5.3.3 Manifold Valve
When setting valves to transfer on or off the vessel, the manifold valve must be opened last - just before the transfer begins. If the transfer is stopped, even for a short while, the manifold valve must be closed.

11.5.3.4 Changing Tanks
When changing tanks, the valve for the next tank must be opened before closing the valve of the tank to be shut off.

11.5.3.5 "Walking Back" Fully Opened Valves
When a valve is opened fully, it should be "walked back" about one turn to prevent it from jamming open.

11.5.3.6 Stopping Transfer
Flow of oil into the vessel must be stopped by shore valves. Flow of oil or ballast out of the vessel must be stopped by vessel valves.

11.5.3.7 In cases of emergency cargo transfer/lightering form 7.24 must be complied with.

11.5.3.8 External doors, ports, and windows of accommodation space including air condition:

- All external doors, ports and similar opening should be closed when the vessel or other vessel adjacent to berth, is conducting any of the following operation:

- Handling volatile petroleum or non-volatile petroleum near to or above its flash point

- Loading non volatile petroleum into tanks containing hydrocarbon vapour.

- Crude oil washing
- Ballasting, purging, Gas Freeing or Tank washing after discharge of volatile petroleum.

If external doors have to be opened for access, they should be closed immediately after use, where practical a single door should be used for working access. Doors that must be kept closed should be clearly marked.

Allowance must be made to permit doors and openings to be opened if the vessel is storing provided there is no possibility of gas entering the accommodation and that the doors do not remain open longer than is necessary. For security concerns, measures doors may be locked in port to prevent unauthorized access while at the same time ensuring that there is a means of escape for personnel inside.

Engine room vents may be open. However, consideration should be given to closing them where such action would not adversely affect the safe operation of engine room spaces served.

Air conditioning intake must be set to ensure that atmospheric pressure inside the accommodation is always greater than that of the external atmosphere. Air conditioning system must not be set to 100 percent recirculation (other than emergency), as this will cause the pressure of the internal atmosphere to fall to less than that of the external atmosphere, due to extraction fans operating in sanitary spaces in galley.

Due consideration should be taken to ensure that pressure differential between that of the inside of the accommodation and that of the outside such that the pressure is not so great as to ensure self closing doors operates effectively and doors do not slam shut or open with the risk of increased injury.
11.6 FIRE PRECAUTIONS

11.6.1 Vapor Control

Vapor Control System
The inert gas system must be used at all times to provide masthead venting of vapors from cargo tanks when transferring oil, dirty ballast, or decanted ballast. Tank hatches and Butterworth plates must be tightly closed.

Doors and Ports
When Class A products are transferred, bulkhead doors, ports, and other openings into the accommodation must be closed.

Ventilating Equipment
When transferring oil or dirty ballast, ventilators must be trimmed to prevent vapors from entering quarters or machinery spaces.

Flame Arrestors in Cargo Vent System
Flame arrestor screens should be regularly inspected, changed, cleaned and repaired as necessary.

11.6.2 Ignition Sources

Smoking
Smoking is only permitted at times and places Approved by the Master.

Static Electricity
a) Synthetic Fibre Hand Lines
Under no circumstances may vessel or terminal personnel use synthetic fibre hand lines at the cargo tanks for taking samples, soundings, ullages, temperatures, etc. Under certain conditions static electricity can be generated by friction between synthetic fibre line and the operator’s hand to the tank top and ignite the oil vapors. Only properly bonded metal tapes or natural fibre line may be used for sampling or measuring oil or dirty ballast.

b) Bonding Wires
Some terminals require that bonding wires be connected between the vessel and the dock before hoses or loading arms are connected. The vessel officer in charge must ensure that this bonding wire is properly connected.

c) Static Electricity in Cargoes
Requirements for limiting cargo loading rates, and allowing a period for the dissipation of static charge are not required on vessels using an inert gas system.

Electrical Equipment
a) Appliances
The use of portable electric appliances (heaters, toasters, immersion heaters, televisions, radios, non-gas tight electric motors) is allowed only in the accommodation block.

b) Temporary Lights
Only approved intrinsically safe flashlights to be used in transfer operations.
c) Radio Transmission
Radiotelegraph and radiotelephone transmission (with the exceptions of VHF/UHF) is prohibited during oil or dirty ballast handling.
c) Mobile phones, pagers, digital cameras, electronic tablets (I Pads, Android etc) and The use of smart watches/ Fitness bands is prohibited out side enclosed accommodation spaces and in gas hazardous area.

11.6.3 Fire Fighting Gear

11.6.3.1 Fire Hoses
During oil transfer through the manifold, fire hoses with nozzles attached must be connected to fire hydrants at suitable locations on the vessel and led out ready for immediate use.

11.6.3.2 Foam Gear
During oil transfer through the manifold, portable foam equipment must be ready for use at the manifold when the hose or loading arm is connected. The nozzle must be connected to a fire hose, with an emergency supply of liquid foam near at hand.

11.6.3.3 Fire Wires
When the vessel is alongside a dock, wire pennants must be hung from the offshore bow and stern of the vessel so that a line can be quickly made fast and the vessel towed away in case of an emergency. Wire must be tended to ensure that the outboard eye will always be close to the surface of the water. The fire wire shall be secured as per International Safety Guide for Oil Tankers and Terminals.
   - Minimum 5 turns on the bitts.
   - No slack on deck.
   - Eye of fire wire just above the surface of Water.

11.6.4 Warnings

11.6.4.1 Red Warning Signal
The following signal must be shown any time oil is transferred:
   - At a dock - a red flag must be shown by day, and a red light by night.
   - At anchor - a red flag must be shown by day. There is no night signal.

Additionally as per local regulations

11.6.4.2 Gangway Warning
Any time oil is transferred, the following warning sign must be posted at the gangway:

**WARNING**

NO OPEN LIGHTS
NO SMOKING
NO VISITORS
MOBILE PHONES AND OTHER ELECTRONIC EQUIPMENTS MUST BE SWITCHED OFF
VISITORS ARE REQUIRED TO SHOW IDENTIFICATION
LIGHTERS AND MATCHES ARE PROHIBITED TO BE CARRIED ON BOARD

11.6.4.3 Radio Transmission Warning
Any time oil is transferred, the following warning sign must be posted in the radio room:
WARNING
DO NOT ENERGIZE RADIO EQUIPMENT
DURING CARGO TRANSFER
11.7 OIL SPILL PRECAUTIONS

11.7.1 Hose and Loading Arms

11.7.1.1 Hose Failure

If, during transfer, any hose bulges, kinks, or seeps, the transfer must immediately be stopped, and the hose replaced.

11.7.1.2 Connections

A vessel officer must supervise any connecting or disconnecting of cargo hoses and loading arms. This officer must ensure that:

1. The hose or loading arm is in good condition and long enough to allow for vessel movement due to tide and changes in draft or trim.
2. Hose is suspended with saddles or straps so that the bend radius is never less than 12 times the hose diameter.
3. Falls or gantlines which support the hose are made fast to a bitt or cleat, never a gypsy head.
4. All bolt holes are used for flanged connections. Only one gasket may be used for each connection and the gasket should be renewed each time the connection is made.

11.7.1.3 Cleaning Hoses or Loading Arms

Water should be used to displace products in cargo hoses or loading arms whenever possible. For cargo hoses belonging to the vessel the hoses must be gas freed before stowing. If necessary, air may be used to clean hoses or loading arms containing crude oil, fuel oil or ballast.

Air must not be used to clean hoses or loading arms containing refined or semi-refined products. Allow them to drain naturally or purge with nitrogen.

11.7.1.4 Sea Valve Lashing or Sealing

Any time oil or dirty ballast is transferred, all sea, bilge and overboard valves, which are connected to the cargo system, must be tightly lashed or sealed. Any time these lashings or seals are made or broken, or the valves inspected a signed entry must be made in the deck log.

11.7.1.5 Oil Spill Containment

All means shall be provided to keep deck spill away from accommodation and service area. This may be accomplished by mean of a permanent continuous coaming of a height of at least 300 mm, extending from side to side. Usually vessel are fitted with Coamings of stated height. In case coaming height in not 300mm, a suitable plate of same thickness to be welded at early opportunity with safety consideration. Secondary purpose of this coaming is to provide oil retention at the after end of main deck in the event of oil spill, giving the crew sufficient time to deal with it and avoid oil entering the water.

Whenever oil or dirty ballast is transferred:

- Scupper plugs must be in place. Plugs may be removed when water is sprayed on deck for cooling, or when rainwater must be drained, but they must be replaced.
- Oil spill containment equipment required by the U.S. Coast Guard or other government pollution prevention regulations must be serviceable and ready for...
use. Spill pumps or dumping arrangement to a cargo tank or other effective means should be readily available.
- If cargo tank or slop tank is not a viable option, an alternate enclosed container with a capacity of at least 2-3 cu.m should be available for the disposal of spill and oily water from deck.
- While using Dump valve ascertain whether opening the valve will actually result in the disposal of spilled oil to the tank.
- It should be recognised that if the vessel is sagged a spill will accumulate amidship and if trimmed by head then it will accumulate forward. The positioning of spill equipment and disposal equipment must take these condition into account.

11.7.1.6 Cargo Leakage into a Permanent Ballast Tank
Cargo Leakage into a Permanent Ballast Tank presents special problems due to the Inert Gas System not covering these spaces.

The following procedure should be followed:

1. Stop all deck work and isolate the affected area.
2. Put fire equipment on standby.
3. Adjust the vessel's course and speed to ensure a crosswind over the deck to provide best dispersal of escaping gas.
4. Instruct the officers and crew thoroughly as to the job to be performed. Emphasize safety and the necessity of avoiding any form of spark generation in the area. Keep non-essential personnel off deck. Limit personnel to those individuals essential to the specific work in hand.
5. Advise the FAREAST SHIPMANAGEMENT HONGKONG Office by SATCOM telephone or most efficient means, the details of the situation. Be prepared to discuss methods by which the leakage may be stopped by redistribution of the cargo, etc.

11.7.1.7 In cases of release of toxic liquid at sea or at terminal form 7.27 must be complied with.
11.8 CARGO LOADING

11.8.1 Tank Inspection
The Chief Mate will accompany the tank inspector to ensure agreement that tanks are empty and fit to receive the grade of cargo to be shipped. If tank lines and pump drains have to be opened to prove dry, the tank dry certificate should be so endorsed. In inerted vessels the certificate should be endorsed "Inerted" unless dipping of the tanks is carried out. See also Section 11.1.14.

11.8.2 Connection of Hoses
Although most installations carry out this operation, the vessel must have crew members ready to assist and to drive winches etc. At many small terminals and at most SBM's it is required for the vessel's crew to connect the hoses. Reducing pieces, joints, nuts and bolts must be kept available on board for use if so required.

11.8.3 Stowage of Cargo
In arranging the stowage, consideration must be given to the separation of different grades and to the stress condition, trim and draft at all stages of the voyage. The arrangement should allow as flexible a discharging program as possible. Weights must be distributed over the length of the vessel so as to avoid unacceptable bending moments or sheering stresses and to give the required draft and trim. Large deviations from the Builder's Trim and Stability data should not be practiced. In vessels with a loading computer: before loading, the stress and trim must be calculated and shown to be acceptable for the whole voyage. Particular attention must be paid to limiting drafts and, where these apply, vessel should if possible, be trimmed to an even keel. When cargo alone is insufficient to achieve satisfactory stress, trim or draft, or if it's distribution cannot be satisfactorily arranged, ballast should be shipped. The FSMHK Office should be consulted before ballasting any cargo tanks to achieve Charterer's loading/discharge instructions and other alternatives should be explored first.

In achieving suitable trim or stresses during a voyage, the transfer of cargo from tank to tank should be avoided and only carried out with Charterer's agreement and after consulting the Office. When such an on board transfer is carried out, the safety precautions for loading/discharging must be enforced and great care taken to avoid accidental spillage.

The remote ullage reading of each tank must be compared with an independent means such as UTI or MMC prior to topping off. A record of this check must be maintained.

11.8.4 Failure of Loading Computer
Should the loading computer fail to operate, only loadings in agreement with the Builder's Trim and Stability data can be undertaken. FAREAST SHIPMANAGEMENT HONGKONG Office must be informed and the loading computer repaired as soon as practical.

11.8.5 Loading Rates
These should always be decided at the pre-transfer conference with terminal representatives based upon the vessel type, pipeline diameters, number of grades being handled and specific grades being handled. The vessel should always request the maximum rate it can safely handle and issue a protest letter of this rate is not supplied. Maximum loading rate and venting capacity must be displayed in CCR

11.8.6 Cargo Loading Documentation
If cargo nomination is different from charterers' and/or owner's loading instructions, tender
Note of Protest and advise immediately.
Inspect all cargo tanks before loading commences and obtain a Dry Certificate, or other form of certification of inspection and suitability for loading, from a cargo surveyor and/or terminal representative. This certification should also indicate the amount of slops in slop tank, if any. If the terminal does not issue a Dry Certificate, note this on your certificate and have this signed by two officers.

Upon berthing, advise the terminal and agents in writing of the loading sequence and required loading rate. If the actual loading rate is less than that requested, tender a Note of Protest and note this rate discrepancy on the Time Sheet.

On a non-SBT vessel, commence loading only after completion of ballasting, in order to avoid the risk of pollution and contamination, unless simultaneous loading and ballasting is required for safety reasons, or by port regulations. Make the proper notation on the Time Sheet. If cargo requires heating per voyage instructions, and loading temperature is lower than that stated in the loading instructions, advise FSMHK, charterers and supplier. Tender Letter of Protest to charterers and suppliers holding them responsible for possible time lost in loading and discharge, and for additional fuel required for heating.

Ullages, temperatures and quantities upon completion of loading should be confirmed by terminal representative and/or surveyor. Also, check for the presence of entrained water in cargo tanks, and tender a protest if any water is found.

In the event that the quantities loaded are less than charterers and/or owners instructions, protest immediately to suppliers and/or charterers representative and, if practical, request to complete cargo.

Upon completion of loading, if ship's figures for each grade are less than those in the Bill of Lading, tender a Note of Protest. If ship's figures are more than 0.1% less than those in the Bill of Lading, insist that an independent surveyor inspect and confirm the quantities on board. If this is impractical, the Master and chief Mate should check the quantities on board and tender a Letter of Protest, indicating that actual quantities will be verified on arrival at the discharge port.

If an Early Departure Procedure (EDP) is used, and differences in quantities are observed, cable a Note of Protest to the agent and suppliers, and advise FSMHK at once. If more than one document is prepared on one or more of the above, it is important that these documents are consistent and do not contradict one another.

Signed cargo documents (Time Sheet, NOR, Dry Certificate, Letter(s) of Protest, etc.) should be mailed to FSMHK office from the load port, or at the first opportunity.

Before loading check list (form 11.3), During loading checklist (form 11.4), After loading checklist (form 11.5) must be completed for all loading operations.

Upon completion of all port operations form 11.9 must be filled.

Additionally form 11.10 should be completed for each unusual port.
11.9 CARGO DISCHARGING

11.9.1 Tank Inspection
(See Section 11.1.14)

11.9.2 Discharging Sequence
The sequence of discharge will be agreed with the Installation Supervisor and will depend upon shore requirements, and ship capabilities, bearing in mind trim and stress throughout the discharge, pump availability etc.

11.9.3 Pressure Limits
When discharge pressure limitations are imposed, on no account should the discharge pressure exceed the maximum stated by the shore, otherwise bursting of the hoses may result. A protest should be issued when ever the shore restricts the discharge rate of the vessel.

11.9.4 Emergency Stops
All Deck Officers must be fully conversant with the procedures for stopping cargo pumps in an emergency.

11.9.5 Cargo Discharge Documentation
Advise terminal as to your discharge sequence and rate based on cargo pumps actual capacity and minimum pressure at manifold of 100 psi. Also advise terminal if the vessel is able to discharge simultaneously, if carrying more than one grade. If the terminal insists on discharge sequence that is not according to your request and/or vessel capabilities, tender Note of Protest. Ship’s ullages, temperatures and quantities should be inspected and confirmed by a terminal representative or a surveyor.
Use all cargo pumps at full discharge capacity unless restrictions by shore or distribution of cargo make this impractical.
If cargo requires heating, ensure that the proper temperature is maintained during discharge, and make the proper entry in all documents.
If discharge rate and/or pressure at manifold and/or number of pumps being used is restricted by the terminal, tender a Letter of Protest and make the appropriate notation on the Time Sheet. Also tender a Letter of Protest and enter on Time Sheet any shore stoppages and/or shore instructions for slow pumping.
Maintain a pumping log with entries every hour, indicating pumps being used, RPM and pressure at manifold. Indicate in this log all reasons for under-performance due to shore instructions. Copies of this log should be mailed to FSMHK office.
If practical and in accordance with Charter Party, Crude Oil Wash (COW) cargo tanks during discharge. Record such activities on the Time Sheet or on a separate statement, including the commencement and completion time for COW.

Upon completion of discharge for each grade, obtain Dry Certificate for all tanks. Each Dry Certificate should be signed by the terminal representative or a surveyor, and contain the notation "UNPUMPABLE RESIDUES, NOT REACHABLE BY CARGO PUMPS.
If there is a dispute regarding ROB, dipping should be done in at least three locations within the tanks: one forward and two aft. Stripping pumps should be re-started to demonstrate that ROB are unpumpable, with protest noting time and expense for charterers or terminal account. Cargo hoses should not be disconnected until agreement on ROB has been reached, and declared to be unpumpable. The reasons for this unpumpable ROB, e.g., cold ambient temperatures, failure of pump suction, should be recorded.

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If in doubt, vessels on voyage charter should use independent surveyor to determine the quantities on arrival, and also ROB upon completion of discharge, for each grade.

If ship quantities at discharge port, when compared to ship quantities at load port, show a loss of more than 0.4%, an independent surveyor should be used to confirm quantities.

On non-SBT tankers, do not ballast cargo tanks before completing all discharge operations. If discharge and ballasting of cargo tanks are done simultaneously, obtain the terminal's permission or instructions and document the reason. If instructed by terminal to stop discharging for ballasting purposes, record this on the Time Sheet.

Whenever you are presented with a Letter of Protest, make the proper remark on the document before signing, or sign for receiving only and prepare a separate statement regarding the matter.

Have terminal representative or surveyor sign and legibly print his full name on each document (e.g., Dry Certificate, Time Sheet) for future reference in case of dispute.

In the event that more than one document is being prepared that relates to the same subject, make sure that the documents make the same statements and do not contradict one another.

Mail to the FAREAST SHIPMANAGEMENT HONGKONG Office from discharge port or at first opportunity all signed cargo documents (Time Sheet, NOR, Dry Certificate, Letter(s) of Protest, Pumping Log, etc.)

Before discharging check list (form 11.6), During discharging checklist (form 11.7), After discharging checklist (form 11.8) must be completed for all loading operations.

Upon completion of all port operations form 11.9 must be filled.

Additionally form 11.10 should be completed for each unusual port.
11.10 CARGOES WITH SPECIAL REQUIREMENTS

11.10.1 Cargoes Requiring Heating

11.10.1.1 General
Heating of viscous cargoes such as heavy fuels is necessary in order to facilitate pumping and draining. If such cargoes are properly heated and discharged efficiently, the amount of cargo left in the ship should not exceed the normally accepted amount.

Heating of these grades reduces the delivery pressure on the ship's pumps and facilitates stripping and subsequent cleaning of the tanks. Some crude oils also require heating in order to keep wax and solids dissolved or suspended.

11.10.1.2 Heating Instructions - Compliance with Charter Party
Heating instructions are issued by the Charterers to the Master usually before arrival at the loading port. Masters must ensure that clear and concise instructions as to the temperatures to which the cargo is to be heated are received in writing before the vessel's departure from the loading port. If they are not received at the latest at the time of departure from the loading port terminal, the Master should request them by radio and advise FAREAST SHIPMANAGEMENT HONGKONG Office accordingly.

The Charterers may request:

a) The cargo to be heated throughout the voyage to a certain temperature.
b) The vessel to arrive at the discharging port with a certain temperature and maintain it throughout discharging.
c) The cargo to be heated throughout the voyage to a certain temperature which should be increased to a higher temperature before arrival.

Underheating as well as overheating may result in serious consequences and claims from the Charterers or receivers. It is extremely important that the cargo should arrive at the discharge port having the correct temperature. If for any reason the Master finds that during the voyage he is unable to comply with the Charterers heating instructions, he must immediately inform the company by radio giving full details of the cause of the failure to heat the cargo correctly. A careful log of the fuel used to heat cargo must be maintained and the Master and Chief Engineer should be familiar with the allowances for heating consumption in the Charter Party.

11.10.1.3 Preparation for Heating
Prior to loading cargoes requiring heating, the Master must ensure that:

1. The Chief Engineer is duly advised as to the Charterer's heating requirements.
2. The boilers/evaporators are in good working condition.
3. Fuel/distilled water are sufficient for the additional consumption due to the heating requirements.
4. The heating coils are tested for leaks and, time permitting, leaks are repaired.
5. The steam traps are functioning properly and there are sufficient spares on board.
6. The control valves and steam lines on deck are in good working condition.
7. Main cargo and stripping pumps are in good working condition and the filters of all pumps are clean.
11.10.1.4 Loading
Under no circumstances should cargoes having temperatures higher than 160° F be accepted on board unless specific instructions to the contrary are received for the Charterers and confirmed by this office. The temperature of the incoming cargo should be checked periodically as too high a temperature may cause undue strain on the ship's structure. Masters of vessels with tanks coated with epoxy or fitted with dresser couplings must be reminded that 150° F is the maximum permissible temperature that the coating or coupling rubber seals will tolerate. Temperatures above this may damage the coating and/or rubber seals.

11.10.1.5 Application of Heating
The heating requirements for a cargo depend upon the characteristics of the cargo, such as the pour point and viscosity. The extent to which the coils will have to be used to heat the cargo to its required temperature will vary according to climate conditions, Charterer's requirements, and duration of the voyage. At times heating should start at, or right after loading; at other times shortly before arrival. When steam is first applied, it should be admitted gradually to avoid damage to the coils by water hammer and rapid expansion. The heating of the cargo requires close cooperation between the Deck and Engine Departments. The objective should be to attain the requisite temperature with the minimum expenditure of fuel. The following procedure should be adopted when heating is commenced:

1. All exhaust drain valves of the heating coils should be fully open and steam be supplied to the main heating coil system line at about 35 psi.
2. The steam control valves for the first set of tanks should be opened. Traces of oil observed in the condensate water flowing from the drains indicate that a heating coil leaks, therefore, the steam control valve of that coil should be shut and the valve lashed with a wire to prevent opening by error. If no traces of oil are observed, then the exhaust control valve should be fully opened and the drain valve closed. This procedure should be followed for the next set of tanks, and so on.

The drain valves of the heating coils should be checked at least twice daily for traces of oil. If traces of oil are found, the defective coils should be isolated at once. Under no circumstances should a coil suspected of leaks be used.

3. It is the duty of the Chief Mate to take temperatures from each tank daily. The temperature of each tank should be recorded as well as the degree of steam valve opening. Copy of this record should be handed to the Chief engineer. The steam valves of individual tanks are adjusted as required based on temperature readings. The steam valves of the wing tanks are usually opened more than those of the center tanks. The steam valves of the forward tanks are opened more than the steam valves of the aft tanks to compensate for the reduced pressure of steam.

4. It is the duty of the Chief Engineer to determine the pressure that he should maintain in the steam line to meet the cargo temperature requirements.

11.10.1.6 Discharging Operation
The measurement of heated cargoes requires attention as the temperature in the various tanks may vary considerably. To avoid discrepancies of the arrival cargo quantity figures, temperatures must be taken from each tank and the cargo quantity for each tank must be separately calculated. In order to take accurate temperatures, the thermometer should be lowered to a point midway between the bottom and top surface of the product. A mistake in the temperature reading cannot be corrected after the product has been discharged. The steam supply should be reduced as the cargo is discharged from a tank. Particular attention
must be paid when heating crudes. If the temperature is permitted to rise excessively the
cargo pump will gas up and lose suction. This is dangerous and can be avoided by controlling
the steam supply to the heating coils in due time.
It is imperative that each tank is stripped right after the main cargo line valve is shut. Under
no circumstances should the stripping be postponed. When the level of the cargo falls below
the heating coils its temperature falls rapidly and if not stripped at once, it might solidify.
If a heated cargo is discharged in very cold weather and the discharge is temporarily stopped,
every effort should be made to drain all cargo lines and main pumps by stripping them dry into
a tank containing oil. This must be carried out immediately after the main pumps are stopped
in order to prevent oil solidifying in the exposed pipelines on deck and in the pumproom. If
after the level of cargo in a tank has fallen below the heating coils a fairly lengthy stop occurs,
the level should be raised by gravitating cargo from another tank. Pumping should
recommence only after the temperature has been raised to the permissible maximum.
Overheating on such occasions may easily occur, therefore, frequently check the
temperature.

It is convenient and practical for vessels carrying cargoes requiring heating to make a
discharge plan in such a way that the main lines in use are always covered with heated cargo,
thus a vessel with all lines in center tanks should discharge and strip dry the wing tanks first
and then the center tanks.

11.10.2 High Vapor Pressure Cargoes
Some vessels encounter difficulties in discharging oil cargoes with high vapor pressure due to
"vapor lock" of the cargo pumps. The pumps become vapor bound as the result of cavitation
and the natural gassing of the liquid.

11.10.2.1 Vapor Pressure Definition
Mates should be aware of the nature of the loaded crude oil or product, especially its API, Reid Vapor Pressure (RVP) and flash point. The flash point is important because generally petroleum products with a low flash point produce the largest amount of gas. The RVP test is
a method of comparing the ability of various petroleum products to give off vapor under
standard conditions. The pressure is usually expressed as millimeters of mercury, pounds per
square inch (psi) or atmospheres. Pounds per square inch is generally used. There are three
types of products:

a) H.V. when RVP is 14 psi or more.
b) I.V. when RVP is over 8.5 psi but less than 14 psi.
c) L.V. when RVP is 8.5 psi or less.

11.10.2.2 USCG Classification
The United States Coast Guard, Department of Transportation has classified oil cargoes into
two major categories, flammable liquids and combustible liquids. These two types have been
further expanded into five grades.

1. Flammable Liquids.
Any liquid which gives off flammable vapors (as determined by flashpoint from
an open-cup tester, as used for test of burning oils) at or below a temperature
of 80°F. Flammable liquids are referred to by grades as follows:

    Grade "A" Any flammable liquid having a RVP of 14 psi or more.
Grade "B" Any flammable liquid having a RVP under 14 psi and over 8.5 psi.

Grade "C" Any flammable liquid having a RVP of 8.5 psi or less and a flashpoint of 80°F or below.

2. Combustible Liquid
   Any liquid having a flashpoint above 80°F (as determined from an open-cup tester, as used for test of burning oils). Combustible liquids are referred to by grades as follows:

   Grade "D" Any combustible liquid having a flashpoint below 150°F and above 80°F.

   Grade "E" Any combustible liquid having a flashpoint of 150°F or above.

11.10.2.3 Discharging
When discharging crudes or products with high RVP, cargo pumps become vapor bound more readily, particularly if the pump revolutions are not adjusted properly in relation to the discharge pressure. In order to avoid this the following discharge procedures are suggested.

1. Separate all cargo pump suction and if possible discharge lines so that each main cargo pump can operate independently from a single cargo tank section.
2. Start the cargo pumps slowly and gradually increase the r.p.m. until the maximum discharge pressure is reached, then decrease the pump speed by approximately 50 r.p.m.
3. Discharge from a single tank or from a pair of wing tanks in each cargo tank section.
4. Strip each tank individually and avoid priming pumps with product from remote tanks.
5. The pump r.p.m. should be gradually reduced as tank ullages increase and pump performance falls off. Remember however, if pump speed is reduced too much the pump may become ineffective.

Pump speed reduction and/or throttling of a discharge valve should be done before the pump starts to lose suction. Since this point is difficult to determine, the first reduction of flow rate should be made when the tank is about 1/3 full, then further reductions can be made as the level is lowered. The discharge of high vapor pressure crudes will be facilitated if:

- Pumps are well controlled and carefully watched.
- Tank ullages are carefully watched.

11.10.2.4 Protests for High RVP Cargoes
The Master should present a note of protest any time the high RVP of the cargo is responsible for pumping performance under charter party warranties.

11.10.3 Static Generating Cargoes

11.10.3.1 General
Refined and semi-refined products have static generating and accumulating characteristics. As such a product moves through a pipe, it leaves a static charge on the pipe and picks up the
opposite charge itself. It also picks up a static charge when it is sprayed or splashed against a metal surface, such as when cargo first enters a tank.

The rate of charge generation increases with the rate of flow agitation in the tank and the amount of entrained water.

A charged product could be a source of ignition if:

- A static charge was generated.
- Enough static charge was accumulated to cause an incendiary spark.
- A means of discharging the spark existed.
- An ignitable air-vapor mixture was present.

By reducing the initial and maximum loading rates, the accumulated static charge is kept too small to cause an incendiary spark. By rigorously excluding objects from the tank, and by delaying sampling, ullaging and dipping by metallic equipment for at least 30 min after loading, thieving, etc. until after the static charge is dissipated, the spark gap is eliminated. UTI Tapes must be bonded before being introduced into tanks. UTI Tapes which have quick coupling to connect the unit to vapor lock will possibly not require bonding wires provided their continuity have been checked prior operation.

To control the source of ignition during washing in non inerted tanks, equipment made entirely of non-metallic materials may, in general, be used, for example a wooden sounding rod may be suspended on a natural fibre rope without earthing. Bonding wires should be incorporated with in all portable tank washing hoses to ensure electrical continuity. Coupling should be connected to the hose in such a way that effective bonding is ensured between them.

On vessels equipped with an inert system an ignitable air-vapor mixture is eliminated by reducing the oxygen concentration.

11.10.3.2 Precautions

a) Planning

At the pre-transfer conference, the officer in charge should determine the static generation precautions necessary giving consideration to Volatility Rating, Flash Point and Reid Vapor Pressure, loading rates based upon pipeline diameters and lengths and any restrictions in pipe line diameter.

b) Rate Restrictions

Advise terminal representatives of any flow rate restrictions and make appropriate log book entries to the effect that the rate was reduced for “cushioning” the product, i.e. safety reasons.

c) Relaxation Time

Relaxation time is the time necessary to dissipate a static charge. This is about 30 minutes in a cargo tank.

d) Inerted Vessels

Vessels fitted with inert gas systems are not required to abide by these precautions provided that all cargo tanks are maintained in an inert condition throughout the entire loading. In this context an inert condition is defined as \( O_2 \) content below 5%.

11.10.4 \( H_2S \) Bearing (Sour) Cargoes
11.10.4.1 General

a) Characteristics

Hydrogen sulphide (H$_2$S) is a highly poisonous gas. It is colorless, initially has a strong odor of rotten eggs and is heavier than air. H$_2$S is soluble in both fresh and salt water, so butterworth helps to remove the gas.

b) Effects

H$_2$S has three main effects on human beings:

- It paralyses the sense of smell. Breathing H$_2$S will cause its characteristic odor to seem to disappear.

- It destroys the ability to reason. A gassed crew member may have the strength to crawl out to a compartment, but be unable to direct his mind to take the correct action.

- It can cause rapid unconsciousness. One breath can be enough.

The effects increase with concentration, as shown below:

<table>
<thead>
<tr>
<th>Amount of H$_2$S in Air (ppm):</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1 – 0.5 ppm</td>
<td>First detectable by smell</td>
</tr>
<tr>
<td>10 ppm</td>
<td>May cause some nausea, minimal eye irritation</td>
</tr>
<tr>
<td>25 ppm</td>
<td>Eye and respiratory tract irritation. Strong odour.</td>
</tr>
<tr>
<td>50 – 100 ppm</td>
<td>Sense of smell starts to break down. Prolonged exposure to concentrations at 100 ppm induces a gradual increase in the severity of these symptoms and death may occur after 4-48 hours exposure.</td>
</tr>
<tr>
<td>150 ppm</td>
<td>Loss of sense of smell in 2 – 5 minutes.</td>
</tr>
<tr>
<td>350 ppm</td>
<td>Could be fatal after 30 minutes inhalation.</td>
</tr>
<tr>
<td>700 ppm</td>
<td>Rapidly induces unconsciousness (few minutes) and death. Causes seizures, loss of control of bowel and bladder. Breathing will stop and death will result if not rescued promptly.</td>
</tr>
<tr>
<td>700+ ppm</td>
<td>Immediately fatal.</td>
</tr>
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</table>

c) Measurement

The concentration of H$_2$S is expressed in two ways:

- The parts per million (ppm) in the liquid, by weight and
- The ppm in the air by volume.

11.10.4.2 Precautions

Although H$_2$S bearing cargoes present special hazards, they may be safely carried if the following precautions are taken:

a) Advance Planning

When orders to load a cargo of sour crude are received, the Master must ensure that the following actions are taken:

1. Vapor Control System

A complete survey must be made of the vapor control system to ensure all fittings and
equipment are tight and in good condition.

2. Breathing Apparatus
The self contained breathing unit must be checked to see that they are working properly and that air bottles are filled to capacity.

3. H₂S Detectors
The H₂S detector must be checked to ensure it is in good operating condition and that sufficient tubes are on hand.
4. Pipelines
All pumproom lines, pumps and fittings must be inspected for tightness. All leaks must be repaired before loading.

Cargo and Bunker fuels should not be treated as free of H2S or benzene until after they have been loaded and the absence of H2S has been confirmed by both the results of monitoring and the relevant MSDS information.

Just before loading the Master must alert all officers and crew to the toxic hazard of H2S.

b) During Cargo Handling

1. Cargo Isolation
The cargo must be loaded through drop lines. The pumproom must be kept isolated.

2. Vapor Control
The closed vapor control system must be used during loading so that the displaced gas is discharged away from deck areas. The Master must post a sign in the pumproom entrance saying:

SOUR CRUDE. DO NOT GO BELOW UNTIL TESTED FREE OF H2S.

3. H2S Testing
Testing for H2S must be carried out during cargo operations by a Deck Officer. Areas to be checked must include open decks, pumproom spaces, engine room spaces, forecastle head spaces, living accommodations and work or storage areas where crew members could come into contact with H2S as a result of deck or loading hose emissions. Crew members must not enter the pumproom without self contained breathing apparatus if any trace of H2S shows on the tester.

4. Personnel
Only personnel actively engaged in cargo handling may be permitted on open decks in the vicinity of operations.

5. Gauging
Normally it is not necessary to sample, thieve or hand gauge a sour cargo during loading. If for any reason this must be done, cargo handling must be stopped. Crew members doing this work must stand to windward and not breath the fumes. If it is necessary to look into the tank, then breathing apparatus must be worn.

Anyone doing this work must be attended by another crew member who is in a safe area. The attendant must be told that if anything goes wrong the first action must be to give an alarm.

6. During the Loaded Passage
When under way periodic checks for leaks and accumulations of H2S should be made of any compartment, which crew members might enter, that could contain H2S.

7. During the Ballast Passage.
If opening pumps or lines, they must be thoroughly washed. Frequent tests with the H2S detector should be made while the work is being done.

Automatic tape housings may be opened and work carried out on them from the deck without gas freeing, but the pressure vacuum relief valve should be open so that there will not be a
release of vapors from the tape housing. The air should be checked with the H\textsubscript{2}S tester to make sure that conditions are safe. The crew member doing this work should stand on the windward side and avoid breathing any fumes. The pumproom blower must be kept running continuously until ship is gas free.

11.10.4.3 Emergency Procedures
When carrying out procedures to effect a rescue or carry out first aid do not enter any area suspected of containing H\textsubscript{2}S without first putting on breathing apparatus.

11.10.4.4 Precautions for Entering Tanks After High H\textsubscript{2}S Cargoes
Tank entry on a vessel which has previously carried cargoes with high H\textsubscript{2}S content may present special hazards. The following additions to normal entry precautions should be followed:

1. All personnel entering a tank must carry Robert Shaw or equivalent five-minute escape packs.
2. Tests for H\textsubscript{2}S must be made and the tank atmosphere constantly monitored from the Deck level during period of tank entry.
3. Pipelines passing through inspected tanks must be flushed and filled with clean ballast water.
4. Adjacent and diagonally adjoining tanks should remain inerted and depressurized while personnel are in the tank.
5. All personnel involved in tank entry should be fully briefed in the hazards of H\textsubscript{2}S.

11.10.5 Aromatic Cargoes

11.10.5.1 General
Aromatic cargoes can produce harmful effect in the body when swallowed, absorbed through the skin, or when the vapors are inhaled. The danger of harmful effects varies according to the type of aromatic, its physical properties and the individual inherent sensitivity. Aromatic cargoes are generally clear colorless liquids, characterized by a distinct sweet odor. Prolonged exposure to their vapors may cause a temporary loss of the sense of smell.

Following are terms and their definitions as used in this Section.
PPM - Parts Per Million - The number of parts of the products per million parts of air.
TLV - Threshold Limit Value - The maximum amount of harmful product vapor concentration to which a person may be exposed, without adverse effects, over an 8 hour work day, for an indefinite number of days.

11.10.5.2 Precautions
1. Prior to loading or discharging please review relevant Material Safety Data Sheets and ensure:
   a) Packing and gaskets in the following fittings are in good condition and that the fittings are tight:
      - Ullage plugs
      - Tank tops
      - Valve deck stands
      - Tank cleaning opening plates
      - Tape wells and wiper glands
      - Pumproom cargo valves, blinds, etc.
b) There are no leaks in the closed vent system and the system is free of obstructions.
c) The cargo and stripping systems to be used are in good condition with no leaks at flange gaskets, packing glands or seals.

2. When concentrations above the TLV of the cargo are unavoidably encountered, breathing protection must be used.

3. Tanks previously containing aromatics must be tested with a combustible gas and oxygen indicator and a vapor indicator before anyone is allowed to enter.

4. Skin contact with aromatics must be prevented. Crew members handling lines and equipment containing such products shall wear neoprene gloves for protection. Clothing that becomes contaminated from spills or splashes should be removed immediately and cleaned before reusing. If the skin should come in contact with the product, the affected area must be washed promptly with soap and water.

5. Checks must be made regularly for aromatic and combustible vapors in locations where excessive concentrations are probable, such as the pumproom.

6. During discharge or when loading through the pumproom, the pumproom ventilation system shall be in continuous operation. Prior to entering the pumproom, the atmosphere shall be vapor tested and appropriate respiratory protection used.

11.10.5.3 Health Information

Aromatics cause irritation if they come in direct contact with the eyes. Prolonged or repeated contact with some aromatics may cause the skin to become dry or cracked due to the defatting action of the material. Some aromatics may cause minor skin irritation from prolonged or repeated contact.

Prolonged exposure to high vapor concentrations of aromatic products may cause signs or symptoms such as headache, dizziness, loss of appetite, weakness, loss of co-ordination, and a loss of consciousness. Afflicted persons usually recover completely when removed from the exposed area. Extreme exposure can result in death.

Chemical pneumonia may result if an aromatic liquid is swallowed and subsequently taken into the lungs.

Very long term exposure to Benzene may cause chronic damage to the blood and blood forming organs and may be fatal.

OSHA (Occupational Health & Safety Administration) now puts the TLV of Benzene at 0.6 ppm. All vessels should be equipped with DRAEGER or MSA-Sample air test equipment capable of measuring Benzene concentrations in the 0-20 ppm range.

11.10.5.4 First Aid Procedures

a) Eyes
Direct Contact - Flush eye immediately for at least 15 minutes with fresh water and get medical attention. If irritation is noticed, flush eye with fresh water. If irritation persists, get medical attention.

b) Skin
Wash affected area with soap and water and rinse thoroughly. If clothing is contaminated it should be removed immediately and washed before wearing again.

c) Inhalation
If there are signs or symptoms of overexposure, move the person to an uncontaminated area and if breathing has stopped, apply artificial respiration. Get medical attention as soon as possible.

d) Ingestion
All aromatic present an aspiration hazard. If swallowed, DO NOT INDUCE VOMITING, get medical help immediately.

11.10.6 Monitoring during carriage

Cargo temperatures must be checked and logged daily for all tanks while at sea if heating is required. Special attention must be paid to inhibited cargoes and other heat sensitive cargoes. Ships not equipped with remote temperature reading system should take manual readings only when weather and other circumstances permit.

The cargo tank venting system must be regularly checked and cargo tank pressure should be regularly monitored during loaded passage. All cargo tank ullage and interface should be checked and compared with previous reading to check for any difference. Any significant change in cargo tank condition should be immediately reported to the office.

Ballast tank atmosphere shall be checked daily on loaded passage for any ingress of cargo. Ballast tank sounding should be monitored and logged daily during sea passage.
### 11.11 CARGO SPECIFICATIONS

#### 11.11.1 Crude oil

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<tr>
<th>NAME</th>
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## Cargo Specifications

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<tr>
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<th>Usual Load Port</th>
<th>Country of Origin</th>
<th>Indicative Specifications</th>
<th>Temperature Requirements</th>
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<th>SHELL CODE NUMBER</th>
<th>USUAL LOAD PORT</th>
<th>COUNTRY OF ORIGIN</th>
<th>DENSITY 15 Deg C</th>
<th>RVP PSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIA JUANA PASEDO (TJP)</td>
<td>03115</td>
<td>PTO MIRANDA</td>
<td>VENEZUELA</td>
<td>0.987</td>
<td>-</td>
<td>-</td>
<td>0</td>
<td>1560</td>
<td>64</td>
</tr>
<tr>
<td>TIGRE (SEE LEONA)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>THISTLE</td>
<td>03415</td>
<td>SULLOM VOE</td>
<td>UK</td>
<td>0.837</td>
<td>5.8</td>
<td>-</td>
<td>9</td>
<td>3</td>
<td>19</td>
</tr>
<tr>
<td>TUYMASA</td>
<td>03420</td>
<td>NOVORROSISK</td>
<td>USSR</td>
<td>0.856</td>
<td>-</td>
<td>-</td>
<td>-6</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>JDANG</td>
<td>0373</td>
<td>-</td>
<td>INDONESIA</td>
<td>0.836</td>
<td>2.6</td>
<td>-</td>
<td>39</td>
<td>10</td>
<td>49</td>
</tr>
<tr>
<td>JMM SHAIF</td>
<td>03671</td>
<td>DAS ISLAND</td>
<td>ABU DHABI</td>
<td>0.84</td>
<td>6.0</td>
<td>20</td>
<td>-15</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>JRAL</td>
<td>03070</td>
<td>VENTSPILS</td>
<td>USSR</td>
<td>0.857</td>
<td>7.0</td>
<td>-</td>
<td>-9</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>WALIO</td>
<td>-</td>
<td>-</td>
<td>KASIM</td>
<td>INDONESIA</td>
<td>0.849</td>
<td>3.1</td>
<td>-</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>WEIZHOU</td>
<td>-</td>
<td>-</td>
<td>NING PO</td>
<td>CHINA</td>
<td>0.891</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>30</td>
</tr>
<tr>
<td>YIZ HENG</td>
<td>-</td>
<td>-</td>
<td>CHINA</td>
<td>0.891</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>30</td>
<td>-</td>
</tr>
<tr>
<td>ZAIRE</td>
<td>-</td>
<td>-</td>
<td>MUANDA</td>
<td>ZAIRE</td>
<td>0.862</td>
<td>5.0</td>
<td>0</td>
<td>24</td>
<td>15</td>
</tr>
<tr>
<td>ZAKIM (LOWER)</td>
<td>03672</td>
<td>DAS ISLAND</td>
<td>ABU DHABI</td>
<td>0.828</td>
<td>7.8</td>
<td>3</td>
<td>-38</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>ZAKIM (UPPER)</td>
<td>03677</td>
<td>DAS ISLAND</td>
<td>ABU DHABI</td>
<td>0.86</td>
<td>5.6</td>
<td>-</td>
<td>-9</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>ZARAZANTINE</td>
<td>03502</td>
<td>LA SKHIRRA</td>
<td>ALGERIA</td>
<td>0.813</td>
<td>9.0</td>
<td>1</td>
<td>-15</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>ZEIT BAY</td>
<td>-</td>
<td>-</td>
<td>ZEIT BAY</td>
<td>EGYPT</td>
<td>0.855</td>
<td>-</td>
<td>-</td>
<td>-6</td>
<td>5</td>
</tr>
<tr>
<td>ZUETINA (SEE LIBYAN LIGHT)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ZUETINA MEDIUM</td>
<td>03543</td>
<td>ZUETINA</td>
<td>LIBRY</td>
<td>0.851</td>
<td>-</td>
<td>-</td>
<td>30</td>
<td>13</td>
<td>34</td>
</tr>
<tr>
<td>ZULUF</td>
<td>03661</td>
<td>RAS TANURA</td>
<td>SAUDI ARABIA</td>
<td>0.873</td>
<td>5.9</td>
<td>-</td>
<td>-40</td>
<td>12</td>
<td>0</td>
</tr>
</tbody>
</table>

### 11.11.2 Refined Products

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### Cargo Specifications

<table>
<thead>
<tr>
<th>Grade</th>
<th>S.G</th>
<th>Flash Point</th>
<th>Water</th>
<th>Sediment</th>
<th>Colour</th>
<th>Viscosity</th>
<th>Critical Properties</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas Oil: Distillate Diesel</td>
<td>0.81/0.85</td>
<td>High</td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td>Grade 46924 is Lead Critical. To safeguard high flash point product particular attention must be paid to cleaning ships pipelines after low flash point materials have been discharged.</td>
</tr>
<tr>
<td>Vacuum Gas Oil</td>
<td>0.85/0.90</td>
<td>High</td>
<td></td>
<td>Salt water Critical</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>See 10.8.8. Cleaning of the colour critical grades after Black Oils is normally adequately taken care of by machine washing with hot water, however, if tanks have carried ‘dirty’ grades for a number of consecutive voyages additional cleaning by removal of deposits and flushing tanks and pipelines with a suitable wash oil may be necessary.</td>
</tr>
<tr>
<td>Blended Diesel</td>
<td>0.83/0.89</td>
<td>High</td>
<td></td>
<td></td>
<td>Often Colour Critical</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Waxy Distillate : Slack Wax</td>
<td>0.82/0.92</td>
<td>High</td>
<td></td>
<td>Water Critical</td>
<td>Sediment Critical</td>
<td>-</td>
<td>-</td>
<td>Metals and Asphaltenes</td>
</tr>
<tr>
<td>Light Fuel Oil (Pourpoint less than 21 deg C) Viscosity less than 180 c S</td>
<td>0.90/1.00</td>
<td>High</td>
<td></td>
<td></td>
<td>-</td>
<td>Wash Tanks after high</td>
<td>See Note for Fuel Oil 55231 -</td>
<td></td>
</tr>
<tr>
<td>Light Fuel Oil (Pourpoint 21 deg C or more) Viscosity 180 c S</td>
<td>0.90/1.00</td>
<td>High</td>
<td></td>
<td></td>
<td>-</td>
<td>Viscosity Grades</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Heavy Fuel Oil (Pourpoint Less than 21 deg C) Viscosity 180 c S</td>
<td>0.95/1.00</td>
<td>High</td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Bitumen and Naphthenic Distillate are exceptions to the above rule and every care must be taken to ensure tanks lines and pumps are water free. VGO cargoes may need salt free stowage. See Ch. 10.8.8.</td>
</tr>
<tr>
<td>Heavy Fuel Oil (Pourpoint 21 deg C or more) Viscosity 180 c S</td>
<td>0.95/1.00</td>
<td>High</td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Waxy Residue (Pourpoint 38 Deg C or more)</td>
<td>0.87/0.97</td>
<td>High</td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Carbon Black Feedstocks</td>
<td>1.05</td>
<td>High</td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Continued.....
<table>
<thead>
<tr>
<th>Grade</th>
<th>S.G</th>
<th>Flash Point</th>
<th>Water</th>
<th>Sediment</th>
<th>Colour</th>
<th>Viscosity</th>
<th>Critical Properties</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bitumen</td>
<td>0.98/1.1</td>
<td>High</td>
<td>Very Water Critical</td>
<td>Sediment Critical</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Penetration Flash Point Wax Before loading Fuel Oil 55231 tanks should be water washed after waxy grades.</td>
</tr>
<tr>
<td>Bitumen Cutbacks</td>
<td>0.92/1.1</td>
<td>Medium</td>
<td>Water Critical</td>
<td>Sediment Critical</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Spiked / Recon Crude</td>
<td>0.79/0.97</td>
<td>low</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Crude Oil (Light, Medium, Heavy)</td>
<td>0.79/0.97</td>
<td>low</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Extra Heavy Crude Oil (Viscosity More than 650 cS)</td>
<td>0.98/1.01</td>
<td>low</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Wax Free Naphthenic Crudes (TJP : Cabimas : Lagunills : Tila Blend)</td>
<td>0.93/0.99</td>
<td>low</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Wax Critical</td>
<td>See 10.6.2</td>
</tr>
<tr>
<td>Naphthenic Distillates</td>
<td>0.86/0.96</td>
<td>High</td>
<td>Very Water Critical</td>
<td>Sediment Critical</td>
<td>-</td>
<td>-</td>
<td>Very Wax Critical</td>
<td>-</td>
</tr>
<tr>
<td>Natural Gasoline (Pentane Plus and Condensate)</td>
<td>0.67/0.70</td>
<td>low</td>
<td>Occasionally Colour Critical</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Often Lead Critical</td>
<td>-</td>
</tr>
</tbody>
</table>

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### 11.11.3 Lubricating Oils

<table>
<thead>
<tr>
<th>Grade Nomeoclature</th>
<th>Density* at 15/14 Deg C</th>
<th>Colour **</th>
<th>Viscosity* at 50 Deg C</th>
<th>Closed Flash*</th>
<th>Glossary of Luboil Grades, Family Groups, Characteristics and Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic Lubricating Oils</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LVI 50</td>
<td>0.925</td>
<td>2.0</td>
<td>14</td>
<td>160</td>
<td>Refind low viscosity index naphthenic oils used for general machinery lubrication and wide variety of process applications. Colour and colour stability of particular importance.</td>
</tr>
<tr>
<td>Gravex 29</td>
<td>0.920</td>
<td>1.0</td>
<td>12</td>
<td>170</td>
<td></td>
</tr>
<tr>
<td>LVI 140</td>
<td>0.943</td>
<td>3.5</td>
<td>50</td>
<td>204</td>
<td></td>
</tr>
<tr>
<td>LVI 450</td>
<td>0.950</td>
<td>3.5</td>
<td>160</td>
<td>211</td>
<td></td>
</tr>
<tr>
<td>LVI 1100</td>
<td>0.962</td>
<td>Dark</td>
<td>500</td>
<td>257</td>
<td>Unrefined heavynaphthenic blending component which should not be allowed to contaminate any refined lub oils.</td>
</tr>
<tr>
<td><strong>MVIN 40 / 45 / BLF</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MVIN 40</td>
<td>0.870</td>
<td>1.0</td>
<td>7/10.</td>
<td>152 / 157</td>
<td>Highly refined premium naphthenic oils. Used for blending refrigerator or oils. Banana Liquid Fungicide (Banana Spray Oil) Colour important for light viscosity grades but above all avoid contamination with paraffinic oils which will affect the low pour point which is an essential feature of MVN Oils.</td>
</tr>
<tr>
<td>MVIN 65</td>
<td>0.887</td>
<td>1.0</td>
<td>20</td>
<td>191</td>
<td></td>
</tr>
<tr>
<td>MVIN 170</td>
<td>0.908</td>
<td>2.0</td>
<td>65</td>
<td>224</td>
<td></td>
</tr>
<tr>
<td><strong>MVIP 1300</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MVIP 1300</td>
<td>0.933</td>
<td>Dark</td>
<td>600</td>
<td>270</td>
<td>Heavy unrefined paraffinic blending component, very high viscosity and very dark colour should not be contaminated with lower viscosity oils.</td>
</tr>
<tr>
<td><strong>HVI 55 (SEPSO) 60 / 65 B</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HVI 55</td>
<td>0.870</td>
<td>0.5 / 1.5</td>
<td>15/20</td>
<td>210</td>
<td>Highly refined premium paraffinic oils where colour and flash point of low viscosity grades is important.</td>
</tr>
<tr>
<td>HVI 55</td>
<td>0.879</td>
<td>2.0</td>
<td>34</td>
<td>235</td>
<td></td>
</tr>
<tr>
<td>HVI 160S / 160 B</td>
<td>0.881/0.889</td>
<td>3.0/3.5</td>
<td>60</td>
<td>241 / 246</td>
<td></td>
</tr>
<tr>
<td><strong>HVI 60 TQ</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HVI 60 TQ</td>
<td>-</td>
<td>Max 1.5</td>
<td>15/25</td>
<td>204</td>
<td>Turbo T grades are manufactured from a restricted number of pure base oils. Control tests are stringent. Tanks / lines to be spotless.</td>
</tr>
<tr>
<td><strong>HVI 650</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HVI 650</td>
<td>0.899</td>
<td>5.5</td>
<td>275</td>
<td>282</td>
<td>Highly refined paraffinic oil.</td>
</tr>
</tbody>
</table>
### Glossary of Luboil Grades, Family Groups, Characteristics and Notes

Finished Branded Lubricating Oil

<table>
<thead>
<tr>
<th>Grade Name or Catalogue</th>
<th>Density* at 15/14 Deg C</th>
<th>Colour ** ASTM D.1500</th>
<th>Viscosity* Cst at 50 Deg C</th>
<th>Closed Flash* Point Deg C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aero Shell Oil 100 / 120</td>
<td>0.885</td>
<td>5.5/6.0</td>
<td>130 / 180</td>
<td>274 / 282</td>
</tr>
<tr>
<td>Aero Shell Oil W 80/W100/W120</td>
<td>0.890</td>
<td>5.0/6.0</td>
<td>90 / 125 / 170</td>
<td>246 / 274 / 277</td>
</tr>
<tr>
<td>Shell Oil S 8154/Fusus A</td>
<td>0.829</td>
<td>0.5</td>
<td>4</td>
<td>118</td>
</tr>
<tr>
<td>Shell Diala Oil B / BX BG</td>
<td>0.870</td>
<td>0.5</td>
<td>10</td>
<td>157</td>
</tr>
<tr>
<td>Shell Diala Oil D / Dx</td>
<td>0.865</td>
<td>0.5</td>
<td>7</td>
<td>138</td>
</tr>
<tr>
<td>Shell Alexia Oil 40 / 50</td>
<td>0.950/945</td>
<td>Dark</td>
<td>86 / 120</td>
<td>218 / 224</td>
</tr>
<tr>
<td>Shell Argina Oil 30/40</td>
<td>0.905/908</td>
<td>8.0</td>
<td>83 / 80</td>
<td>191 / 193</td>
</tr>
<tr>
<td>Shell Gadinia Oil 30</td>
<td>0.897</td>
<td>8.0</td>
<td>83</td>
<td>227</td>
</tr>
<tr>
<td>Shell Melina Oil 30</td>
<td>0.913</td>
<td>6.5</td>
<td>66</td>
<td>218</td>
</tr>
</tbody>
</table>

Refinery Feedstock

<table>
<thead>
<tr>
<th>Grade Name or Catalogue</th>
<th>Density* at 15/14 Deg C</th>
<th>Colour ** ASTM D.1500</th>
<th>Viscosity* Cst at 50 Deg C</th>
<th>Closed Flash* Point Deg C</th>
</tr>
</thead>
<tbody>
<tr>
<td>HNFR 45 / 45 (Two 40/45)</td>
<td>0.866/0.873</td>
<td>0.5</td>
<td>7/10</td>
<td>154 / 160</td>
</tr>
<tr>
<td>NND 40 / 45</td>
<td>0.913</td>
<td>1.5</td>
<td>7/10</td>
<td>154</td>
</tr>
<tr>
<td>NND 225 / 240 / 260 / 280</td>
<td>0.947/0.953</td>
<td>3.5 / 4.5</td>
<td>86/100</td>
<td>210 / 224</td>
</tr>
<tr>
<td>UND</td>
<td>0.939</td>
<td>Dark</td>
<td>31</td>
<td>127</td>
</tr>
<tr>
<td>100 SE Neutral (SEN)</td>
<td>0.875</td>
<td>0.5</td>
<td>14</td>
<td>177</td>
</tr>
</tbody>
</table>

It is important that these aviation engine oils be kept free from contamination particularly by refinery feedstock and adventitious matter. Aero Shell W 100 and W 120 contain additives which make them particular susceptible to water contamination. All are Paraffinic Oils.

All products that these aviation engine oils be kept free from contamination particularly by refinery feedstock and adventitious matter. Aero Shell W 100 and W 120 contain additives which make them particular susceptible to water contamination. All are Paraffinic Oils.

All premium quality finished lubricants for sale as is (Tel. Quel) i.e. without further treatment, blending or processing.

Highly refined (hydro finished) Naphthenic white oil suitable for internal consumption, require lead free stowage max. care of handling and freedom from any contamination.

Unrefined naphthenic oils.

Spray base and transformer feedstocks where colour and flash point are important.
11.12 BALLASTING

11.12.1 General
When the ship is not carrying cargo or is lightly loaded, sufficient ballast must be carried to ensure that the ship’s stress, stability, draft, trim and propeller immersion is within permissible limits to guarantee the safe handling of the vessel in the prevailing or expected conditions. In general, the smallest amounts of ballast practical, consistent with weather conditions, safe trim, stress and handling characteristics of the vessel should be carried. Factors to be considered when determining the amount and distribution of ballast are:

   a) Weather
   b) Propeller Immersion

Draft aft should be enough to keep the propeller tip submerged and thus prevent air drawing or cavitation erosion of the propeller. When the motion of the ship due to heave and pitch is considered, a propeller tip submergence of 2 - 4 feet is required for fair weather ballast patterns, about 6 feet for moderate ballast patterns and about 9 feet for heavy weather ballast patterns.

c) Forward Draft
The forward draft should be sufficient to prevent bow slamming while retaining enough freeboard to minimize deck wetness during moderate and heavy weather ship motions.

d) Trim
Trim should not be large enough to affect the operation of machinery or maneuvering of vessel.

e) Hull Stress
Ballast should be distributed to give acceptable hull stress levels and minimize hull or machinery vibrations. Ballast should be concentrated amidships when possible to reduce pitching motions.

Permanent ballast tanks should be either empty or pressed up to permit the anode system to function properly in reducing corrosion.

In meeting these parameters the vessel must comply, at least, with the requirements of the IMO, Class (especially appendix to Class Certificate) and Port State Authorities.

In 1993 IMO adopted Resolution A.774(18) “Guidelines for Preventing the Introduction of Unwanted Aquatic Organisms and Pathogens from Ship’s Ballast Water and Sediment Discharges”. The procedures that the Company views as the most practical to comply with this IMO Resolution are described in this section, and the Master is to ensure compliance with them.

Ballast operations must always be carried out within the capabilities of the vessel and its systems and if the vessel is unable to follow any of the procedures described below the Company is to be advised.

11.12.2 Designated Officer
The Chief Officer is designated to carry out these procedures and maintain all records as required.

The Master is to ensure the Chief Officer is familiar with the requirements of this section.
including IMO Guidelines. The Master must also ensure that relevant crew members are given instructions and are aware of the need for ballast water control procedures being adopted on board.

Relevant persons in this regard would be all officers, cadets, Deck and Engine ratings with responsibilities during ballast operations.

11.12.3 Planning of Ballast Operations
Ballast operations are always to be planned in advance by the Chief Officer and entered on the Cargo stowage and Operations plan form 11.12 for Tankers. The plan is to be approved by the Master prior to commencing the operation and discussed with all relevant staff. In port, the plan must be discussed and agreed with the terminal personnel.

Each vessel must produce a standard plan for a complete change of ballast. All vessels must additionally comply with any restrictions imposed by the port / coastal state authorities as per information contained in the Ballast Water Management Plan.

11.12.4 Records and Reporting
When taking on ballast waters, the date and time of commencement and completion of the ballast operation, ship’s position, salinity (specific gravity) and amount of ballast water taken onboard must be recorded in the ship’s Deck Log Book.

A report in the format shown in the appendix to IMO Guidelines must be completed by the Master and made available to the Port State Authority on request. Analysis certificates, ballast reports and shore receipts must always be kept on board in a separate file.

On tankers, any ballasting or deballasting of cargo tanks are to be recorded, and shore receipts kept in the Oil Record Book Part II or Cargo Record Book (NLS) as required by annex I and II of MARPOL 73/78.

When the Port State Authority water ballast control requirements (e.g. exchange of ballast at sea) cannot be met during the voyage due to weather condition, operational impracticability, etc, the Master must report this fact to the Company and the prospective Port State Authority prior to entering its national waters (economical zone), so that appropriate alternative action can be arranged.

11.12.5 Controls Applied by Port State Authorities
The Master is to check in advance with the local agent, and the latest Port Guide, for any information on ballast water sediment discharge procedures, being applied by the State Authorities at an expected port of call. These procedures may include, but are not limited to the following control actions:
- The non-release of ballast water;
- Ballast water exchange and sediment removal at sea in acceptable areas;
- Ballast water management practices aimed at minimising the uptake of contaminated water in ballasting and deballasting operations;
- Discharge of ballast water into shore-facilities.

Failure to comply with national requirements may lead to unnecessary delays for the ship. In some cases penalties may be applied by Port State Authorities. The vessel may be required to proceed to an approved location to carry out the necessary exchange, seal the ballast tanks against discharge in the Port State’s waters, pump the ballast water to shore reception facilities, or prove, by laboratory analysis, that the ballast water is acceptable.
11.12.6 Loading of Ballast Water

When loading ballast every effort is to be made to ensure only clean ballast is being taken onboard and the intake of sediment is minimised. Where practicable vessels are to avoid taking on ballast water in shallow water areas or in the vicinity of dredging operations.

Vessels must not ballast if at all practicable in areas where there is a known outbreak of water communicable diseases or where phytoplankton blooms are occurring.

It is recognised however, that when vessels trade to river or estuary ports, intake of some silts and sediments is unavoidable. In such situation the amount of silt taken on board can often be substantially reduced by planning to ballast on the flood tide when the suspended silt levels are normally lower.

Vessels taking on ballast in river or estuary waters or any other areas where the purity of the water is in doubt, including areas of probable contamination from chemicals, disease, pathogens etc. must exchange ballast in deep ocean as soon as practicable. The smallest ballast quantity consistent with safe draft and sufficient propeller immersion shall be loaded in these cases.

When segregated ballast has been loaded in silted or otherwise polluted water, the ballast is to be changed as soon as possible after leaving the port. It is also essential that this is carried out to prevent the build up of mud in ballast tanks which may reduce the vessels cargo lifting capacity.

Whenever possible the initial filling of the ballast tanks should be running in from the sea by gravity in preference to pumping in.

In general, segregated ballast tanks are to be filled to 100% capacity but not be overfilled.

11.12.6.1 Ballasting of Cargo Tanks/Heavy weather Ballast.

In non-SBT (Conventional) tankers, and for SBT tankers in some instances for heavy weather, it is necessary to ballast cargo tanks to achieve a safe condition of the vessel. The decision to take heavy weather ballast shall be taken by the Master and must be made well before the onset of severe weather. In such cases the ballast is only to be loaded into cargo tanks designated for this purpose by the Class Certificate or approved ship's Loading Manual, Trim and Stability Book or Dedicated CBT Operations Manual. These tanks are normally provided with necessary corrosion protection and structural reinforcement. No departure from the approved manual requirements is permitted without Company approval.

A thorough risk assessment must be undertaken and sent to the Company for approval along with a plan for taking in heavy weather ballast prior commencing any operations. Due regard shall be given to the time required for the operation, stress and stability and also to the sloshing effect which may take place if weather conditions deteriorate unexpectedly. The expected time of commencement and completion of the operation must be ascertained with the window period mentioned.

- All relevant tanks, lines and pumps are to be thoroughly drained of cargo and the tanks crude oil washed, if applicable, before loading of ballast water.
- The cargo tanks’ venting system must be correctly set up for the required operation.
- The lines are to be checked by the responsible officer and a cargo pump is to be used and a vacuum obtained prior to opening sea valves. The vacuum is to be maintained on the pump suction side until a proper discharge pressure is obtained and ballast is filling to the required tanks.
- The over side area is to be observed during each opening of sea valves.
Clean ballast is to be loaded and dirty ballast discharged as soon as the voyage circumstances permit.

On vessels classed as SBT, ballast must only be loaded into segregated ballast tanks. Where the Master considers that additional ballast is necessary as permitted by MARPOL 73/78, then the regulatory requirements are to be complied with.

If it is necessary to mount special spool pieces in order to carry out ballasting of heavy weather cargo tanks, the spools are to be removed as soon as ballasting is completed.

**11.12.7 Ballasting Water Exchange and Sediment Removal**

The most realistic and practical method for the control of transportation of marine organisms and to control sediments, is to exchange ballast water in deep ocean or open sea areas. This will limit the probability that fresh water or coastal species will be transferred in the ballast water. The responsibility for deciding on such action rests with the Master who must contact the Port state Authority of his next port via the agents and determine if special control actions are required.

The exchange is to be conducted in water depths greater than 2000 metres. In those cases where this is not possible, exchange of ballast water is to be made at least 200 nautical miles from the nearest land and in water at least 200m in depth and in all cases well clear of coastal and estuary influences.

Draining of each tank is to be done until pump suction is lost. This will minimise the likelihood of residual organism survival. The tank is then to be flushed over the bottom by refilling (if possible-by gravity) to approx. 0.5 metre depth, twice, each time followed by complete draining until pump suction is lost. The tank is then to be refilled. The effectiveness of this flushing can be increased if the vessel is on a course that causes the vessel to roll slightly, however, the vessel must not deviate greater than 15° from the intended voyage course during the time of flushing.

When heavy sedimentation is observed after visual inspection, then manual sediment removal may be undertaken. Tanks shall be inspected visually for sediment build up at least once every six months wherever practical, and sediment build up recorded on the tank condition report which is to be forwarded to the Company.

**11.12.7.1 Flow through Exchanges**

When a vessel cannot conduct a complete ballast change, a “flow through” (through ballast tanks vents) exchange of ballast water may be an acceptable alternative for some tanks, however, it has little effect on sediment control.

Due to the risk of building up the pressure in ballast tanks, and the possibility of damage to vent heads, screens, etc. this procedures would require Administration (Classification) approval and must not be attempted without prior special considerations and authority of the Company. Modification to tanks’ venting arrangements may be necessary to avoid damage to the vent heads and screens. In all cases, it must be verified prior to this operation that vent heads are not obstructed or choked, particularly when such an operation is not routinely carried out. Wherever possible, manholes or access hatches should be used in preference to exchange through air pipes, taking all safety precautions to prevent personnel injury due to the open manholes.
11.12.7.2 Exchange of Ballast Water in Cargo Tanks

Generally non SBT tankers are designed to discharge dirty ballast and load clean ballast simultaneously, and the stability and stresses involved are designed to be within limits, if the operation is carried out as per vessel’s loading manual.

In some instances however the pipeline / valve system design does not allow simultaneous ballasting and deballasting of tanks and it will be necessary to carry out these operations alternately. It is important that all persons are warned of the increased draft that can occur in these circumstances on what is otherwise regarded as a ballast passage.

Clean ballast tanks will have undergone the process of tank cleaning. This process is considered sufficient to satisfy the sediment control procedures (tank bottom flushing). If, however heavy sedimentation is observed after visual inspection then manual sediment removal may be undertaken.

Before loading clean ballast, the relevant tanks, lines and pumps are to be properly washed and drained. The responsible officer is to ensure all valves are correctly set, prior to the commencement of loading clean ballast into a tank. Soon after commencement the surface of the water in the tanks must be visually observed or a sample drawn from the tank, to ensure that the clean ballast is not oil contaminated.

Dirty ballast is to be processed and discharged in accordance with the current editions of “Clean Seas for Oil Tankers” and the MARPOL 73/78 Annex I and II regulations.

The discharge of ballast from cargo tanks whether dirty or clean is to be carried out with the Oil Discharge Monitoring Equipment (O.D.M.E.) in operation. During the discharge of dirty ballast overboard the performance of the O.D.M.E. is to be checked by frequent visual inspections to guard against accidental pollution.

When the overboard discharge is stopped by the monitoring equipment, the remaining oily water is to be retained and transferred to the primary slop tank for settling. Any line flushing necessary is to be made into the slop tanks. After settling of the slop tanks the free water is to be decanted to sea via the O.D.M.E. and on completion any lines used are to be stripped into the primary slop tanks.

11.12.8 Discharge of Ballast Water

No ballast is to be discharged in the continental shelf, coastal or port waters where ballast water and sediment control measures are being applied by State Authorities, unless ballast water and sediment control procedures have been followed, or acceptable alternatives have been adopted.

The effectiveness of the vessels procedures may be verified by Port State Authorities tanking samples of ballast water and/or sediments from the vessel, to test for the continued survival of unwanted aquatic organisms and pathogens. Such samples may also be taken from suction wells, chain lockers and other areas where sediment may accumulate. In certain cases discharge of ballast will not be permitted until analysis of such samples is completed. The Master is to ensure that relevant written authorisation is obtained from the Port Authority prior to discharging any ballast to coastal waters of any country that exercises ballast control measures.

Shortly after commencement and during discharge of any ballast overboard the surface of the sea is to be checked frequently to guard against accidental pollution.
Whenever possible, initial deballasting of SBT is to be by gravity in preference to pumping out.

11.12.8.1 Deballasting of Cargo and Segregated Ballast Tanks

In some cases the discharge of ballast would be made concurrently with the loading of cargo in other groups of tanks. In such cases double valve separation shall be maintained between the cargo being loaded and the ballast discharge. All valves necessary to maintain this separation shall be positively verified to be tight, prior to arrival at loading port. All lines must also be in good condition and free from leakage.

The discharge of clean ballast from cargo tanks overboard is to be carried out with the O.D.M.E. in operation and all details of such operations are to be entered in the Oil Record Book Part II.

Before discharging any clean or segregated ballast, the surface of the water in cargo or segregated ballast tanks must be examined visually, or by taking surface samples. This is to detect the presence of any oil, and if oil contamination is discovered it must be treated as dirty ballast. These checks are also to be made well before arrival at the loading port, in order to avoid substantial delays and costs that might occur. In particular the vessel may not be allowed to deballast and will be liable to large fines. A small quantity of ballast is to be discharged prior to arrival to verify the cleanliness of lines and pumps.

The discharge of clean ballast must use the same lines and pump throughout from the commencement of deballasting. If other pumps (i.e. stripping) are necessary to drain tanks, then the pump shall be discharging slowly throughout the deballasting.

11.12.8.2 Discharge of Ballast Water to Shore Reception Facilities.

Some terminals are already adopting this practice and have done so for many years, as local conditions do not allow any discharge of ballast whatsoever.

The Master is to check with the terminal of any requirements for shore based discharge of ballast through voyage orders, agents instructions, “Guide to Port Entry”, etc. If there is any doubt the Company must be referred to for advice, well before arrival.

Generally SBT vessels are not provided with a direct means to discharge ballast ashore. In this case it will be necessary to either:

- Fit a spool piece between the cargo and ballast suction piping, and to use a cargo pump for discharging of the ballast to the manifold. For this purpose the following precautions shall be taken:
  - All cargo system valves that isolate the cargo being loaded, from the ballast being discharged shall be pressure tested and verified tight.
  - Two valve separation between cargo and ballast is to be maintained. In most cases this will require careful planning of the loading and deballasting operation to ensure that the requirement is met.
  - The spool piece is to be removed and pipes blanked immediately on completion of the deballasting operation.

- Load all ballast in cargo tanks and discharge all segregated ballast tank water in deep ocean areas prior to arrival, with particular reference to Company approval, if tanks not normally designated for ballast water are to be used. Two valve separation is to be maintained between the tanks being loaded and deballasted. These valves are to be tested and verified prior to the operation.
11.12.9 Sample Analysis Certificate
Vessels may avoid changing ballast in some circumstances by having their ballast water or harbour source samples analysed by a laboratory at the departure port. Where the analysis shows the ballast or sediment to be free from unwanted aquatic organisms or pathogens an analysis certificate is to be provided by the Master to the Port State of arrival. This must be carried out by fax several days prior to arrival in case the analysis is rejected, so that the ballast change procedures can be applied prior to arrival.

11.12.10 Manual Removal of Solid Elements
Care is to be taken when manually removing sediments while the ship is in port or in continental shelf waters, to ensure sediments are not discharged into these waters. Sediments must be disposed of ashore and processed according to the local requirements. A log book entry is to be made and receipts obtained.

This part applies to solid sediment discharges, and does not affect sediments that can be removed from the chain locker or wells by had hosting.

11.12.11 Ballast Operation Precautions

11.12.11.1 Personnel Safety
If tank entry is required to affect the taking of samples, carrying out a ballast tank inspection, or for manually removing solid sediments, then all the safety precautions and “Entry into Enclosed Space” Entry Permit Form 6.2 requirements must be complied with.

11.12.11.2 Ship’s Safety
When planning and carrying out operations with ballast water, the following factors must be taken into account:
- Shear Force and Bending Moment
- Stability and Free Surface Effect
- Slack Tanks
- Torsion Loads
- Draft and Trim of the Vessel
The Ship’s course and speed is to be properly set depending on the prevailing weather conditions. Sufficient personnel must be available to allow safe monitoring of the operation. In all cases of ballast operations, including exchange, each step of the operation must be planned and verified as meeting stress and stability criteria through loadicator outputs.

11.12.11.3 Precautions during ballasting or deballasting heavy weather ballast in cargo tanks of segregated ballast tankers and cargo holds of dry cargo vessels.
It may be necessary to load additional ‘Heavy Weather Ballast’ in the cargo tanks of segregated ballast tanks or in cargo holds of dry cargo vessels. In the latter case, it must be noted that in many vessels ballast is loaded in cargo holds as a part of the normal ballast distribution.
Heavy weather ballast must be taken only in exceptional circumstances; to prevent structural damage to the forward part of the vessel in very heavy weather or to reduce the surface area of the vessel exposed to the wind, as a means of preventing the vessel from drifting on to a lee shore for example. To reduce slamming, a more effective and safer method may be to reduce speed.
The taking of additional ballast in heavy weather subjects the vessel’s structure to increased stresses from sloshing loads and reduces stability due to the increase in free surface moments. The vessel’s stability and any sloshing restrictions given in the stability booklet must
be carefully considered before taking on additional ballast. It is better to take on additional ballast, if this is considered necessary, before the onset of very severe weather rather than waiting until very rough weather is experienced. To reduce the time during which sloshing loads are likely to be experienced – in general sloshing restrictions apply to volumes between 20% - 70% capacity of the tank / hold – ballasting and deballasting of heavy weather ballast should be effected as quickly as possible through the use of all available ballast pumps, always consistent with venting capacity. Cargo tanks of crude oil tankers must be crude oil washed prior to any ballast being loaded into them. It is thus necessary, particularly when rough weather is likely to be encountered on the passage, to Crude Oil Wash the designated heavy weather ballast tank/s at the discharging port. In all cases, a written plan must be made before heavy weather ballast operations are undertaken and a risk assessment carried out. The plan should cover all stages of the transfer operations and as a minimum, contain:

- Quantity of ballast to be loaded / discharged;
- A plan of the distribution, lines and pumps to be used;
- Transfer rates and maximum allowable pressures;
- Critical stages of the operation;
- Venting requirements;
- Stability and stress information;
- Drafts and trims;
- Under keel clearance limitations if any; and
- Special precautions required for the particular operation.

11.12.11.4 Ballast Tank’s Venting System
If it of paramount importance that all segregated and permanent ballast tanks’ vents are properly set up and in good condition prior to any ballast operation. All vent closures that are capable of manual operation must be in the open position. The original design venting capability must be available at all times. The vents are to be further checked soon after starting the operation to confirm that the tanks are venting freely. Improperly set ballast vents can result in severe structural damage to the vessel.

Vent screens are to be kept free from paint as this can seriously reduce their volumetric capacity besides adversely affecting their capability of preventing the passage of flame.

Great care is to be taken in conditions where icing is occurring. In certain circumstances screens on ballast tank vents can become blocked by icing. During ballast operation in such conditions, the responsible officer is to ensure that all precautions are adopted to ensure the free venting of ballast tanks, and that regular checks are made to ensure continuous free venting throughout the operation.

11.12.11.5 Pumping Limitation
During pumping of ballast care must be taken not to operate the pumps above the maximum safe rate. In this respect the ballast pump capacity must be borne in mind with respect to the maximum ballasting rate of any given tank or sets of tanks.

When ballasting at sea in heavy weather, there is a significant risk to personnel on deck and it may be more prudent to “run in” the ballast by gravity to a number of tanks.
11.12.12 Cathodic Protection
Uncoated and many coated clean ballast tanks have a sacrificial zinc anode system fitted to protect the entire tanks structure.

Uncoated dirty ballast tanks have a sacrificial zinc anode system fitted to protect the bottom shell plating only to guard against pitting.

CBT product carriers with coated tanks have anodes fitted in designated ballast tanks, sufficient only to protect the tank coatings and the underlying steel in the event of a coating breakdown. Care must be taken to avoid over protection in the tanks as this can lead to coating breakdown.

It is important that ballast is loaded into protected tanks only, and any deviation from this requirement in order to affect ballast control procedures must receive approval from the Company.

If loading ballast into tanks fitted with cathodic protection in a freshwater river or estuary it is also important to change the ballast at sea as soon as practical in order to achieve the full effect of the cathodic protection system.
11.13 INERT GAS SYSTEM

11.13.1 Purpose of Inert Gas

The basic purpose of the inert gas system is to increase crew and vessel safety by maintaining the oxygen content in the cargo tanks at the lowest level possible and the tanks under positive pressure under all conditions of operations, except when a tank must be gas freed for entry. This means that tanks will be inerted when:

- Loading
- Discharging
- On passage-loaded or ballasted
- When tank washing

A number of additional benefits can be realized from inerting tanks:

a) Reduced time in cleaning tanks since large fixed tank cleaning machines can be used.

b) Reduced fuel consumption for tank cleaning over the previous methods.

c) Reduced probability of pollution of the seas since smaller volumes of water will be required to be handled during tank washing.

d) Reduced time to enter certain shipyard berths for emergency repairs since gas freeing may not be required if ship is inerted.

e) Reduced discharge times, particularly with lighter more volatile cargoes, since inert gas will maintain a slight pressure in the tank, and reduce stripping time.

11.13.2 Inert Gas System Operating Policy

On vessels equipped with Inert Gas systems, it is FSMHK policy to continuously maintain all cargo/ballast tanks in a fully inerted condition with the oxygen content of the tanks at 5% or less. The only exceptions to this policy will be when gas freeing a tank after washing for entry, for inspection, mucking, repairs or drydocking.

It is recognized that starting and stopping cargo pumps and other major machinery can cause sudden changes to the boiler load resulting in momentary changes in flue gas oxygen levels until the combustion control stabilizes. When this occurs, cargo handling, crude oil washing, ballast handling or tank washing need not be stopped, as long as the inert gas oxygen level does not exceed 7% and it returns to 5% or below within several minutes. Smooth, orderly operation of steam machinery to minimize boiler variations, and close attention to combustion controls becomes particularly important when operating the inert gas system.

Reverting to conventional closed vent system operation in event of a complete breakdown of the inert gas system should only be done under closely controlled conditions. A "complete" breakdown would be defined as loss of both fans, or scrubber collapse or structural failure that prevents the use of the system. Operating with a conventional closed vent system is very restricted and requires the approval of the FAREAST SHIPMANAGEMENT HONGKONG Office.

Form 11.20 to be used for inert gas operation & maintenance.
11.13.3 Inert Gas System Ship Board Policy

Vessel Masters and Chief Engineers must constantly insure that their officers and crew realize the importance of the Inert Gas Systems.

Operational procedures and techniques must comply with the Inert Gas Operations Manual. These must be reviewed with ship's officers frequently with emphasis on necessity of zero downtime.

Frequent inspections and testing of the components must be undertaken by the vessel's senior officers supplemented by frequent inspection by shoreside staffs. Shipboard personnel must effect repairs required to IGS as soon as possible and must request shoreside support on an urgent basis if repairs are beyond shipboard capability. Shipboard IGS spare parts must be maintained at designated levels.

Complete reports of problems encountered and recommendations for improvements of IGS are to be forwarded to the FSMHK Office in a timely manner.

11.13.4 Danger from Over or Under Pressure

Severe damage can be caused by over or under pressure in tanks or holds beyond their design limitations.

To avoid the danger of overpressuring tanks when loading or ballasting, it is essential the vent system provided is operational. This may be an individual P/V riser for each compartment or a common high velocity vent in the Inert Gas system.

To avoid the danger of creating a vacuum in a compartment during discharge or deballasting, the Inert Gas system must be operating and delivering gas equivalent to at least 125% of the volume of cargo or ballast being discharged.

To avoid any danger of excess pressure or partial vacuum, the Inert Gas inlet valve to the compartment should be open at all times except when the compartment has been washed and gas-freed. The high velocity valve and the liquid vacuum breaker on the Inert Gas system must be properly set, as must the individual P/V valves on compartments where these are fitted. All flame screens must be clean and in good condition.

A secondary means of full flow relief of vapour, air or inert gas mixture shall be provided to prevent over pressure or under pressure in the event of failure of the primary venting system. Alternatively a pressure sensor may be fitted in each tank protected by the primary venting arrangement with the monitoring system in the CCR, such system shall be provided with alarm facility. If pressure sensor are provided as the means of secondary protection, the alarm setting for the pressure sensors must be set to actuate when the tank pressure reaches 10% greater than the normal actuation settings of the PV pressure valves themselves. In the case of low pressure setting a tank pressure setting should be set to 100mmWG or equivalent scale.

Vessel while using vapour connection system, alarms at secondary high pressure setting should be not more than 90% of the lowest pressure relief valve setting. Alarm at low pressure of secondary venting should not be less than 150mmWG.

All officers should be aware of the primary and secondary cargo tank venting system and alarm setting procedures.
11.13.5  Failure of the Inert Gas System

Cargo operations when the inert gas system is not available is expressly prohibited on vessels carrying crude unless all steps outlined in the ISGOTT Manual are strictly followed. Prohibition includes cargo or ballast movement from or to any tanks that have carried crude oil. Segregated ballast movements are still permitted.

If cargo or ballast discharging or tank washing is required on vessels carrying only products when IGS is inoperative, conventional closed venting system procedures must be used which displaces cargo or ballast being discharged by air drawn into tanks through masthead vent risers and deck vent piping.

Approval must be given by the FSMHK Superintendent before cargo or ballast transfer or tank washing can be conducted without a fully operational inert gas system.

11.13.6  Health Hazards of Inert Gas

11.13.6.1 Oxygen Deficiency

Exposure to an atmosphere containing less than 5% oxygen results in immediate unconsciousness. If resuscitation is delayed for more than about four minutes, irreversible brain damage will occur. Further delay will cause death. Exposure to an atmosphere containing less than 21% oxygen is not necessarily incapacitating, but can affect the sense of judgement and balance and could eventually cause unconsciousness. In some circumstances it could also result in permanent brain damage. An oxygen deficiency is thus much more serious than exposure to hydrocarbon vapors, and for this reason a full scale reading on a portable oxygen analyzer (21%) should be obtained throughout the tank before entry is allowed.

11.13.6.2 Toxicity of Flue Gas

The presence of toxic gases such as sulphur dioxide, carbon monoxide and oxides of nitrogen can only be ascertained by measurement. However, provided that the hydrocarbon gas content of an inerted tank does not exceed 2% by volume before gas freeing is started, the dilution of the toxic components of flue gas during the subsequent gas freeing can be correlated with the readings of an approved combustible gas indicator. If be ventilating the compartment, a reading of 1% LEL or less is obtained in conjunction with an oxygen reading of 21% by volume, the toxic trace gases will be diluted to concentrations at which it will be safe to enter.

11.13.6.3 Toxicity of Hydrocarbon Vapors

Inert gas does not affect the toxicity of hydrocarbon gases and the problem is no different from that of ships without an IG system. Because of possible gas pockets, regeneration, etc., gas freeing must continue until the entire compartment shows a zero reading with a reliable combustible gas indicator, or a 1% LEL reading should the instrument have a sensitivity scale on which a zero reading is impractical.

11.13.7  Health Hazard Precautions

11.13.7.1 Ullaging and Inspection of Tanks from Cargo Hatches

The low oxygen content of inert gas can rapidly cause asphyxiation. This type of inspection is
to be minimized and care should be taken to avoid standing in the path of venting gas.

11.13.7.2 Inert Gas On Deck

Gases are not to be vented at low level except through approved portable stacks. If the cargo hatches, ullage caps or other tank vents are used as outlets, localized areas around these outlets can contain levels of gases in harmful concentrations, and can also be depleted in oxygen. In these conditions work on deck should not be undertaken for prolonged periods except when measurements show the hydrocarbon gas content of the atmosphere in the working area to be below 1% LEL and the oxygen content 21% by volume.

There are some wind conditions which may bring gases back down onto the deck even from masthead vent pipes, and if these conditions are suspected combustible gas indicator and oxygen meter checks of working areas on deck should be made.

11.13.7.3 Entering Tanks or Other Enclosed Spaces Subject to IG Accumulation

Before entering tanks and other enclosed spaces to following safety precautions must be taken:

a) The space must be well ventilated before entry. The space must be tested for oxygen content and combustible gas. Take all the other required safety precautions for entering spaces.

b) Cargo tanks that test gas-free safe for men, as far as oxygen and hydrocarbon percentages are concerned, will normally have had sufficient ventilation to thoroughly disperse all inert gases. However, to make certain no dangerous pockets remain, a deck officer is to test bottom areas before allowing men to enter for inspection, repairs or sediment removal. If testing indicates pockets with low O2 concentration, further venting of tank will be required.

c) Pumprooms, fan rooms and other spaces where inert gas equipment or piping is located have been designed to ensure adequate ventilation. However, as an additional safety precaution, the air in these rooms should be periodically checked for oxygen and/or inert gases. Any problem areas should be reported to the Superintendent.

11.13.7.4 Routine Precautions for Living Quarters and Machinery Spaces

Inert gas systems are designed to have equipment as remote as possible from intake of ventilation systems for living quarters and the engine room. However, under certain weather conditions it is conceivable that flue gases emitted at deck level or from the mast heads could be drawn into these areas.

In case of inert gas system leaks there is the possibility of fuel gases escaping to areas adjacent to ventilation intakes.

The following precautions are required:

a) Inert gas piping must be inspected regularly to ensure that it is free of leaks. Any suspected areas must be given soapsud tests while the inert gas system is in operation. If leaks are found, the inert gas system must be shut down until repairs are made.

b) At 3 month intervals or if leakage is suspected, tests must be taken using a DRAEGER multi-gas detector in living quarters and engine room while the inert gas system is operating to determine if traces of flue gases are evident. It is very doubtful that any trace of flue gas would ever be found in these areas.
However, in the event it is, the inert gas system should be immediately shut down and kept off until the problem has been corrected and the gas has been removed.

11.13.7.5 Scrubber and Condensate Water
Inert gas scrubber effluent water is acidic. Condensate water, which tends to collect in the distribution pipes, particularly the deck main, is often even more acidic than the effluent and is highly corrosive. Care should be taken to avoid unnecessary skin contact with either effluent or condensate water. Particular care should also be taken to avoid all contact with the eyes and protective goggles should be worn.

11.13.7.6 Inert Gas room including IGG room
Inert gas room may have a toxic environment when the IG blowers are running. All crew must take necessary precaution before entering the space including periodic check of atmospheric gases should be conducted.
Vessel delivered on or after 1 Jan 2016 two oxygen sensors shall be positioned at appropriate location in the space or spaces containing the inert gas system. If the oxygen level falls below 19% these sensors shall trigger alarm, both visible and audible inside and outside the space in such a position that they are immediately received by responsible members of the crew, on hearing such alarm crew should immediately the IG space. In Vessels delivered before 1 Jan 2016 frequent checks should be made for Oxygen, prior entering the space and at regular interval, and all personnel must carry personal gas meters with them at all times.

The IG room or space should be provided with independent mechanical extraction ventilation system providing 6 air changes per hour. The space shall be clearly marked with “hazard notices warning of the dangers of asphyxiation.”
## 11.14 Tank Cleaning Tables

### CLEANING INSTRUCT. TABLES

<p>| Grade to Be Loaded | Grade to Be Loaded | Grade to Be Loaded | Grade to Be Loaded | Grade to Be Loaded | Grade to Be Loaded | Grade to Be Loaded | Grade to Be Loaded | Grade to Be Loaded | Grade to Be Loaded | Grade to Be Loaded | Grade to Be Loaded | Grade to Be Loaded | Grade to Be Loaded | Grade to Be Loaded | Grade to Be Loaded | Grade to Be Loaded | Grade to Be Loaded | Grade to Be Loaded | Grade to Be Loaded | Grade to Be Loaded | Grade to Be Loaded | Grade to Be Loaded | Grade to Be Loaded | Grade to Be Loaded | Grade to Be Loaded | Grade to Be Loaded |
|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Gas Oil Distillate Diesel | 1 | 5 | 6 | 6 | 7 | 6 | 6 | 6 | X | 6 | 6 | 6 | X | 6 | 3 |
| Blended Diesel | 1 | 1 | 6 | 1 | 6 | 1 | 6 | 6 | 6 | 6 | 6 | 6 | X | 6 | 1 | 3 |
| Waxy Distillate Slack Wax | 1 | 5 | 1 | 5 | 6 | 6 | 6 | 6 | 6 | X | 6 | 6 | 5 | X | 6 | 3 |
| Light Fuel Oil (pour point 21°C) | 1 | 1 | 6 | 1 | 1 | 1 | 1 | 1 | 6 | 6 | 1 | X | 6 | 5 | 5 | 6 | 1 | 3 |
| Heavy F.O. (Pour Point Less Than 21°C) | 1 | 1 | 6 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 |
| Heavy F.O. (Pour P.21°C OR MORE) | 1 | 1 | 6 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 |
| Waxy Residues | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 6 | 6 | 6 | 3 |
| Carbon Black Feedstocks | 1 | 1 | 6 | 1 | 6 | 1 | 6 | 6 | 6 | 1 | X | 1 | 5 | 5 | 6 | 6 | 6 | 3 |
| Bitumen | 9 | 9 | X | 1 | 1 | 1 | 1 | 1 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |
| Bitumen Cutbacks | 1 | 1 | 6 | 6 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 6 | 6 | 1 | 3 |
| Spiked / Recon Crude | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 |
| Crude Oil (Light, Medium, Heavy 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Extra Heavy Crude (Visc. more 650CS) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Wax Free Naphthenic Crudes | 1 | 1 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 1 | 1 | 1 | 1 |
| Naphthenic Distillates | 1 | 5 | X | 5 | 8 | 8 | 8 | 8 | X | 8 | 8 | 8 | 8 | 1 | 7 | 4 |
| Natural Gasoline (Pentane+Condes.) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |</p>
<table>
<thead>
<tr>
<th>TANK CLEANING TABLE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CLEANING INSTRUCTIONS</td>
<td></td>
</tr>
<tr>
<td><strong>NOT TO BE LOADED WITHOUT SPECIAL CLEANING INSTRUCTIONS</strong></td>
<td>✗</td>
</tr>
<tr>
<td>AVIATION GRADES CAN BE CARRIED AFTER SUCH CARGOES IF IT CAN BE ESTABLISHED THAT A MERCAPTAN LEVEL OF 100 PPM AND AN H2S LEVEL OF .10 WHERE NOT EXCEEDED. IN SUCH CASES THE ALTERNATIVE CLEANING CODE INDICATED IN THE TABLE WILL APPLY</td>
<td></td>
</tr>
<tr>
<td><strong>TANKS TO BE WELL DRAINED</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>FLUSH TANKS BOTTOM WITH SEA WATER AND DRAIN WELL</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>FLUSH TANKS BOTTOM WITH SEA WATER, DRAIN WELL AND GAS FREE TO 40% AND LOWER EXPLOSIVE LIMIT</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>FLUSH TANK BOTTOMS, GAS FREE, LIFT SCALE AND MOP UP WHEN LOADING LUB OIL OR NAPHTENIC DISTILLATE EXTRA CARE IS REQUIRED. WHEN DRAINING PIPELINES, BY ALSO DRAINING VALVES AND PUMPS.</strong></td>
<td>4</td>
</tr>
<tr>
<td><strong>COLD MACHINE WASH TANKS FOR ABOUT 4 HOURS (2 HRS ON VESSEL WITH COATED TANKS).</strong></td>
<td>5</td>
</tr>
<tr>
<td><strong>WHEN LOADING WHITE OILS, LUB OIL OR NAPHTENIC DISTILLATE COMPLETE CODE 5 AND THEN FOLLOW UP CODE 4.</strong></td>
<td>6</td>
</tr>
<tr>
<td><strong>CLEANING AS FOR CLEANING CODE 5 BUT USE HOT MACHINE WASH</strong></td>
<td>7</td>
</tr>
<tr>
<td><strong>REFER LUB OIL CLEANING TABLE AND DRAIN WELL</strong></td>
<td>8</td>
</tr>
</tbody>
</table>
11.15 MOORINGS
For the purpose of maintenance of mooring equipment the following guidelines shall be referred and always adhered to:

1) OCIMF mooring Equipment Guideline
2) Effective Moorings
3) Marine Environmental and safety criteria.

All the above publications shall be maintained on board. Although the Company endorses all recommendations contained in the above publications, the following are repeated due to their importance:

- All mooring tails shall be renewed at intervals of no more than 18 mths in service.
  However the mooring tails may be used for more than 18 months subject to the following conditions being met:
  a) Condition of the tail ropes is satisfactory & an inspection indicates that a longer period is warranted.
  b) Monthly inspection of the tail ropes to be carried out as per the guidelines in appendix ‘D’ of the OCIMF publication “Mooring equipment guidelines”.
  c) Detailed inspection reports to be maintained in the PMS & form 3.14.
  d) New tail ropes to be kept as spares for 20% of the total number of tail ropes used on board.

- All mooring winch brakes shall be tested annually as per OCIMF mooring Equipment Guideline and adjusted to render at their maximum designed load.

4) Wires must be inspected & renewed as recommended in Appendix C of OCIMF Mooring Equipment Guideline
5) Synthetic and fibre ropes must be inspected and renewed as recommended in Appendix D of OCIMF Mooring Equipment Guideline

FUNCTION OF MOORINGS
The basic function of mooring system is dual:
- To bring the ship along side and in position
- To keep the ship along side and in position

Moorings contribute greatly for berthing and Unberthing of the vessels. Moorings can provide great assistance while berthing and Unberthing of vessels. Also the vessels are to be securely moored and kept alongside during loading and discharging. Movement up and down the jetty can damage the shore loading arms and of course cause pollution.

Holding a ship in position alongside a berth is the responsibility of the ship’s staff. The best way to stay in position is by carefully planning and arranging the mooring layout when berthing.

MOORING EQUIPMENT ON BOARD:
Master has over all responsibility of upkeep of the mooring equipment on board. Chief Engineer is responsible for maintenance and upkeep of mooring winches, motors, automation, brake mechanism and pumps.
Chief Officer is responsible for maintenance, renewal of mooring ropes and wires.
Chief officer is also responsible for routine oiling and lubrication of all parts of mooring machineries.

On board company tankers more than 80000 DWT only mixed filament ropes shall be used.
Routine risk assessment shall be carried out for identification of any safety hazard shall be carried out while preparing the mooring equipment for arrival port. This shall include the operational check of all mooring winches, readiness of all associated equipment and check on the condition and sufficiency of mooring, messenger and other ropes

PLANNING OF MOORINGS

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All the deck officers should read “Effective Moorings” by International chamber of shipping. This is a very helpful guide for the planning and handling of moorings. Masters / Pilot / mooring Master and deck officers are to plan the mooring pattern at each berth and obtain the most efficient mooring that the ship’s equipment and the layout of the berth allows. Mooring practices to be discussed in the Monthly safety meeting and any crew concern to be addressed.

MOORING OPERATION GUIDELINES:
Wire ropes hold a ship in position better than synthetic ropes because they stretch less. All available wire moorings should therefore be used.

Some directional moorings hold the ship in position better than others. They are given below in order of effectiveness.
1st - Breast Lines
2nd - Spring Lines
3rd - Bow and Stern Lines

Breast lines and Spring lines are essential. Bow and Stern lines can be replaced by an equal number of Breast lines if the berth layout so permits.

Use all available wire ropes in this order of priority.
Do not use mixed moorings, i.e. do not use different types of ropes in the same group of mooring breast/spring/head/stern lines). This is because they stretch differently, and the line, which stretches the least, does all the work and will break first. This applies to combination of synthetic (nylon / polyester / polypropylene) as much as to wire/synthetic combination.

Very short moorings are dangerous, because they are liable to break suddenly in case of stress.

Very long moorings are ineffective because they have to take up the stretch and slack in the rope before they restrain the ship’s movement.

The most effective moorings are those which lie close to the direction of the restraining force desired.

As a general rule:
The direction of breast, head and stern lines should be within 30° of the transverse line of the ship.
The direction of spring lines should be within 15° of the ship's fore and aft line.
All mooring lines should be within 30° of the horizontal plane at all states of tide and loading / unloading.

Nylon (synthetic) tails must be attached to wire mooring by Mandal or Tonsberg shackles and should meet the following criteria;
- Length should be 11 metres.
- Proof load of the tail rope to be 25% greater than the wire to which it is attached

To enhance safety of mooring operation the following shall be adhered to:

1) The steam/ hydraulic lines should be fitted with spray guards in way of working areas.
2) The Enclosed spaces containing hydraulic machinery switchboard should be fitted with fixed gas / fire detection and fire extinguishing system.
The definition of enclosed space shall bed as per section 11.1 of “International safety Guide for Oil Tankers and Terminals”.
3) Where the power source is a single hydraulic motor, alternatives are available (spare motor or cross connection fore and aft, or cross connection between port and starboard motors)
4) Routine risk assessment of the mooring arrangements, using form 6.9 and or 6.10 shall be carried out to ensure all anticipated mooring arrangements and equipment ensure safety of shipboard personnel prior every mooring operation. It shall be checked if Equipment layout minimises the risk of injury. Self-stowing drums, which are operated from remote positions away from the area likely to be affected by rope/wire failure, may help to reduce the risk of injury.
11.16 MSDS

Attached for reference are the following MSDS Sheets. Ship’s staff are reminded that the MSDS sheet for the particular grade of cargo being loaded must be obtained from the Shipper / Terminal prior loading:

- Crude Oil H2S less than 0.002%
- Crude Oil H2S more than 0.002%
- Sour Crude Oil
- Sweet Crude Oil
- Diesel oil #1
- Diesel oil Low Sulphur
- Kerosene
- Jet A1
- Unleaded Gasoline
- Gasoline lead less than 0.1%
11.17 CRUDE OIL WASHING, TANK CLEANING AND GAS FREEING

Crude oil washing, tank cleaning and gas freeing are to be carried out strictly in accordance with the recommendations contained in the latest edition of ISGOTT. The actual procedure & arrangements for each of these operations will differ with each vessel and guidance should be taken from the Crude Oil Washing approved plan on board.

All officers engaged in crude oil washing operation must be aware of the IMO Requirement of crude oil washing and the requirement within COW Manual.

Whenever crude oil washing is planned, a comprehensive plan should be prepared for smooth operation, a bar diagram may be helpful means of depicting this plan.

The person in charge i.e.: chief officer should be suitably qualified in accordance with the requirement of flag state administration and any port regulation that may be in force locally or he should have previous experience of crude oil washing with 6 months experience on tanker carrying crude oil.

With respect to the ballasting of cargo tanks, sufficient cargo tanks shall be crude oil washed prior to each ballast voyage in order that, taking into account the trading pattern and weather condition, ballast water is put only into the cargo tanks which have been crude oil washed. In normal circumstances for vessels carrying out crude washing procedures, minimum 25% of cargo capacity shall be crude oil washed every voyage and 100% of the tank capacity shall be covered within a period of 3 months.

While carrying out tank cleaning / COW operations forms 11.14, 11.15, 11.16 and 11.17 must be complied with as applicable.

Before arrival in port where it is intended to crude oil wash, the tank washing system should be pressure tested to normal working pressure and examined for leaks. The system should be drained down after testing to avoid the risk of leaks due to thermal expansion. Any leak found should be made good, after which the system should be re-tested and proved leak free.

Portable tank cleaning machine should not be used for COW.

When tank cleaning heaters are fitted on same line for crude oil washing, they should be effectively isolated from the crude oil washing line and any hydrant type connection on the crude oil washing line should be blanked and valve caps should be fitted.

The oxygen content of each cargo tank to be crude oil washed shall be tested with portable equipment prior to COW and the result recorded in the deck or cargo log. The oxygen content of tanks to be crude oil washed should not be more than 5% Vol. THE TANKS SHOULD HAVE POSITIVE IG PRESSURE.

During Crude oil washing the system must be kept under constant observation so that any leak can be detected immediately, and the action taken to deal with it. When the crude oil washing are being changed over, the pressure in the COW line should be reduced to minimum before any valves on the system are opened or closed, there by minimising the potential for damage due to surge pressure.

Use only Dry Crude oil for washing. Before washing begins, any tanks that is to be used as source of crude oil washing should be partly discharged to remove any water that has settled out during the voyage. the discharge of a layer at least 1 meter in depth is necessary for this purpose.
A notice should be prominently displayed in the cargo and engine control rooms, on the bridge and on the notice board of ships that have crude oil washing system fitted. The following text:

THE TANK WASHING LINE ON THIS SHIP MAY CONTAIN CRUDE OIL. VALVES MUST NOT BE OPERATED BY UNAUTHORISED PERSONNEL.

A Record should be maintained of all COW operations, including the tank washed, the number of machine used, the time washing started and was completed, the washing pattern employed, the washing line pressure, and the method employed to ensure that the tanks were dry.
11.18 SHIP TO SHIP TRANSFER PROCEDURES

11.18.1 When vessel is to perform the STS operation, in addition to these procedures, the ICS/OICMF publication ‘Ship to Ship Transfer Guide (Petroleum)’ shall be referred to for further guidance. All company check lists (Form 11.18 of Form Manual) pertaining to STS operations must be strictly adhered to. The checklists are in compliance with the Standard checklists recommended in the above publication.

VESSEL TO PREPARE THE RESPONSIBILITY CHART FOR EACH OF THE BELOW LISTED EMERGENCIES AND THESE SHOULD BE POSTED IN NAVIGATING BRIDGE DECK, CARGO CONTROL ROOM AND ENGINE CONTROL ROOM AS MINIMUM.

VESSEL TO CARRY OUT AT LEAST ONE DRILL OF STS CONTINGENCIES, WHERE PRACTICABLE, WITHIN 24 HOURS AND IN ANY CASE NOT MORE THAN SEVEN DAYS BEFORE A SHIP TO SHIP TRANSFER OPERATION.

11.18.2 During Ship to Ship (STS) operation, if there happens to be an emergency on either ship, it should be indicated immediately by sounding the agreed emergency signal. All personnel should then proceed to their respective emergency stations.

The emergency signal between both vessels should be as agreed in the “Ship To Ship Transfer Checklist 4 – Before Cargo Transfer” (Form 11.18). The emergency signal should be sounded by either ship in an emergency or in case of communication breakdown during cargo transfer.

11.18.3 PREPAREDNESS FOR AN EMERGENCY

Both the ships shall have following arrangements made:
- Main engine / steering gear in state of readiness at all times for immediate use.
- Cargo pump and all other equipment trips relevant to the transfer to be tested prior to operation.
- Sufficient crew available and all equipments in readiness to drain and disconnect hoses at short notice.
- Oil spill equipment in state of readiness.
- Mooring equipment for immediate use and extra mooring lines available in an event of emergency.
- Fire fighting equipment in state of readiness for immediate use.

Masters of both the ships should jointly ascertain, particularly in cases of fire, whether it is to their mutual advantage for the ships to remain alongside each other.
11.18.4 VARIOUS IDENTIFIED EMERGENCIES

11.18.4.1 IN EVENT OF FIRE

In the event of fire and/or explosion the primary concern of the Master shall be the safety of crew. The Master shall take all actions to mitigate the damage to the vessel and the environment in accordance with procedures specified in FOM section 7.

Additionally following basic actions shall be taken as required and if applicable:
- **Stop the transfer**
- Sound emergency signal as agreed
- Nature of the emergency to be informed to crew on both ships
- Emergency stations to be manned
- Implement emergency procedures as required by company procedures
- Drain and disconnect cargo hoses
- Send mooring gangs to stations
- Confirm that the main engine is in the state of readiness
- Advise the standby boat (if applicable) of the situation and requirements if any.

11.18.4.2 IN EVENT OF OIL SPILL (ACCIDENTAL CARGO RELEASE)

In every case of pollution or likelihood of pollution, the Master shall take all necessary steps to contain the damage.

The Master shall take all actions to mitigate the damage to the vessel and the environment in accordance with procedures specified in:
- a) The ship’s Vessel Response Plan (for tankers trading to USA) and
- b) SOPEP.

Additionally following basic actions shall be taken as required and if applicable:
- **Stop the transfer**
- Sound emergency signal as agreed
- Nature of the emergency to be informed to crew on both ships
- Emergency stations to be manned
- Implement emergency procedures as required by company procedures
- Drain and disconnect cargo hoses
- Send mooring gangs to stations
- Confirm that the main engine is in the state of readiness
- Advise the standby boat (if applicable) of the situation and requirements if any.

11.18.4.3 EMERGENCY DURING MANOEUVRING

In case of an emergency during manoeuvring:
1. Decision should be taken in ample time when situation is still under control
2. Abort the berthing operation if necessary
3. Inform the Master of other vessel about the action being taken
4. Comply with International Regulations for Preventing Collision at Sea
5. Thoroughly investigate and rectify the fault prior to making another attempt
11.18.4.4 **IN EVENT OF GAS ACCUMULATION ON DECK**

The Master shall take all precautions in accordance with procedures specified in the ISGOTT and additionally if the Master thinks that it could endanger the life of the crew on board he shall.

1. Suspend the STS operation
2. Inform the Master of other vessel
3. Do not resume till risk to personnel and vessel is totally eliminated
4. Air Conditioning to be changed over to full re circulation

Additionally following basic actions shall be taken as required and if applicable:

- **Stop the transfer**
- Sound emergency signal as agreed
- Nature of the emergency to be informed to crew on both ships
- Emergency stations to be manned
- Implement emergency procedures as required by company procedures
- Drain and disconnect cargo hoses
- Send mooring gangs to stations
- Confirm that the main engine is in the state of readiness

Advise the standby boat (if applicable) of the situation and requirements if any.