Discharging Plan

Instructions – Refer to SMS Doc	
1.	*To be reviewed and approved by the Master and where applicable the Chief Engineer*
2.	*Circulated and cross checks by ALL officers engaged in the Cargo Operation.*
3.	*Follow the plan and Port specific Discharging Operation Manual without deviation at all time.*
4.	*If an approved Port specific plan is available, this should be followed as per #3 and replicated in to this plan.*
5.	*Whenever review of an approved port specific finds circumstances have changed or it is deemed unsafe, it must be reported to the Office and/or parties concerned on site and never proceed without the approval from the office and/or terminal/cargo buyer or seller's representatives.*

General			
Vessel	LNG Carrier	Voyage No.	2.1
Date		Port	

TERMINAL	LNG Marine Terminal		
PRODUCT/STOWAGE	LNG		
QUANTITY	98.0% = 163,816 m^3 app/ on arrival		
A.P.I / S.F / DENSITY	425.40 kg/m^3		
TEMPERATURE	- 159.3°C		
VISCOSITY	N/A		
POUR POINT	N/A		
REID VAPOUR PRESS	N/A		
SEA WATER DENSITY	1025 kg/m^3		
MANIFOLD CONNECTION	L4 - L3 – V - L2 –L1	Port Side	
DISCHARGE RATE	12,000 m3/h	Shore max. rate	12,000 m3/h
DISCHARGE TIME	Approx. 13.0 h (Bulk) + 2 h (RU & RD)		
POLLUTION CATEGORY	N/A		
UN / MFAG NUMBER	1972 / 1971 / 620		
EXPLOSIVE RANGE	5-16 % by volume		
RELATIVE GAS DENSITY	0.554 (AIR=1)		
T.L.V.	1000 ppm		
FLASH POINT	-175 deg C		

REMARKS:

- Density of seawater and cargo temperature to be confirmed on arrival
- Port side alongside used for cargo system line up
- This plan is subject to change in accordance with lng terminal instructions and mutual agreement
- Max draft at berth: 12.00 m (max arrival draft: 11.50 m).
- UKC > 2.0 m
- min berth depth 15 m maximum trim 3.0 meters maximum allowed list 0.5 degrees
- Vessel to arrive with liquid header cooled down
- Vessel to arrive with cargo tank vapour pressures less than 15. kpa(g)
- Max temperature arrival for CTMS must be within 0.5 C degrees from loading port closing ctm temperature
- maximum allowable pressure on the manifold must not exceed testing pressure on connection hard arms (usually 500 kPa for liquid lines, 200 kPa for vapour line)

Discharging Plan

File:	
Rev. No.	
Rev. Date	
Approved By	

DETAILED DESCRIPTION OF TANK / LINE / VALVE OPERATION	QTY	MAX		DRAFT		TRIM
	ROB	SF	BM	FWD	AFT	
ARRIVAL CONDITION:						
CARGO [m³]:	163816	8.7%	5.0%	10.90	10.90	0.00
BALLAST [MT]:	1513					
FO [MT]:						
DO/LO [MT]:						
FW [MT]:						
CONSTANT [MT]:						
DWT [MT]:						
DEPARTURE CONDITION:						
CARGO [m³]:						
BALLAST [MT]:						
CARGO TRANSFER OPERATION SUMMARY:						
Q'TY TO DISCHARGE [m³]:		To be confirmed				
HEEL TO RETAIN [m³]:		To be confirmed				
STOPPING LEVELS [m] / VOLUMES [m³]:		(Stopping levels are for main cargo pumps)				
TANK No. 1 @		(Levels shown are corrected level for EK)				
TANK No. 2 @						
TANK No. 3 @						
TANK No. 4 @						
TOTAL VOLUME AT COMPLETION [m³]:						

GENERAL NOTES

Prior to any cargo operations being undertaken please refer to Chief Mate's Standing Orders and ensure all pre-arrival checks have been undertaken and completed satisfactorily.

OOW to check that Very High Level Alarm (99%) and Extremely High Level Alarm (99.5%) inhibits are off before commencement of cargo transfer - these alarms must be active during entire discharging. replace board inside CCR and make sure all CCR team members are aware of the same

OOW to ensure that ESD inhibits are off before commencement of cargo transfer - ESD system must be healthy during entire discharging.

All branch valves are to be visually confirmed closed before starting cargo pumps. Opening is allowed only once cargo pump is running with closure of filling valve in the same time.

OOW to be present on manifold, G/E to be present on site (Cargo Tank Liquid Dome vicinity) to confirm cargo pump start, operation of the valves and float level reading during Ramp Up and Ramp Down.

During cargo transfer cargo tank pressure and cargo tank levels to be constantly monitored by OOW. It is expected that cargo tank pressure will be controlled by FREE FLOW from shore side. Cargo tank pressure to be maintained around 10 kPa.
Adjust CG075 accordingly. Report any abnormality to C/O.

OOW should not hesitate to activate ESD if situation requires to do so. ESD system should be activated in the following (but not limited to) situations:

- Major cargo vapour / liquid leak
- Fire / explosion on board the vessel or in terminal
- Unexpected major increase of cargo tank pressure
- Unexpected major increase of manifold pressure
- Unexpected increase of cargo tank level
- Uncontrolled venting
- Breakdown of cargo containment system or cargo machinery
- Failure of moorings

Any other situations which require immediate stoppage of cargo transfer.

Keep recording events in designated books/sheets, both manually and electronically, as applicable.

GCU will be running on arrival to control cargo tanks pressure.

Density of sea water (1.025 t/m³ expected) and cargo temperature to be confirmed on arrival.

Port side alongside used for cargo system line up.

Trim to be visually checked and verified against the LODIC readouts and CTS (inclinometer) values. Any errors observed must be brought to Chief Mate's attention.

- Refer to MSDS posted in the CCR and attached to this plan for all relevant information regarding flammability and toxicity, hazards of the cargo, first aid and fire fighting measures and action to be taken in the event of a spill.

MOORING:

The vessel shall be berthed PORT alongside
All Officers involved in the mooring operation shall familiarise themselves with the Terminal Information.
To note that as per Optimoor studies specific to this vessel, mooring arrangement will be, 3-3-2 FWD and 3-3-2 AFT. Total of 16 lines in use. There is no mooring boat, as per terminal procedures lines shall be fed one by one using messenger lines.
Split drums will be utilised for all mooring lines. Mooring crew is to be kept closely supervised during whole mooring operations to ensure tasks are carried out in a safe manner. Please ensure that you familiarise yourself

with the anticipated mooring arrangement prior to arrival.
There will be no adjustments on split drums until permission is granted from the Master.
You should also be familiar with the contents of Mooring Procedures in the Safety Management System manual and ensure that mooring practices conform to these guidelines and to the Code of Safe Working Practices and the OCIMF Effective Mooring booklets.
The winches are to be tested during pilotage and are to be reported to the bridge when checked. Also they are to be checked prior to sailing and this is to be reported to the bridge.
Once Pilot on board, mooring arrangement should be discussed with Master and you will receive final instructions.
When the vessel is all fast, please confirm that all mooring winch split drums have been correctly arranged, prior to standing down (minimum of 8 full turns and not more than one complete layer on the tension drum).
Also check all winches are out of gear with the clutch engaging handle safety pins in place.
Officer should check and confirm that all hand brakes are set to 60% MBL as per indicator.
Anchors have to be unlashed, guillotine bar down with the pin out. Duty Officer has to check the correct tension is set on all the ropes.
After mooring operation has been completed, fit Samson rope protection cover inside fairleads to protect them from damage.
Fire wires are not required.
Shore gangway is provided, ensure that is safely rigged.
Make sure that Gangway Log is completed and OOW to check this once per watch.
Draught checks: One deck officer to check forward draught visually before leaving mooring station. For checking the ships aft draught, the OOW will go ashore to read this, first confirm with the shore if ok to do so. Visual draughts Fwd and Aft are to be compared against gauges and Loading Computer on arrival and before sailing. This will be recorded with the cargo information for comparison.

After vessel has been safely moored, wait for bridge confirmation “Finished with Engine” before shore gangway can be placed.

SAFETY INSPECTION:

Prior to safety inspection, OOW to check that manifold dry powder monitor valve is open.
Safety inspection will be carried out by Terminal representative, accompanied by duty Officer.
Duty Officer shall meet Loading Master on the Gangway or in the Conference Room.
Following the safety inspection, the communication will be tested assisted by the Electrician and then there will be a Pre-Discharge meeting in the Conference Room.
ESD cable connection should be done by ETO, arm connection and disconnection will be supervised by Cargo Engineer, at the manifold. The cable shall be secured to the ship’s side rails by means of a light but secure lashing, ensuring the cable hangs in a loose bight. The cable must not be bent over.
Prior to connecting the arms, the water curtain valves are to be opened & GS pump should be started.
Permission shall be given before start-up of water curtain, because some terminals are requiring water curtain to be started after all loading arms are connected.
Close anchor washers to provide more pressure for the water curtain if required.

SAFETY NOTES:

DANGER HIGH VOLTAGE - The High voltage cables (pink cables) under the Trunk Deck rise in a pipe at the aft end of each Liquid Dome. These will energise as the cargo pumps are started. All personnel should keep well clear of them. DO NOT APPROACH THESE PIPES OR THE JUNCTION BOXES. For this reason, when carrying out your rounds, access in the dome area should be on the catwalks only. You can easily see the dome from this position.
DANGER CRYOGENIC TEMPERATURES - During cool down and the entire operation the cargo pipelines will be cold. DO NOT TOUCH FROSTED LINES.

OPERATION (GENERAL NOTES)

During cargo discharge, LNG vapour will be supplied from shore by FREE FLOW to maintain pressure in the cargo tanks on about **10 kPa**
The main cargo pumps discharge LNG to the main liquid header and then to shore via the midship liquid

crossover manifold connections.

After an initial rise in pressure, the pressure in the tanks decreases. It then becomes necessary to supply LNG vapour from shore via the manifold and crossover to the vapour header into the cargo tank gas domes in order to maintain a pressure of **10 kPa**, or as agreed at the pre-discharge meeting.

If the vapour return supply from shore is insufficient to maintain the cargo tank pressures at **8 to 12** kPa, it will be necessary to reduce the discharge rate; if necessary the vessel's LNG vaporiser can to be used to supply the additional vapour.

Ballasting is undertaken at the same time as discharging. The ballasting operation is programmed to keep the vessel upright and within the required limit of draught, trim, hull stress and stability following indications obtained from the loading calculator.

During the discharge period, the ship is kept with a stern trim to aid the final part of the discharge.

On completion of discharge, the loading arms and pipelines are purged and drained to No. 3 cargo tank and the arms are then gas freed and disconnected.

Due to the manifold configuration it is necessary to purge the cargo lines using nitrogen at a pressure of at least **300 kPa**. This is done several times to ensure successful draining at the manifold connections.

The vapour arm is normally disconnected and the resumption of gas burning will cope with any vapour generation, or even steam dumping may be required.

Ramp-up and rate down sheet is attached to this plan and it should be passed to the terminal indicating the intended schedule to bringing the pumps on line and the intended stagger as the tanks become empty.

NOTE:

For CTM Purpose if spray pump was running for ship's line cooldown, return of the cooldown liquid to the bottom of the tank via the loading line can give rise to localised temperature increase at the tank bottom sensor. Sufficient time should be allowed for this to stabilise prior to gauging. Stop the pump 5-10 minutes before gauging.

SAFETY NOTE – VENT MAST MODE:

The forward riser vent valve should NOT be in manual mode/inhibited in port. The only exception to this is if it is a terminal requirement which must be recorded in the log.

Safety Note - Procedure for OVERRIDDING the safety / tank protection system:

At no time shall any cargo safety system be overridden by:

- Inhibiting
- Disconnecting
- Bypassing
- Switching off the system
- Any other method, this is to include the level alarms, pressure alarms and temperature alarms.

Should it become necessary to override any of these safety systems both the override and the restoration is to completed by chief officer and the Master must witness this event.

A separate log/Record sheet should be maintained for recording dates/times and the reason for the override and when they are reset/restored. This record acts as the Masters written approval.

In addition to this record as a double check the appropriate section of the print out from the IAS event log must be signed by both the Chief Officer and the Master whenever the system is overridden or restored.

If for any reason this is not possible an extract of the IAS event log for the override / restore is to be printed and

signed and kept with the above log/record.

Whenever the safety system is overridden a notice is to be posted on the IAS operating console warning that the Alarm system is overridden.

While the system is overridden the cargo tanks / system must be monitored until the alarm system is brought back to normal status.

The system shall be returned to normal status as soon as possible.

SAFETY NOTE:

During arm cool down the manifold lines will become cold.
DANGER CRYOGENIC TEMPERATURES - DO NOT TOUCH FROSTED LINES!!!

SAFETY NOTE:

A Watch Keeper must patrol the whole Trunk Deck area during Arms & Line Cool down and during Ramp Up Operations to monitor for all potential cargo leaks. All leaks, even the smallest one, must be reported immediately to CCR.
Whenever the Chief Officer or Gas Engineer are present in the CCR, the OOW can periodically make additional rounds of moorings, trunk deck, manifold, gas house and over the ship's side.

In any case, thorough rounds to be made by the relieved OOW at the end of the watch and recorded in the deck log book.

This plan is subject to change in accordance with

LNG Terminal instructions and mutual agreement.

1. ARRIVAL

- Start main Cargo and Ballast hydraulic pumps. Stop Topping-Up pumps.
- Water ballast lines filled with water
- Shipôs trim and list adjusted to be even keel and up right
- CTMS trim/list readings set to óAutoô
- Change status on CTS from ñSeagoingò to ñHarbourò
- CTMS snapshot at EOSP and POB
- Loading computer confirmed online and óAt seaô mode
- Clocks synchronized
- Shipôs impressed current system switched off
- Inform engine when óAll fastô
- Setting of Warning Buoys by shore (if applicable)
- Connecting shore gangway aft of the manifold
- Water curtain started on terminal request
- Manifold drain scoops swung out
- Confirm that TOPS very high (99.0%) and (99.5%) level alarms are unblocked, and alarm delay set up to 0 (zero)
- IAS and CTMS snapshot schedule changed to hourly printing
  - Connecting ESD/communication link (Fibre Optic and/or Pneumatic)
- Checking ship/shore communication system:
- Setup Tension Monitor ï separate station provided by terminal
- Safety Round (Deck Officer to accompany shore representative)
- Lower Whessoe gauges and record stored and actual levels
- Pre-Discharging Meeting and Safety Documentation (all cargo loading procedures and precautions to be discussed)

2. PRE ARRIVAL CARGO LINE COOL DOWN (expected duration 2 hrs)

COOL DOWN OF THE LIQUID HEADER TO BE CARRIED OUT BEFORE ARRIVAL (TARGET TEMPERATURE -100°C or LESS)

Duties:

- C/O ï in charge of operation, starting/stopping spray pump
- G/E ï on deck, operating manual valves as required
- Remaining crew ï pilotage, mooring operations

Preconditions:

- Confirm: TOPS system is active, and all delays are removed
- Double check line up by C/O and G/E, make entry in cargo log book
- Confirm: All doubleshut valves are shut
- Confirm: All unused manifold flanges are fully bolted and pressurized with nitrogen
- Confirm: All manifold coold down valves are fully shut

Initial valve setup:

- Branch valves (CL107, CL207, CL307, CL407) ï open
- Filling valves (CL200, CL300) ï shut
- Filling valves (CL100, CL400) ï open 15%
- Pump discharge valves (CL101, CL102, CL201, CL202, CL301, CL302, CL401, CL402) ï shut
- Reliq return (RL041, RL301, RL401) ï open
- Spray master valves (CS103, CS203, CS303, CS403) ï shut
- Spray return valves (CS103, CS203, CS303, CS403) ï shut

- Spray discharge valves (CS101, CS201, CS301, CS401) ï shut
- Spray to liquid crossover (CS071, CS703, CS705, CS803, CS805) ï open

Start spray pump #2:

- G/E to stanby locally at tank dome #2
- Open spray return (CS200) ï 100%
- Open spray discharge (CS201) ï 20% - to remove interlock
- Inform E/R
- Start spray pump
- Gradually close spray return (CS200) to increase pressure in spray header up to 200kPa

Cooling down:

- Open on each tank main cargo pump discharge valves 20%, when temperature on liquid header is below -100C to allow cooldown of pump discharge lines
- Also open for short time filling valves on CT #2 and #3 - 20% to cool down liquid return lines
- Liquid header cool down is completed when -100C or less is reached on crossover and liquid header
- Continously monitor cargo tank levels

Stop spray pump:

- Start closing spray discharge valve
- At the same time stop pump
- Close spray return valve

3. CARGO ARM CONNECTION

Duties:

- C/O ï standby in CCR, carry out pre-operation meeting.
- Duty Officer ï standby in CCR.
- 1/O ï carry out safety round with loading master.
- G/E ï on manifold, supervise cargo arm connecting, line purging, pressure tests, ESD cable connection.
- Trunk deck watchmen ï on manifold, assisting G/E.
- Mooring watch ï Escorting visitors to CCR.
- Manifold watch ï on manifold, assisting G/E.

Arm connection:

Expected shore arm ï manifold configuration:

Ship	L4	L3	V	L2	L1
Shore	Liquid E	Liquid D	Vapour C	Liquid B	Liquid A

- Connecting hard arms (O_2/leak tests). G/E to assist on the manifold.
- Vapour arm to be connected first
- Arms purging and leak testing (500kpa liquid line, 200kpa vapour line)

  - » Open manifold vent valves on lines in use
  - » Supply N_2 into arms ï open N_2 supply valves
  - » Close N_2 supply valves
  - » Measure O_2 contents (less than 1% required) on the sampling points
  - » Repeat procedure until required O_2 value is observed
  - » Close manifold vent valves

4. OPENING CTMS

- Drain liquid header into cargo tanks
- Confirm: Vessel is up right and even keel
- Confirm: Trim/list readout is in auto mode
- Confirm: Cargo data and voyage settings
- Confirm: Unloading mode is selected
- Confirm: All ESD valves shut
- Confirm: Gas burning stopped
- Record cargo float gauges readings
- Open CTMS
- Printout gas flow meters

5. WARM ESD TEST

Duties:

- C/O ï CCR, Supervise operation.
- 1/O ï CCR, Carry out ESD tests in liaison with Loading Master.
- G/E ï at manifold, confirms operation of ESD valves, measuring closing time.
- Duty officer ï CCR, taking records.
- Trunk deck watchman ï as required.
- Mooring watchman ï checking moorings, escorting visitors to CCR.
- Gangway watch ï security watch at gangway.
- Manifold watch ï assisting G/E as required.

Fibre Optic ESD: Ship initiate

Preconditions:

- Confirm: All double shut and cooldown valves port and stbd are fully closed
- Confirm: Fiber Optic is selected in ESD cabinet
- Confirm: Port side is selected on fibre optic console
- Confirm ship/shore link is healthy, if not press RESET on Optic console and/or confirm with loading master terminal readiness
- Confirm: ESD inhibition is on
- G/E to be ready at manifold

Procedure:

- Open ESD valves on connected manifolds
- Remove ESD inhibition
- Wait for terminal countdown / ships countdown
- Activation of ESD
- Record valve closing time

Reset ESD system:

- Inhibit ESD
- Reset each manifold valve
- Reset cabinet
- Confirm terminal is ready

6. ARMS COOLDOWN (expected duration 1.5 hr)

Duties:

- C/O and 1/O in CCR ï in charge of cooldown operation.

- G/E ï on deck at manifold ï operates coold down valves as required
- Duty Officer ï in CCR taking records.
- Trunk deck watch checking lines, port manifold, compressor room, motor room.
- Manifold watch in vicinity of manifold, checking pressure when requersted.
- Gangway watch at gangway.
- Mooring watch checking lines condition, escorting visitors to CCR.

Preconditions:

- Confirm shore tank pressure with terminal
- Confirm ship/shore ESD link is healthy
- Confirm: Water curtain is running
- Remove ESD inhibition
- Open ESD valves (liquid CL041, CL031, CL021 CL01 and vapour CG071)
- BOG valve open (if shore pressure is favourable). Control tank pressure with CG075.

Initial valves setup (using spray pump #2):

- All spray header block and isolation manual valves (CS071, CS700, CS701, CS403, CS303, CS203) - open
- Spray discharge valves (CS101, CS301, CS401) ï shut
- Spray return valves (CS100, CS300, CS400) ï shut
- Spray to liquid crossover (CS035) ï open
- Spray to liquid crossover (CS036, CS025, CS026) ï shut

Start spray pump #2:

- G/E to stanby locally at tank dome #3
- Open spray return (CS200) ï 100%
- Open spray discharge (CS201) ï 20% - to remove interlock
- Inform E/R
- Start spray pump

Cargo arms cooldown:

- Open manifold cool-down valves (CS043, CS033, CS023, CS013) as required in liaison with Loading Master
- Maintain manifold pressure as per Loading Master advice by adjusting spray return valve CS200.
- Take care of sudden rise of pressure on the manifold ï be ready to reduce flow (by opening spray return CS200)
- Start Spray pump No. 3 if one is not enough (liaise with Loading Master)
- During last stage of Shore Arms cool-down it may be required to crack open Crossover Cool down valves (CS025V & CS026V) valves to additionally cool down the liquid header.
- Operation is completed once confirmed by loading master.

Stop spray pump:

- Start closing spray discharge valve
- At the same time stop pump
- Close all cooldown valves.

7. COLD ESD TEST

Duties:

- C/O ï CCR, Supervise operation.

- 1/O ï CCR, Carry out ESD tests in liaison with Loading Master.
- G/E ï at manifold, confirms operation of ESD valves, measuring closing time.
- Duty officer ï CCR, taking records.
- Trunk deck watchman ï as required.
- Mooring watchman ï checking moorings, escorting visitors to CCR.
- Gangway watch ï security watch at gangway.
- Manifold watch ï assisting G/E as required.

Fibre Optic ESD: Shore initiate

Preconditions:

- Confirm: All double shut and cooldown valves port and stbd are fully closed
- Confirm: Fiber Optic is selected in ESD cabinet
- Confirm: Port side is selected on fibre optic console
- Confirm ship/shore link is healthy, if not press RESET on Optic console and/or confirm with loading master terminal readiness
- Confirm: ESD inhibition is on
- G/E to be ready at manifold

Procedure:

- Open ESD valves on connected manifolds
- Remove ESD inhibition
- Wait for terminal countdown / ships countdown
- Activation of ESD
- Record valve closing time

Reset ESD system:

- Inhibit ESD
- Reset each manifold valve
- Reset cabinet
- Confirm terminal is ready

8. DISCHARGING WITH VAPOUR RETURN FROM SHORE

<u>Caution</u>: It is of the utmost importance that the cargo pumps are never allowed to run dry, even for short periods, as this will result in motor failure. A momentary loss of priming during cargo stripping should not be considered the same as running a pump dry. Up to 30 seconds of operation with dry suction but with fluid in the discharge pipe will not damage the pump or the motor.

- On completion of a cold ESD test, operate the following valves:

Position	Description	Valve
Confirm Open	Manifold liquid ESD valves	CL021, CL031, CL041
	Manifold vapour ESD valve	CG071
Open	Tank filling valves CT No. 1	CL100,
Closed	Liquid branch valves CT No. 1	CL107,
Open	Tank filling valves CT No. 2	CL200,
Closed	Liquid branch valves CT No. 2	CL207,
Open	Tank filling valves CT No. 3	CL300,
Closed	Liquid branch valves CT No. 3	CL307,
Open	Tank filling valves CT No. 4	CL400,
Closed	Liquid branch valves CT No. 4	CL407,
Open	Spray Master Valve to CT No. 4	CS-403
Close	Spray line bypass to CT No. 4	CS-404
Close	Spray Return Valve CT No. 2	CS-200
Confirm Open	One Spray nozzle in CT No. 4	CS-407
Once granted permission by Berthing Master:		
Open	Manifold double shut valves	CL023, CL033, CL043

Position	Description	Valve
Close	No. 2 cooldown valve	CS023
Close	No. 3 cooldown valve	CS033
Close	No. 4cooldown valve	CS043

Position	Description	Valve
Open	Vapour crossover valve	CG075

Discharge will commence from No. 2 tank, then No. 3 tank, followed by No. 4 tank and then No. 1 tank.

Eight (8)-step Manual Sequence cargo pump (tank by tank) starting is proffered method by terminal to utilised to commence cargo discharge.

To start the pumps undertake the following and refer to CRAGO PUIMP STARTING SEQ C/L:
- Place both pumps (P & S) onto STBY
- Check that both pumps have been set for MAN operation
- Check:

o Power supply to pump on
o Liquid level above minimum depth required (2m)

Pump start
When using the MANUAL SEQUENCE START with 8steps the liquid branch valve and filling valve are manually controlled. When a sequence is initiated the following operations take place:

- Confirmation of cargo pump start available
- Cargo pump discharge valve open to 15% opening
- Filling valve opens to -100% (the first pump only)
- Liquid branch valve close to O%

Start first pump by locating cursor on "START" and using control bar.

Once the confirmed all in order , the first pump is running, recirculating back into the cargo tank, confirmed with shore terminal they are ready to receive cargo, start opening branch valve and start closing filling valve

Discharge Start
The discharge from the pumps will now be directed to the discharge manifold.

- Carry out these procedures for the remaining 3 tanks.

The Order of cargo Tank to discharge in 8 step MAN SEQ as per " Discharge Sequence:

CT 2 > CT > 3> CT 4 > CT 1

Once all pumps running, carry out safety rounds on all deck, confirm all in order, check with Terminal all in order.

Upon confirmation all in order, resume increasing each cargo pump by 2 Amps, by placing cursor on "U" button and pressing ON for each Amp increase required

Observe the pumps amperes and discharge pressures during the operation.
Adjust the pump discharge valves to maintain operations at the rated amperes / flow rate.

CT 4 = 58 Amps, CT 3 = 59 Amps, CT 4 = 59 Amps, CT 1 = 50 A mps

Discharge Rate agreed on Ship/Shore Meeting 12,000 m3/hr

Caution: Do not exceed the maximum rated current by 50% for more than 2 or 3 seconds when the tank is full. If the running current after this time is more than 150% above the maximum rated current, the overcurrent trip will be activated and the pump stopped. Determine the cause of high current (possible blockage) before attempting to restart.

Start the remaining of the cargo pumps according to shore terminal requests. Once all the pumps are in operation adjust the discharge valves to obtain the required flow or pressure. The theoretical load (amps) of the cargo pumps at full capacity is 59 amps when discharging LNG with an SG of 0.425.

The loading on the pumps when running at their minimum continuous flow rating of 600 m^3/h is < 40 amps.

Request the shore terminal to supply return gas to the ship. Control the vapour header pressure on valve CG075 if on free flow from shore, this is usually required before the second tank is put on line. Ensure that the shore vapour pressure is not significantly higher than that on the ship

before valve CG075 is opened.

Maintain the tank pressures at approximately 10 kPa during discharge.

COMMENCE OF DISCHARGING OPERATION (RAMP UP)

Duties:

- Master ï present at CCR during Ramp Up ï overall supervision on operation.
- C/O and 1/O in CCR ï in charge of ramp up operation.
- G/E at tank liquid domes ï supervising starting of pumps and confirming valve position
- Duty officer in vicinity of manifold
- Trunk deck watch checking lines, port manifold, compressor room, motor room.
- Manifold watch in vicinity of manifold, checking pressure when requersted.
- Gangway watch at gangway.
- Mooring watch checking mooring lines condition.

Preconditions:

- Confirm: shipôs line is in cold condition (temp < 100C).
- Confirm: ESD system is enabled.
- Confirm: Tank protection system (TOPS) is active and any delays removed.
- Confirm: E/R is ready for starting cargo pumps.
- Confirm: ESD valves and double shut valves on unused manifolds are fully shut.
- Advise E/R before starting first pump.
- Cargo pumps will be started in following sequence of 8 steps as **Terminal preffer 8 steps** and agreed during pre-discharging meeting: **#2 → #3 → #4 → #1.**

Initial valves lineup:

- Manifold cooldown valves stbd (CS042, CS044, CS032, CS034, CS022, CS024, CS014, CS012) ï shut
- Manifold cooldown valves port (CS041, CS043, CS033, CS031, CS023, CS021, CS011, CS013) ï shut
- Doubleshut valves (CL043, CL033, CL023, CL013) ï fully open
- Confirm unused doubleshut valves are fully closed
- ESD valves (CL041, CL031, CL021, CL011) ï open
- Branch valves (CL407, CL307, CL207, CL107) ï shut
- Filling valves (CL400, CL300, CL200, CL100) ï open
- Pump discharge valves (CL401, CL402, CL301, CL302, CL201, CL202, CL101, CL102) ï shut

4 STEPS #2 → #3 → #4 → #1 (for reference only)

Discharging of cargo tank procedure (single step). Replace x with tank number:

- Request terminal permission for starting first pump
- Open discharge valve on first pump (CL x01) to 15%
- Confirm there is no interlock
- Start first pump in recirculation
- Wait 3 minutes until current and pressure stabilize
- Request terminal permission for starting second pump
- Open discharge valve on second pump (CL x02) to 15%
- Confirm there is no interlock
- Start second pump in recirculation
- Wait 3 minutes until current and pressures stabilize
- Request permission to send cargo to terminal

- Open branch valve (CL x07) ï 100%
- Close filling valve (CL x00)

OR

8 STEPS #2P → #3S → #4P → #1S→#2S → #3P → #4S → #1P

Discharging of cargo tank procedure **TK no. 2 port**:

- Request terminal permission for starting first pump
- Open discharge valve on first pump (CL 201) to 15%
- Confirm there is no interlock
- Start first pump in recirculation
- Wait 3 minutes until current and pressure stabilize
- Request permission to send cargo to terminal
- Open branch valve (CL 207) ï 100%
- Close filling valve (CL 200)

Continue cargo tank above procedures for remaining cargo tanks:
#3S→ #4P → #1S→#2S → #3P → #4S → #1P

Rump-Up operation:

- Start cargo pumps as agreed sequence
- Once all pumps are running, start increasing flow up to full agreed rate (around 10500m3/hr) by adjusting each cargo pump discharge valves.
- Observe pump current < 50A.
- Observe pump discharge pressure > 500 kPa.
- Monitor manifold pressure and cargo tank leveles during ramp up operation
- It is expected that cargo tank pressure will be controlled by **FREE FLOW FROM** shore side. Adjust **CG075** accordingly to keep tank pressure around 10kPa.
- If shore cannot return vapour for any reason, utilize LNG Vaporizer (outlet temp app.-140C adjust flow to maintain pressure inside CT app. 10 kPag
- However, for reference only if shore is using RGB blower keep CG075 fully open all time.
- Full Rate - Maximum manifold pressure 5 bars.

9. BULK DISCHARGING / BALLASTING (expected duration 15 hrs)

Duties:

- Duty officer ï in CCR ï supervise discharging and ballasting operation, record keeping, carry out safety round at the end of watch.
- C/O or G/E or 1/O ï accompany and supervise OOW in CCR and assist as required.
- Gangway watchmen ï security watch at gangway.
- Manifold watchman ï patrolls manifoild area, check pressure on regular basics, monitos ship's position.
- Trunk deck watchman ï pattrolls trunk deck, port manifold area, compressor room and motor room. Checks liquid, vapour and hydraulic lines for any leakage. Assist mooring watchman during lines adjustments.
- Mooring watchman ï checks ship's mooring lines on regular basics, carry out mooring adjustments (**always liase with CCR and Jetty Control during changing tides**), escorts visitors to CCR. Regulary checks if ship is touching fenders.

Bulk discharging:

- Observe pump current < 60A.

- Observe pump discharge pressure > 500 kPa.
- Maintain rate and stagers required for ramp down
- Keep the vessel upright and trim by the stern as per discharging plan
- Monitor ships position and mooring lines tension
- Make sure that the vessel is touching fenders all the time
- Fill up cargo records as required
- Confirm ballast line is filled up with water **SLOWLY** in order to avoid water hammer
- Start ballasting once we achieved full rate
- At any time if in doubt of the ballast tanks readouts accuracy, manual soundings by the watchman have to be carried out, and LOADIC computer manually updated.
- **Do not try to close any of Sea Chest valves, as it can cause machinery trip / blackout.**

10. BALLASTING INSTRUCTIONS

IMPORTANT NOTE:

Please ensure that ballast piping is filled up with water gradually prior to commencement of ballasting/de-ballasting - to avoid damage to ballast GRP piping, regardless of intention to gravitate or actually pump ballast water. Please do not hesitate to seek advice if in doubt about condition of piping (full or empty), as "water hammer" effect can cause serious damage to equipment and concurrently with that - serious commercial implications.

Filling ballast lines:

- Open 2547V, 2543V for port and stbd ballast line.
- Open 2546V, 2542V ï initially 10%.
- Open 2546V, 2542V ï increase by 10% every few minutes until 100%.
- Observe pressure on ballast lines, should slowly rise to about 40kPa (depends on shipôs draft).

Ballasting by gravity:

- Confirm that ballast lines are filled with water.
- For port ballast line ï open 2546V, 2547V.
- For stbd ballast line ï open 2542V, 2543V
- Open valves on selected tanks for ballasting.

Ballasting by pumps:

- Confirm with ECR that sufficient power is available.
- For port side: 2541V, 2540V, 2559V ï fully open.
- For stbd side: 2530V, 2531V, 2556V ï fully open.
- To use ballast pump #2 ï additionally open 2552V or 2551V as required.
- Open suction valves on selected pumps (2546V or 2544V or 2542V) to 100%.
- Open discharge valves on selected pumps (2550V or 2549V or 2548V) to 18%.
- Once interlock disappear ï start first pump.
- Set discharge pressure to around 400kPa by adjusting discharge valve.
- Wait 5 minutes.
- Once interlock disappear ï start second pump.
- Set discharge pressure to around 400kPa by adjusting discharge valve.
- Now two ballast pumps are running in recirculation.
- Confirm valves on selected ballast tanks are open and lines are filled with water
- For ballasting port side open 2537V and close 2540V
- For ballasting stbd side open 2534V and close 2531V
- Observe pumps discharge pressure (keep above 380kPa) and motor current.
- Adjust discharge valves as required.
- Correct list by adjusting pumps discharge valve.

Aim to complete bulk ballasting about 1 (ONE) hour prior Rate Down. On completion bulk ballasting the vessel will be brought to approximately 2.50 m trim by the stern & to upright condition.
Trim to maintain at the end of discharging max 2.50 m AS (do not excess max. allowed draft 12.0 m)

11. COMPLETE OF DISCHARGING OPERATION (RATE DOWN & H/O)

Duties:

- Master ï present at CCR during Rate Down ï overall supervision on operation.
- C/O and 1/O in CCR ï in charge of Rate Down operation.
- G/E in CCR ï adjuting CG031, reliq flow to keep steady tank pressure
- Duty officer on trunk deck to confirm valve positions.
- Trunk deck watch checking lines, port manifold, compressor room, motor room, latter standing by on d/shut valves.
- Manifold watch in vicinity of manifold, checking pressure when requersted, latter standing by on d/shut valves.
- Gangway watch at gangway.
- Mooring watch checking lines condition.

Preconditions:

- Select Reliq. Mode Selector on Ballast condition, manual, set point 2800 kg/h.
- Give 1 hour notice to Terminal and E/R for RD
- Give 30 min notice to Terminal for RD
- Follow provided RD sheet
- Once vessel achieve rate down quantities, start reducing cargo pumps capacity to minimum flow (discharge valve position around 20%, current 38-40A).

Rate down sequence:

C/T #1 → C/T #2 → C/T #3 → C/T #4

Rump Down and Heel Outr Proceduress

01. Arrange vessel to be trimmed close to 3.0 m by the stern. Aft draft to not exceed max of 12.0 m.

02. Start CT1 Stripping pump when liquid level in CT1 is approx. 2.50 m and transfer cargo through spray line to CT4 in order to cool down spray line. Before that check CS011, CS072 & CS404 to be open and check CS071, CS701, CS702, CS704, CS706, CS801, CS802, CS804, CS806 to be close. Maintain pump on minimum and partially to ran on recirculation by keeping non return valve open and partially trough whole line by keeping spray return valve on CT4 crack open.

03. Start the Stripping Pumps in Cargo Tanks No 2, 3 & 4 when the cargo level as well is 2.50m (shortly after Striping pump No.1 and when is spray header cold). Circulate the stripping pumps into each tank. Double check CS011, CS072 & CS404 to be open. Open CS071 valve.

04. Slowly start closing spray return valves (up to full) to increase pressure in spray header to be above manifold and cargo main crossover pressure (about 5bars) prior come to next step.

05. Open gradually the necessary manual cool down valves CS701, CS702, CS704, CS706 if starboard side or CS801, CS802, CS804, CS806 if port side and discharge through spray line to shore. Approximate time after stop the last cargo pump until heel out is 2-3 hours.

06. First pump in each cargo tank to be stopped at 0.60 meter cargo raw level (Rump down sequence 1-2-3-4)

07. Gradually throttle the cargo pumps discharging valves at cargo level approx. 0.80-0.85 m and once cargo pump current starts reducing. Minimum closing position of discharge valves allowing smooth pump operation is 15% depending on cargo level into the tanks.

08. STOP second Cargo Pump in each Cargo Tank when the load current is reduced to 33 A (Low Current trip set point is 32 A) or when discharge pressure drop below 500KpA. Do not hesitate to minimize cargo pumps discharge valve even up to 10% by using pulse down control. This should allow to discharge each cargo tank by main cargo pump to raw level approx. 0.20 m (or approx. 100m3 per tank).
The minimum allowable flow at continuous running for Cargo Pump is 600 m3/hr. The corresponding amperage for this Flow rate can be derived from Pumpôs performance curve in relation with cargoôs density. For present cargo this value is 36 amperes.

09. When remain last main Cargo Pump running in CT.4 close 2 double shut valves and left only one open to minimize possible cargo return from shore side. And just before last cargo pump stopped send G/E to be st/by on last Double Shut Valve and immediately after stopping last pump CLOSE last manifold double shut manual valve.

10. After all Main cargo Pumps stopped and Manifold Double Shuts closed start draining liquid header by opening first in CT.1 to drain fwd part of header, then open filling valve in CT.2 for 10min, then CT.3 for 10min and last CT4 and left all of that open till end. Like this you will avoid to all liquid from cargo header drain in only one tank and avoid additional time for pumping out by striping pump (Liquid header capacity=60-80m3 , Spray Pump Cap.=60m3 rated flow)

11. During last hour striping CT , monitor discharge pressure and load and control Striping Pump by closing Discharge Valve.

12. Stop the stripping pump in each Cargo Tank when the load current is 29-30 A (Low Current trip set point is 28 A). Stripping sequence should be CT1 - CT2 - CT3 - CT4.

13. For closing CTMS keep vessel trimmed close to 3.0 m by the stern. Like this you will avoid losing reading for level in CT.

Minimum CTMS measurable level for CTK1, CTK3, CTK4 25 mm and for CTK3 26 mm (charterer requirement minimum 35mm).
Condition for Closing CTMS (related to trim) to be agreed in advance to have measurable level in each CT.

Cargo quantities on rate down:

C/T #4	C/T #3	C/T #2	C/T #1

Stopping levels for first pump:

C/T #4	C/T #3	C/T #2	C/T #1

Expected quantities upon completion of Rump Down:

C/T #4	C/T #3	C/T #2	C/T #1

Expected quantities upon completion of Heel Out (If CTMS Closing with 0m Trim):

C/T #4	C/T #3	C/T #2	C/T #1

Total on completion of discharge	
Total cargo on departure	

12. ARMS DRAINING and PURGING

Duties:

- C/O or 1/O in CCR.
- G/E at manifold ï assisting shore personnel.
- Duty officer in CCR.
- Trunk deck watch checking lines, port manifold, compressor room, motor room.
- Manifold watch ï assisting G/E as required.
- Gangway watch at gangway.
- Mooring watch checking lines condition ï assisting G/E as required.

Valve lineup:

- Spray master valves (CS105, CS205, CS305, CS405) ï open
- Spray nozzles valves (CS106, CS107, CS206, CS207, CS306, CS307, CS406, CS407) ï open
- Spray return valves (CS103, CS203, CS303, CS403) ï open
- Reliq return to tanks (RL041, RL301, RL401) - open
- Reliq return to spray header (RL042) ï shut
- Spray header to crossover (CS071) ï open

Arms purging and draining

- Close liquid manifold ESD valves and double-shut valves
- Commence pressurizing linesôsection with Nitrogen - open N2 supply valves

- Open manifold by-pass cool-down valves, close after pressure drop
- Open manifold linesô purge (drain) valves and measure LEL content.
- Repeat procedure until required HC value observed
- Close manifold by-pass (cool-down) valves after pressure drop
- Close vapour ESD valve
- Open N2 supply valve ï pressurize the section (pressure to be 1 bar)
- Open manifold vapor ESD by-pass valve ï depressurize section
- Close vapor ESD by-pass valve
- Open vapour vent valve chock
- Measure LEL content
- Repeat procedure until required Methane content is observed

Operating Procedure for Draining Lines

- Liquid lines, including the horizontal part of the manifolds, will automatically drain to tank No. 3. The inclined parts of the manifold are purged inboard with nitrogen.

Note: This manifold draining/purging procedure varies from terminal to terminal.

- On completion of draining the loading arms close the liquid manifold ESDS valves. The ESD system will have to be put into override mode with the terminalôs permission, switch the ship/shore link selection in the CCR from USE to NOT IN USE.

Ensure the vapour return valve remains open.

Position	Description	Valve
Close	No. 2 port liquid manifold ESD valve	CL021
Close	No. 3 port liquid manifold ESD valve	CL031
Close	No. 4 port liquid manifold ESD valve	CL041

- The shore lines are now pressurised at 300kPa with nitrogen.
- Purging through the manifold ESD bypass cooldown valves CS021, CS031 and CS041. Repeat this operation two or three times until no liquid remains in the manifold lines and loading arms.
- Close the manifold double shut valves and open the manifold drain valves and carry out a vapour purge until the HC content is below 1% by volume.
- When gas readings obtained from a portable meter are less than 1% CH_4 per volume at the vent cocks, all valves are closed and the loading arms are ready to be disconnected.

Operating Procedure for Purging the Vapour Arm

Shortly before departure:

To purge the vapour line connection:

Position	Description	Valve
Close	Vapour manifold ESD valve	CG072
Open	Vapour manifold ESD bypass valve	CG074
Open	Vapour crossover valve	CG075

-
- Purge the vapour line with nitrogen from the shore terminal at a pressure of 300 kPa.
- Confirm that the gas content is less than 1% by volume at the drain valve.

After confirming that the gas content is less than 1% volume, close the cooldown valves, reopen the manifold drain valves to depressurise the arms in readiness for disconnection.

- Disconnect the vapour arm.

- Prepare the cargo system for gas burning at sea.
- Carry out the final custody transfer.

Resume BOG burning to the boilers as soon as the CTS is complete and the surveyors are satisfied with the figures.

13. CLOSING CTMS

- Drain liquid header into cargo tank #3
- Confirm: Vessel is up right and even keel
- Confirm: Trim/list readout is in auto mode
- Confirm: Cargo data and voyage settings
- Confirm: Unloading mode is selected
- Confirm: All ESD valves shut
- Confirm: Gas burning stopped
- Record cargo float gauges readings
- Close CTMS
- Printout gas flow meters

14. CARGO ARMS DISCONNECTION

Duties:

- C/O ï standby in CCR, carry out post-operation meeting.
- Duty Officer ï standby in CCR.
- G/E ï on manifold, supervise cargo arm disconnection, ESD cable disconnection.
- Trunk deck watchmen ï on manifold, assisting G/E.
- Mooring watch ï Escorting visitors to CCR.
- Manifold watch ï on manifold, assisting G/E.

Disconnection:

- Confirm: All ESD valves and cooldown valves are shut
- Starting with liquid lines. Last one vapour arm.
- Stop water curtain
- Secure and tight flanges on manifold
- Disconnect ESD cable.
- Power off ESD cabinet

15. DEPARTURE

- Post-Discharging meeting and documentation exchange
- Switch off ESDS cabinet
- Disconnect shore links
- Change status on CTS from ñHarbourò to ñSeagoingò
- Shore Gangway Off
- Secure float gauges
- Make sure there are no gas locks (keep CG031 15% open, cooldown valves and cooldown crossover valves fully open)
- Change reporting schedule for IAS and CTMS
- Changeover CTMS to seagoing mode
- Switch off hydraulic pumps for ballast and cargo (left only topping pumps)

OTHER OPERATIONS

Stores/spares/provisions are not expected to be received before or after completion of cargo

operations.
SIRE inspection and internal cargo audit are to be carried out during cargo discharging operation

RECORDS TO BE MAINTAINED DURING CARGO OPERATIONS

- Hourly Discharging Rate Calculation - Excel spreadsheet (print every hour)
- Hourly Ballasting Log – set up trough IAS
- CTMS hourly snapshot - set up through SAAB
- Hourly Cargo Operations Log - IAS printer
- Cargo Operations Logbook - all pertinent times to be recorded
- Timesheet
- Discharging Operation Log
- Float gauge vs. radar gauge level comparison
- Stability data-hourly print of summary sheet
- At any salient point or event of interest or concern - print IAS snapshot at any time

EMERGENCY PROCEDURES

During Cargo transfer operations, the vessel is sufficiently protected by automation and alarm systems to hopefully negate the possibility of a major incident. However, there remains the possibility of pipeline failure, relief valve failure, or similar drastic incident, which will require some input from ship staff to minimize the possibility of disaster. **In that case immediately activate ESDS. Do not wait for C/O.**
With any gas tanker, our first means of defence is the ESD. This will stop all cargo related machinery and shut manifold valves. This can be activated from CCR (push the ESD button on CCC) and various locations around the vessel; push buttons at tank domes, manifolds, Fire Control Station, Compressor Room, Motor Room and Bridge. Should a cargo leakage occur, releasing large quantities of vapour, then best course of action following ESD is to immediately start the deck spray pump at ballast console. Although this pump has large starting load, during port operations there should be sufficient power available to allow immediate starting without having first to inform Engine room. Plenty of water around the decks, ESD activated, then we have time to assess the situation & decide course of action. Call C/O.

HAZARDS OF CARGO

Extremely flammable ï follow the guidelines is the Cargo Handling Manual.
ACTIVATION OF ESD
Should a situation arise where an uncontrolled release of LNG occurs, then do not hesitate to use the ESD system. This will automatically stop the shore loading pumps, trip our cargo machinery and close all ESDS valves. ESDS can be manually activated from the following locations:

- Trunk deck right forward at base of foremast
- All cargo tank liquid domes (x4)
- Port &stbd manifold
- Compressor Room
- Electric Motor Room
- CCR console
- Fire Control Station
- Navigation Bridge
- ECR console

UNCONTROLLED VENTING / LNG LEAKAGE– EMERGENCY ACTION

Sound the general alarm and announce release of vapour/liquid over the vesselôs P.A. system.
Activate ESD, muster crew, ready for fire fighting, advice terminal.
Direct visitors ashore or assemble in CCR-Office if access to gangway is dangerous.
Stop all cargo operations ï in a controlled manner to avoid shock loading of systems, otherwise ESD.
Stop all other operations e.g. ballasting bunkering, storing. Any small craft alongside should be

removed.
Deploy and direct the emergency parties as required. Start the water spray pump and fire pump, use fire hoses if required. Close all external accommodation doors.
Try to determine reason for uncontrolled venting / LNG leakage and carry out the control measures.
Engine Room staff to don SCABA equipment in machinery spaces.
Follow release control procedures as for: Toxic Liquid release ï Casualty Manual.
Obligatory report by all means available in the format MOLNG 131.
Chief Officer / Master will make earliest assessment of:
- Location, extent and severity of spill.
- Any structural damage.
- Origin of spill, and is spill continuing after transfer pumps stopped.

In the event of toxic vapour / LNG release from the vessel:

1. Sound the general alarm and announce release of toxic gas or vapour over the vessel's P.A. system.
2. Trigger ESD.
3. Muster crew, if berthed advise Terminal.
4. If berthed: direct visitors ashore or assemble in CCR/Conference Room if access to gangway is dangerous.
5. Stop all cargo operations.
6. Stop all other operations e.g. ballasting bunkering, storing. Any small craft alongside should be removed.
7. Deploy and direct the emergency parties as required.
8. Change over the air conditioning to recirculation and start the water spray pumps.
9. Try to determine reason for uncontrolled venting and place control measures
10. Engine room staff to don SCBA equipment if entering or in machinery space.
11. Close all external accommodation doors.
12. Follow Release Control procedure as for: Toxic Liquid Release - Casualty Manual
13. Obligatory report by all means available in the format of MOL LNG 131.

ACTIONS TO BE TAKEN IN THE EVENT OF SPILL

Refer to MSDS posted in the CCR for all relevant information regarding flammability and toxicity, hazards of the cargo, first aid and firefighting measures and action to be taken in the event of a spill.
Most importantly, prevent oil spill overboard. Use SOPEP equipment available and follow the instructions laid out in the Contingency Manual and SOPEP.
Scuppers are required to be plugged whilst staying on berth all the time, especially when it is raining.
Oil absorbent mat is required to be placed in each drain outlet when it is raining.
Ship is to obtain acceptance from the terminal for disposal of paddled water from deck.

ESD FAILURE

If ESD system fails, Chief Officer is to be informed immediately.
Terminal operates on Fibre-Optic or Pneumatic (usually not connected) system.
If ESD system fail, shut down should occur. Special attention is to be paid on cargo tanks pressure as pressure will increase. Establish tanks pressure control by all available means (Reliq. Plant, GCU burning or directing vapour to shore if ship's pressure is greater than shore pressure).
Additionally tank protection system in place is via fwd vent mast valve (opening at 23 kPa) and cargo tank safety valves (25 kPa).

FAILURE OF THE CUSTODY TRANSFER SYSTEM

Chief Officer must be informed immediately.
If the CTMS equipment fails, the tank levels can be measured by using the Whessoe float gauges. In

that case the volume calculations and corrections have to be made ñby handò using the tank gauge tables. The gauging tables contain corrections for trim, list and thermal value (level gauge) of each tank in order to give the corrected level and volume in each tank.

LNG VAPOUR LEAKAGE TO THE BARRIERS

Continuous monitoring of gas detection system will alarm upon gas leakage in the barrier.
Pressure rise, caused by warming up of cold vapour inside the barrier, will occur. Excess pressure will be released to Vent Mast through the relief valve. By reducing the tank pressure, leak in the barriers will reduce too. Barriers must be continuously swept by nitrogen.
Chief Officer must be informed immediately.

LNG LIQUID LEAKAGE TO THE BARRIERS

This is a major failure of primary barrier, allowing liquid entering into inter-barrier space. This will cause rapid increase of pressure inside inter-barrier space, alarm on gas detection system, low temperature alarm of inter-barrier space and possible low temperature alarm of inner hull.
Chief Officer must be informed immediately. Liquid leakage to insulation space may result in collapse of membrane - cargo operation must be stopped immediately. Prepare punching device from Amidships Store. Punching device is to be fitted once Whessoe gauge is removed. Primary membrane is to be punch holed for pressure equalization between barrier spaces. Cargo tank liquid may have to be transferred to maintain those limits.

BREAK AWAY FROM JETTY

In case of fire or any other emergency situation ship will be requested to depart as soon as possible.
Emergency signals will be sounded and cargo operation must be stopped if not already stopped by ESD system in use. ESD2 system will be triggered resulting in disconnections of all arms. Stay away from the manifold area. Water spray system should be started in case of fire. Vessel will have to be moved by its own power or using tugs. If operational, engine must be prepared as soon as possible. Assemble mooring teams for unmooring. Gas Engineer and Chief Officer must take care of cargo system.

DAMAGE STABILITY CALCULATIONS:

All related data for various cases of damaged ship's compartments can be found in 'Trim and Stability Calculations' book (grey file, kept in CCR). Alternatively, all data and calculations are available through Loading Computer ShipManager-88, which is also in the CCR, at the right side of the CCR console.

PPE REQUIREMENTS

All personnel on deck must wear following PPE equipment:

- Boiler suits
- Safety helmets
- Safety shoes
- Leather gloves
- 3M eye googles

In addition when approaching manifold platform cryogenic equipment must be worn:

- Helmet with full face shield
- Cryogenic gloves

For details please refer to company PPE matrix posted in CCR.

Cargo plans are only a guide, but give a good indication of the various stages of the operation.

Consult me if in any doubt.

A copy of Ship-Shore agreed Loading Plan is to be inserted after this section.

Signatures				

Chief Officer ↑	Date	Master ↑	Date
Gas Engineer ↑		Gas Engineer ↑	
1st Officer ↑		1st Officer ↑	
3rd Officer ↑		Advisor ↑	