LNG TERMINAL 'REVITHOUSSA'

Marine Procedures Manual

DESFA S.A.

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1. Introduction

1.1 Scope

The scope of this "Manual" is to particularise procedures and regulations to be followed by all LNG ships calling and operating at DESFA's LNG Terminal in Revithousa Island, Greece (the "Terminal") (the "LNG Carrier" or "LNG Carriers") and to provide necessary information before the time of their arrival at the pilot station until their departure from the Terminal's area.

This Manual, which takes also into consideration the General Regulation of Ports No. 18 of 1999 (as amended) of the Hellenic Port Police – Hellenic Coast Guard on the Conditions and Safety Measures of Loading, Discharging and Transhipment of Liquefied Gases ("Reg. no. 18") and industry best practices, acts as supplementary to specific procedures/regulations for the waterfront operations at the Terminal and does not substitute them.

Any revision of this Manual is notified to the local Elefsina Port Authority responsible for maritime safety, security and environmental issues at the Terminal and at Revithousa Island and applies to all related parties.

1.2 General Requirements

An LNG Carrier calling for discharging at Revithousa LNG Terminal shall be capable of safely operating within the limitations of the berth and operate in accordance with all Laws, Decrees, Decisions, Regulations etc of Greece and with the International Conventions that Greece has ratified.

Each LNG Carrier calling at the Terminal must follow the rules and requirements of the "LNG vessel approval procedure" of the Terminal before its first calling.

LNG Users of the Terminal can apply to the Terminal for an LNG Carrier compatibility study, at least thirty (30) days before the subject LNG Carrier's first calling at the Terminal or in advance. Only LNG Carriers which satisfactory pass all steps of LNG Carrier approval procedure can call and discharge LNG cargo at the Terminal.

This Manual is provided to any LNG Carrier applying for approval and/or operation at the Terminal and should be agreed by all users who wish for LNG cargo to be discharged and handled at the Terminal.

In accordance with the requirements of Reg. No. 18, the Terminal has authorised staff (the Terminal Representative) responsible for all LNG Carrier's operation at the Terminal. The Terminal Representative, available for each operation, is the contact person with all related parties for the port approach, berthing and mooring of LNG Carriers at the Terminal,

supervises all the operations and assists the Terminal/LNG Carrier's staff for arising tasks and executes for and on behalf of the Terminal all issues described throughout this Manual.

LNG Carriers calling at the Terminal shall comply with International LNG Vessel Standards, Guidelines and must be designed, constructed, equipped, operated, and maintained so as to remain in compliance with the applicable IMO Gas Carrier Codes and equipment of LNG Carriers carrying liquefied gases in bulk *(IGC Code as incorporated into Greek Law by the Presidential Decree 126/1987 as amended)* at all times and while within the Terminal's berth. Older LNG Carriers may have been constructed or may comply with the predecessors of this code. These codes, supported by the rules of the classification societies classifying LNG Carriers, ensure that items such as the materials of construction, cargo containment system, cargo transfer system, electrical installation, fire and safety equipment and instrumentation are of internationally accepted standards.

All LNG Carriers discharging LNG at the Terminal must be classed by a member of the International Association of Classification Societies (IACS).

Memberhip with a P&I Club, member of the International Group, is also necessary for all LNG Carriers calling at the Terminal. The LNG Carrier must provide to the Terminal the insurance documents proving her P&I membership as well as her Blue Card (as per the Bunkers Convention 2001, which was ratified by Greece and was incorporated into Greek Law by Law 3393/2005 as amended).

The LNG Carrier should have a valid OCIMF *SIRE* not older than 12 months prior to the time of her arrival at the Terminal.

A vessel traffic service shall be provided in accordance with the requirements and recommendations of SOLAS chapter V (Safety of Navigation).

Vessel traffic services (VTS) contribute to the safety of life at sea, the safety and efficiency of navigation and the protection of the marine environment, adjacent shore areas, work sites and offshore installations from possible adverse effects of maritime traffic.

LNG Carriers shall at all times, comply with the International Code of Signals and display flags, shapes and lights as required by the International Regulations for the Prevention of Collision at Sea (as incorporated into Greek Law by the Legislative Decree no. 93/1974).

All LNG Carriers, alongside the Terminal's berth from sunrise to sunset shall put their national flag and the Greek flag.

The LNG Carrier's communication means must fully comply with applicable laws and regulations, as well as being operational such as to be in position to communicate at all times with the Terminal, other ships in the area and authorities in any case and/or in an emergency situation.

LNG Carriers shall have and retain onboard at all times, adequate in terms of quantity and training crew (as required by their flag) with good working knowledge of the written and spoken English language to enable operations to be carried out safely and efficiently, as well as to maintain cargo operations records.

Masters of LNG Carriers should be aware that their LNG Carrier can be the subject to Port State Control and Port Authority inspections to investigate compliance with the requirements of international conventions, such as SOLAS, MARPOL, STCW, ISPS and the MLC. All valid and applicable trading certificates, documents, manuals, publications, and charts as required must be on board the LNG Carrier at all times available for inspection.

1.3 Definitions

DESFA	Hellenic Gas Transmission System Operator.
ESD	Emergency Shut Down (as related to LNG Carrier/shore operations).
ETA	Estimated Time of Arrival.
Exclusion Zone	An exclusion zone established round the jetty within all other LNG Carriers and service craft are not permitted to enter.
Heel	The amount of liquid LNG retained in a LNG Carrier's cargo tank at the end of discharge.
Port Authority	Hellenic Coastguard.
IMO	International Maritime Organization.
Jetty man	The Terminal operator assigned for watch keeping duties on the jetty.
LNG	Liquefied Natural Gas and its principal constituent is methane. It is held at close to atmospheric pressure at a temperature of about –162°C.
Terminal Representative	Authorized by DESFA SA person(s) appointed to represent the Terminal on board and coordinate the communication between Terminal and all involved parties for any LNG Carrier call at LNG Terminal.
MARPOL	International Convention for the Prevention of Pollution from LNG Carriers.

Mooring gangs	People team on mooring boat and on jetty (subcontracted) deploys the mooring lines according to the agreed mooring plan.
OCIMF	Oil Companies International Marine Forum.
PERC	Power Emergency Release Coupling.
PPE	Personal Protective Equipment.
PFSO	Port Facility Security Officer, Terminal Security officer.
QC/DC	Quick Connect / Disconnect Coupler.
LNG Carrier's Agent	The local LNG Carrier's Agent appointed by the LNG Carrier while the LNG carrier is in Greek waters.
Shift Leader	The Terminal employee assigned to manage the shift operators.
SIGTTO	Society of International Gas Tankers and Terminals Ltd.
SOLAS	International Convention for the Safety of Life at Sea.
User	Company authorized to bring Cargo at Revithoussa LNG Terminal and using its facilities.

1.4 Revision

In case of new laws, regulations or technical or other changes taking effect, the Terminal will amend the Manual accordingly. In any case, the Manual will be reviewed and updated every three (3) years.

The latest revised version of the Manual shall be uploaded in DESFA's website.

2. Overview of the Terminal

2.1 Terminal Location/Communication and Technical Parameters

The Terminal is situated in the Gulf of Megara (Kolpos Megaron) on Revithoussa Island (Nisos Revithoussa) and is some 10 nautical miles west of Piraeus, Greece.

Terminal geographical position (jetty head)	37° 57.6' N 23° 24.2' E

Anchorage area (1)	A) 37°57'48''N 23°22'06''E	B) 37°57'48''N 23°22'56''E
	C) 37°57'30''N 23°22'56''E	D) 37°57'30''N 23°22'06''E

Temporary anchorage area for three days plus two additional days, after demand to Elefsina Port Authority.

2.2 General Communications

The Terminal is operated by DESFA S.A., the Hellenic Gas Transmission System Operator.

Addresses:

DESFA S.A. Head Offices

357-359 MESSOGION AV.

GR 15231 HALANDRI ATHENS

REVITHOUSSA LNG TERMINAL

REVITHOUSSA Island

19100 MEGARA

ATTIKI – GREECE

Telephone lines / fax. REVITHOUSSA LNG Terminal

	International call	**fax**
Plant Manager	+30-210-5508001	+30-210-5508201
Terminal Representative	**+30 6943077409** +30 210-5508116	+30-210-5508201

	+30 210-5508137	
Operation Manager	+30-210-5508007	+30-210-5508201
Main Control Room	+30-210-5508142 +30-210-5508006	+30-210-5508144
e-mail address	desfalng@desfa.gr	

2.3 Exclusion Zone

Elefsina Port Authority has declared a 200m exclusion zone around the Terminal's jetty and pilots on other LNG Carriers should be aware of this restriction, so keeping a wide distance from moored LNG Carrier.

2.4 Vessel General Acceptable Parameters

The jetty is suitable for LNG Carriers with following size limitation:

Max Deadweight	130.000 tn
Max Length overall (LOA)	300 m
Min Length overall (LOA)	180 m
Max Draft	11,5 m

2.5 Cargo Reception

The cargo reception is carried out at one jetty on the south-east side of the island and following the procedures for unloading and storage facilities of the Terminal.

Terminal Storage Tanks type	2 underground full containment 9% Ni
Terminal Storage Capacity	2x 65.000 m^3
Max Unloading Rate	7.250 m^3/h
Max Operating pressure at manifold	5 barg
Max cargo temperature	-158 ^oC

2.6 Weather/ Tidal Data/Visibility

The predominant wind direction is from south-west to north-east and the wind speed is Beaufort Force 2 for just over 30% of the year. Winds of up to Beaufort 8 are experienced from time to time, more usually from the north.

On about four of five occasions per year northerly winds can exceed 40 knots. Storm force winds with velocities of 60 knots occur about three or four times per year. In spring and autumn winds are mainly westerly while in summer they tend to be variable.

Calculations made for wave height at Revithoussa provide the following data.

Wind Speed (Beaufort)	**Wind Direction – Wave Height (m)**							
	N	NE	E	SE	S	SW	W	NW
6	0.4	0.4	0.7	1.0	1.5	1.4	1.0	0.6
7	0.6	0.6	0.9	1.4	1.8	-	1.4	0.8
8	0.8	0.8	-	-	2.3	-	1.8	0.9

Tidal Data for Revithoussa LNG Jetty			
		Maximum Current at Jetty	
	Height (m)	Knots	Direction
Highest Astronomical Tide	1.0	Currents are reported to be minimal	
Lowest Astronomical Tide	0		
Tidal heights refer to Chart Datum which is at the level of Lowest Astronomical Tide.			

During strong winds, tidal levels may rise by approximately 0.3 m and surface currents are seldom of concern.

Atmospheric visibility in the area is reduced to less than one nautical mile only on about two or three occasions per year.

2.7 Jetty Facilities

Details and data information for jetty facilities are mentioned in Jetty and Terminal information Att. 1.

2.8 Water Depths at the Berth

Based on LLW datum, the minimum water depth at the berth is 12,7m.

At the berth, the Terminal requires LNG Carrier's Masters to maintain a **minimum Under-Keel Clearance (UKC) of 1.0 metre at all times.**

Bythometric chart of Revithoussa jetty water depth is shown in the appended Figure in Att. 2.

3. LNG Carrier Arrival

All users bring LNG cargo at Revithoussa LNG Terminal should be aware that the Hellenic Coastguard is the governmental authority responsible for all matters regarding safety, security, pollution issues and free pratique.

3.1 Standard LNG Carrier Arrival Procedure

All LNG Carriers scheduled for discharge at the Terminal comply with the following LNG Carrier-arrival procedure.

Via the LNG Carrier's Agent, by email the LNG Carrier's Master gives the Terminal advanced notice of the expected time of LNG Carrier's arrival (ETA) at the following intervals: -

- 72 hours prior to arrival
- 48 hours prior to arrival
- 24 hours prior to arrival
- 12 hours prior to arrival

ETA message of 72 hours prior to arrival should include the following information: -

- Name of LNG Carrier/IMO Nu and contact details: LNG Carrier's Inmarsat No's GSM(mobile), Email
- Name of LNG Carrier's Master
- Quality of cargo and Quantity for discharge (Cargo doc.)
- Arrival draft forward and aft and estimated departure draft

ETA message of 48 hours prior to arrival should include the following information: -

- Cargo and Ballast Handling Procedure
- Annex II (Waste record book)
- ISPS doc and visitor list on board

ETA message of 24 hours prior to arrival should include the following information: -

- status of LNG Carrier's lines on arrival
  pre-cool and drained or warm
- Striping/Heel out requirement

- Storing requirements during alongside
- Verification that there are no unusual temperatures or pressures in any cargo tank, hold or inter-barrier space
- Verification that the LNG Carrier's ESD valves work properly, cargo handling equipment is functioning properly and cargo pipelines have shown no signs of leakage
- Verification that the gas detection system is functioning properly with no unusual readings at any sample point
- Verification that the oxygen concentration in all inerted spaces is at an appropriate level
- Verification that the LNG Carrier's navigational status is in accordance with SOLAS requirements and that the largest scale chart for Revithoussa and its approach is available on board
- Provide information of any LNG Carrier defects that may affect port performance, cargo operations or manoeuvrability, including the need for repairs (if any)
- Verify that the LNG Carrier complies with ISM code
- Verify that the LNG Carrier's Master has acknowledged of Marine Procedure Manual.

The LNG Carrier's Agent should inform the following parties in writing giving the information requested by them:

- Elefsina Port Authority, 24 hours prior to arrival.
- Piraeus Port Authority, Tugs/Mooring Gangs, 24 hours prior to arrival.

Concurrent with the ETA message the LNG Carrier's Master shall report on the condition of the LNG Carrier, in accordance with European Union Directive 2002/59/EC (as amended) and incorporated into Greek Law with Presidential Decree 49/2005 regarding setting up a vessel traffic monitoring and information exchange system. If there is any change in the LNG Carrier's condition that might affect her safety or her cargo, the MLNG Carrier's Master must immediately notify the LNG Carrier's Agent for onward transmission to the Terminal, as specified above.

The arrival message also covers any illness amongst the LNG Carrier crew but if this is irrelevant, the LNG Carrier's Master requests Free Pratique by radio from the port health authorities.

3.2 Notice of Readiness (NOR)

The LNG Carrier's Master or LNG Carrier's Agent on arrival of her LNG Carrier at Pilot Station must give Notice to the Terminal by VHF ch. 68 and/or telephone that she LNG Carrier is ready to proceed at the Terminal for the berthing and unloading operation.
The Terminal Representative will instruct the LNG Carrier accordingly by accepting the Notice for her LNG Carrier to proceed for berthing and unloading operation.

The Notice of Readiness (NOR) states the time and date of LNG Carrier's arrival on Pilot Station is tendered and signed from the LNG Carrier's Master.
The Terminal Representative accepts and signs the NOR after berthing of the LNG Carrier at the time of gangway placement.

4. Port Navigation - Marine Operations

This chapter considers the principal features and constraints in the port approach to the Terminal and in accordance with the Elefsina Port Authority requirements.

4.1 Pilotage

The responsibility for harbour pilotage at Revithoussa is at Piraeus within a division of the Piraeus Port Authority.

Pilotage is compulsory for all LNG Carriers arriving at and departing from the Terminal (Communication VHF ch. 68 or 6), except for emergency situations where the LNG carrier Master is authorized to proceed to emergency departure without pilotage.

The Terminal's Pilot Station is located 2NM west of the Terminal's jetty area in a temporary anchorage area.

Local Pilots assist the LNG Carrier's Master who has and retains the full responsibility at all times for the LNG Carrier's safe approaching and berthing at the Terminal facilities.

4.2 Tugs Assistance

Berthing and unberthing operations are accomplished with tugs assistance which is outsourcing service appointed by the Ship's Agent.

Terminal requirements are 4 tugs at least for berthing and 3 tugs at least for unberthing for LNG Carriers calling at the Terminal.

Number and bollard pull of tugs choice is the responsibility of LNG Carrier's Master and the Ship's Agent taking always into consideration local Port Authority requirements.

Table below summarizes minimum requirements for BHP and number of tugs during berthing/Unberthing.

DWT of the LNG Carrier	**Berthing**	**Unberthing**
Up to 35,000	6,000 BHP/3 tugs	4,000 BHP/2 tugs
35,000-70,000	7,500 BHP/3 tugs	4,500 BHP/2 tugs
70,000-160,000	**10,000 BHP/4 tugs**	**7,000 BHP/3 tugs**
160,000-270,000	14,000 BHP/5 tugs	10,000 BHP/4 tugs
270,000-350,000	16,000 BHP/5 tugs	11,000 BHP/4 tugs

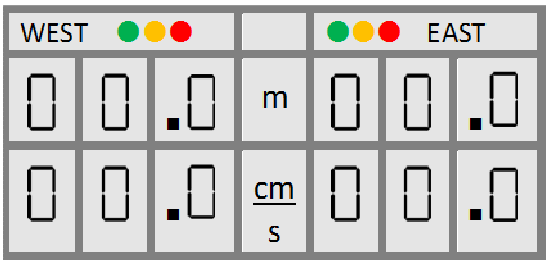
4.3 Approaching

Pilot and Master of the LNG Carrier should

- have as principle to stop the LNG Carrier in parallel position and in a distance more than 50m to the fendering line and bring her by pushing and/or pulling in parallel onto the jetty fenders.
- be aware of the max berthing velocity limit (0,10 m/sec).

Terminal docking system provide continuous monitoring of approaching distance and velocity of the LNG Carrier which are displayed on approaching panel with large read-outs set assists LNG Carrier's Master / Pilot during berthing.

A set of traffic lights (green, yellow and red) with siren signal inform of the approaching velocity of the LNG Carrier and its figures shown below



Position	Displayed data
TopLeft	Current distance from the jetty to the vessel as measured by the left sensor
TopRight	Current distance from the jetty to the vessel as measured by the right sensor
BottomLeft	Current speed of the vessel in relation to the jetty as measured by the left sensor
BottomRight	Current speed of the vessel in relation to the jetty as measured by the right sensor

The lights switched on in the limits shown in the table below:

Approaching Speed	0-9 cm/s	10-14 cm/s	15 cm/s and over
Color of traffic light	Green	Yellow	Red

4.4 Mooring / Unmooring

4.4.1 Mooring arrangement

The Terminal's indicative scheme for mooring lines arrangement and a minimum number of 16 lines is as follows:

- 3 Head line aft/fwd
- 3 Breast lines aft/fwd
- 2 Spring lines aft/fwd

Mooring arrangements should fulfil OCIMF weather criteria and should have been agreed between Terminal and the LNG Carrier on the stage of the compatibility study and should be followed by the LNG Carrier's Master/Pilots/mooring crew. Details of the mooring hooks and arrangement are shown in the att. 1.
Certification of all mooring lines/tails/winch brakes should be available on board and provided to the Terminal Representative at any request.

4.4.2 Mooring Operation

The LNG Carrier's crew deploys the mooring lines in accordance with the LNG Carrier's Master and pilot's instructions and the agreed mooring plan.

Mooring operation is carried out with the assistance of two properly manned mooring boats one at bow and one at stern of the LNG Carrier. Two mooring gangs at each side of the jetty assist and put the lines at corresponding hook as Pilot/LNG Carrier's Master instructs.

Mooring lines are transferred one by one from each mooring boat to the corresponding mooring hook at the berth. Lines are tensioned after putting all lines on each mooring dolphin.
The mooring crew on boat and the jetty should be equipped with proper PPE and to wear lifejackets.

4.4.3 Mooring Lines Monitoring

With respect to mooring plan while alongside, the LNG Carrier and her Master must ensure that: -

- The LNG Carrier is safely moored all the time
- A sufficient number of deck watchkeepers are on duty to tend the mooring lines.
- Line tending operations are carried out as appropriate to ensure the LNG Carrier is held firmly alongside in its correct position with respect to the hard arms. Line tending checks also ensure that mooring lines do not become too slack or too taught.
- When the LNG Carrier is secure in the berth, the mooring winch brakes are properly hardened up and the winch is taken out of gear.

All Terminal mooring hooks are equipped with load sensors and all measurement values are collected to the central control room of the Terminal for continuous monitoring.

Line tension monitoring system has adjustable set points for slack, warning and high load which are shown on the table below:

MH	**SLACK**	**WARNING**	**HIGH HIGH**
MH 1-6	5 MTons	30 MTons	60 MTons
MH 7-10	5 MTons	30 MTons	40 MTons

All above set points can be adjusted as per mooring arrangement for each LNG Carrier.

When the LNG Carrier is alongside the mooring line tension system should always be alive and shall be carefully monitored by Terminal panel operator. LNG Carrier control room at any request can receive and advices the recorded values.

Slack or over tension of lines should be immediately referred to the LNG Carrier control room for readjustment of lines.

4.4.4 Unmooring

Prior to the commencement of unmooring the LNG Carrier's Master/Ship's Agent ensures that the pilot is onboard and tugs, mooring boat/gangs are in attendance and ready to commence unmooring.

Unmooring operations are carried out by LNG Carrier's Master/Pilot instructions and all assisting services should follow the instructions.

Terminal's Shift Supervisor and/or Terminal Representative watch unmooring at jetty area.

4.5 Stand-by Tug

While an LNG Carrier is alongside, one tug with appropriate power should be stand by at the special mooring buoy 300 metres west of the LNG jetty or at a distance of 10 min notice of arrival at jetty area.

The master of the tug should be ready for action at all times and keeps a listening on VHF Channel 68 while the LNG Carrier is alongside.

The tug should be fitted with fixed firefighting equipment meeting its Classification Society's highest fire-fighting standards.

GRT of the LNG Carrier	**BHP stand by tug**
25,001-40,000	1,800 or two of 2,000 BHP
40,001-55,000	2,200 or two of 2,200 BHP
55,001-70,000	2,500 or two of 2,500 BHP
70,001 and more	3,500 or three x 2,000 BHP

Table above summarizes minimum requirements for BHP of stand by tug during the LNG Carrier is alongside established by local Port Authority.

5. Safety Access Security

The regulations are framed to provide guidance to the LNG Carrier and Terminal personnel so that safely and efficient port operations can be achieved.

5.1 Communications

5.1.1 VHF/UHF Radio Communications

Hand-held VHF/UHF intrinsically safe radios should be provided to enable operational communication between Terminal staff and LNG Carrier's crew outside their respective control rooms.

A multi-channel marine VHF radio should be available in the control room for communication with the Terminal, the port authority and other relevant bodies whilst the vessel is alongside.

For LNG Carrier/shore communications after gangway placement and Terminal staff is onboard, the radio system UHF is the primary source of communication.

Terminal, for each unloading provides an approved type of radio device, a spare Battery and a charger.

VHF/UHF Channels used:

Pilot station	VHF channel 68
Terminal Control Room	VHF channel 68 and UHF channel 02
Port Authority	VHF channel 07

5.1.2 Telephone Lines

Two telephones are available on the LNG Carrier through shore link

- one hot-line telephone and
- the other connected to the public system.

	Internal call (1)
Plant Manager	6001
Terminal Representative	6116 6137
Operation Manager	6007
Main Control Room	6142 6006

5.2 Weather Forecast and Weather monitoring

Terminal Representative before each LNG Carrier's acceptance for berthing should advise the weather forecast for at least 24 hours before carrier approaching (weather forecast is available from National Meteorological Service, NMS).

Weather monitoring station is also installed at Revithoussa LNG Terminal with continuous measurement of the wind speed / direction, wave height / peak period, tides etc. Terminal Representative continuously advises this weather station located at main control room for his/her decision to continue, postpone and/or cease all the operations, in case of adverse weather.

5.3 Terminal Weather Limits /Adverse Weather

5.3.1 Weather and Warning restrictions for berthing

Berthing is not permitted under the following conditions:

the wind speed is over **25** knots
the forecasted winds are greater than **40** knots
the wave height is over **1.2** metres
the horizontal visibility at the jetty is less than **1** nautical mile
an earthquake warning has been issued

5.3.2 Weather restrictions for stop unloading/disconnection of arms/unbearthing

The following actions should be done in case of bad weather conditions:

Action	**Weather conditions**
Cargo stoppage	30 knots and rising and/or Electrical storms
Hard arm disconnection	35 knots
Unberthing	When forecasted wind is above 40 knots

Resumption of cargo discharge	20 knots and falling

5.4 State of Readiness

LNG Carrier's Master shall ensure that:

- the LNG Carrier's engines must be maintained at full readiness at all times.
- keep always positive stability with propeller and rudder are full immersed to allow the LNG Carrier to leave the berth at short notice if so required in an emergency.

If emergency departure from the berth is required, this is carried out by the LNG Carrier Master without the aid of a pilot and mooring boats/gangs by prior consultation of Terminal and Port Authority.

5.5 Engine Safety

Unloading arms may not be connected until the LNG Carrier confirms that her main engine(s) is/are off and the turning gear is engaged.
Similarly, main engine warm up may not commence until all unloading arms are disconnected.

5.6 Repairs or Maintenance Works

Repair and maintenance works involving either hot work or cold work is prohibited on the LNG Carrier and jetty unless written permission is obtained from the by Plant Manager and Port Authority.
Repair and maintenance works should be granted in advance at least 72 hours before arrival and not during cargo operation. At these times, the Terminal precautions require the Work Permit system to be strictly followed.

If unavoidable breakdown occurs to the LNG Carrier, then repairs may be permitted with the LNG Carrier remaining alongside after receiving a written approval from the Terminal Manager.
In cases where the LNG Carrier's mobility is affected, permission to remain alongside is conditional, upon the LNG Carrier's Master hires an additional tug so the LNG Carrier may be moved and Port Authority informed accordingly.

5.7 Emergency Towing

While alongside the jetty, good quality emergency towing wires are secured at both bow and stern of the LNG Carrier. Each towing wire has its towing eye maintained at about two metres above the sea surface.

5.8 Leakage, spillage of LNG and Fire Fighting

Means of protection shall be provided on the LNG Carrier to minimize the consequences of spillage and leakage of LNG. This may be by provisions for containment of LNG spill, brittleness protection of carbon steel structural members, a water curtain or other appropriate measures.

Closed-circuit monitoring systems may be used as an aid in the detection of leakage. The LNG Carrier's fire and gas detection system and fire-fighting equipment as specified by the SOLAS Convention (incorporated by Greek Law 1045/1980 as amended) and the IGC Code (as incorporated into Greek Law by Law 2208/1994 as amended and by Ministerial Decision no. Υ.Α. 4113.213/01/2007/2007) should be fully operational at all times and ready for immediate use as stated in the LNG Carrier/shore safety checklist.

Safety plan complying with applicable IMO conventions should be available on board the LNG Carrier.

A plan showing the location and type of all fire-fighting equipment on or adjacent to the jetty should be permanently displayed at the berth, along with any necessary instructions and fire-fighting procedures.
Measures shall be provided to protect personnel, structures and essential equipment from a fire so that the risk of escalation of an incident is minimized. These measures should be including water spray, water monitor or passive fire protection measures.

Water monitors and sprays shall be capable of being operated from a safe location. Water sprays can prove effective in limiting the migration of gas clouds.

5.9 Personal Protective Equipment

During all operations, as appropriate, all persons involved, either on board the LNG Carrier or ashore shall wear:

- Hard hats
- Eye protection
- Leather gloves
- Safety shoes

- Long-sleeved overalls
- Lifejackets, when working close to the water's edge.

5.10 Control of Ignition Sources

Smoking

Smoking should be prohibited and limited at approved locations clearly designed on board, and specified at the LNG Carrier/Shore Safety Check List. These locations must be situated in the accommodation and without doors, windows or portholes that open directly onto the open deck.

Matches, Lighters and Battery Operated Equipment

Persons involved in cargo handling operations are prohibited from carrying any articles that may cause sparks, such as matches or cigarette lighters. The use of battery-operated equipment (including cameras, mobile telephones, torches etc), outside of safe zones, is prohibited, unless authorised by the Terminal Manager for a specific purpose.

LNG Carrier visitors may carry mobile telephones and pagers through the Terminal, but during transit of the Terminal and jetty's Hazardous Areas, the battery must be disconnected and carried separately.

Accommodation Doors and Portholes

All external doors and portholes leading into the LNG Carrier's accommodation and machinery spaces must be closed during cargo operations. Doorways at the boundary between the LNG Carrier's open decks and the accommodation must be fitted with a double-door type entrance. The inner door must be fitted with a self-closing device and kept closed.

Vent Fans and Air Conditioning Units

The air intakes on the central air conditioning must be adjusted to prevent ingress of hydrocarbon gas. This is achieved by switching the system to internal re-circulation.

Window-type Air Conditioning Units

Window-type air conditioning units must be electrically disconnected and external events or air intakes covered or closed.

The LNG Carrier's Main Radio Station

While the LNG carrier is alongside the jetty, the LNG Carrier is not permitted to transmit using its main or emergency radio transmitters and the wireless aerials must be earthed. If necessary, during statutory surveys onboard, the radio transmissions can be tested using by the dummy load facility.

Only low power radio equipment of a fixed nature, such as VHF sets and satellite communication equipment, can be used while alongside.

5.11 Drugs and Alcohol

As part of the prequalification requirements before the LNG Carrier is permitted to call at the Terminal, the LNG Carrier and LNG Carrier Interests must have in place an effective drug and alcohol abuse policy, a copy of which must be posted onboard. This drug and alcohol abuse policy must meet or exceed the standards specified in the *OCIMF Guidelines for the Control of Drugs and Alcohol Onboard LNG Carrier*.

Whilst the LNG Carrier is within the Terminal's operational limits:

(a) this drug and alcohol abuse policy must be strictly observed and the Master must ensure that no restricted drugs (other than those in the medical locker) are onboard and that no alcohol is used or is available for use and

(b) the LNG Carrier's Master and crew must have a zero blood alcohol level whilst the LNG Carrier is approaching, berthing, staying at berth, unberthing and sailing away from the Terminal.

5.12 LNG Carrier's Stores

Provided operations are not delayed, the loading of LNG Carrier's stores and spare gear is permitted while the LNG Carrier is alongside. The Terminal requires an agreed plan to be prepared at the Pre-Discharge Meeting to cover storing requirements and that storing operations are programmed for periods when the operation of discharging is not in progress.

During cargo Operations storing craft/service boat coming alongside the LNG Carrier is not permitted.

All large deliveries must not be loaded when the LNG Carrier is alongside.

5.13 Access and Security

5.13.1 LNG Carrier Access

LNG Carrier's Master should have in place safe means/equipment for all persons embark/disembark the LNG Carrier from seaside in normal situation and/or in case of an emergency.

Pilot and/or accommodation ladder and lifeboat should be in place as per international standards impose.

LNG Carrier access from Terminal is provided by a gangway tower and a satellite ladder places onboard under supervision of deck watch crew.

Terminal gangway is placed between manifold area and accommodation building, only in case of port side berthing position of the LNG Carrier. For easiest and safely access/evacuation of the LNG Carrier this is the preferable berthing side at Revithoussa LNG Terminal.

When vessel is alongside jetty gangway should be always continuous monitoring from deck crew and Terminal jetty man.

5.13.2 LNG Carrier's Crew and Visitors

Procedures shall be in place to ensure the safe and controlled access of authorized visitors to the LNG Carrier. These may include, but are not limited to, LNG Carrier's agents, customs and immigration officials, owners, representatives and superintendents, LNG Carrier's chandlers, vetting inspectors and crew reliefs. Authorization for visitors to the LNG Carrier shall be given by the LNG Carrier's Master.

These procedures shall be in compliance with the requirements of the IMO's ISPS Code (as incorporated by Presidential Decree with no. 56/2004, Regulation (EC) 725/2004 and EU Directive 2005/65 as incorporated with Greek Law 3622/2007).

The Ship's Agent is required to pass a copy of the LNG Carrier's Crew List to Terminal Representative and Port Facility Security Officer.

LNG Carrier's crew and visitors are not allowed to walk through the Terminal facilities without the Terminal's prior permission and without accompanied by the Terminal's authorised staff.

Only authorised persons, or those with prior entry permits issued by the Terminal, are allowed through the security guard at the Terminal's main gate.

All LNG Carrier's visitors through the Terminal facilities announce their arrival beforehand either to the Master or to the Ship's Agent. The Master or Ship's Agent shall then inform the Terminal by providing a Visitor's List with full name and copy of ID cards/passports, so that Terminal Passes can be properly completed in advance of the visitor's arrival from the Terminal/Port Facility Security Officer (PFSO). This procedure applies equally to all persons embark/disembark LNG Carrier using Terminal facilities.

Persons who appear to be under the influence of alcohol or drugs are not allowed to have access to the Terminal and its facilities and embark/disembark LNG Carrier.

5.13.3 ISPS Security

Terminal operates under the International LNG Carrier and Port Facility Security (ISPS) Code, SOLAS Convention (1974/1988) on minimum security arrangements for LNG Carriers, ports and government agencies.

Declaration of Security should be announced, filled and signed by Port Facility Security Officer (PFSO) in case that the Security Level is different than the Level 1.

Security issues arising during marine operations should be referred immediately to Terminal Control Room and/or Terminal Representative.

6. Environmental Regulations

All applicable International Convention MARPOL 73/78 for the Prevention of Pollution from LNG Carriers incorporated into Greek Law by L. 1269/1982 as amended should be followed at all times.

The LNG Carrier's Master should have in place in written an approved SOPEP (LNG Carrier oil pollution emergency plan, and a valid Oil pollution Prevention Certificate (IOPP) (as per the Greek Ministerial Decisions 2431.02/10/2007, 2431.02.1/02/07/2007 and 2431.02.1/05/2010).

The LNG Carrier's Master is responsible for preventing any kind of pollution of the sea or atmosphere (bunkers, LNG, bilge water, dirty ballast, plastics, garbage, or any other matter that results in the pollution).

Any incident of pollution should be immediately referred to Terminal Control Room and the Port authority.

6.1 Oil Pollution

No oil or mixture containing oil is allowed to escape from a LNG Carrier while within Greek waters and Ports.

If floating oil is found in the vicinity, both LNG Carrier and Terminal inform each other regarding the facts. The matter must be immediately notified to the Port Authority at Elefsis.

LNG Carrier and Terminal should put in place their emergency anti-pollution plan.

Blanking Unused Manifold Connections

Unused cargo and bunker manifolds must be properly blanked and have their manifold valves closed. Blank flanges are fully bolted and other types of fittings, if used, are properly secured. Deck scuppers, drain holes, and drip trays on the LNG Carrier within the vicinity of any potential pollution area must be suitably plugged and any accumulated water or effluent drained off as required.

Bunkering

The loading of bunker fuel and diesel oil is not permitted while an LNG Carrier is alongside the berth and carrying out any internal transfer of bunker oil isn't allowed.

6.2 Ballast Water Discharge

Only clean segregated ballast is allowed to be discharged from the LNG Carrier when it is alongside the Terminal berth and only if this is absolutely necessary by prior permission of Port Authority and Terminal.

LNG Carrier should maintain a Ballast Management System and Ballast Water Record Book (IMO) properly fill and should be available on board on any request from Terminal Representative and other interested party such us Port Authority.

6.3 Air emissions

Every LNG Carrier calling at the Terminal should comply with MARPOL Annex VI (October 2008) (as incorporated into Greek law by Presidential Decree with no. 14/2011 as amended).

Natural gas/Boil off and/or low sulphur fuel oil should be used as fuel when the vessel is alongside.

Venting Cargo Vapours

While the LNG Carrier is within port limits, the venting of cargo vapours to atmosphere is strictly prohibited.

Inerting, Purging and Gas Freeing of Cargo Tanks

LNG Carrier's personnel must not inert, purge or gases free a cargo tank while alongside the Terminal.

If such actions become necessary operation MUST be stopped and the LNG Carrier proceeds outside port limits to carry out such works.

6.4 Port Reception Facilities for Waste Oil and Garbage Disposal

No garbage or other materials, either liquid or solid, shall be discharged overboard from a LNG Carrier, but must be retained in suitable receptacles on board until special arrangements are made for disposal by authorized subcontractors. Port Authority has approved contractors for the removal and reception of limited quantities of bilge water and oils.

LNG Carriers wishing to make use of this service via LNG Carrier's Agent, arrange for disposal by prior information of Terminal and Port authority.

7. Cargo Handling and Supervision

The Terminal regulations in this chapter are based on safe working practices widely accepted in the LNG industry and are aimed at the prevention of accidents. These procedures are framed to provide guidance to LNG Carrier and Terminal personnel so that efficient port operations can be achieved.

Once the LNG Carrier is alongside, the responsibility for cargo handling is shared between the LNG Carrier and the Terminal and the following should be decided and agreed:
When the LNG Carrier is alongside the Terminal, cargo operations shall not begin unless and until the LNG Carrier's Master has: -

- acknowledged and signed the acceptance of these procedures/regulations (appendix 4)
- Inspection and completion of the LNG Carrier/Shore Safety Check List (appendix 2)/or LNG Carrier's corresponding,
- posted a Gangway Safety Notice (No Naked Lights, No Smoking, No Unauthorized Persons)
- posted the LNG Carrier's Fire Fighting plan at deck
- water curtain at manifold is in operation.

7.1 Pre-Discharge Meeting

Pre-Discharge Meeting is held between the LNG Carrier and the Terminal to ensure that all aspects of the Cargo handling and supervision issues are covered. In this Pre -Discharge Meeting, the LNG Carrier's chief officer and/or LNG Carrier's Master, the Terminal Representative and the Shift leader of the Terminal should participate.

In this meeting at least the issue below should be discussed and agreed:

- Review the results of the *LNG Carrier/Shore Safety Checklist* inspection
- Review Communication means/check
- ESD testing procedure and sequence
- Unloading Arms cool-down procedure
- Cargo and ballast handling Procedure / Partial Unloading

- Procedures main steps and estimated required time
- Heel and/or stripping requirements
- Emergency Procedures, including emergency departure plan
- Communication and details of Stand-by Tug
- LNG Carrier's visitors entry
- Service boat approach for disembarkation/storing requirements
- Note the name of the standby safety boat and methods of communication.

Pre-discharge meeting agenda is shown in appendix 1 and provided by Terminal.

7.2 Notice of Readiness to discharge

Once Pre-discharge meeting completes the LNG Carrier's Master and Terminal Representative should fill and sign a Notice of Readiness to discharge stating the time/date that the LNG Carrier was ready to commence discharging cargo and the status of the cargo tanks.

7.3 Cargo Operation and Supervision

The supervision of cargo handling operations both on the LNG Carrier, and within the Terminal is carried out between Chief Officer/LNG Carrier Control Room and Shift Leader Shift Staff/ Terminal Control Room.

LNG Carrier's and Terminal's Control Room remotely monitoring all operation, LNG Carrier's manifold and jetty are always monitored from closed circuit television system (CCTV).

When a LNG Carrier is alongside, the LNG Carrier manifold/deck and jetty/shore are always monitoring by checking

- the condition of the manifold/ hard arms
- for any leakage of LNG and/or vapour
- position of unloading arms (PMS system on line on jetty pulpit)
- temperatures, pressures, flow at manifold/hard arms
- position of the gangway
- mooring lines status
- mooring hooks status

- that always the water curtain on LNG Carrier manifold is working properly
- continuously check the unloading rate, cargo remaining on board to discharge and position the LNG Carrier on jetty (draft, trim, list) and movement of the loading arms.

Any deficiency MUST be immediately referred to the Terminal control room and LNG Carrier Control Room and Terminal Representative.

7.3.1 Terminal staff roles and responsibilities for Unloading Operation

Terminal staff involves mainly at Unloading operations and role and responsibilities are described in this section.

Terminal Representative

Terminal Representative on duty will be present at all operations and mainly (not exhaustive list)

- Be informed of all issues agreed in the compatibility study between Terminal / LNG carrier and the their implementation
- Be aware of the implementation of the procedures described in this Manual
- Be the contact person for any matter concerns the LNG Carrier from arrival to unberthing
- Receive the weather forecast and decide to accept LNG Carrier for berthing or postpone it
- Attend the berthing, mooring operations/according to mooring plan agreed
- Accept and sign Notice of Readiness (NOR)
- Perform safety meeting on board of the LNG Carrier together with her Master or Chief Officer
- Perform the safety round tour on board
- Check, fill and sign the LNG Carrier-shore safety checklist
- Attend all operations to be done according to the Terminal procedures

- Witness and sign the opening and closing of the CTMS
- Be present at the post meeting with Master and/or chief officer

Terminal Representative can stay at all times of operations at LNG Carrier Cargo Control Room and/or after stabilizing discharging flow rate can leave the LNG Carrier Cargo Control Room, in any case he/she should be available on any request from Terminal and/or LNG Carrier. Terminal control room and Shift Supervisor hand over, monitor and follow up the operation.

Shift Supervisor

The Shift Supervisor on duty will perform mainly the following (not exhaustive list)

- Attend the Berthing and mooring operations
- Perform the Technical meeting with chief officer and discuss main step of the operations
- Supervise all the operation to be done according to Terminal procedures and inform Terminal Representative for any abnormal situation

Shift Supervisor is also the Leader of any emergency situation to follow and execute the Emergency plan of the Terminal.

Panel Operator

Terminal control room will be always manned and Panel Operator

- Follow-up the whole unloading/reloading operation through DCS and fill all check lists concerning the unloading operation
- Be in contact with field operators and LNG Carrier control room
- Instruct accordingly field operators by giving the feedback from their actions on the field and of any signal arise on DCS
- Perform the ESD test in communication with the LNG Carrier cargo control room and they give each other feedback of good working

- Receive all information of the LNG Carrier cargo control room and cooperate during all operation, keeps records for the operations
- Monitors the operation from close circuit television system (CCTV)

Terminal control room is also the emergency control room in case of any Emergency

Field operator/Jetty man

When the LNG Carrier is alongside jetty is always manned and jetty man monitors

- Condition of the manifold/ hard arms
- Position of unloading arms (PMS system on line on jetty pulpit)
- Temperatures, pressures, flow at manifold/hard arms
- Position of the gangway
- Mooring lines status
- Mooring hooks status
- Water curtain on LNG Carrier manifold is always working properly

He/she is in continuous contact with Terminal Control Room and/or Shift Supervisor and immediately inform for any abnormal situation.

7.4 Connections Terminal and LNG Carrier

7.4.1 Earthing/ESD_Communication Link/Fire Hose

Jetty man and LNG Carrier crew on deck are cooperating to connect:

- Earthing cable (screw type),
- LNG Carrier shore interconnection cable (electrical) /ESD cable / communication (should be switched on before ESD test)
- Fire hose international connector (no under pressure)

7.4.2 Unloading Arms Connection

By checking the insides and outsides of the manifolds to be free from foreign debris and appropriate filter (60mesh) from LNG Carrier side to put in place, the jetty man manoeuvres the hard arms into position adjacent to the appropriate LNG Carrier's manifold. All arms are equipped with Quick Connect/Disconnect Couplers (QC/DCs).

Reducers 3 (16" x 12") on LNG Carrier's manifold should be needed. Terminal can provide them before berthing of the LNG Carrier at anchorage area with a service boat and LNG Carrier's crew should put in place on the appropriate manifold.

Gaskets for 12" side of the reducers are provided by the Terminal and for 16" side by the LNG Carrier.

7.5 Leak Test and Oxygen Purge

Purging and leak test of the hard arms/LNG Carrier's manifold is done with nitrogen provided by the Terminal.

The hard arms are pressurised with nitrogen and the pressure is released to the LNG Carrier's deck area using vent valves or drain valves of the LNG Carrier's manifolds.

Liquid pipelines are pressurized up to 5 barg, and vapour pipeline to 1 barg.

Testing of no leakage is done by applying a soapy water solution to the principal joints and free of air by measuring oxygen content to be less than 3 % by volume.

7.6 Initial Cargo Measurements (opening CTM)

All Users bring cargo to the Terminal should be aware of the Hellenic Regulation of Measurement LNG cargo (Νόμος 4001/2011 ή Αριθμ. Δ3/Α/20701 – ΦΕΚ 1712 Β' 2006 ή Κώδικα ΕΣΦΑ).

For custody-transfer measurement the LNG Carrier should have on board

- Certified/calibrated custody transfer measuring system primary and secondary with appropriate accuracy (level, pressure and temperature)
- Calibrated gas meter for gas consumption at LNG Carrier engines

- Approved cargo tanks volumetric and correction tables
- Pre-cooled unloading lines should be drained
- Close vapour manifold valve
- Zero trim and list

The initial cargo measurement shall be made before ESD and cool down of the LNG Carrier's unloading lines/ Terminal arms and before communicate the vapour phase of the LNG Carrier and the Terminal.
The measurement is done in the presence of chief officer, Terminal's representative and third party surveyor as Users had agreed and authorized.

7.7 Vapour system

Free vapour flow by pressure difference is performed between Terminal and LNG Carrier's tanks. For this reason LNG Carrier should keep the pressure of cargo tanks as low as possible so as the difference of pressure to be adequate for receiving the adequate volume of vapour return.

7.8 Emergency Shut-down Test

Two warm emergency shutdown tests are performed, one from LNG Carrier's control room and one from Terminal's side.

The communication should be done between LNG Carrier's control room and Terminal's control room for all the operations of ESDs.

All unloading lines of the Terminal are kept in cold conditions except the unloading arms, for that reason in case of cold ESD test only double valve of unloading should be tested (functional test).
Time closure of Terminal ESD valves is within 30sec.

7.9 Cool-down of Hard Arms

Cool-down of the hard arms is carried out in close co-operation between LNG Carrier and Terminal's personnel as discussed and agreed in the pre-discharge meeting.

After confirmation that both LNG Carrier and Terminal's liquid lines are lined up and they are ready to commence cool down procedure:

- The LNG Carrier starts spray pumps on the request of the Terminal
- The Terminal shift leader in cooperation with jetty operator and LNG Carrier adjust the cool down flow rate according to cool-down is progressing.
- Cool down of the arms is completed when their temperature reach at -130^{o}C.
- Checks are made to ensure nitrogen is flowing through the hard arm swivel joints.

7.10 Starting Cargo Pumps

Both LNG Carrier and Terminal maintain close contact and cargo pumps are started as follows:

-

- The LNG Carrier opens all valves in its liquid pipeline and closes the cool-down valves at the manifolds
- The Terminal confirms that all valves in the liquid pipeline are open and that the pipeline is in a proper condition to receive cargo
- LNG Carrier gives 5 minutes to the Terminal control room before starting each pump. Increasing of unloading rate should be done gradually and the pumps should be started with intervals not less than 5 min (this time can be extended if unusual pressures or any problem arises at terminal and/or carrier)
- LNG Carrier informs Terminal control room when the agreed unloading rate is reached
- Terminal checks the flow rate and they are mutually confirm and monitor the flow rate

Any changes to above due to technical problems and for any other reason should be immediately referred.

7.11 Ballast Handling

LNG Carrier's Ballast should be done concurrently with the unloading of the cargo tanks avoiding the big differences in the draft of the LNG Carrier.

During unloading LNG Carrier crew should be aware that

- the draft should be kept inside the limits agreed and in respect to berth limitations
- the trim should be in accordance to berth limitations and agreed procedures
- a zero list should be trying always to be kept

Ballast handling procedure should be agreed and monitoring during unloading operations.

7.12 Cargo Sampling

Continuous sampling system of LNG and discontinuous on line gas chromatography analysis every 5 min is used. Manual sampling is also available and gas analysis at the Terminal lab with gas chromatography.

Requirement of 2,5 barg min pressure at unloading lines (max at LNG Carrier's manifold pressure of 5barg) to achieve the best results of cargo sampling and composition analysis.

7.13 Stopping Cargo Pumps

The LNG Carrier gives notice to the terminal

- 5 min before stops each cargo pumps
- when the discharge is completed and all pumps have stopped.

7.14 Drain Liquid Arms and purge of arms

Both LNG Carrier and Terminal co-operate to drain all remaining liquid from the liquid arms based on the agreed drain procedure.

- Outboard liquid arms are drained from Terminal to jetty KO drum
- On the LNG Carrier, liquid in the outboard arms is drained into the LNG Carrier's system by nitrogen pressure supplied by the Terminal
- After three or four times of purging continuous flow of nitrogen purging is done for 4 hours up to complete deicing of the hard arms and nitrogen purge is done from drain valves on LNG Carrier's manifold

Purging flow of nitrogen for deicing purposes can be started since the gas content in the flow is less than 3% by volume and measurement should be done by calibrated gas meter with IR sensor (appropriate for measuring in nitrogen atmosphere).

7.15 Final Cargo Measurements (closing CTM) – Close out Meeting

With reference to para 7.6 above final custody-transfer measurement the LNG Carrier is requested to be on zero trim/list, all LNG Carrier manifold valves should be closed.

In presence of chief officer, Terminal representative and third party surveyor closing reports are witnessed and signed.

7.16 Disconnecting Liquid and Vapour Arms

After de-icing of the hard arms (4 hours) the Terminal operator checks that the gas content is less than 1% by volume using gas meter with IR sensor and disconnect one by one each unloading arm.

8. Marine Emergency Procedures

The purpose of this section is to provide guidelines for marine emergency procedures at the Terminal.

The priorities here are the protection of human life, the preservation of the environment, the protection of property of all parties involved as well as the Terminal's swift recovery from a casualty and the resumption of Terminal's safe operations as soon as possible.

This emergency procedure should be followed in parallel with the Emergency Procedure/Plan of the LNG Carrier and of the Terminal.

8.1 Control of an emergency situation

When an incident occurs at the Terminal's jetty, involving an LNG Carrier, the Terminal shall be in the overall control of the incident as per Terminal Emergency Plan and any action of the carrier should be referred to the Terminal control room.

An incident involving only the LNG Carrier (e.g. engine room fire), shall be under the LNG Carrier's Master's control, assuming that there is no threat to the Terminal, although appropriate assistance shall be provided by the Terminal and the incident should be immediately referred to the terminal**.**

LNG Carrier should have specific emergency procedures onboard and follow it in any incident and/or emergency.

When the LNG carrier is alongside except her emergency procedures the Master must follow the actions in case of any incident onboard and/or at Terminal described below:

- raises an emergency alarm on board
- stops all cargo operation immediately – activate ESD
- informs terminal control and terminal representative
-informs port authority/carrier's agent for immediate actions
- initiates carrier emergency plan
-requests stand by tug for immediate actions
-keeps good communication with all related parties
- requests disconnection of the arms if this is considered necessary, clearance of the manifold

-be always in position to take away the carrier from the berth
-requests from terminal to be ready to release the mooring lines if this is considered necessary or terminal ask to remove the vessel away from berth.

8.2 Emergency departure/Mooring Lines Release

In case of a severe emergency situation where it is reasonably evident to the Terminal and/or LNG Carrier that as a matter or safety the LNG Carrier must leave the berth, both parties should follow the procedure to release ship from berth.
The release of the ship shall be initiated only with the knowledge and agreement of the LNG Carrier's Master.
In case of disagreement between the Master and the Terminal, the Terminal's view shall prevail and be accepted without reservation by the LNG Carrier and her Master.
Control of this situation is in the LNG Carrier Master's hands and must include at all times:

- the LNG Carrier's engines available (see State of Readiness)
- ability to move the LNG Carrier without pilotage assistance and additional tugs, if this assistance cannot reach the LNG Carrier in due time
- sufficient crew on board to handle the situation
- emergency towing wires in place and in good condition
- stand by safety tug at his orders
- establishes communication with the Terminal control room and Terminal Representative, Agent and Port Authority by any of available communication mean (UHF, VHF, telephone etc)
- requesting from Terminal emergency unloading arms release (PERC system/ESD2)
- requesting from Terminal mooring lines release one by one.

Initial actions which should be followed by LNG carrier in conjunction with her emergency procedures in case of an incident and/or in an emergency departure procedure should be posted onboard when the carrier is alongside (appendix 3).

8.3 Emergency Communications

Communications		
Terminal/LNG Carrier communications by LNG Carrier/shore radio		
	UHF ch. 2	
In case of failure use either telephone or Marine VHF		
	Telephone Numbers/email	**VHF Channel**
Terminal	+30 210-5508142 +30 210-5508006 +30 6943077409 desfalng@desfa.gr	68
Port Authority	105 +30 210-5565520 +30 210-5565580	07
Stand by tug		68

8.4 Incident Categorization and Initial Actions

The table below lists emergency scenarios at the LNG Carrier/shore interface and particularises basic initial actions regarding cargo discharge and hard arm operation expected in each case. **As shown, all scenarios require cargo operations to cease**. The letters 'E' and 'C' indicate if the action is taken on an emergency basis ('E') or whether it is carried out under 'normal' controls ('C').

	Source	**Emergency**	**Stop dis/rging**	**Purge arms**	**Dis/nect arms**	**Unberth**
EMERGENCIES	**LNG Carrier**	LNG Carrier Break-out from jetty	✓		**✓E**	**✓E**
		Single mooring line breakout	✓			
		High mooring line tension alarm	✓			
		LNG Carrier crabbing out of position	✓	✓	✓	
		Loss of electrical power	✓			
		Loss of power to valve controls	✓			

		Loss of instrument air pressure	✓			
		Excess movement from spotting line	✓	✓	**✓E**	
		Cargo tank overflow alarm	✓			
		Liquid nitrogen spill	✓			
		Oil spill	✓			
		Fire (cargo)	✓	✓	✓	
		Fire (engine room)	✓	✓	✓	
		Fire (accommodation store rooms)	✓	✓		
		Leakage	✓	✓		
		Medical evacuation	✓			
		Man overboard	✓			
	T/nal	Fire in Terminal	✓	✓		
		Fire on jetty	✓		**✓E**	**✓E**
		LNG tank overflow alarm	✓			
		Leakage	✓	✓		
		Man overboard	✓			
	Other	High winds	✓	✓	✓	**✓C**
		High wind forecast	✓	✓	✓	**✓C**
		High waves	✓	✓	✓	**✓C**
		Earthquake	✓	✓	✓	

Specific actions must be analysed at Emergency plan of the LNG Carrier and Terminal Emergency plan. In addition subsequent actions should be taken depending on the evolution of the incident.

8.5 Specific Incident Scenarios

Specific incident scenarios are described below (with reference to the Terminal Emergency Plan).

Incidents with potential to turn into major events are

- Fire/Explosion
- Gas/LNG release
- LNG carrier out of position

Specific actions to be taken are referred below.

Incident: **Fire at Terminal Jetty**

LNG Carrier actions

- Stop all cargo operation / verify
- Raise the emergency alarm (in case first observe the fire)
- Isolate all ignition sources and prohibit smoking in all areas
- Initiate emergency plan
- Check wind direction to take / observe direction of the flame
- Initiate water deluge where it is appropriate
- Request stand by tug to assist by checking the wind direction, ask to start fire water monitors
- Request Terminal to assist with fire water monitors of the jetty
- Clear the manifold area and request Terminal to disconnect the arms (ESD2/PERC)
- Preparing for emergency departure (in case of escalation of the fire)
- Keep continuous communication with the Terminal, Port Authority, and Agent.

LNG Terminal actions

- Stop all cargo operation / verify
- Evacuate Jetty area
- Initiate emergency plan (mobilize emergency firefighting team, fire fighting vehicles)
- Isolate all ignition sources and prohibit smoking in all areas
- Check wind direction / observe direction of the flame
- Initiate water deluge where it is appropriate, start fire water monitors in the jetty area
- Use the fire fighting vehicle if it is appropriate
- Inform Firefighting Service for assistance
- Keep continuous communication with the LNG carrier, Port Authority
- Inform LNG carrier / Activate emergency release of unloading arms (PERC/ESD2)
- Be prepared to release mooring under LNG carrier Master advice.

Incident: **Gas or LNG release**

LNG Carrier actions

- Stop all cargo operation /verify
- Isolate all ignition sources and prohibit smoking in all areas
- Initiate emergency plan
- Check wind direction to take the correct decision of the dispersion of the flammable gas
- Initiate water deluge where it is appropriate
- Request stand by tug to assist by checking the wind direction
- Request Terminal to assist with fire water monitors of the jetty if it is appropriate

LNG Terminal actions

- Stop all cargo operation/verify
- Isolate all ignition sources and prohibit smoking in all areas
- Initiate emergency plan (mobilize emergency team and fire fighting vehicles)
- Check wind direction to take the correct decision of the dispersion of the flammable gas
- Initiate water deluge where it is appropriate, start fire water monitors in the jetty area

Incident: **LNG Carrier out of position**

LNG Carrier actions

- Stop cargo operation/verify
- Initiate emergency plan
-Inform port authority and LNG carrier's agent
- Preparing for emergency disconnections of the arms
- Request Terminal to activate ESD2/PERC/ clear manifold area
- Preparing for early departure
- Request Terminal to be ready for releasing mooring lines
- Request stand by tug (s) to be ready for actions (Port Authority aadvice if there are other tug
- Keep always good communication with Terminal, Agent

LNG Terminal actions

- Stop all cargo operation/verify
- Inform Port authority
- Initiate emergency plan
- Preparing for disconnection of arms and early departure of the LNG carrier
- Awaiting instruction from LNG carrier Master for releasing the mooring lines
- Watch tension monitoring system of the lines and advice LNG master for the tension
- Request for uptight the tensioned lines
- Keep always good communication with Terminal, Agent.

8.6 Incident Reporting

Brief details of an incident occurring within the Terminal are transmitted to the LNG Carrier.
Brief details of an incident occurring on the LNG Carrier are transmitted to the Terminal.
All marine-related accidents are reported as soon as possible to the Port Authority.
The LNG Carrier and her Master are responsible for any emergency situation arising on board the LNG Carrier and also to notify all incidents on board to the authorities, irrespectively of the Terminal's actions.

APPENDICES

Appendix 1

SHIP- SHORE PRE-DISCHARGE MEETING / UNLOADING SCHEDULE	
TERMINAL NAME : **REVITHOUSSA**	SHIP NAME
DATE:	**TIME:**

A	**GENERAL**				
1	VHF communication Channel 68	Yes	☐	No	☐
2	Terminal gives radio UHF adjusted channel 2 for primary com/tion battery and charger	Yes	☐	No	☐
3	Check the communication lines				
	hot line	Yes	☐	No	☐
	telephon line	Yes	☐	No	☐
4	Connect international fire water hose	Yes	☐	No	☐
5	Cargo tanks pressure alongside			mbarg	
6	Terminal tanks pressure when ship is alongside			mbarg	
8	max Oper pressure of cargo tanks during discharging			mbarg	
9	Burning gas during discharging	Yes	☐	No	☐
10	Change fuel for ESD test?	Yes	☐	No	☐
11	Open Custody transfer CTM (before ESD)	Yes	☐	No	☐
	* with surveyor or no surveyor	Yes	☐	No	☐
12	Zero trim/list for CTM	Yes	☐	No	☐
13	Warm ESD will be initiated by	Terminal	☐	Ship	☐
B	**ARMS CONNECTION PRESSURE & LEAK TEST**				
14	Nu of Reducers in place / spool piece removal	liq./vap.			
15	Filter on ship liq. manifold (60 mesh)	Yes	☐	No	☐
16	Pressure test for liquid/vapour manifold_arms	5barg/1,5 barg			
17	Leak test for all manifold/arms with Oxygen<3% by vol	Yes	☐	No	☐

C	**VAPOUR COMMUNICATION SHIP/SHORE**				
18	Open vapour valve after taking CTM before dicharging			Yes	
19	Vapour flow control by	Terminal		Ship	
	Terminal lines up vapour line and ship can receive when is needed				
20	max vapour pressure during discharging	Terminal	240	mbarg	
		Ship		mbarg	
	Ship cargo tanks during discharging less than 130mbarg for better free flow				
D	**COOL DOWN**				
21	Cool down rate of liquid arms under terminal request		$30m^3/h$ (~1,5barg)		
22	Cool down rate of arms/estimated time of cool down		max 4^oC/min	55 - 60min	
23	Ship lines already cool down	Yes		No	
24	Ship lines cool down with internal recirculation	Yes		No	
25	Manifold drawing & cool down procedure available	Yes		No	
26	Ship lines already drain	Yes		No	
27	Total time for cool down				
E	**CARGO HANDLING**				
28	Quantity of cargo discharged (m3)				
29	Total unloading rate (m3/h)				
30	Capacity of each cargo pump (m3/h)				
31	Shut off pressure of cargo pumps (barg)		max 19barg		
32	Number of cargo tanks/pumps running				
33	Start of each cargo pump as per ramp up schedule				
34	Five min notice before starting each cargo pump				
35	Control of unloaded rate by	Terminal		Ship	
36	Estimated time of discharging				
37	Ship inform terminal when unloading rate will be stabilized			Yes	
38	Ten min notice before 25%, 50%, 75% of total discharged cargo			Yes	
39	Five min notice before stop each pump after dicharging			Yes	
40	Stripping / Hell out requirements	Yes		No	
41	Time needed for heel out				
42	Ship confirmation that all pumps stop			Yes	

F	**BALLAST HANDLING**				
43	Ballast starts concurently with discharging	Yes	☐	No	☐
44	Draft on arrival/departure				m
45	Trim range alongside				m
46	Keep zero list			Yes	☐
G	**AFTER DISCHARGING**				
47	Estimated time of draining arms/manifold	1,5 Hour			
48	Manifold drawing & drain procedure available	Yes	☐	No	☐
49	Stop blowing when methane content < 3% by vol (IR gas meter)	Yes	☐	No	☐
50	Vapour valve will be closed before final CTM	Yes	☐	No	☐
51	Estimated time of N2-purge, de-icing of arms	4-5 Hours			
52	Disconnect arms if methane content < 1% by vol. (IR gas meter)	Yes	☐	No	☐
53	Estimated time of arms disconnection	40 min			
54	Ship returns UHF walky talky to terminal shift supervisor			Yes	☐
55	Gangway removing from ship			Yes	☐
56	Disconnection of international fire water hose			Yes	☐
57	Disconnection of ESD and Earthing cable			Yes	☐
H	**OTHERS**				
58	Visitors on board / check visitor list	Yes	☐	No	☐
59	Store Requirements (before / after discharging)	Yes	☐	No	☐
60	Garbages etc. disposal (before / after discharging)	Yes	☐	No	☐
61	Stand by Tug name & attendance			VHF ch. 68	

Terminal Shift Supervisor	Ship Chief Officer

rev. 2, 15/05/2017

Appendix 2

LNG TERMINAL

Ship/Shore Safety Check List

Ship's Name:	
Berth:	Date of Arrival:
Port:	Time of Arrival:

INSTRUCTIONS FOR COMPLETION

The safety of operations requires that all questions should be answered affirmatively by clearly ticking (v) the appropriate Box. If an affirmative answer is not possible, the reason should be given and agreement reached upon appropriate precautions to be taken between the ship and the terminal. Where any question is considered to be not applicable, then a note to that effect should be inserted in the remarks column.

A box in the columns "ship" and "terminal" indicates that checks should be carried out by the party concerned.

The presence of the letters A, P or R in the column code indicates the following:

A – Any procedure and agreement should be in writing in the remarks column of this check list or other mutually acceptable form. In other case, the signature of both parties should be required.

P – In the case of a negative answer the operation should be carried out without the permission of the Port Authority.

R – Indicated items to be rechecked at intervals not exceeding that, agreed in the declaration.

Ship/Shore Safety Check List					
PART "A" BULK LIQUID GENERAL					
No	**General**	**Ship**	**Terminal**	**Code**	**Remarks**
1	Is the ship securely moored?			**R**	Stop cargo at:**30** kts wind vel. Disconnect at: **35** kts wind vel. Early sailing : > **40** Knts wind vel.
2	Are emergency towing wires correctly positioned at bow and stern?			**R**	
3	Is there safe access between the ship and the shore?			**R**	
4	Is the ship able to move under its own power?			**PR**	
5	Is there an effective deck watch in attendance on board and adequate supervision on the terminal and on the ship?			**R**	
6	Is the agreed ship/shore communication system operative?			**AR**	
7	Has the emergency signals to be used by the ship and the shore explained and understood?			**A**	
8	Have the procedures for cargo, bunker, ballast and stores handling agreed and are they followed?			**AR**	
9	Has the emergency shut down procedure been agreed?			**A**	
10	Are fire hoses and firefighting equipment on board and ashore positioned and ready for immediate use.			**R**	
11	Are cargo arms/bunker hoses in good condition, properly rigged and appropriate for the service intended?				
12	Are unused cargo and bunker connections properly secured with blank flanges fully bolted?				
13	Are sea and overboard discharge valves, when not in use, and bilge overboard discharge valves closed and visibly secured?				
14	Are all cargo and bunker tank lids closed?				
15	Is the agreed tank venting system being used?			**AR**	
16	Are hand torches of an approved type?				
17	Are portable VHF/UHF radios of an approved type?				
18	Are the ship's main radio transmitter aerials earthed and radars switched off?				
19	Are electrical cables to portable electrical equipment disconnected from power?				
20	Are all external doors, portholes and windows in the accommodation closed?			**R**	
21	Are air conditioning intakes which may permit the entry of cargo vapours closed?				

22	Are the requirements for the use of galley equipment and cooking appliances being observed?				
23	Are smoking regulations being observed?			**R**	
24	Are naked light regulations being observed?				
25	Is provision made for emergency escape?				
26	Are sufficient personnel on board and ashore to deal with an emergency?			**R**	
27	Are adequate insulation means in place in the ship/shore connection?				
28	If the ship is capable of "closed loading", have the requirements for closed operations been agreed?			**R**	
29	Has an adequate vapour return line been connected?				
30	If a vapour return line is connected, have operating parameters been agreed?				
31	Are ship emergency fire control plans located externally?				
32	Is the International ship/shore connection fixed to the fire main for immediate use?				
33	Have Security Levels been agreed between the Ship security officer and the Port facility security officer and all the protocols are filled, if appropriate?				Ship level: Shore level:
If the ship is fitted, or required to be fitted, with an Inert Gas System, the following questions should be answered					
34	Is the inert gas system fully operational and in good working order?			**P**	
35	Are deck seals in good working order?			**R**	
36	Are liquid levels in P/V breakers correct?			**R**	
37	Have the fixed and portable oxygen analysers properly calibrated and are they in good working order?			**R**	
38	Are fixed inert gas pressure and oxygen content recorders in good working order?				
39	Are all cargo tank atmospheres at positive pressure with oxygen content of 8% or less by volume?			**PR**	
40	Are all individual tank inert gas valves (if fitted) correctly set and locked?			**R**	
41	Are all persons in charge of cargo operations aware that in case of failure of the inert gas plant, discharge operations should cease and the terminal be advised?				

PART "C" BULK LIQUEFIED GASES

No	Bulk liquefied gases	Ship	Terminal	Code	Remarks
1	Is information available for the safe handling of the cargo?				Is MSDS of the cargo available?
2	Is the water spray system ready for use?				
3	Is sufficient suitable protective equipment (including self-contained breathing apparatus) and protective clothing ready for immediate use?				
4	Are holds and inter-barmer spaces properly inerted or filled with dry air, as required?				
5	Are all remote control valves in good working order?				
6	Are the required cargo pumps and compressors in good working order, and have maximum working pressures been agreed between ship and shore?			**A**	
7	Is the reliquefaction plant or boil-off control equipment in good working order?				
8	Is the gas detection equipment properly set for the cargo, calibrated and in good working order?				
9	Are cargo system gauges and alarms correctly set and in good working order?				
10	Are emergency shutdown systems in good working order?				
11	Does shore know the closing rate of the ship's automatic valves, does ship have similar details for the shore system?			**A**	Ship: Shore: **30 sec**
12	Has information been exchanged between ship and shore on the maximum/minimum temperatures/ pressures of the cargo to be handled?			**A**	
13	Are cargo tanks protected against inadvertent overfilling at all times while any cargo operations are in progress?				
14	Is the compressor room properly ventilated; the electric motor room properly pressurised and is the alarm system working?				
15	Are cargo tank relief valves set correctly and actual relief valve settings clearly and visibly displayed				
	Tank No 1:	Tank No 3:		Tank No 5	
	Tank No 2:	Tank No 4:		Tank No 6:	

Declaration

We, the undersigned, have checked, where appropriate jointly, the items on this checklist and have satisfied ourselves that the entries made are correct to the best of our knowledge.

We have also made arrangements to carry out repetitive checks as necessary and agreed that those items marked with the letter "R" in the column. "Code" should be re-checked at intervals not exceeding 4 hours.

For Ship		**For Shore**	
Name:		Name:	
Rank:		Position:	
Signature:		Signature:	
Date:	Time:	Date:	Time:

Appendix 3

REVITHOUSSA LNG TERMINAL
EMERGENCY PROCEDURE
IN CASE

FIRE ALARM

UNMODULATED - CONTINOUSLY

GAS LEAKAGE ALARM

MODULATED 5 sec ON, 5 sec OFF

LNG LEAKAGE ALARM

MODULATED 5 sec ON, 10 sec OFF

OR ANY INCIDENT ANNOUNCED

LNG Carrier INITIAL ACTION	
RAISE	EMERGENCY ALARM ONBOARD
STOP	CARGO OPERATION - ACTIVATE ESD
INFORM	TERMINAL CONTROL ROOM/REPRESENTATIVE
VERIFY	STOPPAGE OF CARGO OPERATION
INITIATE	CARRIER EMERGENCY PLAN
INFORM	PORT AUTHORITY/ CARRIER'S AGENT
INFORM	STAND BY TUG
REQUEST	STAND BY TUG FOR ACTIONS

REVITHOUSSA LNG TERMINAL
EMERGENCY DEPARTURE PROCEDURE

LNG CARRIER'S MASTER AND TERMINAL AGREED EARLY DEPARTURE

LNG CARRIER'S MASTER HAS THE OVERALL CONTROL TO MOVE THE CARRIER FROM BERTH

INFORM LNG CARRIER'S AGENT
INFORM PORT AUTHORITY

AUTHORIZED TO PROCEED WITH MAIN ENGINE _ STAND BY TUG and without LOCAL PILOT

VERIFY GOOD COMMUNICATION with TERMINAL/PORT AUTHORITY/ STAND BY TUG
VERIFY THAT THERE IS SUFFICIENT CREW TO HANDLE THE OPERATION
REQUEST STAND BY TUG TO BE READY FOR ACTIONS

VERIFY THAT TOWING WIRES ARE IN PLACE FOR USE
REQUEST TERMINAL FOR EMERGENCY DISCONNECTION OF ARMS
VERIFY EMERGENCY RELEASE OF ARMS
REQUEST TERMINAL TO BE READY FOR RELEASING LINES
VERIFY STAND BY TUG IS READY TO ASSIST CARRIER
INITIATE PROCEDURE FOR EARLY DEPARTURE
REQUEST PREPARATION OF MAIN ENGINE

VERIFY THAT CARRIER IS READY FOR DEPARTURE

VERIFY THAT TERMINAL IS STAND BY FOR RELEASING LINES

REQUEST TERMINAL RELEASING LINES ONE BY ONE (as per Master Request)

VERIFY RELEASING OF EACH LINE

REQUEST STAND BY TUG FOR ACTIONS

Communications		
UHF ch. 2 and HOT LINE		
In case of failure use either telephone or Marine VHF		
Terminal Interphone Control Room	6142	VHF ch.68
	6006	
Terminal Repr/tative	**+30 6943077409**	
Port Authority	**106**	VHF ch. 7
	+30 210-5565520	
	+30 210-5565580	
Stand by Tug		VHF ch. 68
Carrier's Agent		

Appendix 4

Letter to Shipmasters of LNG Carriers calling at Revithousa

DESFA
Revithousa LNG Terminal
Date …….

The Master
SS/MV …….

Dear Sir,

General Safety Requirements

The responsibility for safe conduct of operations whilst your ship is at Revithousa LNG Terminal rests jointly with you as shipmaster, and with the terminal *Plant Manager*. Therefore, before operations start, we seek your full agreement on the safety requirements set out in the *Ship/Shore Safety Check List* and the attached *Marine Procedures Manual.* These requirements are based on safe practices widely accepted in the gas industry and by gas carrier owners.

We expect you, and all under your command, to adhere strictly to these requirements throughout your stay alongside Revithousa LNG Terminal and we, on our part, will ensure that our personnel do likewise, and co-operate fully with you in the mutual interest of safe and efficient operations.

Before the start of operations and at approximately four-hourly intervals thereafter, for our mutual safety a member of the terminal staff, together with a ship's officer, will make a routine inspection of your ship against the requirements of the *Ship/Shore Safety Check List*. Where corrective action is necessary we will not agree to start cargo operations or, if already started, we will require them to be stopped.

Similarly, if you consider safety is endangered by any action on the part of our personnel, or by any equipment under our control, you should demand immediate cessation of operations.

Please acknowledge receipt of this letter by countersigning and returning the attached copy.

Signed: …….
Terminal Representative
Terminal Representative on duty is: ……..
Position or Title: …….
Telephone Number. ……
UHF/VHF Channel: ……

Signed: …….
Shipmaster
SS/MV: …….
Date: …… Time: ……