EXCELERATE ENERGY

PETROBRAS TRANSPORTE S.A.
TRANSPETRO

TMS-TRBA-010

Terminal Manual

Bahia LNG Regasification Terminal - TRBA

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Contents

1.0 INTRODUCTION

001 The purpose of this document is to communicate expectations, information, rules, and regulations applicable to all users of the Bahia Terminal for Regasification of Liquefied Natural Gas (TRBA).

002 The operation of ships at the TRBA **must** be in accordance with the recommendations of the *International Safety Guide for Oil Tankers Terminals* (ISGOTT) and the convention of *International Maritime Organization* (IMO) and **must** follow the operation guidelines of the terminal.

003 The information contained in this publication is intended to give support, but never to supersede or change mandatory legislation, instructions, guidelines or official publications, national or international.

004 The Terminal reserves to itself the right to change any operational information herein presented, without previous notice.

005 The Terminal Manual is owned by Excelerate Energy and any continual improvement suggestion **shall** be communicated to EE TRBA Operations.

1.1 Application

006 Understanding and complying with this document is a requirement for users of TRBA and **shall** be read by those directly and indirectly involved in TRBA such as:

- Floating Storage and Regasification Unit (FSRU) Officers and Crew.
- TRBA Employees.
- Masters & Officers of LNG carriers calling at TRBA.
- Port Service Vessels.
- Vessel Agents.
- Applicable Authorities.
- Third-Party Support Functions.

007 Any Lawful National or Local Regulation **shall** override anything stated in this document.

1.2 Abbreviations & Definitions

ANP: National Petroleum Agency**.**

Approved Equipment: Equipment of a design that has been tested and approved by an appropriate authority such as a Government Department or Classification Society. The Authority **shall** have certified the equipment as safe for use in a specified hazardous atmosphere.

Authorized Craft: Any tug, barge, water boat authorized by the Maritime Authority to operate at TRBA, and which complies with the safety requirements.

BP: Bollard Pull is the Vessel longitudinal static tensile.

Cargo Machinery: means cargo pumps, cargo compressors, cargo vaporizers, reliquefaction plant, inert gas generators, gas management equipment, their motors, control equipment, and other cargo handling equipment. It **shall** also include where appropriate, primary, and emergency power supply, circulating pumps, other auxiliary machinery, and equipment essential for the safe and efficient operation of the cargo machinery.

CD: Chart Datum.

CCR: Cargo Control Room.

CNCL: the Pipeline Operation Control Center (Centro Nacional de Controle e Logística) is located at TRANSPETRO headquarters, in Rio de Janeiro.

CNG: Compressed Natural Gas

Cool Down: cooling of the cargo tanks, lines and equipment to gradually meet the cargo temperature, thereby avoiding fracture of the material. LNGC **shall** carry out the cool down process by transferring LNG at low rate to FSRU.

CTMS: Custody Transfer Measuring System.

DHN: Department of the Brazilian Navy (Diretoria de Hidrografia e Navegação).

DoS: Declaration of Security.

DOC: Document of Compliance (ISM Code).

Emergency Response Plan: Plan establishes a set of guidelines for emergency response, defining roles and responsibilities for emergency situations.

EELP: Excelerate Energy Limited Partnership Head Office located in The Woodlands, Texas, USA.

Emergency Response Plan: Plan establishes a set of guidelines for emergency response, defining roles and responsibilities for emergency situations.

ERS: Emergency Release System installed on CNG arms and LNG hoses.

ESD: Emergency Shutdown.

ETM: Excelerate Technical Management – FSRU Technical Managers.

Excelerate Sequoia: The name of the Floating Storage and Regasification Unit (FSRU).

FSRU: Floating Storage and Regasification Unit (Excelerate Sequoia).

Gas Free: A tank, compartment or container is gas free when sufficient inert gas or fresh air has been introduced into it to lower the levels of any flammable, toxic or inert gases to those required for a specific purpose, e.g. hot work, personnel entry, etc., and has been certified for that purpose by an authorized competent person.

HH: High High.

Hot Work: Work involving sources of ignition or temperatures sufficiently high to cause the ignition of a flammable gas mixture. This includes any work requiring the use of welding, burning, or soldering

equipment, blow torches, power driven tools, portable electrical equipment which is not intrinsically safe or contained within an approved explosion-proof housing, sandblasting, or internal combustion engine.

HPNG: High Pressured Natural Gas.

IACS: International Association of Class Societies

ICS: Incident Command System

IMO: International Maritime Organization

Inert Condition: An inerted space or other systems and pipeline where the oxygen content of the atmosphere throughout the space has been reduced to below 8% by volume, by the addition of an inert gas.

Inert Gas: A gas such as Nitrogen or Carbon Dioxide, or a mixture of such flue gases, containing insufficient oxygen to support the combustion of hydrocarbons.

Inerting: The introduction of inert gas into a space to reduce and maintain the oxygen content at a level at which combustion cannot be supported.

Intrinsically Safe: The condition whereby any spark or thermal effect, generated by the normal operation or accidental failure of the equipment, is incapable, under prescribed test conditions, of igniting a prescribed gas mixture. Any equipment so rated **shall** be certified, by the appropriate body as "intrinsically safe."

ISGOTT: International Safety Guide for Oil Tanker and Terminal.

ISPS: International Ship Port Security.

ISSC: International Ship Security Certificate.

LL: Low Low.

LNG: Liquefied Natural Gas.

LNGC: Liquefied Natural Gas Carrier.

Lower Flammable Limit: The concentration of hydrocarbon gas in air, below which there is insufficient hydrocarbon to support and propagate combustion. Sometimes referred to as a lower explosive limit (LEL).

May: Indicates a permitted course of action – an option. The word MAY is highlighted in green bold.

Master: The Captain of the FSRU or LNGC his duly authorized deputy or any person who for the time being is in charge of the FSRU or LNGC respectively.

MOP: Mutual Operation Procedure is an operating principal agreement between Excelerate Energy and Transpetro defining the procedures (for CNG and LNG operations) and emergency actions to be taken by the FSRU, LNGC and TRANSPETRO. The document is owned by Excelerate Energy.

m/s: Unit of velocity – metres per second.

Naked Light: Any open flames, exposed incandescent material or any other unconfined source of ignition.

NOR: Notice of Readiness.

OCIMF: Oil Companies International Marine Forum.

Operations: The discharging and transfer of LNG, loading, and discharge of containers and bulk cargo, ballasting/de-ballasting, gas freeing, purging and tank cleaning and any other activity associated with the handling of cargoes at TRBA.

Owner(s): The owner(s), disponent owner(s), managers and those acting on behalf of owners of any vessel or tankers.

P&I Club: Protection & Indemnity Club is a mutual insurance association that provides risk pooling, information, and representation for its members. Unlike a marine insurance company, which reports to its shareholders, a P&I club reports only to its members.

PBS: Pilot Boarding Station.

PIC: Person in Charge.

PFSO: Port Facility Security Officer.

POAC: Person in Overall Control of an STS Operation.

Port Authority: The TRANSPETRO Administration (TEMADRE's General Manager) answer as Port Authority regarding to TRBA operations, as per Regulation n. 64/2015, 17/August, 2015 from CPBA.

Pressure Surge: A sudden increase in the pressure of the liquid or gas in a pipeline brought about by an abrupt change in flow velocity.

QRH: Quick-Release Hook.

Ready To Operate: statement from operator or vessel duty officer, informing that the alignments and other facilities are in operating conditions, ready to start or restart transfer and send out operations.

Responsible LNGC Officer - the Master or any Officer to whom the Master may delegate authority for any operation or duty on board of LNGC.

Safety Inspector – A TRANSPETRO employee, responsible to carry out before STS operation a Safety Inspection jointly with the FRSU Representative. The individual will remain onboard the LNGC throughout the LNG transfer operation.

Shall: Indicates a mandatory course of action (will or must are alternative words) and ais highlighted in red bold.

SHEQ: Safety, Security, Health Environment and Quality.

Should: Indicates a preferred course of action whereby there **shall** be reasonable circumstances why the action was not taken. The word should is highlighted in orange bold.

SIGTTO: The Society of International Gas Tanker and Terminal Operators Ltd.

SMC: Safety Management Certificate.

SPA: Sales Purchase Agreement.

SSP: Ship Security Plan.

STCW: International Convention on Standards of Training & Watch Keeping for Seafarers.

STS team: Team that boards LNGC prior to berthing for the purpose of STS operation. Team consists of but not limited to mooring master, cargo surveyor and agent representative.

SIGTTO: The Society of International Gas Tanker and Terminal Operators Ltd.

Surveyor: An independent surveyor appointed to witness the LNG STS transfer and the calculation quantity delivered.

T or MT: Unit of mass – Metric tonnes.

UFL: Upper Flammable Limit.

Under Keel Clearance: Depth of water between the ship's hull and seabed.

Upper Flammable Limit: The concentration of hydrocarbon gas in air, above which there is insufficient oxygen to support and propagate combustion. It is sometimes referred to as upper explosive limit (UEL).

Vapor: A gas below its critical temperature.

Vessel: Any LNGC, tug, craft, or other floating navigable object.

1.3 Roles & Responsibilities

1.3.1 TRBA

008 TRBA is the holistic term Bahia Terminal for Regasification of Liquefied Natural Gas referred and collectively includes the Jetty and Infrastructure for providing natural gas, pipeline to the tie in point and the FSRU.

1.3.2 Excelerate Energy Comercializadora de Gás Natural LTDA

009 Is the legal operator of the TRBA Terminal and a subsidiary of Excelerate Energy LP and referred to in this manual as EE TRBA Operations.

1.3.3 Transpetro

010 Is the company that is contracted by Excelerate Energy Brazil to provide operation and maintenance services of the Jetty Infrastructure and Pipeline. There is a TRANSPETRO General Operational Manager is in charge of Bahia State in Madre de Deus Island responsible for the safety operation of TRBA. Responsibilities which fall under Transpetro in this Terminal Manual **will** be referred to as Transpetro.

1.3.4 TRBA Terminal Manager

011 The TRBA Terminal Manager is an Excelerate Energy Brazil employee and overall responsible for the safe operation of TRBA, ensuring managerial oversight of TRBA and that contractual requirements are met on behalf of Excelerate Energy. The TRBA Terminal Manager reports directly to the Excelerate Energy Snr Director – Operations.

012 Overall managerial authority of the terminal, including interfaces with the FSRU but excluding on-board FSRU activities (the responsibility of the FSRU Master).

013 Contractor Manager of Transpetro and therefore responsible for monitoring and verifying their performance particularly in areas of high-risk exposure to Excelerate Energy which includes:

- Process Safety – keeping hazardous substances in their primary systems all of the time.
- Occupational Safety – safety of people.
- Defects (degrading performance) and failures to safety or commercial critical equipment.

014 Interface led between the FSRU and Transpetro.

015 Responsible for conveyance of daily nominations to FSRU and for following up on nomination performance.

016 Ensures all terminal activities are conducted in compliance with applicable national, industry and Excelerate Energy policies and standards.

017 Acts as the liaison between key internal and external stakeholders.

018 In country Emergency Response Representative for TRBA and the FSRU.

019 The TRBA Terminal Manager does not relieve the Master of his Overall Authority under the International Safety Management (ISM) Code. The Master of the FSRU and LNGC **shall** always retain overall command and responsibility for the safety and security of their vessels.

1.3.5 FSRU Excelerate Sequoia

020 FSRU Excelerate Sequoia (IMO 9820843) is a 173,611m3 Floating Storage and Regasification vessel responsible for receipt & storage of LNG, Regas and send-out management, safe FSRU operations and management of the STS interface including mooring/unmooring.

1.3.6 FSRU Master – Person in Overall Charge (POAC)

021 The person accountable and responsible, on behalf of Excelerate Energy Brazil for the safe and efficient operations of the FSRU including all STS Operations.

022 Is the POAC, and as such has overriding authority with respect to connection and disconnection of hoses, communication and emergency shutdown cables, pre/post discharge meeting, discharge procedures and emergency response and for all activities associated with the discharge of the LNGC to the FSRU and operation of the regasification system and other systems onboard the FSRU.

023 The POAC is fully empowered to stop or suspend cargo transfer or stop an operation where:

- It has been identified that there is potential for an immediate incident to occur.
- Where controls are degrading, and the effectiveness is no longer considered acceptable.
- Control has been lost and immediate actions are required to regain control.

1.3.7 FSRU Cargo Officer

024 The person responsible, on behalf of the FSRU Master, for the safety and integrity of the Regas, Cargo and STS operation including ensuring operational limitations are not exceeded to deliver incident free operations.

1.3.8 LNGC Master

025 Provides pre-arrival notices, assures proper cargo conditioning upon arrival and delivery of on-spec cargo, responsible for the safe operation of LNGC.

1.3.9 Harbor Master (or Port Captain):

026 The Maritime Authority or its deputy, the person in charge of Bahia State Ports including all ports in Todos os Santos Bay. Called by “Capitania dos Portos da Bahia”. This C.P.BA is responsible to approve the “Port Rules and Regulations” (“NPCP” - Normas e Procedimentos da Capitania dos Portos da Bahia).

1.3.10 Shipping Agent

027 A licensed agent who transacts or supervises a ship's business, such as pre-arrival requirements, customs and immigration procedures, insurance, documentation, assures all stakeholders are duly informed and provides widespread support to the FSRU and LNGC Owners and Operators.

1.4 Overriding Authority

028 The party receiving LNG has the overriding authority at TRBA.

029 At all times, both the FSRU and LNGC Master are responsible for ensuring the safety of their respective vessels and crews, the prevention of accidents and pollution, and **shall** make every effort to issue appropriate instructions and guidance to their crew.

1.5 Stop Work Policy

030 All Excelerate employees, seafarers, contractors, visitors, and the entire crew of the calling LNGC have the authority and obligation to stop work when there is reason to believe that an Unsafe Act or Unsafe Condition is likely to result in an immediate incident.

031 The Stop Work Authority applies to any operation including the stopping of the vessel STS operation, mooring and/or unmooring of the vessels, if determined unsafe.

032 During STS transfer, if the operation has been stopped then the operation **shall** not resume until the issues and concerns have been addressed to an acceptable level of agreement by the FRSU Master, LNGC Master and the Mooring Master.

1.6 Drug / Alcohol Abuse

033 TRBA has a zero tolerance for Drugs and Alcohol.

034 If at any time an TRBA Representative has reason to suspect that any individual whether a crew member, contractor, or visitor on the FSRU, LNGC or PSV is under the influence of drugs or intoxicating liquor, the following course of action **shall** be taken:

- EE TRBA Operations **shall** be informed immediately of the situation by the observing individual or their supervisor.
- Any Cargo Handling Operations **shall** be suspended immediately where the immediate risk or harm or loss is deemed unacceptable.
- An investigation into the circumstances **shall** be carried out, up to and including and individual being requested to provide a breath sample to an evidential breath analyzer
- The individual suspected of being under the influence **shall** be relieved of their immediately operational responsibilities/duties until the investigation is completed.

035 If Cargo handling operations are suspended, they **shall** remain suspended until such time that the EE TRBA Terminal Manager is satisfied that they **may** be safely resumed. The results of any investigation carried out because of suspended operations **shall** be communicated to the relevant FSRU, LNGC or PSV Owners / Operators, Ship Charterer, and any other relevant authorities.

1.7 Terminal Standards & Expectations

1.7.1 No Objection Certificate

036 Where the TRBA Terminal Manual states that a No Objection Certificate is required from TBRA Operations, then the individual responsible for the asset requiring a No Objection Certificate **shall** send a request to the TRBA Terminal Manager.

037 The request **shall** outline the scope of the activity including any controls which **shall** be implemented to manage the risk to low and acceptable levels.

038 The TRBA Terminal Manager or delegated deputy is responsible for issuing the No Objection Certificate.

1.7.2 Compliance

039 The LNGC is accepted for handling LNG at TRBA on the understanding that the LNGC complies with international, national, and local regulation and industry best practice, the LNGC cargo machinery is in good working condition, operations **shall** be conducted safely and expeditiously and that the LNGC vacates the Berth as soon as practicable after operations are completed.

040 Under the following circumstances, TRBA reserves the right to suspend operation and request the removal of any LNGC from TRBA following consultation with the both the FSRU and LNGC Master:

- Flagrant or continuous disregard of the TRBA Terminal Manual.

- Any defects to vessel, equipment, personnel, or operations that in the reasonable opinion of the Terminal Representative present an increased risk to the Terminal, the Terminal Personnel, or allow for continued safe operation.
- When onboard operational performance fails to utilize the available Terminal Facilities satisfactorily and thereby, in the reasonable opinion of the Terminal, constitutes an unacceptable constraint on Terminal operations.

041 TRBA **shall** not be held liable for any costs incurred by the LNGC, its Owner, Charterer or Agent because of a refusal to load or discharge all or part of a nominated shipment, delay to or suspension of loading, discharging, or any other operation conducted whilst at TRBA, or a requirement to vacate TRBA when the vessel is in contravention of the requirements documented in the TRBA Terminal Manual and the Conditions of Use for the facilities.

042 Deviation from the requirements of the TRBA Terminal Manual **may** only be permissible with written permission from EE TRBA Operations.

043 EE TRBA Operations reserves the right to monitor the cargo handling of any LNGC to ensure compliance with the codes and regulations mentioned in the TRBA Terminal Manual, and to notify the appropriate authority in the event of contravention.

1.7.3 Communication Expectations

044 All operational communication within the following **shall** be English:

- On the FSRU and LNGC Bridge.
- In the FSRU and LNGC Cargo Control Rooms.
- Between the FSRU and LNGC.

045 During operational communication, a 'positive' reporting system **should** be used, i.e., all messages **should** be repeated back by the recipient and acknowledged by the sender.

046 The LNGC Master **shall**, whilst alongside, report any defect or deficiency, without unreasonable delay to the FSRU which affects the following:

- The LNGC state of readiness with regards to maneuvering.
- Cargo Machinery, malfunctions or abnormalities which may result in the reduction of Gas Management Capability or LNG transfer.
- The safety of the LNGC or the FSRU - this includes (but not limited to) any loss of containment within the cargo system, all LNG and vapor releases, regardless of size **shall** immediately be reported to the FSRU.

047 The FSRU Master **may** suspend operations until the defect or deficiency has been rectified.

048 If a known defect or deficiency has not been reported by the LNGC and is observed by the FSRU or Transpetro then operations **may** be immediately suspended, and the LNGC **may** be held liable for any costs incurred for such delay.

1.7.4 Manning, Crewing Standards and Competence

049 The Master and Crew on the FSRU, LNGC, and PSV **shall** be trained, qualified, and certified in accordance with the relevant provisions of the International Convention on Standards of Training & Watch Keeping for Seafarers (STCW Convention and subsequent amendments) as adopted by the vessels Flag State.

050 The Master **shall** produce, on request, valid Certificates of Competency for all appropriate personnel, in accordance with the law of the state in which the ship is registered.

051 The LNGC Officers **shall** meet the EE Marine Risk Standards for STS Training and Competency.

052 The Master and crew **shall** be aware of their respective tasks and operations regarding the ship's design, equipment, and manning, including familiarization with the appropriate sections of the TRBA Terminal Manual including relevant Annexes.

053 The FSRU and LNGC Officers and Crew **shall** be trained to respond to:

- LNG spills.
- Gaseous natural gas releases.
- LNG fires.

054 The FSRU and LNGC Cargo Control Rooms **shall** be always manned, by at least one competent, ships officer with an Operational Level Certificate of Competency.

055 When a Cargo Control Room is manned by more than one officer it **shall** be clearly stated which officer has the deciding authority.

056 The officer delegated by the Master as being In-charge of Cargo Operations onboard (Management Level Certificate of Competency) **shall** be present in the Cargo Control Room during critical stages of the operation and available by radio or telephone at all other times. Critical stages are defined as but not limited to:

- During any process upsets or a cargo incident.
- During ESD Testing and cold stroke testing.
- During cool down.
- During startup of cargo transfer any substantial ramp up during the operation.
- During ramping down, topping off and completion of cargo transfer.
- During STS hose draining and purging.

057 The Master and Officer-In-Charge of Cargo Operations on both the FSRU and LNGC **shall** remain the same until completion of cargo transfer. No handover of responsibilities and accountability during the operation.

058 Sufficient personnel **should** be available on watch to maintain an efficient deck and cargo watch.

1.8 Documentation

059 If requested by the EE TRBA Operations or the FSRU Master, it is the LNGC Master's responsibility to produce the documents which are not limited to following list:

- LNGC Stowage & Cargo Handling Plan.
- LNGC Cargo Handling Manual / Transfer Procedures
- LNGC Cargo Tank Calibration Tables & List of Corrections – CTMS Certificates.
- LNGC pre-arrival checks
- Original Bills of Lading
- Original signed Condition of Use and Notice of Readiness
- LNGC Load Port Documents
- LNGC Crew List
- LNGC General Arrangement Plan
- LNGC Emergency procedures, Fire Control, and Safety Plans

1.9 LNGC Approval Process

060 TRBA has been designed to receive LNG Carriers of up to and including Q-Flex size vessels.

061 Approval to call at TRBA **shall** be obtained prior to every visit and **should** be obtained prior to the LNGC loading the cargo.

062 The LNGC approval process includes a Vetting and Compatibility review.

063 Request to start the LNGC approval process **shall** be sent to the following:

TO: Excelerate Energy Marine Risk Team

Cc: EE TRBA Operations Team

Cc: TRBA Terminal Manager

064 A written approval email is issued to all concerned parties by the Excelerate Energy Marine Risk Team

1.10 Condition of Use (COU)

065 The LNGC Master using the TRBA Terminal **shall** be required to sign a copy of the Condition of Use (COU) prior to arrival at the Pilot Boarding Station in the acknowledgment of the LNGCs' responsibility and liabilities whilst using the TRBA Terminal.

066 The TRBA COU **shall** be sent by the FSRU master to the LNGC upon safe receipt of the LNGC's Departure from Discharge Port Notification. The COU **shall** be signed, scanned, and emailed to the EE TRBA Operations with the FSRU Master in copy. A copy of the COU can be found in Annex 1 of this document.

1.11 Compliance with ISPS Code

067 The TRBA terminal falls under the jurisdiction of the Maritime Terminal Alves Câmara – TEMADRE Port Facility which is certified by ISPS Code with IMO Number: 24064BRSSA.

068 Under normal circumstances TRBA operates at ISPS Security Level 1.

069 As the terminal operator Transpetro provide the Port Facility Security Officer.

070 Transpetro are responsible for implementing protection measures to managed identified security risks in compliance with the International Ship and Port Facility (ISPS) code.

071 The access control **shall** occur onshore at the point that the individual embarks the boat to come to the TRBA terminal, regardless of its place of embarkation (Madre de Deus or Salvador). Further security checks **may** be conducted on arrival at the TRBA Jetty or upon boarding the FSRU or LNGC.

072 The TRBA Jetty is considered as restricted with access only for the people which work there routinely, or which have a business case and authorized by the Management of TEMADRE.

073 Visitors and Contractors **must** be accompanied when at the TRBA Jetty Facility.

074 Both the FSRU and the TRBA Jetty is provided with recorded close circuit television (CCTV) for monitoring the activities within proximity to the TRBA Jetty for compliance with the ISPS Code.

075 The TRBA Jetty **shall** receive from ashore in compliance with local procedures information related to the authorized vessels, persons and material with authorized access for both the Jetty and FSRU.

076 At the TRBA platform reception, the watchman in duty **will** check and inspect of persons and luggage, not supplying badges or any procedures for local register and release of access to that installation.

077 Any security violations or threats **shall** be immediately brought to the attention of the TRBA Terminal Manager and EE Security.

078 All persons wishing to access the FSRU through the Terminal **must** be previously identified by the Agent (all of crew change, embark of maintenance technicians; material, spare parts or provisions delivery or garbage removal). See the table below.

	Federal Police Authorization	ID	Baggage Inspection	Remarks
Access for Agent	No	Brazilian ID Card	Random	Prior notice to TRBA by the Agent Access by boat (only)
Local Technicians (FSRU Only)	No	Brazilian ID Card	Random	Prior notice to TRBA by the Agent
International Technicians (FSRU Only)	Yes	Passport	Random	Prior notice to TRBA by the Agent
Crew change (only for FSRU)	Yes	Brazilian ID card Or Passport	Random	Prior notice to TRBA by the Agent
Provision delivery (only for FSRU)	No	Brazilian ID card	No	Prior notice to TRBA by the Agent Need pre approval by ANVISA
Garbage removal (only for FSRU)	No	Brazilian ID card	No	Prior notice to TRBA by the Agent Need pre approval by ANVISA
Relatives access (only for FSRU)	Yes	Brazilian ID card Or Passport	Random	NOT PERMITTED BY EXCELERATE

2.0 PORT OVERVIEW

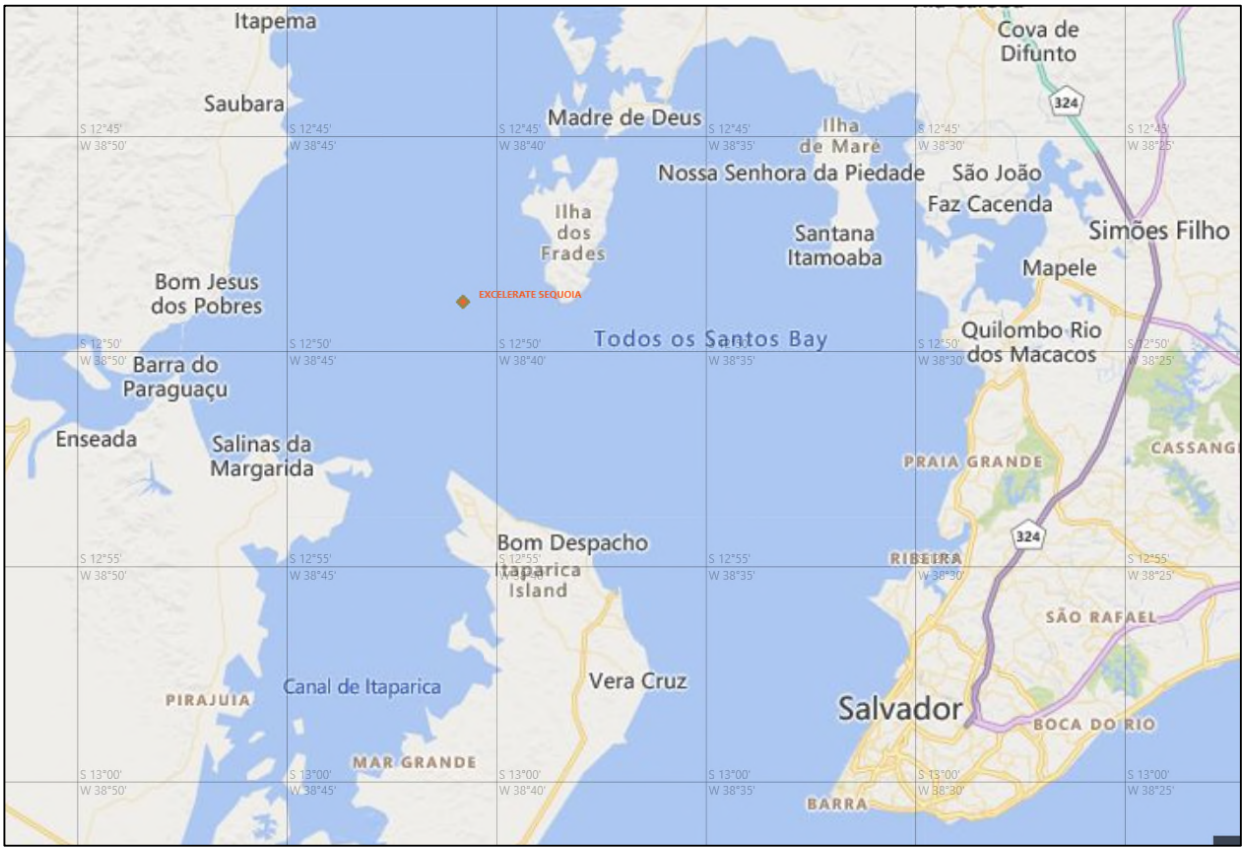
2.1 General Description of Todos os Santos Bay

079 **Todos os Santos Bay**, also called **All Saints Bay**, sheltered bay of the Atlantic Ocean on the eastern coast of Brazil. A natural harbour, it is 25 miles (40 km) long and 20 miles (32 km) wide.

080 The harbour is located between the Ponta de Santo Antônio (East) and the island of Itaparica (West). Salvador, the principal seaport and capital of Bahia state, is on the peninsula that separates the bay from the Atlantic. Todos os Santos Bay has many islands and receives the Paraguaçu River. The bay is surrounded by the Recôncavo, a fertile coastal lowland, the contours of the bay elevate themselves gradually and providing protection for the vessel at anchor.

081 Its main channel is dredged from the Atlantic entrance to the port of São Francisco do Conde, an outlet for the petroleum refinery at Mataripe.

082 The Bahia LNG Regasification Terminal (TRBA) are situated in Todos os Santos Bay approximately 2.25 nautical miles West of the most southern point of Frades Islands.



2.2 Navigation Dangers in the Todos os Santos Bay

083 The bottom of the Todos os Santos Bay is mainly mud.

084 The positions of the sand banks are marked by buoys and navigation charts **shall** be referenced.

085 Around 1.75 miles at West-northwest of the spotlight of Ponta de Monte Serrat there is a buoy with red lamp emitting a red glimmer at each 5 seconds, equipped with radar reflector demarking a high depth where there is sounded 8.5 to 11m (28 to 36 ft.).

086 The islands of Maré, Frade, Vacas, Madre de Deus, Itaparica, Bom Jesus dos Passos, Maria Guarda and some others smaller are in the North area of the bay and are collectively named, Recôncavo Islands.

087 The island of Frade is between 5 and 8 miles North-northeast of the Ponta de Itaparica at the North extreme of the island of Itaparica.

088 The lighthouse of the island of Frade, international nº G 0266 Gr.Lp 2 B 6sec 5M 9m, is at an elevation of 35m (114 ft.). It is a concrete quadrangular building of 5 meters (16 ft.) of height at the Ponta de Nossa Senhora de Guadalupe.

When navigating Todos os Santos Bay, Bridge Teams shall maintain awareness of small vessels some of which are engaged in towing and pushing operations in addition to ferry boats crossing the Bay on route from Salvador to Itaparica Island.

2.2.1 Wrecked Hulls (Submerged)

- Marker 212° 4.4 NM from Lighthouse Garcia d'Avila.
- Marker 170° 2.9 NM from the Lighthouse of Santo Antônio.
- Marker 185° 5.0 NM from the Lighthouse Garcia d'Ávila.
- Marker 218° 300 meters from the Lighthouse Santo Antônio.
- Marker 291° 500 meters from the Lighthouse Santo Antônio.

2.2.2 Bottom Risings, Banks, Crowns and Others at the Bay and Access Channel:

089 The Bank of **"Panela"** with a sandy bottom rising, between the markers 245° and 009° of the Salvador Port South Jetty spotlight, at distances of 0.2 to 0.9 miles and minimum depth of 4.4 meters. This bank is demarked at S by a luminous green buoy and, at W and at N, by luminous red buoys.

2.3 Nautical Publications and Charts

Publication	Brazil DHN Charts	AVCS
Proximities of the Port of Salvador	Chart 1101	-
Port of Salvador	Chart 1102	BR 501110
Todos os Santos Bay (Northeast part)	Chart 1104	BR 401104
Todos os Santos Bay (West part)	Chart 1107	BR 501108
Todos os Santos Bay (General)	Chart 1110	BR 401110
Rules and Procedures of the Port Authority	NPCP Salvador Port	-
Support to navigation at the East Shore	DH1– II	-
Tide Table	Porto de Madre de Deus (BAHIA)	

Publication	Scale	Chart Number
Ponta Acu da Torre to Ilheus	300000	BA 3975
Baia de Todos os Santos	75000	BA 540
Ports in Baia de Todos os Santos	20000	BA 545
Admiralty Sailing Directions – South America	-	NP 5
Admiralty Digital List of Lights (ADLL)	-	Area 10
Admiralty Digital Radio Signals Volume 1345 (ADRS)	-	Area 2
Admiralty Digital Radio Signals Volume 2 (ADRS)	-	Area 2
Admiralty Digital Radio Signals Volume 6 (ADRS)	-	Area 10
Admiralty TotalTide (ATT)	-	Area 10

2.4 Environmental Factors

2.4.1 Winds

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Direction	E	E	E	ESE	E	ESE	ESE	ESE	E	ESE	E	E

090 The prevailing wind mean speed for the region is 8-12 knots. Strong gusts of wind **may** arise with the maximum recorded speed of 47 knots.

091 Winds can blow from the South during new moon and full moon periods, leading to wind wave generation and associated unpredictable conditions.

2.4.2 Waves

092 Wave height (Hs) increases around the TRBA Jetty when cold fronts from the Northeast occur.

093 Wave height averages between 0.5 - 1.5 meters with periods from 5 seconds to 15 seconds.

2.4.3 Visibility

094 The visibility is greater than 10 km at 90% of time.

095 During periods of heavier rainfall (winter) the visibility **may** reduce.

2.4.4 Tides and Currents:

096 The tidal range is - 0.53m (below Chart Datum) to 3.55m (Above Chart Datum).

097 The maximum current across the approach channel is approximately 1.5 knots.

098 The maximum current at the TRBA Jetty is closer to 1.2 knots.

099 The winds of from the East have a greater influence on vessel manoeuvres than the current.

100 Use the Tide Table for PORTO DE SALVADOR (ESTADO DA BAHIA) at: http://www.marinha.mil.br/chm/tabuas-de-mare.:

2.4.5 Water Density & Temperature

101 The average density of the water density at TRBA Jetty varies from 1022.0 to 1026.5 kg/m³.

102 Average Sea Water Temperature in °C.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average	27.4	28.0	28.4	28.5	27.6	26.7	25.9	25.5	25.7	26.2	26.5	26.9

2.4.6 Atmospheric Pressure

103 The local atmospheric pressure reaches a maximum value of 1,011.5 mb, in July, and a minimum value of 1,006.2 mb, in December, resulting in an annual average variation of 5.3 mb.

2.4.7 Temperatures & Relative Humidity

104 The maximum temperatures reach the highest values at the months of January, February and March, around 30 ºC. The minimum climatologic temperatures occur at the months de July, August and September, between 21 ºC and 22 ºC. The annual average temperature is around of 25.2ºC. The relative humidity of the air reaches its maximum in **May** (83%), coinciding with the maximum rainfall.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High	29.9	30.0	30.0	28.6	27.7	26.5	26.2	26.4	27.2	28.1	28.9	29.0
Low	23.6	23.7	23.9	23.7	22.9	22.0	21.4	21.2	21.7	22.5	22.9	23.2
RH %	79.4	79.0	79.8	82.2	83.1	82.3	81.5	80.0	79.6	80.7	81.5	81.1

2.4.8 Rainfall

105 The average annual rainfall at the region is 2,100 mm.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average	82.5	107.2	156.6	305.2	359.5	243.7	175.0	127.4	102.0	114.9	137.1	116.1
Days	10	13	16	17	20	19	20	15	12	10	11	10

2.5 Port Control

2.5.1 Port Control (VTS)

106 The Port of Salvador doesn't have special service for traffic and navigation control.

2.5.2 Maritime Authority

107 Port Authority of Salvador is the Maritime Authority for covering TRBA Terminal

108 The LNGC calling at TRBA is required to undergo an inspection for issuance of the SOC - Statement of Compliance which **shall** be conducted at the inner anchorage within the bay. The LNGC Agent is responsible for coordinating this inspection.

109 The ships calling at TRBA **will** be visited by Port Health, Customs and Federal Police at the anchorage and all documents related with the ship dispatch at the last port visited **must** be shown to the port authorities.

110 The LNGC is not considered ready to discharge the cargo until a successful inspection has been completed therefore Notice of Readiness **shall** not be submitted until this inspection is completed.

2.6 Pilotage

111 The use of pilots is compulsory for vessels bound for berthing and unberthing at TRBA.

112 The three Pilotages Services ("Salvador Pilots", "Bahia Pilots" and "Todos os Santos Bay") of the BTS in standby 24 hours per day.

113 The request for Pilot **shall** be done by the LNGC Agent, with at least 3 hours of notice from the time of the ship leaving the anchorage and 4 hours before the beginning of the undocking at the TRBA.

114 The Pilots monitor VHF Channel 16.

115 Pilots **will** board the LNGC inbound in the Todos os Santos Bay in position:

LATITUDE 12° 58’ 10” S

LONGITUDE 038° 32’ 22” W

116 Pilots are advisors to the bridge team, the LNGC Master remains in command and is the responsible the safe Navigation of their LNGC.

117 Any ship abnormalities and defects to the following which impacts the LNGC to berth, unberth, remain alongside or safely navigate **shall** be reported to the Maritime Authority:

- Mooring systems and equipment
- Propulsion Systems
- Steering Systems
- Positioning Monitoring Systems

118 If the LNGC Master decides not to follow the Pilot instructions, then the event including the reasons **shall** be reported immediately by the LNGC Master after berthing or when clear of the port (outbound – safe navigation permitting) to the agent who **shall** forward the information to the Port Captain in writing.

2.7 Towage (Tugs)

119 An escort Tug is required upon entry to Todos os Santos Bay until departure.

120 One (1) tug and pilot are to be assigned to escort the LNGC from the pilot boarding station to either the anchorage and/or terminal, and vice versa.

121 A minimum of four (4) tugs are required for berthing and unberthing operations.

122 All individual tugs **shall** have a minimum Bollard Pull (BP) of 40 Tons.

123 The total combined minimum Bollard Pull (BP) **shall** be not less than 200 Tons

124 One (1) Tug with Fire Fighting capability **shall** remain onsite at TRBA type from All Fast to All Gone.

125 The TRBA Transpetro Safety Inspectors & a representative from EE Brazil **shall** inspect the Tugs used at TRBA at least every 6 months

126 TRBA Transpetro can provide more information about the tugs upon request.

2.7.1 Communication between Tugs and Ships

127 The tugs are equipped with VHF for continuous communication between ship and tug during the mooring and unmooring operation.

128 Tugs maintain a 24-hour listening watch at the channel 16 in case of emergency.

129 During the manoeuvring, if there is a radio communication failure between the tugs and the ship, then the manoeuvre **should** be aborted.

130 During the STS Transfer the LNGC **shall** conduct a communication check with the Standby Firefighting Tug every hour. The TRBA Transpetro Safety Inspector onboard the LNGC **shall** be informed of any communication failure with the standby firefighting tug.

131 The FSRU can contact the terminal control room directly during other periods.

2.8 Port Services

132 The LNGC Agent is responsible for booking the Mooring Line Handling vessels for Mooring Operations.

133 Service Vessels providing provisions and crew changes for the FSRU **shall** be arranged by the FRSU Agent and are permitted upon approval from the EE TRBA Operations.

134 Service Vessels providing provisions and crew changes for the **LNGC** are not permitted alongside at TRBA and **shall** be arranged to be conducted at the anchorage through the LNGC Agent. Any operations **shall** not delay the berthing operation at TRBA.

2.9 Anchorages

2.9.1 Designated Anchorages

135 The internal Anchorage III **shall** be used for the LNG vessel due to berth next at TRBA arriving and is used for all local authority inspections prior to berthing.

136 The internal Anchorage III In permitted only one LNG vessel at a time.

137 The external Anchorage Area V **shall** be used when there is a LNGC occupying the internal anchorage.

Name	Latitude & Longitude	Remarks
Area for LNG vessel at Anchorage III inside of Todos os Santos Bay	12° 56,20' S 038° 35,12' W	Anchorage is 1.3 NM west of the coast, 0.25 NM radius in 15 meters of water. Preferred anchorage for LNG vessels. Pilot and escort tug is required onboard for any LNG vessel maneuvers at this Anchorage.
Anchorage V outside of Todos os Santos Bay.	13° 00,30' S 038° 36,60'W 13° 01,50' S 038 ° 35,00'W 13° 03,90' S 038° 36,80'W 13° 02,70' S 038° 38,40'W	Rectangular Area waiting anchorage of ships waiting for vacancy at the internal anchorage within Todos os Santos Bay.

2.9.2 Forbidden Anchorages

138 Anchoring in the following areas is forbidden.

Name	Latitude & Longitude	Remarks
Anchorage I	12° 55.70' S 038° 32,88' W 12° 55,70' S 038° 31,46'W 12° 56,95' S 038° 30,45'W 12° 56,35' S 038° 32,88'W	Intended for refueling, inspections, small repairs and disembarkation of crews of ships with draft equal or lower than ten meters.
Anchorage II	12°56,70' S 038° 32,88'W 12° 58,47' S 038° 32,88'W 12° 57,20' S 038° 30,89'W	Intended to the free anchorage of ships with draft equal or lower than ten meters.
Anchorage III	12° 58,47' S 038° 33,16'W 12° 58,47' S 038° 34,92'W 12° 55,98' S 038° 35,58'W 12° 56,62' S 038° 33,16'W	Intended for refueling, inspections, small repairs and disembarkation of crews of ships with draft equal or greater than ten meters.
Anchorage IV	12° 55,80' S 038° 33,60'W	Intended for ships in quarantine situation, designed by the Maritime Authority.

2.10 Restricted Areas

2.10.1 Exclusion Zone

142 There is an Exclusion Zone within a radius of 150 meters around the LNGC hull when berthed at TRBA.

143 It is prohibited to carry out any service, including maintenance, which can generate any source of ignition, without the prior port authority consent when in the Exclusion Zone.

2.10.2 Safety Zone

144 At the anchorage there is a Safety Zone with a 500-meter radius around the ship.

145 It is forbidden for any vessel to enter, transit or stay within the 500-meter zone of a vessel at anchor that is not providing a service to the anchored vessel without the prior permission of the port authority.

146 The LNGC Agent is responsible for coordinating amongst the various parties (Pilots, Operators, Terminals etc to ensure this approach restriction (Safety Zone) is complied with.

3.0 TERMINAL OVERVIEW

3.1 General Description

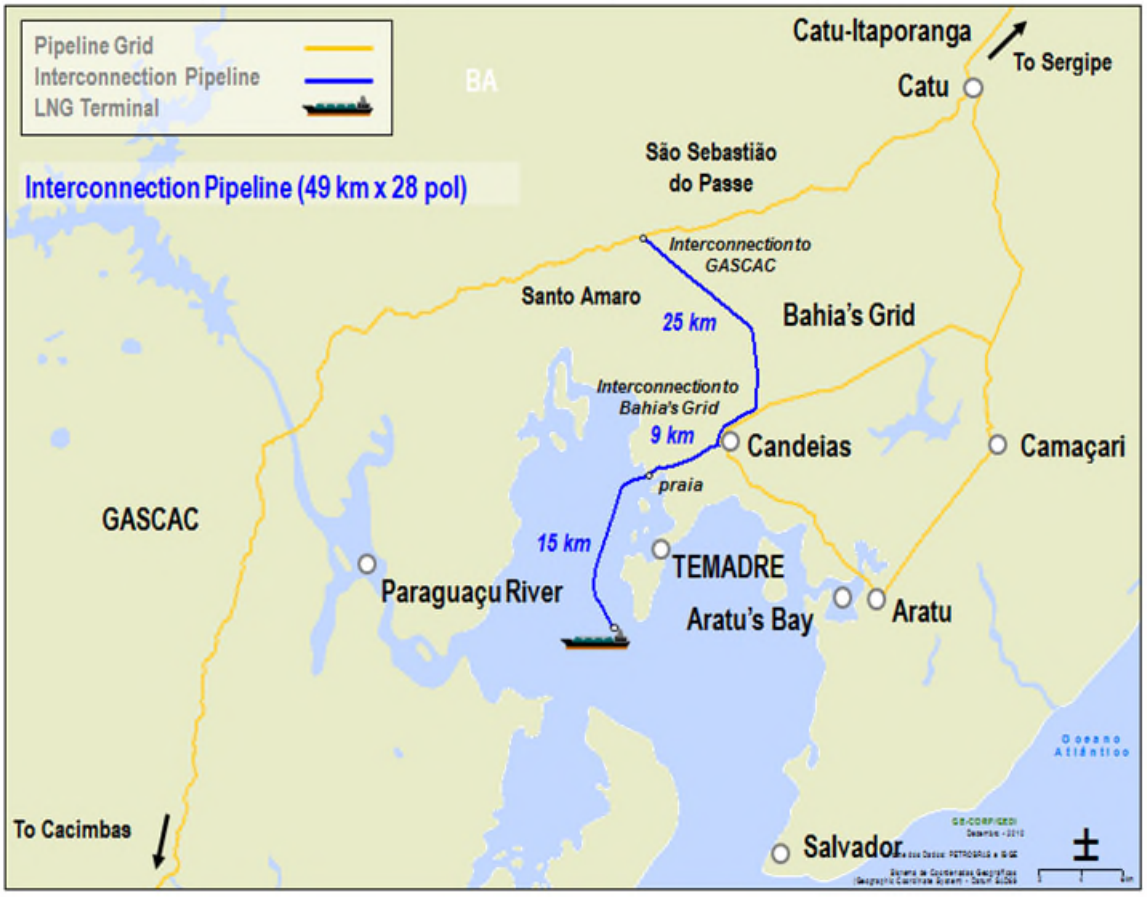
147 The Bahia Regasification Terminal is operated by Excelerate Energy. Transpetro have been contracted by Excelerate Energy to provide the Jetty and Pipeline Operation and Maintenance Services. The FSRU Excelerate Sequoia is operated by Excelerate Energy and Technically Managed by in house by Excelerate Technical Management BV.

148 The Bahia Regasification Terminal is a pier offshore type island, built in 2013, with one (01) berth for mooring a Floating Storage and Regasification Unit (FSRU) with a capacity of 170,139 m³.

149 This FSRU Excelerate Sequoia is moored portside to the TRBA Jetty and has a regasification capability up to 750 mmscfd.

150 An LNGC with cargo carrying capacity up to 215K m3 can discharge portside to using STS Hoses with a total maximum transfer capability of 9,000 m3/hr.

151 After the vaporization of the LNG, the CNG is offloaded by means of two High Pressure Marine Loading Arms (HPMLA) on the TRBA Jetty which is connected a 28-inch diameter Gas Pipe spanning 15.5 km underwater sand 29.5 km overland to the main grid connection point.



3.2 Location Coordinates

152 The coordinates of TRBA Terminal are **12° 48' 52" S** and **038° 40' 45'' W**.

153 LNGC **will** berth portside alongside.

3.3 Time Zone

154 TRBA Time Zone is UTC - 3:00 and presently daylight savings time is not observed.

155 TRBA is operational 24 Hours per day, 7 days a week, 365 days a year.

3.4 Terminal Approach

3.4.1 Access Channel

156 Access to TRBA is via the São Roque/Paraguaçu Channel which is IALA System Region B.

157 The access channel is marked with the following Navigational Aids:

Mark ID	Color	Geographic Coordinates		UTM Coordinates	
		Longitude	Latitude	N	E
BUOY REGAS 1	158	12° 52'15.81" S	038° 38'31.09" W	8,577,096.34	538,845.62
BUOY REGAS 2	159	12° 51'09.04" S	038° 40'39.67" W	8,579,152.48	534,972.97
BUOY REGAS 3	160	12° 51'23.01" S	038° 39'09.35" W	8,578,719.68	537,694.64
BUOY REGAS 5	161	12° 49'54.73" S	038° 39'59.39" W	8,581,433.63	536,189.93
BUOY REGAS 7	162	12° 49'03.40" S	038° 41'25.81" W	8,583,013.65	533,586.73
BUOY SPECIAL 1	163	12° 49'02.11" S	038° 40'25.92" W	8,583,050.50	535,391.13
BUOY SPECIAL 2	164	12° 48'30.02" S	038° 41'07.76" W	8,584,132.03	534,132.03
FTE DOLFIN 1	165	12° 48'47.29" S	038° 40'48.50" W	8,583,507.54	534,712.11
FTE DOLFIN 2	166	12° 48'54.64" S	038° 40'40.99" W	8,583,281.26	534,938.39
Coroa de Pedras	167	12° 49'57.92" S	038° 41'24.34" W	8,581,338.77	533,629.03

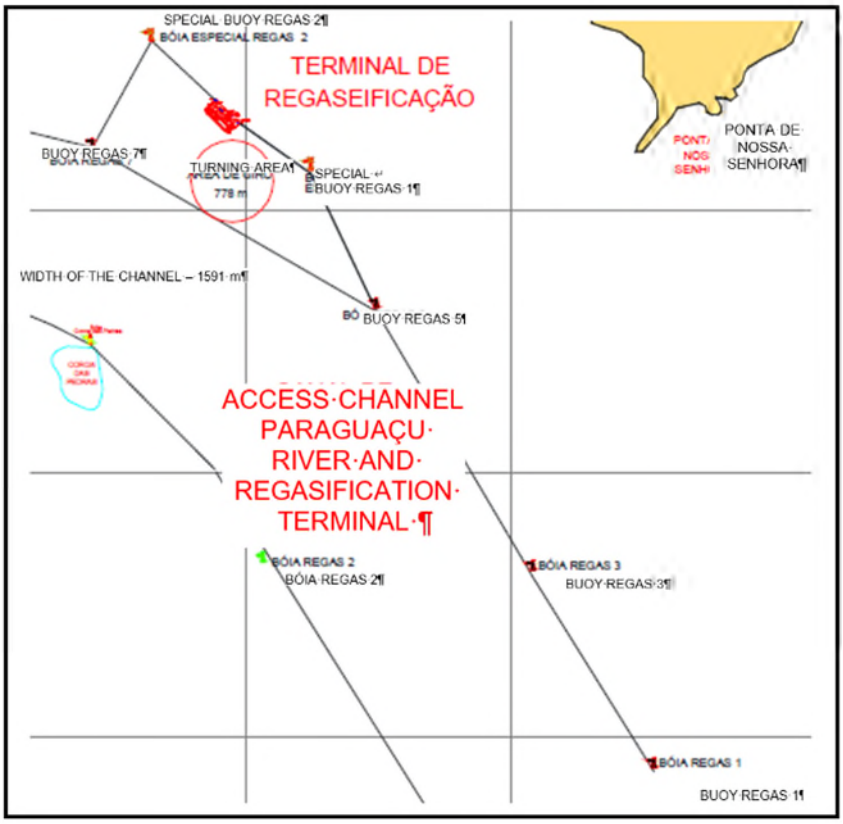
168 The Navigation Marks have the following characteristics as per Technical Report Number RL-4100.25-6443-933-PIG-001 Rev. 0

Mark ID	Type	Luminous	Period	Phase	Height	Altitude
BUOY REGAS 1	Articulated Buoy	Lp. E	3s	E.0.3 Ecl. 2.7	N/A	N/A
BUOY REGAS 2	Articulated Buoy	Lp. V	3s	E.0.3 Ecl. 2.7	N/A	N/A
BUOY REGAS 3	Articulated Buoy	Lp. E	5s	E.4.0 Ecl. 1.0	N/A	N/A
BUOY REGAS 5	Articulated Buoy	Lp. E	3s	E.0.3 Ecl. 2.7	N/A	N/A
BUOY REGAS 7	Articulated Buoy	Lp. E	5s	E.4.0 Ecl. 1.0	N/A	N/A
BUOY SPECIAL 1	Articulated Buoy	Lp. A	2s	E.0.8 Ecl. 1.2	N/A	N/A
BUOY SPECIAL 2	Articulated Buoy	Lp. A	2s	E.0.8 Ecl. 1.2	N/A	N/A
FTE DOLFIN 1	Spotlight	ISSO	x	F. A	4.80m	4.975m
FTE DOLFIN 2	Spotlight	ISSO	x	F. A	4.80m	4.975m
Coroa de Pedras	Articulated Buoy	Lp. E	3s	E.0.3 Ecl. 2.7	N/A	N/A

3.4.2 Turning Basin

169 The turning basin has a diameter of 778 meters in the quadrilateral area bounded by the Special REGAS 1 and 2 buoys, limited by the 15-meter depth line.

170 The turning basin is designed for vessels up to 315 meters in length.



3.5 Berthing Maneuver

171 The berthing philosophy is to turn the LNGC to starboard in the turning circle,

172 Bring the LNGC parallel to the FSRU at a distance not less than 50 meters and stopped in the water.

173 Tugs **shall** then push the vessel onto the FSRU Berthing Line.

174 To avoid damage to the FSRU fenders the LNGC **should** land squarely on the fenders with a contact speed not exceeding 0.10 m/s.

175 Only after the vessel has been positioned and is being held alongside the FSRU by the tugs, can mooring lines be passed to the FSRU – First Line Ashore is the Inner Fore and Aft Spring Lines.

176 Positioning of LNG by use of engine once hull is in contact with the FSRU fenders is prohibited.

177 If major re-positioning is required the LNGC **shall** be pulled away from fenders, aligned correctly and then pushed back onto the fender line by use of Tugs.

3.6 Daylight Limitations

178 The berthing and unberthing is permitted during day light hours only which is considered as:

- Berthing Window – Pilot may board 90 minutes before sunrise up to 150 minutes before sunset.
- Unberthing Window - Pilot may board 30 minutes before sunrise up to 60 minutes before sunset.

3.7 Tidal Limitations

179 Tidal restrictions window is as follows:

- Berthing Window – Start maneuver with Pilot onboard 2 hours before Low tide until 3 hour before high tide at Salvador.
- Unberthing Window – No Restrictions.

3.8 Current Limitations

180 Maximum current speed of up to one (1) knot for berthing, measured at the turning basin using the LNGC Speed Log.

3.9 Speed Limitations

181 The maximum speed in the main channel **shall** not exceed 6 (six) knots (Speed Over Ground).

182 The maximum speed of approach to the turning basin **shall** not exceed 4 (four) knots (Speed Over Ground).

183 Maximum berthing speed (for contact to fenders) 0.10 m/s.

3.10 Jetty Specification

Description	Specification
Total Length of the Pier	330 meters
Berth Depth (Chart Datum)	17 meters
Distance between fenders (external / internal)	110 / 80 meters
Maximum Deadweight (DWT)	125,000 tons
Maximum Displacement (Tons)	146,500 tons
Maximum Draft (m)	12.5 meters
Maximum Length (m)	315 meters
Maximum Breadth (m)	50 meters

3.11 Physical Berthing Limitations

Description	Minimum	Maximum
Summer deadweight	48,857 t	125,000 t
Displacement	No Limit	146,500 t
Volumetric capacity	89,000 m^3	218,000 m^3
Length (LOA)	239 m	315 m
Beam	No Limit	50 m
Draft	No Limit	12.5 m
Body Length Total Parallel	62 m	No Limit
PBL Forward of Manifold	23 m	No Limit
PBL Aft of Manifold	39 m	No Limit
Bow to Manifold Distance	97 m	188 m
Stern to Manifold Distance	117 m	188 m
Height of Manifold above the waterline	13 m	28 m
Air draft	No restrictions	No restrictions
Berthing Angle	-	Max 15°
Berthing Speed	-	0.10 m/s
FSRU Berthing to Jetty	Portside To	
LNGC Berthing to FSRU	Portside To	

3.12 Weather Limitations

Activity		Wind Speed (knots)	Wave Height (m)	Action
FSRU or LNGC	Mooring	< 20 < 15 (from South) < 15 (from South East)	<=0.9	Normal Condition. No action.
	Unmooring	> 20		Mooring and Unmooring **shall** be suspended
		> 35		Tugs **shall** be requested to be close to the FSRU or LNGC. Commence drain STS Hoses and disconnection process.
STS	Operations	> = 30 (Sustained)	>1.3	Stop Cargo Transfer Operations.
		> 35 (Sustained)		Disconnect LNG hoses and unmoor the ship by master's evaluation

3.13 Fenders

3.13.1 Jetty Fenders

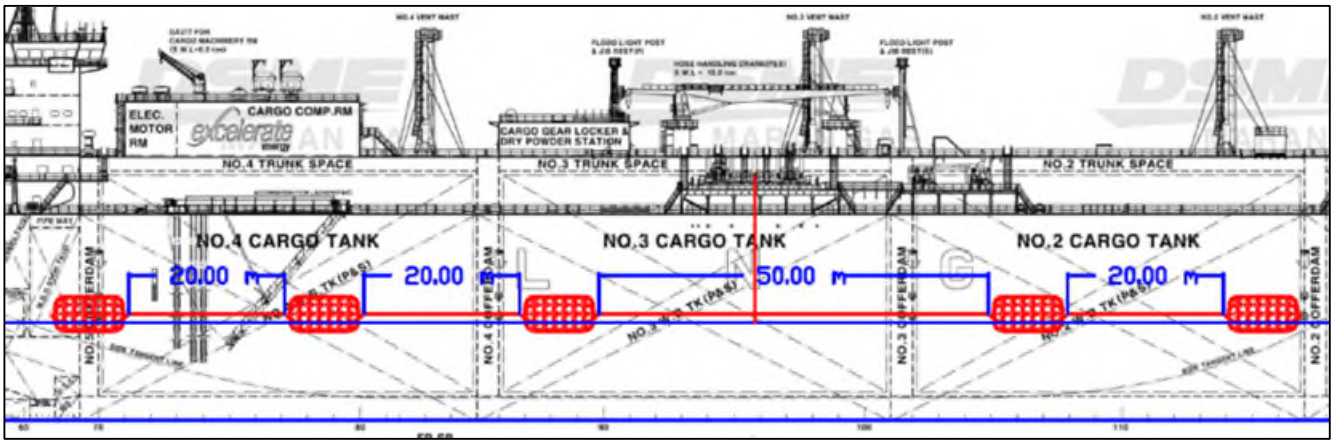
184 The fender specification can absorb berthing energy for vessel up to QFLEX size based on PIANC Guidelines.

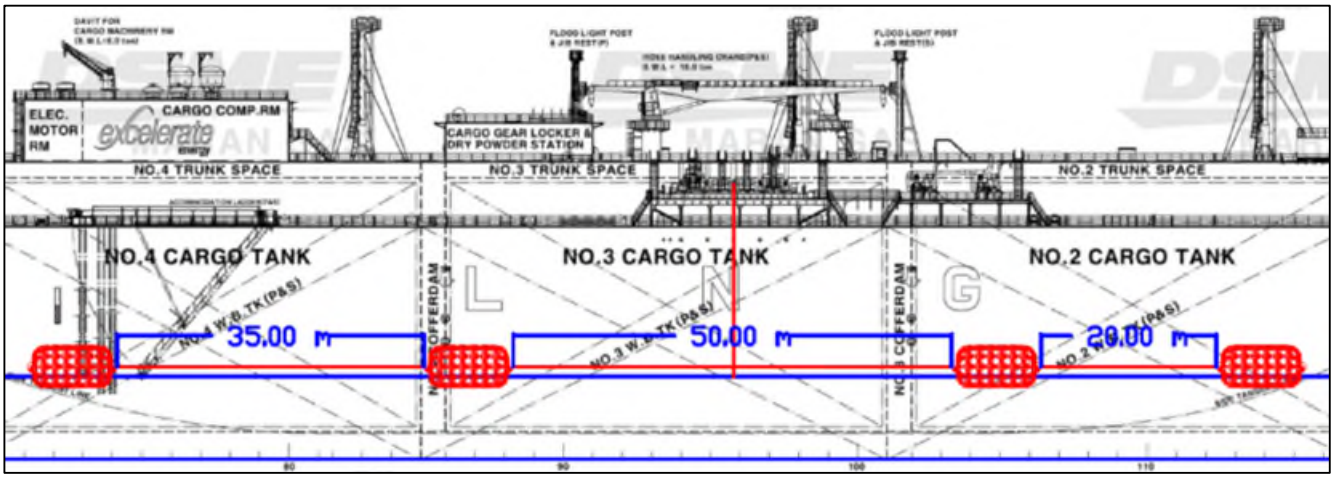
185 Vessels **should** berth as parallel as possible with the berthing line, contacting the fenders at the same time, but in all cases the berthing angle **shall** not exceed 15° from the longitudinal.

186 Maximum berthing speed **shall** not exceed 0.10 m/s.

3.13.2 STS Floating Fenders

187 Primary Fenders – The FRSU has Five (5) Jumbo Pneumatic fenders, 4.5 m diameter and 9.0 meters long, wrapped in a tire net (5.2 m with tire net) rigged on the FSRU starboard side, two (2) forward of the manifold area and three (3) aft of the manifold area. A minimum of four (4) Jumbo Fenders are required for LNG STS Operations at TRBA, therefore there is redundancy built into the Jumbo fender strig for any operational issues that **may** arise.





188 Secondary Fenders - The FSRU has Two (2) Secondary or 'baby' pneumatic fenders, 1.5 m in diameter and 3.0 meters in length, wrapped in a tire net rigged on the starboard side, on the upper fore and aft limits of the parallel mid-body. They **shall** be suspended from the FSRU deck bollards with a rope and wire harness arrangement.

189 Vessels **should** berth as parallel as possible with the STS Fender Berthing Line, contacting the fenders at the same time, but in all cases the berthing angle **shall** not exceed 15° from the longitudinal.

190 Maximum berthing speed **shall** not exceed 0.10 m/s – LNGC Master **shall** ensure compliance.

191 The ends of the fender string are secured forward and aft with dedicated ropes to the FSRU deck bollards, an additional rope safety line **shall** be rigged forward within the fender string and made fast on the FSRU deck bollards.

192 No safety wire is required.

193 All fenders **shall** be ISO 17357 compliant.

194 All fenders **shall** be visually inspected from deck level prior to each STS Operation by FSRU Staff.

195 Fenders **shall** be serviced at least annually in full compliance with the manufacturers manual which **shall** include the servicing of the safety valve.

196 The above fender arrangement is based upon typical LNGC calling at TRBA, however, the Compatibility Study **shall** review the fender configuration and determine if a different number and/or re-alignment is necessary or acceptable.

197 Under normal circumstances, there is no requirement to have fenders rigged on the LNGC.

3.14 Access to FSRU and LNGC

3.14.1 Access to FSRU

198 The TRBA is fitted with a hydraulic gangway, located on the portside aft of the FSRU Cargo Manifold.

199 The gangway **shall** be operated by competent TRANSPETRO personnel.

200 The FSRU **shall** monitor the position of the gangway and notify TRANSPETRO if the gangway position needs adjusting.

3.14.2 Access to LNGC

201 The FSRU is fitted with a certified Personnel Transfer Basket which is located aft of the FSRU starboard side manifold.

202 The Personnel Transfer Basket **shall** land aft of the LNGC portside cargo manifold and form part of the pre-arrival compatibility checks. The LNGC is responsible for painting a 2.1 m in diameter yellow circle maker “Billy Pugh” in black letters. The centre of this circle **shall** be not more than 20.0 m aft of the vapor line. This landing area **shall** be free of hatches, vents, and other obstructions.

203 The LNGC **shall** prominently display "No Smoking" and "Authorized Access" notices in safe proximity to the landing area.

204 The FSRU crane utilized to lift this basket is certified for lifting personnel.

205 The FSRU crane operator **shall** be trained and certified in compliance with the FSRU safety management system requirements.

206 The FSRU **shall** appoint a Person In charge who **shall** manage the transfer process and ensure that all personnel are briefed prior to boarding. The Person In charge cannot be an individual who is riding the Personnel Transfer Basket nor be the Crane Operator.

207 All personnel riding the Personnel Transfer Basket **shall** have undergone familiarization onboard the FSRU which **shall** include as a minimum watching the Safe Transfer video. The video **shall** be viewed at least annually be personnel riding the basket. It **may** be necessary for personnel using the transfer basket to sign an LOI prior to using this service.

208 Before the first Personnel Transfer Basket on to the LNGC, the Person In charge on the FSRU **shall** agree to the safe landing area with the LNGC. The LNGC **shall** have at least one crew member available to tend the Personnel Transfer lifts.

209 On completion of mooring the LNGC Master **shall** verbally confirm to the FSRU Master that the LNGC is securely moored (“All Fast”) and that the Personnel Transfer Basket can now be operated and land on the LNGC deck.

210 Personal Transfers are not permitted in wind greater than 20 knots.

211 The FSRU Master or Chief Officer is required to give verbal permission for a Personal Transfer Operation to proceed.

212 The FSRU **shall** comply with their SMS Requirements with regards Personal Transfer Operations.

4.0 COMMUNICATIONS

213 This section highlights what information needs to be sent to which stakeholders and when.

214 EE TRBA Operations **shall** acknowledge receipt via email for all notifications received.

4.1 Emails

215 All relevant TRBA Terminal communication **shall** be addressed to the following:

To: EE TRBA Operations	TRBA@excelerateenergy.com
Cc: FSRU Excellence	master.sequoia@fleet.exceleratetm.com
Cc: Transpetro Jetty	trba.operations@transpetro.com.br
Cc: Other Parties	As stated in any commercial Instructions

4.2 VHF

216 The FSRU and Port Service Vessels **shall** always monitor VHF Channel 16.

217 The LNGC **shall** initially contact the FSRU on VHF Ch 16 before switching to an agreed TRBA Working Channel and **shall** maintain VHF communication throughout mooring cargo and unmooring operation.

4.3 Notifications

218 Note that below notifications are related to EE TRBA Operations only.

219 The LNGC **shall** also be communicating with the appointed local agent to provide notices, forms, and certificates to public authorities as required by The Convention on Facilitation of International Maritime Traffic (FAL Convention).

4.3.1 Notification 1 (Email): LNGC Departure from Load Port

AA LNGC Name / Call sign / Port of Registry / IMO Number

BB Load Port / Departure Date / Departure Time (UTC)

CC ETA at TRBA Pilot Station (LT)

DD Current Tank Pressure in mbar (g)

EE Current Tank Temperature in (°C)

FF Loaded LNG Density (m3/kg)

GG Estimated Quantity of LNG to be Discharged at TRBA (m3)

HH Estimated Heel Quantity Remaining Onboard After Unloading at TRBA (m3)

II If Heeling Out – Estimated Additional Time Required (hh:mm)

JJ If Heeling Out – LNGC Maximum Trim Required (m)

KK Load Port Certificate of Quality Copy

LL Estimated Draft on Arrival Alongside FSRU (m)

MM Estimated Height of Manifold above Keel on Arrival Alongside FSRU (m)

NN Estimated Lightest Draft when Alongside the FSRU (m)

4.3.2 Notification 2 (Email): 96 Hour Arrival Notice at Pilot Station

AA LNGC Name

BB Updated ETA at TRBA Pilot Station (LT)

CC Current Tank Pressure in (kPa Gauge) & Estimate Tank Pressure on Arrival TRBA (kPa Gauge)

DD Current Tank Temperature in (°C) & Estimate Tank Temperature on Arrival TRBA (°C)

EE Estimated Quantity of LNG to be Discharged at TRBA (m3)

FF List defects impacting LNGC Navigation, Cargo Operations or Gas Management Capability

GG Copy of Arrival Crew List (included Supernumeraries)

4.3.3 Notification 3 (Email): 72 Hour Arrival Notice at Pilot Station

AA LNGC Name

BB Updated ETA at TRBA Pilot Station (LT)

CC Current Tank Pressure in (kPa Gauge) & Estimate Tank Pressure on Arrival TRBA (kPa Gauge)

DD Current Tank Temperature in (°C) & Estimate Tank Temperature on Arrival TRBA (°C)

EE Estimated Quantity of LNG to be Discharged at TRBA (m3)

4.3.4 Notification 4 (Email): 48 Hour Arrival Notice at Pilot Station

AA LNGC Name

BB ETA at TRBA Pilot Station (LT)

CC Current Tank Pressure in (kPa Gauge) & Estimate Tank Pressure on Arrival at TRBA (kPa Gauge)

DD Current Tank Temperature in (°C) & Estimate Tank Temperature on Arrival at TRBA (°C)

EE Confirm the following have been tested and/or are fully operational:

- Navigation, mooring, safety & engine systems.
- Cargo system & boil off control systems.
- Gas detection systems
- ESD system, alarms, and interlocks

- Cargo tank high and low-level alarms
- High & Low-pressure alarms
- Remotely operated valves including ESD valve closing time in sec.

FF Copy of Signed TRBA Condition of Use (Annex 1)

4.3.5 Notification 5 (Email): 24 Hour Arrival Notice at Pilot Station

AA LNGC Name

BB Confirm ETA at TRBA Pilot Station (LT)

CC Current Tank Pressure in (kPa Gauge) & Estimate Tank Pressure on Arrival TRBA (kPa Gauge)

DD Current Tank Temperature in (°C) & Estimate Tank Temperature on Arrival TRBA (°C)

EE List defects impacting LNGC Navigation, Cargo Operations or Gas Management Capability

FF ISPS Security Level

GG LNGC Company Security Officer Contact Details

HH LNGC Ship Security Officer Contact Details

II Confirmation that LNGC officers and crew have been made aware of their respective tasks and operations regarding the safe operation of ships equipment including familiarization with the appropriate sections of the TRBA Terminal Manual

4.3.6 Notification 6 (Email): 12 Hour Arrival Notice

AA LNGC Name

BB Confirm ETA at TRBA Pilot Station (LT)

CC List defects impacting LNGC Navigation, Cargo Operations or Gas Management Capability

4.3.7 Notification 7 (VHF): 2 Hours

220 LNGC **shall** establish communication with the FSRU at least 2 hours prior to arrival at TRBA Pilot Station.

4.3.8 Notification 8 (Email): On Arrival – Notice of Readiness (NOR)

221 The LNGC **shall** tender NOR as 6.6 Notice of Readiness.

222 The NOR **shall** be signed and accepted by the attending TRBA Representative during the Pre-Transfer Meeting after successful completion of the safety checks.

4.3.9 Notification 9 (Email): TRBA Terminal Departure Notification

AA LNGC Name

BB Outstanding Port Log items

CC LNG Volume Unloaded at Closing CTMS (m3)

DD LNG Heel Remaining Onboard at Closing CTMS (m3)

EE Pilot Away Time (LT)

4.3.10 Agents - Reporting System

223 The LNGC Master **may** be requested to furnish the Local Agent with additional details and documents prior to arrival at TRBA.

224 The LNGC Master is responsible for contacting the Local Agent well in advance to comply with any information requests.

225 Agents are responsible for arranging Pilots.

4.3.11 Additional Notifications

226 Once VHF contact has been made with the FSRU, then they **shall** advise on any additional reporting requirements.

4.3.12 Change in Notification

227 A notification change **shall** be updated and sent if:

- ETA deviates by more than 4 hours from that initial Departure of Load Port Notification.
- ETA changes by more than 1 hour after sending the 24-hour Notification.
- LNGC ISPS Security Level changes after sending the 24-Hour Notification.
- Change in estimated quantity of LNG to be Discharged at TRBA (m3).
- Change in estimated Heel Quantity remaining onboard after unloading at TRBA (m3).
- Any deficiencies affecting Navigation, Cargo Operations or Gas Management Capability.

5.0 MOORING PROCEDURES ALONGSIDE FSRU

229 Pilots and tugs are mandatory for the berthing and unberthing of an LNGC at TRBA. Unmooring **shall** not commence until the pilot is onboard and the Pilot Master Exchanged has been completed.

230 All approaches and mooring operations are recorded by TRBA CCTV.

231 The FSRU and LNGC **shall** have a copy of an approved mooring study completed as part of the STS Compatibility Study.

232 The approved mooring arrangement **shall** be discussed and agreed between the Pilot and LNGC Master. It **shall** then be confirmed with the FSRU Master over the radio.

233 If it is required to deviate from the initial approved arrangement, then the FSRU Master **shall** be informed accordingly. Any deviation from the approved mooring plan **shall** be brought to the attention of EE Marine Risk Team and they need to confirm that it is suitable prior commencing operations.

234 Mooring Stations onboard both the FSRU and LNGC **shall** be adequately manned, and equipment prepared and tested before the LNGC enters the approach channel. Any defects identified during the testing of mooring equipment **shall** be reported to the FSRU Master prior to entering the approach channel.

235 Mooring lines **shall** only be sent to the FSRU when agreed between the FSRU and LNGC Masters.

236 Tugs **shall** only be dismissed by the pilot once the LNGC is confirmed all fast.

237 The Pilot is not permitted to leave the LNGC until confirmed all fast.

238 The FSRU is moored portside alongside the jetty.

239 The LNGC is moored portside alongside the FSRU.

5.1 Mooring Systems

240 A QRH can be manually or locally released.

241 All hooks have individual load cells that **shall** be calibrated every 12 months.

5.1.1 TRBA Jetty Mooring System (LNGC Head & Stern Lines)

242 Mooring System (DAM 1 Stern to DAM 6 Forward) in compliance with OCIMF MEG 4 Guidelines.

DOLPHIN	No. Units	No. Hooks per Unit	Safe Working Loading
MD - DAM 1	2	3 Hooks	3x150 tons each / 3x125 tons each
MD - DAM 2	1	3 Hooks	3 x 125 tons each
MD - DAM 3	1	3 Hooks	3 x 125 tons each
BD - DAT 1	1	2 Hooks	2 x 125 tons each
BD - DAT 2	1	2 Hooks	2 x 125 tons each
BD - DAT 3	1	2 Hooks	2 x 125 tons each

BD - DAT 4	1	2 Hooks	2x125 tons each
MD - DAM 4	1	3 Hooks	3 x 125 tons each
MD - DAM 5	1	3 Hooks	3 x 125 tons each
MD - DAM 6	2	3 Hooks	3 x 125 tons each / 3 x 150 tons each

5.1.2 FSRU Mooring System (LNGC Spring and Breast Lines)

243 The mooring system for STS operation on board of the FSRU consists of:

Optimoor Reference	Lines	No. Hooks per Unit	Safe Working Loading
49 & 48	Aft Breasts / Stern Lines	2 Hooks	2 x QRH 150 Tons
47 & 46	Aft Breasts	2 Hooks	2 x QRH 150 Tons
45 & 44	Aft Breasts	2 Hooks	2 x QRH 150 Tons
43 & 42	Aft Breasts	2 Hooks	2 x QRH 150 Tons
41 & 40	Aft Springs	2 Hooks	2 x QRH 150 Tons
39 & 38	Fwd Springs	2 Hooks	2 x QRH 150 Tons
37 & 36	Fwd Breasts	2 Hooks	2 x QRH 150 Tons
35 & 34	Fwd Breasts	2 Hooks	2 x QRH 150 Tons
33 & 32	Fwd Breasts	2 Hooks	2 x QRH 150 Tons
31 & 30	Fwd Breasts / Head Lines	2 Hooks	2 x QRH 150 Tons

5.2 Mooring Equipment

244 The LNGC specification, inspection, and maintenance of mooring equipment and ropes/wires is expected to comply with the latest OCIMF Mooring Equipment Guidelines (MEG) publication. The LNGC Mooring System specification **shall** be reviewed as part of the compatibility process.

245 All vessels **shall** have sufficient usable wires or high modulus ropes with a maximum 11-meter tail.

246 Synthetic tail ropes **must** be renewed at intervals not exceeding 18 months unless inspections indicate a shorter period is warranted.

247 The LNGC **should** arrive with a sufficient complement of mooring lines, with a minimum of 1 spare mooring rope and 1 spare mooring tail. Normally, 16 to 18 mooring lines **should** be in use at the terminal. Further details **shall** be provided as part of the compatibility process.

248 All Mooring Lines **shall** be pre-rigged and laid out on the deck.

249 All moorings **shall** be passed from LNGC to the FSRU using a combination of LNGC's heaving line and messenger lines on an endless loop. The FSRU Messenger Line for the springs **should** be a 40mm line.

250 Messenger lines are given from the FSRU only. The LNGC **should** have on stand-by and ready for use at both mooring stations a three-strand or eight stranded polypropylene rope of at least 24mm diameter in

good condition and long enough to reach the LNGC manifold from the spring winch. In any case with sufficient length to reach the furthest QRH as per the agreed mooring plan.

251 Any locking turns experienced on the LNGC Warping Drum when heaving up the FSRU Messenger Line **shall** be addressed immediately. Continuing to heave in a messenger line which is locked onto the warping drum **shall** be considered a failure to comply.

252 Mooring lines **shall** be made fast on the quick release hooks on the FSRU, per the approved mooring plan.

253 The mooring lines used in a common direction (head/stern/breast/springs) **shall** be of identical breaking strength, elasticity, and material. Under no circumstances **shall** a mixture of wire and synthetic ropes be accepted, nor **should** different length tail be utilized.

254 Mooring wires and ropes with dedicated winch drums **shall** be spooled in the correct direction on the winch drum.

255 On completion of mooring, winches **should** be out of gear with the brakes 'hardened up to the mark'. Winches **must** not be left on 'automatic tension'.

256 The LNGC winch brakes **shall** be tested at 12 monthly periods and the test results **should** be retained onboard for inspection by FSRU.

257 An integrated mooring monitoring system (IMMS) has been installed on the FSRU for monitoring mooring loads/tensions.

5.3 Mooring Process

5.3.1 Mooring Configuration

258 Normal mooring configuration is 2-4-2 Forward and Aft (16 Lines).

259 Depending on the size of the LNGC **will** depend on whether the Head and Stern lines are made fast on the jetty mooring dolphins or the FSRU QRHs.

5.3.2 Mooring Sequence

- Step 1 FWD and AFT springs lines (inner to outer) from LNGC to FSRU by messenger (1 line at a time). Spring lines are not allowed to be tensioned until all forward and aft spring lines are fast and FSRU crew is clear from QRH's and snap back area.
- Step 2 FWD and AFT breast lines (inner to outer) from LNGC to FSRU by messenger (1 line at a time). Breast lines are not allowed to be tensioned until all forward and aft breast lines are fast and FSRU crew is clear from QRH's and snap back area.
- Step 3 Headlines and Stern lines (inner to outer) from LNGC to FSRU by messenger (1 line at a time).
- Step 4 Headlines and Stern lines (inner to outer) from LNGC to mooring dolphins by mooring line boat.

5.3.3 Mooring Practices

260 During the FSRU berthing a competent individual **shall** be positioned at shore HPMLA and a FSRU competent persona at the CNG Manifold for alignment monitoring.

261 A competent individual **shall** be placed at both the FSRU and LNGC cargo manifolds for alignment monitoring.

262 Mooring practices **shall** be in full compliance as defined in industry best practices guideline publications.

263 The LNGC **shall** moor port side to the FSRU starboard side.

264 Spring lines fore and aft **shall** be the first lines to be sent to the FSRU.

265 The method of sending lines across to the FSRU **shall** be as follows:

- LNGC crew **shall** throw their heaving line to the FSRU.
- FSRU crew **shall** heave up the heaving line and connect the end of the FSRU messenger line to the LNGC heaving line
- LNGC crew **shall** heave up their heaving line and FSRU messenger line using their warping drum.
- LNGC crew **shall** make fast the messenger line to the mooring line and send the line out.
- FSRU crew is to heave on the mooring line using the QRH warping head.
- Fore and Aft movement when alongside the fenders should be kept to a minimum or with minimum force against the fenders to avoid damage.
- Spring lines fore and aft **shall** be the first lines to be sent to the FSRU. First inner followed by outer spring lines.
- Final fore and aft positioning **shall** be made when forward and aft spring lines are connected to the FSRU's mooring hooks. At that point FSRU Officer at the manifold will cross-check final positioning.
- Once forward and aft springs lines are fast there **will** be an FSRU Officer at the manifold to cross-check positioning. Final fore and aft positioning **shall** be made when forward and aft spring lines are connected to the FSRU's mooring hooks.

266 Thereafter the fore and aft breast, head and stern lines **shall** be sent as per the agreed mooring plan. This mooring procedure requires close cooperation between LNGC's crew and the FSRU crew to ensure a smooth and safe mooring operation.

267 All 4 springs **shall** be on hooks before adjusting the position of vessel forward and aft. Only one mooring line is permitted to be placed on one hook.

268 Only one mooring line **should** be attached to the messenger. Attempting to secure more than one mooring line on a single messenger is unsafe and **shall** only extend the time taken to complete the mooring operation.

269 In the interest of safety and until all mooring lines have been passed to the designated mooring hooks, it is extremely important that the LNGC crew do not heave on any mooring lines until the Mooring Crew are clear of the mooring hook concerned.

270 All mooring lines **will** be made fast to QRHs on the FSRU or Jetty Dolphins.

271 LNGC **must** have a sufficient supply of good quality heaving lines of sufficient length to reach the furthest dolphin as per the agreed mooring plan. The FSRU **will** provide the messenger lines.

272 Mooring lines **should** be pre-tension between 5–10 Tonnes upon completion of the mooring operation.

5.3.4 Unmooring Process

273 Under normal circumstances mooring lines **will** be released by the FSRU Crew and recovered by the LNGC.

274 Only a completely slack mooring line **shall** be release from a QRH.

275 A mooring line **shall** never be heaved up until it is confirmed that the line has been released by the FSRU Master to the LNGC Master.

5.3.5 Unmooring Sequence

- All lines to be cast off two by two
- Step 1 Head and Stern lines (outer to inner) from Mooring Dolphin to LNGC.
- Step 2 Head and Stern lines (outer to inner) from FSRU to LNGC.
- Step 3 FWD and AFT Brest lines (outer to inner) from FSRU to LNGC.
- Step 4 FWD and AFT Springs lines (outer to inner) from FSRU to LNGC.

5.4 Mooring Integrity

276 It is the responsibility of the LNGC Master to ensure the following:

- Whenever any mooring lines need to be handled, the mooring master and FSRU should be informed, and this should be logged.
- All personnel involved in mooring operations are trained and deemed competent for the role they have been assigned to and have undergone familiarization of the Terminal's mooring procedure and the agreed upon Mooring Arrangement.
- All Mooring Stations are supervised by a competent Deck Officer, who maintains an overview of the operation and does not get involved handling mooring lines.
- Their vessels are securely moored in line with the foregoing as applicable and with due regard to the current weather forecast.
- Moorings lines are monitored which **shall** include at least an hourly visual inspection and tendered as necessary to prevent damage to equipment, over tensioned lines, slack lines, and undue movement of the LNGC. Freeboard changes between the LNGC and FSRU and any stern trim on the LNGC **shall** be monitored to avoid chaffing occurrences. Any excess surging or swaying movements or where the LNGC comes off the fender line **shall** be reported to the FSRU immediately.

- Good line tending **shall** be exercised to ensure that all lines share the load to the maximum extent possible and the ship's movement is limited along the berthing line in both a longitudinal and transverse direction. Line tendering **shall** be conducted in line with industry best practices and any case the position of the LNGC with respect to the FSRU **shall** be monitored by the LNGC Crew during any tendering of lines.
- The local weather forecast **shall** be monitored during the vessel's stay alongside, and appropriate action taken in advance of deteriorating weather.

277 **Should** the LNGC land heavily against the fenders, with suspicion of damage, or make actual contact with the FSRU when berthing, cargo operations **shall** not commence until an assessment of damage has been made. If necessary, the LNGC **may** depart to validate the condition of the FSRU, LNGC and equipment. In case of major contact, the Regas operation **should** be stopped and HPMLA disconnected as necessary.

278 In the event of a mooring line failure, the cargo transfer operation **shall** be suspended until the line is replaced or an alternative mooring configuration is agreed between the FSRU and LNGC Master.

279 The loss of a single line **may** not be symptomatic of a system failure but **may** be because of an individual line condition. If progressive failures occur, a controlled shut down, hose disconnection and unmooring **should** be initiated.

280 The failure to comply with safe mooring practices and adequately tend the moorings **shall** be followed up by Excelerate Energy Marine Risk Team with the Ship Operator.

5.5 Vessel Moving Out of Position While Alongside

281 If the LNGC moves out of position then the cargo transfer **shall** be immediately stopped until the LNGC can be repositioned and the reason for the vessel movement out of permission is determined, only

282 The Master has the overriding authority to take any action needed to regain control. If a Master does not actually know their actions **shall** work to regain control if something foreseeable goes wrong, then a Master **shall** not continue with the cargo transfer operation.

283 Whenever re-positioning of an LNGC is required, the Pilot, LNGC Master, FSRU Master, and Tugs **shall** be in attendance, the LNGC engine readied, and the FSRU / LNGC mooring crew on station.

284 On all accounts, hourly safety rounds **should** be made on deck on both the FSRU and the LNGC, and the position of the LNGC **shall** be checked at least hourly.

6.0 PRE-CARGO TRANSFER OPERATIONS

285 The LNGC **shall** maintain their own detailed procedures for performing Ship to Ship Cargo Transfer which **shall** comply with any mandatory requirements stated in this TRBA Terminal Manual and industry best practise.

286 The FSRU is responsible for the management of the STS Transfer Operation.

6.1 SIGGTO Checklists

287 TRBA is not considered an at Sea STS Operation under SIGTTO Guidelines therefore the SIGTTO STS Checklists are not required for operations at TRBA.

6.2 Pre-Arrival Documentation Transmittal to LNGC.

288 The below documents / information **shall** be sent to the LNGC at least 72 hours prior to arrival.

289 The following **shall** be sent by EE TRBA Operations:

- Condition of Use - Annex 1. This document **shall** be signed by the LNGC Master, scanned and emailed to EE TRBA Operations prior to arrival at the Pilot Station. The original copy **shall** be handed over during the Pre-Transfer meeting.
- Pre-approved mooring arrangement for the LNGC as per the compatibility study **shall** be sent to the LNGC Master and FSRU Master.
- Planned schedule **shall** be sent to the LNGC Master and FSRU Master document key events and planned timings. This operation schedule **shall** be further confirmed during the Pre-Transfer Meeting.

290 The following **shall** be sent by the FSRU Master:

- Welcome Message with the latest copy of the TRBA Terminal Manual with the relevant Annexes for the operation **shall** be sent to the LNGC.

6.3 Cargo Arrival Conditions

291 The LNGC Master **should** arrive with cargo tank pressures as low as reasonably possible considering contractual agreements between the cargo seller and buyer but in any case, at Opening CTS requirements:

- Less than 60% of the LNGC MARVS.
    - 25 kPa MARVS on LNGC = Maximum Cargo Tank Pressure of 15 kPa
    - 35 kPa MARVS on LNGC = Maximum Cargo Tank Pressure of 21 kPa
- Average Liquid Temperature no warmer than -159°C

292 The cargo **shall** be accepted based on the contractual agreement between the Cargo Buyer and Seller.

293 The following restrictions due to cargo arrival condition or FSRU Inventory Levels **may** be enforced by TRBA or the FRSU Master:

- Request the Seller to condition the cargo prior to arrival.
- Declares the LNGC to be not ready for unloading.
- Stop or delay the commencement of transfer until the vapor pressure is reduced.
- Reduce the transfer rate to a limit, which allows the FSRU to manage their vapor.
- Delay the start of cargo or reduce the transfer rate until FSRU Inventory levels are adequate.

6.4 Pre-STS Coordination Meeting (FSRU & Terminal)

294 A meeting is conducted onboard the FSRU preferably one day before arrival date of the LNGC.

295 The attendees of this meeting **shall** be the following:

- TRBA Terminal Manager (Remotely)
- FSRU Master (Chairperson)
- FSRU Chief Regas Officer
- FSRU Chief Officer
- FSRU Cargo Engineer
- Transpetro Representative
- LNGC Agent Representative (Remotely)
- Any other individual with a recognized and legitimate interest in the STS operation

296 This Pre-STS Coordination meeting **shall** follow the below agenda:

- Learnings from Previous STS Operations
- Roles & Responsibilities (Including Resource Planning)
- LNGC General Information
- STS Timeline
- Weather forecast
- Mooring Operations
- Transfer Plan
- Defects and Issues
- Emergency Readiness

297 During the meeting, the proper operational window **shall** be confirmed by comparing the weather and current forecast reports with the operational limits for berthing and STS operations.

6.5 LNGC Pre Arrival Preparations

298 The visiting LNGC **shall** perform the normal pre-arrival tests, inspections and preparations as per recognized industry best practice and their respective SMS', which **shall** include as a minimum:

- ESD System tested, and performance verified.
- Cargo alarms set points tested and performance verified.
- Low cargo tank pressure alarm tested, and performance verified.
- Fire Pump tested and performance verified.
- Ballast System tested and verified fully operational.
- Manifold **shall** be cleaned, purged and ready for opening (singled-up to 4 bolts).
- Air & N2 hoses and connections ready at the LNGC manifold.
- Fire Hose (to fill saddle with water) rigged and ready for use.
- Sufficient 16" gaskets available
- Sufficient Bolts and Nuts to connect 16" Reducer on LNGC Manifold (M27 or 1" Nuts and bolts of at least 150 mm in length)
- Portable Gas Meters tested, and performance verified.
- Portable Deluge System **shall** be already installed and tested (FSRU does not have a spare).
- Water Bath Dams under the manifold platform on the main deck installed.
- Liquid Lines cold and drained prior to start of connection
- Pre-Arrival tests, inspection checklists completed

299 Any known defects which **may** impact mooring equipment performance, gas management, cargo system, manoeuvring of the LNGC, or the ability to comply with industry best practice to be reported to FSRU prior to arrival.

300 The Master of the LNGC, his owners, operators, and charterers **shall** take utmost care to have the requisite authority for the Master of the LNGC to commence discharge operation without any delays.

6.6 Notice of Readiness

301 Notice of Readiness **shall** be submitted as follows whichever is later, unless otherwise stated in the SPA:

- Berthing Pilot onboard Date and Time.
- Upon satisfactory completion of the local authority inspection at the internal anchorage at which point the vessel is given permission to berth.

302 The Master of the LNGC **shall** send the Notice of Readiness by email to the following:

To:	EE TRBA Operations	TRBA@excelerateenergy.com
Cc:	FSRU Excellence	master.sequoia@fleet.exceleratetm.com
Cc:	Transpetro Jetty	trba.operations@transpetro.com.br
Cc:	Other Parties	As stated in any commercial Instructions / Voyage Orders

6.7 Automatic Identification System including MF/HF

303 The AIS **shall** always be turned on while the ship is underway or at anchor so the Terminal can monitor the LNGC position.

304 Once alongside the AIS including MF/HF **shall** be either turned off or onto low transmission power.

6.8 Communications Alongside

305 The type of communication Link, along with the primary and secondary means of communication **shall** be agreed during the Pre-Transfer Meeting and tested prior to any transfer operations commencing.

306 Primary Communication:

- HOT PHONE between the FSRU and LNGC Cargo Control Rooms.

307 Alternative Communication:

- FSRU will provide the LNGC with a hand-held UHF Radio, spare battery and charger for the unloading operation.
- VHF Channel 16.

308 In the event of a communications failure between the vessels, all cargo transfer operations **shall** be stopped immediately until the cause has been identified, and communications between the vessels re-established.

6.9 Gas Burning

309 Gas burning on board of the LNGC can be accepted according to commercial terms and condition outlined in the commercial agreements. However, a certified meter **shall** be installed, and measurement **shall** be taken with the CTM procedures and be presented to Cargo Surveyor prior to gas burning.

310 If the LNGC does not have a valid certificate for the applicable gas flow meters, then a case-by-case decision on the actions to be taken **shall** be determined between the Buyer, Seller and the attending Cargo Surveyor.

311 Any failures of gas burning metering equipment on the LNGC **shall** be brought to the attention of EE TRBA Operations prior to arrival.

6.10 Safety Inspection (Including Mooring Integrity Checks)

312 The Master of the LNGC **shall** ensure that the vessel is moored properly and safely according to the agreed mooring layout.

313 Prior to the Commencing the Pre-Transfer Meeting a competent representative from the FSRU and LNGC **shall** conduct a safety inspection onboard the LNGC verifying the following:

- All moorings are tight.
- Brakes are properly hardened up.
- Winches are out of gear.
- Scupper Plugs are in place.
- Firefighting equipment is deployed.
- Offshore manifolds are fully blanked and tight.
- Other areas of general safety.

314 Any defects discovered during the inspections **shall** be raised and discussed between the FSRU and LNGC Master and corrective actions agreed.

315 On completion of completing the safety inspection the connection of hoses can commence.

316 A representative from Transpetro **may** accompany the inspection team.

6.11 Pre-Transfer Meeting

317 For every STS Operation, a Pre-Transfer Meeting **shall** be held on the LNGC upon completion of the Safety Inspection.

318 The relevant STS Documentation **shall** be completed jointly by the Responsible Officers from the FSRU and the LNGC. All STS documentation to be completed are included in Annex 2.

319 Alternative arrangements due to, for instance, pandemic **may** be required at times. Pretransfer meetings **may** be held remotely if justified to mitigate risks with infective diseases such as Covid-19.

320 The attendees of this meeting **shall** be the following:

- FSRU Chief Officer – FSRU Representative
- LNGC Chief Officer (Master is optional)
- Transpetro Representative
- Transpetro Port Facility Security Officer (if Declaration of Security is Required)
- Cargo Surveyor (as applicable)
- LNG Buyer Representative (as applicable)
- LNG Sellers Representative (as applicable)
- Any other individual with a recognized and legitimate interest in the cargo transfer operation

321 The purpose of this meeting is to ensure that all aspects of the cargo transfer and associated activities are clearly understood and agreed between all attending stakeholders.

322 Upon completion of pretransfer meeting the Ship Shore Safety Checklist **shall** be completed and signed by both LNGC as FSRU representatives prior the start of the cargo operations.

323 Both vessels **shall** equally be responsible for follow up checks not exceeding 4 hours.

6.12 Emergency Shutdown System Information

324 The LNGC **will** connect to the FSRU ESD system.

325 The FSRU Primary ESD connection is Electrical and secondary (back up) is the Optical Link.

326 FSRU Pin configuration of the Electrical Pyle national ESD system in use:

- PYLE 06/07 – ELEC TEL HOTPHONE
- PYLE 13/14 - ESD FSRU to Ship
- PYLE 15/16 - ESD Ship to FSRU
- PYLE 17/18 - ESD Umbilical continuity

327 VSD – Vessel Separation Detector's (three distance sensors with cable) **will** cause the ESD-2 sequence to start. ESD-1 state is always initiated first when an ESD-2 demand is made.

328 The VSD **will** be deployed and set by the FSRU personnel as it needs to be verified with the FSRU CCR therefore it cannot be done by LNGC crew.

6.13 STS Transfer Kit and Hose Connection

329 All STS Equipment is type-approved, and certification can be provided by the FSRU upon request.

330 The FSRU **shall** provide the main and auxiliary components of the STS transfer system to the LNGC.

6.14 Cargo Transfer Hose Specification

331 The standard configuration is using four (4) single LNG Transfer Hoses (L1-L2-V-L3-L4).

332 Two (2) hoses to a Y-Piece **shall** be connected for the Vapour Return Line due to velocity.

333 The maximum design transfer rate with one liquid STS Hose connected is limited to 2,250 m3/hr.

334 Each in use manifold **shall** have one cargo hose connected to it using a reducing spool piece. The hose is fitted with an ANSI 150 class floating flange. The hoses used for the vapour transfer are interchangeable with the hoses used for liquid transfer.

335

Type:	Composite, multi-layer
Diameter:	250 mm nominal internal
Bending Radius:	1500 mm supported

Material:	Polyester and Polyamide films and fabrics 316 L stainless steel end fittings, flanges, inner and outer wire mandrel
Length:	18.0 m (Primary) 13.5 m (Secondary)
Temperature:	-196 °C to +50 °C
Minimum Bend Radius:	1.5 m
Weight	661 kg (Dry Weight)
	1578 kg (Filled with LNG and covered with 25 mm (1") of hard ice)
Pressure:	Working Pressure: 10.5 bar - Tested at 15.75 bar (150%)
Connection:	ASA Floating Flanges
Standard:	European Committee for Standardization: Thermoplastic multi-layer, (non-vulcanized) hoses and hose assemblies for the transfer of liquid petroleum gas and liquefied natural gas-Specification EN 13766 dated February 2003 and EN1474-2:2008

336 A hydrostatic pressure test **shall** be completed every 12 months for each hose, in accordance with manufacturer's recommendations.

337 A certificate **shall** be generated by the FSRU Master and is available to the LNGC upon request.

338 When the cargo transfer hoses are not in use, they **shall** either remained pre-rigged at the FSRU manifold or stowed on board the FSRU in a dedicated wooden hose rack in a horizontal position, with a protective canvas cover to protect the hoses from exposure to the elements.

339 STS hoses **shall** be stowed blanked off and under a slight positive N2 pressure.

6.15 Manifold Interface

340 The LNGC **shall** provide following manifold flange specifications: 16" ANSI 150 bolted (16 bolts) RF.

341 Prior to arrival, the LNGC **shall** ensure that their short distance piece or 20"x 16" reducer is fitted on the manifold and the presentation face is in good condition. Once the LNGC is in position the manifold presentation flange can be singled up to 4 bolts (tight).

342 The LNGC is responsible for supplying the 20" and 16" gaskets and associated M27 or 1" nuts and bolts of at least 150 mm in length.

343 The FSRU **shall** supply a 16"x10" reducing spool piece and the 10" gasket. The FSRU Staff always connect and disconnect this spool piece and **will** bring tools necessary for making connections and disconnections.

344 The STS Hose **shall** be connected to the 10" presentation flange by the Cryogenic Flange Connector ("Camlock") which is a clamp connection arrangement. All packing and gaskets **shall** be in good condition.

6.16 Emergency Release (Hose Couplings)

345 On the FSRU side, each liquid and vapor hose **shall** be fitted with a cryogenic dry-break emergency release coupling ERC.

346 The system **shall** be at least a KLAW Mk.7 specification which provides the ESD-2 function with internal double closure valves activated by an integrally mounted hydraulic release mechanism.

347 The ERC **shall** be Class approved and can function with ice accumulation up to 25mm in accordance with IGC code requirements.

348 The ERC actuation system **shall** be tested prior to starting the hose cooldown on FSRU side.

349 Details on the Emergency Release Couplers can be found in the separate OEM.

6.17 Hydraulic Power Unit (HPU)

350 In addition to the ERCs, the FSRU **shall** maintain a hydraulic power unit (HPU) – KLAW Mk. 5 design. The HPU is an integral part of the cargo transfer hose strings, as it provides the control means for full function release of the couplers and remains on board the FSRU. These modes include manual, automatic, and manual override functions.

6.18 Cargo Hose Support Saddles

351 The typical LNGC is not fitted with a cargo hose-railing in the way of the manifold to support the weight of the hose filled with product, transferring the static and dynamic loads to the deck, while maintaining the minimum bend radius of the hose.

352 The FSRU is outfitted with adjustable hose support saddles for use during the STS operation.

353 The saddles are designed and engineered for their intended purpose, constructed of marine-grade aluminium, and have an internal water ballast tank which provides mass to the system necessary to manage the loads.

354 The saddle on the FSRU includes a hose-brake system designed to lower the cargo hose after an ESD-2 actuation to prevent damage to the hose or ERC assembly and the LNGC hull.

355 The saddle for the LNGC does not contain the hose-brake system.

356 The saddle to be transferred to the LNGC has lifting eyes integral to the structure and a weight of 405 kg.

357 The saddle **shall** not be lifted when filled with water ballast.

358 Prior to arrival, the LNGC Manifold **shall** have fire hoses rigged to fill the saddle with ballast upon the instruction from the FSRU Officer in charge of connection/disconnection attending the LNGC Manifold.

359 The saddle landing area on the LNGC manifold **shall** be free of any obstructions (pad eyes, brackets, etc.) that **shall** impede proper saddle placement.

6.19 Vessel Separation Detector (ESD-2)

360 A Vessel Separation Detector(s) (VSD) **shall** be connected between the FSRU and LNGC manifolds which activates the ESD-2 in case the vessel moorings fail, and the ships are moving apart.

361 When the distance between the two ships reaches a set point the VSD (three distance sensors with cable) **will** initiate an ESD-2 sequence. ESD-1 state is always initiated first when an ESD-2 demand is made.

362 The VSD (s) **will** be deployed and set by the FSRU personnel as it needs to be verified with the FSRU CCR therefore it cannot be done by LNG/c crew.

363 The VSD(s) **shall** be disconnected before the start of hose disconnection.

6.20 LNGC Manifold Filter

364 LNGC assigned unloading lines **shall** have a clean 60 mm mesh filter in place.

365 LNGC **may** be required to install a 100 or 200 mesh if this is the first discharge after dry dock. This **shall** be confirmed to the ship operator during the approval process.

366 LNGC manifold filters **shall** be inspected by FSRU Personnel before connection and upon disconnection.

6.21 STS Hose Connection

367 The FSRU **shall** provide the following persons who **shall** attend the LNGC Manifold:

- Officer in Charge (Chief Officer or Second Officer)
- Cargo Engineer
- Cargo Assistant
- 1 x Deck Crew (AB)
- Additional protocols for the LNGC may be enforced in order to protect the attending team from the FSRU from possible COVID19 transmission from the LNGC. Such protocols will be discussed and agreed during the pre-operations planning.

368 STS equipment handling and hose connection **shall** be guided by the FSRU Officer in Charge who **shall** attend the LNGC manifold during the connection process.

369 The LNGC **shall** be responsible for connecting and torquing the 16” to 10” Reducer to the LNGC Manifold,

370 The FSRU team **shall** be responsible for the hose connection.

371 The LNGC crew **shall** be actively involved in assisting the securing and ballasting of the saddles and providing general support during the connection process. Therefore, the LNGC **shall** provide an adequate number of competent crew members for the connection process.

372 Flange insulation sets **shall** be inserted on board the FSRU between the reducing spool piece and the Emergency Release Coupling in each hose string.

373 A hull bonding cable between the vessels **shall** NOT be connected.

374 Liquid manifold connections not used for the cargo transfer **shall** remain blinded and secured with bolts/nuts in all flange connection holes.

375 Usually, the cargo transfer hoses **shall** be connected starting with the first liquid manifold connection (L-1) and working aft until all hoses are connected.

376 Prior to beginning the lifting of the STS Hoses from the FSRU to the LNGC, the following checks **shall** be carried out on the Hose Support Saddles:

- No visible damage to the Teflon sheet that could damage hoses
- Bottom ballast tank of each saddle is filled with seawater
- Horizontal securing strap and wooden blocks are in place
- The hose support saddle is stable.

377 Hose buns designed to support and protect the composite hose when lifted by the crane **shall** be provided by the FSRU. The hose bun **shall** be secured to each hose and used to lift the hose, thus avoiding external damage and excessive bending.

378 The FSRU has the option of either connecting the STS Hoses with a manual bolting arrangement or via the Cryogenic Flange Connector.

379 Where manual bolting is carried out the flange connections **shall** be set with a torque 350 Nm for 16" flanges and 250 - 270 Nm for 10" flanges, each with a new packing installed.

380 The responsible LNGC officer **shall** verify the torque settings on the LNGC manifolds.

381 Where the Cryogenic Flange Connector is utilized, only FSRU Staff are permitted to handle such connection.

6.22 Cargo Hose Purging and Flange Leak Test

382 Once the cargo hoses are connected, the manifolds, spools, and hoses **shall** be purged of oxygen using nitrogen supplied by the FSRU.

383 The pressure **shall** be raised to 520 kPa (5.2 bar) in the liquid lines and 150 kPa (1.5 bar) in the vapor line.

384 The pressure **shall** be maintained while a leak test is carried out on the flanged connections using a soapy water solution.

385 Once the leak test has been completed the pressure **shall** be released to atmosphere by the LNGC and the hose atmosphere **shall** be tested.

386 Purging **shall** only be considered complete once the O2 is < 2%.

387 All hoses **shall** be depressurized to 5-10 kPa after the leak test and purged.

6.23 Water Deluge Systems (water curtain & bath)

388 The Fire Main **shall** always remain pressurized on both the FSRU and the LNGC.

389 Once the LNGC is safely moored to the FSRU, and before line cooldown commence, the hull water curtain **shall** be started, both, on the LNGC and the FSRU.

390 Both the LNGC and FSRU **shall** have a water deluge beneath the cargo manifold, which is designed to protect the trunk slope or cargo tank weather cover. The water from the deluge collects in a bath under the cargo manifold to protect the main deck in case of LNG release.

391 The FSRU does **NOT** have a spare potable deluge system for the LNGC.

392 The water bath **shall** be constructed by the LNGC using wooden planks (or fixed design) secured in place forward and aft of the cargo manifold.

393 Water supply to the water deluge beneath the cargo manifold is from the Fire Main through an international shore connection attached to the end of the temporary or fixed system.

394 Before line cooldown commences the water deluge beneath the cargo manifold on both the FSRU and the LNGC **shall** be started.

7.0 LNG TRANSFER OPERATION

7.1 Warm ESD Test

395 Prior to the commencement of the STS Hose Cool Down warm ESD **shall** be conducted to test the linked ESD System function in accordance with the IGC code.

396 The warm ESD test **shall** be conducted once cargo transfer hoses are connected and purged. It is important that the ESD valves are not operated before purging has been completed since the cargo transfer hose and spool pieces **may** contain oxygen and moisture.

397 Prior to the opening of the ESD Valves the LNGC **shall** verify (double-check) that the cargo system and cargo lines are set up as per the cargo plan and that the pressure in the cargo lines is the same as the average cargo tank pressures.

398 When both parties are ready, the LNGC **shall** open their ESD valves first and then check that the pressure at the vapour manifold is the same or lower than the LNGC average cargo tank pressures. Once confirmed, the FSRU **shall** open their ESD Valves.

399 Warm ESD Test(s) **shall** be activated as agreed in the Pre-Transfer Meeting and in full compliance with the IGC Code. All valves and equipment connected to the ESD system **shall** be operating properly when the ESD System is released.

Test Description	**Initiated By**	**ESDV Closing Time - LNGC**	**ESDV Closing Time -** FSRU
First Warm ESD Test	LNGC	< 25 Seconds	< 30 Second
Second Warm ESD Test	FSRU	< 25 Seconds	< 30 Seconds

7.2 Warm ERC Test

400 Upon completion of the successful warm ESD tests, the FSRU **shall** start the HPU for the ERC.

401 The FSRU **shall** conduct a warm HPU/ERC test.

402 Once the test is successfully completed the FSRU **shall** inserts the ERC Pins.

403 ESD System **shall** then be put back to normal on both vessels and confirmed.

404 Cool down operation is ready to commence once Opening Custody Transfer is completed.

7.3 Opening Custody Transfer (OCT)

405 Before the LNGC manifold valves are opened at the start of STS Hose cooldown, the Opening Custody Transfer **shall** first take place. The LNGC **should** be Even Keel and Upright for Opening Custody Transfer with cargo lines drained back to the cargo tanks.

406 Clocks between the FSRU and LNGC Control Rooms **shall** be synchronized prior to Opening Custody Transfer.

407 In the event of primary gauging system failure, the secondary gauging system **shall** be used for CTMS.

408 The SPA between the LNG Seller and LNG Buyer **shall** be complied with for the Opening Custody Transfer process. The need to secure gas-burning prior to or during gauging **shall** be agreed between the LNG Seller, LNG Buyer, and the attending Third Party Surveyor.

409 Open Custody Transfer is usually attended as follows:

- LNGC Chief Officer — Measurement, calculation & documentation
- Third-Party Surveyor(s) — Witness and verification
- LNG Buyers Representative — Witness as applicable
- LNG Sellers Representative — Witness as applicable

7.4 STS Hose and Cargo Line Cooldown

410 LNGC **should** arrive with their cargo lines cold. Further cooling down of the STS Hoses, Manifold and Cargo Lines is still required and is referred to generically as the 'Cooldown' process.

411 The official time for starting the Cooldown process is the time at which the LNGC starts the Cooldown Pump and not the time at which liquid is noted at the manifold.

412 Cooldown **shall** be considered completed once the forward and aft liquid cross-over lines are < -110˚C on both the LNGC and FSRU.

413 The cooldown process **shall** be discussed and agreed during the Pre-Transfer Meeting.

414 ESD / ERC system **must** be active during cool down. Wherever possible the cooldown flow is to be directed through open ESD valves and not through bypasses to ensure ESD system isolation integrity in the event of an emergency.

415 During the cooldown, the integrity of the hoses, pipelines, valves, flanged connections, and the manifold area **shall** be closely monitored.

416 The cooldown **shall** be performed by using either the LNGC cargo spray pumps as agreed in the Pre-Transfer Meeting and **should** take a minimum of 90 minutes from the point at which liquid flow is first observed at the LNGC manifold, to allow controlled cooling of the hoses and the ERC's

417 An FSRU Officer **shall** be at the FSRU Manifold, providing guidance on the cooldown process.

418 Communication between the FSRU and LNGC Manifold **shall** always be via radio communication rather than shouting from one manifold to the other, thus reducing the risk of miscommunication.

419 The cooldown **shall** be conducted with the LNGC ESD valves open, and the manifold double-block valves closed.

420 The rate of cooldown **shall** be controlled with the cooldown valves on the manifold coming from the spray header.

421 On the FSRU manifold, ESD valves **should** be closed, and the double-block valves **shall** be opened to start the cooldown.

422 The coolant **shall** be passing the ESD bypass valves and lined up in accordance with the cooling down plan, the coolant from LNGC is to be directed to FSRU liquid header as the stripping header is used for regasification purpose.

423 Once the desired temperature is achieved, the cooldown is completed and stopped.

7.5 Cold ESD Valve Stroke Test

424 Both LNGC and the FSRU **shall** conduct a cold stroke function test (opening and closing) of all ESD valves and confirm proper closure.

425 The function of the ESD valve **shall** be observed locally by a competent individual (CCTV is not permitted).

426 This is a function test of the valve under cold conditions, as the closing is not initiated through ESD solenoid block there no requirement to record the ESD closing time.

7.6 Cold HPU & ERC Test

427 TRBA does not require a cold HPU ERC Test.

7.7 Cold Torque of Manifold

428 Cold torquing of the manifolds after cooldown is not required unless a leak is observed or unless the need was agreed by both the LNGC and FSRU in the Pre-Transfer Meeting.

7.8 Starting Cargo & Ramping Up

429 The FSRU **shall** be informed prior to the LNGC starting the first and consequent cargo pumps.

430 Upon start up the liquid flow **shall** be kept to 800 m3/h to monitor for leaks or anomalies, consequent sets of pumps **shall** be started at 10-minute intervals once the cargo system integrated is confirmed.

431 An Officer **shall** be on deck during ramping up process and close by the tank to witness the starting of any cargo pump.

432 Once full rate is achieved both vessels **shall** complete an integrity check of the cargo system and report back.

7.9 Cargo Transfer

433 The FSRU **shall** oversee the cargo transfer and has the Ultimate Authority. In any case the cargo operation **should** be executed in careful cooperation between the LNGC and the FSRU.

434 The FSRU **shall** have and comply with Rollover prevention procedures.

435 The FSRU and the LNGC **shall** line up respectively for the cargo transfer.

436 When all parties have completed the cargo pipe line-up and are ready for cargo transfer, both FSRU and LNGC Officers in charge of transfer **shall** acknowledge to each other that cargo transfer can commence.

437 One of the primary variables that dictate the LNG cargo transfer rate is the regas rate from the FSRU into the pipeline. The LNG cargo transfer rate **may** have to be reduced to control FSRU tank pressure and levels within operating limits.

438 The Terminal is designed for a maximum transfer rate of 9,000 m3/hr with four liquid STS hoses. However, the back pressure at the LNGC manifold **shall** not exceed the leak test pressure (5.2 bar) which **may** require a reduction in transfer rate to around 8,000 m3/hr depending on the LNGC.

439 The FRSU **shall** advise the LNGC of the maximum loading rate for the individual discharge.

440 During the LNG cargo transfer a careful check of the tank pressure **shall** be maintained throughout.

441 To maintain acceptable tank pressures on the LNGC, at the request of the LNGC, BOG from the FSRU **shall** be returned via the vapour system by free flow method.

442 Starting cargo transfer and subsequent increases **shall** be authorized by the FSRU to ensure that tank pressures are managed in a safe manner.

443 Simultaneously with the cargo transfer, the LNGC **shall** be ballasting, and the FSRU **should** be de-ballasting if necessary. Both the FSRU and the LNGC **shall** have a stability plan prepared for this operation.

444 Ramping up and down rates **shall** be discussed at the pre-transfer meeting. However, the ramping up can be slowed down if either party feels uncomfortable with the situation. Normal ramp-up is expected to take 1 hour.

445 During the transfer, an hourly exchange of information **shall** take place between the vessels. This **shall** include (but not limited to):

- Cargo transfer rate.
- Tank pressure.
- Cargo ROB quantities.
- Mooring line tension.
- Midship draft status.

446 The FSRU **shall** challenge any inaccurate feedback or data received.

447 If the LNGC is failing to maintain flow rate within 2% of the agreed, then this **shall** be brought to the attention of the LNGC CCR to be addressed.

448 The relative change in manifold height **shall** be monitored throughout the STS by both the FSRU and LNGC. The difference in the FSRU and LNGC manifold height **shall** at no time exceed 4.5 meters, and the transfer **shall** be planned based on this requirement. Where there is the potential to exceed the 4.5-meter difference, then it **shall** be brought to the attention of the FSRU CCR immediately.

449 The ramping-down process **shall** be discussed and agreed during the pre-transfer safety meeting.

450 The FSRU and LNGC **shall** take snapshots of their CTMS at the following intervals

- Commencing Cargo Transfer (Starting First Cargo Transfer Pump on LNGC)
- Completion on Ramp Up / Commence Full Rate Transfer (Commencing Bulk Discharge)
- Commencing Ramp Down / Completed Full Rate Transfer (Completed Bulk Discharge)
- Completion of Cargo Transfer (Stopping Last Cargo Transfer Pump on LNGC)

7.10 Sloshing

451 Membrane-type LNGC cargo tank structures can be damaged because of cargo sloshing inside the cargo tank. Each vessel **shall** be operated within the specified limits established by their respective Classification Society.

452 In the event the cargo transfer **shall** be suspended, each vessel **shall** have a contingency plan to consolidate cargo prior to departing to open waters.

453 The cargo transfer and stowage plan **shall** be followed throughout the various stages of the unloading sequence.

454 The plan **shall** follow a prepared sequence to give a maximum of nine (9) hours of internal transfer to attain cargo levels outside of the sloshing zone.

455 Vessel stability criteria **shall** be met throughout the cargo transfer operation by following the approved ballast plan for the vessel.

7.11 Tank Pressure Management

456 TRBA has a no venting policy. Thus, venting is utilized only in emergency situations.

457 Both the FSRU and LNGC is responsible for their own gas management and consume generated vapours within their own capacities.

7.11.1 FSRU Gas Management Capability

458 The FSRU has the following tank pressures safe operating limits:

- Up to 350 mbar — Normal Tank Pressure
- 490 mbar — Commence reducing Tank Pressures
- 560 mbar — Stop Loading
- 700 mbar — Tank Safety Valves Lift

459 The FSRU has the following Gas Management capability:

- Under standard conditions, the tank pressures are maintained stable by using natural boil-off gas (BOG) to fuel the power generation modules.
- The FSRU is fitted with a Re-Condenser.

- The FSRU is equipped with a Gas Combustion to manage excess BOG during idle conditions.

7.11.2 Control of Return Gas to LNGC

460 During the pre-transfer meeting the LNGC **shall** communicate the tank pressure that they wish to maintain during the operation which the FSRU **shall** maintain via an automatic regulated valve (Free Flow).

461 The LNGC Boil Off Gas valves **must** be always OPEN.

462 It is the responsibility of the LNGC to monitor the pressure in its tanks and the LNGC **shall** give the FSRU 10 minutes notice if they wish to increase or decrease tank pressure.

463 If pressure in the return gas line falls to 80 mbar(g) or below then the LNGC **must** adjust its unloading rate until pressures return to normal levels.

464 Boil-off Gas Management and the monitoring of tank pressures is the responsibility of the LNGC. The FSRU Cargo Control Room **shall** be informed immediately in the following circumstances:

- If the pressure in the LNGC return gas line falls to 80 mbar(g) or below.
- If there is any problem with the LNGC taking return gas.
- If the rate of which LNG vapor accumulates in the LNGC cargo tanks (t/hr) exceeds the maximum Gas Management capability of the LNGC.
- Any problem with the LNGC taking return gas.

465 Corrective actions **shall** then be agreed between the FSRU and LNGC with a combination of applicable controls such as reducing or stopping the transfer operation, LNGC starting / stopping or increasing / reducing gas burning and the FSRU is receiving BOG or sending return gas until the LNGC tank pressures stabilize.

466 Where an LNGC has required the FSRU to assist in the management of BOG, prior to disconnection of STS Hoses, the LNGC **shall** demonstrate for at least 30 minutes that they can maintain stable tank pressures using the LNGC BOG Management equipment only.

7.12 Topping Off

467 Topping off **shall** occur at the pre-agreed reduced rate, one tank at a time.

468 A maximum topping off rate of 800 m3/hr is normally agreed upon.

469 There **may** be an increase in the effect boil-off has on tank pressures whilst tanks are being topped off, this is due to the construction shape of the prismatic tanks.

470 Adequate precautionary measures **shall** be taken to avoid possible venting.

7.13 Stripping / Heeling Out

471 If the LNGC intends to Heel Out, it **shall** be discussed with EE TRBA Operations prior to the LNGC arrival.

472 Heeling out operation is permitted if commercial terms and conditions agree with this operation.

473 TRBA **shall** not be responsible for excess laytime due to the heeling out operation.

474 Stripping pumps **shall** be started in ample time if the discharging vessel intends to heel-out. This **shall** ensure cargo consolidation can be completed if the main cargo pump loses suction due to liquid movement.

475 The minimum LNG liquid level accounted in the custody transfer is the height of the liquid, where the accuracy equal to or better than plus or minus five (±5) millimetres over the relevant measurement ranges of the cargo tanks as outlined in the calibration table of the vessel. Any liquid level below the minimum measurement of the tank **shall** be not accounted.

476 Heeling out operation **shall** be discussed during the pre-discharge meeting.

7.14 Cargo Hose Draining

477 The process **shall** be completed in compliance with TRBA Terminal Manual Annex 4 – Draining and Purging Procedure.

478 Once the cargo transfer operation has been completed, the ESD valves on the manifold of the FSRU remain open.

479 On the LNGC the double-block valves **shall** be closed while the ESD valves remain open to allow draining of the vertical risers and cargo transfer hoses. It is expected to take 15 minutes to complete this step.

480 All cargo transfer hoses **shall** be drained from the LNGC towards the FSRU.

481 After 15 minutes the FSRU and LNGC close ESD valves & both vessels open double shut valves to start liquid freeing the cargo transfer hoses.

482 The FSRU **shall** confirm when hose draining has been completed.

483 Liquid freeing **shall** be conducted by water spray focused on the U-Bend of the liquid hoses only, as the LNG boils-off the line pressure increase **shall** assist in displacing liquid in the lines.

484 Once the pressure reaches 4.5 bar, FSRU to open manifold ESD bypass valves. This step to be repeated until the hoses are liquid free.

485 If it is necessary to de-ice the spool piece on LNGC manifold flange, freshwater to be used and any spraying water on the STS hose **should** be avoided.

486 After a period, there **shall** be no more liquid remaining in the cargo hoses, at which point there **shall** be a temporary stop in the water spraying on the lower bend of the hose. There **should** be no more icing visible, and if the pressure is no longer rising in the STS hoses with the valves closed, the liquid freeing **should** be considered as completed and closing CTMS can then be carried out.

7.15 Final Gauging - Closing Custody Transfer

487 Upon completion of cargo transfer, after draining LNG lines, final gauging and closing CTMS **shall** be carried out.

488 The LNGC cargo piping system **should** be the same as Initial Gauging, and the LNGC **should** be Even Keel as far as possible, and Upright during the Gauging Custody Transfer. In any case the liquid level in the tanks **shall** be measurable and the SPA **shall** be complied with during the Closing Custody Transfer.

489 Final Gauging usually is attended by the below as applicable:

- LNGC Chief Officer — Measurement, calculation and documentation
- Third Party Surveyor(s) — Witness and verification
- LNG Buyers Representative — Witness as applicable
- LNG Sellers Representative — Witness as applicable

490 In addition to standard CTM prints, the LNGC **should** provide screen prints from the control system to demonstrate vapour handling onboard the LNGC in the power module, steam plant, Gas Combustion Unit or Reliquefication unit consumption as applicable.

491 The need to secure gas-burning prior to or during gauging **shall** be agreed between the LNG Seller and LNG Buyer and the attending Third Party Surveyor.

492 On completion of cargo calculation and agreement of the cargo quantity transferred, any documentation **shall** be prepared by the Third-Party Cargo Surveyor, for signing by all interested parties.

493 The origin certificate **may** be used for the initial calculation and analysis of conformity. The calculation of quantities **will** be done based on the ship measurement, with the origin certificate of analysis supplied by the loading terminal. At the final calculation **will** be discounted the vapor returned to the Supplier ship.

494 The LNG quality determination **will** be done by the chromatograph installed at the FSRU, during all the offload operation.

495 The chromatograph report **will** be used for calculation of mass and calorific value at the operation end. At the detection of product out of specification at any time during the operation, it **will** be immediately suspended.

496 The procedures and standards for measurement, sampling, testing and energy calculation **will** be based on the Resolution ANP nº 16, of 17, June 2008 - DOU 18/06/2008 (Appendix E) or another replacing it. Reference conditions: T1=20 deg C and T2=20 deg C.

497 Final release of the ship: it **will** be given after compare the quantities.

7.16 Cargo Hose Purging

498 Follow TRBA Terminal Manual Annex 04 – STS Hose Draining & Purging.

8.0 POST CARGO TRANSFER OPERATIONS

8.1 Water Curtain

499 The water curtain **shall** be turned off once purging is completed and before hose disconnection.

8.2 Removal of ESD Cable

500 The ESD cable **shall** be disconnected prior to disconnection of cargo hoses (to avoid entanglement) and only after water curtains are switched off.

8.3 Cargo Hose Disconnection

501 Hose connecting **shall** not beginning until the LNGC confirms to the FSRU that all cargo manifold valves are verified closed.

502 In general, the cargo transfer hoses **shall** be disconnected in reverse order. The general order **shall** be to disconnect hoses, spool pieces, remove the saddle and finally collect all tools and miscellaneous equipment.

503 All crane movements **shall** be directed by the FSRU Officer-in-Charge.

504 Only the FSRU crane is expected to be used.

8.4 Letter of Protest

505 A Letter of Protest (LOP) is a written communication intended to convey and record dissatisfaction on the part of the protester concerning some matter over which the recipient has control and holding the recipient responsible of any legal or financial consequences of the subject matter.

506 A Letter of Protest **should** only be issued over matters which the **recipient has control.** TRBA request that master's take this into account and that when issuing a Letter of Protest where the recipient has no control is deemed unnecessary.

507 Any Letter of Protest from the LNGC **shall** be addressed to the FSRU Master.

508 A Letter of Protest **shall** be signed:

- "for receipt only" to avoid any implication of the acceptance of liability.
- By the attending organizations representative if addressed to an organization.
- By the individual or his delegated authority if addressed to an individual.

509 The Letter of Protest recipient **should** receive an original and one copy.

8.5 Closing Meeting

510 The attendees of this meeting **shall** be the following:

- FSRU Chief Officer Regas
- LNGC Chief Officer (Master is optional)
- Independent Surveyor (if applicable)
- LNG Sellers Representative (if applicable)
- LNG Buyers Representative (if applicable)
- Any other individual with a recognized and legitimate interest in the cargo transfer operation.

511 The closing meeting **shall** follow the below agenda:

- Completion of Cargo Transfer Documentation
- Operational Performance Review Discussion
    - What Went Well
    - Areas of Improvement
- Exchange of Letter of Protests (if applicable)
- LNGC Departure Process and Testing of Systems
- Any Other Business

8.6 Testing of Engines Prior to Departure

512 The LNGC **shall** be permitted to test their Main Engine(s) & Propeller prior departure only when:

- The pilot is onboard.
- Testing is discussed and agreed with the pilot.
- Tugs are all fast and have control of the LNGC.
- ALL lines from the LNGCs are released and cleared.
- Permission is obtained from the FSRU Master prior to testing.

513 The Main Engine(s) **should** only be run ahead or astern for the shortest possible duration during testing without the LNGC moving from its position.

514 The FSRU Master **shall** be the final authority whether to allow Main Engine testing or not.

515 For steam turbine-powered vessels, the LNGC **shall** have Turning Gear engaged. Auto Spin **shall** only be used only for warming up turbine prior departure. The Engine Control Room **shall** be always manned when operating in Auto Spin Mode with an engineer officer dedicated to overseeing the auto spin operation.

516 The process of manually opening the ahead and astern valves remotely and kicking ahead and astern is not acceptable practice at TRBA.

8.7 Unmooring and Departure

517 The LNGC agent is responsible for booking the Pilot outbound. The Agent requires 4 hours' notice.

518 Mooring stations **shall** be adequately manned to safely conduct the unmooring of the LNGC, and sufficient time allowed to provide onsite toolbox talk prior to letting go.

519 Unmooring **shall** be conducted in compliance with the agreed procedure between the Pilot and LNGC Master, and it **shall** then be communicated to the FSRU Master over the radio before commencing unmooring operations.

520 Particular attention **should** be given to prevailing weather and tidal conditions during departure.

521 Under normal circumstances mooring lines **shall** be released and recovered by the LNGC starting with outer mooring lines, forward and aft with the spring lines being the last lines to be released.

522 Mooring lines to be released **shall** be slacked sufficiently before they **shall** release the hook.

523 Once the line has been released, the Pilot **shall** confirm with the LNGC Master that it is safe to recover the mooring line.

524 Bow and stern thrusters, when fitted, **may** be used to full advantage once the last line has gone. Consideration **should** be given to the effects that the use of the thrusters **may** have on the FSRU.

525 Agreed upon communication channels **shall** remain open and in use till the LNGC is clear of the FSRU.

8.8 Terminal Feedback

526 TRBA is committed to continual improvement for safe operations. Increased opportunities to enable learning **shall** be captured via a post-operations briefing between Terminal and mooring masters.

527 The terminal feedback questionnaire is external site and independent from the vessel masters.

528 The FSRU Master **shall** send the following link to the LNGC Master in the LNGC Welcome Email requesting Feedback from the operation. LNGC - STS Feedback

9.0 MISCELLANEOUS OPERATIONS

9.1 Use of the Port Service Vessels

529 Port Service vessels are available at the anchorage arranged by the LNGC Agent.

9.2 LNGC Visitors and Contractors

530 LNGC Visitors and Contractors **shall** only embark and disembark at the anchorage.

531 On a case-by-case basis, permission to embark inspectors for audits and inspections **may** be granted by the TRBA Terminal Manager, subject to embarkation and disembarkation taking place outside of periods when the LNGC Pumps are running or there is hydrocarbons present in the transfer hoses.

532 LNGC **shall** be responsible for all transportation offshore via their agent.

9.3 FSRU Visitors & Contractors

533 Visitors and Contractors **shall** have a valid business case for visiting the FSRU.

534 All visit requests **shall** be raised to EE TRBA Operations.

9.4 Diving Operations

535 Under normal circumstances, Diving Operations are not permitted at TRBA.

536 If diving operations are required, then the scope of work and risk assessment **shall** be sent to EE TRBA Operations for review and facilitating any approval from the local authorities as necessary.

537 If diving operations are required while the LNGC is alongside, then the FSRU Master **shall** attend the Pre-Dive Operations meeting on the LNGC where the operation and control measures **shall** be discussed and agreed.

9.5 Helicopter Operations

538 Helicopter operations at TRBA are restricted to emergency transportation only (winching). These operations **shall** be carried out by local authorized aviation service providers and guided by the latest edition of the International Chamber of Shipping Guide to Helicopter / Ship Operations.

539 The agent is responsible for arranging any Helicopter Transportation requirements.

540 The FSRU Master **shall** be the on scene point of contact for any Helicopter operations who **shall** coordinate with the LNGC Master to ensure safe operation.

9.6 Bunkering Operations

541 Bunkers are not locally available.

542 If bunkers become available, then permission is required from the local authorities.

9.7 Internal Fuel Oil Transfers

543 Internal fuel oil transfer is not permitted onboard the LNGC or FSRU during STS Operations.

9.8 Fresh Water

544 The LNGC is not permitted to load Fresh Water alongside at TRBA.

545 The FSRU is permitted to fresh water bunker with a service vessel while alongside the TRBA Jetty when not engaged in STS Operations, subject to approval from the local authorities which **shall** be obtained by the local agent.

9.9 Storing and Spares

546 Storing of the LNGC is permitted at the local anchorage subject to prior approval from local authorities.

547 LNGC needs to arrange for transportation through their agent.

548 TRBA **shall** not be responsible for any delays due to storing operations.

549 The FSRU is permitted to conduct storing operations with a service vessel while alongside the TRBA Jetty when not engaged in STS Operations, subject to approval from the local authorities which **shall** be obtained by the local agent.

9.10 Waste Management

550 Waste Management services are not currently available at TRBA for the calling LNGC. Such service **may**be available at the anchorage subject to approval from the local authorities which **shall** be arranged by the LNGC Agent. TRBA **shall** not be responsible for any delays to STS due to this operation.

551 The FSRU is permitted to conduct waste management operations with a service vessel while alongside the TRBA Jetty when not engaged in STS Operations, subject to approval from the local authorities which **shall** be obtained by the local agent.

9.11 Medical Facilities Ashore

552 Medical facilities are only available ashore for urgent or emergency cases.

553 The vessel agent **shall** be contacted if shore medical facilities are required.

9.12 Crew Changes & Shore Leave

554 TRBA is an island terminal and shore leave is not permitted.

555 LNGC Crew changes are not available alongside at TRBA. Crew changes **may** be available at the anchorage subject to approval from the local authorities which **shall** be arranged by the LNGC Agent.

556 FSRU Crew changes are permitted outside of STS windows and **shall** be arranged through the local agent.

9.13 Immigration

557 The LNGC **shall** contact their agent with regards the immigration pre-arrival documents required.

10.0 HEALTH AND SAFETY

10.1 Safety Letter

558 The LNGC Master is responsible for the safe operation of the LNGC, including cargo-handling operations and the safety of the LNGC personnel.

559 The LNGC Master **shall** sign the Safety Letter acknowledging their responsibility in this respect.

560 A copy of the Safety Letter is in Annex 2.

10.2 Bridge Watches

561 Bridge watches are not required on either the FSRU or LNGC while berthed alongside the TRBA Jetty.

10.3 Hours of Rest

562 Work and rest periods **shall** be carefully planned and discussed as necessary at the pre-transfer meeting.

10.4 Main Engine Readiness

563 The LNGC **shall** maintain the main engine(s) in a condition ready for departure within 20 minutes of any notification. This **shall** be discussed in the Pre-Transfer Meeting.

10.5 Critical Systems

564 Whilst alongside the FSRU, repairs, and maintenance to the LNGC machinery and equipment **shall** be restricted to necessary work which does not impair or limit the use of:

- The fire detection or fire-fighting capability.
- The safe and efficient handling of the cargo.
- The propulsion system, power generation or maneuverability of the LNGC.
- The integrity of the mooring system.
- The safe operation of electrical equipment in dangerous gas zones

565 If urgent repairs on the above systems are deemed necessary, the LNGC Master **shall** inform the FSRU Master and gain permission from EE TRBA Operations who **shall** consult with the local authorities as necessary.

566 All maintenance activities for the duration of LNGC stay alongside the FSRU **shall** be declared during the Pre-Transfer meeting to ensure compliance with the above.

567 **Should** any maintenance work represent a risk to the FSRU or TRBA, or **should** the conditions of the approval be compromised, EE TRBA Operations or the FSRU Master **may** require that the vessel be unberthed from the FSRU at the LNGC Owners costs.

568 Any direct or indirect consequential costs or delays resulting from repair work carried out on the LNGC while alongside at TRBA **shall** be borne by the LNGC Owners.

10.6 Navigational Lights & Illumination

569 The FSRU & LNGC **shall** be illuminated continuously from before sunset and until sunrise, and during any periods of reduced visibility when moored alongside the FSRU.

570 Navigational lights **should** be illuminated as per "International Convention for the Prevention of Collisions at Sea".

10.7 Emergency Towing Wires (FireWire)

571 Emergency towing wires **shall** only be deployed forward and aft on the offshore side of the LNGC if tugs cannot make fast on the LNGC sunken bitts.

572 The height of the sunken bitts regarding the ability of the tug making fast their line **shall** be checked during the vessel compatibility process.

573 If Emergency Towing Wires are deployed, they **shall** be in good condition with no visible defects and of size (diameter and breaking load) commensurate with the size of the LNGC.

10.8 Testing of Lifeboats and Rescue Boats

574 The LNGC Lifeboats and rescue boats are not permitted to be lowered to the water and tested for maintenance purposes while alongside the FSRU.

575 The LNGC lifeboats **may** be lowered and tested while at the anchorage, subject to getting obtaining approval from the port authorities via the agent.

576 The FSRU **may** lower lifeboats and rescue boats while alongside the TRBA Jetty subject to getting obtaining approval from the port authorities.

10.9 Sources of Ignition & Hot Work

10.9.1 Sources of Ignition

577 Sources of ignition, including smoking, hot works and the use of electrical equipment **shall** be restricted to designated areas onboard the LNGC and the FSRU.

578 All portable electrical equipment, including handheld torches, radios, and gas analysers, which are operated in gas dangerous zones on all vessels **shall** be Approved Equipment for use in the flammable atmosphere concerned.

579 All electrical equipment **shall** be in good order, maintained and operated in such a manner that its original certification is not jeopardized.

580 Transportation of non-intrinsically safe battery-powered equipment such as computers and mobile phones while in the Restricted Zone is permitted provided that the equipment is switched off and is carried in a closed case. The equipment **shall** not be switched on again until inside the FSRU/LNGC accommodation.

581 The use of a non-intrinsically safe mobile phone on the deck of a vessel within the Restricted Zone is strictly prohibited.

582 While within the Restricted Zone and berthed the MF/HF transmitting aerials **shall** be earthed on both the FSRU and LNGC. Intrinsically safe handheld VHF and UHF communications with a radiated power of 1 watt or less are permitted.

583 A risk-based approach **shall** be used to determine whether cargo operations need to be suspended when lightning is forecasted or observed in the local area. Any decision **shall** be agreed between the FSRU Master and LNGC Master.

10.9.2 Hot Work

584 Naked Flame Hot Work and Potential Spark is not permitted within the Restricted Zone while an LNGC is alongside the FSRU.

585 Naked Flame Hot Work is considered as Welding, burning, riveting, drilling, grinding, chipping, or any other work where a flame is used or sparks are produced or is any work involving temperature conditions which are likely to be of sufficient intensity to cause ignition of combustible gases, vapours or liquids in, or adjacent to the area involved.

586 Potential Spark Hot Work is considered as Low energy ignition sources such as needle guns, hand scaling, pneumatic drilling, pneumatic chisels, pneumatic grinding and disking machines equipped with flexible sanding disks and grit/hydro blasting including portable electrical equipment which is not intrinsically safe or contained within an approved explosion-proof housing, and internal combustion engines which **may** have a potential to generate sparks, **may** only be used in areas where the release of hazardous atmospheres is effectively prevented.

587 The FSRU **shall** obtain permission from EE TRBA Operations prior to carrying out any Naked Flame Hot Work outside of the designated workshop onboard. In all cases Naked Flame Hot Work is not permitted onboard the FSRU during LNG Cargo transfer.

10.10 Smoking

588 Smoking is only permitted in the designated Smoking Room on any vessel within the Restricted Zone.

589 Smoking regulations **shall** be strictly enforced. Warning notices **shall** be displayed and smoking designated rooms **shall** be clearly marked.

10.11 Fire Fighting Systems & Appliances

590 The FSRU is equipped with fire-fighting systems and appliances designed to cover the FSRU only.

591 Both the FSRU and LNGC firefighting systems and appliances **shall** be in good working order.

592 Portable Fight Fighting Appliances **shall** be correctly positioned and ready for immediate use.

593 An onsite standby tug during STS Operations **shall** be Fire Fighting classification and **shall** be available to both the FSRU and LNGC. Any defects in such capability **shall** be reported immediately to FSRU Bridge and EE TRBA Operations.

594 Both the FSRU and LNGC Fixed Fire and Gas Detection equipment **shall** be fully operational. Any isolated heads which impact the coverage area by design **shall** be declared and discussed during the Pre-Transfer Meeting.

10.12 Inert Gas & Nitrogen Systems

595 Both the FSRU and LNGC **shall** have a fully functional inert gas plant in a standby operational condition.

596 Both the FSRU and LNGC **shall** always have their nitrogen plant in operational condition during the cargo transfer operation to afford a supply of compressed nitrogen, as **may** be required for purging cryogenic systems.

10.13 Ventilators and Air Conditioning Units

597 Intakes of central air conditioning or mechanical ventilations systems (fans) **should** be adjusted to prevent the entry of dangerous gases or vapours. This **should** be accomplished, if possible, by the recirculation of air within the enclosed spaces.

598 If at any time, it is suspected that dangerous gas or vapour is being drawn into the accommodation the central air conditioning and / or mechanical ventilating systems **should** be stopped, and the intakes covered or closed.

599 All access doors to the accommodation **shall** be kept closed and only opened for momentarily access during the STS Operations.

600 The FSRU and LNGC Master **shall** designate access doors to be used to enter and leave the accommodation during the STS Transfer.

10.14 Cargo System Leaks

601 All cargo system leaks **shall** be immediately reported to the FSRU CCR via agreed communications.

602 In the event of any significant hydrocarbon vapor or liquid leak on either the FSRU or LNGC then the STS Transfer **shall** be immediately stopped. The transfer **shall** not resume until the leak is identified, repaired, or isolated and the vapor cloud has dispersed.

603 Where a cargo operation has been stopped due to a leak, a competent person from the FSRU **shall** in person verify, that the leak has been addressed, control measures have been agreed for a safe restart and **shall** be implemented throughout the remainder of the transfer.

10.15 Fishing

604 Fishing within an Exclusion or Safety Zone is prohibited.

10.16 Photography

605 Photography is only permitted subject to a business case and approval by the EE TRBA Operations.

11.0 ENVIRONMENTAL

11.1 Pollution Prevention

606 Preservation of the environment is of utmost importance to TRBA to ensure the quality of the local marine and coastal habitat.

607 All vessels berthing at TRBA **shall** be in full compliance with latest MARPOL requirements.

608 All vessel masters are warned that pollution of any kind, irrespective of quantity, is viewed as extremely serious and **shall** be reported immediately to EE TRBA Operations. Offenders **may** be prosecuted.

609 The costs of any clean-up operation **shall** be for the LNGC account.

610 All LNGC Masters **shall** implement the following:

- Prior to picking up the pilot, all deck scuppers **shall** be closed. However, it is important that any deck water does not accumulate with the potential to spill over the top of the fish plate without controls in place. Therefore, scuppers maybe opened momentarily to free deck water if the following conditions are met:
  - The water and deck in the area to be drained is free of any oil sheen.
  - Oil Absorbent mats are in place around the scupper area.
  - The Scupper is manned while it is open and plugged immediately after.
  - When within the Restricted Zone permission **shall** be obtained from the FSRU.
- All plugs around deck equipment, hydraulic lines, vents, and sounding pipes **shall** be plugged.
- No oil or mixture containing oil **shall** be discharged or allowed to escape from any vessel while in the Restricted Zone.
- No garbage or other materials, either liquid or solid, **shall** be discharged overboard from any vessel, but **shall** be retained in suitable receptacles on board.
- Whilst within Restricted Zone the internal transfer of any oil, slops or bunkers on board is prohibited.

611 In the event of any leakage or spillage of oil or oil contaminated liquids on board, the FSRU **shall** be advised immediately so that loading operations can be stopped until the spill has been cleaned up.

612 Prior to commencement and at regular intervals throughout unloading, regular checks are to be made around the FSRU & LNGC to ensure that oil or oily water is not escaping through sea valves.

613 Overboard discharge valves through which oil could escape **shall** be lashed in the shut position during the vessel's stay alongside. Where lashing is not practical, a suitable means of marking the valves **should** be used to clearly indicate that the valves are to remain closed.

614 Unused cargo and bunker connections **shall** be closed and blanked. Blank flanges **shall** be fully bolted with gaskets in place and other types of fittings, if used, properly secured.

11.2 Ballast

615 In normal operations, it is not expected that the LNGC **shall** de-ballast alongside the FSRU. In case ballasting is required, the vessel **should** follow local and international procedures and regulations.

616 Ballast Tank Cleaning is not permitted at TRBA.

11.3 Air Pollution - Venting

617 Venting hydrocarbons directly to the atmosphere is an unacceptable practice except in emergency.

618 If venting is required for safety reasons, preparations **should** be made so that the temperature of such gas vented to the atmosphere is lighter than air.

619 Precautionary measures **shall** be agreed between the FSRU and LNGC. In any event, cargo transfer **shall** be suspended if venting of hydrocarbon gas becomes necessary.

11.4 Air Pollution - Soot Blowing

620 It is prohibited to soot blowing during an STS Operation at TRBA.

621 The LNGC **shall** avoid performing soot blowing while within the Todos os Santos Bay.

622 Failure to comply with Air Pollution **may** result in fines by the competent authorities and removal from the berth which **will** be at the cost of the vessel operator.

11.5 Incinerator

623 The use of the Incinerator in not permitted on board any vessel at TRBA.

12.0 ANNEXES

12.1 Annex 01 – Condition of Use

12.2 Annex 02 – STS Transfer Checklists

12.3 Annex 03 – STS Hose Cryogenic Flange Connector Procedure

12.4 Annex 04 – STS Hose Draining & Purging Procedure

12.5 Annex 05 – STS Contingency Management Plan

13.0 APPENDICES

Appendix A – FSRU Particulars

Appendix B – OPTIMOOR BERTH DATA

Appendix C – OPTIMOOR FSRU DATA

Appendix D – OPTIMOOR STS Fender Data

Appendix E – Natural Gas Specification for Brazil

14.1 Appendix A – FSRU Particulars

Vessel Name / IMO	Excelerate Sequoia / 9820843
Hull Number / Delivery Date	2477 / 10 June 2020
Flag / Port of Registry	Marshall Islands / Majuro
Classification Society	Bureau Veritas
Registered Owner	Anemoesa Marine Inc
Bareboat Charterer	Excelerate Energy LP
Technical & Crew Manager	Excelerate Technical Management (ETM)
LNG Capacity	173,611.3 m3
Ballast Capacity	64,772.8 m3
Gross Tonnage	116,282
Net Tonnage	34,885
Lightship:	38,325.3 T
Loaded Draft / Displacement (Summer)	12.52m / 132,768 Tonnes
Ballast Draft / Displacement	9.49m / 97,767 Tonnes
Length Overall	294.50 m
Length Between Perpendiculars	283.50 m
Breadth	46.4 m
Depth	26.50 m
Keel to Mast	61.20 m
Railing to Manifold	3850 mm (3500 mm with Short Distance Piece)
Height of Manifold Centre above Keel	31.20 m
Manifold Centre (Vapour) to Bow	146.50 m
Centre (Vapour) to Stern	148.50 m

14.2 Appendix B – OPTIMOOR BERTH DATA

Berth Data for TRBA Jetty

Units in m & tonnes

Left to Right of Screen Site Plan Points:	250°
Width of Channel (for Current):	600
Pier Height (Fixed) above Datum:	7.0
Seabed Depth in way of Ship below Datum:	17.2
Permissible Surge Excursion Fwd/Aft:	± 3.50
Permissible Sway Excursion Port/Stbd:	± 1.80
Dist of Berth Target to Right of Origin:	0.0
Wind Speed Specified at Height:	10.0
Current Specified at Depth:	mean

Hook/ Bollard	X-Dist to Origin	Dist to Fender Line	Ht above Pier	Allowable Load
MD 1A	-162.0	40.0	0.5	375
MD 1B	-158.0	40.0	0.5	375
MD 2	-140.0	40.0	0.5	375
MD 3	-120.0	40.0	0.5	375
BD 1	-55.0	4.0	0.5	250
BD 2	-40.0	4.0	0.5	250
BD 3	40.0	4.0	0.5	250
BD 4	55.0	4.0	0.5	250
MD 4	120.0	40.0	0.5	375
MD 5	140.0	40.0	0.5	375
MD 6A	158.0	40.0	0.5	375
MD 6B	162.0	40.0	0.5	375

Fender	X-Dist to Origin	Ht above Datum	Width Along Side	Face Contact Area (m²)
aa	-55.0	5.0	4.5	25.7
bb	-40.0	5.0	4.5	25.7
cc	40.0	5.0	4.5	25.7
dd	55.0	5.0	4.5	25.7

Fender Load-Compression Data

aa	122	214	255	265	263	260	263	270	tonnes
	0.11	0.23	0.34	0.45	0.79	0.90	1.13	1.18	m
bb	122	214	255	265	263	260	263	270	tonnes
	0.11	0.23	0.34	0.45	0.79	0.90	1.13	1.18	m
cc	122	214	255	265	263	260	263	270	tonnes
	0.11	0.23	0.34	0.45	0.79	0.90	1.13	1.18	m
dd	122	214	255	265	263	260	263	270	tonnes
	0.11	0.23	0.34	0.45	0.79	0.90	1.13	1.18	m

14.3 Appendix C – OPTIMOOR FSRU DATA

Vessel Data for FSRU Excelerate Sequoia at TRBA

Longitudinal datum at Midship

LBP:	283.5
Breadth:	46.4
Depth:	26.5
Port Target:	33.2 fwd from midship -23.2 from CL & 4.4 above deck
Stbd Target:	0.2 fwd from midship 23.2 from CL & 4.4 above deck
End-on projected windage area:	894 above deck level
Side projected windage area:	2976 above deck level
Fendering possible from:	0.406 LBP aft of midship
to:	0.302 LBP fwd of midship
Current drag data based on:	OCIMF MEG-4 Gas Carrier
Wind drag data based on:	OCIMF MEG-4 Gas Carrier (Prismatic)
Wave motion data based on RAO data for:	Gas Tranzport (Prismatic)
Roll Damping Coeff:	5% of Critical
Loaded Cb:	0.74
Hull Pressure Limit (t/m²):	20

Flatside Contour — Longitudinal datum at Midship

X-dist	-115.2	-112.4	-104.5	-86.5	-73.6	-47.8	28.8	57.9	66.1	74.4	81.0	85.5
Depth	0.0	5.0	9.6	16.1	19.8	23.5	23.5	19.9	17.1	12.7	6.7	0.0

Line No.	Fair-Lead X	Fair-Lead Y	Ht on Deck	Dist to Winch	Brake Limit	Pre-Tension	Line Size	Line Type	Line BL	Tail Segment-1 Lgth	Tail Segment-1 Size	Tail Segment-1 Type	Tail Segment-1 BL
1	146.7	-2.1	0.5	9.7	75	10	42	SW	125	11.0	98	nd	172
2	147.0	1.0	0.5	10.0	75	10	42	SW	125	11.0	98	nd	172
3	137.3	11.0	0.5	10.6	75	10	42	SW	125	11.0	98	nd	172
4	135.5	11.9	0.5	9.5	75	10	42	SW	125	11.0	98	nd	172
5	123.3	16.9	0.5	25.0	75	10	42	SW	125	11.0	98	nd	172
6	121.9	17.5	0.5	25.1	75	10	42	SW	125	11.0	98	nd	172
7	118.4	18.9	0.5	24.9	75	10	42	SW	125	11.0	98	nd	172
8	116.4	19.2	0.5	25.6	75	10	42	SW	125	11.0	98	nd	172
9	114.7	19.6	0.5	26.3	75	10	42	SW	125	11.0	98	nd	172
10	95.8	22.7	0.5	46.6	75	10	42	SW	125	11.0	98	nd	172
11	93.8	22.8	0.5	46.8	75	10	42	SW	125	11.0	98	nd	172
12	91.9	22.9	0.5	46.9	75	10	42	SW	125	11.0	98	nd	172
13	-108.1	22.9	0.5	6.1	75	10	42	SW	125	11.0	98	nd	172
14	-110.0	22.9	0.5	6.1	75	10	42	SW	125	11.0	98	nd	172
15	-113.6	22.9	0.5	39.8	75	10	42	SW	125	11.0	98	nd	172
16	-133.0	19.4	-5.0	6.2	75	10	42	SW	125	11.0	98	nd	172
17	-134.7	18.4	-5.0	5.0	75	10	42	SW	125	11.0	98	nd	172
18	-138.8	16.7	-5.0	29.7	75	10	42	SW	125	11.0	98	nd	172
19	-140.8	16.0	-5.0	30.2	75	10	42	SW	125	11.0	98	nd	172
20	-145.8	-2.8	-5.0	3.7	75	10	42	SW	125	11.0	98	nd	172
21	-145.8	-4.5	-5.0	3.7	75	10	42	SW	125	11.0	98	nd	172
22	-145.8	-7.7	-5.0	3.7	75	10	42	SW	125	11.0	98	nd	172
23	-144.0	-14.2	-5.0	1.6	150								
24	-142.3	-15.1	-5.0	2.6	150								
25	-140.8	-16.0	-5.0	2.2	150								
26	-138.9	-17.0	-5.0	2.6	150								
27	-134.7	-18.8	-5.0	1.8	150								
28	-132.7	-19.1	-5.0	2.3	150								
29	-118.9	-22.8	0.5	1.7	150								
30	-117.5	-22.9	0.5	1.7	150								
31	-36.5	-23.2	0.5	1.7	150								
32	-33.1	-23.2	0.5	5.1	150								
33	34.3	-23.2	0.5	5.7	150								
34	36.6	-23.2	0.5	3.2	150								
35	47.6	-23.2	0.5	5.2	150								
36	53.3	-23.2	0.5	10.8	150								
37	92.0	-22.8	0.5	2.3	150								
38	93.8	-22.7	0.5	3.8	150								
39	113.1	-20.0	0.5	3.7	150								
40	115.0	-19.4	0.5	3.8	150								
41	131.8	-14.5	0.5	4.4	150								
42	133.5	-13.5	0.5	5.9	150								
43	141.6	-8.2	0.5	2.8	150								
44	143.3	-6.8	0.5	3.3	150								

14.4 Appendix D – OPTIMOOR STS Fender Data

STS FENDERS at alongside FSRU Excelerate Sequoia at TRBA

Fender	Dist Below to Origin	Width Deck	Contact Along Side	Area (m²)
a	-76.4	at SWL	9.0	40.5
b	-47.5	at SWL	9.0	40.5
c	-18.4	at SWL	9.0	40.5
d	14.6	at SWL	9.0	40.5
e	48.6	at SWL	9.0	40.5

Fender Load-Compression Data

a	16	32	55	102	243	374	451	535	288	323	tonnes
	0.50	0.70	0.90	1.20	1.73	1.74	1.84	1.90	1.91	1.98	m
b	16	32	55	102	243	374	451	535	288	323	tonnes
	0.50	0.70	0.90	1.20	1.67	1.74	1.84	1.90	1.91	1.98	m
c	16	32	55	102	243	374	451	535	288	323	tonnes
	0.66	0.70	0.90	1.20	1.67	1.74	1.84	1.90	1.91	1.98	m
d	16	32	55	102	243	374	451	535	288	323	tonnes
	0.66	0.70	0.90	1.20	1.67	1.74	1.84	1.90	1.91	1.98	m
e	16	32	55	102	243	374	451	535	288	323	tonnes
	0.66	0.70	0.90	1.20	1.67	1.74	1.84	1.90	1.91	1.98	m

14.5 Appendix E – Natural Gas Specification for Brazil

Table I: Natural Gas Specification (1) (June 17th, 2008)

CARACTHERISTIC	UNIT	LIMIT(2) (3)			Method	
		North	Northeast	South, Southeast, Central West	ASTM	ISO
Higher Heating Value (4)	kJ/M³ kWh/m³	34.000 to 38.400 9,47 to 10,67	35.000 to 43.000 9,72 to 11,94		D 3588	6976
Wobbe Index (5)	kJ/M³	40.500 to 45.000	46.500 to 53.500		-	6976
Methane Number(6), min.		(3)	65			15403
Methane, min	% mol.	68,0	85,0		1945	6974
Ethane, max.	% mol.	12,0	12,0		1945	6974
Propane, max.	% mol.	3,0	6,0		1945	1945
Butane and heavier, max.	% mol.	1,5	3,0		1945	1945
Oxygen, max.	% mol.	0,8	0,5		1945	6974
Inert (N2 + CO2), max.	% mol.	18,0	8,0	6,0	1945	6974
CO2 ,max	% mol.	3,0			1945	6974
Total Sulphur, max. (8)	mg/m3	70			D5504	6326-2 6326-5 19739
Gas hydrogen sulfide (H_2S), max	mg/m³	10,0	13,0	10,0	D5504 6228	6326-3
Dew point of water at 1atm, max.	ºC	-39	-39	-45	D5454	6327 10101-2 10101-3 11541
Dew point of hydrocarbons at 4,5 MPa, max (10)	ºC	15	15	0		6570
Mercury, max. (11)	µg/m³	Take note				6978-1 6978-2

(2) The specified limits are referred to 293,15K (20ºC) and 101,325kPa (1atm) in dry base, except for water and hydrocarbons dew point.

Note: See all Remarks on the ANP Original document: ANP Original Document Link