

OPERATIONAL APPENDIX

For the interpretation of this Appendix, words or expressions beginning with a capital letter have the definitions given to them in Article 1 of the framework contract.

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1 Approval

Access to the Terminal and the Station is only authorised for Carriers, Drivers and Roadway Equipment all of which have been Approved in advance by the Terminal's Operator according to the procedure described below.

Approval does not imply the Terminal's Operator's assent to the Approved element but must be considered as authorisation to use the Station.

1.1 Stages in the Approval procedure

1.1.1 Requirements and information

For each element (be it a Carrier, Driver, or each item of Roadway Equipment), the Terminal's Operator specifies:

- a. The minimum requirements to be met
- b. Possibly, recommended good practices, encouraged but not critical for Approval
- c. The list of documents and information to provide when requesting Approval.

The Client is responsible for ensuring that each element meets these requirements, at the time of Approval and for all subsequent Scheduled Operations. The Terminal's Operator reserves the right to carry out checks in situ and/or demand documents in connection with these requirements at any time.

1.1.2 Request for Approval and exchanges of information

The Client sends a Request for Approval to the Terminal's Operator's contacts listed in the Specific Conditions. The request must be sent at least ten (10) Business Days before any request for Scheduling an Operation (including a Test Loading) involving the element to be Approved.

All the required documents and information must be attached to the request and if necessary translated into French or English.

The Terminal's Operator makes reasonable efforts to respond swiftly to the request. If there are too many requests, the Terminal's Operator may ask the Client to prioritise its requests on the basis of the planned dates of the Operations.

The documents and information to be sent to the Terminal's Operator with the Request for Approval are listed below for each element requiring Approval.

1.1.3 Compatibility analysis

On the basis of the documents and information provided, the Terminal's Operator ascertains that element requiring Approval meets the requirements set out below.

If necessary, the Terminal's Operator or the Client may request a meeting in order to obtain more information, which must be attended by at least one representative of the Client or Carrier.

If several items of Roadway Equipment are identified as being *Sister Trucks*, i.e. identical in terms of manufacturer, design and model, operate by the same Carrier and having the same technical documentation, the Terminal's Operator may, at the request of the Client, agree to do the compatibility analysis in one go for all the items of Roadway Equipment concerned. However, each item of Roadway Equipment must undergo a Test Loading separately to be duly Approved.

The Terminal's Operator sends the Client a response to the Request for Approval as soon as possible, which may be:

- a. Negative: the element is incompatible,
- b. Provisional: requesting additional documents or further information,
- c. Positive:
 - i. For a Carrier, this allows it to move directly on to the validation stage explained in detail in Article 1.1.5 below,
 - ii. For a Driver or item of Roadway Equipment, this allows it to move on to the next stage, namely a Test Loading.

1.1.4 Test Loading

A Test Loading is like a normal Loading, during which the Terminal's Operator carries out additional checks on the Driver and the Truck.

A Test Loading must be Scheduled in a Slot authorised in advance by the Terminal's Operator (usually during working hours on a Working Day), who where necessary will specify all the conditions to be met for Scheduling the Operation. The Client must specify the condition of the Tank Container requiring approval (for instance: in gas or in nitrogen, etc.). When the Slot has been confirmed by the Terminal's Operator, it must be duly Scheduled in the Scheduling Tool by the Client.

The same Test Loading can Approve both a Driver and a Truck (complete). With the prior consent of the Terminal's Operator, who will specify the number of Slots to plan for, the Test Loading can be combined with a Cooling Down, gassing up or other Service.

The Driver must present himself with his Truck ahead of the time scheduled for the Slot, this lead time being specified by the Terminal's Operator according to the number of elements requiring Approval and the type of Operation.

This Test Loading is the subject of an observation report sent to the Client, identifying any corrective measures that may need to be taken.

If the Test Loading is inconclusive, depending on the difficulties encountered, the Truck may be required to leave the Terminal empty or only partially loaded.

1.1.4.1 Test Loading for a Driver

The Terminal's Operator carries out the following checks:

- a. Conformity of the Driver with the documentation provided
- b. Command of the language (French or English)

- c. Conformity of the PPE
- d. General knowledge (conversation with the Officer and a written test):
 - i. Safety rules at the LNG terminal
 - ii. Basic characteristics of LNG
 - iii. Risks
 - iv. ADR and GCW (Gross Combination Weight)
 - v. Documents
 - vi. Operation and characteristics of the Tank Container
 - vii. Station operation
 - viii. Sequence of operations (including traffic plan)
 - ix. Security Protocol defined with the Carrier (given to the Driver)
- e. Skills and know-how tested *in situ* around a Truck.

1.1.4.2 Test Loading for Roadway Equipment

The Terminal's Operator carries out the following checks:

- a. Conformity of the Roadway Equipment with the documentation provided
- b. Authenticity of the ADR plate
- c. A check that the piping and instrumentation diagram (PID) matches the facility and the identification of the valves
- d. Emergency stop tests
- e. Compatibility of the connection to the Station's air system (LARCO type system where applicable)
- f. Test of the mechanism preventing the vehicle from moving while connected to the Station's facilities
- g. ADR conformity (condition of the Truck, lights, signals, chocks, fire extinguishers, etc.)
- h. Absence of leaks (all fluids)

1.1.5 Validation

On the basis of an analysis of the documents and information received and the results of a Test Loading carried out by the Terminal's Operator:

- a. The element is not authorised to perform operations at the Station; the entire procedure must be completed again for any new request for Approval of the element in question,

or

- b. The element can undergo another Test Loading after the corrective measures identified in the previous stage have been taken; or

or

- c. The element (Carrier, Driver or Roadway Equipment) is Approved and authorised to carry out all operations at the Station; in which case the Client receives a signed certificate of Approval for each element separately.

A certificate of Approval is usually valid for five (5) years.

In certain special cases, the certificate of Approval may mention restrictions (for instance: compatibility limited to a single Terminal). In the absence of any restrictions stated in the

certificate, the certificate of Approval for an item of Roadway Equipment is deemed valid for all the Terminals. The certificate of Approval for a Driver is valid for all the Terminals but when he/she goes to a Terminal for the first time, the Client must notify the Terminal's Operator thereof and the Driver must follow an induction session, comparable to a simplified Test Loading, to familiarise himself with the Terminal's specific equipment and procedures.

The Terminal's Operator may issue the Driver with a personal access badge to keep, and may fit an automatic recognition system on the Roadway Equipment (such as an RFID chip or QR code) to facilitate reception at the Terminal.

1.1.6 Follow-up

The Client must ensure that the Carrier renews the authorisations and certificates as often as regulations so require and send the Terminal's Operator the new versions of the documents without undue delay.

An Approval may be suspended by the Terminal's Operator without prior notice in the event of a serious incident involving the Carrier, Driver or Roadway Equipment, a serious breach of rules and procedures, or even a spot check revealing a Driver's lack of knowledge of the rule and procedures. In that case, the Terminal's Operator shares its analysis of the incident with the Client and explains the measures taken or under consideration.

The Client informs the Terminal's Operator of any significant changes, and the latter will then decide whether the change requires the Approval procedure to be repeated.

If an Approved Driver or item of Roadway Equipment changes Carrier (occupational mobility, assignment), the certificate of Approval remains valid with the caveat that:

- a. The Terminal's Operator is informed as soon as possible
- b. The new Carrier is itself Approved and in conformity
- c. For an item of Roadway Equipment, no modification has been made to it.

Once the Approval certificate has expired, the Client must complete the Approval procedure again.

1.2 Carrier Approval

Requirements:

- a. Certified to the ISO 9001-2008 or more recent standard
- b. Have signed a valid Security Protocol
- c. Prepare an annual report for the ADR security advisor

Documents and information to be sent to the Terminal's Operator:

- a. ISO 9001 certificate
- b. Duly completed Security Protocol (in particular the contacts, address, etc.)
- c. SIRET number

- d. Preliminary agreement authorising cab searches and installation by the Terminal's Operator of an automatic recognition system (such as an RFID chip or QR code) on its Roadway Equipment

1.3 Driver Approval

Requirements:

- a. Have RAA accreditation (Restricted Access Area as defined in the orders of 4 June 2008 and 1 April 2015 on the conditions of access and traffic in the restricted access areas of the ports and port facilities and on the issuing of travel documents) or have accreditation pending (accreditation procedure initiated by the Terminal's Operator)
- b. Speak French or English
- c. Have a driving licence and ADR permit
- d. Have attended at least three (3) Operations at the Terminal accompanied by an Approved Driver (exemption possible if the Carrier does not have any other Approved Drivers)
- e. Have the know-how and basic knowledge of LNG, the procedures to follow during Operations, the Roadway Equipment he/she handles and the risks arising in the Operations

Recommendations:

- a. Have completed further special training on handling LNG (even for operations outside the Terminal)

Documents and information to be sent to the Terminal's Operator:

- a. Proof of identity
- b. Driving licence
- c. ADR permit
- d. Certificate of professional competence or training certificate (code 95)
- e. Duly completed ZAR accreditation application form (see template)
- f. For foreign drivers: criminal records (country of birth and/or, if applicable, of nationality) dating less than 3 months and translated in French
- g. Preliminary agreement on the use of personal data

1.4 Approval of Roadway Equipment

Each item of Roadway Equipment must be Approved individually: tractor vehicle, Tank Container, platform (for an ISO container).

1.4.1 For a Tank Container (road tanker or container ISO container)

Requirements:

- a. Comply with the current ADR regulation on the carriage of LNG on roads
- b. For an ISO container, where applicable, be in conformity for rail, waterway or sea transport
- c. Be ATEX, i.e. in conformity with the provisions of European directives 1999/92/EC and 2014/34/EU
- d. Be isolated under vacuum

- e. External material in stainless steel or carbon steel and show proof of thermal and mechanical resistance to a temperature of 700°C and head radiation of 35kW/m²
- f. Have two independent means of checking the liquid level in the inner vessel (gauge + try cock, for example);
- g. Have an earthing connection
- h. Have the following types of coupling:
 - a. Liquid: DN65, male coupling, Air Liquide specification: 792.10832
 - b. Gas: DN40, male coupling, Air Liquide specification: 792.07185
- i. The set of valves must allow the Station to purge the hoses of their contents and flush them with nitrogen
- j. Be fitted with a male pressure-free quick release coupling that connects to the Station air supply, *Legris* specifications: 90873021
- k. The materials, in particular the pipework, must be ASME B31.3 compliant or equivalent and EN 10204-3.1 equipment certificates

Documents and information to be sent to the Terminal's Operator:

- a. ADR Certificate and expiry date
- b. Car registration document and unladen weight (except for ISO container)
- c. Roadworthiness test and expiry date (except for ISO container)
- l. Certificate of ATEX conformity with European directives 1999/92/EC and 2014/34/EU
- d. Hallmark or photo of the ADR plate
- e. PID or PFD technical drawing (with valves)
- f. Geometric plan of the Tank container
- g. Loading, Cooling Down and Unloading procedures
- h. General information and technical documentation:
 - i. Manufacturer
 - ii. Year of manufacture
 - iii. Valve opening pressure
 - iv. Number of axles
 - v. Loading point (Rear/Right-hand side/Left-hand side)
 - vi. Height of the hose connection flanges (for an ISO container):
 - vii. Dimensions of the Tank Container
 - viii. Water-filled volume
 - ix. Length of the Tank container
 - x. Diameter of the Tank container
 - xi. Presence of level gauge
 - xii. Gauge table (where applicable)
 - xiii. Presence of an ADR 95% overflow and details of the fill and pre-fill percentages
 - xiv. Mass of maximum LNG as stated on the Tank Container plate
 - xv. Tank Container group (note ref.1/2/3)

1.4.2 For a tractor vehicle or platform (in the case of an ISO container)

Requirements:

- a. Comply with the current ADR regulation on the carriage of LNG on roads
- b. Be ATEX, i.e. in conformity with the provisions of European directives 1999/92/EC and 2014/34/EU

- c. Be compliant with the EURO VI or earlier standard according to the date of first registration (only for the tractor vehicle)

LNG-powered tractor vehicles are allowed in the Terminal.

Documents and information to be sent to the Terminal's Operator:

- a. ADR Certificate and expiry date
- b. Registration document and unladen weight
- c. Roadworthiness test and expiry date
- d. Certificate of ATEX conformity with European directives 1999/92/EC and 2014/34/EU

2 Scheduling

2.1 Use of the Scheduling Tool

The Operator grants the Client several licences to access the Scheduling Tool. If the Client requests additional licences and the Operator is able to grant them, it may invoice the Client for any extra costs in that respect subject to producing supporting documents.

The Operator may temporarily withdraw licences if the Client has not loaded a Tank Container within one hundred and eighty (180) days. The licences will be reassigned to the Client when it Schedules a Tank Container.

The Client may grant a third party (for instance a Carrier) permission to use one or more of its licences but remains at all times fully responsible for all actions carried out with these (for instance, the Client will assume the consequences of any belated cancellation or Abusive Scheduling done by the third party). These licences remain in the name of the Client and grant access to all the Client's information in the Scheduling Tool.

2.2 Slot times

Operations must be Scheduled by the Client at the times of the Slots displayed in the Scheduling Tool.

2.3 Preparation and modification of the Scheduling

The principle of Scheduling is to allow the planning of Operations in complete safety by optimising the Station's capacity while granting fair access to all the Users.

Barring temporary arrangements made by the Terminal's Operator, Slots are awarded on a "first-come, first-served" basis.

For the sake of convenience, the Scheduling Tool may display Slots in calendar days without this in any way affecting the applicability of the Contract.

The mains parameters of the Scheduling Tool are as follows:

- a. Availability lead time of Slots: fourteen (14) calendar days before the day of the Slot (D+14)
- b. Slot availability times: every Day from ten (10) a.m.
- c. Time from which a cancelled Slot will be invoiced: every Day at three (3) p.m. for any Slots on the following Day.

The Terminal's Operator can modify these parameters subject to notifying the Client thereof.

The Client fills in or checks the required fields for each Slot it Schedules, in particular:

- a. Terminal
- b. Slot Date and time
- c. Client and Contract
- d. Carrier

- e. Driver
- f. Tank container
- g. Quantity of LNG to load: the Client must specify a target quantity, or failing which select "max" if it wants the Tank Container to be fully loaded subject to regulatory constraints (ADR and GCW in particular)
- h. Requested services (Loading, Cooling Down, etc.)

Any specific information concerning the Operation must be provided by the Client.

For a straightforward Loading (excluding a Test Loading, Cooling Down or any other Service), and in the absence of any incident, failure or Case of Force Majeure, the Terminal's Operator undertakes to complete the Operation within a period of one (1) Slot.

For any Service other than a straightforward Loading, the Client is responsible for Scheduling the right number of consecutive Slots needed for the Operation it wishes to plan. If in doubt, the Terminal's Operator may give a non-binding estimate (in particular for long Operations like Cooling Down, gassing up or inerting). If there are not enough Scheduled Slots and the Officer realises that the Operation cannot be completed within the allotted time, the Terminal's Operator reserves the right to interrupt the Operation.

When the Scheduling is confirmed by the Client, the Slot becomes unavailable for other Users and the Client is committed to using and paying for it, unless it cancels it within the deadline specified above.

On confirmation, the Booking Single Code (IUR) is issued by the Scheduling Tool. The Driver must be able to present at least the last 4 characters of the Slot's IUR on arrival at the Terminal and at any time during the Operation.

The Client loses priority over a Slot it has Scheduled if it cancels or postpones it.

2.4 Delay and rescheduling

The Terminal's Operator is only required to carry out Scheduled Operations if the Truck arrives no later than ten (10) minutes after the beginning of the Scheduled Slot.

After which time, the Terminal's Operator notifies the Client that the Operation has been refused and asks the Client to postpone it to an available Slot on the same Day or possibly to the Reserved Slot, subject to it still being available.

If no Slot is available on the same Day, and the Reserved Slot is not available either, the Operation is deemed to be cancelled by the Client.

If a delay is caused by the Terminal's Operator, even further to a short-lived case of Force Majeure, it will endeavour to resume the Scheduling in the initial order, informing the Client of the delay, the expected length of time needed to return to normal and any Operations that cannot be carried out, the Client having the option to adjust this order according to its

priorities. The Terminal's Operator shall make reasonable efforts to offer Reserved Slots in order to minimise the impact on the Client's Operations.

Certain operations concerning other Terminal activities may force the Terminal's Operator to postpone or cancel a Slot. As a Prudent and Reasonable Operator, the Terminal's Operator makes every effort to avoid or minimise the impact of postponed or cancelled Slots on Station availability, and where applicable update the Scheduling Tool at the earliest possible opportunity. If the Slot concerned is already Scheduled by the Client, the Terminal's Operator informs the Client at the earliest possible opportunity in order to enable it to find a replacement Slot.

2.5 Abusive Scheduling

The flexibility offered by the Scheduling Tool must on no account allow the Client to prevent other users from accessing the Station. The Terminal's Operator reserves the right, after having notified the Client, to change the Scheduling in the event of proven Abusive Scheduling.

2.6 Congestion and downgraded mode

In the event of congestion (very busy Station and lack of available Slots), the Terminal's Operator may take any necessary measures, including modification of Slot availability times, deadlines for invoicing belated modification or cancellation, to achieve the following objectives:

- a. Allow fair access to the Station for all Users
- b. Abide by the "first-come, first-served" principle

If the Scheduling Tool is unavailable, the Scheduling is done by any means agreed on by the Parties.

3 Operations

3.1 Station characteristics

Non-binding details:

	Montoir-de-Bretagne	Fos Tonkin	Fos Cavaou
Commissioning:	2013	2014	2019
Loading bays:	1 semi-automated bay 1 manual bay (backup)	2 semi-automated bays including 1 backup	2 semi-automated bays
Weighbridge:	1 weighbridge on semi-automated bay 1 Terminal weighbridge (backup)	1 Terminal weighbridge	2 Terminal weighbridge (one on each bay)
Maximum flow rate:	100m ³ /hour	100m ³ /hour	100m ³ /hour
Operational flow rate:	80m ³ /hour	80m ³ /hour	80m ³ /hour
Maximum working pressure (pipework):	12 bar	8 bar	12 bar
Operational pressure:	7-8 bar	5-6 bar	7-8 bar
Couplings:	Loading through hoses Couplings: <ul style="list-style-type: none"> • Liquid: DN65 Female PN40, Messer Griesheim specification 794.01837 • Gas: DN40 Female PN40, Messer Griesheim specification 794.01837 		

3.2 General rules

Trucks must not park in the area around the Terminal, either before or after the Operations. There are ADR truck parks near the Terminals. All Trucks must be able to quickly leave the area around the Terminal if the need arises and must not be left unattended. Barring security imperatives, the trailer must not be unhitched.

For all Operations, movements and manoeuvres in or in the immediate vicinity of the Terminal, the Driver is placed under the supervision of the Terminal's Operator and must obey all safety instructions issued by the Officer or the Terminal's Operator's staff or the security guards.

All Operations at the Station takes place under the responsibility of the Officer. The Driver must assist the Officer throughout the operation.

Barring any provisions to the contrary for certain specific loading stages, specified below in the description of the sequence of Operations, the Officer is responsible for handling the Station's equipment and the Driver is responsible for handling the Roadway Equipment.

3.3 Accessing the Terminal and the Station

3.3.1 Addresses of the Terminals

Montoir-de-Bretagne	Fos Tonkin	Fos Cavaou
Terminal Méthanier Elengy Porte Nord Zone Portuaire 44550 Montoir-de-Bretagne France Coordonnées GPS : 7°18'30.7"N 2°08'26.1"W 47.308536, -2.140575	Terminal Méthanier Elengy Fos Tonkin 13270 Fos-sur-Mer France Coordonnées GPS : 43°27'18.1"N 4°50'55.5"E 43.455018, 4.848747	Terminal Méthanier Elengy Fos-Cavaou Route des plages, 13270 Fos-Sur-Mer France Coordonnées GPS : 43°25'32.7"N 4°54'01.2"E 43.425739, 4.900323

3.3.2 Station controls and access clearance

The Terminal's guardhouse and security guards admit the Driver and the Truck and clear them to access the Station in accordance with the Scheduling.

On arrival, the Driver must park his Truck in the designated areas and present himself at the guardhouse. He/she must be able to present:

- a. His identity papers and ADR permit
- b. His personal access badge, if one was issued to him at the time of Approval
- c. The identification of the Roadway Equipment and approval certificates
- d. The automated recognition device (RFID chip or QR code), if one was fitted to the Roadway Equipment at the time of Approval
- e. The IUR of the Scheduled Slot
- f. The waybill specifying his destination (place of delivery)

The security guard checks that:

- a. The documents are authentic and currently valid
- b. The Driver and Roadway Equipment are duly Approved
- c. The IUR is valid and consistent with the Scheduling
- d. The time of arrival is consistent with the Slot's times

The security guard may also be led to search the Driver and/or the Truck's cab, only for security purposes.

Non-ATEX devices (mobile phones, etc.) must be left at the guardhouse, in accordance with the site's instructions.

The security guard or the Officer (if he/she goes to the guardhouse) uses a checklist to ascertain that:

- a. The Truck and its equipment are in good working order and do not present any visible defects like a broken indicator, a punctured tyre, defective heat insulation (condensation on the external container), ...
- b. The Driver has his PPE, which is in a good state of repair
- c. The LNG Safety Data Sheet (document issued by the LNG vendor specifying the data needed to handle the LNG in complete safety) and the other documents required by current regulations are on board the vehicle.

When all the checks have been carried out, the security guard or the Officer, in coordination with the Terminal's control room, can authorise the Driver and Truck to access the Station. On the instructions of the security guard, the Driver proceeds to the Station.

3.4 Sequence of Operations

3.4.1 Verification of the condition of the Tank Container

The Tank Container must meet the following conditions, otherwise the Operation may be refused by the Terminal's Operator:

- a. Be under natural gas or nitrogen atmosphere (unless it has Scheduled a gassing up) and meet the following specifications (the Terminal's Operator reserves the right to carry out checks):
 - i. maximum 1 ppm steam H₂O
 - ii. maximum 100 ppm CO₂
 - iii. maximum 100 ppm O₂
- b. Be "cold" (unless it has Scheduled a Cooling Down), i.e. in cryogenic conditions. The measured temperature of the evaporations on depressurisation must not exceed a threshold set on each Terminal:

Montoir-de-Bretagne	Fos Tonkin	Fos Cavaou
-80°C	-30°C	-80°C

- c. Be equipped with seals and coupling in perfect working order and have spare seals if need be.

If the Tank Container is not cold without a Cooling Down having been Scheduled, the Officer normally refuses the Operation, but in exceptional cases, if Scheduling conditions so permit, it may agree to the Operation with the agreement of the Driver recorded on the checklist. In that case, the Terminal's Operator makes reasonable efforts to perform a Cooling Down, but the Operation may be interrupted by the Officer at the end of the Scheduled Slot, even if the Scheduled Service has not ended, and the Operator and/or the Terminal's Operator cannot be held liable for any damage caused to the Roadway Equipment as a result of the Tank Container not being in a good condition.

3.4.2 LNG Loading and/or Truck Cooling down

The stages of the LNG Loading and/or Cooling down Operation are as follows (the order of the stages may vary depending on the Terminal):

- 1) Position the Truck (chocks, immobilisation)
- 2) Make earthing connection
- 3) Connect the fluid and gas hoses

- 4) The Officer approves the mass to load
- 5) Weigh the unladen Truck
- 6) The Driver checks the correct configuration of the valves (bypass valves and vents closed)
- 7) Decompress the Tank Container to roughly one (1) bar
- 8) Cool down the hoses and manifolds
- 9) Start the Cooling Down and/or Loading sequence
- 10) End of Loading
- 11) Empty and flush the hoses with nitrogen
- 12) Disconnect the hoses and the earthing connection
- 13) Weigh the loaded Truck
- 14) Edit the loading documents
- 15) The Truck leaves the Station and the Terminal

The Tank container's fill rate will be checked by the Officer during loading based on the Tank container's level. The Tank container's fill rate must comply with regulatory requirements (ADR and GCW in particular).

The unladen weight, laden weight and mass of loaded LNG are determined using the Station's weighbridge, failing which the Terminal's.

The pressure of LNG at the flange is controlled to remain lower than the opening pressure of the Tank Container's valves. The Terminal's Operator makes all reasonable efforts to ensure that the pressure in the Tank Container does not exceed one (1) bar on completion of Loading.

Loading is done with the Station's hoses. The Tank Container's hoses are not used and the Terminal's Operator on no account checks their conformity.

3.5 Issue of documents and departure from the Terminal

On completion of the Operation, the Transport Document and a copy of the Loading Certificate are given to the Driver in provisional versions clearly identified as such. These documents ensure circulation in full compliance but must not be regarded as contractually binding documents, more particularly with regard to the quality of the LNG or the energy value of the cargo.

The Client can also use the Scheduling Tool to consult these documents in their provisional version thirty (30) minutes after completion of the Operation.

Only the final versions of the documents, updated in the Scheduling Tool and put at the disposal of the Client, must be regarded as approved by the Terminal's Operator.

If a Loading Certificate is re-edited, only the latest version is deemed authentic.

4 LNG Quantity and quality calculation

4.1 Quantity of loaded LNG

4.1.1 Mass of loaded LNG

The mass of loaded LNG is measured using a weighbridge at the Terminal that complies with the Measuring Instruments Directive and has undergone a metrological inspection under the supervision of an accredited audit firm.

The Terminal keeps documents vouching for the metrological conformity of the weighing device(s).

If the weighbridge is unavailable, or for any situation in which the weighbridge does not give a satisfactory measurement of the loaded LNG, the Terminal's Operator will use the Station's mass flowmeter, or if that is unavailable, he/she will define a fault-tolerant mode and notify the Client thereof.

The mass (M) of loaded LNG, expressed in kilogrammes, is:

$$M_{GNL \text{ chargé}} (kg) = M_{\text{Camion-citerne après Opération}} (kg) - M_{\text{Camion-citerne avant Opération}} (kg)$$

4.1.2 Volume of loaded LNG

The volume (V) of loaded LNG, expressed in m³, is calculated using the mass (M) of loaded LNG and the mass density (ρ) of LNG at -160°C according to the following equation:

$$V_{GNL \text{ chargé à } -160^{\circ}C} (m^3) = \frac{M_{GNL \text{ chargé}} (kg)}{\rho_{GNL \text{ à } -160^{\circ}C} (kg/m^3)}$$

4.1.3 Energy of loaded LNG

The energy E of loaded LNG, expressed in kWh, is the mass of loaded LNG multiplied by the mass GCV of the LNG using the following formula:

$$E_{GNL \text{ chargé}} (kWh) = M_{GNL \text{ chargé}} (kg) \times PCS_{\text{massique}} (kWh/kg)$$

The energy of the loaded LNG thus calculated is used to deducted the inventory level of LNG held by the Client under its Access Contract or Loading Authorisation.

4.1.4 Equivalent in volume of loaded natural gas

The equivalent in volume of loaded natural gas in m³(n) at 0°C with a pressure of 1.01325 bar is calculated using the volume of loaded LNG at -160°C multiplied by the LNG/natural gas expansion factor.

4.2 Quality of loaded LNG

4.2.1 Determining the composition of the loaded LNG

The composition of the loaded LNG, expressed as a molar percentage (%mol.), is determined after vaporisation of the LNG by chromatography in gaseous phase in accordance with the ISO 6974 standard.

The sample of LNG used for these measurements is taken at the Terminal's generating point (regasification of the LNG for transmission to the gas transmission network) or at any other point deemed more precise by the Terminal's Operator.

If no gas is transmitted at the Terminal, the Terminal's Operator will use the latest measurement data.

If no gas is transmitted at the Terminal for a long time, the Terminal's Operator may propose a simulation of the changing characteristics of the LNG.

4.2.2 Calorific value, Wobbe Index, mass density and relative density calculations

The main physical characteristics of the gas (volumetric calorific value (kWh/m³(n)), mass calorific value (kWh/kg), Wobbe index, density and mass density) are determined according to the ISO 6976 standard for a reference combustion temperature of 0°C and a volume measurement temperature of 0°C, both at an atmospheric pressure of 1.01325 bar.

4.2.3 Calculation of the density of the loaded LNG

The density of the loaded LNG in kg/m³ is calculated using the composition of the loaded LNG in mole % at a fixed temperature of -160°C, taking into account the molar mass of each constituent as defined in the ISO 6976 standard, the molar volume of each constituent, correction factors K₁ and K₂ as described in the revised Klosek McKinley calculation method published in the Technical Note of NBS (National Bureau of Standards) in December 1980.

4.3 Specifications of Loaded LNG

Characteristics	Reference combustion T & P	Unit	Minimum	Maximum
Gross Calorific Value (GCV)	@ 0°C and 1.01325 bar	kWh/m ³ (n)	10.70	12.80
	@ 25°C and 1.01325 bar	kWh/m ³ (n)	10.67	12.77
Wobbe	@ 0°C and 1.01325 bar	kWh/m ³ (n)	13.64	15.70
	@ 25°C and 1.01325 bar	kWh/m ³ (n)	13.60	15.66
Methane content		mol%	80	-
H ₂ S + COS		mgS/m ³ (n)	-	5
RSH		mgS/m ³ (n)	-	6
Total S		mgS/m ³ (n)	-	30

5 Templates

The templates hereafter are provided for your information, the original documents may vary.

5.1 Security Protocol Template

Example for Montoir

PROTOCOLE DE CHARGEMENT GNL

Arrêté du 26 avril 1996 codifié par les R 4515-1 à 11 du Code du Travail

ELENGY	ENTREPRISE DE TRANSPORT <i>Entreprise extérieure</i>
Raison sociale ELENGY	Raison sociale _____
Adresse Terminal de Montoir de Bretagne Zone Portuaire BP35 44550 Montoir de Bretagne	Adresse _____ _____ _____
Téléphone : 02 40 17 54 43 / 06.98.53.57.50	Téléphone : _____
Email : montoir-gnl-porte@elengy.com	Email : _____
Nom du Responsable : Chef de quart en poste	Nom du Responsable : _____
Horaires d'ouverture de l'établissement aux transporteurs : h24 fonction de la programmation opérationnelle	
Personne à contacter : B. Mossot (GNL porté) + Responsable sécurité (ADR/TMD)	
Nature de l'opération <input checked="" type="checkbox"/> Chargement <input type="checkbox"/> Déchargement <input type="checkbox"/> Ponctuel <input checked="" type="checkbox"/> Répétitif	

Descriptif de l'opération : **Chargement citerne GNL selon LNG-PRO-2020**

PRODUITS : SYMBOLES ET IDENTIFICATION DE DANGER

GAZ NATUREL LIQUEFIE (G.N.L.):



Les risques : Inflammation, pression, température cryogénique (-160°C)

Les conséquences : Brûlures (froides et chaudes), blessure due à la pression et au bruit

GAZ NATUREL (G.N.):



Les risques : Inflammation, déflagration, pression, température (-150° C)

Les conséquences : Brûlures (froides et chaudes), blessure due à la pression et au bruit









TYPE DE VÉHICULE	CONDITIONNEMENT	MATERIEL DE MANUTENTION
Véhicule Poids lourd Semi-remorque 	GNL en vrac citerne	Flexibles cryogéniques certifiés ADR fournis et manutentionnés par ELENGY

**EN CAS D'URGENCE SUR LE SITE COMPOSER LE 18 DEPUIS UN TELEPHONE DE SITE
EN CAS D'ALERTE P.O.I. :**
INTERROMPRE L'OPERATION – REGAGNER LE POSTE DE GARDE A PIED
ATTENDRE LES INSTRUCTIONS DE L'AGENT D'ACCUEIL (FIN D'ALERTE)

LES ÉQUIPEMENTS DE PROTECTION INDIVIDUELLE

						
Stationnement Chargement GNL	Tenue de travail antistatique	Chaussures de sécurité	Gants cryogéniques	Casque avec jugulaire	Protection faciale	Détecteur gaz

LES CONSIGNES GÉNÉRALES À RESPECTER

			
Respecter la limitation de vitesse du site	Respecter le cheminement prévu pour les citernes GNL sur le site. Attention au côté de raccordement des flexibles. Interdire les croisements avec d'autres PL.	Interdiction de porter sur soi un appareil fonctionnant à piles (baladeur, téléphone portable, radio, clé de voiture, etc...)	
			
Respecter l'interdiction de fumer et d'utiliser le téléphone sur le site. Flamme nue strictement interdite	Respecter le code de la route et la signalisation.	Contrôle de l'équipement par le gardien	Interdiction d'être sous l'emprise d'alcool et substances illicites

LES REGLES À RESPECTER LORS DU CHARGEMENT - DÉCHARGEMENT

RISQUES	MESURES DE PREVENTION	RESPONSABLE
SURETE	S'adresser au gardien Porte Nord du terminal en présentant pièce d'identité, permis ADR et carte grise de la citerne présentée. Vérification des données avec la programmation opérationnelle citerne Remise du badge d'accès au chauffeur accrédité + moyen de com.radio Contrôle sûreté de l'ensemble routier	Chauffeur Agent de sûreté
ACCES ET CIRCULATION	Accès de la citerne en zone d'attente 1 face au bâtiment administratif, Respect du code de la route et des consignes en vigueur sur le site	Chauffeur
	Accès de la citerne en zone d'attente 2 au Stop, sur ordre de l'opérateur Elengy via moyen de com. radio, Respect du code de la route et des consignes en vigueur sur le site	Chauffeur
	Accès de la citerne sur le pont bascule baie 2, sur ordre de l'opérateur Elengy	Chauffeur
ADR	Check List ADR : contrôle de conformité ADR de l'ensemble routier Signalétique, équipements obligatoires, EPI chauffeur Validation de l'adresse de livraison pour le PTR A	Agent de conduite
OPERATION DE CHARGEMENT	L'agent de conduite Elengy responsable du chargement devra connaître l'emplacement de « l'arrêt d'urgence » du véhicule	Agent de conduite
	Fermer les portes et les vitres du véhicule tracteur citerne	Chauffeur
	Mise à la terre de la citerne GNL	Chauffeur
	Mise en place du coupe batterie et du dispositif anti arrachement	Chauffeur
	Branchement des flexibles	Chauffeur
	S'assurer du remplissage de la citerne en GNL sans dépasser la limite du PTR A et du taux de remplissage maximum	Agent de conduite
PROJECTIONS DE GNL (BRULURES FROIDES ET PRESSION)	Respect du mode opératoire chargement d'une citerne GNL -Pour Montoir : TMM-MOP-0096	Chauffeur / Agent de conduite

INFLAMMATION (ZONE ATEX)	Coupe-circuit du véhicule enclenché lors du chargement	Chauffeur
	Moyens de lutte incendie opérationnels sur station de chargement GNL et sur la citerne	Agent de conduite
	Utilisation de matériel <u>anti-étincelant</u> et port des EPI	Chauffeur / Agent de conduite
MOYENS DE SECOURS EN CAS D'ACCIDENTS OU D'INCIDENTS		
A tout moment l'agent de conduite Elengy responsable du chargement pourra prévenir la salle de contrôle qui organisera les secours. Liaison permanente par talkie-walkie avec la salle de contrôle		
Le véhicule sera équipé de contenants et/ou absorbants pour les fuites propres au véhicule et est équipé d'extincteurs.		
L'agent de conduite responsable du chargement assurera la bonne mise à disposition des moyens de sécurité de la station de chargement GNL (absence d'eau dans la rétention, AU disponibles et accessibles...) et matériel d'extinction à proximité (extincteurs, générateur à mousse, lance incendie).		
Application du Plan d'urgence .		
- Déclenchement du POI		

EN CAS DE SIRENE VOUS DEVEZ :

TERMINAL DE MONTOIR

- De type continu (POI) Durée 1 min
- De type modulé (PPI) Durée 1 min



Si P.O.I / PPI :



Rejoindre le point de rassemblement et se faire enregistrer à l'aide du badge.

PLAN DU SITE TERMINAL DE MONTOIR



Procédure

Après passage du poste de garde porte Nord du terminal, stationnez en « zone d'attente 1 ».
L'opérateur Elengy vous ordonnera, par talkie-walkie, de venir stationner en zone d'attente 2 au niveau des stop puis de placer la citerne sur le pont bascule de la baie de chargement.
En fin de chargement, quitter le pont bascule et placer la citerne en « zone de transit » le temps d'établir les documents de transport.

MATIERES DANGEREUSES :

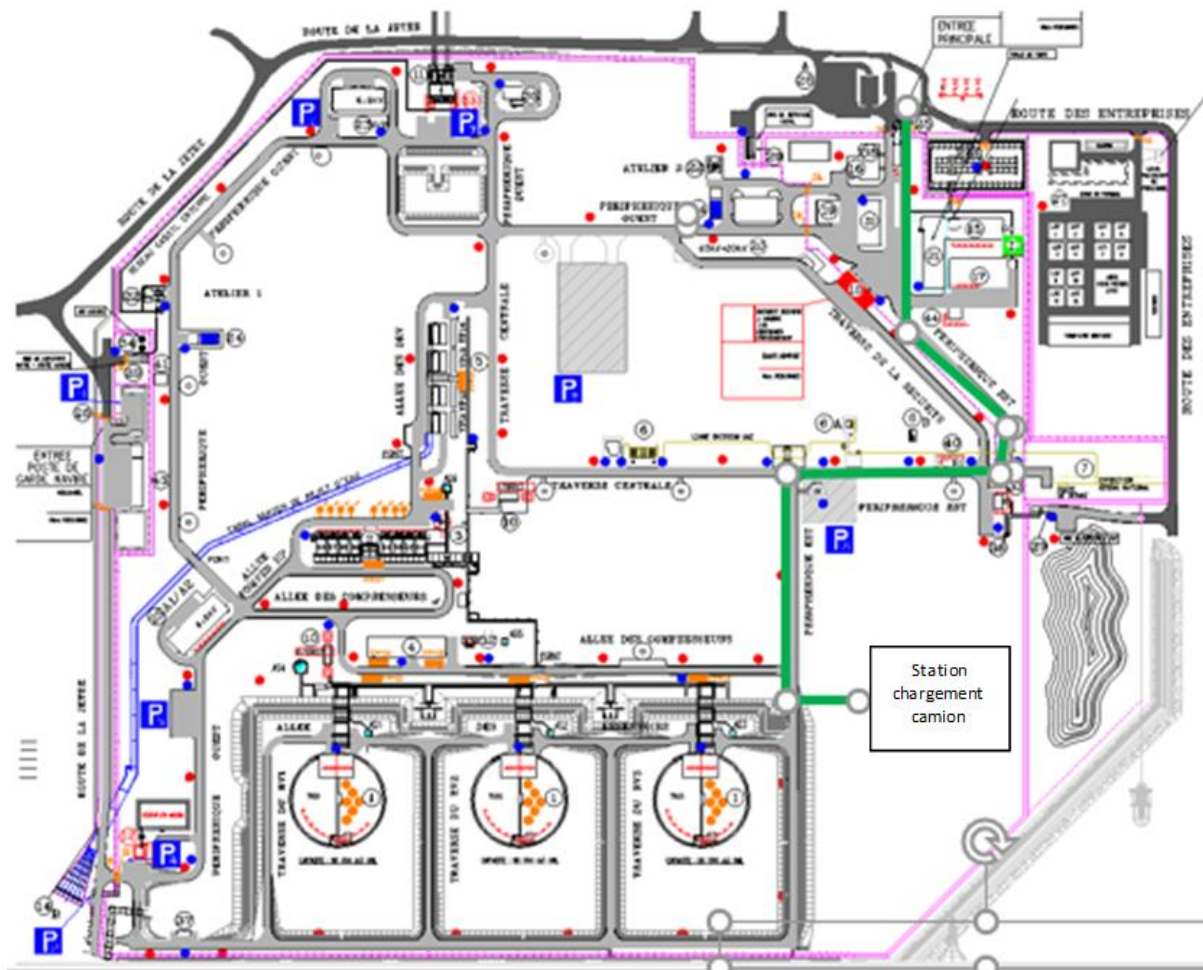
L'entreprise de transport, s'engage à l'application de la législation transport routier. Notamment : l'affichage du code de danger et son numéro d'identification, les documents de transport, les consignes écrites et la formation du conducteur, l'équipement du véhicule et son agrément.

Le .../.../20....	Elengy		Entreprise de transport
	Donneur d'Ordre	Service Sécurité	
Nom			
Prénom			
Fonction			
Signature			

Fos Tonkin terminal map



Fos Cavaou terminal map



5.2 ZAR habilitation form template

<h1 style="margin: 0;">Demande d'habilitation ZAR</h1> <h2 style="margin: 0;">Terminal Méthanier de Fos sur Mer</h2>
<p style="font-size: small; margin: 0;">Demande d'habilitation d'accès en Zone d'Accès Restreint conformément à l'arrêté du 18 juin 2008. Zone d' Accès Restreint définie par arrêté préfectoral du 08 août 2011</p>

INFORMATIONS PERSONNELLES	
NOM (de jeune fille) :	Prénom :
NOM marital :	
Profession :	
Date de naissance (jj/mm/aaaa) :	Nationalité :
Lieu de naissance : ville :	Département : pays :
Pièce d'identité (*) <input type="checkbox"/> passeport	n° Validité :
<input type="checkbox"/> CNI	n° Validité :
Nom du père :	Prénom du père :
Nom (de jeune fille) de la mère :	Prénom de la mère :
<u>ADRESSE :</u>	
N°, rue :	
Tour, étage, escalier :	
Ville :	Code postal :
N° téléphone :	
E.mail :	
EMPLOYEUR / FONCTION	
NOM de l'entreprise:	Pays :
Adresse :	
N° SIRET :	Statut entreprise :
N° SIREN :	
Nom du Responsable de l'entreprise:	
Saisie CEZAR le :	Retour CEZAR le :

(*) : Joindre photocopie pièce identité

5.3 Checklist template

Example for Montoir

Check-list de contrôle chargement citerne GNL

Contrôle réalisés en amont du chargement :

Lors de l'approbation de la citerne (gestionnaire activité citerne) + lors de l'accès site (poste de garde)

Identité conducteur + Permis de conduire valide du conducteur	<i>Poste de garde :</i> Le chauffeur doit présenter sa pièce d'identité et son permis de conduire. Si un des 2 documents est manquant, le chauffeur se verra interdire l'accès au terminal.
Vérifier l'attestation de conformité ADR de la citerne (valable 1 an)	<i>Terminal, personnel en charge de la gestion de l'activité citerne :</i> Le certificat ADR est vérifié lors de l'approbation citerne. Les clients doivent envoyé au terminal le certificat ADR tous les ans. Si un certificat n'est plus valide, l'équipement routier est bloqué à la réservation dans l'outil informatique de manière automatique.
Certificat de formation du conducteur appropriée au transport ADR (y compris spécialisation citerne ou produits pétroliers selon le cas)	<i>Terminal, personnel en charge de la gestion de l'activité citerne :</i> Le certificat de formation est vérifié dès lors qu'un client déclare un nouveau chauffeur. Si la date de formation est dépassée, le chauffeur ne peut plus être programmé par les clients dans l'outil informatique. Le chauffeur est bloqué automatiquement. Les clients sont avertis par mail avant la date de fin de validité et doivent envoyer un document valide au terminal pour mise à jour.
Protocole de sécurité	<i>Terminal, personnel en charge de la gestion de l'activité citerne :</i> Le protocole est signé chaque année par chaque transporteur utilisateur du service. Si la date de validité est dépassée, le transporteur est bloqué dans l'outil informatique. Le terminal envoie une version actualisée pour toute modification de la procédure ou plan de circulation.

Contrôle réalisé par l'opérateur en charge de l'opération commerciale

Immatriculation véhicule Tracteur :	Immatriculation de la Citerne :	Chauffeur :	Baie 1 <input type="checkbox"/> Baie 2 <input type="checkbox"/>
--	------------------------------------	-------------	--

Le chauffeur est stationné sur le pont bascule, il a mis ses cales, activé son coupe-batterie et son dispositif anti-arrachement. Il a raccordé la liaison équipotentielle et les flexibles.

L'opérateur Elengy réalise un **contrôle visuel renforcé** de l'ensemble routier avant chargement pour vérifier la conformité ADR des points suivants :

Contrôle véhicule avant chargement / Check before loading	Conforme	Non conforme
Etat général du véhicule satisfaisant - Feux de signalisation en état - Pneu en bon état - Ailes au-dessus des roues en bon état - Etat général		
Présence des plaques orange codifiées (223/1972) et des plaques étiquettes de danger Vérification du système de fixation des plaques oranges		
Les cales sont en place pour le chargement (1 sur le tracteur, 1 sur la citerne à minima)		
2 extincteurs sont présents sur la citerne 12 kg au total avec à minima 1 de 6 Kg sur la citerne, 1 de 2 Kg dans la cabine		
Pas de fuite GNL		
Pas de signe de faiblesse de l'isolation (givre en arrière de la citerne ou condensation, pression...)		
Le chauffeur porte ses EPI : double couche, chaussures de sécurité, gants, visière, détecteur gaz		
Contrôle visuel des flexibles avant chargement des citernes de GNL		

Pesée / Pression / Masse

Pesée avant chargement :	Pesée après chargement :
Pression de la citerne avant la décompression :	Pression de la citerne après chargement :
Masse chargés dans la citerne :	

Avant le départ / Before departure

	Conforme	Non conforme
Le véhicule dispose des éléments conforme a l'ADR (<i>points vérifiés précédemment : cales, extincteurs, plaques, feux, pneus...</i>)		
Remise des documents de transport : « Document de transport G.N.L » et « certificat de chargement »		
Les dispositifs de fermeture sont en position fermée et étanches		
Remise du certificat de pesée au conducteur (ticket)		
Document 'consignes de sécurité transport-GNL' en possession du chauffeur.		

Observation(s) / problème(s) rencontré(s) pendant l'opération (Opérateur Elengy ou Chauffeur)

<u>Représentant elengy</u>	<u>Chauffeur</u>

Si chargement partiel, partie à renseigner (demande du chauffeur)

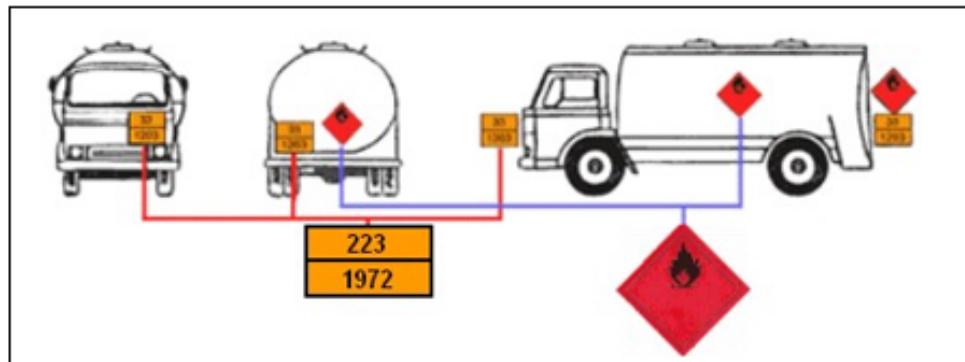
% de remplissage de la citerne :	Quantité chargée (en Kg):
Quantité / Poids demandé :	

Engagement du conducteur :

Je soussigné, conducteur du véhicule ci-dessus mentionné, reconnait qu'au départ de la société, mon véhicule était convenablement équipé, signalé et étiqueté et qu'en cas de retrait de signalisation, de chargement ultérieur incompatible ou de modifications du calage / arrimage du chargement, ma responsabilité seule serait engagée.

Nom et signature du vérificateur :	Nom et signature du chauffeur / <i>Name and signature driver</i>
------------------------------------	--

Nb : Les citernes vides et non dégazées gardent la signalisation. citernes vides et dégazées : panneau orange barré.



5.4 Loading Certificate and Transport Document Template

**Certificat de chargement en GNL d'un
camion-citerne à 0°C**

Version provisoire (données indicatives en attente de validation)

Date :	17/01/2018
Client :	
Immatriculation de la citerne :	AH05586
Dénomination sociale du Transporteur :	
Référence du chargement en GNL :	CAM-TMF-2018-01-17-01-44263-V00
Identifiant Unique de Réservation :	FOS_ _201801171230_NPEL
N° de version :	0
Mise en froid de la citerne :	Non
Début de chargement : 17/01/2018 01:30	Masse avant chargement (kg) : 20 000
Fin de chargement : 17/01/2018 03:30	Masse après chargement (kg) : 40 000

Analyse GNL

<table style="width: 100%;"> <tr><td>Azote :</td><td>0,000000 %</td></tr> <tr><td>Methane :</td><td>100,000000 %</td></tr> <tr><td>Ethane :</td><td>0,000000 %</td></tr> <tr><td>Propane :</td><td>0,000000 %</td></tr> <tr><td>Iso Butane :</td><td>0,000000 %</td></tr> <tr><td>Normal Butane :</td><td>0,000000 %</td></tr> <tr><td>Néo Pentane :</td><td>0,000000 %</td></tr> <tr><td>Iso Pentane :</td><td>0,000000 %</td></tr> <tr><td>Normal Pentane :</td><td>0,000000 %</td></tr> <tr><td>Hexane et + :</td><td>0,000000 %</td></tr> </table>	Azote :	0,000000 %	Methane :	100,000000 %	Ethane :	0,000000 %	Propane :	0,000000 %	Iso Butane :	0,000000 %	Normal Butane :	0,000000 %	Néo Pentane :	0,000000 %	Iso Pentane :	0,000000 %	Normal Pentane :	0,000000 %	Hexane et + :	0,000000 %	<table style="width: 100%;"> <tr><td colspan="2">Gaz à 0°C</td></tr> <tr><td>PCS sur une base massique :</td><td>15,460 kWh/kg</td></tr> <tr><td>PCS sur une base volumique :</td><td>11,090 kWh/m3(n)</td></tr> <tr><td>Indice de Wobbe</td><td>14,890 kWh/m3(n)</td></tr> <tr><td>PCI base volumique :</td><td>9,970 kWh/m3(n)</td></tr> <tr><td>Masse volumique</td><td>0,717 kg/m3(n)</td></tr> <tr><td>Densité</td><td>0,555</td></tr> <tr><td colspan="2">GNL à -160°C</td></tr> <tr><td>PCS sur une base volumique :</td><td>6 502,241 kWh/m3(n)</td></tr> <tr><td>Masse volumique :</td><td>420,547 kg/m3</td></tr> <tr><td>Facteur d'expansion</td><td>586,146</td></tr> </table>	Gaz à 0°C		PCS sur une base massique :	15,460 kWh/kg	PCS sur une base volumique :	11,090 kWh/m3(n)	Indice de Wobbe	14,890 kWh/m3(n)	PCI base volumique :	9,970 kWh/m3(n)	Masse volumique	0,717 kg/m3(n)	Densité	0,555	GNL à -160°C		PCS sur une base volumique :	6 502,241 kWh/m3(n)	Masse volumique :	420,547 kg/m3	Facteur d'expansion	586,146
Azote :	0,000000 %																																										
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Normal Butane :	0,000000 %																																										
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Masse volumique :	420,547 kg/m3																																										
Facteur d'expansion	586,146																																										

Composées soufrés (mgS/m3(n))	
H2S + COS	< 5 mgS/m3(n)
RSH	< 6 mgS/m3(n)
S Total	< 30 mgS/m3(n)

Résultat

	Volume en m3 à -160°C	Energie en MWh PCS	Masse en kg
GNL chargé	47,56	309,228	20 000
Equivalent volume (en m3m(n)) : 27 875			



**Document de transport G.N.L.
L.N.G Transport Document**

N° ONU:	Classe	Etiquette	Groupe d'emballage	Code Tunnel
	2	2.1		(B/D)
<u>IDENTIFIANT UNIQUE DE RÉSERVATION</u> FOS_201801171230_NPEL		<u>N° DE VERSION</u> 0		
<u>EXPÉDITEUR (CLIENT) :</u>		<u>DESTINATAIRE :</u>		

<u>TRANSPORTEUR :</u>	<u>IMMATRICULATION TRACTEUR :</u>	<u>IMMATRICULATION CITERNE :</u>
	TTRACTEUR	AH05586
Adresse :	<u>Masse net chargée (en kg) :</u>	<u>Niveau de remplissage (en %) :</u>
	20 000	100,00
N° SIRET :		

Déclaration du Remplisseur :
Je déclare les marchandises classées et autorisées au transport conforme à l'ADR, fournir au transporteur le document de transport et les consignes de sécurité. Je déclare avoir vérifié la conformité de la citerne, observé les prescriptions particulières relatives au chargement et à la manutention, respecter les prescriptions relatives aux signalisations de danger. Je déclare m'être assuré que le conducteur est titulaire d'une attestation de formation en cours de validité adaptée au transport à entreprendre, le véhicule dispose des équipements divers prévus par l'ADR et des extincteurs, et qu'au départ de l'établissement l'unité de transport est correctement signalée et placardée.

Fos Tonkin, le 17 Janvier 2018	Nom :
	Signature et cachet

Déclaration du Transporteur :
Je déclare avoir vérifié l'autorisation au transport des marchandises chargées, la surcharge du véhicule, m'être assuré de la remise du document de transport et des consignes de sécurité, que le chargement ne représente par de défaut manifeste, fuite ou risque de perte imminente de matière, que les étiquettes de danger et les signalisations soient apposées.

Fos Tonkin, le 17 Janvier 2018	Nom :
	Signature et cachet :

Référence du chargement : CAM-TMF-2018-01-17-01-44263-V00

5.5 Safety Data Sheet Template

MATERIAL SAFETY DATA SHEET

SECTION 1: COMPANY

Adresse

N° 24h/24

SECTION 2: PRODUCT IDENTIFICATION

Trade Name: Liquefied Natural Gas (LNG)

Synonyms: Liquid Methane, Natural Gas, Methane

Chemical Family: Alkanes

Chemical Formula: CH₄ plus higher hydrocarbons – see Section 3

Identification Number : UN 1972

SECTION 3: PHYSICAL DATA AND COMPOSITION

General: Clear, Colourless Cryogenic Liquid, odourless

Molecular Weight: 16

Freezing Point: -183°C (- 297°F)

Boiling Point: -162 °C (- 259°F)

Liquid Density: 400 - 480 kg/m³

Gas Specific Gravity : 0.6

Vapour Neutral Buoyancy Temperature in Ambient Air: -110°C (-166°F)

Liquid-to-gas Expansion Ratio : 1:600

Typical chemical composition of LNG

Chemical	Chemical formula	Low	High
Methane	CH ₄	62%	99%
Ethane	C ₂ H ₆	2%	11%
Propane	C ₃ H ₈	>1%	5%
ISO Butane	C ₄ H ₁₀	0	<1%
Nitrogen	N ₂	0	4%
Other Hydrocarbons	Various	Trace	Trace

SECTION 4: HAZARDS

EMERGENCY OVERVIEW
Extremely cold, very volatile liquid
Vapour (natural gas) forms highly flammable mixtures with air which may cause flash fire
If mixed with air and ignited within confined spaces, vapour may explode
Liquid pools can burn with intense heat radiation
Liquid can cause frostbite
Liquid and vapour have no odour
Vapour can cause dizziness, drowsiness and suffocation
Protective clothing and self-contained breathing apparatus may be required by rescue workers
Water should not be sprayed directly on LNG

Potential Health Hazards of LNG and its Vapour

LNG vapour at ambient conditions and at low concentrations does not present an inhalation, ingestion or skin hazard. However contact with pressurised vapour, cryogenic liquid or exposure at high concentrations will result in health hazards. Should LNG or its vapour catch fire, intense heat radiation and combustion products can present a health hazard to any personnel nearby.

Momentary contact of liquefied or cold pressurised natural gas with the eyes may result in freezing of the tissue followed by swelling and eye damage. Longer exposure can cause frostbite, freeze burns and permanent eye damage.

Direct contact of liquefied or cold **pressurised** natural gas with skin or mucous membranes may cause freeze burns and /or frostbite. Signs of frostbite include a change in skin **colour** to grey or white followed by blistering. Any flesh that comes in contact with very cold material can stick to that material, even non-metallic materials.

LNG **vapour** is non-toxic and non-carcinogenic. The effects of inhalation in high concentrations are those of asphyxiation. The **vapour** (natural gas) reduces the available oxygen in the air resulting in symptoms of headache, nausea, dizziness, fatigue and possibly coma and/or death. Not all these symptoms will necessarily be present depending on the concentration of natural gas in the air and unconsciousness could occur without preceding signs of danger.

Any skin burns due to heat radiation or lung conditions due to inhalation of combustion products occurring before evacuation of personnel to a sufficient distance from the source of any fire would be dealt with by the normal medical procedures for such injuries.

SECTION 5: COMBUSTION AND FIRE DATA

LNG is not flammable in the absence of **oxidising agents such as air**

Vapour Flammable Range in Air: 5% to 15% by volume

Auto-ignition Temperature: 540°C (1,000°F)

Extinguishing Media: CO₂, Dry chemical powder

Fire Control Media: Shutdown systems, Spill impoundment, High-expansion foam, Water mist

Special Firefighting Procedures

Instigate pre-planned emergency response procedure. Fire crews should have available protective clothing and self-contained breathing apparatus. Shut off source of fuel if possible. If there is no special extinguishing or fire control system, allow fire to burn out. Cool adjacent structures with water spray BUT ENSURE THAT WATER IS NOT DIRECTLY SPRAYED ON A LNG FIRE AS IT INCREASES FIRE SEVERITY

SECTION 6: DOCUMENT STATUS

This document contains material from a number of Industry Sources and is believed to be accurate at the time of preparation but is not so warranted. Readers are advised to confirm ahead of time that the data are current, suitable for their needs and consistent with the site procedures.

5.6 Loading Authorisation Template

MODELE D'AUTORISATION DE CHARGEMENT EN GNL

[Papier à entête du VENDEUR DE GNL]

A l'attention de [Coordonnées ELENGY DSDC]

Object: Autorisation de Chargement en GNL pour [ACHETEUR DE GNL] dans le cadre du Contrat de Chargement de Citernes en GNL conclu entre Elengy et [le CLIENT] (ci-après le « Contrat »)

[Coordonnées de l'ACHETEUR DE GNL]

Nous confirmons par la présente lettre que

- (i) Nous [VENDEUR DE GNL], autorisons Elengy à charger en GNL les Citernes qui seront présentés par [CLIENT], au Terminal méthanier de [Montoir-de-Bretagne OU Fos sur Mer], entre le [DATE] et [DATE], et dans la limite de [QUANTITE] MWh (PCS volumique @ 0°C et 1,01325 bar).
- (ii) Nous autorisons Elengy à déduire les quantités de GNL réellement chargées ou prélevées pour les besoins de l'exécution du Contrat du stock de GNL [PRECISION SUR LE STOCK CONCERNE SI NECESSAIRE] que nous détenons au Terminal méthanier de [TERMINAL].

Fait à [à compléter],
le [à compléter],
En [à compléter] exemplaires

5.7 Notice of Force Majeure Template

Service : Terminal méthanier de XX
 Télécopie : XX
 Téléphone : XX
 Date : XX

À l'attention de :
 Fonction :
 Service :
 Société :
 Télécopie :
 Nombre de pages : 1

NOTIFICATION DE FORCE MAJEURE N° FM CC_01

Terminal: XX

En accord avec l'article 21 du contrat de chargement camions-citernes, nous vous informons par la présente un évènement de Force Majeure.

Evènement: XX	
Date de début de FM: XX/XX/XXXX – XX:XX	Date envisagée de fin de FM: XX/XX/XXXX – XX:XX
Conséquences : Service de déchargements de camions qui risque d'être impacté => Proposition de reprogrammation opérationnelle	