VESSEL PARTICULARS (FORM C)
LPG/C GAS LEGACY
(last updated 29/02/2012)

Specifications of the vessel and the gas installation which are representations by the Owners.

(A) VESSEL'S CHARACTERISTICS

PREAMBLE

Name	:	**GAS LEGACY**
Owner	:	**NORTHERN YIELD SHIPPING LIMITED**
Flag	:	**CYPRUS**
Build	:	**30/06/1998**
Date on Service	:	**21/12/1998**
Class	:	**LLOYD REGISTER**

GRT International	:	**3392**	Suez	:	**3720.01**
			Panama	:	**3392**
NRT International	:	**1018**	Suez	:	**2864.15**
			Panama	:	**2907**
Is vessel build according to			USCG regulations?	:	
			RINA regulations?	:	
			Japanese regulation?	:	
Has vessel received			USCG approval?	:	
			RINA approval?	:	

HULL

LOA	:	**95.95M**
LBP	:	**88.79M**
Breadth	:	**16M**
Depth	:	**7.1M**
Summer Draft	:	**5.11M corresponding to Summer DWT = 3318.81**
Multiple Draft		**M corresponding to Multiple DWT =**

Estimated draft with full cargo and full bunkers are as follows.

Product	Draft Fore' (m)	Draft Aft' (m)	Draft Mean (m)	Corresponding Deadweight (t)
Propane (98%)	4.26	5.28	4.77	2916
Butadiene (98%)	4.46	5.45	4.96	3146
VCM (98%)	4.04	6.17	5.11	3318

Propeller immersion :

At draft	**At 5,28 m correspond.**	**:**	**150.86 %**
At draft	**At 5.45 m correspond.**	**:**	**155.71 %**
At draft	**At 6.17 m correspond.**	**:**	**176.29 %**

COMMUNICATION EQUIPMENT

Call letter		:	C4EL2
Radio Station normally watched		:	GMDSS
Radio MF/HF NBDP		:	FITTED
Radio MF/HFTEL/DSC		:	FITTED
VHF		:	FITTED
Satellite Communication	**Inmarsat 'C'**	:	**FITTED – TELEX: 420908410**
	Inmarsat 'F'	:	**FITTED - TEL: 764893651-2**
		:	**FAX: 764893653**
		:	**EMAIL: gaslegacy@ship.rydex.com.sg**

MACHINERY

Main Engine x 1	.	Type and make	:	**5UEC 33LSII & AKASAKA MITSUBISHI**
	.	Service power	:	**3303 PS at 203 RPM**
		No of Cylinders		**5 CYLINDERS**
		Cyl Bore x Stroke		**330 mm x 1050 mm**
	.	Grade of fuel used	:	**HFO 380 CST**
Auxiliaries		Type and make (Electrical)		**TAIYO ELECT CO.,LTD** **3 PHASE / 500 KVA /450V** **1200 RPM / 60 Hz**
		(Mechanical)		**YANMAR DIESEL ENGINE CO.,LTD.** **S165 L – EN ; 400 KW – 1200 RPM**
		Grade of fuel used		**MGO**
		No off		**2**
Emergency Gen		Type		**YANMAR DIESEL CO.,LTD** **NF 19-HF , 13 BHP / 1800 RPM (AUTO)**
		No off		**1**
Bow Thruster		Type : Power:		**N/A**
Boiler		Type		**N/A**
		Evaporation		
		Max Design Pressure		
		Feed Water Temp		
		No off		
Exhaust Economiser		Type		**N/A**
		Evaporation		
		No off		
Air Compressors (Main)		Type / Capacity		**MATSUBARA IRON WORKS** **MH – 108 , 15 PS / 1150 RPM** **25 Kg/CM2 (AUTO)**
		No off		
Air Compressors (Emergency)		Type		**YANMAR COMPRESSOR** **NC 2 , 30 KGF/CM2 (MANUAL)**
		No off		
Fuel Oil Purifier		Type		**MITSUBISHI KAKOKI KAISHA LTD.** **SJ – 10F (MANUAL)**
		No off		

	Capacity	**1900 L/H – 5.5 KW 9000 RPM**
Lub Oil Purifier	Type	**MITSUBISHI KAKOKI KAISHA LTD.** **SJ -10F (MANUAL)**
	No off	
	Capacity	**1900 L/H – 5.5 KW 9000 RPM**
Evaporator	Type	**ALFA LAVAL** **JWP – 26 - C80**
	Capacity	**10 M3/24 HRS**
Fresh Water Sterilizer	Type	**NIPPON CONTROL CO.,LTD.** **L-N201 F , AC 100V / 60 Hz**
	Capacity	**FLOW RATE : 2000 L/H**
Fresh Water Mineraliser (FILTER)	Type / Capacity	**NIPPON CONTROL CO.,LTD.** **L-B-L** **3000 L**
Waste Oil Incinerator (IMO MEPC 76 (40))	Type	**SUNFLAME CO.,LTD.** **OSV – 10 SA**
	Capacity	**10 X 10 4 KCAL MJ/HR**
Oily Water Separator	Type	**TAIKO KIKAI / USC - 10**
	Capacity	**1.0 M3/HR**
Sewage Treatment plant	Type	**TAIKO SHIP SEWAGE TREATMENT** **SBT 2S**
	Capacity	
Hot Water Set (Calorifier unit)	No off	**HARISON CO.,LTD , CFT – 500 – E 0.04 M3/MIN.** **TK CAP:500L** **440V / 2S KW/60 Hz/3 PHASE (AUTO)**
Steering Gear	Type	**TOKIMEC INC. JAPAN**
	Duty Capacity	**14.0 MPA**
	Hydraulic pump unit	**2 UNITS**

Speed
UP TO BEAUFORT SCALE 4, DOUGLAS SEA 3
About: BALLAST : 13.0 KTS / LADEN : 13.0 KTS

CONSUMPTION/ DAY

		AT SEA	AT PORT
Main Engine	HFO	**ABOUT 9.0 MT/DAY BALLAST** **ABOUT 9.5 MT/D LADEN**	**NIL**
Auxiliary Engine	MGO	**ABOUT 0.9 MT/DAY** **PLUS ABT 1.0 MT/D WHEN INERTING**	**IDLE/LOADING ABT 0.9 MT/DAY** **DISCH: ABT 1.5 MT/DAY**

Permanent bunker capacity (100%)			Bunkering Filling Limits As Per GMS At 90%	
HFO	:	**416.81 M3**	HFO	**375.129 M3**
Diesel	:	**89.37 M3**	Diesel	**80.433 M3**
Fresh Water	:	**160.88 M3**		

(B) CARGO INSTALLATIONS

1. Transportable products and respective quantities, calculated in accordance with IMO – maximum filling formula. (Tonnes)

	100% (CBM)	98% (CBM)
NO.1 CARGO TANK	1756.75	1721.61
NO.2 CARGO TANK	1757.04	1721.9
T O T A L	3513.79	3443.51

	SPSV (bar g)	Ref. Temp. (deg. C.)	Density at (Ref. Temp.)	Corresponding Quantity (MT)
Propane	17.65	53.8	0.443	1525.47
Propylene	17.65	45.4	0.468	1611.56
B/P Mixture	17.65	64.0	0.451	1553.02
I-Butane	6.86	52.0	0.516	1776.85
N-Butane	6.86	64.0	0.524	1804.40
Butylenes	6.86	56.5	0.545	1876.71
Butadiene	6.86	59.0	0.568	1955.91
V.C.M.	6.86	46.0	0.870	2500
Isoprene	6.86	106.0	0.684	2011.10
Pentanes (ALL ISOMERS)	6.86	107.0	0.530	1825.06
Pentene (ALL ISOMERS)	6.86	98.0	0.552	1900.81

Note(1): In case of USCG, propylene, propane and B/P mixtures are not to be carried except the vapour pressure of B/P mixtures is not more than 12.75 bar g, 13.0 kg/cm^2 @ 45 °C
Note(2): On and after, the pressure value in parentheses is shown as a conversion value
Mixing ratio of above mentioned B/P mixtures is as follows:
Butane 35 wt% and propane 65 wt%

2. Other transportable products N/A

	SPSV	Ref. Temp. (°C.)	Density at Ref. Temp.	Corresponding Quantity (MT)
Raffinate 1				
Raffinate 2				
C4				

3. TANKS

3.1	Design pressure (Vapour) – BV-IGC	:	**17.65 bar g (1.765 MPag)**
	- USCG	:	**12.75 bar g (1.275 MPag)**
3.2	Valve setting	:	**17.65 bar g (1.765 MPag) / 12.75 bar g (1.275 MPag)**
3.3	Maximum vacuum obtainable	:	**Atmospheric**
3.5	Maximum temperature acceptable	:	**45 °C**
3.6	Minimum temperature acceptable	:	**0 °C**
3.7	Hydrostatic Test Pressure	:	**26.48 bar g (2.648 MPag)**

4. LOADING RATE (TONS/HOUR) – For Full Cargo Parcels

Ex-atmospheric storage with gas	:	1 tank	:	**360 t / HR**
Return		2 tanks	:	**360 t / HR**

Remarks:

***** Based on maximum velocity of 6.5 metres/sec except VCM, and 4.0 meters/sec for VCM in the liquid piping.

* If cargo temperature is less than 0 °C, shore heater to be used. If ship heater used, max rate is **250 m^3** per hour.

***** Loading by shore pump only, proper size gas return line to be connected

***** Subject to both ship and shore tanks being under favourable conditions

5. CARGO PUMPS

5.1	Type	:	**Deepwell / Centrifugal**
	Make	:	**Teikoku Machinery Works Ltd.**
	How many	:	**2 units**
	Maximum specific gravity	:	**0.948 (VCM) S.G. At 0 c**
5.2	Capacity (CMB/Hour)	:	**300 m3/Hr (LPG) / 250 m3/Hr (VCM)**
	Two speed or variable speed	:	**One Speed**
	Rated kW (each)		**120 Kw**
	Working pressure maximum	:	**20 Kg/CM2**
5.3	Location	:	**1 each cargo tank top**
	Removable	:	**no**
5.4	Booster pumps	:	**N/A**
	Type	:	
	Maker	:	
5.5	Capacity (CMB/Hour)	:	**N/A**
	Working pressure	:	
5.6	Location	:	**N/A**

5.7 Time to discharge a full liquid cargo using all pumps against back pressure at pump

1 bar	:	**about hours for LPG = 6 HRS**
5 bars	:	**about hours for LPG = 8 HRS**
10 bars	:	**------- = 12 HRS**

5.8	Nominal back pressure when working	:	**about 1 bar**
	In series corresponding head	:	**N/A**
	Maximum back pressure	:	**about 5 bar**
	Nominal pressure at rail (propane)	:	**about 13 bar at 20 degree C of cargo temperature**

5.9 What amount of cargo remains in tanks after completion pumping before stripping:

- liquid	:	**about per one tank = 0 Liquid**
- vapour	:	**about ton per one tank for LPG = 10 T**

6. STRIPPING

6.1	Stripping system, if any	:	**Nil**

6.2 Time required to remove all traces of liquid cargo as stated in 5.9 for:

- LPG	:	**After disch of cargo tank is liquid free**

7. CARGO COMPRESSORS

7.1	Type	:	**Vertical 1-stage water cooled double acting**
	Make	:	**Tanabe Pneumatic Machinery Co.,Ltd.**
	How many	:	**2 units**
	Piston displacement		**460 m3/H**
	Rated Kw		**75 Kw**
	Stroke		**177.8 mm**
	Max discharge pressure		**20 Kg/CM2**
	Pressure differential		**Normal 4.0 Kg/CM2**
	No of Revolutions		**540 RPM**
7.2	Are compressors oil free	:	**YES**
7.3	Can they reliquefy VCM without risk	:	**N/A**
7.4	State time to bring full cargo of butane to atmospheric pressure from 0.5 Bars	:	**Approx. 2 Hrs**

8. INERT GAS SYSTEM

8.1	Does the vessel use inert gas?	:	**Nitrogen Generator**
	If so, state utilization and quantities	:	**200 m3/H**
8.2	Can the vessel produce inert gas?	:	**YES**
	If so, state type and composition of gas produce: 99.90 N2		
	Discharge Capacity		**200 m3/H**
8.3	Maximum production obtainable		**200 M3/H**

NOTE:- Above quantities obtained at engine room temperature 45° C

8.4 State if there are storage facilities for inert gas onboard: **N/A**

- Size	:	**N/A**
- Pressure	:	**N/A**

8.5 State if any shore supply of nitrogen may be required: : **N/A**

- for what purpose	:	**N/A**
- what quantities	:	**N/A**

9. GAS FREEING

9.1	State method used giving all details	:	**Nitrogen Plant / Fans**
9.2	State time required including stripping	:	**TBA**

10. CHANGING GRADE

10.1 From completion discharge of cargo Propane, time required in hours and inert gas in CBM required to reach a tank and gas installation atmosphere of less than 100 ppm of Propane in Vapour phase.

Time required: TBA

10.2 Can this operation be carried out at sea? : **YES**

10.3 Can the ship measure the number of ppm in vapour phase? : **YES**

10.4 Has vessel deck tank for changing grade/cooling operations? : **N/A**

10.5 Deck tanks : **NIL**
Capacity :
Purpose :

11. COOLING BEFORE LOADING : **N/A**

12. CARGO HEATER **N/A**

12.1 Type :
12.2 Inside Diameter
12.3 Overall length
12.4 Cargo flow rate
12.5 Min Inlet Temp
12.6 Min Outlet Temp
12.7 Required Sea water Capacity
12.8 Design Pressure
12.9 Hydrostatic Test Pressure
12.10 Tightness Test Pressure

12.0 State discharging rate for propane to be brought from atmospheric pressure
Loading rate for Propane – ° C / 0° C: **about** 300 Mt/hr

13. CARGO VAPORIZER

In case vapour gas is needed to feed compressors, can vessel produce its own if no shore available:
No

14. REFRIGERATING APPARATUS **NA**

14.1 Is it independent of cargo? : **NA**
Is so, state cooling agents : **NA**

14.2 What minimum temperature can be maintained : **NA**

14.3 What time required at sea to lower by 1^{o}C the full cargo of : **NA**

15. MEASURING APPARATUS

What gauges on board?
Type : **Float type level gauge**
Location : **At each cargo tank dome**

16. SAMPLES

16.1 State how tank atmosphere samples can be taken and where from?

Slip-tubes
Standard of fitting? : **3/8 inch coupling**

16.2 Same question for cargo : **TBA**

16.3 Are sample bottles available on board? : **No**

17. CARGO LINES

17.1 Is ship fitted with a port and starboard cargo manifold? : **Yes**

17.2 Position of cargo manifold

- distance from stern (AP) (S / P)	:	**48.94**	**M**
- distance form stem (FP) (S / P)	:	**39.16**	**M**
- height above deck	:	**0.9**	**m for Liquid manifold**
- distance from ship's rail	:	**2.3**	**M**
- underside keel to manifold	:	**8**	**M**

17.3 Liquid line

- flange-size	:	**8 in.**
- type	:	**ANSI 300**

Gas line

- flange-size	:	**5 in.**
- type	:	**ANSI 300**

17.4 What reducers on board? :

For Liquid line (low temperature)
8X6 ; 8X5 ; 8X4 ; 8X3 inches
For Vapor line (normal temp.)
6X5 ; 4x5 ; 3x5 inches

17.5 Is ship fitted with stern discharge? **No**

- Liquid line - diameter	:	**N/A**
- flange – size	:	**N/A**
- type	:	**N/A**

18. HOSES

Are serviceable hoses available on board? : **None**

18.1 :

Length	:
Diameter	:
Flange-size	:
Type	:
Bending radius	:

18.2 Minimum temperature acceptable :
Maximum pressure acceptable :

18.3 For what products are hoses suitable? :

19. DERRICKS

- Hose cranes	:	**YES**
- Where situated	:	**P/S Manifold**
- Lifting capacity	:	**0.9 T**
- Working radius	:	**4.0 M**

20. SPECIAL FACILITIES

20.1 How many grades can be segregated? : **N/A**

20.2 How many cooled? : **N/A**

20.3 Can vessel sail with slack cargo tanks? : **Yes**