MANDATORY GUIDELINES FOR
TRAINING INSTITUTES
FOR OBTAINING APPROVAL FROM
DIRECTORATE GENERAL OF SHIPPING

TO CONDUCT

Specialized training program in LNG Tanker operations

To avoid unnecessary repetition, reference has been made herein to DGS Order no: 1 of 2003 (Guidelines for the conduct of Pre-Sea Training courses for Merchant Navy) wherever appropriate.

TABLE OF CONTENTS

Specialized Training Program in LNG Tanker Operations

1. BASIC DETAILS OF THE COURSE

1.1. Aims:

This course provides training for masters, chief engineers, officers and any person with immediate responsibility for the loading, discharging and care in transit or handling of cargo. It comprises a specialized training programme appropriate to their duties, including Liquified natural gas tanker safety, fire safety measures and systems, pollution prevention, operational practice and obligations under applicable laws and regulations. The course takes full account of Section A-V/1 of the STCW Code adopted by the International Convention on Standards of Training, Certification and Watch keeping for Seafarers 1978, as amended in 1995.

Any of this training may be given in a class room. It should be supplemented by practical instructions, where appropriate, in a simulator or a LNG ship-in campus.

1.2. Objective

Provided they hold an appropriate certificate and are otherwise qualified in accordance with regulation V/1-2.2 of the International Convention on Standards of Training, Certification and Watch-keeping for Seafarers 1978, as amended 1995, those successfully completing the course should be able to take immediate responsibility for loading, discharging and care in transit or handling of cargo on liquefied natural gas tankers.

These guidelines shall be applicable from. **01.1.2007.**

2. QUALIFICATION & ELIGIBILITY OF STUDENTS

2.1. Entry standards

This course is open to seafarers who have completed a shore-based advanced fire-fighting training course approved by the Administration, and who have relevant experience appropriate to their duties on liquefied natural gas tankers, as stipulated in STCW regulation V/1, para 2.1, (Annexure 1) and hold a certificate of competency issued under STCW A-II/2 or AIII/2 or higher.

2.2. Required attendance:

100% attendance is required for successful completion of the course. However, in exceptional circumstances, a student is allowed absence of up to one day subject to his attending the lectures missed out during the next course at the same institute. The institute shall keep proper records of such cases.

2.3. Course intake limitations

The number of trainees should not exceed 20, and practical training should be undertaken in small groups of not more than four.

3. INFRASTRUCTURE REQUIREMENT

3.1. Teaching facilities and equipment

Ordinary classroom facilities and an overhead projector are sufficient for most of the Course. However, dedicated CBT modules to be run on an ordinary PC as well as exercises on an operational, hands-on liquid cargo handling simulator, will greatly enhance the quality and result of the course. In such cases sufficient PCs for use by one or two trainees will be required. In addition, a video player will be required when using videos in the teaching program.

The following equipment should be available for use and demonstrations

1. Oxygen Resuscitator
2. Self Contained Breathing apparatus
3. Portable oxygen meter
4. Portable combustible-gas detector or Portable multi gas detector.
5. Portable toxic -gas detector
6. Chemical absorption tubes for toxic -gas detector (for methane)
7. Tank evacuation equipment (Harness, Pulleys, Tackles.)
8. Gas Suits.

3.2. Use of Simulators

The revised STCW Convention sets standards regarding the performance and use of simulators for mandatory training, assessment or demonstration of competence. The general performance standards for simulators used in training and for simulators used in assessment of competence are given in Section A-l/12. Section B-1/12 provides guidance on the use of simulators in these activities. Simulator -based training and assessment is not a mandatory requirement for this liquefied natural gas tanker training program. However, it is widely recognized that well-designed lessons and exercises can improve' the effectiveness of training and shorten training times compared to traditional methods.

If using simulator-based training, instructors should ensure that the aims and objective of these sessions are defined within the overall training program and that tasks are selected so as to relate as closely as possible to shipboard tasks and practices. Instructors should refer to STCW, Section A-I/12, Part 2.

4. COURSE DETAILS

4.1. Course duration: 10 days (63 hours.)

4.2. Course outline: As per Annexure 2

5. HOLIDAYS

5.1. Sundays shall be holidays.

5.2. Independence Day (15th August) and Republic Day (26th January) shall be compulsory holidays.

5.3. Students shall normally enjoy the holidays observed by the Govt of the state in which the institute is located.

6. FACULTY REQUIREMENT

6.1. Qualifications and experience of Training Staff

The Course in charge shall hold a Certificate of competency as Master (FG) OR MEO Class I, issued or recognised by the Government of India. and at least 5 years service on Merchant ships of which at least one year should have been in the rank of Master or Chief Engineer and shall have at lease three months sea experience on LNG Ships in a managerial rank.

Or

shall have served on board a gas tanker for atleast 3 months as a certified officer and have a minimum teaching experience of conducting atleast 6 full courses as a faculty for this course.

6.2. Additional faculty shall hold a Certificate of competency as Master (FG) OR MEO Class I, issued or recognised by the Government of India, and at least 3 years service on merchant ships of which at least one year should be in the rank of a Chief Officer or Second Engineer and shall have had sea-experience of at least 3 months on a gas tanker in a certified rank.

6.3. The Course-in-charge and the faculty shall have undergone an approved Specialized Training Program in LNG Tanker Operation.

6.4. Training of Trainers & Assessors Course:
As per **DGS Order no: 1 of 2003.**

6.5. Visiting faculty members:
Qualifications and experience of visiting faculty members should be the same as that of regular faculty as specified above.

6.6. Age limit for regular faculty members:
As per **DGS Order no: 1 of 2003.**

7. FACULTY STRENGTH

7.1. Not less than two faculty (inclusive of the course-in-charge) .

7.2. A minimum of 50% of the entire portion must be covered by permanent faculty.

8. COURSE DURATION
A total of 63 hours of lectures, including practical training and assessment.

9. ASSESSMENT
Assessment shall be carried out at the end of each course. A minimum of 50% must be obtained to declare the trainee to be successful.

10. QUALITY STANDARDS
As per **DGS Order no: 1 of 2003.**

11. INSPECTIONS
As per **DGS Order no: 1 of 2003.**

12. COST OF INSPECTIONS
As per **DGS Order no: 1 of 2003.**

13. FEES TO GOVT.
As per **DGS Order no: 1 of 2003.**

14. TEACHING AIDS

Teaching Aids (A)

A 1 Instructor Manual (Guidance notes for the Instructor and overhead presentation material)

A2 Overhead/ Multimedia projector .

A3 Recommended Videos

- An Introduction to Liquefied Gas Carriers (Catalogue Code No.103)
- Cargo Fire fighting on Liquefied Gas Carriers (Catalogue Code No.254)
- Permit to Work (Catalogue Code No. 621)-
- Who Needs It? Personal Protective Equipment (Catalogue Code No.597)

- The Chemistry of Liquefied Gas (Catalogue Code No.641)
- The Physics of Liquefied Gas (Catalogue Code No.642)/
- Portable Gas Detectors -A Breath of Fresh Air (Catalogue Code No.650)

Available from: Videotel Marine International Ltd.
84 Newman Street
London W1P 3LD, UK
Tel: +44 171 299 1800 Fax: +44 171 299 1818
e-mail: mail@videotelmail.com
URL: www.videotel.co.uk

A4 Recommended CBTs.

- Inert Gas Generator
- Low Temperature Insulation on Gas Carriers
- Gas Measurements
- Gas Tanker Training System

Available from: Seagull A.S.
Gamleveien 36, PO Box 1062
N-3194 Horten, Norway
Tel: +4733047930 Fax:+47 33046279
e-mail: seagull@sgull.com
URL: www.sgull.com

A5 Simulators (If used in the course.)

A6 Recommended Textbooks

Textbooks (T)

T1 Liquid SIGTTO, Liquefied Gas Handling Principles on Ships and in Terminals, Maguire and White, SIGTTO 2nd ed. (London, Witherby Marine Publishing, 1996) (ISBN 1 85609-0876).

T2 T.W.V. Woolcott, Liquefied Petroleum Gas Tanker Practice. 2nd ed. (Glasgow, Brown, Son & Ferguson Ltd., 1987) (ISBN 0-85174-510-5).

T3 International Chamber of Shipping, Tanker Safety Guide (Liquefied Gas). 2nd ed.(London, Witherby Marine Publishing, 1996) (ISBN 0-906270-03-0)

T4 Liquefied Gases Marine Transportation and Storage by Alain Vaudolon

T5 Safe Gas Tanker Operations, Capt. KSD Mistree and Mr. BK Sharma.

T6 LNG Operational Practice by Peter Hyde – Witherby Seamanship Publication

The following BIBLIOGRAPHY (B) is considered as optional reading

B1 R. F Fooks, Gas Carriers. 1st ed. (London, Fairplay Publications Ltd., 1984) (ISBN 0-805045-52-1) [Out of Print 1999]

B2 R.G. Wooler, Marine Transportation of LNG and Related Products. (Cambridge, MD, Cornell Maritime Press Inc., 1975) (ISBN 0-87033-193-0).

B3 Drager- Tube Handbook. 11 th ed. (Drager Sicherheitstechnik GmbH, Revalstrasse 1, D-23560 Lubeck, Germany 1998) (ISBN 3-926762-06-3).

B4 ICS/OCIMF SIGTTO, Ship to Ship Transfer Guide (Liquefied Gases). 2nd. ed. (London, Witherby & Co. Ltd., 1995) (ISBN 1-856090825).

B5 ICS, Guide to Helicopter/Ship Operations. 3rd ed. (London, Witherby & Co. Ltd., 1989) (ISBN 0-949691-44-1)

B6 SIGTTO/Guidelines on the Maintenance of Pressure Relief Valves on board Gas Carriers. (London, Witherby & Co. Ltd., 1994) (ISBN 1-85609-099 X)

B7 Bureau Veritas Gas Carrier Safety Handbook. (London, LLP Limited, 1997) (ISBN 1-85978-109-8)

B8 SIGTTO/IACS Applications of Amendments to Gas Carrier Codes Concerning Type "C" Cargo Tank Loading Limits. (London, Witherby & Co Ltd., 1997) (ISBN 1-85609-125-2).

B9 Recommendations and Guidelines for Linked Ship/Shore Emergency Shut-Down of Liquefied Gas Cargo Transfer, 1987, SIGTTO.

B10 Site Selection and Design for LNG Ports and Jetties (Information Paper No.14), 1997, SIGTTO.

B11 Liquefied Gas Carriers: Your Personal Guide to Safety, 2002, SIGTTO, (Witherby Publication Code: 4582).

B12 Crew Safety Standards and Training for Large LNG Carriers, 2003, SIGTTO, (Witherby Publication Code: 5827).

B13 LNG Operations in Port Areas, 2003, SIGTTO.

B14 Ship Vetting and its Application to LNG, 2004, SIGTTO.

B15 Guidelines for Automatic Cargo Tank Overfill Protection Aboard Gas Carriers, 1993, SIGTTO.

B16 Recommendations for the Installation of Cargo Strainers on LNG Carriers (2nd Edition), 1992, SIGTTO

B17 Recommendations for Manifolds for Refrigerated Natural Gas Carriers (LNG) (2nd Edition), 1994, SIGTTO & OCIMF

B18 Safety in Liquefied Gas Tankers, 1980, ICS (Witherby Publication Code: 634)

B19 LNG Custody Transfer Handbook, 2001, GIINGL.

B20 Code of Safe Working Practices for Merchant Seamen, 2004, MCA, UK.

B21 LNG Terminal Information Web Portal SIGTTO / GIINGL (www.lngterminalinfo.org).

B22 Contingency Planning and Crew Response Guide for Gas Carrier Damage at Sea and in Port Approaches (1999), ICS & OCIMF (Witherby Publication Code: 3455).

IMO references (R)

R1 International Convention for the Safety of Life at Sea, 1974 (SOLAS Consolidated Edition 1997 (IMO-110)

R2 International Convention on Standards of Training, Certification and Watch keeping for Seafarers, 1978/1995 (IMO-938)

R3 Code for Existing Ships Carrying Liquefied Gases in Bulk, as amended (IMO-788) its Supplement 1980 (IMO-791)

R4 Code for the construction and Equipment of Ships Carrying Liquefied Gases in bulk as amended (IMO-782)

R5 International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code), as amended (IMO-104)

R6 Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (MFAG) as amended (IMO-251)

R7 MARPOL 73/78 Consolidated Edition (IMO-520)

R8 IMO Model Course X.XX - Specialised Training Program for LNG Tanker Operations.

R9 International Safety Management Code (ISM Code) (IMO-186)

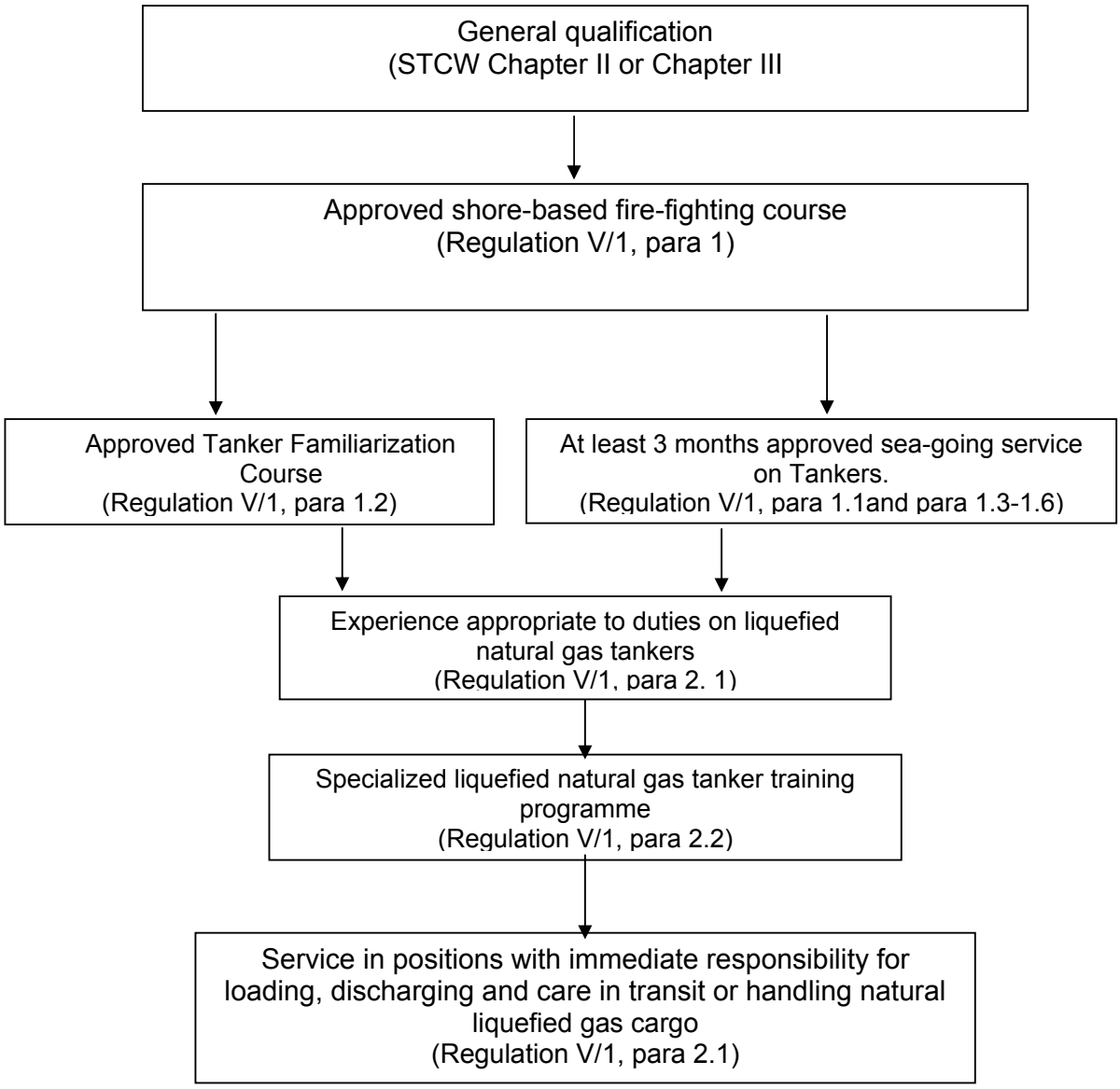
Details of distributors of IMO publications that maintain a permanent stock of all IMO Publications may be found on the IMO web site at http://www.imo.org

15. TIME-TABLE

See **Annex 3**

Annexure 1

STCW 95 scheme for personnel on liquefied natural gas tankers



Annexure 2

COURSE OUTLINE

Subject Area		Approximate Time (Hours)	
		Lecture/ Discussion	**Practical**
1.	**Introduction**	**3.0**	
1.1	Introduction – The Course	0.5	
1.2	Development of Liquefied Natural Gas Transportation	0.5	
1.3	Production of Liquefied Natural Gas	1.0	
1.4	Sea transport of Liquefied Natural Gas	0.5	
1.5	Terminology	0.5	
2.	**Chemistry and Physics (STCW Code, Section A-V/1 para 26)**	**5.0**	
2.1	Properties and characteristics of liquefied gases and their vapours	1.0	
2.2	Basic Thermodynamic theory	1.0	
2.3	Properties of single liquid	1.0	
2.4	Nature and Properties of solution	1.0	
2.5	Control of boil off	1.0	
3.	**Hazards (STCW Code, Section A-V/1 para 27,32)**	**3.0**	
3.1	Health Hazards	1.0	
3.2	First Aid treatment	0.5	0.5
3.3	Reactivity , Flammability and Explosion	0.5	
3.4	Hazards	0.5	
3.5	Repairs and hot work		
4.	**Rules and Regulations (STCW Code, Section A-V/1 para 23)**	**1.5**	
4.1	International and national Codes and	0.5	
4.2	Regulations	0.5	
4.3	Gas Carrier Codes Certification and Surveys	0.5	
5.	**Ship Design and Cargo Contamination (STCW Code, Section A-V/1 para 24,28)**	**5.0**	
5.1	Construction and equipment requirements	0.5	
5.2	Ship Arrangements and Principal of Design *	1.5	
5.3	Cargo containment *	1.5	
5.4	Ship types and survival capability	1.5	
6.	**Equipments and Support systems**	**9.0**	
6.1	Water Curtain and Deck Spray	1.0	
6.2	Low Duty and High duty compressors	1.0	
6.3	Low Duty and High duty Gas Heaters	1.0	
6.4	Integrated Automation System (IAS)	1.0	

6.5	High Voltage System	1.0	
6.6	Cargo Pumps and Spray Pump	1.0	
6.7	Compressor lubricating oil system	1.0	
6.8	Fixed and Portable Gas Detection Equipment	0.5	0.5
6.9	Emergency Shut Down System (ESDS)	0.5	
6.10	Level Gauging system	0.5	
7.	**Cargo Handling Systems (STCW Code, Section A-V/1 para 30)**	**12.0**	
7.1	Tanks, piping and valves *	1.0	
7.2	Cargo ventilation system *	1.0	
7.3	Cargo Pumps and the unloading system, Spray pumps *	2.0	
7.4	Low duty and high duty compressors, Low duty and high duty Heaters *	2.0	
7.5	Reliquefaction plants, Re-gasification plants	2.0	
7.6	LNG vaporisers and Forcing vaporisers *	1.0	
7.7	Inert Gas Generator and Nitrogen Generator, Nitrogen pressurisation and purge *	1.0	
7.8	Instrumentation and auxiliary systems *	1.0	
7.9	Custody transfer system (CTS),Cofferdam Heating System	1.0	
8.	**Safety (STCW Code, Section A-V/1 para 25,29,32)**	**4.0**	
8.1	Tank atmosphere evaluation *	1.0	
8.2	Fire prevention and equipment	1.0	
8.3	Pollution	1.0	
8.4	Protective and safety equipment	0.5	0.5
9.	**Cargo Handling Operations (STCW Code, Section A-V/1 para 30,34)**	**10.0**	
9.1	General Cargo Handling, Ship/Shore * preparation and Manifold Connection	1.0	
9.2	Procedures for preparation for loading and loading	2.0	
9.3	Cargo measurement and calculation *	1.0	
9.4	Loaded and ballast passage	1.0	
9.5	Procedures for preparation for unloading and * unloading, emergency discharge	2.0	
9.6	Hold Space and Cargo Tank Drying, Nitrogen * Purging ,Inerting of Cargo System	2.0	
9.7	Inerting, Cool down of cargo systems, * Warming up cargo tanks, Procedures for dry-docking	1.0	
10.	**Ship/Shore Interface (STCW Code,Section A-V/1 para 30,33,34)**	**1.0**	**0.5**
11.	**Emergency Operation (STCW Code,Section A-V/1 para 31)**	**5.0**	
11.1	Organisational structure	0.5	

11.2	Alarms	0.5	
11.3	Emergency procedures (Cargo Pump Failure, * Leak from Cargo Tank, Loss of primary Barrier, Ballast Tank Leakage into Containment Space, Nitrogen Supply Failure, Jettison of Cargo, Overfilling of a Cargo Tank, Loss of Cargo Pipeline Containment, Failure of Integrated Automation System, Uncontrolled Release of Cargo.	4.0	
12.	**Discussions on National / Flag state Natural Gas Carriers and films**	**2.0**	
13.	**Assessment/Discussion**	**2.0**	**2.0**
	Total	**63.0**	

Note: It is suggested that an LNG – Liquid Cargo Handling Simulator can serve as an efficient **teaching** tool. Should such a system be available, then the class / lecture hours should be adapted to incorporate such without raising the overall duration of the course. Areas that may be suitable for such training are indicated with an asterisk (*).

Annexure 3

Course Timetable

PERIOD / DAY	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
1st Period (1.5 hours)	**1. Introduction** 1.1. The Course 1.2. Development of Liquefied Natural Gas Transportation 1.3. Production and use of Liquefied Natural Gas	2.3 Properties of single liquid	**4. Rules and Regulations** 4.1 International and National codes and regulations 4.2 Gas Carrier Codes 4.3 Certification & Surveys	**6. Equipment & Support System** 6.1Water Curtain & Deck Spray 6.2 Low duty and high duty compressor, Low duty and high duty Heaters	**7 Cargo Handling Systems** 7.1 Tanks, piping and valves 7.3 Cargo pump & unloading system ,Spray Pump 7.4 Low duty & high duty compressor
BREAK					
2nd Period (1.5 hours)	1.4. Sea transport of liquefied Natural gas 1.5. Terminology	2.4 Nature and properties of solution 2.5 control of boil	**5. Ship Design and Cargo Containment** 5.1 Construction and equipment requirements 5.2 Ship arrangements	6.3 Gas Heaters 6.4 Integrated Automation System 6.5 High Voltage System	7.2 Cargo Ventilation System 7.5 Reliquefaction plants and Regasification plants)
LUNCH BREAK					
3rd Period (1.5 hours)	**2. Chemistry and Physics** 2.1 Properties & Characteristics of Liquefied Gases & their vapours	**3. Hazards** 3.1 Health hazards 3.2 First Aid treatment	5.3 Cargo Containment	6.6 Cargo pump and spray Pump 6.7Compressor lubricating oil system	7.6 LNG vaporisers and Forcing vaporisers
BREAK					

4th Period (1.5 hours)	2.2 Basic Thermodynamic Theory	3.3 Reactivity hazards 3.4 Flammability and explosion hazards 3.5 Repairs & Hot work	5.4 Ship types and survival capability	6.8 Fixed and portable gas detection equipment 6.9 Emergency shut down system (ESDS) 6.10 Level gauging system	7.7 Inert gas generator and nitrogen generator pressurisation and purge 7.8 Instrumentation and auxiliary systems 7.9 Custody transfer system (CTS), Cofferdam Heating System
PERIOD / DAY	**DAY 6**	**DAY 7**	**DAY 8**	**DAY 9**	**DAY 10**
1st Period (1.5 hours)	**8. Safety** 8.1 Tank atmosphere evaluation	**9. Cargo handling and ballast operations** 9.1 General cargo handling and ballast operations	9.5 Procedure for preparations for unloading and ballast	9.7 Inerting, Cool down of cargoes system, warming up cargo tank ,procedure for dry-docking and tank cleaning	12.0 Discussions on Indian Gas carriers and case studies and Films
B R E A K					
2nd Period (1.5 hours)	8.2 Fire prevention equipment	9.2 Procedure for loading and preparations for loading and Ballast	9.5 Procedure for preparations for unloading and ballast	**10.0 Ship/Shore Interface**	12.0 Discussions on National / Flag Gas carriers and case studies and Films-contd-
L U N C H B R E A K					

3rd Period (1.5 hours)	8.3. Pollution Prevention	9.3 Cargo Measurement & Calculation	9.6 Hold space Cargo tank Drying, Nitrogen purging, inerting of cargo System	**11. Emergency Operation** 11.1 Organizational Structure 11.2 Alarms 11.3 Emergency procedures	13. Assessment/ Feed back
B R E A K					
4th Period (1.5 hours)	8.4 Protection and safety equipment	9.4 Loaded and ballast passage	9.6 Hold space Cargo tank Drying, Nitorgen purging, inerting of cargo System	11.3 Leak from cargo 11.3 loss of primary barrier	12. Assessment/ Feed back

Annexure 4 - Course Certificate

LOGO

Name and Address of the Institute

Certificate No. : ____

THIS IS TO CERTIFY THAT _____

Date of Birth _____

Holder of C.D.C. No. _____ and Passport No. _____

Certificate of Competency, Grade. _____ No. _____

Indian National Data base (INDos No.) _____

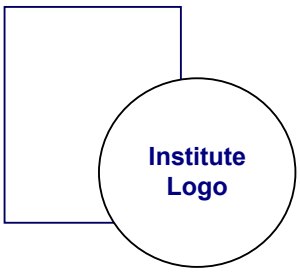
has successfully completed a five days training course on

SPECIALIZED TRAINING PROGRAMME IN LNG TANKER OPERATIONS

held **from** _____ **to** _____

at ----------***Maritime Training Centre.***

The course is approved by the Directorate General of Shipping and meets the requirements laid down in STCW 95 Regulation I/12, Section A-I / 12 , Table A-II / 2 and Section A- V/1..



_____ _____ _____

Signature of Candidate ***Course In-charge*** ***Principal***