

LNG CARGO & BALLAST HANDLING (LICOS) SIMULATOR TRAINING

(Based on the IMO Model Course 1.36)

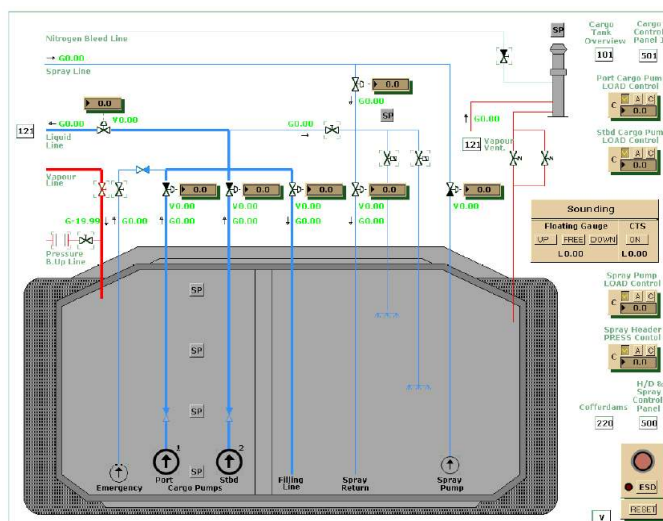
TRAINING COURSE

A. OVERALL AIM

To assist the Trainees Officers improve their practical skills and competence in the planning, conduct and monitoring of cargo and ballast operations in an LNG Carrier.

On completing the Training Course, the Officers are expected to:

- Be familiar with the equipment, instrumentation and controls used for cargo handling on an LNG Carrier.
- Acquire a greater awareness of the need for proper pre-planning, use of check lists and the time scales involved in the various LNG cargo and ballast handling operations, ranging from the post dry dock operations, the initial loading, the loaded voyage, the discharging operations and the emergency procedures.
- Improve their ability to prepare the cargo system for loading/discharging including lining-up and operation of the equipment.



DAY 1

1.A LNG CHS Simulator Familiarization

1.B Simulation Exercise No. 1: Inerting of Insulation Spaces

1.A LNG CHS Simulator Familiarization

The LNG Cargo Handling Simulator (K-Sim Neptune CHS) simulates a Steam Turbine LNGC of 145.000 m³, with a GTT NO 96.2 Evolution Cargo Containment System, 8 main vertical cargo pumps (1650 m³/h x 150 mlc), an IGG 14.500 m³/h X 25 kpa, a Nitrogen Separator low pressure membrane type, etc. It consists of a Full Mission and (6) Desk Work Stations with an on-line loading, stress and stability instrument.

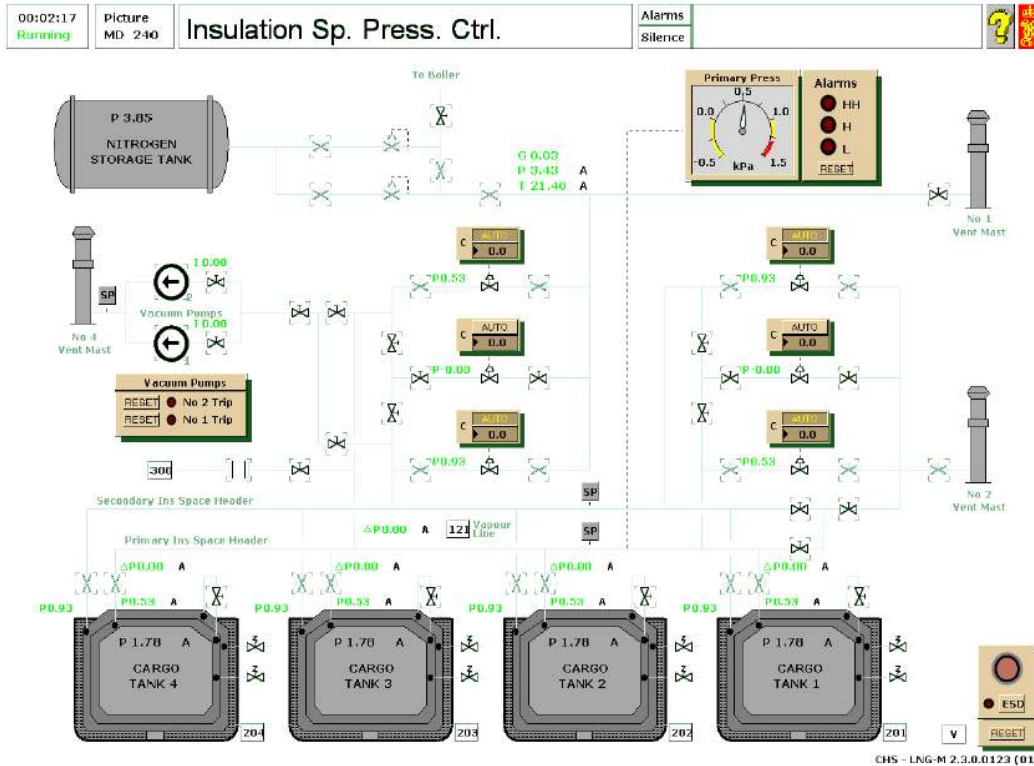


1.B Simulation Exercise No.1: Inerting of Insulation Spaces

The Instructor will present first the difference of pressures in the insulation spaces of the NO 96 GW and Mark III system. Using the Mark III Modelled LNGC in the CHS Simulator, the IBS (Interbarrier Space and Insulation Space) will be inerted with nitrogen produced by the nitrogen generator of the vessel and maintained under a positive pressure.

In a Mark III system, there are (2) different spaces located between the primary barrier and the inner hull.

- The Inter Barrier Space (IBS) between the primary and the secondary barrier. The pressure is maintained between 0.5 kPa and 1.0 kPa above the atmospheric pressure.
- The Insulation Space (IS) between the secondary barrier and the inner hull. The pressure is maintained 0.5 kPa and 1 kPa above the IBS space.



DAY 2

2.A Simulation Exercise No.2: Loading Operation

Discussion on the development of a Loading Plan based on a hypothetical scenario. The Instructor will present the assumptions around the intended operation (i.e. COTs are maintained at -130°C during the ballast voyage by drawing vapor LNG to the dual-fuel propulsion and auxiliary engines, cargo data sheet information, a maximum allowed shore discharge rate, a maximum pressure at shore manifolds and cargo tanks vapor pressure at arrival at the terminal, etc.).

- The Instructor explains in brief the intended operation presenting the arrival status of the vessel (tanks and cargo lines in cold condition), the anticipated filling level, the use of VR compressors, possible use of GCU, de-ballasting via the BWTS of the vessel, cold/warm ESD, draining of liquid header/liquid lines to a specific tank.
- The Instructor will explain the pre-arrival tests of high level and overfill alarms, VR compressors, ESD system (valves' closing time), the required checks to various cargo equipment, vapor domes valves' condition, etc.

- The Instructor will explain the details of cooling down of liquid header prior to the arrival at the terminal using a spray pump, how main line remains full until all fast at berth or before CTMS is opened and how draining to a COT is to be done).



- Line up for cargo lines cooling down/terminal pumping.
- Line of valves on the spray line and the liquid isolation valves in the appropriate Mimics Diagram.
- Vapor dome line up for supplying LNG to spray rings. Vapor manifold valve.
- Manifold valve on liquid manifold 3P and manifold cool down valve to allow the liquid into the stripping/spray main via crossover valve, for additional cargo tanks cool down, if necessary.
- Opening of certain tanks liquid filling valves.
- Terminal will start pumping at a slow rate to gradually cool down the terminal piping and ship's headers.
- Opening of liquid double shut valves in one COT. Slowly the rate is increased until the main and spray headers cool down.
- VR compressor starts and flow is adjusted to maintain the required vapor pressure.

DAY 3

3. Simulation Exercise No.3: Discharging Operation

Discussion on the development of a Discharging Plan based on the required arrival LNG cargo temperature/pressure and the maximum allowable discharging rates by the terminal. Ballasting by using a BWTS is included to provide a further overview of the combined operations against the trim/stability/stress requirements.

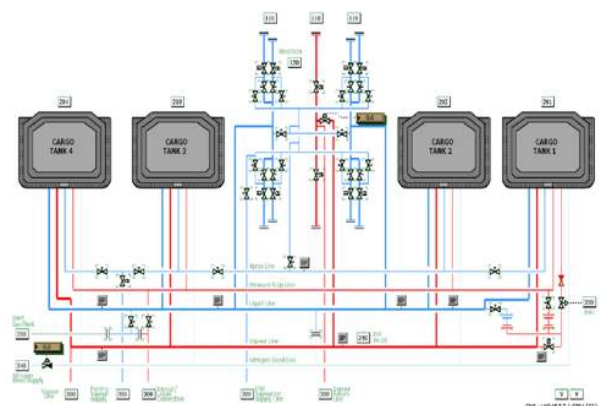
- Preparations and Line up for cooling down of liquid header. Use of a specific spray pump to be started in the re-circulation mode. Ensure that all cooling down valves at the manifolds and all Master spray valves except one will be shut off. At the liquid line, all main cargo pumps discharge valves, filling valves and double shut valves to be verified as closed. The Instructor will explain when the operation will be considered as completed (specifying a certain temperature and maintaining the main liquid line full before opening the CTMS).
- Discussion on Warm ESD. Shore arms cooling down. Discussion on when the ESD valves will be opened, when one of the spray pumps will be started, valves to be opened to fill up the ships' liquid header, pressure and flow at manifolds to be adjusted as per Terminal's requirements.
- Discussion on Cold ESD. Line up for discharging. Ramp up procedure. Sequence of cargo pumps. IAS verification settings. Full discharging rate.
- Vapor pressure control. Ramp down. Stripping/Completion of ballasting.

DAY 4

4. BOG Management in Sea Passage – Emergency Procedures



DAY 1	
Time	Topics
09.15 – 09.30	Introduction – Learning Objectives
09.30 – 11.15	Familiarization with the LNG CHS Simulator <ul style="list-style-type: none"> · Modelled LNGC · Cargo Containment System · Cargo Machinery and Equipment · Mimic Diagrams · Piping and Instrumentation · Workstation Operation
11.15 – 11.30	Coffee Break
11.30 – 12:30	An overview of the LNG Operation Sequence (Yard – Service – Yard)
12.30 – 13.30	Simulation Exercise No.1 (Inerting of Insulation Spaces)
13.30 – 14.00	Lunch Break
14.00 – 16.00	Simulation Exercise No.1 (continued)
16.00 – 16.15	Coffee Break
16.15 – 17.00	De-briefing



DAY 2	
Time	Topics
09.15 – 10.15	Preparation of a Loading Plan
10.15 – 11.15	Using the SSSCL Loading and De-ballasting
11.15 – 11.30	Coffee Break
11.30 – 13:30	Simulation Exercise No.2 – Loading Operation
13.30 – 14.00	Lunch Break
14.00 – 16.00	Simulation Exercise No.2 (continued) Monitoring of Operation and Relevant Parameters
16.00 – 16.15	Coffee Break
16.15 – 17.00	De-briefing

DAY 3	
Time	Topics
09.15 – 11.15	Preparation of a Discharging/Ballasting Plan Preparation for Cooling Down of Liquid Line, Manifolds and Cargo Arms
11.15 – 11.30	Coffee Break
11.30 – 13:30	Simulation Exercise No.3 – Discharging Operation with Vapor Return from Shore
13.30 – 14.00	Lunch Break
14.00 – 16.00	Simulation Exercise No.3 – Discharging Operation with Vapor Return from Shore (continued)
16.00 – 16.15	Coffee Break
16.15 – 17.00	De-briefing – Assessment

DAY 4	
Time	Topics
09.15 – 11.15	Loaded / Ballast Passage Pressure Maintenance – BOG Management Requirements, methods and principles for BOG Management
11.15 – 11.30	Coffee Break
11.30 – 13:30	Emergency Procedures ESD Requirements – Causes and Parameters that Initiate the ESD
13.30 – 14.00	Lunch Break
14.00 – 16.00	Emergency Procedures Vapour Leakage into the Primary Insulation Space – Simulation Exercise No.4
16.00 – 16.15	Coffee Break
16.15 – 17.00	De-briefing – Assessment