INTERTANKO

Tanker Officer Training Standards (TOTS)

4C Product Tanker Simulator Training Course

Poseidon Challenge

WARSASH MARITIME ACADEMY

INTERTANKO

Tanker Officer Training Standards (TOTS)

4C Product Tanker Simulator Training Course

CONTENTS

Simulator Exercises

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Tanker Officer Training Standards (TOTS)

4C Product Tanker Simulator Training Course

Prerequisites

It is intended that by the time candidates are given this tanker simulator training, they will have experienced sea time on similar tankers and have taken part in the similar exercises to those simulated here. This encounter with simulated exercises should not be their first experience of such operations.

It is intended that the simulator used for this training will enable demonstration of the following competencies:

TOTS Reference	Competence
TOTS 4C	Training in product tanker operations

STCW 95 Reference	Competence
Table A-II/1.9	Monitor the loading, stowage, securing, care during the voyage and unloading of cargoes
Table A-II/3.6 Table A-II/3.8 Table A-III/1.11	Maintain seaworthiness of the ship
Table A-II/2.11	Plan and ensure safe loading, stowage, securing, care during voyage and unloading of cargoes
Table A-II/12.2	Carriage of dangerous cargoes
Table A-II/2.13 Table A-III/12.12	Control trim, stability and stress
Table A-II/2.14 Table A-III/2.13	Monitor and control compliance with legislative requirements and measures to ensure safety of life at sea and protection of the marine environment
Section A-V/1.19	Ship operations (product tanker)
Section A-V/1.21	Emergency operations (product tanker)

For instructor, supervisor and assessor qualifications see STCW 95 Regulation I/6, Section A-I/6 paragraph 3 and A-I/12 paragraphs 6 to 9.

Exercise Descriptions

What follows by way of exercise descriptions has been written in the form of students' objectives. In order to prevent multiple duplications, the notes may also form guidance for instructors.

Physical Realism

IMO Model Course 1.04 Part D Appendix 9

The simulator used should fulfil the following minimum requirements:

- It will simulate a typical cargo handling system found on a chemical tanker based on real operational vessels.
- The equipment is arranged in a ship like manner.

The simulator includes the following components and subsystems:

- Cargo control system
- Ballast control system
- Tank cleaning system
- Overboard discharge and monitoring systems
- Tank content monitoring systems
- Inert / venting control system including sparging, gas freeing, purging and aerating.
- Tank atmosphere control system
- Alarm system
- Communication system
- Cargo pumping system
- A system for communicating with 'the outside world'
- A stability and stress calculator.

Additional resources: Ship/shore check list
Tank washing checklist
NLS Cargo record book extracts
Log sheets
Oil Cargo Record Book Extracts
Entry Permit

Behavioural Realism

IMO Model Course 1.04 Part D Appendix 9

The simulator model replicates the dynamic behaviour of the cargo handling system and its parameters. Furthermore, the simulator model simulates the components, their processes and control systems. It will be possible to introduce failures, breakdowns and wear to all equipment simulated.

Operating Environment

IMO Model Course 1.04 Part D Appendix 9

The simulator will simulate restrictions and failures in the cargo transfer, for instance, introduced by the simulated shore terminal. Alarms will be announced by flashing alarm lamps and sound in the 'cargo control room'.

Simulator Facility

These exercises have been written taking into account the variety of simulators which may be used to facilitate them. As few specific features as possible have been featured, so as to increase the adaptability of the exercises to the various simulators available.

The tanker in this package is double hulled, has 6 pairs of wing tanks and a pair of slop tanks. There are 3 manifolds, 4 cargo pumps and 2 ballast pumps. The ballast tank arrangement has not been specified and neither has the venting system. It is assumed the tanker has a cargo pump room and associated network of pipelines.

It is suggested that the individual training facilities select three grades of cargo to illustrate how specific physical or chemical properties may influence the handling and carriage of petroleum products.

However, the simulator should have its own Cargo Operations Manual which will be used during the training.

Simulator Exercises

Exercise 1. Simulator and ship familiarisation

Exercise 2. Start Inert Gas Plant and Commence Primary Inerting

Exercise 3a. Completion of Primary Inerting by Dilution

Exercise 3b. Completion of Primary Inerting by Displacement

Exercise 4. Cargo Planning Prior to Loading

Exercise 5. Commence Loading

Exercise 6. Complete Loading

Exercise 7. Loaded Passage

Exercise 8. Plan Discharge

Exercise 9. Commence Discharge of One Parcel

Exercise 10. Complete Discharge and Ballasting Operations

Exercise 11. Water Wash Cargo Tanks

Exercise 12. Start Taking Heavy Weather Ballast in Cargo Tanks

Exercise 13. Emergency Water Wash of Both Slop Tanks without IG

Exercise 14. Decanting Slops after Washing and Ballasting

Exercise 15. Gas free Cargo Tank Prior to Entry for Inspection

Appendix I Cargo Stowage Plan – After first load port

EXERCISE 1

Simulator and Ship Familiarisation

Objective

The purpose of this exercise is to help you become familiar with the operation of the simulator and the cargo system. At the same time, you will undertake the necessary tests to ensure the Inert Gas Generator is fully operational, finish ballasting the forepeak and test the operation of a cargo pump.

Information

The vessel has just departed from drydock, so the cargo system is gas free and will need inerting. All bunkers, fresh water and ballast are as per the normal ballast condition, other then the forepeak ballast tank, which needs topping up.

Note: it is appreciated that not all liquid cargo simulators will have exactly the same functions incorporated. The following are suggestions of procedures with which you need to be familiar.

1. Check the various display pages of the simulator and familiarise yourself with the information shown. Where is the EMERGENCY SHUTDOWN button?
2. Change pages and operate valves.
3. Find the pages dealing with the BALLAST SYSTEM.
4. Open the appropriate sea suction valve, open appropriate ballast line valves, start a ballast pump, open the pump discharge valve and start topping up the FORE PEAK tank. This operation will provide a good opportunity for best practice of pump and line operation to be observed.
5. Familiarise yourself with the ALARM PANEL page.
6. Familiarise yourself with the GAS DETECTION facility.
7. While the vessel has been in drydock, many parts of the Inert Gas plant have been opened up for repair and maintenance. The boilers have already been flashed up and the next tasks are to restore the IG System to safety, start up the plant and test its interlocks and shutdowns prior to use. This operation also provides a good opportunity to test the communications systems with the engine room.
8. Depending on the simulator being used, the various parts of the Inert Gas System can be checked, such as:
    - The seal pump to the scrubbing tower
    - The deck seal
    - The scrubbing tower level
    - The automatic shutdown indicator
    - The interlock to the scrubbing tower cooling water pump
    - Calibrating the fixed oxygen analyser
    - Automatic shutdown and resetting the trip facility
    - The atmospheric vent
    - The deck main isolating valves
    - The flue gas isolating valve sealing arrangements
    - The inert gas line pressure gauges
9. As well as the fixed gas detecting system, do not forget the standard practice of utilising portable gas detectors, where required.
10. Start the Inert Gas System as per the operating manual and check the AUTOMATIC SHUTDOWN facility.
11. Do not forget to monitor the ballasting of the forepeak tank.
12. In order to familiarise yourself with the cargo system, it is suggested to water flush the cargo line system. Sea water can be taken from a sea suction and deposited in a slop tank. When appropriate, the flush can continue by re-circulating sea water from the chosen slop tank. Test the eductors, whilst executing this operation.
13. Whilst sending sea water around the cargo system, take the opportunity to test the STEAM system, by heating the water.

EXERCISE 2

Start inert gas plant and commence primary inerting

Objective

The purpose of this exercise is to produce and execute an operational procedure for starting the IG plant from a normal shut down condition, and then to commence primary inerting the cargo tanks including residue and slop tanks, using EITHER a dilution OR displacement method.

Information

1. On this vessel, primary inerting can be achieved by using either the dilution (mixing) method, or the displacement (layer) method.
2. Inert gas can be vented from the cargo tanks via either the IG inlets to the mast riser, the cargo lines, purge pipes, or the short stand pipes on deck, the latter two options being activated by inserting the appropriate spool pieces.
3. Note the P/V valve pressure and vacuum setting on your simulator model. Note also the IG blower capacities.
4. The vessel has just left drydock and is on passage to the loading port. Note the forward and aft draft of the vessel. The first loading port is five days steaming away.
5. The sea temperature and air temperature should be noted and any major contrast considered.
6. All portable instruments have been checked and calibrated.
7. The IG system is set for safety, i.e. the water pump serving the scrubber seal and deck seal is ON. In addition, the scrubber cooling water pump has been switched ON and the scrubber tower has been flushed for at least fifteen minutes. All other tests and checks on the plant have been completed.

Competence Requirements

1. Identify and describe an understanding of the two methods of primary inerting, dilution or displacement.
2. Identify the relative density of the gases involved in the inerting operation.
3. If dilution method is chosen, state how many tanks will initially be opened and the expected duration of the operation.
4. If displacement is chosen, states the minimum number of tanks to be inerted at any one time.
5. State if the main Gas Regulating Valve should be used in AUTO or MANUAL for this operation.
6. Identify and apply appropriate monitoring requirements during the inerting procedure.
7. State what checks on the system will be made during this operation.
8. State the maximum permitted oxygen concentration in the inert gas being delivered to the cargo system.
9. State the maximum permitted oxygen concentration in the inert gas inside the individual cargo tanks in order for the tank to be considered inert.
10. State a typical chemical composition of inert gas from a boiler uptake.
11. Identify appropriate sampling positions in tanks for use with portable gas analysing equipment.
12. Identify appropriate pressures to which the gas main may be raised.
13. State the hazards of inerting after an inert gas plant breakdown.

EXERCISE 3a

Completion of primary inerting by dilution

Objective

The purpose of this exercise is to complete the primary inerting of the cargo and slop tanks using the dilution method. A cargo tank oxygen level reading log should be maintained. Upon completion of the operation, the system should be pressurised and the IG system shut down in a safe manner.

Information

1. The IG system is in operation with one blower and the Gas Regulating Valve in 'manual' mode.
2. The last set of cargo tanks, 6P and 6S are currently being inerted, in via the deck distribution system and out via the stand pipes. All other tanks except the slop tanks have been completed but not checked or pressurised and are currently isolated from the IG system.
3. Check your company's Inert Gas Operating Manual;

   What is the maximum oxygen content permitted in the cargo tanks prior to loading cargo?

   Ensure the oxygen readings taken are recorded.

   Establish the minimum permitted pressure on the inerted system under all conditions of operation.
4. Assess the list of readings (appended) supplied by an experienced and reliable member of the deck watch. These readings were taken in the last hour.
5. All portable gas detecting instruments have been checked and calibrated.
6. The vessel is now within 72 hours of the load port.

Competence Requirements

1. State what conditions have to be satisfied before primary inerting has been completed successfully.
2. State what will be the final status of the inert gas plant and distribution system.
3. State what checks will be made on the system after final shut down.
4. Shut down the inert gas plant upon completion of the operation.

   - Describe a safely shut down plant
   - Shut down the plant
   - Water flush the flue gas scrubber
   - Flush the overboard valves and lines
   - Describe post shut down maintenance
   - Describe blower flushing and internal inspection
   - Set the plant for safety
   - Ensure the water supply is running and the alarms are in order
   - Incorporate the routine testing of interlocks during shut down.

OXYGEN READING REPORT

Slop P	Top	20.81%	Slop S	Top	20.81%
	Middle	20.81%		Middle	20.81%
	Bottom	20.81%		Bottom	20.81%
6S	Top	6.51%	6P	Top	6.36%
	Middle	6.49%		Middle	6.38%
	Bottom	6.52%		Bottom	6.41%
5S	Top	4.61%	5P	Top	4.61%
	Middle	4.59%		Middle	4.66%
	Bottom	4.60%		Bottom	4.59%
4S	Top	4.83%	4P	Top	4.85%
	Middle	4.81%		Middle	4.83%
	Bottom	4.79%		Bottom	4.82%
3S	Top	4.63%	3P	Top	4.64%
	Middle	4.60%		Middle	4.63%
	Bottom	4.62%		Bottom	4.64%
2S	Top	4.66%	2P	Top	4.68%
	Middle	6.44%		Middle	4.66%
	Bottom	4.61%		Bottom	4.67%
1S	Top	4.12%	1P	Top	5.27%
	Middle	4.09%		Middle	5.24%
	Bottom	4.11%		Bottom	5.25%

EXERCISE 3b

Completion of primary inerting by displacement

Objective

The purpose of this exercise is to complete the primary inerting of the cargo and slop tanks using the displacement method. A cargo tank oxygen level reading log should be maintained. Upon completion of the operation, the system should be pressurised and the IG system shut down in a safe manner.

Information

1. The IG system is in operation with one blower and the Gas Regulation Valve in 'manual' mode.
2. The last set of tanks 2P, 2S, 3P, 3S, 5P and 5S are currently being inerted, in via the bottom cargo lines and out via the deck stand pipes. All other tanks have been completed but not checked or pressurised and are currently isolated from the IG system.
3. Check your company's Inert Gas Operating Manual;

   What is the maximum oxygen content permitted in the cargo tanks prior to loading cargo?

   Ensure the oxygen readings taken are recorded.

   Establish the minimum permitted pressure on the inerted system under all conditions of operation.
4. Assess the list of readings (appended) supplied by an experienced and reliable member of the deck watch. These readings were taken in the last hour.
5. All portable gas detecting instruments have been checked and calibrated.
6. The vessel is now within 72 hours of the load port.

Competence Requirements

1. State what conditions have to be satisfied before primary inerting has been completed successfully.
2. State what will be the final status of the inert gas plant and distribution system.
3. State what checks will be made on the system after final shut down.
4. Shut down the inert gas plant upon completion of the operation.

   - Describe a safely shut down plant
   - Shut down the plant
   - Water flush the flue gas scrubber
   - Flush the overboard valves and lines
   - Describe post shut down maintenance
   - Describe blower flushing and internal inspection
   - Set the plant for safety
   - Ensure the water supply is running and the alarms are in order
   - Incorporate the routine testing of interlocks during shut down.

OXYGEN READING REPORT

Slop P	Top	2.95%	Slop S	Top	3.05%
	Middle	2.94%		Middle	3.06%
	Bottom	2.96%		Bottom	3.05%
6S	Top	2.91%	6P	Top	2.91%
	Middle	2.90%		Middle	9.21%
	Bottom	2.91%		Bottom	2.89%
5S	Top	20.78%	5P	Top	20.78%
	Middle	2.91%		Middle	2.92%
	Bottom	2.92%		Bottom	2.91%
4S	Top	20.81%	4P	Top	2.91%
	Middle	2.90%		Middle	2.90%
	Bottom	2.91%		Bottom	2.91%
3S	Top	20.78%	3P	Top	20.78%
	Middle	2.93%		Middle	2.94%
	Bottom	2.92%		Bottom	2.94%
2S	Top	20.79%	2P	Top	20.78%
	Middle	2.92%		Middle	2.92%
	Bottom	2.91%		Bottom	2.91%
1S	Top	2.91%	1P	Top	2.91%
	Middle	2.90%		Middle	2.92%
	Bottom	2.89%		Bottom	2.91%

EXERCISE 4

Cargo Planning Prior to Loading

Objective

To prepare a cargo plan and operational procedure, including all safety and pollution prevention precautions, for the loading of three products.

Information

1. The vessel has inerted the cargo system and is proceeding toward the next load port.
2. Cargo orders have been received so a loading plan needs to be drawn up.

   Maximum cargo incorporating three grades is to be loaded.

   The three grades are:

Grade 1	Note	Density Temperature Quantity
Grade 2	Note	Density Temperature Quantity
Grade 3	Note	Density Temperature Quantity

3. The cargo system can load the three grades simultaneously, though the Grade 2 is to be the grade which commences loading and the grade to be topped off and completed first.
4. Grade 1 is to be loaded into 1 P & S, 4 P & S, 6 P & S and the port slop tank, through the forward most manifold.
5. Grade 2 is to be loaded into 2 P & S and 5 P & S and the starboard slop tank, through the aft most manifold.
6. Grade 3 is to be loaded into 3 P & S through the middle manifold.
7. Plan for the loading operation, detailing the manifolds and lines to be used for each grade. De-ballasting will be required concurrent with loading operations.
8. The plan should also incorporate which grade will complete the loading operation.
9. Note the maximum loading rate supplied by the terminal in relation to the maximum loading rate capabilities of the vessel.
10. Note also the maximum permitted manifold pressures.
11. The cargo tank venting must be set appropriately taking into consideration gas evolution from the cargo. A vapour return arrangement is available. After loading, the Grade 3 requires segregated venting.
12. Ensure the ship/shore checklist is complete.
13. The distribution and quantities of ballast, fresh water, fuel and stores on arrival at the outer anchorage is as in the normal ballast condition.
14. Before berthing, bunkers will be taken in the outer anchorage. Note how this will affect the trim, list, longitudinal and transverse stability.

Competence Requirements

1. Plan the status of the IG system and tank venting system during this operation.
2. Refer to the vessel cargo operations manual for details of tank grouping and suggested line up.
3. Ensure vessel stability and hull stresses are within safe limits at all times during the operation.
4. Refer to the Cargo Operations Manual for specific cargo handling information and warning regarding the effects of free surface.
5. Read Exercises 6 and 7, note which will be the completing grade.
6. In order to create a finish loading exercise specific to your loading plan it is likely a unique exercise will be required to be programmed into your simulator. In order to create this, depending on the simulator in use, you may also supply the following information;
   - Final loaded condition of each tank as a percentage full.
   - The condition of the last 4 pairs of wing tanks to be topped off before finishing loading. This should also be supplied as the tank percentage full. Note that you are required to top off all of the last 4 pairs of wing tanks in the "Complete Loading" exercise (6).
7. State in the plan how the following loading issues may be monitored:
   - Cargo loading rates
   - Starting procedure
   - Venting
   - Monitoring full and empty tanks
   - Location and readiness of safety equipment
   - Location and readiness of pollution equipment
   - Shut down procedures, both routine and emergency
   - Deballasting
   - Pumproom segregation
   - Line up
   - Topping off
8. The plan should also be flexible in case of a change in loading sequence.

EXERCISE 5
Commence Loading

Objective

Execute an operational procedure, including all safety and pollution prevention precautions, for the start of loading three grades of petroleum product.

Information

1. The vessel is berthed port side to alongside.
2. All three manifolds have been connected.
3. All local and terminal regulations are being complied with and the ship/shore checklist has been completed and signed by the required staff.
4. The oxygen content in each tank has been tested and been found to be less than 8% by volume in each case.
5. The inert gas plant is shut down and set for safety.

Competence Requirements

1. Start load procedure. Do not open manifold valves until the agreement of the jetty operator has been obtained.
2. Limit the number of tanks to be loaded to one line one tank.
3. Establish a low initial loading rate.
4. Check offshore and isolated manifolds.
5. Communicate with deck staff to ensure safety and pollution checks are being maintained.
6. State when the deballasting operation should start and check:
   - Cleanliness of the surface of the water being discharged
   - Cleanliness of harbour water overboard having started deballasting
   - Deballast through appropriate sea valve
7. Prepare and use an action plan to deal with the possibility of
   - Stuck valves
   - Leaking valves
   - Communication failure
   - Gauge failure
8. Describe how the following stability issues may be monitored:
   - Longitudinal
   - Transverse
   - Free Surface
   - Hull stresses
   - Bending moments and sheer forces
9. During bulk loading monitor, monitor loading rate stresses
10. Adjust cargo flow for trim and list purposes.
11. Monitor moorings and maintains security.

EXERCISE 6
Complete loading

Objective

Execute an operational procedure, including all safety and pollution prevention precautions, for the completion of loading three grades of petroleum product.

Information

1. The vessel is berthed port side to alongside.
2. De-ballasting is almost completed, though two ballast tanks need to be finished.
3. The vessel is currently loading through the two forward manifolds, the Grade 2 having been loaded through the aft manifold, topped off and manifold closed.
4. The vessel is currently loading at the maximum the shore is able to supply and the loading rate can be adjusted up to the maximum manifold loading rate, if required.
5. The ship's manifolds should remain open until the terminal has agreed they may be closed.
6. The emergency stop procedure has been agreed as follows:
    - The jetty should be contacted by radio.
    - The jetty operator will then take appropriate action to stop the cargo as quickly as possible.
    - The vessel will be informed when it is safe to close the manifold valves.

Competence Requirements

1. Careful checks on the operation should be maintained at all times including manifold pressures, flow rates and tank ullages.
2. State which topping off procedure to be used.
3. Shut the tanks in a predetermined sequence.
4. Adjust flow rates to avoid creating an excessive manifold pressure.
5. Monitor completed tanks for a steady ullage.
6. Confirm the completion procedures with the terminal.
7. Carry out line draining to avoid the pressure of trapped cargo.
8. Drain the manifold in such a way as to avoid spills.

EXERCISE 7
Loaded Passage

Objective
Minimise losses due to evaporation as far as practicable. Monitor cargo containment.

Information
1. Discuss tank pressure management and a reduction in VOC losses, especially the benefits in reducing these losses.
2. Vapour segregation needs to be maintained during the loaded passage as follows:
   - Grade 1 and Grade 2 vapour may use the same venting.
   - Grade 3 vapour should be segregated.

Competence Requirements
1. Cargo tank ullages, as well as ballast spaces, still need monitoring for any hydrocarbon leakage during the loaded passage.
2. State which vessel stress and stability is to be monitored during this exercise.
3. Prior to arrival at the discharge port, a checklist needs to be completed.
4. State how the pressure and vacuum settings on the venting systems will affect this issue?
5. Monitor the cargo tank pressure and top up with inert gas if necessary.
6. In the event of cargo leakage into a ballast space, activate the appropriate action plan and reporting procedure.

EXERCISE 8
Plan discharge

Objective
To prepare a cargo plan and operational procedure, including all safety and pollution prevention precautions, for the discharge of three products.

Introduction
1. Discharge of the entire cargo is to be planned but it has been agreed that the discharge will commence with the Grade 2 parcel.

   Pump No. 1 can discharge the Grade 1.

   Pump No. 2 can discharge the Grade 3.

   Pump No. 3 can discharge the Grade 2.
2. Each grade can be discharged simultaneously but can also be kept segregated during the discharge. Initially, the discharge of one grade will start, followed by the remainder.

Competence Requirements
1. A ballast plan needs to be created. All ballast spaces will need to be filled as the cargo is discharged.
2. However, it is good practice to leave a pair of ballast tanks available for list and trim purposes during the discharge.
3. On completion of the discharge all cargo is to be drained from the pipelines and pumps and sent ashore.

EXERCISE 9

Commence Discharge of One Parcel

Objective

Execute an operational procedure, including all safety and pollution prevention precautions, for commencing of discharge of one grade of petroleum product.

Information

1. Follow the plan made in the previous exercise.
2. The plan has been discussed and agreed with the terminal.
3. The terminal requests that discharge commence with Grade 2 with MCP NO. 1.
4. Once the discharge of this parcel has started, the others may follow simultaneously.
5. A ship/shore safety checklist has been completed.
6. The vessel is port side to alongside and has all three manifolds connected.
7. The inert gas plant has been tested before arrival and no defects found. All cargo tanks have been tested for oxygen concentration and each found to have less than 8% by volume.
8. The main cargo pumps have been warming through for the last hour.

Competence Requirements

1. State and prepare the line set-up prior to commencing discharge.
2. State and prepare the operational status of the IG plant.
3. Refer to the Cargo Operations Manual for specific cargo pump and cargo discharge information.
4. Prepare the cargo pumps for operation.
5. Monitor the pump running conditions with reference to:
   - Suction and discharge pressures
   - Cargo tank level
   - Manifold flow
6. Balance the pump speeds for common discharge when in parallel.
7. Monitor and controls the suction and discharge pressures.
8. Commence the discharge in line with best practice:
   - Fill the line and pump gradually
   - Ensure the pumproom is manned
   - Limit the number of tanks open at one time
   - Start the pump on slow speed and accepts hand over from the engineer
   - Open the manifold with terminal agreement
   - Direct the deck watch to carry out safety and counter pollution monitoring
   - Monitor active and closed cargo tank levels.
9. Continue to monitor longitudinal and transverse stability.
10. Continue to monitor draft, list and trim.

EXERCISE 10

Complete discharge and ballasting operations.

Objective

Execute an operational procedure, including all safety and pollution prevention precautions, for the completion of discharge of three grades of petroleum product. ROB must be minimised so that an efficient draining procedure is completed.

Information

1. Discharge of the Grade 2 parcel has already commenced, so the discharge plan made earlier can be followed in order to execute the discharge of the remaining parcels.
2. The inert gas plant is running and delivering inert gas to the deck as required.
3. Remember to check the oxygen content in the Grade 3 and Grade 1 tanks prior to starting their discharge.

Competence Requirements

1. Describes the equipment with centrifugal pumps for tank draining as:
   - Automatic self-priming stripping systems (Vac-Strip, Prima Vac)
   - Operate such systems in automatic and in manual modes
   - Describe the optimum tank draining sequence as from for'd to aft
   - State that suction valves are not throttled when using the system
2. Describe auxiliary tank draining equipment and states the operating requirements for:
   - Eductors
   - Reciprocating pumps
3. Carry out cargo stripping with reference to:
   - Optimum trim and list (if appropriate)
   - Sequence for maximum efficiency (main pump, eductor, reciprocation stripping pump).
4. Monitor the level in tank being drained to ensure the liquid is actually moving, if not, to ascertain why and/or move to another tank.
5. Completes of cargo discharge:
   - Monitor completed tanks to ensure valves are not leaking
   - Drain cargo deck mains and risers to slop tank or pump
   - Drain residual liquid from centrifugal pump casing
   - Drain manifold connection
   - Manage pressure of inert gas to ensure no venting occurs
6. Prepare and use an action plan to deal with typical problems:

   Tank overflow resulting from:
   - Movement of cargo between tanks of differing levels
   - Line up error
   - Slop tank overflow during educting
   - Valve leakage or failure
   - Failure of automatic stripping system
   - IG plant failure, either permanent or temporary
   - Bilge level alarm

EXERCISE 11

Water wash cargo tanks

Objective

Plan and execute a routine tank washing and preparation operation, including all safety and pollution prevention precautions. All MARPOL concerns must be addressed and the operation recorded in the Oil Record Book.

Information

1. Having sailed from the discharge port, the cargo system requires a routine wash. Cargo orders have already been received for the next loading pattern but the cargoes nominated are not high specification parcels. A routine water wash is all that will be required, cold water for the Grade 3 and Grade 1 tanks but hot water for the Grade 2 tanks. At this stage, the slop tanks will not be washed since they will need to contain the residues of tank washings.
2. As per routine safety procedures, the inert gas system must be run during the tank washing programme.
3. Remember to monitor the inert gas quality being delivered to the deck as well as the IG main pressure, to ensure that safety requirements are fulfilled.

Competence Requirements

Tank Washing - With Water

1. State that washing tanks with water is carried out to enable entry and maintenance.
2. State that water washing is carried out with either cold water or hot water heated:
   - By in line heater
   - In a slop tank
3. State that a tanker fitted with an inert gas plant must wash tanks with the atmosphere in the inert condition and that crude tankers smaller than 20,000 dwt without an inert gas plant may wash tanks in the non-inert condition following the most stringent safety procedures.
4. For Washing in the Inert Condition:
   - Tank atmosphere is tested and controlled to be 8% or less by volume Oxygen and positive pressure (as for COW)
   - Recirculated wash water may be used using one or more slop tanks
   - Chemical additives may be used, either injected into the water supply or added in bulk to the cargo or slop tank
5. Fixed washing machines and/or portable machines may be used
6. State that for portable machines:
   - Spot washing can be accomplished
   - An electrical continuity test of the hoses is required before use (not to exceed 6 ohm per metre length)

EXERCISE 12

Start taking heavy weather ballast in cargo tanks

Objective

Plan and execute the ballasting of 3 P & S cargo tanks for the purposes of heavy weather. All MARPOL concerns must be addressed and the operation recorded in the Oil Record Book.

Information

1. After the vessel has sailed from the discharge port and routinely washed the cargo tanks have been routinely washed, the weather has deteriorated and the Master has decided to take on heavy weather ballast for safety reasons.

2. The designated heavy weather ballast tanks are 3 P & S, so the lines need to be set to ballast these cargo tanks. Depending on the simulator model in use, a spool piece may need to be positioned for this purpose.

3. Do not forget to set the venting system appropriately as well. Consider the loading rate of the ballast into the cargo tanks and ensure the exit velocity of the inert gas in 3P & S can at least match the rate of the incoming ballast.

Competence Requirements

1. State the requirements for taking heavy weather ballast in cargo tanks such as:
   - Tanks have to be washed
   - The pipelines used need to be drained of oil
   - Pipelines have to be flushed into a slop tank
   - Ensure that hydrocarbon vapour is vented through the approved venting system
   - State that when starting to load cargo tank ballast, pumps should be operated in accordance with the ICS/OCIMF publication “Prevention of Oil Spillages through Cargo Pumproom Sea Valves”
   - State that if a non-inerted tank containing hydrocarbon vapour is to be ballasted, valve operation and filling rate must be controlled to prevent spraying of water which may create an electrostatically charged mist
2. Control inert gas system with regard to:
   - Tank pressure
   - Vapour emissions
   - Vapour balancing - concurrent ballasting and cargo discharge
3. Exercise pollution prevention procedures by controlling:
   - Pump starting at very slow speed
   - Opening sea suction valve
   - Centifugal pump speed control, avoid trip
   - Consider use of stripping pump to create vacuum
   - Carry out overside check
4. State that other allowable operational exceptions for taking cargo tank ballast in cargo tanks are:
   - passage under a low bridge
   - height of loading connections (and combination carrier hatch coamings) relative to shore systems
   - local regulations requiring specific draft for safe navigation
   - (exceptions for maintenance reasons are allowed)

EXERCISE 13

Emergency water wash of both slop tanks without IG

Objective

Plan and execute a water wash of the port slop tank, without inert gas, including all safety and pollution prevention precautions. All MARPOL concerns must be addressed and the operation recorded in the Oil Record Book.

Information

1. After taking on heavy weather ballast, a problem has occurred with the inert gas system. The vessel needs to prepare for the next cargo as expediently and effectively as possible.
2. The vessel's engineers are confident they have the resources on board to rectify the IG supply but they estimate the task will take around three days. Arrival at the next load port is estimated to be five days from now.
3. The port slop tank has been decanted into the starboard slop tank and the pressure and quality of the atmosphere within starboard tank maintained in an inert condition. However, in order to evacuate the port tank and avoid under pressurisation, air had to be introduced into the port tank to replace the water.
4. Therefore, with no IG supply, the port tank has to be washed in a non-inert condition.
5. Permission has been obtained from the vessel's owners and charterers to proceed with this water wash, as long as the precautions sated in ISGOTT 5th Edition are followed strictly.

Competence Requirements

For washing in the non-inert condition:

1. State that ISGOTT section 11.3 provides detailed requirements which are based on the need to control the "fuel" and the "sources of ignition" of the fire triangle.
2. Before washing:
   - Tank bottom is flushed with main cargo pumps and lines
   - Piping system is flushed and stripped to the slop tank
   - Tank to be ventilated to 10% or less of the LFL
3. During washing:
   - Frequent atmosphere testing at various levels to detect raised LFL %
   - Ventilation to continue during washing wherever possible to provide a free flow of air from one end of the tank to the other
   - Tank atmosphere to be kept below 35% LFL. Should that be reached washing MUST STOP
   - Only resume washing when the atmosphere has been reduced to 10% or less of the LFL
   - Isolate the venting system to prevent ingress of gas from other tanks
4. To control "sources of ignition" in the tank:
   - Individual washing machines should not have a throughput greater than 60 m^3/hr
   - Total throughput per tank not to exceed 180 m^3/hr
   - Recirculated wash water must not be used
   - Limitations are placed on the use of chemicals, heated water and steam
   - Tank kept drained during washing and discharge into the slop tank kept below its liquid level
   - For portable washing machine, hoses tested for electrical continuity, not introduced into the tank until below 10% LFL, connections not broken until after the machine has been removed from the tank
   - Sounding precautions are taken if a full depth sounding pipe is not provided
   - Measures taken to prevent ignition from mechanical defects of equipment in the tank
   - Precautions are taken to avoid mechanical sparks from dropped metal objects
   - Use of non-intrinsically safe portable electrical equipment NOT allowed

EXERCISE 14

Decanting slops after washing and ballasting

Objective

Plan and execute the legitimate disposal of slops from the starboard slop tank, including all safety and pollution prevention precautions. All MARPOL concerns must be addressed and the operation recorded in the Oil Record Book.

Information

1. The vessel is now two days from the next load port. Weather conditions have improved considerably and the heavy weather ballast has been discharged, with the oil residues contained in the starboard slop tank. 3 P & S cargo tanks have been washed and inerted.
2. In order to minimise slops on arrival, the remaining residues in the starboard slop tank have to be decanted.
3. Ensure the required components of the line system are in place to enable the starboard slop tank to be discharged, via the Oil Discharge Monitoring Equipment, into the sea.
4. Upon completion of this operation, such components (e.g., spool piece) should be removed as required prior to working the next cargo.

Competence Requirements

1. Describe the requirements for discharge in compliance with Regulation 34 of Revised Annex I MARPOL 73/78 not in a special area:
   - more than 50 miles from land
   - en route
   - instantaneous rate of oil content discharge not to exceed 30 litres per mile
   - total quantity of oil discharged not to exceed 1/30,000 of the previous cargo
   - Oil Discharge Monitoring & Control system and slop tank in use any residues which cannot be discharged into the sea to be retained on board
2. Describe appropriate entries to be made in the Oil Record Book Part II - Cargo/ballast operations
3. Decanting of slops remaining from cargo tank water washing operations:
   - Describe and demonstrates the operation of the interface detector
   - Calculate the quantities of oil and water by reference to tank calibration tables
   - State that the heating of slops is a method of reducing the quantity of emulsion at the interface
   - Demonstrate discharge of the “clean” part of the slop tank contents, stop discharge before excess oil is discharged

EXERCISE 15

Gas free cargo tank prior to entry for inspection

Objective

Plan and execute the gas freeing of 1 P & S cargo tank in order to inspect the internal structure. Gas freeing procedures should be carried out in accordance with the vessel's operating manuals.

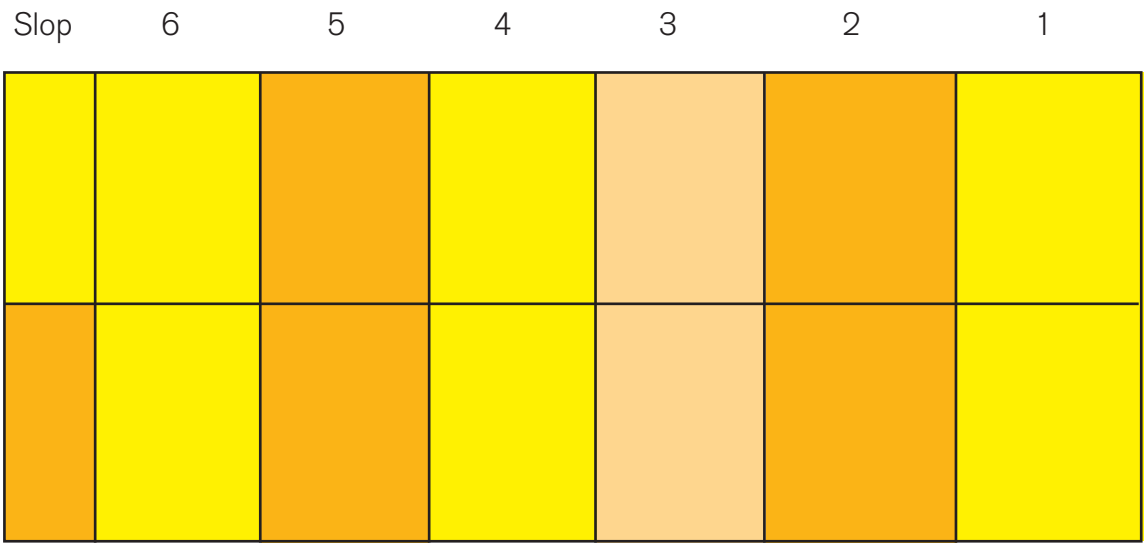
Information

1. As a result of concerns for the integrity of the vessel's structure after encountering heavy weather, a routine inspection of 1 P & S cargo tanks is planned.
2. Since these tanks have already been washed, they will need only to be gas freed for entry.
3. The decanting of the starboard slop tank has been completed. It is considered there will be sufficient time to gas free 1 P & S cargo tank over night, inspect them and re-inert them, should there be no significant damage sighted, in time for arrival at the next port. This will only be achieved, however, with detailed planning and co-ordinated action.

Competence Requirements

1. State that for an inerted tank, gas freeing may only take place once purging has been completed
2. State that either the Inert Gas Plant, or fixed or portable ventilation equipment may be used
3. Describe fixed equipment such as a "Golar Vent" and describes the requirement for isolation from the cargo system when not in use
4. Describe portable equipment, such as:
   - Water/air/hydraulic/steam operated fans
   - State that when portable equipment is used the tank is to be isolated from the inert gas/vent main
   - State that portable trunking may be used but that flow characteristics of the portable equipment may indicate greater efficiency without
5. Describe with the aid of ISGOTT 11.4 the procedures and safety precautions to be taken when gas freeing with portable equipment

CARGO STOWAGE PLAN



	Grade 1	1 P & S	4 P & S	6 P & S	Slop P
	Grade 2	2 P & S	5 P & S	Slop S	
	Grade 3	3 P & S			

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