National Occupational Standards for FPSO/FSUs

Marine Technician Operations Shuttle Tanker Operations

AMENDMENTS				
AMENDMENT & DATE	**PAGES**	**CHANGES MADE BY:**	**CHECKED BY:**	**APPROVED BY:**

Any amendments made to this standard by OPITO will be recorded above.

GLOSSARY

Angle of Loll - An angle of Loll is where a vessel initially has unstable equilibrium, where G (Centre of Gravity) is above M (Metacentric Height). The resulting angle of heel causes G to drop below M again, this angle that the vessel is heeled to and settled at is known as the Angle of Loll.

Ballast Tank - Any tank which is used to contain Seawater in order to assist with raising or lowering the draft of the vessel and maintaining stability.

Bending Moment - The Bending Moment at a point is the algebraic sum of the moments of the forces to one side of the point considered. A bending moment above the neutral axis will be positive and below the neutral axis will be negative.

Bilge - The space at the bottom of the vessel which collects spills and leaks for a compartment e.g. Pumproom or Engine room Bilges

Bunker System - The pipework and tanks on a ship / vessel used to transport fuel onto and around the vessel.

Confined/Controlled Space Entry - Any space that requires a control measure to be put in place to allow safe entry. This is normally a Confined Space Entry Permit (e.g. **restricted space** – machinery space; **enclosed space** – ballast tank**).**

Deck Operator - A person who is utilised to monitor, operate or control equipment externally on the Process or Marine Decks of a vessel/FPSO/FSU.

Free Surface Effect - Free Surface Effect is defined as a virtual loss of GM. When an external force heels a vessel, the liquid in the vessel is free to move also. The liquid will move to the low side of the vessel causing G to move off the centreline. The result is that the GZ (righting moment) of the vessel is reduced from what it would be if the liquid were not free to move **and** the effect is that the vessel will have a smaller GM than is actually the case**.**

Field Operations - Any operation that occurs within the extremities of the Installation 500m Zone; includes surface, subsea and airborne operations.

Heavy Weather - Conditions which are outwith Installation accepted 'Norms' for continued safe operations, includes Wind, Sea Swell conditions.

Heel - A ship / vessel is said to be heeled when she is inclined by an external force, e.g. when inclined by the action of wind or waves.

Hogging - A vessel is HOGGED if too much weight is loaded at either end causing the amidships draught to be less than the fwd and aft draughts

List - A ship / vessel is said to be listed when she is inclined by forces within the ship / vessel, e.g. when a weight is moved transversely within the ship**.**

Marine Systems - Any system which requires a Marine Operator to have input into controlling the input or output of the system.

Offload Station - The area of the Installation or vessel where cargo is exported/offloaded to another facility e.g. Offtake Tanker.

Sagging - A vessel is SAGGED if too much weight is loaded in the middle causing the amidships draught to exceed the fwd and aft draughts

Shear Force - The Shear Force at a point is the algebraic sum of the forces acting to one side of the point considered. A shear force above the neutral axis is considered positive and below the neutral axis is considered negative.

Stability - The subject of maintaining a vessel afloat in a safe condition

Stiff Ship - A stiff ship is where she has a large righting moment at small angles of heel. An example is when a vessel has a large GM caused by too much cargo loaded low down in the vessel (double bottom ballast tanks).

Synoptic Chart - A chart of an area of operation that has an overlay of the weather patterns that have developed or are developing in the area. Used to predict / forecast the expected weather in a specific location.

Tender Ship - A tender ship is where she has a small righting moment at small angles of heel. An example of this is when a vessel has a small GM caused by loading cargo high up in the vessel (timber deck cargo or too much process deck added to a conventional tanker)

Tensile Loading - Any external load applied to a material in such a way as to cause an extension of the material, results in Tensile Loading.

Validate - To confirm or corroborate

Verify - To check or determine correctness

ABBREVIATIONS

IGS	Inert Gas System
ESD	Emergency Shut Down
HASAWA	Health and Safety at Work Act
COSHH	Control of Substances Hazardous to Health
GPS	Global Positioning System
UTM	Universal Transverse Mercator
ARPA	Automatic Radar Plotting Aid
TPC	Tonnes Per Centimetre
MCTC	Moment to Change Trim by one Centimetre
KG	Height of Centre of Gravity (G) Above Keel
KM	Height of Metacentre above Keel
LCB	Longitudinal Centre Buoyancy
C of G	Centre of Gravity
RVP	Reid Vapour Pressure
BSW	Base Sediment and Water
FS (effect)	Free Surface Effect
P & IDs	Piping and Instrument Drawings
FFA	Fire Fighting Appliances
LSA	Life Saving Appliances
CCTV	Closed Circuit Television
HCS	Heading Control System
H & S	Health and Safety
P & ID	Process and Instrument Diagrams
GM	Metacentric Height

Unit MOT10 : Plan and Prepare for FPSO/FSU Shuttle Tanker Operations (Passive Weather Vaning)

This unit is concerned with ensuring that safe and efficient **planning and preparation** are carried out for cargo offloading operations by the FPSO/FSU Control Room when the FPSO/FSU is weather vaning **i.e. no heading control of the FPSO/FSU**.

This unit consists of one element:

10.1 Plan and Prepare to Start Up Shuttle Tanker Operations

During this work you must take account of the relevant installation, operational requirements, procedures and safe working practices AS THEY APPLY TO YOU.

In achieving this unit you will have demonstrated that you have successfully met all the required Standards of Performance and that you have all the knowledge and understanding which underpins the achievement of those Standards of Performance. This ensures that you can do the work, understand the work and so can react appropriately to any contingency which falls within your responsibility.

Unit Guidance

Competence Requirements

To fully demonstrate your competence you must be able to plan and prepare for FPSO/FSU cargo offloading operations. This planning and preparation must be able to demonstrate your awareness and ability to manage any relevant operational hazard (to include stability) and how you would safely and effectively plan to deal with the following abnormal situations:

- shuttle tanker mooring connection failure
- offloading hose failure
- pump malfunction or failure
- valve/line blockages
- valve/line malfunctions or failure
- instrument failure
- IGS malfunction or failure
- inboard loss of containment
- outboard loss of containment
- main/auxiliary power failure
- communications failure
- crude out of specification
- unexpected weather
- heavy weather routines
- unplanned movement of the FPSO/FSU
- failure of FPSO/FSU anchoring systems/mooring failure
- unexpected transfer of cargo
- failure of hawser/hose handling equipment
- failure of shuttle tanker manoeuvring systems

Where you do not have the opportunity to cover all aspects of the Standards of Performance in the workplace you may be permitted to supplement your demonstration of competence by realistic simulations and questioning.

Element MOT10.1 PLAN AND PREPARE TO START UP SHUTTLE TANKER OPERATIONS

This element is about planning and preparing to start up cargo offloading operations.

Standards of Performance:

In achieving this element, you will have:

1. carried out FPSO/FSU/Field operational pre-planning

2. updated impact of weather conditions on operations

3. evaluated mooring operational requirements against operational parameters and prevailing weather conditions

4. updated operational pre-planning as required

5. reviewed and confirmed Shuttle Tanker operations/offloading plan

6. conducted team briefings

7. established and maintained effective communications with relevant parties

8. confirmed as suitable vessel, ballast, tank status tank priorities and hydrostatic profile

9. ensured pre-operational operations/checks are completed

10. supervised and coordinated hawser and hose transfer operations

11. verified cargo system, ballast system and inert gas system status

12. exchanged operational information and documentation with shuttle tanker

Knowledge Specification: (see also Unit Guidance)

Within the limits of your responsibility you must be able to demonstrate that you know:

- procedures necessary to carry out FPSO/FSU/Field operational pre-planning
- how to update operations taking into account the impact of weather conditions (e.g. heavy weather, adverse weather, normal weather)
- the procedures for reviewing and agreeing Shuttle Tanker operations/offloading plan
- how to conduct effective team briefings
- the procedures for validating vessel, ballast, tank status and tank priorities
- the procedures for validating the hydrostatic profile (e.g. trim, stability, stress) – to include list, trim, draft
- how to carry out line pressure tests prior to cargo operations & COW'ing
- the pre-operational operations/checks (to include pre-mooring, routine checks on hawser/hose)
- how hawser/hose transfer operations should safely and effectively be carried out
- the procedures necessary to maintain effective supervision and coordination of hawser/hose connection activities with shuttle tank
- how to verify cargo system, ballast system and inert gas system status
- procedures for exchanging operational information and documentation with shuttle tanker (e.g. cargo nomination, vessel particulars, notice of readiness, operational parameters, shutdown parameters, cargo and ballast handling plans, communication and back up systems

Underpinning Knowledge and Understanding

Within the limits of your responsibility you must be able to demonstrate that you know:

- the location and identity of all control room equipment using P + IDs as appropriate
- the layout of appropriate working areas (e.g. control room, control stations)
- the layout/function/operation of: process flows; ballast system; cargo system; crude oil washing; inert gas system; cargo heating system; cargo metering, cargo offloading system; shuttle tanker mooring system; FPSO/FSU mooring system; bunkering systems (e.g. polymers, potable water, lube oil, diesel); instrument and plant air; vessel cooling water; diesel system and hydraulic system using P & IDs and Process Flow Diagrams as appropriate
- the location of process high pressures, high temperatures and the relevant safety measures
- how to carry out effective trouble shooting procedures
- the location function and operation of ESD systems using P & IDs as appropriate
- how to carry out effective handovers between shifts and maintain continuity
- how to carry out positive reporting of instructional actions, tasks, safety measures and checks ensuring reports are clear accurate and complete
- the emergency procedures relevant to the cargo handling system
- the emergency procedures relevant to the ballast control system
- the emergency procedures relevant to shuttle tanker operations
- working understanding of the terms TPC, MCTC, KG, KM, LCB, C of G, Moments, Displacement, Reserve Buoyancy, angle of Loll, Volume, RVP, BS & W
- the minimum and maximum allowable draft
- the maximum allowable trim and reason(s) for limitation
- effects on vessel due to loading or discharging weights on draft, freeboard, trim, list, density (of water and crude oil)
- effects on vessel of staggered loading conditions
- terms and consequences of FS Effect, Stiff and Tender ship, Hogging and Sagging, Stable, Unstable and Neutral Equilibrium
- terms and effects of shear force and bending moments, compressive and tensile loadings, area under curve of stability
- tensile loadings
- information sources in relation to the performance of manual calculations
- the routine checks on the loading calculator/computer equipment

Unit MOT11 : Plan and Prepare for FPSO/FSU Shuttle Tanker Operations (Active Weather Vaning)

This unit is concerned with ensuring that safe and efficient **planning and preparation** are carried out for cargo offloading operations by the FPSO/FSU Control Room **when the FPSO/FSU is using heading control methods.**

This unit consists of one element:

11.1 Plan and Prepare to Start Up Shuttle Tanker Operations

During this work you must take account of the relevant installation, operational requirements, procedures and safe working practices AS THEY APPLY TO YOU.

In achieving this unit you will have demonstrated that you have successfully met all the required Standards of Performance and that you have all the knowledge and understanding which underpins the achievement of those Standards of Performance. This ensures that you can do the work, understand the work and so can react appropriately to any contingency which falls within your responsibility.

Unit Guidance

Competence Requirements

To fully demonstrate your competence you must be able to plan and prepare for FPSO/FSU cargo offloading operations. This planning and preparation must be able to demonstrate your awareness and ability to manage any relevant operational hazard (to include stability) and how you would safely and effectively plan to deal with the following abnormal situations:

- shuttle tanker mooring connection failure
- offloading hose failure
- pump malfunction or failure
- valve/line blockages
- valve/line malfunctions or failure
- instrument failure
- IGS malfunction or failure
- inboard loss of containment
- outboard loss of containment
- main/auxiliary power failure
- heading control systems failure
- navigational systems failure
- communications failure
- crude out of specification
- unexpected weather
- heavy weather routines
- unplanned movement of the FPSO/FSU
- failure of FPSO/FSU anchoring systems/mooring failure
- unexpected transfer of cargo
- failure of hawser/hose handling equipment
- failure of shuttle tanker manoeuvring systems

Where you do not have the opportunity to cover all aspects of the Standards of Performance in the workplace you may be permitted to supplement your demonstration of competence by realistic simulations and questioning.

Element MOT11.1 PLAN AND PREPARE TO START UP SHUTTLE TANKER OPERATIONS

This element is about planning and preparing to start up cargo offloading operations.

Standards of Performance:

In achieving this element, you will have:

1. carried out FPSO/FSU/Field operational pre-planning

2. updated impact of weather conditions on operations

3. evaluated heading control requirements against operational parameters and prevailing weather conditions

4. updated operational pre-planning as required

5. review and confirm Shuttle Tanker operations/offloading plan

6. conducted team briefings

7. established and maintained effective communications with relevant parties

8. confirmed as suitable vessel, ballast, tank status, tank priorities and hydrostatic profile

9. ensured pre-operational operations/checks are completed

10. supervised and coordinated hawser and hose transfer operations

11. verified cargo system, ballast system and inert gas system status

12. exchanged operational information and documentation with shuttle tanker

Knowledge Specification: (see also Unit Guidance)

Within the limits of your responsibility you must be able to demonstrate that you know:

- procedures necessary to carry out FPSO/FSU/Field operational pre-planning
- how to update operations taking into account the impact of weather conditions (e.g. heavy weather, adverse weather, normal weather)
- how to evaluate and action heading control requirements, power generation (e.g. prevailing weather data) against operational parameters as appropriate
- how to update operational pre-planning taking heading control requirements against operational parameters and prevailing weather conditions into account
- how to conduct effective team briefings
- the procedures for validating vessel, ballast, tank status and tank priorities
- the procedures for validating the hydrostatic profile (to include list, trim, draft)
- how to carry out line pressure tests prior to cargo operations & COW'ing
- the pre-operational operations/checks (to include pre-mooring, routine checks on hawser/hose, navigational systems, heading control systems)
- how hawser/hose transfer operations should safely and effectively be carried out
- the procedures necessary to maintain effective supervision and coordination of hawser/hose connection activities with shuttle tanker
- how to verify cargo system, ballast system and inert gas system status
- procedures for exchanging operational information and documentation with shuttle tanker (e.g. cargo nomination, vessel particulars, notice of readiness, operational parameters, shutdown parameters, cargo and ballast handling plans, communication and back up systems

Underpinning Knowledge and Understanding

Within the limits of your responsibility you must be able to demonstrate that you know:

- the location and identity of all control room equipment using P + IDs as appropriate
- the layout of appropriate working areas (e.g. control room, control stations)
- the layout/function/operation of: process flows; ballast system; cargo system; crude oil washing; inert gas system; cargo heating system; cargo metering, cargo offloading system; shuttle tanker mooring system; FPSO/FSU mooring system; bunkering systems (e.g. polymers, potable water, lube oil, diesel); instrument and plant air; vessel cooling water; diesel system and hydraulic system using P & IDs and Process Flow Diagrams as appropriate
- the heading control systems and their operational parameters, along with the navigational systems used to support these operations
- the location of process high pressures, high temperatures and the relevant safety measures
- how to carry out effective trouble shooting procedures
- the location function and operation of ESD systems using P & IDs as appropriate
- how to carry out effective handovers between shifts and maintain continuity
- how to carry out positive reporting of instructional actions, tasks, safety measures and checks ensuring reports are clear accurate and complete
- the emergency procedures relevant to the cargo handling system
- the emergency procedures relevant to the ballast control system
- the emergency procedures relevant to shuttle tanker operations
- working understanding of the terms TPC, MCTC, KG, KM, LCB, C of G, Moments, Displacement, Reserve Buoyancy, angle of Loll, Volume, RVP, BS & W
- the maximum allowable trim and reason(s) for limitation
- effects on vessel due to loading or discharging weights on draft, freeboard, trim, list, density (of water and crude oil)
- effects on vessel of staggered loading conditions
- terms and consequences of FS Effect, Stiff and Tender ship, Hogging and Sagging, Stable, Unstable and Neutral Equilibrium
- terms and effects of shear force and bending moments, compressive and tensile loadings, area under curve of stability
- tensile loadings
- information sources in relation to the performance of manual calculations
- the routine checks on the loading calculator/computer equipment

Unit MOT12 : Start Up Cargo Offloading Operations with Shuttle Tanker

This unit is concerned with ensuring that a safe and efficient **start up** of cargo offloading operations is carried out from the FPSO/FSU Control Room.

This unit consists of one element:

12.1 Start Up the Cargo Offloading Operations

During this work you must take account of the relevant installation, operational requirements, procedures and safe working practices AS THEY APPLY TO YOU.

In achieving this unit you will have demonstrated that you have successfully met all the required Standards of Performance and that you have all the knowledge and understanding which underpins the achievement of those Standards of Performance. This ensures that you can do the work, understand the work and so can react appropriately to any contingency which falls within your responsibility.

Unit Guidance

Competence Requirements

To fully demonstrate your competence you must be able to safely start up the offloading operations and can safely and effectively deal with the following abnormal situations:

- offloading hose failure
- pump malfunction or failure
- valve/line blockages
- valve/line malfunctions or failure
- instrument failure
- IGS malfunction or failure
- inboard loss of containment
- outboard loss of containment
- main/auxiliary power failure
- communications failure
- crude out of specification
- unexpected weather
- heavy weather routines
- unplanned movement of the FPSO/FSU
- failure of FPSO/FSU anchoring systems/mooring failure
- unexpected transfer of cargo
- failure of hawser/hose handling equipment

Where you do not have the opportunity to cover all aspects of the Standards of Performance in the workplace you may be permitted to supplement your demonstration of competence by realistic simulation and questioning.

Element MOT12.1

Start Up the Cargo Offloading Operations

This element is about the start up procedures for cargo offloading operations.

Standards of Performance:

In achieving this element, you will have:

1. obtained permission for cargo offloading operations

2. commenced initial cargo offloading

3. verified cargo offloading status

4. initiated full cargo offloading operations

5. monitored operations for potential abnormal situations and dealt with them as appropriate

6. maintained communications with Shuttle Tanker and Control Room

7. ensured and confirmed steady state condition

8. completed ongoing log details

Knowledge Specification: (see also Unit Guidance)

Within the limits of your responsibility you must be able to demonstrate that you know:

- the procedures to obtain permission for cargo offloading operations
- how to start initial cargo offloading operations
- how to verify cargo offloading status (to include processing – with temperature control; offloading/metering; storage; isolated; offloading station; shuttle hose and hawser connection)
- the procedures necessary to effectively monitor operations for potentially abnormal situations
- how to safely and effectively deal with abnormal situations
- how to ensure and confirm steady state conditions
- how to clearly and accurately complete the relevant log details

Underpinning Knowledge and Understanding

Within the limits of your responsibility you must be able to demonstrate that you know:

- how to select, use and care for PPE (to include sight/hearing protection, gloves, footwear, hard hats, respirators)
- the implications of statutory (e.g. HASAWA and COSHH) and organisational requirements
- how to interpret operational requirements (e.g. relevant policies, procedures, instructions, codes of practice, standards, schedules)
- the location and identity of all control room equipment using P + IDs as appropriate
- the layout of appropriate working areas (e.g. control room, control stations)
- the layout/function/operation of: process flows; ballast system; cargo system; crude oil washing; inert gas system; cargo heating system; cargo metering, cargo offloading system; shuttle tanker mooring system; FPSO/FSU mooring system; bunkering systems (e.g. polymers, potable water, lube oil, diesel); instrument and plant air; vessel cooling water; diesel system and hydraulic system using P & IDs and Process Flow Diagrams as appropriate
- the location of process high pressures, high temperatures and the relevant safety measures
- how to carry out effective trouble shooting procedures
- the location function and operation of ESD systems using P & IDs as appropriate
- how to carry out effective handovers between shifts and maintain continuity
- the permit to work system
- how to carry out positive reporting of instructional actions, tasks, safety measures and checks ensuring reports are clear accurate and complete
- the emergency procedures relevant to the cargo handling system
- the emergency procedures relevant to the ballast control system
- the emergency procedures relevant to shuttle tanker operations

Unit MOT13 : Monitor and Control Cargo Offloading Operations with Shuttle Tanker

This unit is concerned with ensuring that the cargo offloading operations are safely and efficiently **monitored and controlled** from the FPSO/FSU Control Room and that all potential operational hazards (to include stability) are safely and effectively managed during the cargo offloading operations.

This unit consists of one element:

13.1 Monitor and Control Cargo Offloading Operations

During this work you must take account of the relevant installation, operational requirements, procedures and safe working practices AS THEY APPLY TO YOU.

In achieving this unit you will have demonstrated that you have successfully met all the required Standards of Performance and that you have all the knowledge and understanding which underpins the achievement of those Standards of Performance. This ensures that you can do the work, understand the work and so can react appropriately to any contingency which falls within your responsibility.

Unit Guidance

Competence Requirements

To fully demonstrate your competence you must be able to monitor and control the cargo offloading operations and to safely and effectively manage all potential operational hazards (to include stability). You will also be required to demonstrate that you can safely and effectively deal with the following abnormal situations:

- offloading hose failure
- pump malfunction or failure
- valve/line blockages
- valve/line malfunctions or failure
- instrument failure
- inboard loss of containment
- outboard loss of containment
- main/auxiliary power failure
- communications failure
- crude out of specification
- unplanned movement of the FPSO/FSU
- failure of FPSO/FSU anchoring systems/mooring failure
- unexpected transfer of cargo
- failure of hawser/hose handling equipment

Where you do not have the opportunity to cover all aspects of the Standards of Performance in the workplace you may be permitted to supplement your demonstration of competence by realistic simulations and questioning.

Element MOT13.1 MONITOR AND CONTROL CARGO OFFLOADING OPERATIONS

This element is about monitoring and controlling the offloading operations to the shuttle tankers.

Standards of Performance:

In achieving this element, you will have:

1. monitored cargo offloading and ballast operations
2. updated impact to weather conditions on operations
3. evaluated heading control requirements against operational parameters as appropriate
4. established and maintained navigational operational parameters as appropriate
5. monitored operations for potential abnormal situations and dealt with them as appropriate
6. maintained communications with Shuttle Tanker Supervisor and Operators
7. carried out routine duties, checks and procedures and reported as appropriate
8. completed ongoing log details

Knowledge Specification: (see also Unit Guidance)

Within the limits of your responsibility you must be able to demonstrate that you know:

- the maximum permissible export rate and reasons for limitations
- the layout of cargo tanks, pipelines, gauges and valves relevant to discharging operations
- cargo pump operational characteristics, capabilities and controls
- how to monitor cargo offloading and ballast operations
- the procedures for evaluating heading control requirements (e.g. turret, thrusters prevailing weather data) against operational parameters as appropriate
- how routine duties, checks and procedures must be carried out and reported
- how to clearly and accurately complete the relevant log details
- the FPSO/FSU telemetry systems

Underpinning Knowledge and Understanding

Within the limits of your responsibility you must be able to demonstrate that you know:

- how to select, use and care for PPE (to include sight/hearing protection, gloves, footwear, hard hats, respirators)
- the implications of statutory (e.g. HASAWA and COSHH) and organisational requirements
- how to interpret operational requirements (e.g. relevant policies, procedures, instructions, codes of practice, standards, schedules)
- the location and identity of all control room equipment using P + IDs as appropriate
- the layout of appropriate working areas (e.g. control room, control stations)
- the layout/function/operation of: process flows; ballast system; cargo system; crude oil washing; inert gas system; cargo heating system; cargo metering, cargo offloading system; shuttle tanker mooring system; FPSO/FSU mooring system; bunkering systems (e.g. polymers, potable water, lube oil, diesel); instrument and plant air; vessel cooling water; diesel system and hydraulic system using P & IDs and Process Flow Diagrams as appropriate
- the location of process high pressures, high temperatures and the relevant safety measures
- how to carry out effective trouble shooting procedures
- the location function and operation of ESD systems using P & IDs as appropriate
- how to carry out effective handovers between shifts and maintain continuity
- the permit to work system
- how to carry out positive reporting of instructional actions, tasks, safety measures and checks ensuring reports are clear accurate and complete
- the emergency procedures relevant to the cargo handling system
- the emergency procedures relevant to the ballast control system
- the emergency procedures relevant to shuttle tanker operations

Unit MOT14 : Monitor and Control the Inert Gas System Activities

This unit is concerned with ensuring that the inert gas systems are safely and efficiently **monitored and controlled** from the FPSO/FSU Control Room. That the necessary planning, preparation and assistance are provided in inerting/purging and gas freeing, operations and all potential operational hazards are safely and effectively managed.

This unit consists of one element:

14.1 Monitor and Control Inert Gas Systems

During this work you must take account of the relevant installation, operational requirements, procedures and safe working practices AS THEY APPLY TO YOU.

In achieving this unit you will have demonstrated that you have successfully met all the required Standards of Performance and that you have all the knowledge and understanding which underpins the achievement of those Standards of Performance. This ensures that you can do the work, understand the work and so can react appropriately to any contingency which falls within your responsibility.

Unit Guidance

Competence Requirements

To fully demonstrate your competence you must effectively contribute to the monitoring/controlling of inert gas systems and the necessary planning/preparation/assistance required for inerting/purging and gas freeing operations. You will also be required to demonstrate your awareness and ability to manage any potential hazards relevant to these operations and can safely and effectively deal with the following abnormal situations:

- pump malfunction or failure
- valve/line blockages
- valve/line malfunctions or failure
- instrument failure
- inboard loss of containment
- outboard loss of containment
- main/auxiliary power failure
- communications failure
- crude out of specification
- unexpected transfer of cargo
- heavy weather routines
- unexpected transfer of cargo
- over/under pressurisation of cargo tanks and associated venting and inert gas lines
- loss of cargo tank or associated venting and inert gas lines atmosphere containment

Where you do not have the opportunity to cover all aspects of the Standards of Performance in the workplace you may be permitted to supplement your demonstration of competence by realistic simulations and questioning.

Element MOT 14.1

MONITOR AND CONTROL INERT GAS SYSTEMS

This element is about monitoring and controlling inert gas systems and contributing to the inerting/purging and gas freeing operations

Standards of Performance:

In achieving this element, you will have:

1. assisted in the operation of the inert gas system as appropriate

2. monitored and maintained records of the inert gas operations during crude oil discharge operation

3. planned, prepared and assisted in inerting/purging and gas freeing operations for cargo tanks

4. verified cargo tank atmosphere suitability prior to introducing hydrocarbons following gas free operation

5. verified cargo tank atmosphere suitability prior to introducing hydrocarbons following gas free operation

Knowledge Specification: (see also Unit Guidance)

Within the limits of your responsibility you must be able to demonstrate that you know:

- the function/operation of the inert gas system during routine storage/prior to discharging/during discharge operations
- inerting and purging procedures, through dedicated toplines/bottom cargo lines
- gas freeing operations utilising fixed and portable equipment how to use fixed and portable measuring equipment
- how to use fixed and portable measuring equipment
- inert gas system components and layout
- inert gas characteristics
- function and operation of inert gas primary and secondary relief systems
- the procedures for monitoring inert gas operations during offloading operation and record requirements
- the procedures for planning, preparing and assisting in inerting/purging and gas freeing operation
- how to verify cargo tank atmosphere
- procedures for controlling inert gas pressures in the cargo system

Underpinning Knowledge and Understanding

Within the limits of your responsibility you must be able to demonstrate that you know:

- how to select, use and care for PPE (to include sight/hearing protection, gloves, footwear, hard hats, respirators)
- the implications of statutory (e.g. HASAWA and COSHH) and organisational requirements
- how to interpret operational requirements (e.g. relevant policies, procedures, instructions, codes of practice, standards, schedules)
- the location and identity of all control room equipment using P + IDs as appropriate
- the layout of appropriate working areas (e.g. control room, control stations)
- the layout/function/operation of: process flows; ballast system; cargo system; crude oil washing; inert gas system; cargo heating system; cargo metering, cargo offloading system; shuttle tanker mooring system; FPSO/FSU mooring system; bunkering systems (e.g. polymers, potable water, lube oil, diesel); instrument and plant air; vessel cooling water; diesel system and hydraulic system using P & IDs and Process Flow Diagrams as appropriate
- the location of process high pressures, high temperatures and the relevant safety measures
- how to carry out effective trouble shooting procedures
- the location function and operation of ESD systems using P & IDs as appropriate
- how to carry out effective handovers between shifts and maintain continuity
- the permit to work system
- how to carry out positive reporting of instructional actions, tasks, safety measures and checks ensuring reports are clear accurate and complete
- the emergency procedures relevant to the cargo handling system
- the emergency procedures relevant to the ballast control system
- the emergency procedures relevant to shuttle tanker operations

Unit MOT15 : Monitor and Control Shutdown for FPSO/FSU Shuttle Tanker Operations

This unit is concerned with ensuring the safe and efficient **shutdown** for FPSO/FSU Shuttle Tanker Operations, and the evaluation of the Shuttle Tanker and Ballast Plan are carried out by the FPSO/FSU Control Room.

This unit consists of one element:

15.1 Shutdown Cargo Offloading Operations

During this work you must take account of the relevant installation, operational requirements, procedures and safe working practices AS THEY APPLY TO YOU.

In achieving this unit you will have demonstrated that you have successfully met all the required Standards of Performance and that you have all the knowledge and understanding which underpins the achievement of those Standards of Performance. This ensures that you can do the work, understand the work and so can react appropriately to any contingency which falls within your responsibility.

Unit Guidance

Competence Requirements

To fully demonstrate your competence you must effectively contribute to the safe shutdown of the FPSO/FSU Shuttle Tanker operational activities and the effective evaluation of the Shuttle Tanker and Ballast/Offload Plan. You will also be required to demonstrate that you can safely and effectively deal with the following abnormal situations:

- shuttle tanker mooring connection failure
- offloading hose failure
- pump malfunction or failure
- valve/line blockages
- valve/line malfunctions or failure
- instrument failure
- IGS malfunction or failure
- inboard loss of containment
- outboard loss of containment
- main/auxiliary power failure
- communications failure
- crude out of specification
- unexpected weather
- heavy weather routines
- unplanned movement of the FPSO/FSU
- failure of FPSO/FSU anchoring systems/mooring failure
- unexpected transfer of cargo
- failure of hawser/hose handling equipment

Where you do not have the opportunity to cover all aspects of the Standards of Performance in the workplace then you may be permitted to supplement your demonstration of competence by realistic simulations and questioning.

Element MOT 15.1

SHUTDOWN CARGO OFFLOADING OPERATIONS

This element is about shutting down the cargo offloading operations and evaluating the Shuttle Tanker and Ballast Plan.

Standards of Performance:

In achieving this element, you will have:

1. responded to shutdown requirements

2. maintained communications with relevant internal/external personnel

3. monitored and controlled the shutdown to ensure satisfactory progress

4. supervised and co-ordinated the hose/hawser and mooring disconnection procedures

5. monitored operations for potential abnormal situations and dealt with them as appropriate

6. evaluated and updated Shuttle Tanker and Ballast/Offload Plan

7. completed all relevant log details

Knowledge Specification: (see also Unit Guidance)

Within the limits of your responsibility you must be able to demonstrate that you know:

- how to respond to shutdown requirements
- how to monitor and control the shutdown to ensure satisfactory progress
- the hose/hawser and mooring disconnection procedures
- how to evaluate and update Shuttle Tanker and Ballast/Offload Plan
- how to clearly and accurately complete all the relevant log details

Underpinning Knowledge and Understanding

Within the limits of your responsibility you must be able to demonstrate that you know:

- how to select, use and care for PPE (to include sight/hearing protection, gloves, footwear, hard hats, respirators)
- the implications of statutory (e.g. HASAWA and COSHH) and organisational requirements
- how to interpret operational requirements (e.g. relevant policies, procedures, instructions, codes of practice, standards, schedules)
- the location and identity of all control room equipment using P + IDs as appropriate
- the layout of appropriate working areas (e.g. control room, control stations)
- the layout/function/operation of: process flows; ballast system; cargo system; crude oil washing; inert gas system; cargo heating system; cargo metering, cargo offloading system; shuttle tanker mooring system; FPSO/FSU mooring system; bunkering systems (e.g. polymers, potable water, lube oil, diesel); instrument and plant air; vessel cooling water; diesel system and hydraulic system using P & IDs and Process Flow Diagrams as appropriate
- the location of process high pressures, high temperatures and the relevant safety measures
- how to carry out effective trouble shooting procedures
- the location function and operation of ESD systems using P & IDs as appropriate
- how to carry out effective handovers between shifts and maintain continuity
- the permit to work system
- how to carry out positive reporting of instructional actions, tasks, safety measures and checks ensuring reports are clear accurate and complete
- the emergency procedures relevant to the cargo handling system
- the emergency procedures relevant to the ballast control system
- the emergency procedures relevant to shuttle tanker operations