Transport Canada Transports Canada

Marine Safety

TP 10937 E

Mobile Offshore Units
Training Courses

Responsible Authority	Approval
The Director, Marine Personnel Standards and Pilotage, is responsible for this document, including any changes, corrections or updates.	_____ Director, Marine Personnel Standards and Pilotage Date signed: _____

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REVISIONS

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1	June 2006	Chapters 1 to 9	Amir Maan and Naim Nazha	Complete revision of the publication and changed to Quality format from its original edition.
2	January 2007	Chapters 10 and 11	Amir Maan	Newly developed courses incorporated.

Important:

This publication is subject to periodic review and it is updated from time to time
Cette publication est sujette à des revues périodiques et elle est mise à jour en fonction des ses modifications successives

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Chapter 1 – Scope and Application

1.1 Purpose

1) To provide information to marine stakeholders, stakeholders of mobile offshore units (MOUs), seafarers and all members of maritime crew who work on board or visit MOUs, with respect to course contents of the mandatory safety and emergency preparedness training required for all personnel on MOUs.

2) To provide recognized institutions with information about requirements for MOU training courses that must be met in order to obtain course approval from Marine Safety, Transport Canada.

1.2 Scope

1) Applicable to seafarers and all maritime crew members who work on board or visit MOUs.

2) Compliance with the *Marine Personnel Regulations* under the *Canada Shipping Act, 2001* and the recommendation on *Training of Personnel on Mobile Offshore Units* as set out in the Annex to *IMO Resolution A.891(21)* of February 2000, as well as the requirements of the *International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978***,** as amended (STCW Convention).

1.3 Effective date

This document enters into force on the day the *Marine Personnel Regulations* come into effect.

1.4 Authority

Canada Shipping Act, 2001.

Chapter 2 – General

2.1 Objectives

1) Compliance with the recommendation on *Training of Personnel on Mobile Offshore Units* as set out in the Annex to *IMO Resolution A.891(21)* of February 2000, as well as the requirements of the STCW Convention.

2) To ensure that the standards for the mandatory safety and emergency preparedness training required for seafarers and all maritime crew members who work on board or visit MOUs are consistent with the provisions of the document *Canadian East Coast Offshore Petroleum Industry, Standard Practice for the Training and Qualifications of Personnel* published by the *Canadian Association of Petroleum Producers* (CAPP).

2.2 Goals

1) To provide seafarers and all members of maritime crew who work on board or visit MOUs with an understanding of the hazards and emergencies associated with the offshore environment and their MOUs.

2) To provide all personnel with standards for familiarization, basic safety training and competencies to cope with such hazards and emergencies to the extent appropriate to their functions on board MOUs.

2.3 Courses

1) The following safety training courses, which are mandatory in certain cases specified in Part 1 of the *Marine Personnel Regulations*, are described in this publication:

   a) Basic Offshore Survival;

   b) Hydrogen Sulphide (H_2S);

   c) Stability and Ballast Control (MOU/surface);

   d) Stability (MOU/self-elevating);

   e) Supervisor Offshore Well Control;

   f) Command and Control and Management of Major Emergencies.

Chapter 3 – Course Approval

3.1 General

Canada's accession to the STCW Convention means that all approved marine training programs and courses must be delivered and monitored through a quality management system.

3.2 Recognized Institution

1) Courses are to be provided by a "recognized institution" as defined in the *Marine Personnel Regulations*. Approval procedures are provided in the document *Quality Management Manual, Marine Personnel Standards and Pilotage*, and specifically in Part II of that document, entitled *Approval of Marine Training Courses and Programs*, which is published by the Department of Transport, Marine Personnel Standards and Pilotage Directorate.

2) Institutions must submit for approval their course syllabus, training manual, instructor qualifications and any other information required by the above-mentioned document, to the following address:

Marine Personnel Standards & Pilotage
Transport Canada, Marine Safety
112, Kent Street, Tower B, 4th Floor
Ottawa, Ontario K1A 0N5

Chapter 4 – Terms and Definitions

Here are the definitions of certain terms used in this publication:

1) "**Combined Operations**" means operations in association with or in close proximity to another MOU or offshore installation, where conditions on the other unit or installation may have an immediate impact on the safety of the unit; for example, a mobile offshore drilling unit attached to a fixed platform.

2) "**Maritime Crew**", in respect of an MOU, comprises the offshore installation manager, barge supervisor, ballast control operator and maintenance supervisor as well as other deck and engineer officers, radio operators and ratings as defined in Regulation I/1 of the STCW Convention.

3) "**Muster List**", in respect of an MOU, means the list that indicates essential information on actions to be taken in the event of an emergency, in particular the station to which each person must go and the duties which that person must perform, including individual responsibilities for the safety of others.

4) "**Survival Conditions**" means conditions wherein a unit may be subjected to environmental loadings in excess of those established by the unit's operating manual. It is assumed that routine operations will have been discontinued due to the severity of the environmental loading. The unit may be either afloat or supported on the seabed.

5) "**MODU** (Mobile Offshore Drilling Unit)" means a marine offshore unit that is designed or fitted for drilling operations beneath the seabed in order to explore or exploit resources such as liquid or gaseous hydrocarbons, sulphur and salt.

6) In the chapters on stability courses, the following acronyms have their standard meaning:
GZ: righting lever
KG: distance between the vessel's keel and centre of gravity
VCG: vertical position of the centre of gravity
LCG: longitudinal position of the centre of gravity
TPC: tons per centimetre of immersion
MTC: moment required to change trim by one centimetre.

Chapter 5 – Minimum Standards of Proficiency for Basic Training

5.1 Table – Minimum standard of proficiency in personal survival techniques

Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
Emergency signals	Participants must receive an initial orientation on the types of emergency signals and their identification Participants must be acquainted with the location of the muster list, as a source for identifying emergency signals In the case of combined operations, participants must be given information on additional alarms and procedures	Examination or assessment of evidence obtained during satisfactory participation in drills and exercises	Actions taken during drills and in emergencies are appropriate to the emergency signal
Mustering of personnel	During onboard orientation all participants must be shown their primary safe muster areas Participants must be acquainted with the posted muster list	Examination or assessment of evidence obtained during satisfactory participation in drills and exercises	Actions taken during drills and in emergencies are appropriate to the emergency signal
Use of lifejackets	Participants must receive instruction on the location, types, inspection and donning of lifejackets	Don lifejacket	Lifejacket is donned correctly
Use of immersion suits	Participants must be given instruction on the location, types, inspection and donning of immersion suits, if required	Don immersion suit	Immersion suits are donned correctly
Lifeboat procedures	Participants must be instructed on proper entry into lifeboats and the use of seat belts	Board lifeboat during drills and strap in	Lifeboat is boarded correctly
Modes of evacuation	Participants must be instructed on the selection and use of available modes of evacuation, which may include: -helicopter -catwalks or bridges -standby vessel -lifeboat -life raft -ladders/escape devices -jumping from height (undesirable)	Examination or assessment of evidence obtained during satisfactory participation in drills and exercises	Demonstration of correct actions during drills and exercises
Boarding life rafts or buoyant apparatus	Participants must be instructed on boarding a life raft or buoyant apparatus both at deck level and from the sea	Examination or assessment of evidence obtained during satisfactory participation in drills and exercises	Demonstration of correct actions during drills and exercises
Water survival techniques	Participants must be instructed on the following, as applicable: - use of lights and whistles and other signalling devices - proper body positions to conserve body heat and prevent hypothermia - how to right an inverted life raft - boarding a rescue craft from the water	Examination or assessment of evidence obtained during satisfactory participation in drills and exercises	Demonstration of correct actions during drills and exercises

Deployment of life rings and associated equipment	Participants must be instructed in the procedures for deploying life rings and associated equipment Participants must be instructed in procedures for raising the alarm	Examination or assessment of evidence obtained during satisfactory participation in drills and exercises	Demonstration of correct actions during drills and exercises

5.2 Table – Minimum standard of competence in fire prevention and basic fire fighting

Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
Minimize the risk of fire and maintain a state of readiness to respond to emergency situations involving fire	Participants must receive instruction in: 1. elements of fire and explosion (the fire triangle) 2. types and sources of ignition 3. flammable materials, fire hazards and spread of fire 4. need for constant vigilance 5. classification of fires and applicable extinguishing agents Participants must receive an initial orientation and familiarization in: 1. onboard fire-fighting organization and muster list 2. location of fire-fighting equipment and emergency escape routes 3. onboard fire and smoke detection and automatic alarm systems 4. actions to be taken on discovery of smoke or fire 5. in the case of combined operations, instruction on additional alarms and procedures Each participant must receive instruction on actions to be taken, given his/her status onboard	Examination or assessment of evidence obtained during satisfactory participation in drills and exercises	Initial actions during drills or in response to emergencies conform to established procedures
Fight and extinguish fires	Participants must receive familiarization instruction in: 1. selection and use of fire-fighting equipment and its location on board 2. selection and use of personal protective equipment 3. fire-fighting and containment methods 4. fire-fighting agents	Examination or assessment of evidence obtained during satisfactory participation in drills and exercises	Actions during drills or in response to emergencies conform to established procedures

5.3 Table – Minimum standard of competence in personal safety

Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
Comply with emergency procedures	- Types of emergency that may occur, such as collision, fire, foundering - General knowledge of contingency plans for response to emergencies and individual responsibilities under these plans - Emergency signals; muster list; muster stations; and correct use of personal safety equipment - Action to take on discovering a potential emergency, including fire, collision, foundering and ingress of water - Action to take on hearing emergency alarm signals - Knowledge of escape routes and internal communication and alarm systems	Examination or assessment of evidence obtained during satisfactory participation in drills and exercises	Action during drills or in response to emergencies conform to established procedures
Pollution prevention	Participants must be instructed in the potentially harmful effects of pollution and in the procedures for identifying and preventing pollution	Examination or assessment of evidence obtained during satisfactory participation in drills and exercises	Follows established pollution prevention procedures
Observe safe working practices	- Importance of adhering to safe working practices at all times - Safety and protective devices available to protect against potential hazards - Precautions to be taken when entering enclosed spaces	Examination or assessment of evidence obtained during satisfactory participation in safety meetings	Safe working practices are observed and appropriate safety and protective equipment is correctly used at all times
Understand orders and instructions and be understood in relation to assigned duties	- Ability to understand orders and instructions and to communicate with others in relation to assigned duties - Participants must be instructed in the chain of command and in the importance of following the orders and instructions of those appointed over them	Follows orders and instructions	Follows orders and instructions given

Chapter 6 – Basic Offshore Survival Training Course

6.1 Course objectives

1) To provide participants with an understanding of offshore activities and familiarization with personal survival techniques and workplace safety;

2) To provide participants with an understanding of the hazards associated with working in an offshore environment, the knowledge and skills necessary to react effectively to offshore emergencies, and the ability to care for themselves and others in a survival situation.

6.2 Course duration

Minimum of thirty-seven and a half (37.5) hours.

6.3 Number of participants in a course

1) The number of participants in a course should not exceed 12 for practical demonstrations, open water drills and pool exercises under the supervision of an instructor;

2) The number of participants should not exceed 24 for lectures and audiovisual instruction under the supervision of an instructor.

6.4 Instructor qualifications

1) The main course instructor should hold a valid certificate of competency not lower than a Barge Supervisor or Maintenance Supervisor certificate. If the main course instructor is not a holder of above stated certificate, in that case he must hold industry recognized qualifications related to the marine offshore industry (offshore Survival training) or must have related skills and be approved by Marine Personnel Standards and Pilotage;

2) If the course is under the supervision of more than one instructor, the assistant instructors must hold qualifications related to the marine industry or must have related skills and be approved by Marine Personnel Standards and Pilotage.

6.5 Minimum equipment required

1) A totally enclosed motor-propelled survival craft (TEMPSC), a portable rescue craft or a lifeboat;

2) An inflatable life raft (minimum 20 persons), fully equipped including an emergency position-indicating radio beacon (EPIRB) buoy;

3) An approved lifejacket for each participant (Marine and Aviation);

4) A complete firefighter's suit for each participant;

5) A variety of immersion suits for at least 120% of the participants;

6) Two approved lifebuoys with lines;

7) One approved lifebuoy with approved light;

8) A rescue sling;

9) A rescue blanket;

10) Portable extinguishers:

   a) 6 dry chemical,

   b) 6 water pressure,

   c) 4 CO_2;

11) Steel trays for containing fires;

12) Propane fuelled props or Safety cans for fuel;

13) Training models of luffing, gravity, single arm davits and marine evacuation systems (may be replaced by audiovisual presentation);

14) Variety of approved hand flares and a legal area to fire them;

15) Visual or audiovisual presentation of the following:

a) Totally enclosed motor propelled survival craft (TEMPSC),

b) Partially enclosed lifeboat,

c) Open lifeboat,

d) Fast rescue craft (FRC),

e) Lifeboat Occupant Recovery system (LORS),

f) Emergency multiple person rescue apparatus (EMPRA) basket,

g) SkySkape Escape system (SES),

h) Preferred Orientation and Displacement (PrOD) Lifeboat Launching system, and

i) Hypothermia, its effects and ways of overcoming it;

16) Access to open waters or pool facilities suitable for teaching the use of the minimum equipment.

6.6 Course content

1) Familiarization and orientation on general arrangement of the MOU, central processes, operating systems, equipment and procedures, organization, safety philosophy and contingency plans, as well as on preventive safety systems such as permit-to-work procedures, the owner or authorized representative's health and medical services, and on other matters related to safety;

2) Hazards and emergencies associated with working offshore;

3) Understanding the critical need to bring any abnormal situation on board the MOU to the attention of a responsible person;

4) Practical familiarity with emergency duties;

5) Emergency preparedness and response;

6) Prevention, detection and control of fire;

7) Self-contained breathing apparatus (SCBA);

8) Personal flotation devices;

9) Knowledge of available evacuation methods and procedures;

10) Knowledge of alarm procedures for emergency situations;

11) Knowledge of safety procedures;

12) Operations and emergencies involving divers, where applicable;

13) Abandoning the MOU;

14) Inflatable life rafts;

15) Totally enclosed motor-propelled survival craft (TEMPSC);

16) Enemies of survival;

17) Search and rescue;

18) Practical sea exercises;

19) Helicopter safety and emergency procedures, including Emergency Compressed Air Breathing systems (EBS) / rebreathers;

20) Helicopter underwater escape trainer (HUET) exercises;

21) Personnel transfer exercises;

22) Demonstration of emergency personal descent devices;

23) Demonstration and use of smoke hoods.

6.7 Course outline

Subject Area	Hours		Audiovisual
	Lecture	Practical	
1. Introduction and principles of safety	0.5 hours		
2. Orientation/familiarization and basic safety communications Safe working practices and permit-to-work system Human relationships aboard MOUs Basic organizational structure and chain of command	1.5 hours		
3. Hazards, emergencies and pollution prevention	2.5 hours		
4. Fire-fighting theory	2.0 hours		
5. Fire control aboard MOUs	1.0 hour		
6. Fire-fighting organization aboard MOUs	1.0 hour		3.0 hours
7. Onboard training and practical fire fighting	1.5 hours	3.0 hours	
8. Use and care of fire-fighting equipment	0.5 hour	1.0 hour	
9. Emergency response	2.0 hours		
10. Helicopter underwater escape training, including EBS / rebreathers	2.0 hours	3.0 hours	
11. Lifesaving appliances and abandonment	2.5 hours	2.5 hours	
12. Survival	2.0 hours	1.0 hour	
13. Rescue	1.0 hour	1.0 hour	
14. Practical exercises and evaluation	1.0 hour	2.0 hours	
Sub-total	21.0 hours	13.5 hours	
Total	**37.5 hours**		

6.8 Course goals

1) To provide participants with basic understanding of the hazards associated with the offshore environment and with their own MOUs.

2) To provide participants with an understanding of types of emergencies which may occur on board MOUs, such as collision, fire and foundering, and to provide them with a basic knowledge of contingency plans for response to emergencies and a knowledge of individual responsibility.

3) To provide participants with an understanding of the potentially harmful effects of pollution and of procedures for identifying and preventing pollution.

4) To provide participants with an understanding of emergency signals, the muster list, muster stations, escape routes, internal communication, alarm systems and the correct use of personal safety equipment found aboard MOUs and to ensure all participants are able to raise and react to alarms, respond to an emergency situation and deal with emergencies.

5) To provide participants with knowledge of the fire triangle, types and sources of ignition, flammable materials, fire hazards, spread of fire, the need for constant vigilance, classification of fires and extinguishing agents.

6) To provide participants with an understanding of the onboard fire-fighting organization, the muster list, fire fighting and containment, emergencies, onboard fire and smoke detection and automatic alarm systems, selection and use of fire-fighting equipment and its location, to enable participants to effectively operate the fire-fighting equipment found on board MOUs.

7) To provide participants with the knowledge and skills necessary to protect themselves and others on board the MOU from fire hazards while fighting fires and to ensure that participants are able to provide assistance in the event of fire or emergency abandonment situations.

8) To provide participants with instructions in:

   a) use of lights and whistles and other signalling devices;

   b) procedures for deploying life rings and associated equipment;

   c) types, inspection and donning of lifejackets and immersion suits;

   d) how to board a survival/rescue craft, such as a lifeboat, life raft or buoyant apparatus both at deck level and from the sea;

   e) proper body positions to conserve body heat and prevent hypothermia;

   f) selection and use of available modes of evacuation, such as helicopter, catwalks or bridges, standby vessel, lifeboat, life raft, ladder/escape devices.

9) To ensure that participants have acquired the understanding, knowledge and skills which will enable them to assist in their own survival and rescue.

10) To provide participants with the knowledge and skills that will enable them to board a life raft or buoyant apparatus both at deck level and from the sea, co-ordinate survival activities, and increase their chances of survival.

11) To enable participants to plan, organize and carry out safety drills.

6.9 Course learning objectives

1) Introduction

   a) Performance Objective: Participants will understand the purpose and the objectives of the course and the course procedures.

2) Participants will demonstrate their understanding of the following:

   a) Familiarization and basic safety

      i) Communication:

         A) Understand and be able to communicate with other persons on board about elementary safety matters,

         B) Understand safety information symbols, signs and alarm signals, especially with regard to knowing what to do if a person falls overboard; fire, smoke, or hydrogen sulphide is detected; or the fire, abandon ship, toxic gas or other general alarm is sounded;

      ii) Locate and don lifejackets;

      iii) Locate and don immersion suits;

      iv) Identify muster and embarkation stations and emergency escape routes;

v) Raise the alarm and have a basic knowledge of the use of portable fire-extinguishers;

vi) Take immediate action upon encountering an accident or other medical emergency on board;

vii) Close and open the fire doors and weathertight doors as well as watertight doors other than those for hull openings;

viii) Follow the unit's basic safe work practices and permit-to-work system;

ix) Understand the unit's basic organizational structure and chain of command.

b) Hazards and emergencies associated with the offshore environment and MOUs

i) Instructional Objective:

A) Without the use of reference material, the participant will be able to list the major types of emergencies which may occur on marine offshore units.

B) Acceptable performance means the participant can correctly recall and describe the types of emergencies which may occur.

ii) Associated Learning Task:

A) Identify types of emergencies which may occur on various types of marine offshore units and their associated causes, including fire and explosion, collision, structural failure, foundering, grounding, severe weather, cyclones, approaching iceberg and operational pollution such as hydrocarbon leakages.

c) Fire fighting

i) Instructional Objective 1:

A) Without the use of reference material, the participant will be able to list all four elements of the fire tetrahedron and describe the principle of extinguishing fires by removing one of the four elements of the tetrahedron.

B) Acceptable performance means the participant can correctly identify the four elements of the fire tetrahedron and explain the principle of extinguishment in terms of the tetrahedron.

ii) Associated Learning Tasks:

A) Identify the four elements of the fire tetrahedron and explain that all four elements are required in the correct proportion to sustain combustion.

B) Explain the effect of removing one element of the fire tetrahedron.

iii) Instructional Objective 2:

A) Without the use of reference material, the participant will be able to identify the four classes of fire and identify their graphic symbols.

B) Acceptable performance means the participant can identify the four classes of fires and identify their graphic symbols.

iv) Associated Learning Tasks:

A) Describe the four classes of fire (A, B, C and D).

B) Identify the graphic symbols for class A, B, C and D fires.

v) Instructional Objective 3:

A) Without the use of reference material, the participant will be able to identify the agents that can be used to extinguish each of the four classes of fires and describe how they work.

B) Acceptable performance means the participant can correctly correlate the classes with the extinguishing agents and can explain the principle of extinguishment for each of the agents.

vi) Associated Learning Task:

A) For each of the four classes of fire, identify the appropriate extinguishing agents and explain how they extinguish fires.

vii) Instructional Objective 4:

A) Given a number of portable fire extinguishers, the participant confronted with a fire will be able to use the extinguisher to control and put out the fire.

B) Acceptable performance means the participant can successfully select the correct fire extinguisher and extinguish small class A and B fires in the open.

viii) Associated Learning Task:

A) Demonstrate the correct use of portable fire extinguishers, including portable carbon dioxide extinguishers, portable dry chemical extinguishers and portable water extinguishers, for extinguishing class A, B and C fires.

ix) Instructional Objective 5:

A) Without the use of reference material, the participant will be able to describe the safety rules for attacking a fire with a portable extinguisher.

B) Correct recall of the safety rules constitutes acceptable performance.

x) Associated Learning Task:

A) Describe safe practices for attacking a fire with a portable extinguisher:

B) After discovering a fire, always raise the alarm before attacking the fire;

C) Never pass the fire in order to fetch an extinguisher;

D) Always check that the extinguisher is operational before approaching the fire;

E) Keep low while attacking the fire and never turn your back on the fire even after it is out;

F) As soon as possible, provide hose line back-up to those attacking the fire with a portable extinguisher;

G) Report the use of a portable extinguisher to your supervisor and do not return it to its station.

d) Emergency response:

i) Instructional Objective 1:

A) Without the use of reference material, the participant will know the types of information found on an emergency muster list.

B) Acceptable performance means the participant can correctly state the types of information found on an emergency muster list.

ii) Associated Learning Task:

A) Discuss the need to be constantly aware of:

B) the participant's specific duties in any emergency;

C) his/her own survival craft station;

D) the signals calling all crew to their survival craft or fire station.

iii) Instructional Objective 2:

A) The participant will understand the importance of training and proper drills and be aware of the need to be ready for an emergency at any time and what that involves.

B) Acceptable performance means that the participant understands the importance of training and drills and can correctly state the precautions they can take in order to be ready for an emergency at all times.

iv) Associated Learning Tasks:

A) Discuss the purpose and importance of training and drills;

B) Discuss the need to be ready for any emergency and be aware of the location of his/her own and spare lifejacket or immersion suit, location of fire alarm controls, means of escape including alternate route if primary route is unattainable and consequences of panic.

v) Instructional Objective 3:

A) Given a specific emergency situation, the participant will list the actions to be taken.

B) Acceptable performance means that the participant, without the use of reference material, can state the correct actions to take upon discovering an emergency situation and upon being called to emergency stations.

vi) Associated Learning Tasks:

A) Discuss the immediate actions to be taken upon discovering an emergency situation: fire, person overboard, unconscious casualty in tanks or enclosed spaces, injured person, and flooding.

B) Discuss the actions to be taken when called to emergency stations: the need for clothing suitable for the emergency situation and the weather conditions and donning a lifejacket/immersion suit.

e) Lifesaving appliances and abandonment

i) Instructional Objective 1:

A) Given lifejackets, immersion suits and lifebuoys found on MOUs the participant will be able to explain and demonstrate their proper use.

B) Acceptable performance means that the participant can demonstrate in water the proper use of lifejackets, immersion suits and lifebuoys.

ii) Associated Learning Task:

A) Explain and demonstrate how to correctly use a lifejacket, including donning and wearing a lifejacket properly, entering water from a 4.5 metre height or from the highest practical lesser height depending upon facility arrangements, wearing a lifejacket properly and swimming while wearing a lifejacket.

B) Explain and demonstrate how to correctly don and use immersion suits found on MOUs, including donning and wearing suit properly, entering water from a 4.5 metre height or from the highest practical lesser height depending upon facility arrangements, wearing suit properly and swimming while wearing an immersion suit.

C) Explain and demonstrate how to correctly use lifebuoys found on MOUs, including throwing a buoy, securing oneself to a buoy while in water, and waiting for rescue.

iii) Instructional Objective 2:

A) The participant will be aware of the various types of survival craft and launching devices found on board units.

B) Acceptable performance means that the participant can describe survival craft in general terms and give a brief description of the characteristics and operations of evacuation systems, including luffing davits, gravity davits, and single arm davits.

iv) Associated Learning Task:

A) Discuss the characteristics and outfitting of the following types of survival craft: totally enclosed motor propelled survival craft (TEMPSC), enclosed boat, open lifeboat, inflatable life raft.

B) Discuss the following types of marine evacuation system: luffing davits, gravity davits and single-arm davits.

C) Discuss the actions to be taken to board the survival craft from the vessel or from the water.

v) Instructional Objective 3:

A) Given an approved marine life raft, the participant will be able to launch the raft, right it when capsized, board it from the water, manoeuvre it, and use the sea anchor to reduce drift.

B) Acceptable performance means that the participant can assist in launching a life raft and then right a capsized raft, board it from the water, manoeuvre the raft and use the sea anchor.

vi) Associated Learning Tasks:

A) Discuss the storage of inflatable life rats and demonstrate the launching of a raft.

B) Demonstrate how to right a capsized raft.

C) Demonstrate how to board an inflatable life raft from the water, using rope ladders and boarding ramps.

D) Demonstrate how to manoeuvre a raft.

E) Demonstrate how to set a sea anchor.

F) Discuss the function of the releasing mechanism.

f) Survival

i) Instructional Objective 1:

A) The participant will be made aware of the factors relating to survival.

B) Acceptable performance means that the participant can identify and correctly explain these factors.

ii) Associated Learning Tasks:

A) Identify the factors related to survival and discuss how each factor affects human response and performance in a survival situation.

B) Discuss the medical aspects of survival including thermal balance, water balance and energy balance.

iii) Instructional Objective 2:

A) When in the water, the participant will be able to take action necessary to increase their chances of survival and rescue.

B) Acceptable performance means that the participant, while in the water, can demonstrate the HELP position and can swim with a group in a chain and form a huddle.

iv) Associated Learning Tasks:

A) Discuss and explain the need to stay together in the water.

B) Demonstrate the HELP position.

C) Demonstrate how to swim as a group in a chain.

D) Demonstrate how to form a huddle in the water.

v) Instructional Objective 3:

A) Without reference material, the participant will be able to describe the actions to be taken after abandoning a vessel in a survival craft.

B) Acceptable performance means that the participant can recall the correct actions.

vi) Associated Learning Tasks:

A) Discuss the actions to be taken after leaving the vessel in an enclosed boat.

B) Discuss the actions to be taken after abandoning the vessel in an open lifeboat.

C) Discuss the actions to be taken after abandoning the vessel in an inflatable life raft.

g) Rescue

i) Instructional Objective 1:

A) Without the use of reference materials, the participant will know how to assist in their own rescue by the correct use of rescue apparatus, whether being rescued by civilian or military personnel.

B) Acceptable performance means the correct description and use of rescue sling, rescue basket, rescue nets and rescue litters.

ii) Associated Learning Tasks:

A) Discuss the following rescue apparatuses used by civilian or military rescue personnel and how they are used in a rescue operation: rescue sling and rescue basket.

B) Discuss how individuals can assist in their own rescue.

C) Demonstrate the use of rescue apparatuses, including a rescue sling (single lift and two-person lift) and a rescue basket.

iii) Instructional Objective 2:

A) Given various emergency signalling devices, the participant will be able to recognize and operate each device to signal search and rescue personnel.

B) Acceptable performance means that the participant can describe and operate the following signalling devices: emergency position-indicating radio beacon (EPIRB) buoy, daylight signalling device (heliograph mirror), signalling flash light, hand flare and parachute rocket flare.

iv) Associate Learning Tasks:

A) Identify, and demonstrate the above-mentioned signalling devices found in survival craft.

B) Discuss when it is appropriate to operate each device in an actual survival situation.

h) Theoretical and Audiovisual

i) Theoretical and audiovisual training in the following:

A) Life-saving and rescue appliances including their upkeep, with emphasis on the equipment presently being used on MOUs, and the development of new appliances such as free fall lifeboats, evacuation systems and Arctic survival units;

B) Boarding and disembarking from a personnel basket;

C) Cold weather survival;

D) Pollution, potentially harmful effects of pollution, and steps to identify and prevent pollution; introduction to established pollution prevention procedures;

E) Offshore explosions and poisonous gases, fixed and portable monitoring and detection devices, and location of hazardous area zones;

F) Boiling liquid expanding vapour explosion (BLEVE);

G) Alarms and related protection systems;

H) Fires and hazards resulting from dangerous materials carried on MOUs, i.e.: cement, oil-base or chemical-added mud, flammable liquids, aviation gas, caustic soda, explosives, radioactive material, oxy/acetylene cylinders;

I) Safety in transportation and rescue by helicopter.

i) Practical

i) Practical training in the following:

A) Boarding, launching and releasing a TEMPSC or capsule and steering it away from the MOU;

B) Safe procedure for boarding and disembarking using a personnel basket;

C) Isolating helicopter fires, rescuing personnel, and fighting such fires either on marked helipad on top of vessel mock-up or on adjacent land;

D) Established pollution prevention procedures;

E) Escape and rescue procedure.

6.10 Recognized equivalent training certificates

1) None.

6.11 Attachments

1) For information, the following sample drills and exercises are described in attachments to this publication:

a) Attachment 1 – Sample drill/exercise record

b) Attachment 2 - Sample assessment drill record sheet

c) Attachment 3 - Sample offshore emergency response exercise

d) Attachment 4 - Possible elements of emergency response for developing routine drills

e) Attachment 5 - Standard assessment drills

f) Attachment 6 - Survival craft boarding procedures

g) Attachment 7 - Survival craft start and launching procedures

h) Attachment 8 - Escape drill

i) Attachment 9 - First aid drill

j) Attachment 10 - Fire drill

2) Performance Objective: Participants will demonstrate individual competence in the elements of basic safety training and will demonstrate their understanding that proper drills and exercises are to be conducted and that these exercises are to be the primary means of testing and maintaining the emergency response arrangements of an MOU.

3) Offshore/onshore exercises: Many MOUs rely on response by shore-based support in case of major emergencies:

a) These exercises are to be used to test and develop communications and relationships between the unit and onshore emergency support teams.

b) Offshore/onshore exercises must be held with sufficient frequency to allow each offshore installation manager to participate in at least one exercise every 3 years, i.e. the average frequency should be approximately 18 months.

4) Offshore exercises: These exercises are to be conducted to test and develop communications and relationships between those on board the unit and the unit's emergency support teams. They are also used to test and develop integrated emergency response arrangements for units engaged in combined operations.

5) Drills are to be structured so as to demonstrate that associated emergency appliances and equipment are complete, in good working order and ready for immediate use.

6) Debriefings are to be held after each drill or exercise, for training purposes and also to assist in the overall assessment of the drill/exercise.

7) For units that may be working with open wells, the status of the well and the safety of well operations must be given special consideration.

8) The development of drills and exercises addressing combined operations is encouraged, though for units involved in such operations, the effect of the drill/exercise on the other unit or facility must be considered.

6.12 Attachment 1 – Sample drill / exercise record

Unit: **Date:**

Brief description of drill / exercise scenario (e.g. fire in pantry, muster)

Emergency response elements exercised:

1	Emergency Control Centre Command Communications Information availability Establishing alternate location	5	First Aid Casualty management Casualty handling Casualty evacuation	9	Man Overboard Rescue boat launching Communication with standby vessel
2	Mustering Accounting for personnel Moving and controlling personnel Communications	6	Well Control (if applicable) Trip drills Kick drills Well control Well kill Shallow gas	10	Severe Storm Securing equipment on deck Preserving watertight integrity
3	Evacuation/Escape Survival craft boarding Survival craft launching Escape systems Protective equipment Communications	7	Helideck (if installed) Leadership Fire monitor and rescue equipment Casualty handling	11 12	Hydrogen Sulphide Diving Operations (if applicable) On-board emergency while divers submerged Emergencies involving divers
4	Fire Teams Leadership Communications Fire containment and extinction Dewatering Breathing apparatus procedures Search and rescue Casualty handling	8	Collision/Flooding Manual operation of valves Preserving watertight integrity Emergency dewatering	13	Assistance to Others

Comments on performance:

Recommendations for improvements:

Signed: Position:

Date:

6.13 Attachment 2 – Assessment drill record sheet

(A separate record sheet must be completed for each drill)

Unit Name

Location

Date of Drill

Drill No. or Title

Participants Assessed

Name	Employer	Training Passport or Record No.	Performance

Assessor

Name

Position

I confirm that I have assessed the performance of the above participants against the drill objectives and found it to be satisfactory. I have endorsed their individual records accordingly.

Signature

Date

Offshore Installation Manager

I confirm that the above drill and assessment was carried out.

Signature

Date

6.14 Attachment 3 – Sample offshore emergency response exercise

Objective:
To demonstrate the unit's ability to respond to a major incident which escalates to the point that evacuation is appropriate.

Outline scenario:
- Exercise commences with a manually initiated alarm and a report of fire, collision, loss of well control or other escalating event.
- Emergency response procedures are put into action.
- One or more people are identified as missing.
- The event escalates until the response teams conclude containment is no longer possible.
- Abandon unit procedures are initiated.
- Personnel proceed to controlled evacuation or escape points, as directed.

Expected response:
- Personnel make job sites safe and proceed to assigned muster areas.
- On units engaged in well operations, the drill crew closes the well and makes it safe.
- The OIM proceeds to designated emergency control point and takes control.
- Standby vessel, emergency response organizations, and onshore base(s) are notified of exercise, as appropriate.
- Mustering; identification of missing person or persons and where last seen.
- Fire teams, appropriately clothed, run hoses and commence search of area.
- Where safe and appropriate to do so, fixed fire-fighting systems are activated and performance verified.
- Casualties are located and are moved to a safe area by first aid responders or the stretcher bearers.
- Fire escalates and personnel ordered to preferred evacuation points.
- Fire teams are withdrawn and abandon unit alarm is initiated.

Possible scenario variables: (Not all will be used in a single exercise)
- Communications failure between fire team leader, muster checkers or OIM.
- OIM incapacitated at some stage during the exercise.
- Other key personnel incapacitated.
- Routes to muster areas or evacuation points are blocked.
- Critical equipment fails, e.g., loss of a fire pump.
- Search teams are trapped.
- Casualties in other areas require immediate medical attention.

6.15 Attachment 4 – Possible elements of emergency response for developing routine drills

1 Emergency Control Centre
Command
Communications
Information availability
Establishing alternate location

2 Mustering
Accounting for personnel
Moving and controlling personnel
Communications

3 Evacuation/Escape
Survival craft boarding
Survival craft launching
Escape systems
Protective equipment
Communications

4 Fire Teams
Leadership
Communications
Fire containment and extinction
Dewatering
Breathing apparatus procedures
Search and rescue
Casualty handling

5 First Aid
Casualty management
Casualty handling
Casualty evacuation

6 Well Control (if applicable)
Trip drills
Kick drills
Well control
Well kill
Shallow gas

7 Helideck (if installed)
Leadership
Fire monitor and rescue equipment
Casualty handling

8 Collision/Flooding
Manual operation of valves
Preserving watertight integrity
Emergency dewatering

9 Man Overboard
Rescue boat launching
Communication with standby vessel

10 Severe Storm
Securing equipment on deck
Preserving watertight integrity

11 Hydrogen Sulphide

12 Diving Operations (if applicable)
On-board emergency while divers submerged
Emergencies involving divers

13 Assistance to Others
(particularly for combined operations)

6.16 Attachment 5 – Standard assessment drills

Mustering

Drill objectives: Participants are to demonstrate to the satisfaction of the assessor that on hearing/observing alarms, they can:

- correctly identify the alarm, make their work area safe, and proceed to their assigned muster area
- arrive at the muster area suitably clothed, with the required personal protective equipment, and with such other equipment as may be assigned on the muster list or station bill
- follow the instructions and directions of the muster checker or other person in control
- don their personal protective equipment.[1]

Drill conditions: This drill may form part of the unit's routine drill program provided that:

- the assessor is in a position to observe the participants at their muster area
- the drill includes transferring the group from the muster area to the point of evacuation or escape, if different from the muster area
- the persons being assessed can demonstrate the ability to don all appropriate personal protective equipment.[2]

Assessment frequency: Personnel are to be assessed on their performance in the drill at 21- to 27-month intervals (average 24 months).

Assessment process: Before the drill begins, the participants for assessment must be identified so as to be recognizable by the assessor.

- The assessor will evaluate each participant's success in achieving the drill objectives.
- If the assessor is not satisfied with a participant's performance, the participant's supervisor or employer must be informed.

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1 Including both lifejackets and immersion suits if operating in an area where immersion suits are provided. If sealed immersion suits are provided, individuals may demonstrate donning procedures on suits provided for demonstration and drill purposes.

2 For assessment purposes, this part of the drill may take place at the end of the routine drill when other personnel have completed the drill.

6.17 Attachment 6 – Survival craft boarding procedures

WARNING - PRECAUTIONS MUST BE TAKEN TO PROTECT AGAINST INADVERTENT ACTIVATION OF THE SURVIVAL CRAFT'S RELEASING GEAR DURING THIS DRILL

Drill objectives: By the end of the drill participants will demonstrate to the satisfaction of the assessor that they can:

- board a survival craft in accordance with appropriate procedures
- secure themselves in the survival craft
- assist others in the survival craft.

Drill conditions: This drill may form part of the unit's routine drill program provided that the assessor is in a position to observe participants throughout the drill.

Assessment frequency: Personnel are to be assessed on their performance in the drill at 21- to 27-month intervals (average 24 months).

Assessment process: Before the drill begins, the participants for assessment must be identified so as to be recognizable by the assessor.

- The assessor will evaluate each participant's success in achieving the drill objectives.
- If the assessor is not satisfied with a participant's performance, the participant's supervisor or employer must be informed.

6.18 Attachment 7 – Survival craft start and launching procedures

WARNING - PRECAUTIONS MUST BE TAKEN TO PROTECT AGAINST INADVERTENT ACTIVATION OF THE SURVIVAL CRAFT'S RELEASING GEAR DURING THIS DRILL

Drill objectives: By the end of the drill, participants will demonstrate to the satisfaction of the assessor that they:

- can secure the survival craft for launch
- can start the survival craft using both primary and back-up systems
- are familiar with the procedures for launching and releasing the survival craft
- know which way to steer the survival craft
- are familiar with the essential equipment on board the survival craft.[1]

Drill conditions: This drill will not normally form part of the unit's routine drill program. It must be carried out at the end of a routine drill or as a separate event. The number of personnel involved in the drill must be restricted, normally to a maximum of six.

Assessment frequency: Personnel are to be assessed on their performance in the drill at 21- to 27-month intervals (average 24 months).

Assessment process: The assessor will ask participants to secure the survival craft ready for launch and then ask them to talk through the start-up launch and steering procedures. If the assessor is not satisfied with a participant's performance, the participant's supervisor or employer must be informed.

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1 Care must be exercised to prevent the inadvertent broadcast of distress calls when handling equipment such as radios and EPIRBs.

6.19 Attachment 8 – Escape drill

Drill objectives: By the end of the drill participants will demonstrate to the satisfaction of the assessor that they know:

- the locations of the unit's escape and emergency communications equipment, e.g. life rafts, knotted ropes, scramble nets, other personnel escape systems and EPIRBs
- how to deploy the equipment
- the techniques for using the equipment[1]
- the precautions for jumping into the water from a height.

Drill conditions: This drill must be carried out at the end of a routine drill or as a separate event. When it is used for assessment purposes, the number of participants in the drill must be restricted to a maximum of six.

Assessment frequency: Personnel are to be assessed on their performance in the drill at 21- to 27-month intervals (average 24 months).

Assessor: The assessment will be carried out by a supervisor who has the knowledge and skills necessary to correctly perform it.

Assessment Process: The assessor will ask participants to lead him/her to the place where the escape systems are located. They will then be asked to talk through the procedures for deploying the equipment, outline how the equipment must be used and, when appropriate, demonstrate its use. If the assessor is not satisfied with a participant's performance, the participant's supervisor or employer must be informed.

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1 Care must be exercised to prevent inadvertent broadcast of distress calls when handling equipment such as radios and EPIRBs.

6.20 Attachment 9 – First aid drill

Drill objectives: By the end of the drill participants will demonstrate to the satisfaction of the assessor that they:

- can take the basic precautions to maintain an airway
- understand and can apply basic cardio-pulmonary resuscitation (CPR)
- can take necessary precautions to control bleeding
- know how to assist a hypothermia victim.

Drill conditions: This drill must be carried out with a maximum of six participants under controlled conditions. If available, suitable aids should be used to assist participants in demonstrating their skills to the satisfaction of the assessor.

Assessment frequency: Personnel are to be assessed on their performance in the drill at 21- to 27-month intervals (average 24 months).

Assessment Process: The assessor will take the participants through the basic requirements of first aid, ask questions of the group, and ask for demonstrations of the various techniques. A first aid mannequin must be available for the demonstrations. If the assessor is not satisfied with a participant's performance, the participant's supervisor or employer must be informed.

6.21 Attachment 10 – Fire drill

Drill objectives: By the end of the drill participants will demonstrate to the satisfaction of the assessor that they:

- understand the elements of fire and explosion, types and sources of ignition, classification of fires and appropriate extinguishing agents
- know the onboard fire-fighting organization and their individual responsibilities
- can locate fire-alarms, fire-fighting equipment and emergency escape routes
- can take the necessary action upon discovering smoke or fire
- know how to exit a smoke-filled space
- can properly use breathing apparatus, if provided
- can properly use equipment commonly used to extinguish small fires.

Drill conditions: This drill must be carried out with a maximum of six participants under controlled conditions. Use of actual equipment is encouraged if safe.

Assessment frequency: Personnel are to be assessed on their performance in the drill at 21- to 27-month intervals (average 24 months).

Assessment process: The assessor will examine participants on their basic knowledge of fire theory, on-board fire-fighting, fire-fighting organization and individual responsibilities. Participants will be asked to individually demonstrate and walk through the actions they would take upon discovery of smoke or fire.

Chapter 7 – Hydrogen Sulphide (H_2S) Training Course

7.1 Course objective

1) To provide participants with an awareness of the dangers associated with hydrogen sulphide (H_2S) gas and the appropriate measures to be taken should it be encountered.

7.2 Course duration

1) Minimum of eight (8) hours

7.3 Number of participants in a course

1) The number of participants in a course should not exceed 12 for practical demonstrations under the supervision of an instructor;

2) The number of participants should not exceed 24 for lectures and audiovisual instruction under the supervision of an instructor.

7.4 Specific instructor qualifications

1) The main course instructor should hold a valid certificate of competency not lower than a Barge Supervisor or Maintenance Supervisor certificate. If the main course instructor is not a holder of above stated certificate, in that case he must hold industry recognized qualifications related to the Marine Offshore industry (H2S training) or must have related skills and be approved by Marine Personnel Standards and Pilotage;

2) If the course is under the supervision of more than one instructor, the assistant instructors must hold qualifications related to the marine industry or must have related skills and be approved by Marine Personnel Standards and Pilotage.

7.5 Course content

1) Characteristics of H_2S;

2) Symptoms of H_2S poisoning;

3) Exposure limits and toxicity levels;

4) Methods of detecting and monitoring H_2S;

5) Operation and maintenance of breathing apparatus;

6) Response strategy;

7) Rescue techniques;

8) Resuscitation.

7.6 Course outline

Subject area	Hours	
	Lecture	**Practical**
1. Introduction and safety	0.5 hours	
2. Hazards and emergencies	1.0 hour	
3. Symptoms of H_2S poisoning, exposure limits and toxicity levels	1.0 hour	
4. Methods of detecting and monitoring H_2S	1.5 hours	1.0 hour
5. Protective equipment	1.0 hour	1.0 hour

6. Emergency response	1.0 hour	
Sub-total	6.0 hours	2.0 hours
Total	**8.0 hours**	

7.7 Course goals and learning objectives

1) Introduction

   a) Performance Objective: Participants will understand the purpose and the objectives of the course and course procedures.

2) Characteristics and hazards of hydrogen sulphide (H_2S)

   a) Performance Objective: Participants will demonstrate a thorough understanding of the following:

      i) Characteristics of H_2S, including its physical properties;

      ii) Health effects of inhaling H_2S gas;

      iii) Acute health hazards;

      iv) Long-term health hazards.

3) Symptoms of H_2S poisoning

   a) Performance Objective: Participants will demonstrate a thorough understanding of all known symptoms of H_2S poisoning.

4) Exposure limits and toxicity levels:

   a) Performance Objective: Participants will demonstrate a thorough understanding of

      i) Site rules and procedures;

      ii) Possible H_2S sources;

      iii) Exposure limits and toxicity levels.

5) Methods of detecting and monitoring H_2S

   a) Performance Objective: Participants will demonstrate a thorough understanding of:

      i) H_2S detecting and monitoring equipment (i.e. chemical sensing instruments and detector tubes) and potential limitations and interference associated with the use of this equipment;

      ii) Proper use of different types of monitoring equipment (e.g. personal, hand held and remote monitors);

      iii) Maintenance, testing and calibration of the equipment mentioned in (i) and (ii), according to the recommendations of manufacturers;

      iv) Signage and product labels.

6) Protective Equipment

   a) Performance Objective: Participants will demonstrate a thorough understanding of the operation and maintenance of breathing apparatuses most commonly in use, e.g. pressure-demand self-contained breathing apparatus (SCBA) and supplied air breathing apparatus (SABA).

7) Emergency response

   a) Performance Objective: Participants will demonstrate a thorough understanding of:

      i) Pre-job planning and site rules and procedures;

      ii) Response strategy;

iii) Rescue techniques;

iv) Resuscitation;

v) Rescue and evacuation procedures.

7.8 Recognized equivalent training certificates

1) None.

Chapter 8 – Stability and Ballast Control (MOU/surface) Training Course

8.1 Course objectives

1) To provide participants with a thorough understanding of the terminology and principles of static and dynamic stability, and of stability management procedures related to mobile offshore units (MOUs)

2) To provide participants with an advanced knowledge of the principles of stability and the application of that knowledge to the day-to-day operation of a column-stabilized installation in both the intact and damaged condition with emphasis on the response of the installation to various loading and environmental forces

3) To provide participants with knowledge of and ability to apply relevant international and national standards concerning stability, and with practical experience in emergency procedures on MOUs, including knowledge of the effect on trim and stability of flooding due to damage, fire-fighting, loss of buoyancy or other reasons, and countermeasures to be taken

8.2 Course duration

1) Minimum of sixty-three (63) hours

8.3 Number of participants in a course

1) The number of participants in a course should not exceed 12 for practical demonstrations under the supervision of an instructor;

2) The number of participants should not exceed 24 for lectures and audiovisual instruction under the supervision of an instructor.

8.4 Specific instructor qualifications

1) The main course instructor must hold a valid certificate of competency not lower than Barge Supervisor, MOU/surface. If the course is under the supervision of more than one instructor, the assistant instructors must hold qualifications related to the marine industry or must have related skills and be approved by Marine Personnel Standards and Pilotage.

8.5 Course content

1) The fundamental principles of vessel construction, principal structural members, effects of corrosion on structures and required periodic inspections, especially with regard to MOUs/surface;

2) Basic stability: understanding of general terms such as displacement, draught, trim, heel, freeboard, buoyancy and reserve buoyancy;

3) Understanding of centre of gravity, centre of buoyancy, position of metacentre, GZ and their effects on transverse stability;

4) Stable, unstable and neutral equilibrium;

5) Theory of moments as applied to stability, including effects of heavy lifts and their movement;

6) Effect of adding, removing and shifting of weights; calculation of vertical, transverse and longitudinal shift of centre of gravity;

7) Understanding of the inclining experiment report and its use;

8) Theory and effect of free surface on stability and factors affecting same;

9) Theories and factors affecting trim and stability and the measures necessary to preserve trim and stability;

10) Understanding of change of trim, trimming moments, longitudinal metacentre and longitudinal stability; change of draft, change of longitudinal centre of buoyancy and centre of gravity, TPC and MTC;

11) Use of hydrostatic curves, deadweight scales and hydrostatic tables;

12) Use of cross curves to produce a curve of static stability, and deriving information from curve;

13) The static and dynamic stability of MOUs, synchronous rolling and angle of loll; stability criteria for MOUs; stability at large angles;

14) Use of loading stability information contained in or derived from stability and trim diagrams, operating manuals, or computer-based loading and stability programs;

15) Knowledge of and ability to apply relevant international and national standards concerning stability; the relationship between these standards and regulatory requirements with respect to stability curves for operating conditions and survival conditions, taking into account the effect of prevailing environmental conditions;

16) The effect on MOU trim and stability of damage to and consequent flooding of any compartment, and countermeasures to be taken;

17) Knowledge of the principle of watertight integrity, the importance of maintaining it on an MOU, and procedures for maintaining it;

18) Knowledge of methods and aids to prevent pollution of the environment; knowledge of relevant international and national requirements, especially with regard to responsibilities under international agreements and with regard to certificates and other documents required by international conventions or national law, how the documents may be obtained and their period of validity;

19) Loading supplies and ballasting in order to keep the unit's stresses within acceptable limits;

20) Effect of mooring system on stability;

21) Daily loading calculations;

22) Application of stability knowledge, where the following must include the relevant theory and calculations:

- a) Deck loads and their effect on stability; change in lightweight,
- b) Examination of bilge and ballasting systems and procedures,
- c) Response to system failures including station-keeping systems, damage to structures and subsequent action,
- d) Damaged stability, damage control procedure, watertight compartments counter-flooding, use of pumps and pumping systems, secondary de-ballast systems and cross-connections,
- e) By-passing pumps for gravity flow,
- f) Calculation of final draft after flooding of various compartments,
- g) Environmental conditions and their effect on stability,
- h) Unit and environmental limitations and criteria for moving into survival conditions mode,
- i) Zones of reduced stability, precautions to take, unsymmetrical ballasting/de-ballasting and importance of sequence with regard to stress,
- j) Theory of calculations carried out on daily loading sheet, use of daily loading reports and marine operations manual; variations in chain deployed and effect on vertical moment,
- k) Emergency procedures.

Note: Course curriculum must include the use of a computer-based ballast control simulator capable of simulating the functions of a typical twin pontoon column-stabilized installation and the response of the installation to various loading and environmental forces in both the intact and damaged condition. The simulator must be mounted on a tilting device or provided with a dedicated display, which gives a continuous pictorial representation of the attitude of the installation (i.e. combined heel and trim).

8.6 Course outline

Subject area	Hours		
	Lecture	Practical	Simulator
1. Introduction and principles of basic stability	0.5 hours		
2. Basic vessel, MOU/surface, MODU construction	1.5 hours		
3. Terminology, definitions and stability	2.5 hours		
4. Stability criteria for MOUs (static and dynamic)	3.0 hours		
5. Theories and factors affecting trim and stability and the measures necessary to preserve trim and stability	2.5 hours		
6. Effects of weight, ballast and free surface on trim and stability	3.0 hours		
7. Transverse stability at small angles	1.0 hour		
8. Longitudinal stability	1.0 hour		
9. Deck loads and heavy lifts	1.0 hour		
10. Environment conditions and effects	1.0 hour		
11. Inclining experiment	3.0 hours		
12. MOU/surface and MODU systems	1.0 hour		
13. Mooring, mooring forces and effects on stability	2.0 hours		
14. Marine operations manual	1.5 hours	1.0 hour	
15. Stability calculations and reports	2.0 hours	2.0 hours	
16. Damaged stability	1.5 hours		
17. Theory of watertight integrity, damage control and damage control procedures	2.5 hours		
18. Emergency response and response to system failures	3.5 hours		
19. Storm survival preparations	2.0 hours		
20. Simulator training or worst case scenarios	1.0 hour		
21. Exercises / Assessments	1.0 hour	1.0 hour	2.0 hours
Sub-total	38 hours	4.0 hours	21 hours
Total	**63 hours**		

8.7 Course goals

1) To provide participants with an understanding of the fundamental principles of vessel construction, principal structural members and effects of corrosion on structure, particularly with respect to column-stabilized MOUs;

2) To enable participants to understand the terminology used to describe the hydrostatic and stability characteristics of floating bodies; theories and factors affecting trim and stability and measures to preserve trim and stability;

3) To enable participants to understand the significance of the relative positions of the centre of buoyancy or gravity and metacentre on transverse and longitudinal stability;

4) To enable participants to fully understand the effects of free surface on stability and factors affecting same;

5) To develop in the participants an understanding of, and an ability to perform, calculations related to initial stability and equilibrium in the transverse direction;

6) To develop in the participants an understanding of equilibrium in the longitudinal direction and an ability to perform calculations related to longitudinal stability;

7) To provide participants with an understanding of the use of loading information that may be contained in or derived from stability and trim diagrams, the MOU's marine operations manual, or computer-based

loading and stability programs, and an ability to use this information to calculate a vessel's stability conditions;

8) To provide participants with a thorough understanding of the stability and loading characteristics and stability management procedures for MOUs/surface (particularly with respect to MODUs);

9) To give participants an understanding of the inclining experiment report and its use;

10) To provide participants with a thorough understanding of the principles of stability and the application of that knowledge to the day-to-day operation of a column-stabilized installation in both the intact and damaged condition, with emphasis on the response of the installation to various loading and environmental forces;

11) To provide participants with an understanding of the static and dynamic stability of MOUs/surface (particularly with respect to MODUs) in order to assist designated personnel in making decisions that will eliminate adverse conditions which could affect the safety of the unit;

12) To provide participants with a knowledge of and the ability to apply relevant international and national standards concerning stability;

13) To provide participants with an understanding of stability criteria for MOUs/surface, environmental limits and criteria for moving into survival conditions mode;

14) To provide participants with a knowledge of mooring systems and the effects of mooring line failure;

15) To provide participants with a knowledge of the effect on trim and stability of flooding due to damage, fire-fighting, loss of buoyancy or other reasons, and countermeasures to be taken;

16) To provide practical experience in emergency procedures on mobile offshore units with the aid of a computer-based ballast control simulator;

17) To enable participants to safely operate ballast and related systems on a simulated MOU/surface;

18) To enable participants to detect and react to simulated faults which can take place in the ballast and related systems on an MOU;

19) To provide participants with knowledge of methods and aids to prevent pollution of the environment, and of relevant international and national requirements; prepare participants for emergencies and pollution prevention work.

8.8 Course learning objectives

1) Introduction

   a) Performance Objective: Participants will understand the purpose and the objectives of the course and course procedures.

2) Basic vessel construction

   a) Performance Objective: Participants will demonstrate understanding of the following:

      i) Fundamental principles of vessel construction and principal structural members;

      ii) Effects of corrosion on structures.

3) Terminology and basic stability

   a) Performance Objective: Participants will demonstrate understanding of the following:

      i) Definitions of displacement, draught, trim, heel and list, freeboard, buoyancy, reserve buoyancy, lightship, deadweight and TPC;

ii) Volume, density and displacement and relationship between them; change of draft due to change of density; understanding of centre of gravity, centre of buoyancy, position of metacentre, GZ and their effects on transverse stability;

iii) Forces, moments and theory of moments as applied to stability; knowledge of righting moments; wind heeling moments and how they affect stability; how to determine righting moments and overturning moments;

iv) Definitions of centre of area and the various centres of gravity (VCG, LCG, KG) and how they are used in stability calculations; shift of centre of gravity; effects of adding, removing and moving of weights on the shift of centre of gravity and effects of multiple weights added, removed or shifted;

v) Knowledge of semi-submersible geometry, buoyancy, flotation and displacement, including knowledge of centre of buoyancy, reserve buoyancy, freeboard, draft and load line;

vi) Knowledge of pontoons, columns, deck; describe typical semi-submersible geometry in terms of the pontoons, columns and deck;

vii) Knowledge of draft, freeboard, air gap; define draft, freeboard and air gap for a semi-submersible;

viii) Knowledge of centre of buoyancy, centre of gravity, metacentre; understand the locations of the centre of buoyancy, centre of gravity and metacentres of a semi-submersible.

4) Static and dynamic stability of MOUs/surface

a) Performance Objective: Participants will demonstrate their understanding of the following:

i) Knowledge of stable, neutral and unstable equilibrium;

ii) Knowledge of stability theory and basic principles of stability as defined in both the static and dynamic state;

iii) Knowledge of change of trim, change of draft, change of longitudinal centre of buoyancy and centre of gravity, TPC and MTC;

iv) Knowledge of stability at small angles, use of cross curves to produce GZ curve and information from GZ curve; also knowledge of hydrostatic tables/curves;

v) Basic knowledge of stability at large angles;

vi) Knowledge of dynamic stability, its definition and stability criteria for MOUs/surface.

5) Theories and factors affecting trim and stability and the measures necessary to preserve trim and stability

a) Performance Objective: Participants will demonstrate a basic knowledge concerning centres of gravity, displacement, pitch and roll, righting moments and environmental effects on trim and stability.

6) Effect of weight, ballast and free surface on trim and stability

a) Performance Objective: Participants will demonstrate their understanding of the following:

i) Basic knowledge of how distribution and movement of weight and ballast, as well as free surface, affect trim and stability;

ii) Knowledge of the effects of loading supplies and ballasting in order to keep the unit's stresses within acceptable limits;

iii) Knowledge of effects of loading and discharging, heavy weights, allowable KG, deck loading, GZ diagram; effect on stability of ballasting and de-ballasting;

iv) Knowledge of the effects of free surface on stability and factors affecting same; significance of liquid in tanks, effect of divided tanks; calculation of free surface correction; description of pocketing; effect of freely suspended weights.

7) Transverse stability at small angles

a) Performance Objective: Participants will demonstrate their understanding of the following:

i) List - The effect of the COG being off the centreline;

ii) List - The effect of a weight on board moved transversely;

iii) List - The effect of a weight on board moved vertically or transversely;

iv) List - Moving weights to eliminate an initial list;

v) List - The effect of weight added off the centreline;

vi) List - The effect of weight removed from off the centreline;

vii) List - The tabular method - multiple weights added, removed or moved.

8) Longitudinal stability

a) Performance Objective: Participants will demonstrate their understanding of the following:

i) Definitions of forward perpendicular, aft perpendicular, length between perpendiculars, trim and true mean draft;

ii) Changes of draft and trim;

iii) Location of the LCF;

iv) Trim - Change of draft with LCF midships;

v) Trim - change of draft with LCF not amidships;

vi) Trimming moments and change of trim due to moving a weight;

vii) Change of trim due to weights loaded or discharged, bodily rise / sinkage;

viii) Trim calculations;

ix) Explain in depth list and calculation of list.

9) Deck loads and heavy lifts:

a) Performance Objective: Participants will demonstrate their understanding of the following:

i) The effect of deck loads on stability;

ii) Zones of reduced stability;

iii) Heavy lifts and shift of heavy lift.

10) Environmental conditions and their effects

a) Performance Objective: Participants will demonstrate their understanding of the following:

i) Knowledge of the characteristics of semi-submersibles, added mass and resonance;

ii) Environmental conditions and their effect on stability:

A) Responding to changing environmental conditions,

B) Recognizing the effect of environmental conditions on stability;

iii) Environmental limitations and criteria for moving into survival conditions mode:

A) Criteria for moving into survival conditions mode,

B) Identify different environmental limitations.

11) Inclining experiment

a) Performance Objective: Participants will demonstrate their understanding of the following:

i) Inclining experiment procedure, report and use;

ii) Setup and operation of the inclining experiment;

iii) Inclining experiment calculations and their use.

12) MOU/surface and MODU systems:

a) Performance Objective: Participants will demonstrate their understanding of the following:

i) Ballast system, planning, procedures and gravity flow;

ii) Sequencing of ballast for stress and avoidance of free surface;

iii) Drill water system;

iv) Fresh water system;

v) Bilge pump system;

vi) Fuel oil system;

vii) Fire protection system;

viii) Mooring system.

13) The effect of mooring and mooring forces on stability

a) Performance Objective: Participants will demonstrate their understanding of the following:

i) Basic knowledge of an MOU/surface anchoring system and how it affects stability characteristics;

ii) Describe a standard anchor pattern and the effects of mooring system and mooring line failure;

iii) Mooring system:

A) Explain in depth the reasons for a mooring system, the various types of mooring system in use, the behaviour of mooring systems and the distribution of forces; describe the effects of a mooring system on stability,

B) Use of mooring system for manoeuvring,

C) The principles of dynamic positioning system, including capabilities and limitations of thrusters, power systems, and maximum allocable position offsets,

D) Sea bed composition and characteristics;

iv) Mooring forces:

A) How to calculate the mooring forces, length of used chain and remaining weight on board,

B) Consequences of the mooring system failing.

14) Using hydrostatic information and the marine operations manual

a) Performance Objective: Participants will demonstrate their understanding of the following:

i) Use of loading stability information contained in or derived from stability and trim diagrams, an MOU's marine operations manual, or computer-based loading and stability programs;

ii) Basic knowledge of the contents of a typical MOU marine operations manual and its applicability in calculating the stability of an MOU/surface;

iii) Basic knowledge to perform hydrostatic calculations related to combined list and trim, and use of hydrostatic curves, hydrostatic tables and deadweight scales and tank capacity tables.

15) Stability calculations and reports:

a) Performance Objective: Participants will demonstrate their understanding of the following:

i) Basic knowledge of daily loading calculations

ii) How to complete all necessary stability calculations including the use of tables and curves and how to complete a stability report.

16) Damaged stability

a) Performance Objective: Participants will demonstrate understanding of the following:

i) Basic knowledge of the principles of damaged stability and the necessary calculations to correct for damage occurring both above and below waterline;

ii) Flooding of amidships compartment;

iii) Permeability;

iv) Flooding of an end compartment;

v) Effect of flooding on stability;

vi) List due to flooding of side compartment;

vii) Watertight subdivision.

17) Theory of watertight integrity, damage control and damage control procedures

a) Performance Objective: Participants will demonstrate understanding of the following:

i) Basic knowledge of the theory of watertight integrity and the importance of watertight integrity aboard an MOU;

ii) Principles of damage control on board an MOU/surface;

iii) Knowledge of the configuration of compartments, tanks and voids as well as the means of ballasting or dewatering each space;

iv) Basic knowledge of piping valves and pumps arrangements aboard an MOU/surface;

v) Review of major MOU/surface accidents involving lack of watertight integrity;

vi) Knowledge of damage and damage control procedures and the meaning of the expression "isolate, investigate, remedial action".

18) Emergency response and response to system failures:

a) Performance Objective: Participants will demonstrate understanding of the following:

i) Knowledge of emergency procedures; effect on trim and stability of flooding due to damage, fire-fighting, loss of buoyancy or other reasons; countermeasures to be taken;

ii) Knowledge of methods and aids to prevent pollution of the environment;

iii) Knowledge of relevant international and national requirements, especially with regard to:

A) Certificates and other documents required by international conventions or national law, how they may be obtained, and their period of validity,

B) Responsibilities under relevant international agreements;

iv) Emergency procedure;

v) Operations manual for marine drilling rigs;

vi) Failure in station keeping system and variation in chain deployment:

A) React to failure in station keeping system,

B) Predict change in stability with change in chain deployment;

vii) Damage to structure;

viii) Counter flooding and use of pump system;

ix) Fire alarms.

19) Storm survival preparations

a) Performance Objective: Participants will demonstrate a basic knowledge of major storm preparations, the reasons for taking a particular course of action, and the problems that may result from the action taken.

20) Simulator training or 'worst case' scenarios

a) Performance Objective: Participants will demonstrate understanding of how the various forces affect the stability of an MOU through practical applications. If a simulator is not used, the participants must demonstrate the proper response to various emergency scenarios. These scenarios must cover all types of emergencies that might be encountered on an MOU/surface.

Note on simulator examination or 'worst case' scenario role-playing: A practical demonstration of the participants' ability to deal with stability-related casualties. If a simulator is not used, the participants must demonstrate the proper response to various emergency scenarios. These scenarios must cover all types of emergencies which might be encountered on an MOU/surface.

8.9 IMO recommendations

1) To meet the recommendations on training of personnel on MOUs as set out in the Annex to IMO Resolution A.891 (21) of February 2000, on completion of this course all successful participants will be able to demonstrate that they have achieved the minimum competency standards described on Table 8.9.

8.10 Table - Specification of minimum standard of competence

Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
Planning and safety of ballasting and deballasting operations and dealing with changes in deck loads	Knowledge of and ability to apply relevant international and national standards concerning stability Use of loading stability information as may be contained in or derived from stability and trim diagrams, marine operations manuals, or computer-based loading and stability programs	Examination and assessment of evidence obtained from one or more of the following: in-service experience, direct observation, formal instruction, simulator training, or examination	Ballasting and deballasting operations are planned and executed in accordance with established procedures Changes in deck loads are accounted for in accordance with established procedures
Operational control of trim, stability and stress	Understanding of fundamental principles of MOU construction, including principal structural members and required periodic inspections Basic knowledge of effects of welding, and effects of corrosion on the structure Understanding of the principles of and the theories and factors affecting trim and stability and the measures necessary to preserve trim and stability (afloat mode) Stability criteria for MOUs, environmental limits and criteria for moving into survival conditions mode Understanding the inclining experiment report and its use. Use of daily loading calculations Dynamic stability Knowledge of the effect: 1. on MOU trim and stability of damage to and consequent flooding of a compartment, and countermeasures to be taken (afloat mode) 2. of loading supplies and ballasting in order to keep the unit's stress within the limits specified in the marine operations manual 3. of mooring systems and mooring line failure 4. of pre-loading and leg stresses on MOUs/self-elevating 5. of loss of buoyancy	Examination and assessment of evidence obtained from one or more of the following: in-service experience, direct observation, formal Instruction, simulator training, or examination	Stability and stress conditions are maintained within established limits at all times
Emergency response	Knowledge of: 1. emergency procedures 2. the effect on trim and stability of flooding due to damage, fire-fighting, loss of buoyancy or other reasons, and countermeasures to be taken 3. how to effectively communicate stability-related information	Examination and assessment of evidence obtained from one or more of the following: in-service experience, direct observation during drills and exercises, formal instruction, simulator training, or examination	Established procedures are followed during drills and emergencies Communications are clear and effective

Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
Pollution prevention	Methods and aids to prevent pollution of the environment Knowledge of relevant international and national requirements with regard to: 1. Certificates and other documents required by international conventions and Canadian law, how they may be obtained and their period of validity .2 responsibilities under relevant international agreements	Examination and assessment of evidence obtained from one or more of the following: in-service experience, formal instruction, or examination	Follows pollution prevention procedures established by international convention, national requirements and company policy

Chapter 9 – Stability (MOU/self-elevating) Training Course

9.1 Course objectives

1) To provide participants with a thorough understanding of the stability criteria for MOUs/self-elevating, stability principles, calculations and practices, stability management procedures and marine operations unique to MOUs/self-elevating in the floating and elevated modes.

2) To provide participants with knowledge of and ability to apply relevant international and national standards concerning stability and give participants practical experience in emergency procedures on MOUs, including knowledge of the effect on trim and stability of flooding due to damage, fire-fighting, loss of buoyancy or other reasons, and countermeasures to be taken.

9.2 Course duration

1) Minimum of thirty-seven and a half (37.5) hours.

9.3 Number of participants in a course

1) The number of participants in a course should not exceed 12 for practical demonstrations under the supervision of an instructor;

2) The number of participants should not exceed 24 for lectures and audiovisual instruction under the supervision of an instructor.

9.4 Specific instructor qualifications

1) The main course instructor must hold a valid certificate of competency not lower than a Barge Supervisor certificate. If the course is under the supervision of more than one instructor, the assistant instructors must hold qualifications related to the marine industry or must have related skills and be approved by Marine Personnel Standards and Pilotage.

9.5 Course content

1) The fundamental principles of vessel construction, principal structural members, effects of corrosion on structures and required periodic inspections with regard to MOUs/self-elevating;

2) Basic stability; definitions and general understanding of stability concepts; understanding of general terms such as displacement, draught, trim, heel, freeboard, buoyancy and reserve buoyancy;

3) Understanding of centre of gravity, centre of buoyancy, position of metacentre, GZ and their effects on transverse stability;

4) Stable, unstable and neutral equilibrium;

5) Theory of moments as applied to stability including effects of heavy lifts and their movement;

6) Location and control of the centre of gravity, effect of adding, removing and shifting of weights; calculation of vertical, transverse and longitudinal shift of centre of gravity;

7) Understanding of the inclining experiment report and its use for an MOU/self-elevating;

8) Theory and effects of free surface on stability and factors affecting same;

9) Theories and factors affecting trim and stability and the measures necessary to preserve trim and stability;

10) General understanding of change of trim, trimming moments, longitudinal metacentre and longitudinal stability; change of draft, change of longitudinal centre of buoyancy; TPC and MTC;

11) Elevating and lowering, i.e. jacking up and jacking down;

12) Use of hydrostatic curves, deadweight scales and hydrostatic tables;

13) Use of cross curves to produce a curve of static stability, and deriving information from curve;

14) The static and dynamic stability of MOUs; synchronous rolling and angle of loll; stability criteria for MOUs; stability at large angles;

15) Afloat versus elevated stability;

16) Vessel's reaction to being towed;

17) Collision while being towed;

18) Knowledge of preloading and how the distribution and movement of weight and ballast (e.g. pre-load tanks), as well as free surface, affect trim and stability;

19) Afloat stability analysis (field transit);

20) Elevated stability analysis (storm standby);

21) Knowledge of the basic concepts of leg reactions, leg stresses and how to conduct a leg stress analysis;

22) Use of loading information contained in or derived from stability and trim diagrams, the vessel's marine operations manual, or computer-based loading and stability programs, and an ability to use this information to calculate a vessel's stability conditions;

23) Knowledge of and ability to apply relevant international and national standards concerning stability; the relationship between these standards and regulatory requirements with respect to stability curves for operating conditions and survival conditions, taking into account the effect of prevailing environmental conditions;

24) The effect on MOU trim and stability of damage to and consequent flooding of any compartment, and countermeasures to be taken;

25) Knowledge of the principle of watertight integrity, the importance of maintaining it on an MOU, and procedures for maintaining it;

26) Methods and aids to prevent pollution of the environment; knowledge of relevant international and national requirements, especially with regard to certificates and other documents required by international conventions or national law, how they may be obtained, and their period of validity; and responsibilities pertaining to environmental pollution under relevant international agreements;

27) Loading supplies and ballasting in order to keep unit's stresses within the limits specified in the stability manual;

28) Different types of punch-through;

29) Knowledge of methods of soil and site analysis and understanding of the results;

30) Effect of mooring system on stability;

31) Daily loading calculations;

32) Application of stability knowledge, including relevant theory and calculations in the following areas:

    a) Deck loads and effect on stability; change in lightweight;

    b) Examination of liquid transfer systems and their limitations and procedures including bilge and ballasting systems and procedures;

    c) Importance of load distribution with regard to structural stress;

    d) Damaged stability, damage control procedure, watertight compartments, counter-flooding, use of pumps and pumping systems, secondary de-ballast systems and cross-connections;

    e) Calculation of final draft after flooding of various compartments;

f) Environmental conditions and their effect on stability and drilling operations; response to heavy weather under tow;

g) Zones of reduced stability, unsymmetrical ballasting/deballasting;

h) Unit and environmental limitations and criteria for moving into survival conditions mode;

i) Watertight integrity;

j) Emergency procedures.

Note: Course curriculum must include the use of a computer-based simulator capable of simulating the response of an MOU/self-elevating to various loading and environmental forces while in the floating and elevated modes.

9.6 Course outline

Subject area	Hours		
	Lecture	**Practical**	**Simulator**
1. Introduction and principles of stability	0.5 hours		10 hours
2. Basic vessel /MOU construction	0.5 hours		
3. Terminology, definitions and stability	1.5 hours		
4. Stability criteria for MOUs (static and dynamic)	1.5 hours		
5. Theories and factors affecting trim and stability and the measures necessary to preserve trim and stability (afloat and elevated modes)	2.0 hours		
6. Effects of weight, ballast and free surface on trim and stability	2.0 hours		
7. Transverse stability	0.5 hours		
8. Longitudinal stability	0.5 hours		
9. Elevating and lowering (jacking up and jacking down)	1.0 hour		
10. Environmental conditions and their effects	1.0 hour		
11. Inclining experiment	3.0 hours		
12. MOU systems	0.5 hours		
13. Towing	0.5 hours		
14. Marine operations manual	0.5 hours	1.0 hour	
15. Stability calculations and reports	1.0 hour	1.0 hour	
16. Damaged stability	0.5 hours		
17.Theory of watertight integrity, damage control and damage control procedures	1.0 hour		
18. Emergency response and response to system failures	1.5 hours		
19. Storm survival preparations	1.0 hour		
20. Simulator training or worst case scenarios	1.0 hour		
21. Exercises / Assessments	1.0 hour	1.0 hour	2.0 hours
Sub-total	22.5 hours	3.0 hours	12 hours
Total	**37.5 hours**		

9.7 Course goals

1) To provide participants with an understanding of the fundamental principles of vessel construction, principal structural members and effects of corrosion on structure, particularly with respect to MOUs/self-elevating;

2) To enable participants to understand the terminology used to describe the hydrostatic and stability characteristics of floating bodies; theories and factors affecting trim and stability and measures to preserve trim and stability;

3) To enable participants to understand the significance of the relative positions of the centre of buoyancy, centre of gravity and metacentre on transverse and longitudinal stability;

4) To enable participants to understand afloat versus elevated stability, calculate and understand basic static and dynamic stability for a vessel, especially with regard to MOUs/self-elevating both in the floating and elevated modes, and assist designated personnel in making decisions that will eliminate adverse conditions which could affect the safety of the unit;

5) To enable participants to understand, and have an ability to perform, calculations related to initial stability and equilibrium in the transverse direction;

6) To develop in the participants an understanding of equilibrium in the longitudinal direction and an ability to perform calculations related to longitudinal stability;

7) To enable participants to have an understanding of the inclining experiment report and its use with an MOU/self-elevating;

8) To provide participants with a thorough understanding of the principles of stability and the application of that knowledge to the day-to-day operation of an MOU/self-elevating in both the intact and damaged condition, with emphasis on the response of the installation to various loading and environmental forces;

9) To provide participants with a thorough understanding of a vessel's reaction to being towed;

10) To provide participants with an understanding of soil and site analysis methods and an ability to interpret the results;

11) To provide participants with a thorough understanding of leg reactions, leg stresses and how to conduct a leg stresses analysis;

12) To provide participants with an understanding of the use of loading information contained in or derived from stability and trim diagrams, the MOU's marine operations manual, or computer-based loading and stability programs, and an ability to use this information to calculate a vessel's stability conditions;

13) To provide participants with a knowledge of and the ability to apply relevant international and national standards concerning stability;

14) To provide participants with a knowledge of the effect on trim and stability of flooding due to damage, fire-fighting, loss of buoyancy or other reasons, and countermeasures to be taken;

15) To provide participants with a knowledge of methods and aids to prevent pollution of the environment, and of relevant international and national requirements; prepare participants for emergencies and pollution prevention work.

9.8 Course learning objectives

1) Introduction

   a) Performance Objective: Participants will understand the purpose and the objectives of the course and course procedures.

2) Basic vessel construction

   a) Performance Objective: Participants will demonstrate understanding of the following;

      i) Fundamental principles of vessel construction and principal structural members;

      ii) Effects of corrosion on structures.

3) Terminology and basic stability

   a) Performance Objective: Participants will demonstrate understanding of the following:

      i) Definitions of displacement, draught, trim, heel and List, freeboard, buoyancy, reserve buoyancy, lightship, deadweight and TPC;

ii) Volume, density and displacement and relationship between them; change of draft due to change of density; understanding of centre of gravity, centre of buoyancy, position of metacentre, GZ and their effects on transverse stability;

iii) Forces, moments and theory of moments as applied to stability; knowledge of righting moments; wind heeling moments and how they affect stability; How to determine righting moments and overturning moments;

iv) Definition of centre of area and various centres of gravity (i.e. VCG, KG, LCG) and how they are used in stability calculations; shift of centre of gravity; effects of adding, removing and moving of weights on the shift of centre of gravity and effects of multiple weights added, removed or shifted;

v) Buoyancy, flotation and semi-submersible geometry:

A) Knowledge of semi-submersible geometry, buoyancy, flotation and displacement, including knowledge of centre of buoyancy, reserve buoyancy, freeboard, draft and load line,

B) Knowledge of pontoons, columns, deck; describe typical semi-submersible geometry in terms of the pontoons, columns and deck,

C) Knowledge of draft, freeboard, air gap; define draft, freeboard and air gap for a semi-submersible,

D) Knowledge of centre of buoyancy, centre of gravity, metacentre; understand the locations of the centre of buoyancy, centre of gravity and metacentres of a semi-submersible.

4) Static and dynamic stability

a) Performance Objective: Participants will demonstrate their understanding of the following:

i) Knowledge of stable, neutral and unstable equilibriu

ii) Knowledge of stability theory and basic principles of stability as defined in both the static and dynamic stat

iii) Knowledge of change of trim, change of draft, change of longitudinal centre of buoyancy and centre of gravity, TPC and MT

iv) Knowledge of stability at small angles, use of cross curves to produce GZ curve and information from GZ curve; also knowledge of hydrostatic tables/curve

v) Basic knowledge of stability at large angle

vi) Knowledge of dynamic stability, its definition and stability criteria for MOUs.

5) Theories and factors affecting trim and stability and the measures necessary to preserve trim and stability

a) Performance Objective: Participants will demonstrate a basic knowledge of centres of gravity, displacement, pitch and roll, righting moments and environmental effects (i.e. wind, waves, current and seabed), how they are affected by jacking up or jacking down, and their effects on trim and stability. Afloat and elevated stability analysis.

6) Effect of weight, ballast and free surface on trim and stability

a) Performance Objective: Participants will demonstrate a basic knowledge of pre-loading and how the distribution and movement of weight and ballast (e.g. pre-load tanks), as well as free surface, affect trim and stability:

i) Knowledge of loading supplies and ballasting in order to keep the unit's stresses within the limits specified in the stability manual,

ii) Knowledge of loading and discharging of heavy weights; allowable KG, deck loading, GZ diagram; effect on stability of ballasting and de-ballasting;

iii) Knowledge of the theory and effects of free surface on stability and factors affecting same; significance of liquid in tanks, effect of divided tanks, calculation of free surface correction, description of pocketing, effect of freely suspended weights;

iv) Afloat versus elevated stability.

7) Transverse stability at small angles

a) Performance Objective: Participants will demonstrate their understanding of the following:

i) List - The effect of the COG being off the centreline;

ii) List - The effect of a weight on board moved transversely;

iii) List - The effect of weight on board moved vertically or transversely;

iv) List - Moving weights to eliminate an initial list;

v) List - The effect of weight added off the centreline;

vi) List - The effect of weight removed from off the centreline;

vii) List - The tabular method - Multiple weights added, removed or moved.

8) Longitudinal stability

a) Performance Objective: Participants will demonstrate their understanding of the following:

i) Definitions of forward perpendicular, aft perpendicular, length between perpendiculars, trim and true mean draft;

ii) Changes of draft and trim;

iii) Location of the LCF;

iv) Trim - Change of draft with LCF amidships;

v) Trim - Change of draft with LCF not amidships;

vi) Trimming moments and change of trim due to moving a weight;

vii) Change of trim due to weights loaded or discharged; bodily rise/sinkage;

viii) Trim calculations;

ix) Explain, in depth, list and calculation of list.

9) Elevating and lowering

a) Performance Objective: Participants will demonstrate an understanding of the following:

i) Knowledge of the process and procedures involved in jacking up and jacking down;

ii) Knowledge of basic concept of leg reactions, leg stresses and how to conduct a leg stress analysis;

iii) Knowledge of methods of soil and site analysis and understanding the results;

iv) Knowledge of different types of punch-through;

v) Elevated stability analysis (storm standby);

vi) Afloat stability analysis (field transit).

10) Environmental conditions and their effects

a) Performance Objective: Participants will demonstrate understanding of the following:

i) Knowledge of the characteristics of semi-submersibles, added mass and resonance;

ii) Environmental conditions and their effect on stability;

iii) Responding to changing environmental conditions;

iv) Recognizing the effect of environmental conditions effect on stability;

v) Environmental limitations and criteria for moving into survival conditions mode;

vi) Criteria for moving into survival conditions mode;

vii) Identify different environmental limitations;

viii) Storm standby.

11) Inclining experiment

a) Performance Objective: Participants will demonstrate their understanding of the following:

i) Inclining experiment procedure, report and use, for an MOU/self-elevating;

ii) Operation and setup;

iii) Inclining experiment calculation and use.

12) Systems of an MOU/self-elevating

a) Performance Objective: Participants will demonstrate a basic knowledge of the ballast system, drill water system, fresh water system, bilge pump system, fuel oil system and fire protection system.

13) Towing

a) Performance Objective: Participants will demonstrate their understanding of the following:

i) Rules, requirements, procedures and stability criteria for towing a self-elevating unit;

ii) Vessel's reaction to being towed;

iii) Stability analysis while under tow.

14) Using hydrostatic information and the marine operations manual

a) Performance Objective: Participants will demonstrate their understanding of the following:

i) Use of loading stability information contained in or derived from stability and trim diagrams, marine operations manual, or computer-based loading and stability programs;

ii) Basic knowledge of the contents of a typical MOU/self-elevating marine operations manual;

iii) Basic knowledge to perform hydrostatic calculations related to combined list and trim, and use of hydrostatic curves, hydrostatic tables and deadweight scales and tank capacity tables.

15) Stability calculations and reports

a) Performance Objective: Participants will demonstrate their understanding of the following:

i) Basic knowledge of daily loading calculations;

ii) How to complete all necessary stability calculations, including the use of tables and curves, and how to complete a stability report;

iii) Instruction includes pre-loading calculation procedures.

16) Damaged stability

a) Performance Objective: Participants will demonstrate a basic knowledge of the principles of damaged stability and the necessary calculations to correct for damage occurring both afloat and in elevated conditions.

17) Theory of watertight integrity, damage control and damage control procedures

a) Performance Objective: Participants will demonstrate understanding of the following

i) Basic knowledge of the principles of damage control aboard an MOU/self-elevating, knowledge of the configuration of compartments, tanks and voids as well as the means of ballasting or dewatering each space. Also a basic knowledge of piping, valves and pump arrangements aboard an MOU/self-elevating;

ii) Knowledge of corrections and responses to punch-through and mud slides, importance of watertight integrity aboard an MOU/self-elevating. Review of major MOU/self-elevating accidents involving lack of watertight integrity; knowledge of damage and damage control procedures; meaning of the expression "isolate, investigate, remedial action".

18) Emergency response and response to system failures

a) Performance Objective: Participants will demonstrate understanding of the following:

i) Knowledge of emergency procedures; effect on trim and stability of flooding due to damage, fire-fighting, loss of buoyancy or other reasons and countermeasures to be taken;

ii) Knowledge of methods and aids to prevent pollution of the environment;

iii) Knowledge of relevant international and national requirements, especially with regard to:

A) Certificates and other documents required by international conventions or national law and how they may be obtained, and their period of validity,

B) Responsibilities under relevant international agreements;

iv) Emergency procedure;

v) Damage to structure.

19) Storm survival preparations

a) Performance Objective: Participants will demonstrate a basic knowledge of major storm preparations, the reasons for taking a particular course of action, and the problems, which may result from the action taken.

20) Simulator training or ‘worst case’ scenarios

a) Performance Objective: Participants will demonstrate understanding of how the various forces affect the stability of an MOU/self-elevating in the floating and elevated modes through practical applications. If a simulator is not used, the participants must demonstrate the proper response to various emergency scenarios. These scenarios must cover all types of emergencies, which might be encountered on an MOU/self-elevating in the floating and elevated modes.

Note on simulator examination or ‘worst case’ scenario role playing:
A practical demonstration of participants’ ability to deal with stability-related casualties. If a simulator is not used, the participants must demonstrate the proper response to various emergency scenarios. These scenarios must cover all types of emergencies which might be encountered on an MOU/self-elevating in the floating and elevated modes.

Chapter 10 – Supervisor Offshore Well Control Training Course

10.1 Course objectives

1) To provide participants with a good understanding of drilling operations and maintenance of wells as they relate to maritime safety, including appreciation of the interrelationship between marine operations and industrial activities relating to drilling and maintenance of wells;

2) To provide participants with an advanced knowledge of offshore well control equipment, the safe operation of offshore well control equipment and techniques;

3) To provide participants with a good understanding in preventative well control measures, recognition of well control events, measurement of well control parameters and proper response to observations and measurements;

4) To provide participants with a good understanding of closing in Blowout prevention equipment to stop unwanted formation fluids in the wellbore. In the event of unwanted formations fluids entering the wellbore, then gaining understanding in using the various well control techniques in a controlled manner to regain primary well control and dispose of the unwanted fluids safely;

5) To provide practical hands-on training in proper well control procedures during simulated kick situations using a certified rig floor simulator; and

6) To increase risk awareness and to present risk mitigation measures.

10.2 Course duration

1) Minimum of forty (40) hours.

10.3 Number of trainees in a course

1) The number of participants in a course should not exceed 12 for practical demonstrations under the supervision of an instructor;

2) The number of participants should not exceed 24 for lectures and audiovisual instruction under the supervision of an instructor.

10.4 Prerequisites

1) None

10.5 Instructor's specific qualifications

1) The main course instructor should hold a valid certificate of Competency, not lower than Offshore Installation Manager (OIM). If the main course instructor is not a holder of above stated certificate, in that case he must hold industry recognized qualifications related to the Marine Offshore industry (Drilling Operations) or must have related skills and be approved by Marine Personnel Standards and Pilotage;

2) If the course is under the supervision of more than one instructor, the assistant instructor shall hold qualifications related to the Marine Offshore industry (drilling operations) or must have related skills and be approved by Marine Personnel Standards and Pilotage.

10.6 Course contents

1) Core curriculum must include a body of knowledge and a set of job skills that can be used to provide well control skills for industrial operations related to drilling and maintenance of wells activities including Subsea operations;

2) Practical exercises must be provided to give participants hands-on experience in implementing and completing the well control techniques and procedures taught in lecture;

3) The Simulator, well facility, etc. being used must provide realistic responses and scenarios that a participant would encounter in the field;

4) A minimum of two simulated well control practice exercises must be provided for each participant on a properly certified [Marine Safety (AMSP) approved] rig floor simulator used for the training and assessment; and

5) Course must as a minimum cover the following topics:

   a) Well Control Math and definitions, including:

      i) Basic Math;

      ii) Rounding;

      iii) Pressure fundamentals;

      iv) Volume Calculations (Capacities & Displacements); and

      v) Force.

   b) Government, Industry, and Company Rules, Orders and Policies, including:

      i) CAPP, CAODC, IADC,API and ISO recommended Practices, Standards and Bulletins pertaining to well control;

      ii) Bridging Documents;

      iii) Federal, Regional and / or local regulations where required;

      iv) Policies & Practices;

      v) As an OIM, appreciation of the interrelationship between marine operations and industrial operations related to drilling and maintenance of wells;

      vi) Crew's Responsibility During Well Control Operations; and

      vii) Minimum Training Requirements.

   c) Well Planning, including:

      i) Formation Pressure;

      ii) Formation Strength;

      iii) Well Planning;

      iv) Leak Off Test (LOT); and

      v) Formation Integrity Test (FIT).

   d) Pressure Concepts and Calculations, including:

      i) Types of pressure Calculations;

      ii) Pressure versus Force calculations;

      iii) Conversion of pressure to an equivalent mud weight;

      iv) Volume/Height relationship and effect on pressure;

      v) Drop in pump pressure as fluid density increases during well control operations;

      vi) Maximum wellbore pressure limitations;

      vii) Hydrostatic Pressure;

      viii) Formation Pressure;

      ix) Height of Influx;

      x) Gradient of Influx;

xi) Kill Mud Weight;

xii) ICP;

xiii) FCP;

xiv) Strokes / Time;

xv) Pump Strokes / Pressure Relationship; and

xvi) Mud Weight Change / Pressure Relationship.

e) Gas Characteristics and Behavior, including:

i) Gas types;

ii) Density, pressure/volume relationship;

iii) Boyle's Gas Law and Accumulator Calculations:

iv) Migration & Gas bubble migration;

v) Gas Expansion and migration relationships;

vi) Solubility of gases;

vii) Pressure/Temperature/Compressibility Effects on Fluids/Gases and phase behavior; and

viii) Solubility in mud.

f) Well Control Principles, including:

i) Primary Well Control;

ii) Kick Fundamentals:

A) Definition of a kick;

B) Causes of Kicks:
- Unintentional flow or "kick" from a formation; and
- Intentional flow or "kick" from a formation.

C) Kick Detection:
- Kick indicators;
- Warning signals that indicate a kick may be occurring or is about to occur;
- Indications of possible increasing formation pressure;
- Importance of responding to kick indicators in a timely manner; and
- Distinguishing kick indicators and warning signals from other occurrences.

iii) Tripping Practices;

iv) Drilling Fluids:

A) Types of drilling fluids;

B) Fluid property effects on pressure losses;

C) Fluid density measuring techniques; and

D) Mud properties following weight-up and dilution.

v) Secondary Well Control; and

vi) Tertiary Well Control.

g) Procedures, including:

i) Set/Check Alarm limits;

ii) Pre-recorded well control information;
iii) Flow checks, including checks after cementing;
iv) Shut-in;
v) Verification of shut-in;
vi) Well monitoring during shut-in;
vii) Response to massive or total loss of circulation;
viii) Tripping;
ix) Well control drills (types and frequency);
x) Formation competency;
xi) Stripping operations; and
xii) Shallow gas hazards.

h) Well Control Equipment, including:
i) Well control related instrumentation;
ii) BOP configuration;
iii) Manifolds and piping;
iv) Valving;
v) Auxiliary well control equipment;
vi) BOP closing unit – function and performance;
vii) Testing/Completion pressure control equipment;
viii) Pressure and function tests;
ix) Well control equipment arrangements;
x) Minimum BOP Requirements;
xi) Minimum Diverter Requirements;
xii) Closing Units and Accumulator Requirements;
xiii) Choke and Kill Manifold Requirements;
xiv) Other Well Control Equipment;
xv) Well Control Equipment Testing Requirements;
xvi) Closing and Opening Ratios; and
xvii) Government Regulations.

i) Actions Upon Taking A Kick, including:
i) Detecting a Kick;
ii) Containment as Early as Possible;
iii) Shut-in Procedures;
iv) Hang-off Procedure;
v) Shut-in Period Prior to Well Kill;
vi) Gas Migration / Review Gas Law;
vii) Volume to Bleed to Maintain Constant BHP;

viii) MASP or MAASP; and

ix) MGS (Mud Gas Separator).

j) Preparation & Prevention, including:

i) Preparation of Equipment and Materials;

ii) Well Control Drills;

iii) Pre-Recorded Information; and

iv) Kick Prevention During Operations.

k) Well Control/Kill Methods/Techniques, including:

i) Objectives of well control techniques;

ii) Techniques for controlling or killing a producing well;

iii) Preparing for well entry;

iv) No returns pumping technique (e.g. Bullheading);

v) Volumetric method/ technique and lubricate & bleed;

vi) Constant bottomhole pressure (BHP) methods (forward or reverse circulation);

vii) Example steps for maintaining constant bottomhole pressure well control;

viii) Driller's Method;

ix) Wait and Weight Method;

x) Stripping;

xi) Preparation of Well control kill worksheet;

xii) Well control procedures; and

xiii) Other well control methods.

l) Well Control Complications and Solutions, including:

i) Complications:

A) Trapped pressure;

B) Pressure on casing;

C) Underground flow;

D) Cannot circulate well (i.e. plugged workstring, etc.);

E) Hydrates; and

F) Lost circulation

m) Specific Environments, including:

i) Deviated / Horizontal Well Control.

ii) Shallow Gas / Diverting Procedures;

iii) Hydrogen Sulphide;

iv) HP/HT (High Pressure / High Temperature);

v) Lost Circulation;

vi) Underbalanced Drilling;

vii) Slim Hole; and

viii) Government Regulations.

n) Subsea Operations, including:

i) Subsea Well Control, including:

A) Subsea equipment;

B) Diverter system;

C) Kick detection issues;

D) Procedures;

E) Compensating for hydrostatic head changes in choke lines;

F) Choke Line Friction Loss;

G) Gas in Choke Line / Riser;

H) Riser Margin;

I) Hydrates;

J) Trapped Gas / Removal;

K) Deepwater Well Control; and

L) Government Regulations.

ii) Shut-In for Subsea and Deepwater Wells:

A) Shut-in for subsea wells.

iii) Subsea and Deepwater Well Kill Considerations, including:

A) Constant bottom hole pressure methods;

B) Bullheading;

C) Number of choke and kill lines;

D) Volumetric method; and

E) Dynamic lubrication methods.

iv) Subsea and Deepwater Well Control – Shallow Flow(s), including:

A) Shallow flow(s) prior to BOP installation;

B) Shallow flow detection;

C) Shallow flow prevention technique, procedures and practices; and

D) Shallow flow well control methods.

v) Subsea and Deepwater Well Control – Kick Prevention and Detection, including:

A) Kick Prevention & Detection; and

B) Riser gas considerations.

o) Subsea and Deepwater Well Control – BOP Arrangements, including:

i) Subsea BOP Stack;

ii) Choke manifold system;

iii) Subsea control systems; and

iv) Diverter System – Floating Unit.

p) Subsea and Deepwater Well Control – Riser System, including:

i) Riser considerations;

ii) Boost lines; and

iii) Fill-up valves (dump valve).

q) Subsea and Deepwater Well Control – ROV Interventions, including:

i) Minimum subsea BOP/ROV intervention functions; and

ii) Common BOP override functions.

r) Subsea and Deepwater Well Control – Drilling Fluids, including:

i) Subsea drilling fluid considerations; and

ii) Fluid storage.

s) Subsea and Deepwater Well Emergency Disconnect, including:

i) DP emergency disconnect considerations.

6) Special Situations, including:

a) Hydrogen sulfide (H2S);

b) Horizontal well control considerations;

c) Off bottom kills;

d) Underground blowouts;

e) Combination thief and kick zones;

f) False kick indicators;

g) Pipe reciprocation during well kill (biaxial loading);

h) Underbalanced drilling;

i) Slim-hole well control considerations;

j) Coiled tubing;

k) Snubbing;

l) New well control technology and equipment;

m) High pressure/high temperature considerations;

n) Tapered string/tapered hole;

o) Wellhead component failure points;

p) Shut-in and circulating kick tolerance;

q) Small tubing unit; and

r) Wireline.

10.7 Course outline

	Subject Area	Hours	
		Lecture	Exercises
1.	Introduction to drilling operations and Well Control Mathematics	1.0	
2.	Government, Industry, and Company Rules, Orders and Policies, including as an OIM, appreciation of interrelationship between marine operations and industrial operations related to drilling and maintenance of wells	1.5	
3.	Well Planning	1.0	

4.	Pressure Concepts and Calculations	1.5	
5.	Gas Characteristics and Behavior	1.0	
6.	Well Control Principles, including maintenance of wells	2.0	
7.	Procedures	1.25	
8.	Simulator Exercises	-	3.0
9.	Well Control Equipment	2.0	
10.	Actions Upon Taking A Kick	1.5	
11.	Preparation & Prevention	1.5	
12.	Well Control/Kill Techniques	2.0	
13.	Simulator Exercises	-	3.0
14.	Well Control Complications	1.25	
15.	Specific Environments	1.0	
16.	Subsea Operations	3.0	
17.	Simulator Exercises	-	3.0
18.	Special Situations	1.0	
19.	Case Studies	1.0	
20.	Simulator Exercises	-	3.0
21.	Written Exam.	2.0	
22.	Simulator Exam.	-	2.5
	Sub Total	**25.5**	**14.5**
	Total	**40.0 hours**	

10.8 Course goals and learning objectives

1) Introduction:

   a) Performance Objective: Students will understand the purpose and the objectives of the course and course procedures.

   b) Students will demonstrate understanding of the following:

2) Knowledge of the Government, Industry, and Company Rules, Orders and Policies, including:

   a) Knowledge of CAPP, CAODC, IADC, API and ISO Practices, Standards and Bulletins pertaining to well control;

   b) Recognize Bridging Documents:

   c) (a) Describe how bridging documents can resolve differences between operator and contractor well control policies (e.g., shallow gas and diverter operations).

   d) Recognize Federal, Regional and / or local regulations where required;

   e) Knowledge of Polices & Practices;

   f) As an OIM, recognize the importance of interrelationship between marine operations and industrial operations related to drilling and maintenance of wells; and

   g) Recognize Crew's Responsibility During Well Control Operations;

3) Demonstrate the knowledge and skills of Well Planning, including:

   a) Formation Pressure;

   b) Formation Strength;

   c) Well Planning;

   d) Leak Off Test (LOT); and

   e) Formation Integrity Test (FIT).

4) Demonstrate the understanding of pressure concepts and calculations, including:

a) Types of pressure, including:

i) U-tube concept and hydrostatic column;

ii) Define Pressure gradient;

iii) Define Formation gradient;

iv) Define and calculate Hydrostatic pressure;

v) Define and calculate Bottomhole pressure;

vi) Differential pressure;

vii) Define Surface pressure and describe its effect on downhole pressures;

viii) Explain System pressure losses (circulating friction pressure losses);

ix) Estimate system pressure losses due to pump speed and/or fluid density changes;

x) "Trapped" pressure;

xi) Casing shoe pressure;

xii) Surge and swab pressures;

xiii) Explain causes and effects of surge pressures on wellbore;

xiv) Calculate Hydrostatic pressure change due to loss of fluid levels and/or fluids with different mud densities (e.g., pills slugs, washes, spacers, etc.);

xv) Static and dynamic calculation of bottomhole pressure; and

xvi) Fracture pressure (leak-off pressure) as defined by API RP 59;

b) Knowledge of the Types of pressure Calculations;

c) Ability to perform the calculations, including:

i) Volume of tanks and pits;

ii) Volume of a cylinder as related to pump output;

iii) Displacement of open and closed pipe;

iv) Annular capacity per unit length;

v) Annular volume;

vi) Hydrostatic pressure

vii) Fracture pressure (as defined by API RP 59);

viii) Formation pressure;

ix) Conversion from pressure to equivalent fluid density;

x) Kill mud weight;

xi) Circulation time;

xii) Bottoms up time for normal drilling;

xiii) Total circulating time, including surface equipment;

xiv) Surface-to-bit time;

xv) Bit-to-shoe time;

xvi) Bottoms up strokes;

xvii) Surface-to-bit strokes;

xviii) Bit-to-shoe strokes;

xix) Total circulating strokes, including surface equipment;

xx) Pump output (look up from chart values only);

xxi) Equivalent circulating density based on annular pressure;

xxii) Relationship between pump pressure and pump speed;

xxiii) Relationship between pump pressure and mud density;

xxiv) Maximum allowable annulus surface pressure;

xxv) Effect of water depth on formation strength calculation;

xxvi) Gas laws PV=K;

xxvii) Weighting material required to increase density per volume;

xxviii) Volume increase due to increase in density;

xxix) Volume to be bled off, corresponding to pressure increase (volumetric method);

xxx) Initial circulating pressure;

xxxi) Final circulating pressure;

xxxii) Riser volume and fluid required to displace;

xxxiii) Choke and kill line volumes;

xxxiv) Choke and kill line strokes;

xxxv) Choke and kill line circulation time; and

xxxvi) Pressure drop per step

d) Understanding of Pressure versus Force calculations;

e) Understanding of Conversion of pressure to an equivalent mud weight:

i) Required mud weight:

A) Fluid density increase required to balance formation pressure;

ii) Equivalent circulating density (ECD), including:

A) ECD loss during flow check while drilling; and

B) No ECD loss during tripping flow check.

iii) Calculate fluid density increase required to balance formation pressure;

iv) Calculate the effect of circulating friction pressure losses on surface and downhole pressures, including:

A) Volume/Height relationship and effect on pressure;

B) Calculate height of a given volume of fluid.

C) Drop in pump pressure as fluid density increases during well control operations;

D) Describe why pump pressure drops as fluid density increases during a constant bottomhole pressure method; and

E) Maximum wellbore pressure limitations:

- Surface (e.g., wellhead, BOP, casing);
- Subsurface (e.g., perforations, casing shoe, open hole formation); and

- Describe the consequences of exceeding maximum wellbore pressure limitations.

F) Hydrostatic Pressure;

G) Formation Pressure;

H) Height of Influx;

I) Gradient of Influx;

J) Kill Mud Weight;

K) ICP;

L) FCP;

M) Strokes / Time;

N) Pump Strokes / Pressure Relationship; and

O) Mud Weight Change / Pressure Relationship.

5) The knowledge of Gas Characteristics and Behavior, including:

a) Recognize Gas types, including:

i) Hydrocarbon;

ii) Toxic;

iii) H2S; and

iv) CO2.

b) Knowledge of Density, including:

i) Gas;

ii) Gas and mud mixtures;

iii) Recognize the relatively low density of gas and its effect on the hydrostatic column;

iv) Describe how the presence of gas affects; wellbore pressure;

v) Explain the effect of gas cutting on bottomhole pressure and the use of pit level monitoring to recognize hydrostatic loss; and

vi) Describe the conditions where gas cutting may have little effect on hydrostatic head and bottomhole pressure.

c) Knowledge of Pressure/volume relationship:

d) State Boyle's Gas Law and Knowledge of Accumulator Calculations:

e) Knowledge of Migration & Gas bubble migration, including:

i) If the well is left shut-in while gas is migrating;

ii) If the well is allowed to remain open with no control;

iii) If bottomhole pressure is controlled; and

iv) Explain the consequences of gas migration.

f) Knowledge of Gas Expansion and migration relationships, including:

i) While in well;

ii) Through surface equipment;

iii) Explain the relationship between pressure and volume of gas in the wellbore;

iv) Explain why a gas kick must expand as it is circulated out in order to keep bottomhole pressure constant; and

v) Explain the consequences of gas moving through the choke from a high pressure area to a low pressure area.

g) Knowledge of Pressure/Temperature/Compressibility Effects on Fluids/Gases and phase behavior, including:

i) Hydrocarbon gas can enter the well in either liquid or gaseous form, depending on its pressure and temperature;

ii) Hydrocarbon gas entering as a liquid may not migrate or expand until it is circulated up the wellbore;

iii) Liquids can move down the annulus and come up the drillstring; and

iv) Describe how hydrocarbon gas may not migrate and the consequences for well control.

h) Knowledge of Solubility of gases and solubility in mud, including:

i) Combinations of gas and liquid in which solubility issues may apply:

A) H2S and water;

B) CO2 and water;

C) H2S and OBM; and

D) Methane and OBM.

ii) CO2 and OBM;

iii) Gases dissolved in mud behave like liquids;

iv) Identify combinations of gas and liquid which may result in solubility issues (H2S and water, CO2 and water, H2S and OBM, methane and OBM, CO2 and OBM);

v) Describe the difficulty of detecting kicks with soluble gases while drilling and/or tripping;

vi) Describe how dissolved gas affects wellbore pressures when it comes out of solution; and

vii) Describe the sequential consequences of gas evolving from the mud system.

6) Demonstrate the knowledge of Well Control Principles, including:

a) Primary Well Control;

b) Kick Fundamentals:

i) Definition of a kick, including:

A) Ability to define two types of kick: unintentional and intentional.

ii) Recognize Causes of Kicks, including:

A) Unintentional flow or "kick" from a formation;
- Failure to keep hole full;
- Swabbing effect of pulling pipe:
  - Hole and pipe geometry;
  - Well depth;
  - Mud rheology;
  - Hole conditions and formation problems;
  - Pipe pulling and running speed; and
  - BHA configuration;
- Loss of circulation;

- Insufficient density of drilling fluid, brines, cement, etc.;
- Abnormally pressured formation;
- Lowering pipe too rapidly into hole (surge);
- Annular gas flow after cementing;
- Identify causes of unintentional kicks;
- Describe the piston effect (suction and how increased drag may be associated with swab);
- Describe the effect of the items at left on surge and swab pressures; and
- Describe how fluid density can be unintentionally reduced, i.e., barite ejected by centrifuge, dilution, cement settling, temperature effects on fluids, settling of mud weighting materials, etc.

B) Intentional flow or "kick" from a formation:
- Drill stem test;
- Completion; and
- Identify causes of intentional kicks.

iii) Kick Detection:

A) Knowledge of Kick indicators and Identify kick indicators; including:
- Gain in pit volume (rapid increases in fluid volume at the surface);
- Increase in return fluid-flow rate (with no pump strokes per minute increase);
- Well flowing with pump shut down;
- Hole not taking proper amount of fluid during trips; and
- Well monitoring and alarm devices:
  - Pit volume totalizers (PVT);
  - Relative flow increase.

B) Warning signals that indicate a kick may be occurring or is about to occur, including:
- Drilling rate change;
- Trip, connection, and background gas change;
- Gas-cut mud;
- Water-cut mud or chloride concentration change;
- Decrease in circulating pressure or increase in pump strokes; and
- Identify kick warning signals.

C) Indications of possible increasing formation pressure, including:
- Cuttings size and shape:
  - Torque;
  - Drag;
  - Fill;
  - Volume of cuttings; and
  - Appearance of sloughing shale.
- Temperature changes;
- Gas levels;
- Change in flow rate or mud properties of drilling fluid;
- Other pore pressure indicators;
- Rate of penetration increase; and
- Recognize and explain how the conditions listed above are associated with well control.

D) Importance of responding to kick indicators in a timely manner, including:
- Minimize:
  - Kick size;

- Surface pressures; and
- Lost operations time.

- Consequences of not responding:
  - Kick becomes blowout;
  - Release of poisonous gases;
  - Pollution; and
  - Fire.
- Identify the importance of early detection and the consequences of not responding to a kick in a timely manner.

E) Distinguishing kick indicators and warning signals from other occurrences, including:

- Increases in pit level:
  - Surface additions; and
  - Flow from formation.
- Decreases in pit level:
  - Solids control;
  - Dumping mud; and
  - Lost circulation.
- Drilling rate changes:
  - Rate of penetration (ROP) as a function of weight on bit, formation type, RPM, and pump rate;
  - Drilling break (rapid increase in ROP);
  - Rapid decrease; and
  - Associate change in ROP with changes in formation.
- Gas cut mud and/or gas in drilled cuttings;
- Identify the causes of changes in pit level; and
- Identify drilling rate changes.

iv) Tripping Practices;

v) Drilling Fluids:

A) Types of drilling fluids:

- Identify types of drilling fluids, including:
  - Water based mud;
  - Oil based mud (OBM), synthetic oil based mud (SOBM);
  - Cement; and
  - Completion fluids.

B) Explain how fluid properties affect pressure losses, including:

- Density;
- Viscosity; and
- Changes in mud properties due to contamination by formation fluids.

C) Fluid density measuring techniques:

- Mud balance;
- Pressurized mud balance; and
- Measure fluid density.

D) Mud properties following weight-up and dilution:

- Gel strengths;
- Plastic viscosity and yield point (PV and YP); and
- Explain the effects of weighting-up and diluting fluid on gel strength, PV and YP.

vi) Secondary Well Control; and

vii) Tertiary Well Control.

7) Demonstrate the knowledge of Procedures, including:

a) Knowledge of Set/Check Alarm limits:

i) High and low pit level;

ii) Return flow sensor;

iii) Trip tank level;

iv) Others (i.e., H2S and flammable/explosive gas sensors).

b) Demonstrate the procedures for setting well control monitoring indicators, including, where applicable, the items listed above.

c) Recognize Pre-recorded well control information, including:

i) Standpipe pressure at slow pump rates;

ii) Well configuration;

iii) Fracture gradient;

iv) Maximum safe casing pressures:

A) Wellhead rating;

B) Casing burst rating;

C) Pipe/Tubing collapse; and

D) Subsurface weak zone (optional);

v) Identify appropriate pre-recorded information;

vi) Record standpipe pressure at slow pump rate;

vii) Read at choke console; and

viii) Recognize an error in gauge readings based on discrepancies between readings.

d) Flow checks, including checks after cementing:

i) While drilling – normal flow back;

ii) While tripping – well is hydrostatically balanced (no ECD loss considerations);

iii) While drilling – normal flow back;

iv) While drilling – abnormal flow back;

v) Loss of equivalent circulating density (ECD) – pumps off;

vi) While tripping – well is hydrostatically balanced (no ECD loss considerations);

vii) Use and purpose of trip sheet;

viii) Describe the procedure to perform a flow check in the situations listed above;

ix) Recognize and measure normal flow back;

x) Recognize a flow that differs from normal flow back;

xi) Take action based on recognition of flow;

xii) Explain how to establish that a well is static before starting trip;

xiii) Explain why an absence of flow (during flow check) is not an absolute indicator that there is no influx; and

xiv) Demonstrate understanding that the primary indicator of influx is the trip sheet (hole fill-up) rather than flow check.

e) Knowledge and skills for Shut-in, including:

i) While drilling:

A) Individual responsibilities;

B) Pick up (with pump on);

C) Space-out;

D) Shut pump off;

E) Flow check;

F) Close-in BOP;

G) Close choke; and

H) Notify supervisor.

ii) While tripping:

A) Individual responsibilities;

B) Close off drillstring bore given variety of tubular used;

C) Close BOP; and

D) Notify supervisor.

iii) While running casing:

A) Individual responsibilities;

B) Install device to stop potential flow through casing;

C) Close appropriate BOP or divert as appropriate;

D) Close choke as applicable; and

E) Notify supervisor.

iv) While cementing:

A) Individual responsibilities;

B) Space out, including consequences of irregular tubular lengths;

C) Shut pump off;

D) Close BOP;

E) Close choke; and

F) Notify supervisor.

v) During wireline operations:

A) Individual responsibilities; and

B) Close BOP with consideration for cutting/closure around wire.

vi) During other rig activities:

A) Individual responsibilities;

B) Use of surface equipment to shut-in well;

C) Close choke; and

D) Notify supervisor.

vii) Verification of shut-in:

A) Annulus:
- Through BOP;
- At the flow line.

B) Drillstring:
- Pump pressure relief valves;
- Standpipe manifold.

C) Wellhead/BOP:
- Casing valve (not applicable to subsea stack);
- Broaching to surface (outside of wellbore).

D) Choke manifold:
- Choke;
- Overboard lines.

viii) Upon observing positive flow indicators, shut in the well in a timely and efficient manner to minimize influx. Proceed according to a specific procedure which will address the operations listed at above;

ix) List differences between the Soft vs Hard methods of well control as defined by API RP 59 for both levels (see API RP 59); and

x) For any shut-in, verify well closure by demonstrating that the flow paths listed at above are closed.

f) Knowledge and skills for Well monitoring during shut-in, including:

i) Recordkeeping:

A) Time of shut-in;

B) Drillpipe and casing pressures:
- At initial shut-in; and
- At regular intervals.

C) Estimated pit gain;

ii) Principles of bleeding volume from a shut-in well:

A) Trapped pressure:
- Causes;
- Relief of.

B) Pressure increase at surface and downhole from:
- Gas migration;
- Gas expansion.

iii) Determining shut-in drillpipe pressure when using a drillpipe float;

iv) Effects of density differences from gas, oil, or salt water kick on surface pressures;

v) Situations in which shut-in drillpipe pressure exceeds shut-in casing pressures:

A) Cuttings loading;

B) Inaccurate gauge readings;

C) Density of influx fluid greater than drilling fluid;

D) Flow through drill string; and

E) Blockage downhole.

vi) Maximum safe annulus pressure;

vii) Pressure between casing strings;

viii) Explain or demonstrate recommended procedures to use for well monitoring during shut-in;

ix) Read, record, and report well shut-in recordkeeping parameters;

x) Identify at least two causes of trapped pressure;

xi) Describe the effects of trapped pressure on wellbore pressure;

xii) List two consequences on surface pressure resulting from shutting-in on a gas vs a liquid kick of equivalent volume;

xiii) Perform choke manipulation to achieve specific pressure or volume objectives;

xiv) Demonstrate procedure for relieving trapped pressure without creating underbalance;

xv) If a float valve is in use (ported or non-ported), demonstrate the procedure to open the float to obtain shut-in drillpipe pressure;

xvi) List two situations in which shut-in drill pipe pressures would exceed shut-in casing pressures;

xvii) List hazards if closed-in annulus pressure exceeds maximum safe pressure;

xviii) Describe at least one method for controlling bottomhole pressure (BHP) while gas is migrating;

xix) Identify two causes of pressure between casing strings; and

xx) Describe potential hazard(s) of pressure trapped between casing strings and actions required.

g) Response to massive or total loss of circulation, including:

i) During drilling, fill annulus with fluid in use;

ii) Notify supervisor immediately;

iii) Use of bridging materials (e.g., cement, gunk plugs, lost circulation materials, etc.);

iv) Elimination of overbalance;

v) Identify at least two methods of responding to massive or total loss of circulation during a well kill operation; and

vi) Upon observing loss of circulation, perform the actions listed at above.

h) Tripping, including:

i) Procedures used for keeping hole filled:

A) Using rig pump;

B) Using trip tank; and

C) Using recirculating trip tank (continuous fill).

ii) Methods of measuring and recording hole fill volumes;

iii) Procedure and line up to keep hole filled;

iv) Wet trip calculations:

A) Return to mud system;

B) No return to mud system.

v) Dry trip calculations;

vi) Slugs;

vii) Trip margin:

A) Measure hole fill-up;

B) Recognize discrepancy from calculated fill-up;

C) Take appropriate action:
- At flow, go to shut-in;
- At no flow and short fill-up, go back to bottom.

viii) Procedure and line up to keep hole filled;

ix) Calculate correct fill volumes:

A) Wet trip;

B) Dry trip.

x) Explain trip margin;

xi) Explain the effect of slugs on hole fill up;

xii) Measuring displacement volumes while tripping into hole:

A) With check valve in drillstring;

B) Without check valve in drillstring.

xiii) Perform the items listed at above with regard to hole fill up on trips; and

xiv) Demonstrate, explain, or perform the actions listed at above with regard to tripping.

i) Well control drills (types and frequency), including:

i) Pit drills;

ii) Trip drills;

iii) Personnel evacuation;

iv) Diverter drills as they relate to shallow gas hazards; and

v) Describe the steps involved in conducting the types of drills listed at above.

j) Formation competency, including:

i) Pressure integrity test (testing to a specific limit);

ii) Leak-off test (testing to formation injectivity);

iii) Interpret data from formation tests;

iv) Effect of fluid density change as applicable:

A) Leak-off test (at least one method)
- Calculate equivalent mud weight for leak-off test pressure

B) Formation pressure integrity test
- With check valve in drillstring

v) Prepare the well for leak-off testing;

vi) Describe or perform proper hook-up and procedures for conducting a formation leak-off test or competency test for a given configuration;

vii) Identify from a plot the point at which leak-off begins;

viii) Describe or perform the leak-off test and formation pressure integrity test; and

ix) Describe how formation competency test results may be affected by fluid density change.

k) Stripping operations, including:

i) Line up for bleeding volume to stripping tank;

ii) Stripping procedure through BOP;

iii) Measurement of volume bled from well;

iv) Calculations relating to volumes and pressures to be bled for a given number of drillstring stands run in the hole;

v) Stripping with/without volumetric control;

vi) Define the following aspects of stripping: purpose, suitability, and method; and

vii) Demonstrate stripping procedures listed at above.

l) Shallow gas hazards, including:

i) Mechanisms and timing of events;

ii) Kill procedures:

A) Shut-in;

B) Use of diverters:
- With drillpipe;
- Running casing.

C) Riserless drilling.

iii) Pilot holes;

iv) During and after cementing conductor and surface casing;

v) Setting barite or cement plugs;

vi) Explain why it is relatively easy to become underbalanced at shallow depths (e.g., hole sweeps, gas cutting, swabbing, lost circulation);

vii) Explain the limited reaction time for kick detection;

viii) Explain the well control procedural options available (i.e., shut-in vs. divert);

ix) Explain the use of pilot holes;

x) Describe the technique or procedure for preparing and setting barite or cement plugs;

xi) Describe the difference between diverting and conventional well kills;

xii) Describe the difference between diverting and conventional well kills;

xiii) List at least two conditions under which the use of a diverter may be applicable; and

xiv) List at least two potential hazards when using a diverter.

8) Demonstrate the knowledge of the Well Control Equipment, including:

a) Knowledge for Well control related instrumentation, including:

i) Fluid pit level indicator;

ii) Fluid return indicator;

iii) Pressure measuring equipment and locations:

A) Locations:
- Standpipe pressure gauge;
- Drillpipe pressure gauge;

- Pump pressure gauge; and
- Casing pressure gauge (also referred to as choke manifold or annular pressure gauge).

B) Range and accuracy.

iv) Mud pump/Stroke counter;

v) Mud balance and pressurized mud balance;

vi) Gas detection equipment:

A) H2S;

B) Flammable/Explosive gases.

vii) Drilling recorder:

A) Pit volume (number of barrels of fluid in the pit);

B) Flow rate;

C) Rate of penetration (ROP);

D) Pressure;

E) Strokes per minute (SPM);

F) Mud weight; and

G) Depth recorder.

viii) Describe the relationship between mud pit and flow sensors, and drill floor kick indications;

ix) List at least two reasons for possible gauge inaccuracies;

x) Describe the purpose and use of the mud pump/stroke counter (e.g., stroke rate, flow rate, and displaced volume);

xi) Measure current drilling parameters.

b) Knowledge for BOP configuration, including:

i) Components (See API RP 53, most recent version):

A) Annular preventer;

B) Ram preventers/elements:
- Blind;
- Blind/Shear;
- Pipe;
- Variable bore pipe; and
- Ram elements.

C) Drilling spool or integral body; and

D) Valves.

ii) Functions;

iii) Demonstrate basic understanding of the use of ram and annular preventers;

iv) Identify flow path for normal drilling operations;

v) Identify flow path for well control operations;

vi) Identify areas exposed to high and low pressure during shut-in and pumping operations;

vii) Identify and confirm line-up for equipment pressure testing, shut-in, and pumping operations;

viii) Demonstrate ability to shut-in the well in the event of primary equipment failure;

ix) Given a BOP stack configuration, identify potential flow paths for kill operations;

x) Given a BOP stack configuration, identify shut-in, monitoring, and circulation operations which are possible and those which are not; and

xi) Given a BOP stack configuration, select an appropriate BOP to effect closure on a given tubular.

c) Knowledge of Manifolds and piping, including:

i) Standpipe;

ii) Choke.

d) Knowledge of Valving, including:

i) BOP stack;

ii) Drillstring:

A) Full opening valves (DPSV, kelly cock, Kelly valve);

B) Check valves; and

C) Float valves – advantages and disadvantages.

iii) Choke manifold:

A) Adjustable choke:
- Hydraulic (remote operated);
- Manual.

B) Fixed choke; and

C) Valves to direct flow.

iv) Mud pressure relief;

v) Describe opening and closing a full-opening safety valve;

vi) Describe the difference in use between a full-opening safety valve and a check valve (e.g., inside BOP);

vii) Be able to identify compatibility of thread types;

viii) Distinguish the function of the choke from that of other valve types;

ix) Define the function of a choke;

x) Describe the function of adjustable chokes, both manual and hydraulic; and

xi) Identify changes in valve positions resulting from opening or closing the diverter.

e) Knowledge of Auxiliary well control equipment, including:

i) Mud/Gas separator:

A) Gas blow-through;

B) Vessel rupture.

ii) Mud pits:

A) Suction pit;

B) Return pit;

C) Mixing equipment.

iii) Degasser;

iv) Trip tank:

A) Gravity feed;

B) Recirculating type.

v) Top drive systems:

A) Kelly valves, lower;

B) Spacing out;

C) Shutting-in;

D) Stripping.

vi) Define function, operating principles, flowpaths, and components of mud-gas separators;

vii) List two possible consequences of overloading the mudgas separator and explain the appropriate corrective actions;

viii) Describe pit alignment during well control operations(e.g., vacuum degasser, flaring);

ix) Describe the procedures for handling of gas in return fluids (e.g., vacuum degasser, flaring);

x) Describe the characteristics of a trip tank (e.g., small cross-section, accurate fluid volume measurements); and

xi) Describe considerations when using top drive systems.

f) Demonstrate the knowledge and skills for BOP closing unit – function and performance:

i) Usable fluid volume test:

A) Gas blow-through;

B) Vessel rupture.

ii) Closing time test;

iii) Accumulator pressure:

A) Pre-charge pressure;

B) Minimum system pressure;

C) Operating pressure; and

D) Maximum system pressure.

iv) Adjustment of operating pressure:

A) Manifold pressure regulator;

B) Annular pressure regulator.

v) Operating functions:

A) Regulator;

B) Unit/Remote switch;

C) By-pass valve; and

D) Accumulator isolator valve.

vi) Demonstrate understanding of the function of the accumulator system, including an explanation of the consequences of losing nitrogen pre-charge pressure;

vii) Identify major components of a BOP control system;

viii) Describe the reasons and procedure for a usable fluid volume test;

ix) State, for a 3000 psi system, the pre-charge pressure, minimum system pressure, normal regulated operating pressure, maximum system pressure;

x) List two reasons for adjusting regulated annular operating pressure;

xi) Demonstrate the ability to operate the BOP from the driller's panel and the remote control panel; and

xii) Diagnose simple functional problems.

g) Knowledge for Testing/Completion pressure control equipment, including:

i) Packers;

ii) Lubricators;

iii) Christmas trees;

iv) Test trees; and

v) Explain use of testing and completion well control equipment.

h) Knowledge of Pressure and function tests, including:

i) Maximum safe working pressure:

A) Pressure ratings of all equipment;

B) Reasons for de-rating; and

C) Areas exposed to both high and low pressures during shut-in and pumping operations.

ii) General emphasis on quality maintenance practices:

A) Correct installation;

B) Maintenance;

C) Wear and replacement requirements; and

D) Rings, flanges, and connectors.

iii) Emphasis on quality testing practices;

iv) Procedures for function and pressure testing all well control equipment:

A) Function and testing of high pressure well control equipment:
- BOP stack;
- Manifolds; and
- Auxiliary well control equipment.

B) Function and testing of low pressure well control equipment:
- Mud-gas separator;
- Fluid/Gas pathways.

v) Pressure or function testing of diverter systems;

vi) Identify the maximum safe working pressure for a given set of well control equipment upstream and downstream of the choke;

vii) List at least two reasons for possible de-rating of the working pressure of the well control equipment;

viii) Describe correct installation, maintenance, wear, and replacement requirements, and describe rings, flanges, and connectors; and

ix) Perform, explain, or demonstrate function and testing of high pressure well control equipment, low pressure well control equipment, and diverter systems.

i) Knowledge of Well control equipment arrangements, including:

i) General arrangements for BOP, valving, manifolds, and auxiliary equipment (applicable to both written and practical testing):

A) BOP, manifold plug, and valve line-up:
- For drilling operations;
- For shut-in;
- For well control operations; and
- For testing;

ii) Identify the flow path for well control operations;

iii) Identify areas exposed to high and low pressure during shut-in and pumping operations;

iv) Identify and confirm line-up for equipment pressure testing, shut-in, and pumping operations;

v) Demonstrate ability to shut-in the well in the event of primary equipment failure;

vi) Demonstrate the correct alignment of standpipe and choke manifold valves, including downstream valves for the the following conditions:

A) Drilling operations;

B) Shut-in;

C) Well control operations;

D) Testing.

j) Minimum BOP Requirements;

k) Minimum Diverter Requirements;

l) Closing Units and Accumulator Requirements;

m) Choke and Kill Manifold Requirements;

n) Other Well Control Equipment;

o) Well Control Equipment Testing Requirements;

p) Closing and Opening Ratios; and

q) Government Regulations.

9) Demonstrate the knowledge and the skills for Actions Upon Taking A Kick, including:

a) Detecting a Kick;

b) Containment as Early as Possible;

c) Shut-in Procedures;

d) Hang-off Procedure;

e) Shut-in Period Prior to Well Kill;

f) Gas Migration / Review Gas Law;

g) Volume to Bleed to Maintain Constant BHP;

h) MASP or MAASP; and

i) MGS (Mud Gas Separator).

10) Demonstrate the knowledge and skills for the Preparation & Prevention, including:

a) Preparation of Equipment and Materials;

b) Well Control Drills;

c) Pre-Recorded Information; and

d) Kick Prevention During Operations.

11) Demonstrate the knowledge and skills for Well Control/Kill Methods/Techniques, including:

a) Objectives of well control techniques, including:

i) Circulate kick safely out of the well;

ii) Re-establish primary well control by restoring hydrostatic balance;

iii) Avoid additional kicks; and

iv) Avoid excessive surface and downhole pressures so as to prevent inducing an underground blowout.

b) Techniques for controlling or killing a producing well;

c) Preparing for well entry;

d) No returns pumping technique(e.g. Bullheading);

e) Volumetric method/ technique and lubricate & bleed;

f) Principles of Constant bottomhole pressure(BHP) methods (forward or reverse circulation), including:

i) Shutting-in well will stop influx when bottomhole pressure (BHP) equals formation pressure:

A) Close choke and observe pressure gauges (SIDPP + SICP = 0 psi);

B) If hydrostatic balance is restored, open BOPs and check for flow;

C) Resume operations.

ii) Circulating out a kick by maintaining enough choke back pressure to keep bottomhole pressure equal to or slightly greater than formation pressure;

iii) Bottom of the drillstring must be at the kicking formation (or bottom of the well) to effectively kill the kick and be able to resume normal operations;

iv) Explain how pump and choke manipulation relates to maintaining constant bottomhole pressure;

A) Read, record and report drillpipe and annulus pressures; and

B) List the phases of at least one constant bottomhole pressure well control method.

g) Example steps for maintaining constant bottomhole pressure well control: Driller's Method & Wait and Weight Method:

i) Well control and kill – calculations and procedures:

A) Proficiency in both constant bottomhole pressure well control methods – Driller's and/or Wait & Weight Method:

- Bring pump up to slow kill rate while opening choke;

- Maintain surface pressure while circulating according to method;
- Increase mud weight in pits to kill weight;
- Line up pump to kill mud;
- Line up choke manifold and auxiliary well control equipment;
- Pump kill weight mud until kill mud completely fills the wellbore;
- Circulate until all kicks are removed from well;
- Shut off pumps;
- Close choke and observe pressure gauges (SIDPP + SICP = 0 psi);
- If hydrostatic balance is restored, open BOPs and check for flow; and
- Resume operations.

B) Preparing the killsheet:

- Organize the specific responsibilities of the rig crew during a well control/kill operation;
- Demonstrate proficiency in implementing both the Wait & Weight and Driller's Methods;
- Read, record and report drillpipe and annulus pressures;
- List the phases of at least one constant bottomhole pressure well control method;
- Explain how these steps relate to maintaining bottomhole pressure equal to or greater than formation pressure;
- 6. Demonstrate proficiency in at least one constant bottomhole pressure well control method (Driller to act under the direction of Supervisor); and
- Demonstrate or describe the process of organizing the specific responsibilities of the rig crew during the execution of a well kill operation.

h) Stripping;

i) Preparation of Well control kill worksheet, including:

A) Well control calculations:

- Drillstring and annular volumes;
- Fluid density increase required to balance increased formation pressure;
- Initial and final circulating pressure as appropriate for method(s) taught.

B) Maximum wellbore pressure limitations:

- Surface; and
- Subsurface.

C) Selection of a kill rate for pump:

- Allowing for friction losses;
- Barite delivery rate;
- Choke operator reaction time;
- Pump limitations; and
- Surface fluid handling capacity.

D) Correctly fill out a kill sheet for one well control method;

E) Determine weight up material required and corresponding volume increase;

F) Describe the consequences of exceeding maximum wellbore pressure at surface and subsurface; and

G) Identify factors affecting selection of kill rate for pump.

i) Well control procedures, including:

i) Procedure to bring pump on and off line and change pump speed while holding bottomhole pressure constant using choke:

A) Use of casing pressure gauge; and

B) Lag time response on drillpipe pressure gauge.

ii) Initial circulation pressure:

A) Using recorded shut-in drillpipe pressure and reduced circulating pressure;

B) Without a pre-recorded value for reduced circulating pressure; and

C) Adjustment for difference in observed vs. calculated circulating pressure.

iii) Choke adjustment during well kill procedure:

A) Changes in surface pressure as a result of changes in hydrostatic head or circulating rates:
- Drop in pump pressure as fluid density increases in drillstring during well control operations; and
- Increase in pump pressure with increased pump rate and vice versa.

B) Pressure response time:
- Casing pressure gauge (immediate); and
- Drillpipe pressure gauge (lag time).

iv) Handling of problems during well control operations:

A) Pump failure;

B) Changing pumps;

C) Plugged or washed out nozzles;

D) Washout or parting of drillstring;

E) BOP failure:
- Flange failure;
- Weephole leakage;
- Failure to close; and
- Failure to seal.

F) Plugged or washed out choke;

G) Fluid losses;

H) Flow problems downstream of choke;

I) Hydrates;

J) Malfunction of remote choke system;

K) Mud/Gas separator;

L) Problems with surface pressure gauges; and

M) Annulus pack-off.

v) Considerations if using a diverter;

vi) Demonstrate bringing pump on and off line and changing pump speed while holding bottomhole pressure constant using choke;

vii) Determine correct initial circulating pressures;

viii) Operate choke to achieve specific pressure objectives relative to selected constant bottomhole pressure methods;

ix) Describe why pump pressure drops as fluid density increases during a constant bottomhole pressure method; and

x) Given a scenario detailing a well control problem, identify the problem and demonstrate or describe an appropriate.

j) Other well control methods, including:

i) Volumetric, including lubrication/bleed:

A) During drilling;

B) During well testing/completion.

ii) Bullheading:

A) During drilling;

B) During well testing/completion.

iii) Reverse circulation during well testing/completion;

iv) Reasons for selecting the specific well control methods;

v) Assumptions and limitations of methods; and

vi) Demonstrate proficiency in control/kill methods including volumetric with lubrication and bleeding, bullheading, etc.

12) Demonstrate the knowledge and skills for Well Control Complications and Solutions, including:

a) Complications:

i) Trapped pressure:

A) Wireline plugs;

B) Subsurface safety valves (storm chokes);

C) Surface controlled subsurface safety valve;

D) Bridge plugs;

E) Sand bridges;

F) Paraffin;

G) Hydrates;

H) Beneath packer;

I) Identify sources of potential trapped pressure;

J) Determine potential pressures beneath various downhole plugs, valves, etc.; and

K) Describe procedure for resolving sources identified at left.

ii) Pressure on casing:

A) Hole in tubing;

B) Hole in casing;

C) Seal or packer leak;

D) Pressure or temperature pulled seals out of seal bore;

E) Failed squeeze job or patch; and

F) Identify sources of pressure on casing and explain the well control implications.

iii) Underground flow:

A) Based on surface parameters, identify underground flow and possible solutions.

iv) Cannot circulate well (i.e., plugged workstring, etc.):

A) List three reasons why a well cannot be circulated and a solution for each.

v) Hydrates:

A) Describe the possible effects of hydrates on well control; and

B) Describe how hydrate formation may be prevented.

vi) Lost circulation:

A) Identify signs of lost circulation; and

B) List at least two possible remedies to lost circulation.

13) Demonstrate the knowledge and skills for Specific Environments, including:

a) Deviated / Horizontal Well Control;

b) Shallow Gas / Diverting Procedures;

c) Hydrogen Sulphide;

d) HP/HT (High Pressure / High Temperature);

e) Lost Circulation;

f) Underbalanced Drilling;

g) Slim Hole; and

h) Government Regulations.

14) Demonstrate the knowledge for Subsea Operations, including:

a) Demonstrate the knowledge and skills for Subsea Well Control, including:

i) Subsea equipment:

A) Marine riser systems:
- Drilling with riser; and
- Drilling without riser.

B) BOP control systems:
- Block position;
- Pilot system; and
- Subsea control pods.

C) BOP stack:
- Lower marine riser package (LMRP);
- Configuration; and
- Ram locks.

D) Ball joint;

E) Flex joint;

F) Slip joint;

G) Riser dump valve;

H) Identify and describe the function of each system described at above;

I) State how to activate ram locks;

J) Describe reasons for drilling with and without riser; and

K) Describe operating principles of subsea BOP stack control system.

ii) Diverter system:

A) Configuration and components;

B) Diverter line size and location;

C) Line-up for diversion:
- Valve arrangement and function;
- Valve operational sequence; and
- Limitations of the diverter system.

D) Describe principle of operation of the diverter system on a floating unit.

iii) Kick detection issues:

A) Vessel motion;

B) With and without riser;

C) Riser collapse;

D) Water depth (BOP placement); and

E) Describe how the items listed at left affect kick detection.

iv) Procedures:

A) Choke and/or kill line friction:
- Measurement of choke and/or kill line friction;
- Compensating for choke and/or kill line friction:
  - Static kill line;
  - Casing pressure adjustment.

B) Removing trapped gas from BOPs:
- Use of bleed lines;
- U-tubing of trapped gas.

C) Clearing riser:
- Gas in riser;
- Displacing riser with kill weight mud.

D) Hydrostatic effect of riser disconnects and re-connects;

E) Spacing and hang-off;

F) Effect of depth on formation competency;

G) Define or describe the effect of fluids of different densities in the choke and kill lines for both levels;

H) Explain consequences of trapped gas in subsea BOP system;

I) Describe specific procedure for removing trapped gas from the BOP stack following a kill operation;

J) Describe killing a subsea riser with kill mud and the consequences of failure to fill riser with kill mud after circulating out a kick;

K) Describe possible consequences of trapped gas removal in terms of well behavior or riser without riser margin; and

L) Describe steps necessary to space out drillpipe and hang-off using motion compensator, ram locks, etc.

v) Compensating for hydrostatic head changes in choke lines:

A) Demonstrate ability to adjust circulating pressures to compensate for choke line friction;

B) Demonstrate ability to adjust choke appropriately to compensate for rapid change in hydrostatic pressure due to gas in long choke lines.

vi) Choke Line Friction Loss;

vii) Gas in Choke Line / Riser;

viii) Riser Margin;

ix) Hydrates:

x) (a) Identify possible complications caused by hydrates.

xi) Trapped Gas / Removal;

xii) Deepwater Well Control; and

xiii) Government Regulations.

b) Demonstrate the knowledge regarding Shut-In for Subsea and Deepwater Wells:

i) Shut-in for subsea wells:

A) Pre-kick preparation;

B) Hard shut-in vs. soft shut-in;

C) Annular shut-in vs. ram shut-in;

D) Shut-in while drilling;

E) Shut-in while tripping;

F) Shut-in while making a connection;

G) Shut-in with bit above BOPs;

H) Shut-in while running casing/liner;

I) Masking of choke pressure by high gel strength in C&K lines;

J) Reading shut-in drill pipe pressure;

K) Demonstrate the ability to shut in the well in a timely manner to minimize influx after observing positive flow indicators;

L) For any shut-in, verify well closure by demonstrating the flow paths are closed; and

M) Describe how choke pressure readings are affected in deepwater by the high gels of the mud in the choke and kill lines.

c) Demonstrate the knowledge and skills for Subsea and Deepwater Well Kill Considerations, including:

i) Constant bottom hole pressure methods, including:

A) Driller's method;

B) Wait and weight method;

C) Demonstrate proficiency in implementing both the Wait & Weight and the Drillers Method;

D) Identify differences in using either of these methods in subsea environment.

ii) Bullheading, including:

A) Identify when bullheading should be used in lieu of constant bottom hole pressure methods;

B) Demonstrate proficiency in implementing a bullheading procedure.

iii) Number of choke and kill lines, including:

A) Explain how the number of choke and kill lines can affect circulating well kill methods.

iv) Volumetric method:

A) Explain differences in volumetric methods for subsea.

v) Dynamic lubrication methods:

A) Explain dynamic lubrication of gas below subsea BOP stack.

d) Demonstrate the knowledge and skills for Subsea and Deepwater Well Control–Shallow Flow (s), including:

i) Shallow flow(s) prior to BOP installation:

A) Shallow water flow;

B) Shallow gas;

C) Describe the mechanisms that can result in shallow flow; and

D) Discuss difficulty in controlling flows, emphasis must be placed on detection, prediction and prevention.

ii) Shallow flow detection:

A) Shallow flow indicators;

B) Shallow flow detection methods and equipment;

C) Explain how shallow flows can be detected, e.g.:
- during drilling;
- while running casing; and
- during/after cementing.

iii) Shallow flow prevention technique, procedures and practices:

A) Describe ways to prevent shallow water and shallow gas flows.

iv) Shallow flow well control methods:

A) Shallow water flow;

B) Shallow gas;

C) Lost circulation and formation breakdown;

D) Explain how to implement shallow water kill procedures;

E) Explain how to implement shallow gas kill procedures; and

F) Explain how to implement lost circulation and/or formation breakdown procedures.

e) Demonstrate the knowledge and skills for Subsea and Deepwater Well Control – Kick Prevention and Detection, including:

i) Knowledge of Kick Prevention & Detection, including:

A) Early kick detection:
- Drilling data analysis;
- Pressure detection services;
- Pressure transition management;
- General practices to managing pressure;
- Drilling fluid analysis;
- Simulated connections; and
- Mud gas levels.

B) Tripping practices:
- Circulating trip gas.

C) Subsea Circulating Practices;

D) Connection and rotating practices;

E) Ballooning;

F) Explain why subsea kick detection is more difficult;

G) Describe how a leak-off test should be conducted in subsea operating environments;

H) Explain why early kick detection is necessary in deepwater operating environments;

I) Explain reasons for pressure transition problems in deepwater;

J) Describe how pressure detection services can detect kicks or lost circulation;

K) Describe "best practices" to managing pore and fracture pressures in deepwater drilling environments; and

L) Describe practices used to identify ballooning vs. wellkicks.

ii) Knowledge of Riser gas considerations, including:

A) Danger of free gas in riser;

B) When to apply gas in riser procedures;

C) Considerations for handling gas in riser:
- Alternatives for handling riser gas;
- Riser circulation timing (1/4, ½, ¾, etc.).

D) Explains the risks and hazards of free gas in the riser;

E) Demonstrate proficiency in implementing procedures for handling riser gas;

F) Explain the usage of the diverter system in handling riser gas; and

G) Explain the benefits of having:
- riser mud gas separator, and
- riser boost lines.

f) Demonstrate the knowledge and skills for Subsea and Deepwater Well Control – BOP Arrangements:

i) Subsea BOP Stack:

A) BOP Arrangements;

B) Placement of rams/outlets;

C) Moored and dynamic positioned rig;

D) Hang-off;

E) BOP instrumentation arrangements;

F) External loading of BOP equipment;

G) Hot stab requirements;

H) Describe the purpose/function of rams in a subsea stack;

I) Describe placement of rams/outlets in a subsea stack;

J) Describe the differences between BOP stacks on moored and dynamic positioning rigs BOP;

K) Describe essential hang-off requirements for BOP rams; and

L) Describe BOP instrumentation preferred for deepwater.

ii) Choke manifold system:

A) Overboard / mud gas separator bypass;

B) Strip tank tie-in;

C) Low pressure gauges;

D) Hydrate inhibition;

E) Explain the diverter and surface gas handling facilities to meet deepwater riser gas requirements;

F) Explain the alignment of choke/kill manifold in preparation of well control procedures; and

G) Explain the importance of displacement fluids required to be displaced into choke/kill lines in deepwater.

iii) Subsea control systems:

A) Direct hydraulics;

B) Multiplex;

C) Acoustics;

D) Explain block position;

E) Explain pilot system;

F) Explain subsea accumulator bottles;

G) Explain BOP response time;

H) Explain BOP / wellhead connectors /disconnect;

I) Explain dedicated hydraulic line;

J) Explain subsea control pods; and

K) Explain “usable” fluid.

iv) Diverter System – Floating Unit:

A) Configuration and components;

B) Diverter line size and location;

C) Line-up for diversion:
- Valve arrangement and function;
- Valve operational sequence; and
- Limitations of the diverter system.

D) Describe principle of operation of the diverter system on a floating unit.

g) Demonstrate the knowledge and skills for Subsea and Deepwater Well Control – Riser System, including:

i) Riser considerations:

A) Design;

B) Operating characteristics;

C) Describe and identify key components required for a riser management system; and

D) Describe and identify riser design and operating characteristics:
- Collapse;
- Buoyancy; and
- Tension Loading.

ii) Boost lines:

A) Explain how the use of boost lines affects the kick detection process.

iii) Fill-up valves (dump valve):

A) Describe the purpose of a fill-up valve; and

B) List two situations where the use of a fill-up valve is required.

h) Demonstrate the knowledge and skills for Subsea and Deepwater Well Control – ROV INTERVENTIONS, including:

i) Minimum subsea BOP/ROV intervention functions:

A) Hot stab plug considerations;

B) ROV capabilities; and

C) Explain how an ROV can be used in well control intervention.

ii) Common BOP override functions:

A) Identify common override functions and how they can be used to effect efficient well control.

i) Demonstrate the knowledge for Subsea and Deepwater Well Control – Drilling Fluids:

i) Subsea drilling fluid considerations, including:

A) Temperature effects;

B) Hydrates;

C) Identify how the drilling fluid properties affect:
- Losses and fracture propagation;
- Ballooning;
- Equivalent circulating densities;
- Temperature stability;
- Gas solubility (OBM, SBM);
- Leak-off tests (OBM, SBM);
- Fluid compressibility (OBM, SBM);
- Riser margin; and

- Hydrate formation, prevention and removal, e.g., glycol addition.

D) Explain the effect of the low temperature on the pressure losses in the choke and kill lines.

ii) Fluid storage:

A) Weighted systems for shallow water flow kill;

B) Barite storage/mixing capacities and rates;

C) Kill weight mud; and

D) Describe how barite storage, kill weight mud storage, and the rig's mud mixing system can be used to control shallow water flows.

j) Demonstrate the knowledge and skills for Subsea and Deepwater Well Emergency Disconnect:

i) DP emergency disconnect considerations, including:

A) Yellow/Red alert considerations;

B) Emergency disconnect sequence functions;

C) Autoshear and deadman systems;

D) Acoustic back-up systems;

E) List two situations that would call for an emergency disconnect on a dynamically positioned rig; and

F) List the consequences of a Failure to Disconnect.

15) Demonstrate the knowledge and skills for Special Situations, including:

a) Hydrogen sulfide (H2S):

i) Risks encountered in well control operations involving H2S:

A) Toxicity;

B) Potential for explosion;

C) Corrosivity; and

D) Solubility.

ii) Well control handling options:

A) Bullheading; and

B) Circulation with flaring.

iii) Identify risks associated with H2S;

iv) Specify crew responsibilities; and

v) Identify well control options, including bullheading and circulation with flaring.

b) Horizontal well control considerations:

i) Influx detection;

ii) Off bottom kill;

iii) Special kill sheet;

iv) Explain the following considerations related to horizontal well control:

A) Any kill sheet modifications;

B) Influx detection;

C) Procedure for off bottom kill;

D) Gas behavior in horizontal section; and

E) Pressurized drilling equipment.

c) Off bottom kills:

i) Explain off bottom kills.

d) Underground blowouts:

i) Indications of underground flow:

A) At shut-in;

B) During kill.

ii) Demonstrate how to recognize loss of formation integrity during shut-in or circulation.

e) Combination thief and kick zones:

i) Thief zone on top, kick zone on bottom;

ii) Kick zone on top, thief zone on bottom; and

iii) Explain problems and procedural responses for combination thief and kick zone.

f) False kick indicators:

i) Kelly cut;

ii) Background gas;

iii) Bottoms up with OBM;

iv) Fluid transfer; and

v) Describe false kick indicators.

g) Pipe reciprocation during well kill (biaxial loading):

i) Explain procedure for pipe movement during well kill.

h) Underbalanced drilling:

i) Producing while drilling;

ii) Pressurized drilling equipment:

A) Rotating annular;

B) Rotating head.

iii) Explain well control procedures for underbalanced drilling.

i) Slim-hole well control considerations:

i) Explain well control concerns during slim-hole drillling.

j) Coiled tubing:

i) Explain well control during coiled tubing operations.

k) Snubbing:

i) Explain well control during snubbing operations.

l) New well control technology and equipment;

m) High pressure/high temperature considerations;

n) Tapered string/tapered hole;

o) Wellhead component failure points:

  i) Casing hangers;

  ii) Casing isolation seals; and

  iii) Connections and fittings.

p) Shut-in and circulating kick tolerance;

q) Wireline; and

r) Small tubing unit.

Chapter 11 – Command and Control and Management of Major Emergencies Training Course

11.1 Course objectives

16) To provide MOUs' offshore senior management members with the knowledge and skills necessary to ensure their junior officers, key personnel and emergency response teams are properly prepared and organized to effectively deal with any emergency situation and to ensure all the emergency response equipment with the arrangements are maintained in such a condition that they will reliably perform their role when required to do so;

17) To provide MOU's offshore senior management team with the knowledge and skills necessary to coordinate the Unit's response to an emergency on board their own MOU and others in distress and also to enable them to retain this awareness in demanding circumstances; and

18) To identify the competencies that are required to effectively deal with emergencies and to ensure emergency command capabilities of the MOUs offshore management team are developed and assessed using scenario-based training and assessment techniques.

10.2 Course duration

1) Minimum of thirty-two (32) hours.

10.3 Number of trainees in a course

1) The number of participants in a course should not exceed 12 for practical demonstrations, open water drills and pool exercises under the supervision of an instructor;

2) The number of participants should not exceed 24 for lectures and audiovisual instruction under the supervision of an instructor.

10.4 Prerequisites

1) Completion of STCW Basic Safety, Proficiency in survival craft and rescue boats other than fast rescue boats, and Advanced fire fighting courses.

10.5 Specific instructor qualifications

1) The main course instructor must hold a valid certificate of Competency, not lower than Barge Supervisor or Maintenance Supervisor. If the course is under the supervision of more than one instructor, the assistant instructor shall hold qualifications related to the marine Offshore industry or shall have related skills and be approved by Marine Safety (AMSP), Ottawa.

10.6 Minimum equipment required

1) Following from various relevant types of MOUs / Rigs:

   a) Particulars, drawings, aerial photos, unit's layout diagrams and plans of various MOUs/ Rigs;

   b) Emergency Response and Procedures Manuals;

   c) Organization charts;

   d) Copies of ER plans;

   e) Operating Manuals and Duty cards for emergency response positions;

   f) Material Safety Data Sheets (MSDS);

   g) Safety and Health Policies;

   h) Environmental Policies; and

   i) Quality Policy documents;

2) Copies of the CSA/ CSA, 2001, various regulations, relevant TPs , CLC Part II, MOHS regulations, CAPP's documents, IADC's documents, CAODC's documents, national, international and IMO documents;

3) Various marine casualty investigation reports (national and international);

4) Maps (regional and local), hand-held radios, multi-line telephone system, fire and gas panel and general alarm system, PA system, CCtv, Camera, ER status boards, ER Manual Station bill, DVD Camera recording system, computers, computer-projection system, sound effects console, sound effects speaker system, POB Muster status board, flip charts etc; and

5) Access to equipment of a fully operational approved MED establishment or the MOU/ vessel is essential.

10.7 Course contents

1) This course must be structured to provide both theory (i.e. lectures, written material, presentations, videos, etc.) and practical simulated exercises using the typical MOU's emergency response procedures with the emphasis on practical exercises. Sufficient resources must be available to provide for the observation of students under realistic emergency conditions such that instructors can provide relevant and effective feedback;

2) A thematic approach is to be used to link the presentations and each is to be related to the Elements, Core Essential Knowledge and understanding required for training and assessment; and

3) Scenario-based simulated exercises are to be used for the training and assessment, and the course must as a minimum cover the following topics:

   a) The orientation and emergency training of MOUs' offshore personnel and visitors, including:

      i) Define a major emergency and list emergencies that may be encountered on MOUs;

      ii) Discuss the statutory requirements for fire and abandon ship drills on MOUs;

      iii) Discuss the training of MOUs' Offshore personnel to meet the needs of these emergencies in (i) above, including:

         A) Identify how drills and exercises raise awareness of potential accidents on MOUs;

         B) Ensure that drills and exercises are consistent with priorities, objectives, procedures and statutory requirements;

         C) Knowledge to ensure that personnel are trained and assessed in their potential to respond to emergencies during drills and exercises;

         D) Analyze how drills and exercises can be used to recognize the strengths and weaknesses of the emergency response plans on MOUs;

         E) Personnel are encouraged to seek clarification of their allocated roles and responsibilities; and

         F) Actions to deal with potential emergencies are planned.

      iv) Discuss the planning, management and conduct of emergency drills and exercises; and

      v) Plan, prepare, manage and conduct training drills for a MOU in the following anticipated emergency situations:

         A) Well Control incident;

         B) Explosion and fire;

         C) Helicopter incident;

         D) Collision;

E) Structural failure;

F) Extreme weather, including icing;

G) Loss of stability (mobile units); and

H) Rapid Penetration (Jack Ups).

b) Damage Control, including:

i) Assess damage and its effects on MOUs' seaworthiness:

A) Know the SOLAS requirements for stability and subdivisions as applicable to MOUs;

B) Discuss permeability and use of stability data to assess damage on a MOU's seaworthiness; and

C) Monitoring and control of stability during firefighting and outer hull damage, particularly in case of floating units: knowledge of effects of excess water (free surface effects), pumping and drainage of excess water including flooding rates from damage and fire fighting water.

ii) Assess the feasibility of damage control and emergency response plan:

A) Discuss the theory of damage control to minimize the effects of damage and preserve MOUs' seaworthiness under the following situations: pressurizing tanks, double bottoms and cofferdams, and Engine room leaks.

B) Discuss methods of reducing or preventing oil pollution due to a damaged hull.

c) Knowledge of contingency planning, including:

i) Preparation of contingency plans for response to emergencies; and

ii) Formulate an emergency muster list, emergency procedures' guide and a contingency plan for MOUs in response to various anticipated emergencies when the MOU is:

A) At sea under its own power;

B) At sea under tow;

C) On station while performing operations in various modes like D.P., on anchors etc.;

D) In port; and

E) During refit

d) Maintenance of a state of readiness on MOUs/ Offshore Installations, including:

i) Define emergency prevention and response on MOUs;

ii) Define an Emergency preparedness and discuss regulatory requirements for emergency preparedness on MOUs;

iii) Knowledge and skills to enable participants to be able to maintain a state of readiness to deal with major emergencies onboard MOUs/ Offshore installations;

iv) Knowledge of Life saving appliance regulations (International Convention for the Safety of Life at Sea) as applicable to MOUs;

v) Knowledge of serviceability and sufficiency of equipment and maintenance management standards in accordance with Company's Management System Requirements;

vi) Ability to maintain a state of readiness, proactive planning and importance of proactive functions of this element; and

vii) Characteristics of MOUs/ Offshore Installations that influence emergencies.

e) Organization of emergency response & management of emergency response on MOUs, including:

i) Understand the differences between Normal and Major emergency management;

ii) Knowledge of Emergency response measures including the management, organizational aspects, hardware and equipment provided to deal with emergencies on a MOU, including:

A) Preparation for emergencies, including safety in emergency response;

B) Emergency planning;

C) Communications; and

D) Enquiries and requests from media and next of kin.

iii) Knowledge and skills to implement predetermined emergency plans and procedures in the context of the current emergency;

iv) Recognize the need for a properly equipped and ergonomically designed Emergency Response Centre;

v) MOUs' offshore senior officer's responsibilities and duties during an emergency and developing the discipline of implementing their MOU's Emergency Response Plan;

vi) Recognize the importance of the Emergency Response Manager in maintaining a broad overview of the emergency response, including:

A) Assigning duties of the emergency response to subordinates;

B) Valid and reliable information is supplied to relevant personnel;

C) How to take an overview of the situation and not get overloaded with details;

D) Incident recording/Event logs, including POB tracking;

E) Management and control of injured persons, including Medivac procedures; and

F) Overall monitoring the emergency situation.

f) Emergency response plan (ERP) and procedures, including:

i) Statutory requirements for comprehensive emergency response plans and procedures;

ii) Functional requirements for an ERP on MOUs;

iii) Factors to be considered to ensure an effective and comprehensive ERP for MOUs;

iv) Necessity of a properly prepared Emergency Response Plan that covers potential situations, including:

A) Fatalities, serious injuries and medical emergencies;

B) Missing persons, including Man overboard;

C) Diving emergencies;

D) Loss of control of a well;

E) Fires and explosions;

F) Accommodation fires;

G) Oil or hazardous material spills;

H) Damage to drilling rigs, FPSOs, production platforms, support vessels and aircraft;

I) Collision or wave damage causing structural collapse;

J) Presence of heavy seas, ice or icebergs;

K) Extreme weather, including icing;

L) Structural failure;

M) Loss of stability (Mobile Units);

N) Helicopter incident, including missing or downed helicopters;

O) MOU/FPSO/Vessel grounding; and

P) Terrorist activity.

v) Discuss the main elements of an emergency response system for MOUs and Emergency scenarios, review of a typical MOU's emergency response procedures, ERT support structure, Station bill, Safety systems etc;

vi) In reference with attachment 11.13, assess an emergency situation, organize a response and manage the response while considering at least three different simulated emergency major incident exercises from the following exercise scenarios:

A) Well Control incident;

B) Explosion and fire:
- Engine Room
- Electrical Switchgear Room
- Mud Pit and Mud Pump Room
- Drill floor
- Well Test Area

C) Accommodation fire;

D) Helicopter incident;

E) Pipeline incident;

F) Collision or wave damage causing structural collapse;

G) Presence of heavy seas or icebergs;

H) Loss of stability (mobile units); and

I) Rapid Penetration (Jack Ups).

g) Situation assessment, prioritization and implement of effective action, including:

i) Ability to assess a situation, prioritize and implement effective action;

ii) Tools for assessing the situation and taking effective action including use of Dynamic Risk Assessment Techniques;

iii) Skills for evaluation of the initial situation following an event requiring an emergency response and skills to obtain, evaluate and confirm as quickly as possible information from all appropriate sources;

iv) Skills to make valid interpretations of all evidence and make valid decisions throughout an emergency;

v) Skills to review, and where needed ensure review by subordinates, of the potential outcomes of an emergency;

vi) Ability to review, manage and assess the information available in an emergency situation in a timely manner, establish priorities and take effective action;

vii) Knowledge to develop and implement a plan of effective actions to efficiently deal with the emergency as quickly as possible, including requirements to deal with the

contingencies in the light of the evidence and the plan of action is to be continually reviewed and updated.

viii) Knowledge of current health and safety legislation; and

ix) Knowledge to co-ordinate and direct effectively the emergency response teams.

h) Crisis Management on MOUs:-

i) Human factors in Crisis Management on board MOUs, including:

A) Knowledge of human factors as applicable to emergency situations on MOUs;

B) Stress induced reduction in performance;

C) Contributing human factors to failure, including:
- Optimism in the face of adversity;
- False sense of security;
- Over-cautious; and
- Under-cautious etc.

D) Communications techniques; and

E) Decision-making processes.

ii) Crowd Management:

A) Knowledge and skills to direct effectively all personnel onboard MOUs during an emergency;

B) Knowledge and skills to prevent panic and how to control all personnel during emergencies; and

C) Develop leadership skills and enable the participants to make valid decisions under pressure during emergencies;

iii) Stress – recognition and management, including:

A) Knowledge to recognize quickly symptoms of developing excessive stress in self and others;

B) Ability to deal with stress in themselves and in others; and

C) Ability to take appropriate actions to ensure the continuance of the activities in an emergency.

i) Decision-making processes, including:

i) How to make valid decisions under pressure throughout an emergency;

ii) Decision making process in the event of an emergency on a MOU and supply of adequate information; and

iii) Dangers of decision making based on inadequate information.

j) Maintenance of communications, including:

i) Knowledge of Internal and external communications on board MOUs;

ii) Identify communication routes and procedures for emergency response within a given organization and with external agencies

iii) Knowledge and skills to ensure students are able to efficiently communicate information and instructions;

iv) Radio protocol and Communications barriers;

v) Knowledge to ensure that all essential people and organizations are informed of the emergency and the status of the progression of emergency response at the appropriate times;

vi) The plan of action is to be effectively communicated to the relevant people and a common understanding is to be achieved and maintained throughout the emergency management team;

vii) Knowledge to maintain an accurate record of key events and communications throughout the emergency;

viii) Knowledge of alternative means of communications when necessary, including:

A) Radios;

B) Tannoy;

C) Telephones; and

D) Runners.

ix) Ability for establishing and maintaining effective communications in an emergency on MOUs, both on the MOU and externally with the Coastguards, the stand-by vessel, other MOUs or installations that might be involved, other ships, helicopters in the area etc; and

x) Conduct a simulated communications exercise using correct procedures, language and methods.

k) Information management, including:

i) Recognize the principles behind and the operation of an Information Management System;

ii) Knowledge and skills to demonstrate a command of information flow (acquisition and distribution) during an emergency situation;

iii) How to handle information and manage it efficiently; and

iv) Controlling the flow of information.

l) Resource management, including:

i) Ability to manage individuals and teams in emergencies, including:

A) Knowledge and skills to achieve and promote positive responses from others;

B) Knowledge for appropriate actions and behaviors that contribute to the confidence and effectiveness of the team at all times; and

C) Knowledge to recognize the strengths and weaknesses within the Emergency Response team and appropriate actions taken.

ii) Ability to monitor and control resources, evaluate progress and communicate changes in plans and priorities;

iii) Roles and responsibilities of the on-scene emergency response team leader and team members, including plans of action;

iv) Explain the roles and responsibilities of external agencies in the response to an emergency situation on MOUs, including:

A) Search and rescue;

B) Policing; and

C) Oil spills response.

v) The role of joint rescue coordination centre; and

vi) Knowledge of and ability to utilize appropriate resources throughout the emergency.

m) Time-out procedures, including:

i) What to do during a time-out; and

ii) Taking time out to reflect on the whole situation.

n) Command and control strategies and processes, including:

i) Objectives of Command and Control on MOUs;

ii) Principles of Command, Control and Communication;

iii) Identify general organizational components for command and control of emergencies, including:

A) Command structure and factors to be considered while establishing a proper command structure to effectively deal with any emergency on MOUs;

B) Critical posts for command and control in an emergency on a MOU and positions of responsibility;

C) Communications routes and procedures; and

D) External agencies.

iv) Identify the specific organizational components for command and control of emergencies within a Company's emergency response plan;

v) Adequate redundancy such that successful emergency response is likely, even if key individuals are not able to perform their assigned roles; and

vi) Functional requirements for Command and Control on MOUs.

o) Delegation of Authority, including:

i) Ability to effectively delegate authority;

ii) Knowledge to take valid decisions on which activities should be delegated in the light of the circumstances of the moment;

iii) Delegated activities are assigned to those most suited to deal with them in accordance with established procedures; and

iv) Knowledge to ensure that those delegated, understand the tasks and report back as required.

p) Roles and responsibilities of the OIM in an emergency on MOUs, including:

i) Effectively communicate stability-related information;

ii) Knowledge of actions to be taken to protect and safeguard all persons on board MOUs in emergencies, including evacuation;

iii) Knowledge of actions to limit damage following a fire, explosion, collision, or grounding;

iv) Knowledge of precautions to be taken before onset of heavy weather, including event logs/Incident recording;

v) Knowledge of Abandon Ship decision, Protocols of death and Protocols of abandonment;

vi) Knowledge and skills for Mustering all personnel and determining whether or not anyone is missing, including POB tracking/recording**;**

vii) Knowledge of methods and aid to prevent pollution of the environment;

viii) Knowledge of pollution prevention systems and controls;

ix) Knowledge of Pollution control procedures, including the Unit's Shipboard Oil Pollution Emergency Plan, MARPOL Annex V Waste Management Plan, and other applicable plans dealing with dangerous/hazardous goods;

x) Knowledge of precautions to be taken during transfer of personnel, including effect of environmental conditions on method of personnel transfer in an emergency on MOUs:

A) Use of the personnel basket;

B) Helicopter transfers; and

C) Vessel transfers.

q) Escape, Refuge, Evacuation, Search, Rescue and Recovery, including:

i) Explain the search & rescue organizations, agencies and their functions, areas of responsibility, geographic areas of operation and equipment available:

A) discuss search and rescue in Canadian and adjacent waters as outlined in the Canadian Shipping Act and the Annual Notice to Mariners with reference to:
- Rescue coordination centers;
- Marine rescue sub centers;
- Geographic division and SAR responsibilities; and
- Responsibilities and obligations of an OIM on board a Canadian MOU.

B) discuss the role of the AMVER system;

C) discuss the role of GMDSS;

D) discuss the resources available for SAR in Canadian and adjacent waters:
- MOUs/vessels;
- Aircraft;
- Associated equipment.

ii) Coordinate a search and rescue operation:

A) explain the role of the "on scene coordinator" with reference to MERSAR and CANMERSAR;

B) discuss with reference to MERSAR and CANMERSAR, the role of an OIM in planning and conducting a search and rescue; and

C) discuss the MOU/ship handling required and rendering of assistance to other vessels and survivors relevant to weather conditions, survival equipment and MOU/vessel types.

r) Protocols of Death, Protocols of Abandonment and Abandon ship decision;

s) Determining the procedures to be followed including predicting the likely escalation; and

t) Case studies, e.g. Marine Offshore Casualty Reports (National and International), to name few - Piper Alpha, Ocean Ranger, Ocean Odyssey etc.

10.8 Course outline

	Subject Area	Hours	
		Lecture or Presentation	Practical / Exercises
1.	Introduction, safety and principles of emergency preparedness on board MOUs.	0.5	20.5
2.	The orientation and emergency training of MOU's offshore personnel and visitors.	0.5	
3.	Contingency plans.	0.5	

4.	The roles and responsibilities of the person in charge (PIC/ OIM) in emergencies on MOUs, including mustering of all personnel and determining whether or not anyone is missing and importance of POB recording/tracking.	0.5	
5.	Managing and coordinating resources for emergency response onboard MOUs: 1. Organization of emergency response, including: (i) Emergency response command center; (ii) Command and control strategies and processes; (iii) Event logs/Incident recording & POB tracking; and (iv) Safety in emergency response, including actions to be taken to protect and safeguard all persons onboard MOUs in emergencies. 2. Maintaining a state of readiness onboard MOUs, including: (i) Review of typical MOU's emergency response procedures, ER plans, ERT Support, Station Bill, Safety systems etc. 3. Management of emergency response on MOUs, including major Emergencies Management; 4. Situation assessment, prioritization and implement of effective action; 5. Maintaining communications; 6. Decision making processes and delegation of authority; 7. Resource management, including managing individuals and teams performances; 8. Information management; 9. Management and control of injured persons, including Medivac procedures; 10 Precautions to be taken before onset of heavy weather.	4.0	
6.	Crisis management on MOUs: 1. Human factors in crisis management, including time-out procedures; 2. Crowd management; and 3. Recognizing and dealing with stress in oneself and in others.	1.5	
7.	Damage control .	0.5	
8.	Escape, refuge, evacuation, search, rescue and recovery, including Abandon ship decision, protocols of abandonment and protocols of death	1.5	
10.	Development of leaderships skills, including case studies	1.0	
11.	Written assessment	1.0	
	Sub Total	**11.5**	**20.5**
	Total	**32.0 hours**	

10.9 Course goals

1) To provide participants with the knowledge and skills to enable them to be able to maintain a state of readiness to effectively deal with major emergencies onboard MOUs / Offshore installations;

2) To provide participants with the knowledge and skills to enable them to be able to monitor and control resources, evaluate progress and communicate changes in plans and priorities;

3) To provide students with the knowledge and skills to enable them to be able to effectively delegate authority, manage individuals and teams in emergencies;

4) To provide participants with the necessary knowledge and skills to enable them to manage, coordinate and use available resources to respond effectively to emergency situations that impact or have the potential to impact their organization;

5) To provide participants with the knowledge and skills to competently manage emergency situations which occur in an offshore environment;

6) To provide participants with the knowledge and skills to enable them to:

a) Be able to review, manage and assess the information available in an emergency situation in a timely manner, establish priorities and take effective action;

b) Be able to implement predetermined emergency plans and procedures in the context of the current emergency;

c) Develop Communication skills and enable them to able to efficiently communicate information and instructions;

d) Improve and consolidate knowledge of controlling emergencies;

e) Gain practical experience of a wide range of emergency situations in a secure environment;

f) Further develop individual management and leadership skills under pressure and in emergency situations;

g) Examine ways of detecting and dealing with stress in oneself and in others;

h) Further develop team building, communications and decision making skills;

i) Implement and practice procedures required to manage major emergencies.

10.10 Course learning objectives

1) Introduction

a) Performance objective: Students will understand the purpose and the objectives of the course and course procedures.

2) Students will demonstrate understanding of the following:

a) The orientation and emergency training of MOUs' offshore personnel and visitors (Exercises, drills, simulation and role play):

i) Ability to define a major emergency and list emergencies that may be encountered on MOUs;

ii) Recognize the statutory requirements for fire and abandon ship drills on MOUs;

iii) Recognize the importance of exercises/drills, simulation and role play in emergency response training;

iv) Recognize the importance of the training of MOUs' offshore personnel to meet the needs of these emergencies in (i) above, including:

A) Identify how drills and exercises raise awareness of potential accidents on MOUs;

B) Ability to ensure that drills and exercises are consistent with priorities, objectives, procedures and statutory requirements;

C) Knowledge to ensure that personnel are trained and assessed in their potential to respond to emergencies during drills and exercises;

D) Ability to analyze how drills and exercises can be used to recognize the strengths and weaknesses of the emergency response plans on MOUs;

E) Ability to prove that personnel are encouraged to seek clarification of their allocated roles and responsibilities; and

F) Recognize actions to deal with potential emergencies are planned.

v) Demonstrate the ability for the planning, management and conduct of emergency drills and exercises; and

vi) Ability to plan, prepare, manage and conduct training drills for MOUs in the following anticipated emergency situations:

A) Well Control incident;

B) Explosion and fire;

C) Helicopter incident;

D) Collision;

E) Structural failure;

F) Extreme weather, including icing;

G) Loss of stability (mobile units); and

H) Rapid Penetration (Jack Ups).

vii) Ability to identify the characteristics of effective emergency simulations, including;

A) Functioning in the context of a given scenario;

B) Making the exercises as realistic as possible without creating a real danger; and

C) Debriefing and discussion of exercise performance with peers;

viii) Identify the benefits of simulation training in improving emotional coping strategies and abilities.

b) The Roles and responsibilities of the Person in Charge (PIC/OIM) in emergencies on board MOUs:

i) Recognize importance of the Person in Charge (PIC/OIM) in maintaining a broad overview of response, assigning the details of the response to subordinates, and monitoring overall activity;

ii) Analyze the role and responsibilities of the Person in Charge (PIC/OIM) in developing:

A) Personal and employee emergency response skills by participating in simulations;

B) Facilitating team building;

C) Ensuring that exercises/drills are audited and reviewed for the purpose & efficacy;

D) Demonstrating a team approach to emergency response management during simulations; and

E) Fostering positive group dynamics.

iii) Demonstrate the ability to effectively communicate stability-related information;

iv) Demonstrate actions to be taken to protect and safeguard all persons on board MOUs in emergencies, including evacuation;

v) Demonstrate actions to limit damage following a fire, explosion, collision, or grounding;

vi) Recognize precautions to be taken before onset of heavy weather, including event logs/Incident recording;

vii) Demonstrate the knowledge of the Abandon Ship decision, Protocols of Death and Protocols of Abandonment;

viii) Knowledge and skills for mustering all personnel and determining whether or not anyone is missing, including POB tracking/recording**;**

ix) Demonstrate the knowledge of methods and aid to prevent pollution of the environment;

x) Demonstrate knowledge of pollution prevention systems and controls;

xi) Demonstrate knowledge of Pollution control procedures, including the Unit's Shipboard Oil Pollution Emergency Plan, MARPOL Annex V Waste Management Plan, and other applicable plans dealing with dangerous/hazardous goods; and

xii) Demonstrate knowledge of precautions to be taken during transfer of personnel, including effect of environmental conditions on method of personnel transfer in an emergency on MOUs:

A) Use of the personnel basket;

B) Helicopter transfers; and

C) Vessel transfers.

c) Contingency plans:

i) Ability to prepare contingency plans for response to emergencies; and

ii) Ability to formulate an emergency muster list, emergency procedures' guide and a contingency plan for MOUs in response to various anticipated emergencies when the MOU is:

A) At sea under its own power;

B) At sea under tow;

C) On station while performing operations in various modes like D.P., on anchors etc.;

D) In port; and

E) During refit, etc.

d) Damage Control, including:

i) Ability to assess damage and its effects on MOUs' seaworthiness:

A) Recognize the SOLAS requirements for stability and subdivisions as applicable to MOUs;

B) State the permeability and demonstrate use of stability data to assess damage on MOUs' seaworthiness; and

C) Demonstrate the ability to monitor and control Stability during firefighting and outer hull damage, including ability to show the effects of excess water (free surface effects) pumping and drainage of excess water including flooding rates from damage and fire fighting water.

ii) Ability to assess the feasibility of damage control and emergency response plan:

A) Demonstrate the knowledge of the theory of damage control to minimize the effects of damage and preserve MOUs' sea-worthiness under the following situations:
- Pressurizing tanks, double bottoms, cofferdams; and
- Engine room leaks.

B) Recognize the methods of reducing or preventing oil pollution due to a damaged hull.

e) Managing and coordinating resources for emergency response on MOUs:-

i) Organization of emergency response:

A) Recognize the need for a properly equipped and ergonomically designed Emergency Response Command Centre and list the characteristics of a functional Emergency Command Centre, including:
- Communication facilities;
- Lighting;
- Washroom facilities;
- Air Conditioning;
- Nourishment; and
- Contingency planning.

B) Command and control strategies and processes:
- State the objectives of Command and Control on MOUs;
- Understanding the principles of Command, Control and Communication;
- Ability to identify general organizational components for command and control of emergencies, including:
  - Command structure and factors to be considered while establishing a proper command structure to effectively deal with any emergency on MOUs;
  - Critical posts for command and control in an emergency on a MOU and positions of responsibility;
  - Communications routes and procedures; and
  - External agencies.

ii) Ability to identify the specific organizational components for command and control of emergencies within a Company's emergency response plan;

iii) Ability to ensure adequate redundancy such that successful emergency response is likely, even if key individuals are not able to perform their assigned roles;

iv) State the functional requirements for Command and Control on MOUs;

v) Knowledge of the roles and responsibilities of external agencies in the response to an emergency situation including search and rescue; civil authorities; and oil spill response;

vi) Identify communication routes and procedures for emergency response within a given organization;

vii) List the general areas of responsibility for command and control of emergencies, including:

A) Maintaining of a state of readiness;

B) Situation assessment, prioritization and implement of effective action;

C) Maintenance of communications;

D) Delegation of authority;

E) Management of individuals and teams in emergencies; and

F) Dealing with stress in oneself and in others.

viii) Demonstrate the command of information flow (acquisition and distribution) during emergency response simulations.

f) Maintaining a state of readiness onboard MOUs:-

i) Ability to define emergency prevention and response on MOUs;

ii) Define an Emergency preparedness and state regulatory requirements for emergency preparedness on MOUs;

iii) Demonstrate the knowledge of Life saving appliance regulations (International Convention for the Safety of Life at Sea) as applicable to MOUs;

iv) Demonstrate the knowledge of serviceability and sufficiency of equipment and maintenance management standards in accordance with Company's Management System Requirements;

v) Ability to maintain a state of readiness to deal with major emergencies onboard MOUs, proactive planning and importance of proactive functions of this element;

vi) List the characteristics of MOUs/ Offshore Installations that influence emergencies; and

vii) Identify the responsibilities of the Person in Charge (PIC/OIM) in preparation for emergencies to ensure the following:

A) An appropriate written plan is in place for responding to emergencies;

B) Lines of communication are planned to ensure the flow of valid and reliable information to affected parties;

C) Exercises are consistent with accepted emergency response procedures and that they comply with regulatory requirements;

D) Personnel are encouraged to seek clarification of their allocated emergency roles and responsibilities; and

E) Appropriate emergency response equipment is in place to enable personnel to effectively respond.

g) Management of emergency response on MOUs:

i) Recognize the differences between Normal and Major emergency management;

ii) Demonstrate the knowledge of emergency response measures including the management, organizational aspects, hardware and equipment provided to deal with emergencies on MOUs, including:

A) Preparation for emergencies, including safety in emergency response;

B) Emergency planning;

C) Communications; and

D) Enquiries and requests from media and next of kin.

iii) Demonstrate the knowledge and skills to implement predetermined emergency plans and procedures in the context of the current emergency;

iv) Recognize the need for a properly equipped and ergonomically designed Emergency Response Centre;

v) Recognize MOUs' offshore senior officer's responsibilities and duties during an emergency and developing the discipline of implementing their MOU's Emergency Response Plan;

vi) Recognize the importance of the Emergency Response Manager in maintaining a broad overview of the emergency response, including:

A) Ability to assign duties of the emergency response to subordinates;

B) Valid and reliable information is supplied to relevant personnel;

C) Ability to take an overview of the situation and not get overloaded with details;

D) Demonstrate the knowledge and skills for Incident recording/Event logs, including POB tracking;

E) Demonstrate the knowledge and skills for the management and control of Injured Persons, including Medivac Procedures;

F) Ability for overall monitoring the emergency situation.

vii) Demonstrate the knowledge of Emergency response plan (ERP) and procedures, including:

A) List the Statutory requirements for comprehensive emergency response plans and procedures;

B) Demonstrate the knowledge of functional requirements for an ERP on MOUs;

C) List the factors to be considered to ensure an effective and comprehensive ERP for MOUs;

D) Recognize the necessity of a properly prepared Emergency Response Plan that covers potential situations, including:

- Fatalities, serious injuries and medical emergencies;
- Missing persons, including Man overboard;
- Diving emergencies;
- Loss of control of a well;
- Fires and explosions;
- Accommodation fires;
- Oil or hazardous material spills;
- Damage to drilling rigs, FPSOs, production platforms, support vessels and aircraft;
- Collision or wave damage causing structural collapse;
- Presence of heavy seas ice or icebergs;
- Extreme weather, including icing;
- Structural failure;
- Loss of stability (Mobile Units);
- Helicopter incident, including missing or downed helicopters;
- MOU/FPSO/Vessel grounding; and
- Terrorist activity.

viii) Demonstrate the knowledge of the main elements of an emergency response system for a MOU and emergency scenarios, review of a typical MOU's emergency response procedures, ERT support structure, Station bill, Safety systems etc; and

ix) In reference with attachment 11.13, demonstrate the ability to assess an emergency situation, organize a response and manage the response while considering at least three different simulated emergency major incident exercises from the following exercise scenarios:

A) Well Control incident;

B) Explosion and fire:

- Engine Room
- Electrical Switchgear Room
- Mud Pit and Mud Pump Room
- Drill floor
- Well Test Area

C) Accommodation fire;

D) Helicopter incident;

E) Pipeline incident;

F) Collision or wave damage causing structural collapse;

G) Presence of heavy seas or icebergs;

H) Loss of stability (mobile units); and

I) Rapid Penetration (Jack Ups).

h) Situation assessment, prioritization and implementation of effective action:

i) During emergency response situations:

A) Demonstrate the ability to assess the given data and take effective action to obtain, evaluate and confirm information received;

B) Demonstrate the ability to assess a situation, prioritize and implement effective action;

C) Recognize tools for assessing the situation and taking effective action including use of Dynamic Risk Assessment Techniques;

D) Demonstrate the ability to review, manage and assess the information available in an emergency situation in a timely manner, establish priorities and take effective action;

E) Ability to utilize appropriate resources throughout the emergency;

F) Demonstrate the skills for evaluation of the initial situation following an event requiring an emergency response and skills to obtain, evaluate and confirm as quickly as possible information from all appropriate sources;

G) Demonstrate the skills to make valid interpretations of all evidence and make valid decisions throughout an emergency;

H) Demonstrate the skills to review, and where needed ensure review by subordinates, of the potential outcomes of an emergency;

I) Ability to develop and implement a plan of effective actions to efficiently deal with the emergency as quickly as possible, including requirements to deal with the contingencies in the light of the evidence and the plan of action is to be continually reviewed and updated;

J) Demonstrate the knowledge of current health and safety legislation;

K) Demonstrate the knowledge to co-ordinate and direct effectively the emergency response teams;

L) Ability to review the potential outcomes of an emergency;

M) Review possible response actions, consequences and probabilities;

N) Ability to ensure that lessons learned are incorporated into emergency response procedures;

O) Ability to ensure appropriate actions are taken as quickly as possible;

P) Ability to ensure emergency response teams are coordinated and directed in an effective manner; and

Q) Ability to ensure working practices are safe and conform to current health and safety legislation.

i) Maintaining communications:

i) Demonstrate the knowledge of Internal and external communications on board MOUs;

ii) Ability to identify communication routes and procedures for emergency response within a given organization and with external agencies;

iii) Demonstrate the knowledge of Radio protocol and Communications barriers applicable to MOUs; and

iv) Ability to maintain communications during emergencies to ensure that:

A) All essential people and organizations are informed of the emergency and the status of the progression of emergency response at the appropriate times;

B) The plan of action is to be effectively communicated to the relevant people;

C) A common understanding is to be achieved and maintained throughout the emergency management team;

D) All personnel are updated on the progress of the emergency response;

E) An accurate record of key events and communications throughout the emergency is maintained; and

F) Where possible, alternative means of communications are put in place when necessary to maintain communications, including:
- Radios;
- Tannoy;
- Telephones; and
- Runners.

v) Ability for establishing and maintaining effective communications in an emergency on MOUs, both on the MOU and externally with the Coastguards, the stand- by vessel, other MOUs or installations that might be involved, other ships, helicopters in the area etc; and

vi) Ability to undertake a simulated communications exercise using correct procedures, language and methods.

j) Delegation of authority:

i) Ability to effectively delegate authority;

ii) Knowledge to take valid decisions on which activities should be delegated in the light of the circumstances of the moment;

iii) Delegated activities are assigned to those most suited to deal with them in accordance with established procedures; and

iv) Knowledge to ensure that those delegated, understand the tasks and report back as required.

k) Resource management:

i) Demonstrate the ability to manage individuals and teams in emergencies, including:

A) Knowledge and skills to achieve and promote positive responses from others;

B) Demonstrate the knowledge and skills for appropriate actions and behaviors that contribute to the confidence and effectiveness of the team at all times;

C) Knowledge to recognize the strengths and weaknesses within the Emergency Response team and appropriate actions taken.

D) Strengths and weaknesses within the emergency response team are recognized and appropriate action taken;

E) An appropriate degree of detachment is maintained at all times.

ii) Ability to monitor and control resources, evaluate progress and communicate changes in plans and priorities;

A) Understanding the roles of the emergency response team members including leaders;

B) Understanding of the roles and responsibilities of external agencies in the response to an emergency situation on MOUs, including:
- Search and rescue;
- Policing; and
- Oil spills response.

C) Understanding the role of joint rescue coordination centre; and

D) Demonstrate the knowledge of and ability to utilize appropriate resources throughout the emergency.

l) Information management:

i) Recognize the principles behind and the operation of an Information Management System;

ii) Demonstrate a command of information flow (acquisition and distribution) during an emergency situation;

iii) Demonstrate how to handle information and manage it efficiently; and

iv) Demonstrate the ability to control the flow of information.

m) Safety in emergency response:

i) Identify industry appropriate regulations that outline management's responsibilities for safety in emergencies;

ii) Demonstrate an understanding of the intent of these regulations during simulated emergencies.

n) Crisis Management:-

i) Crowd management:

A) Demonstrate ability to direct effectively all personnel on board MOUs during an emergency; and

B) States the need to prevent panic and how to provide control over all personnel;

ii) Human Factors in Crisis Management:

A) Recognize:
- Human factors as applicable to emergency situations on MOUs;
- Stress induced reduction in performance;
- Contributing human factors to failure, including:
  - Optimism in the face of adversity;
  - False sense of security;
  - Over-cautious; and
  - Under-cautious etc.

B) Communications techniques;

C) Time-out procedures:
- Demonstrate knowledge and skills for what to do during a time-out and
- Ability to take time out to reflect on the whole situation.

D) Decision-making processes:
- State the ways in which emotional "stress" and emotional "distress" influence the decision making process;

- Demonstrate how to make valid decisions under pressure throughout an emergency;
- Demonstrate decision making process in the event of an emergency on MOUs and supply of adequate information; and
- Recognize dangers of decision- making based on inadequate information.

iii) Dealing with stress in oneself and in others:

A) Distinguish between emotional "stress" and emotional "distress";

B) Identify ways in which emotional stress can be mitigated to prevent the onset of emotional distress.

C) Ability to recognize quickly symptoms of developing excessive stress in self and others;

D) Ability to deal with stress in oneself and in others; and

E) Ability to take appropriate actions to ensure the continuance of the activities in an emergency.

o) Escape, refuge, evacuation, search, rescue and recovery, including:

i) Demonstrate the knowledge of the search & rescue organizations, agencies and their functions, areas of responsibility, geographic areas of operation and equipment available:

A) Demonstrate the knowledge of search and rescue in Canadian and adjacent waters as outlined in the Canadian Shipping Act and the Annual Notice to Mariners with reference to:
- Rescue coordination centers;
- Marine rescue sub centers;
- Geographic division and SAR responsibilities; and
- Responsibilities and obligations of an OIM on board a Canadian MOU.

ii) State the role of the AMVER system;

iii) Recognize the role of GMDSS;

iv) State the resources available for SAR in Canadian and adjacent waters:

A) MOUs/vessels;

B) Aircraft;

C) Associated equipment.

p) Demonstrate how to Coordinate a search and rescue operation:

i) State the role of the "on scene coordinator" with reference to MERSAR and CANMERSAR;

ii) With reference to MERSAR and CANMERSAR, state the role of an OIM in planning and conducting a search and rescue; and

iii) Demonstrate the knowledge and skills for the MOU/ship handling and rendering of assistance to other vessels and survivors relevant to weather conditions, survival equipment and MOU/vessel types.

q) Demonstrate the knowledge and skills for the Abandon ship decision;

r) State the Protocols of Death, Protocols of Abandonment; and

s) Demonstrate the knowledge and skills for determining the procedures to be followed including predicting the likely escalation.

3) To provide designated personnel with formal training in command and control and the management of major emergencies. Individuals who have completed this course should be able to:

a) Maintain a state of readiness to deal with major emergencies onboard MOUs/offshore installations;

b) Understand the importance of accurate assessment of the situation;

c) Review, manage and assess the information available in an emergency situation in a timely manner, establish priorities and take effective action;

d) Implement predetermined emergency plans and procedures in the context of the current emergency;

e) Maintain and enhance communication skills;

f) Efficiently communicate information and instructions;

g) Monitor and control resources, evaluate progress and communicate changes in plans and priorities;

h) Employ logical delegation of tasks;

i) Effectively delegate authority;

j) Manage self and teal performance in a comprehensive manner;

k) Manage individuals and teams; and

l) Deal with stress in themselves and others.

10.11 Assessment

1) Assessments must be carried out by a team (a minimum of two) of Transport Canada Marine safety (AMSP) approved assessors who have extensive relevant experience and formal training in conducting assessments. At least one member of the team must have experience in a command position on a similar type of MOU/offshore installation;

2) The assessment must be completed against properly documented, previously determined, objective criteria;

3) The assessment must focus on the individual's command and control ability and his ability to manage major emergencies not on technical details;

4) Observation of the individual in realistic emergency scenarios must form a significant part of each assessment;

5) Interviews, written tests and other assessment methodology should also form part of the assessment. The assessment must include, as a minimum, the following topics:

a) Ability to maintain a state of readiness;

b) Knowledge of contingency planning, emergency response procedures, drills and exercises;

c) Knowledge of and ability to utilize resources;

d) Ability to assess a situation, prioritize and implement effective action;

e) Ability to maintain effective communications in emergency situations;

f) Ability to effectively delegate authority;

g) Knowledge of human factors as applicable to emergency situations;

h) Ability to manage individuals and teams in emergencies;

i) Ability to deal with stress in oneself and in others

10.12 Recognized certificates

1) Successful completion, at a recognized institution, of courses in Marine Emergency Duties, as set out in TP 4957: MED for Senior Officers.

10.13 Attachment - Components of an Emergency Response Team System

Component	Examples of Hardware	Examples of Software
Detection	• Automatic systems • Manual systems • Communication	• Organization • Elements of emergency response • Procedures • Training and competence • Lines of command
Raising the alarm	• Automatic systems • Manual systems • Communication • Audible/visual signal	• Organization • Procedures • Training and competence • Lines of command • Emergency response plan
Mustering of persons	• Escape routes • Protection • Muster areas • Temporary refuge • Communication • Medical equipment • Diving provisions • Short Duration BA	• Account for POB • Organization • Procedures • Training and competence • Emergency response plan • Lines of command • Casualty provision
Assessment	• Communication • Remote facilities • Protection • Temporary refuge • Short Duration BA	• Procedures • Organization • Lines of command • Competence • Training and competence • Emergency response plan
Evacuation	• Evacuation routes • Communication • On installation • Off-installation • Protection • Accessibility • Medical equipment • Availability • Diving provisions • PPE • Primary Systems • Secondary Systems	• Procedures • Organization • Lines of command • Training and competence • Emergency response plan • Ease of use • Casualty provision
Escape	• Escape routes • Escape equipment • Communication • Accessibility • Protection • Availability • Medical equipment • PPE	• Procedures • Organization • Lines of command • Training and competence • Emergency response plan • Ease of use • Casualty provision
Rescue	• SBV, SC, FRC • Availability • Communication • Protection • Medical equipment • Diving provision	• Procedures • Organization • Lines of command • Training and competence • Emergency response plan • Casualty provision