SEAFARERS TRAINING CENTER INC

PERSONAL SAFETY AND SOCIAL RESPONSIBILITIES

In compliance with the 1978 International Agreement on Standards of Training, Certification and Watch keeping for Seafarers Code (STCW as amended)

SCOPE

This course aims to meet the mandatory minimum standards of competence in personal safety and social responsibilities in accordance with Section A-VI/1 of the STCW 1978 Code, Table A-VI/1-4.

OBJECTIVE

This course will prepare new recruits for life on a ship at sea, giving them an insight into the various elements of a ship and working procedures on board so that they adjust to the shipboard environment.

A trainee successfully completing this course will be able to:

- Comply with emergency procedures
- Take precautions to prevent pollution of the marine environment
- Observe safe working practices
- Contribute to effective communication on board ship
- Contribute to effective human relationships on board ship
- Understand and take necessary actions to control fatigue

ENTRY STANDARDS

There are no specific entry standards for the training in this model course. The training is mandatory for all prospective seafarers, who should complete this basic training before being assigned to any shipboard duties.

COURSE CERTIFICATE

Certificate will be issued certifying that the holder has met the standard of competence specified in Table A-VI/1-4 of STCW 1978 Code.

COURSE INTAKE LIMITATIONS

The maximum number of trainees attending each session will be 25 persons.

STAFF REQUIREMENTS

Instructors shall be appropriately qualified and have training in instructional techniques and training and assessment methods and must be approved by the Administration (STCW Code Section A-I/6, paragraphs 1-7).

TEACHING FACILITIES AND EQUIPMENT

Ordinary classroom facilities and an overhead projector.

TEACHING AIDS

- Instructor Manual.
- Audio-visual aids-video cassette player, TV, Slide Projector, OHP etc.
- Photographs or pictures of various types of ships, such as bulk carriers, tankers and container ships, and various parts of the ships, including:
  - Gangway and safety net
  - Main deck
  - Holds and hatches
  - Forecastle and poop deck
  - Windlass, anchors and winches
  - Cranes and cargo gear
  - Manifold and deck pipeline system (on a tanker)
  - Accommodation
  - Bridge
  - Engine – room
  - Survival craft and fire-fighting equipment
- Demonstration equipment as follows:
  - Helmet
  - Goggles
  - Gloves
  - Safety shoes
  - Dust masks and respirators
  - Protective clothing
  - Self-contained breathing apparatus
  - Fall arrestor
  - Safety harness
  - Hearing protection

IMO REFERENCES

- International Convention on Standards of Training Certification and Watchkeeping for Seafarers, 1978, as amended.
- International Convention for the Safety of Life at Sea, 1974 (SOLAS 1974), as amended.
- International Convention for the Prevention of Pollution from Ships (MARPOL) as amended.
- IMO Life-Saving Appliances Code (LSA Code).
- Standard Marine Communication Phrases.
- Human Resources Management for Marine Personnel.
- International Safety Management Code (ISM Code).
- Guidelines for the Development of Shipboard Oil Pollution Emergency Plans.
- Guidance on Fatigue mitigation and management (MSC/Circ.1014)

TIMETABLE
COURSE OUTLINE

Couse Outline	Approximate tine (hours)
Competence and subject matter	**Lectures, demonstration and practical work**
1. INTRODUCTION 1.1 Importance of the course 1.2 Ship familiarization	**1**
2. COMPLY WITH EMERGENCY PROCEDURES 2.1 Types of emergency which may occur, such as collision, fire, foundering 2.2 Knowledge of shipboard contingency plans for response to emergencies 2.3 Emergency signals and specific duties allocated to crew members in the muster list; muster stations; correct use of personal safety equipment 2.4 Action to take on discovering potential emergency, including fire, collision, foundering and ingress of water into the ship 2.5 Action to take on hearing emergency alarm signals 2.6 Value of training and drills 2.7 Knowledge of escape routes and internal communication and alarm system	**2**

3. TAKE PRECAUTIONS TO PREENT POLLUTION OF THE MARINE ENVIONMENT 3.1 Basic knowledge of the impact of shipping on the marine environment and the effects of operational or accidental pollution 3.2 Basic environmental protection procedures 3.3 Basic knowledge of complexity and diversity of the marine environment	**4**
4. OBSERVE SAFE WORKING PRACTICES 4.1 Importance of adhering to safe working procedures at all times 4.2 Safety and protective devices available to protect against potential hazards aboard ship 4.3 Precautions to be taken prior to entering enclosed spaces 4.4 Familiarization with international measures concerning accident prevention and occupational health	**4**
5. CONTRIBUTE TO EFFECTIVE COMMUNICATIONS ON BOARD SHIP 5.1 Understand the principles of, and barriers to, effective communication between individuals and teams within the ship 5.2 Ability to establish and maintain effective communications	**3**
6. CONTRIBUTE TO EFFECTIVE HUMAN RELATIONSHIP ON BOARD SHIP 6.1 Importance of obtaining the necessary rest 6.2 Basic teamworking principles and practice, including conflict resolution 6.3 Social responsibilities; employment conditions; individual rights and obligations; dangers of drug and alcohol abuse	**2.5**
7. UNDERSTAND AND TAKE NECESSARY ACTIONS TO CONTROL FATIGUE 7.1 Importance of obtaining the necessary rest 7.2 Effects of sleep, schedules and the circadian rhythm on fatigue 7.3 Effects of physical stressors on seafarers 7.4 Effects of environmental stressors in and outside the ship and the impact on seafarers 7.5 Effects of schedule changes on seafarer fatigue	**1.5**
Review and assessment	**2**
Total	**20**

COURSE TIMETABLE

PERIOD	DAY 1	DAY 2	DAY 3
1st PERIOD (1.5 hours)	1 Introduction to the personal safety and social responsibilities course and its importance to the prospective seafarer and ship familiarization (1hr). 2 Comply with emergency procedures (0.5hr)	4 Observe safe working practices	6 Contribute to effective human relationship on board ship
2nd PERIOD (2 hours)	2 Comply with emergency procedures (continued) (1.5hr) 3 Take precautions to prevent pollution of the marine environment (0.5hr)	4 Observe safe working practices (continued)	6 Contribute to effective human relationship on board ship (continued) (1hr) 7 Understand and take necessary actions to control fatigue (1hr)
BREAK	**BREAK**	**BREAK**	**BREAK**
3rd PERIOD (1.5 hours)	3 Take precautions to prevent pollution of the marine environment (continued)	4 Observe safe working practices (0.5hr) 5 Contribute to effective communications on board ship (1hr)	7 Understand and take necessary actions to control fatigue (continued) (0.5hr) Review and assessment (1hr)
4th PERIOD (2 hours)	3 Take precautions to prevent pollution of the marine environment (continued)	5 Contribute to effective communications on board ship (continued)	Review and assessment (continued) (1hr)

1. Introduction

The International Maritime Organization adopted the 1978 International Agreement on Standard s of Training, Certification and Watch keeping for Seafarers in 1978. This agreement did not enter into effect until 1984 due to a slow acceptance process by the member states during the Convention. By 1992, the agreement had been ratified by many governments (administrations). The member states at the convention quick1y realized that a complete revision was necessary, and this was swiftly completed. The Agreement was revised and signed on April, 1995; this revision was called STCW-95 (Standards of Training, Certification and Watch keeping for Seafarers).

The revision of the STCW Agreement was necessary due to the great number of accidents that could be attributed to human factors; there was, and still existed, a vacuum where competency was a concern, in part, because of changes in crewmember supplies and the variable quality of education and training systems. Although the latter included some good principles, it was not specific enough to be properly implemented. Mainly, it did not supply enough help for implementation and control by authorities. The STCW95 Code establishes certain minimal requirements for all seafarers. The new requirements entered into effect on February 1st, 1997. The basic training requirements apply, particularly, for those who begin training after August 1st, 1998.

1.1 Importance of the course

The importance of STCW Personal Safety and Social Responsibility (PSSR) course is providing basic induction training in safety procedures and accident prevention and familiarizes novice seafarers with employment and working conditions onboard.

1.2 Ship familiarization

New crew members joining a ship must be familiarized with their duties and important information about the ship. This is to ensure that the new people onboard ship understand their responsibilities thoroughly before commencing their duties.

It is the duty of the master of the ship to ensure that each new crew member is given proper familiarization training to ensure personal safety and well-being of the ship.

The master would designate a qualified person in charge of training the new crew members of the ship.

The familiarization training will include:

- Duties to be performed by the new crew member
- Specific equipment to be operated and maintained
- Ship specific watchkeeping duties
- Any particular instruction regarding machinery or ship parts which the new crew member should know
- If the new member belongs to the deck side, he or she will be familiarized with navigation equipment, GMDSS, steering system, mooring equipment, cargo handling equipment, etc.
- If the new member belongs to the engine side, he or she will be familiarized with the designated machinery, maintenance procedures, and watch keeping procedures

Types of Ships

The great majority of ships that are neither military vessels nor yachts can be divided into several broad categories: cargo carriers, passenger carriers, industrial ships, service vessels, and noncommercial miscellaneous.

– **Cargo Carriers**

Cargo ships can be distinguished by the type of cargo they carry, especially since the means of handling the cargo is often highly visible.

- **Tankers.** Ships that carry liquid cargo (most often petroleum and its products) in bulk are made distinctive by the absence of cargo hatches and external handling gear.

- **Container Ships.** Like tankers, container ships are characterized by the absence of cargo handling gear, in their case reflecting the usual practice of locating the container-handling cranes at shore terminals rather than aboard ship. Unlike the tanker, container ships require large hatches in the deck for stowing the cargo, which consists of standardized containers usually either 20 or 40 feet in length. Below decks, the ship is equipped with a cellular grid of compartments opening to the weather deck; these are designed to receive the containers and hold them in place until unloading is achieved at the port of destination. The ship is filled to

the deck level with containers, the hatches are closed, and one or two layers of containers, depending upon the size and stability of the ship, are loaded on the hatch covers on deck.

- **Barge-carrying Ships.** An extension of the container ship concept is the barge-carrying ship. In this concept, the container is itself a floating vessel, usually about 60 feet long by about 30 feet wide, which is loaded aboard the ship in one of two ways: either it is lifted over the stern by a high-capacity shipboard gantry crane, or the ship is partially submerged so that the barges can be floated aboard via a gate in the stern.

- **Roll-on/Roll-off Ships.** Designed for the carriage of wheeled cargo, are always distinguished by large doors in the hull and often by external ramps that fold down to allow rolling between pier and ship. The general outline of the ship, in view of its relatively low density of cargo, is rather “boxy,” with a high freeboard and a high deckhouse covering much of the ship’s superstructure, to afford more parking decks.

- **Dry-Bulk Ships.** Designed for the carriage of ore, coal, grain, and the like, dry-bulk ships bear a superficial likeness to container ships since they often have no cargo handling gear and, unlike the tanker, have large cargo hatches. The absence of containers on deck is a decisive indicator that a vessel is a dry-bulk ship, but an observer may be deceived by the occasional sight of a dry-bulk ship carrying containers and other nonbulk cargo on deck.

- **General Cargo Ships.** The once-ubiquitous general cargo ship continues to be built, though in modest numbers. Those built in the last third of the 20th century are usually fitted with deck cranes, which give them an appearance distinct from the more-specialized ship types.

– **Passenger Carriers**

Most passenger ships fall into two subclasses, cruise ships and ferries.

- **Cruise Ships.** Most of them are designed for large numbers of passengers (perhaps several thousand), they are characterized by high superstructures of many decks, and they are typically painted white all over. These two characteristics give them a "wedding cake" appearance that is easily recognizable from great distances.

- **Ferries.** Ferries are vessels of any size that carry passengers and (in many cases) their vehicles on fixed routes over short cross-water passages.

– **Industrial Ships**

Industrial ships are those whose function is to carry out an industrial process at sea. A fishing-fleet mother ship that processes fish into fillets, canned fish, or fish meal is an example. Some floating oil drilling or production rigs are built in ship form. In addition, some hazardous industrial wastes are incinerated far at sea on ships fitted with the necessary incinerators and supporting equipment.

– **Service Vessels**

The service ships are mostly tugs or towing vessels whose principal function is to provide propulsive power to other vessels. Most of them serve in harbours and inland waters.

– **Miscellaneous**

The word miscellaneous has only small scope here. It is intended to encompass classifications such as icebreakers and research vessels, many of which are owned by government. Neither type need be of large size, since no cargo is to be carried.

- **Icebreakers.** They are usually wide in order to make a wide swath through ice, and they have high propulsive power in order to overcome the resistance of the ice layer. Icebreakers also are characterized by strongly sloping bow profiles, especially near the waterline, so that they can wedge their way up onto thick ice and crack it from the static weight placed upon it. To protect the hull against damage, the waterline of the ship must be reinforced by layers of plating and supported by heavy stiffeners.

- **Research Vessels.** They are often distinguished externally by cranes and winches for handling nets and small underwater vehicles. Internally, research vessels are usually characterized by laboratory and living spaces for the research personnel.

Working Environment of the Ship

When we refer to working environment onboard, we use the phrase in its widest sense. The traditional areas such as noise, vibrations, ergonomics and protective equipment are obviously included. But we also work to improve the psycho-social environment in which factors such as leadership, general well-being, communication, working hours, diet, exercise and drugs are included.

Employees on ships often enjoy working at sea very much. Freedom, team spirit, exciting tasks and long periods off are much appreciated and many seamen find it difficult to imagine exchanging their life at sea for a job ashore. However, working at sea can also include strains, both physical and psychological.

Ships are workplaces that are in constant motion and where the risk of accidents is relatively high. Duties sometimes include heavy lifting work, contact with chemical substances and high noise levels, and great awareness and knowledge is required to avoid unnecessary risks. Some people think it is difficult to be away from family and friends, and facilities for communicating with those at home are valued highly.

2. Comply with emergency procedures

All workplaces are required to have procedures in place to effectively manage emergencies that could happen at work.

The emergency procedure is a plan of actions to be conducted in a certain order or manner, in response to an emergency event.

2.1 Types of Emergency which may occur, such as collision, fire, foundering

Emergency is a serious, unexpected, often dangerous situation that requires immediate action. An emergency situation on ship must be handled with confidence and calmness, for haste decisions and “jumping to conclusions” can make the matters even worse. Efficient tackling of emergency situations can be achieved by continuous training and by practical drills onboard vessel. However, it has been seen that in spite of adequate training, people get panic attacks and eventually do not do what they should in an emergency situation.

As far as the seafarer is concerned, first and foremost, he or she must be aware of the different types of emergency situations that can arise on board ship. This would help in understanding the real scenario in a better way, and would also lead to taking correct actions to save life, property, and environment.

There are various emergencies which may occur on board ship for example:

- Fire
- Collision
- Grounding
- Foundering
- Person Overboard
- Flooding (ingress of water into the ship)
- Oil Spill
- And others

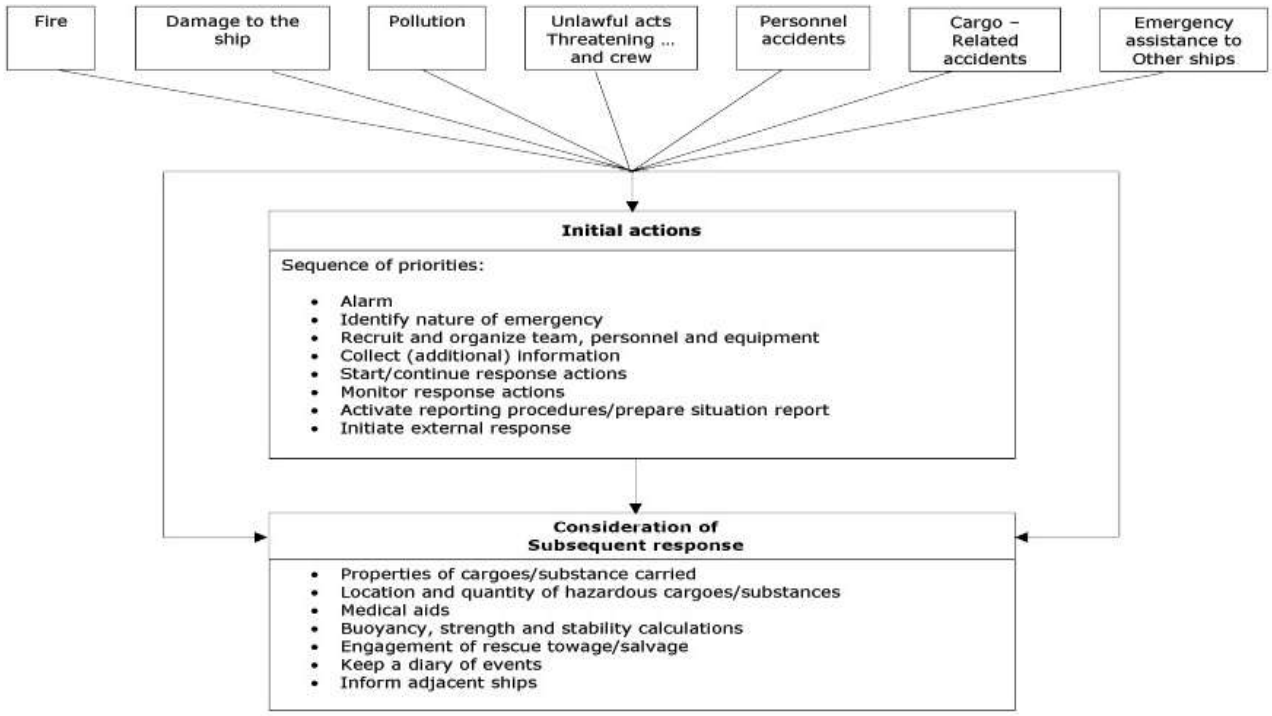
2.2 Knowledge of shipboard contingency plans for response to emergencies

Ships need a plan for emergencies that can have a wider impact. Special procedures are needed for emergencies such as collision, fire, foundering, etc.

Quick and effective action may help to ease the situation and reduce the consequences. However, in emergencies people are more likely to respond reliably if they:

- are well trained and competent
- take part in regular and realistic practice
- have clearly agreed, recorded and rehearsed plans, actions and responsibilities

Example:



2.3 Emergency signals and specific duties allocated to crew members in the muster list; muster stations; correct use of personal safety equipment

Emergency Signals are signals used on board ships in times of emergencies. According to the Safety Of Life At Sea (SOLAS) Convention the signals issued via the general alarm system shall be audible in all accommodation and normal working spaces of the crew as well as on the open deck. The sound pressure level shall be over the ambient level.

It shall be possible to trigger the alarms both via an automatic signal generator or by hand. The alarms may be interrupted temporarily by announcements made over the loudspeaker installation.

On the open decks of cargo ships, the signals are triggered by the automatic signal generator and generated by the general alarm system can either be produced by the whistle or by sirens. The sirens shall be located at uniform distances spread over the open deck. It shall be possible to interrupt the driving of the whistle by the automatic signal generator by means of a non-locking pushbutton or a switch or a locking pushbutton. On Passenger Ships the alarm shall be audible in all accommodation spaces, all normal working spaces of the crew and on all open decks, and its sound pressure level shall be above the ambient noise level. The accommodation spaces also include the cabins and living areas as well as the public spaces of the passengers.

The appropriate signal to indicate different emergency situations are:

- **General Emergency Alarm.** Is recognized by 7 short followed by 1 long blasts of ship`s horn or rings of ship`s bell. It is sounded to make aware the crew onboard that emergency has occurred.
- **Fire Alarm.** Is sounded as continuous ringing of ship`s bell or blast of ship`s horn.
- **Man Overboard Alarm.** When a man falls overboard, the ship alarm bell sounds 3 long rings and ship whistle will blow 3 long blasts to notify the crew onboard and the other ships in nearby vicinity.
- **Abandon Ship Alarm.** When the emergency is out of control is no longer safe for crew onboard the ship. The Master can give a verbal Abandon ship order, but this alarm is never given by ship`s bell or whistle. The general alarm is sounded and everybody goes to emergency muster station where the Master or his substitute (Chief Officer) gives the verbal order to abandon the ship.
- **Ship Security Alarm System.** Is a silent alarm system sounded in a pirate attack emergency. This signal is connected with different coastal authorities all over the world via a global satellite system to inform about the piracy.

Muster List and Muster Stations

A ship's crew must be prepared at all times to tackle and fight any kind of emergencies which can arise due to reasons such as rough weather, machinery malfunction, pirate attack, human error etc. Such emergencies can lead to a fire, collision, flooding, grounding, environmental pollution, and loss of life.

- **Muster List** consists of duties and responsibilities in case of such mishaps, designated and assigned to each person on the ship; in other words, it is a list of the functions each member of a ship crew is required to perform in case of emergency. Owing to it being a document that specifies the job that every crew member is assigned with in case of an emergency, it must be displayed at every conspicuous location onboard. Some of the important areas where the muster list is posted are- Bridge, Engine room, accommodation alleyways etc. – areas where ship's crew spends the maximum of their time.

– **Muster Station** is an area of a ship where passengers are directed to assemble in an emergency.

When mustering at the station all crew members should wear appropriate clothes, helmet, safety shoes and life jacket.

2.4 Action to take on discovering potential emergency, including

– **Fire**

1. Inform Officer On Watch.
2. Check if it is a false or true alarm.
3. Report back of findings.
4. In case of fire, raise the Fire alarm as soon as possible.
5. Try to stop fire and if it is not possible, muster crew members to be ready for abandon the ship.

- **Collision**
  1. Inform the Master and Engine Room
  2. Immediately send distress signal
  3. Record important data
  4. Sound the alarms
  5. Assess the damages
  6. Take the soundings
  7. Take immediate action in case of damage
  8. Check for oil spill
  9. Reach the nearest port if is possible
  10. Abandon the ship only if everything else fails

- **Grounding**
  1. Stop Engines
  2. Sound General Alarm
  3. Close water tight doors
  4. Send distress signal
  5. Check position on the chart
  6. Take note of any valuable information
  7. Take soundings
  8. Evaluate risk of pollution

- **Foundering**
  1. Close the water tight doors
  2. Start pumping out the affected section
  3. If is possible list the ship to reduce the ingress of water into the ship
  4. Use any possible material to plug up a hole

- **Person Overboard**
  1. Shout 'Man Overboard on Starboard/Port side'
  2. Change over to hand steering from auto and put the wheel hard over to the respective side (port or starboard)
  3. Release MOB marker from the side of the bridge wing to which MOB has occurred. This marker is buoyant and has a self-igniting light as well as a self-activating smoke signal
  4. Press the MOB button on the GPS to mark the position of the casualty for future reference
  5. Sound 'O' on the whistle (one prolonged blast). This is to let the Master and the crew know about the emergency situation. Supplement this with the appropriate 'O' flag
  6. Post extra lookout as soon as possible
  7. Sound the General Alarm on the ship's whistle to alert everybody to proceed to stations. This is to ensure that if the crew has not understood the one prolonged blast for MOB, they are alerted regardless and proceed to muster stations to assist in the recovery of the person
  8. Thereafter, announce the MOB situation on the ship's PA system

9. Inform the engine room of the situation and let them know that maneuvering will be required
10. Execute the Williamsons turn (explained later)
11. Keep a keen eye on the RADAR/ARPA and put the VHF on Channel 16
12. Maintain a record of all the events in the Bell book
13. Carry out Master's orders
14. The Chief Mate should take-over all decisions based on deck with regard to lowering survival craft etc.
15. The Third Mate ought to assist the Master on Bridge
16. The officer in charge at the moment must send out an "Urgency signal" on all the communications systems to let ships in the vicinity know about the situation
17. Keep the lifebuoy (MOB marker) in sight
18. The rescue boat should be manned adequately with enough personnel to carry out the rescue operation
19. A portable handheld VHF must be carried by the officer in the rescue boat
20. Once the person is rescued, the rescue boat must be picked up upon arrival close to the ship along with the lifebuoy and hoisted back
21. Immediate first aid should be administered if required
22. An 'Urgency Signal' must be sent out to cancel the last transmitted MOB alert
23. Appropriate entries must be made in the Ship's Logbook
24. The Master must carry out an enquiry with respect to the MOB incident and all entries made in the Ship's Logbook

- **Flooding (ingress water into the ship)**
  - **Engine Room Flooding**
    1. In case of engine room flooding, Chief Engineer should be called immediately and general alarm should be raised.
    2. Immediate action should be taken in preventing more sea water to enter the engine room and Emergency bilging from the Engine Room should be established in accordance with the Chief Engineer.

  - **Cargo Hold Flooding**
    1. In case of cargo hold flooding, Master must be informed immediately.
    2. All precaution must be taken to contain the flooding to that hold.
    3. General alarm must be raised.

2.5 Action to take on hearing emergency alarm signals

The actions to be taken for a crew member when hearing the emergency alarm are: recognize type of alarm that is sounding and then follow the procedures accordingly.

If crew member finds something strange that might be a potential emergency the first thing to do is reporting to the Officer on Watch and then follow the procedures depending on the emergency.

2.6 Value of training and drills

Drills and trainings on boards of the ships are the essential part of seafarers' professions. One of the ways of finding out about the dangers, which can occur onboard because of the human factor, is to check crew skills in practice and improve them with onboard training and drills.

Drills and their different scenarios are a perfect opportunity of gaining and improving the knowledge and give the ability of finding the best solution in case of real emergency.

Some aspects of the need for drills are:

- Crew members have to understand main hazards connected with each kind of emergency.
- The crew should be aware of the places where the equipment is being kept and of the ways of using it.
- To reduce the time of response in case of unexpected event.

2.7 Knowledge of escape routes and internal communication and alarm system

Internal Communication Systems

Several types of shipboard internal communications are used on board. Not every ship has all of these means of communication. The larger ships do, but the smaller ones may have only a few of them. As our discussion progresses, we will examine each type of internal communications.

- **Voice tubes**

  Voice tubes provide an important means of internal communications, although they are normally used only as a standby measure. This system is merely a network of metal tubes designed to carry the sound of the voice from one station to another. The major value of this system is that it is practically immune to mechanical failure. Consequently, it can be relied upon when accidents or damage disrupts other systems.

- **Ship's service telephones**

  Although the ship's service telephones are not part of the battle communication system, they can prove invaluable if the regular systems fail. They are standard telephones powered by the ship's generators and are normally used in carrying out the administrative routine aboard ship.

- **Messengers**

  Ships today still use the oldest method of communication; the messenger. Although messengers are a reliable means of communication, they are not as fast as the other methods. You will be called on many times during your naval career to use your knowledge of the ship by serving as a messenger.

- **Pneumatic tubes**

  Pneumatic tubes are for relaying written messages between communication stations in some ships. This system has the advantage of routing a message

quickly. Two disadvantages are that it needs ship's power for compressed air and that it is good for written messages only.

- **Multi-channel (MC) systems**

  Multi-channel (MC) systems transmit orders and information between stations within the ship, by means of direct, amplified voice communications. There are two types of MC equipment: one type is used in intercommunication (intercom) systems; the other type is used in shipboard announcing systems.

- **Inter Voice Communication System (IVCS)**

  IVCS is a computer–controlled voice system that serves as the ship's internal telephone system and replaces the majority of the circuits traditionally associated with sound-powered telephones. IVCS has predefined networks, such as the Lookout net with jack boxes at all lookout watch stations and the pilothouse.

- **Sound-powered telephone systems.**

  Is a communication device that allows users to talk to each other with the use of a handset, similar to a conventional telephone, but without the use of external power. This technology has been used since at least 1944 for both routine and emergency communication on ships to allow communication between key locations on a vessel even if power, including batteries, is no longer available. A sound-powered phone circuit can have two or more stations on the same circuit. The circuit is always live, thus a user simply begins speaking rather than dialing

another station. Sound-powered telephones are not normally connected to a telephone exchange.

- **Two-way Radio**

  Is a radio that can do both transmit and receive a signal (a transceiver), unlike a broadcast receiver which only receives content. A two-way radio (transceiver) allows the operator to have a conversation with other similar radios operating on the same radio frequency (channel). Two-way radios are available in mobile, stationary base and hand-held portable configurations. Hand-held radios are often called walkie-talkies, handle-talkies, or just hand-helds.

Emergency Escape Routes

Usually emergency escape routes are located confined areas like Engine Room, Stores, Steering Gear Room and accommodations. There main porpouse is to lead crew or passengers to Open Decks, so they can proceed safely to Muster Station. Also they can be used as way of access for Fire Fighters.

Emergency Escape Routes shall be clearly marked, and the markings shall remain visible in emergency situations. Escape routes shall be kept clear of obstructions whenever the vessel is operating. Furniture and fittings along and within the vicinity of escape routes shall be secured or designed to prevent them blocking the escape route in an emergency.

Citadel

In terms of ships, a citadel refers to a room where the crew of the ship can hide in case there is a pirate attack on the ship or when the pirates are aboard the ship. In recent times, the usage and incorporation of the citadel method in ships to protect the ship's crew against maritime piracy has increased.

The citadel requires having not just food and water supplies but also effective communication channels to be able to communicate with the outside world, with a proper system of ventilation and a first aid kit.

Is mandatory for crew members to know the number and location of emergency escape routes to reach faster the ship's citadel. They can find this information in the Fire Plans.

3. Take precaution to prevent pollution of the marine environment

The most important instrument for the prevention of marine pollution is the International Convention for the Protection of Marine Pollution from Ships (MARPOL convention). The convention itself contains six mandatory annexes with provisions for the prevention of marine pollution from ships.

3.1 Basic Knowledge of the impact of shipping on the marine environment and the effects of operational or accidental pollution

Pollution is the introduction of contaminants into the natural environment that cause adverse change, it can occur naturally, for example through volcanic eruptions, or as the result of human activities, such as the spilling of oil or disposal of industrial waste.

Marine Pollution can be defined as anything that contaminates the sea. Common marine pollutants include chemicals, small plastic beads in exfoliants and also toxic bio-matter (such as sewage). But, noise, due to excessive traffic around the ocean, can also be defined as pollution if it disrupts marine life.

There are various ways by which pollution enters the ocean. Some of them are:

- **By Nature**
  - **Land Run-off**

    This occurs when water infiltrates the soil to its maximum extent and the excess water from rain, flooding or melting flows over the land and into the ocean. Often times, this water picks up man-made, harmful contaminants that pollute the ocean, including fertilizers, petroleum, pesticides and other forms of soil contaminants. Fertilizers and waste from land animals and humans can be a huge detriment to the ocean by creating dead zones.

- **Littering**

  Pollution from the atmosphere is, believe it or not, a huge source of ocean pollution. This occurs when objects that are far inland are blown by the wind over long distances and end up in the ocean. These objects can be anything from natural things like dust and sand, to man-made objects such as debris and trash.

– **By Human Activities**

- **Sewage**

  Pollution can enter the ocean directly. Sewage or polluting substances flow through sewage, rivers, or drainages directly into the ocean. This is often how minerals and substances from mining camps find their way into the ocean.

- **Toxic Chemical from Industries**

  Industrial and agricultural waste are another most common form of wastes that are directly discharged into the oceans, resulting in ocean pollution. The dumping of toxic liquids in the ocean directly affects the marine life as they are considered hazardous and secondly, they raise the temperature of the ocean, known as thermal pollution, as the temperature of these liquids is quite high. Animals and plants that cannot survive at higher temperatures eventually perish.

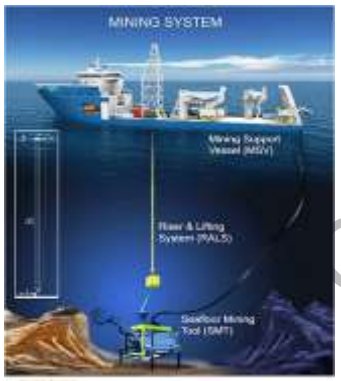
- **Oil Spills**

  Ship pollution is a huge source of ocean pollution, the most devastating effect of which is oil spills. Crude oil lasts for years in the sea and is extremely toxic to marine life, often suffocating marine animals to death once it entraps them. Crude oil is also extremely difficult to clean up, unfortunately meaning that when it is split; it is usually there to stay.

- **Ocean Mining**

  Ocean mining in the deep sea is yet another source of ocean pollution. Ocean mining sites drilling for silver, gold, copper, cobalt and zinc create sulfide deposits up to three and a half thousand meters down in to the ocean. While we have yet the gathering of scientific evidence to fully explain the harsh environmental impacts of deep sea mining, we do have a general idea that deep

sea mining causes damage to the lowest levels of the ocean and increase the toxicity of the region. This permanent damage dealt also causes leaking, corrosion and oil spills that only drastically further hinder the ecosystem of the region.



Sources of Marine Pollution

- **Toxic chemicals in water.**

  Chemical runoff from industry can really endanger marine life. Industrial waste pumped into the sea, household cleaners poured down the sink, and even chemicals in the atmosphere (for instance due to the discharge of industrial wastes through factory chimneys) that dissolve into the sea can pollute our oceans significantly.

- **Oil spillages.**

  This is usually an accidental form of industrial dumping, whereby leaks in oil tankers cause vast quantities of oil to pour into the ocean. Accidental oil spills can devastate marine life.

- **Small particles.**

  The tiny plastic beads in exfoliating creams and other small particles that we pour down the drain without thinking wind up polluting the ocean.

- **Plastic, Litter, and human waste.**

  Plastic bags, aluminum cans, trash and other human waste constitute a major pollutant of the world's oceans. A huge 'island' of trash roughly the size of Texas was recently found in the Pacific Ocean for instance, demonstrating the vast scale of this problem.

- **Sewage.**

  Whether or not it is treated with toxic chemicals, sewage pollutes the clear, clean water of the oceans. This is another type of industrial dumping. Sometimes, sewage is not pumped directly into the sea but into rivers, and then the untreated water of rivers carries it into the sea.

- **The shipping industry.**

  Gases (which dissolve in the sea), chemicals, ballast and sewage from con ships are major pollutants.

Pollutants by Ships

Ships generate a number of pollutants that can result in discharges to the marine environment, which might be sewage, graywater, hazardous wastes, oily bilge water, ballast water, and solid waste. They also emit air pollutants to the air and water.

Effects of operational or accidental pollution of the Marine Environment

- **Effect of Toxic Wastes on Marine Animals**

  Oil spill is dangerous to marine life in several ways. The oil spilled in the ocean could get on to the gills and feathers of marine animals, which makes it difficult for them to move or fly properly or feed their children. The long term effect on marine life can include cancer, failure in the reproductive system, behavioral changes, and even death.

- **Disruption to the Cycle of Coral Reefs**

  Oil spill floats on the surface of water and prevents sunlight from reaching to marine plants and affects in the process of photosynthesis. Skin irritation, eye irritation, lung and liver problems can impact marine life over long period of time.

- **Depletes Oxygen Content in Water**

  Most of the debris in the ocean does not decompose and remain in the ocean for years. It uses oxygen as it degrades. As a result of this, oxygen levels go down. When oxygen levels go down, the chances of survival of marine animals like whales, turtles, sharks, dolphins, penguins for long time also goes down.

- **Failure in the Reproductive System of Sea Animals**

  Industrial and agricultural wastes include various poisonous chemicals that are considered hazardous for marine life. Chemicals from pesticides can accumulate in the fatty tissue of animals, leading to failure in their reproductive system.

- **Effect on Food Chain**

  Chemicals used in industries and agriculture get washed into the rivers and from there are carried into the oceans. These chemicals do not get dissolved and sink at the bottom of the ocean. Small animals ingest these chemicals and are later eaten by large animals, which then affects the whole food chain.

- **Affects Human Health**

  Animals from impacted food chain are then eaten by humans which affects their health as toxins from these contaminated animals gets deposited in the tissues of people and can lead to cancer, birth defects or long term health problems.

3.2 Basic Environmental protection procedures

MARPOL 73/78 Is the International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978.

MARPOL 73/78 is one of the most important international marine environmental conventions. It was developed by the International Maritime Organization (IMO) in an effort to minimize pollution of the oceans and seas, including dumping, oil and air pollution. The objective of this convention is to preserve the marine environment in an attempt to completely eliminate pollution by oil and other harmful substances and to minimize accidental spillage of such substances.

The original MARPOL was signed on February 17, 1973; but did not come into force at the signing date. The current convention is a combination of 1973 Convention and the 1978 Protocol. It entered into force on October 2, 1983. As of April 2016, 154 states, representing 98.7 per cent of the world's shipping tonnage, are state parties to the convention.

All ships flagged under countries that are signatories to MARPOL are subject to its requirements, regardless of where they sail and member nations are responsible for vessels registered under their respective nationalities.

Sewage disposal arrangements

Sewage is treated in different ways and if well treated can be disposed at sea. The amount of sewage effluent generated depends on for example the number of people onboard and the type of treatment system used.

Garbage Management Plan

The Garbage Management Plan is a complete guideline which comprises of a written procedure for collecting, storing, processing, and disposing of garbage generated onboard ship as per regulations provided in Annex V of MARPOL.

Training must be given to ship's staff for proper garbage disposal onboard ship and for knowledge on garbage disposal regulations at sea and in special areas.

Garbage Record Book

Ships with a Garbage Management Plan are also required to have a Garbage Record Book on board in a place where it can be easily inspected. The record book must be filled in by the officer in charge after every discharge of garbage into the sea, every delivery of garbage to port waste reception facilities and every incineration operation. Each entry should highlight the position of the ship, the date and time of the operation, an estimate of the amount and a description of the type of garbage. The Master of the ship signs each page after it is completed. The record should be kept for two years once the book is completed.

Shipboard Oil Pollution Emergency Plan (SOPEP)

SOPEP stands for Ship oil pollution emergency plan and as per the MARPOL 73/78 requirement under Annex I, all ships with 400 GT and above must carry an oil prevention plan as per the norms and guidelines laid down by International Maritime Organization under MEPC (Marine Environmental Protection Committee) act.

SOPEP contains the following things:

- The action plan contains duty of each crew member at the time of spill, including emergency muster and actions.
- SOPEP contains the general information about the ship and the owner of the ship etc.
- Steps and procedure to contain the discharge of oil into the sea using SOPEP equipment.
- On board Reporting procedure and requirement in case of oil spill is described.

- Authorities to contact and reporting requirements in case of oil spill are listed in SOPEP. Authorities like port state control, oil clean up team etc are to be notified.
- SOPEP includes drawing of various fuel lines, along with other oil lines on board vessel with positioning of vents, save all trays etc.
- General arrangement of ship is also listed in SOPEP, which includes location of all the oil tanks with capacity, content etc.
- The location of the SOPEP locker and contents of the locker with a list of inventory.

Garbage disposal arrangement and handling

The new amendments of MARPOL Annex V prohibit the disposal of almost all kinds of garbage at sea with the exemption under specific requirements of food waste, animal carcasses, cargo residues contained in wash water and environmental friendly cleaning agents. As a result of these regulations more and more ships will dispose their ship-generated waste to reception facilities ashore.

Shipboard organization to deal with pollution

Ship organization to deal with pollution consists in having and developing a good plan for fast and organized response to contain the spill with the necessary equipment, first of all try that spill does not go out from the ship and if it does, then try to contain the spread of the oil.

Pollution incident report

Every ship that has a pollution incident must report immediately to the concerning parties for assistance.

This parties could be:

- Appropriate regulatory authority (ARA)
- Environment Protection Authority (EPA)
- Ministry of Health
- Local authority,
- Fire and Rescue NSW.

Structure of oil spill response team and assigned duties to officers and crew

Oil Spill Response Team should be fast and effective. The Officer on watch can find the spill by him/herself or be informed about it by a crew member. Right after this, the Officer on watch must report to the Master immediately and the rest of the crew. Depending on the Muster List, officers and crew, start carrying out their respective duties.

Measures for control of Oil Spills

Despite the technological control and the continuously improved preventive measures, oil spills that pollute many elements of the environment are still occurring today. According to the EPA, almost 14,000 oil spills are reported each year in the U.S. alone.

Oil spill control measures aim to decrease and limit oil spills, as well as limit their spreading in the environment. This can be done in several ways, including the controlled burning of spilled oil, which is similar to controlled forest burning to get rid of dry wood that may pose a hazard if left in place.

- **Controlled Burning** is one of the most effective ways of getting rid of the spilled oil. The method is usually applicable on calm seas soon after the oil film forms so that the oil doesn't get mixed with water. The Exxon Valdez spill proved that this method is efficient for approximately 90% of the captured oil. However, residuals from burning and the resulted fumes may still affect air quality and the land near the spill area.
- **Use of barriers and adsorbant materials** to mechanically recover the spilled oil is a commonly used method when the oil spill happens in a water environment, implying the use of physical barriers for the mechanical prevention of oil spreading. Some of the barriers may also chemically interact with the spilled oil and thus providing both mechanical and chemical control means. The main types of barriers used are:
  - **Booms.** Fire resistant booms are used in order to restrict the burning area, especially when controlled burning is applied.
  - **Skimmers.** Skimmers are usually propylene mop-like pads that are placed on the ocean surface to adsorb the spilled oil film.
  - **Natural and synthetic absorbing materials.** These have a sponge-like behavior, used to control a large variety of spills by removing some of the spilled oil and serving as a physical barrier that limits oil migration.
  - **Use of monomolecular surface films** around the oil spilled on water to compress it into a thick layer that can be recovered more easily and reduce the damage to the environment, fishing and properties. This technique appeared in the early 1970's and was incorporated by the Navy into the control programs of bays and harbors.
  - **Use of chemical and biological methods** for the cleaning up of oil spills increases the oil's natural chemical or biological degradation processes. These

methods are used together with mechanical control techniques and are especially relevant when the spill has reached a sensitive ecosystem.

- **Spraying dispersants** that make the oil more compact and ease the cleanup process, even though they might affect wildlife and coral reefs. Dispersants can be sprayed:

1. **From airplanes into the slicks**. A traditional method usually consisting of a surfactants and solvents mixture which act like a soap. The result is the fine dispersing of oil and its mixing with water, followed by an increased efficiency of the natural microbial degradation processes.

2. **Under water**. A method recently experimented by experts in order to increase the natural attenuation of spilled oil and prevent it from reaching water surface.

Other methods may be used for particular situations. Physical methods are used to clean up the shorelines and involve mechanical removal methods such as: wiping with sorbents, raking and bulldozing, or pressure washing. Scare tactics involve the prevention of wild animals and birds pollution. Examples are devices such as helium-filled balloons, floating dummies, or scare-cans.

Importance of Shipboard drills to deal with pollution of the marine environment

Nowadays, when environmental protection is one of the top priorities for shipping companies, it is essential to raise awareness of this issue among the crew. Trainings concerning the oil spill emergency should motivate the crew to develop their skills and understand the importance of the task.

Pollution by Sewage from ships

- **Sewage.** Waste matter such as water or human urine or solid waste.
- **Discharge of sewage.** Prohibited except when the following requirements are complied with:
  - Comminuted and disinfected sewage: at least 3 nautical miles from the nearest land, or
  - Sewage not comminuted or disinfected: at least 12 nautical miles form the nearest land. Sewage that has been stored in holding tanks shall be discharged at a moderate rate when the ship is in route and proceeding at not less than 4 knots (the discharge rate shall be approved by the Administration based upon standards developed by the Organization).
  - The ship has in operation an approved sewage treatment plant which has been certified by the Administration

Pollution by Garbage from ships

- **Garbage.** Is waste to be thrown out, or anything worthless or offensive.
- **The revised Annex V of MARPOL** now generally prohibits the discharge of all garbage into the sea, except for food waste, cargo residues, cleaning agents and additives and animal carcasses.

Control of Oil discharge from ships

- **Oil Water Separator porpouse**. It is used to separate oil and water mixtures into their separate components. They are found on board ships where they are used to separate oil from oily waste water such as bilge water before the waste water is discharged into the environment. These discharges of waste water must comply with the requirements laid out in MARPOL 73/78.
- **Disposal of garbage as per MARPOL requirements.** Subject to the provisions of regulation 4 of Annex I and paragraphs 2, 3, and 6 of regulation 15, any discharge into the sea of oil or oily mixtures from ships shall be prohibited.

A. Discharges outside special areas

Any discharge into the sea of oil or oily mixtures from ships of 400 gross tonnage and above shall be prohibited except when all the following conditions are satisfied:

1. the ship is proceeding en route;
2. the oily mixture is processed through an oil filtering equipment meeting the requirements of regulation 14 of this Annex;
3. the oil content of the effluent without dilution does not exceed 15 parts per million;
4. the oily mixture does not originate from cargo pump-room bilges on oil tankers; and
5. the oily mixture, in case of oil tankers, is not mixed with oil cargo residues.

B. Discharges in special areas

Any discharge into the sea of oil or oily mixtures from ships of 400 gross tonnage and above shall be prohibited except when all of the following conditions are satisfied:

1. the ship is proceeding en route;
2. the oily mixture is processed through an oil filtering equipment meeting the requirements of regulation 14.7 of this Annex;
3. the oil content of the effluent without dilution does not exceed 15 parts per million;
4. the oily mixture does not originate from cargo pump-room bilges on oil tankers; and
5. the oily mixture, in case of oil tankers, is not mixed with oil cargo residues.
6. In respect of the Antarctic area, any discharge into the sea of oil or oily mixtures from any ship shall be prohibited.
7. Nothing in this regulation shall prohibit a ship on a voyage only part of which is in a special area from discharging outside a special area in accordance with paragraph 2 of this regulation.

C. Requirements for ships of less than 400 gross tonnage in all areas except the Antarctic area

In the case of a ship of less than 400 gross tonnage, oil and all oily mixtures shall either be retained on board for subsequent discharge to reception facilities or discharged into the sea in accordance with the following provisions:

1. the ship is proceeding en route;
2. the ship has in operation equipment of a design approved by the Administration that ensures that the oil content of the effluent without dilution does not exceed 15 parts per million;

3. the oily mixture does not originate from cargo pump-room bilges on oil tankers; and
4. the oily mixture, in case of oil tankers, is not mixed with oil cargo residues.

Content of Oil and Garbage Record Book

– **Oil Record Book**

The entries of oil record book Part I, for ships holding an IOPP Certificate, shall be in English. The Oil Record Book Part I shall be kept in such a place as to be readily available for inspection at all reasonable times and, except in the case of unmanned ships under tow, shall be kept on board the ship. It shall be preserved for a period of three years after the last entry has been made.

When making entries in the Oil Record Book Part I, the date, operational Code and item number shall be inserted in the appropriate Columns and the required particulars shall be recorded chronologically in the blank spaces. Each completed operation shall be signed for and dated by the officer or officers in charge. The master of the Ship shall sign each completed page. The Oil Record Book Part I contains many references to oil quantity. The limited accuracy of tank Measurement devices, temperature variations and clingage will affect the accuracy of these readings. The entries in the Oil Record Book Part I should be considered accordingly.

In the event of accidental or other exceptional discharge of oil statement shall be made in the Oil Record Book Part I of the circumstances of, and the reasons for, the discharge.

Any failure of the oil filtering equipment shall be noted in the Oil Record Book Part I.

- **Garbage Record Book**

  The garbage record book must be in the working language of the crew and in English, carried on board the installation at all times and be readily available for inspection by the EPA at all reasonable times. The owner of the installation must keep this document for two years after the last entry is made in the record.

  Every discharge of garbage, and each completed incineration of garbage, must be promptly recorded and include date and time, position of the offshore installation, category of the garbage, and the estimated amount incinerated or discharged.

  An entry must also be made in the garbage record book of the location of, circumstances of and reasons for any accidental discharge or loss of garbage, details of the items discharged or lost, and the reasonable precautions taken to prevent or minimize such discharge or loss.

  Each completed page of the garbage record book must be signed by the person on board who has overall responsibility for the installation's operations.

Content of Annex VI of MARPOL

Although air pollution from ships does not have the direct cause and effect associated with, for example, an oil spill incident, it causes a cumulative effect that contributes to the overall air quality problems encountered by populations in many areas, and also affects the natural environment, such as tough acid rain.

MARPOL Annex VI, first adopted in 1997, limits the main air pollutants contained in ships exhaust gas, including Sulphur oxides (SOx) and nitrous oxides (NOx), and prohibits deliberate emissions of ozone depleting substances (ODS). MARPOL Annex

VI also regulates shipboard incineration, and the emissions of volatile organic compounds (VOC) from tankers.

Following entry into force of MARPOL Annex VI on 19 May 2005, the Marine Environment Protection Committee (MEPC), at its 53rd session (July 2005), agreed to revise MARPOL Annex VI with the aim of significantly strengthening the emission limits in light of technological improvements and implementation experience. As a result of three years examination, MEPC 58 (October 2008) adopted the revised MARPOL Annex VI and the associated NOx Technical Code 2008, which entered into force on 1 July 2010.

3.3 Basic knowledge of complexity and diversity of the marine environment

Fragile nature may be regarded as an inherent property of an ecosystem. An ecosystem has a certain fragility whether or not it is ever exposed to any disturbances like being strongly damaged by human activities.

We all make use of our seas and oceans. Traditional uses (transport, fishing, tourism) now sit alongside more recent activities (mineral extraction, wind farms). The seas have enormous intrinsic value: unlike our cities, they provide us with a free horizon; we enjoy clean coastal and marine environments and the wildlife they support; and we benefit from their role in keeping our climate stable. But the unsustainable use of our seas threatens the fragile balance of marine environment. Human activities that depend on the sea, such as fishing and tourism, suffer from damaged ecosystems and use-related competition will become increasingly serious.

4. Observe safe working practices

Safe working practices are generally written methods outlining how to perform a task with minimum risk to people, equipment, materials, environment, and processes. Safe job procedures are a series of specific steps that guide a worker through a task from start to finish in a chronological order.

4.1 Importance of adhering to safe working practices at all times

Working on ships has its perks, but it's also a well-known fact that working at sea is one of the most hazardous occupations, in regards to personal health and safety concerns of seafarers. Apart from accidents, seafarers are prone to certain serious diseases and health hazards due to the nature of onboard work, change in climatic conditions, type of cargo carried, working hours, materials being handled, epidemic and endemic diseases, personal habits etc.

The various shipboard hazards are:

- Slips, trips and falls due to slippery surfaces (oil, grease, garbage, water, ice, etc.) or obstructions (pipelines, welding cables, lashing eyes, wires, ropes, etc.);
- Head injuries due to low doorway entrances, overhead loads, falling equipment or material, etc.;
- Falls through open manholes, unfenced 'tween decks, loose or missing gratings, etc.;
- Clothing, fingers, etc. getting caught in moving machinery such as grinding wheels, winchdrums, gears, flywheels, etc.;
- Burns from steam pipes, hot machinery, welding sparks, etc.;
- Eye injuries through chipping, welding, chemicals, etc.;
- Hazards of extreme weather e.g. cold temperatures can cause frost bite.

4.2 Safety and protective devise available to protect against potential hazard aboard ship

Ship's Safety Manual Contents

Safety Manual is being developed in accordance with ISM Code. This manual should be kept updated onboard each vessel with the responsibility of the Master. Any comments should be forwarded directly to the DPA.

Safety Manual contents:

- Safety Procedures
- Communication Messages & Letters
- Safety Instructions
- Safety Posters
- Safety Forms
- Emergency Checklists

Importance of creating a safety culture on board

To create a safety culture onboard means to encourage the crew to follow safety measures according to the job to be done and also in the daily work looking forward to avoid incidents, accidents or loss of life in the working place.

Importance of safety meetings on board

Safety meetings are important because is the best chance to discuss with the onboard management all about safe working practices, procedures, amendments, use of PPE and other topics of safety matters

Requirements for the shipboard familiarization

The main aim of the familiarization training is to make the new crew aware of important safety procedures that are to be carried out on ships while working or during an emergency situations. It is the duty of the officer in charge of the training to train the new crew regarding:

- Instructions on SOLAS and MARPOL
- Important features of muster list
- Guidelines on how to tackle all kinds of emergency situations on ships
- Important documents and publications of ships
- Ship's Fire Control Plan
- Different types of fire fighting appliances and procedures to use them

Apart from the above mentioned points, the officer must also ensure that the new crew members know the following:

- Location of life jackets and immersion suits, along with the procedure to wear the life jacket
- Location of escape routes
- Actions for man overboard situation
- Different types of alarms on board ship
- Location of his or her cabin, along with the location of the nearest escape route and fire extinguisher
- Procedure for abandon ship alarm
- His or her duties in the muster list and during emergency situations
- Basics of fire prevention on ships
- Actions to be taken in case of medical emergency before further medical assistance is received
- Operation of fire and water-tight doors fitted on ships

- Important instructions on various drills on ships
- Procedure to operate fire extinguishers
- Procedure to raise an alarm in case of an accident or emergency

Principles of International Management Code

The basic principle of this Code is to provide an international standard for the safe management and operation of ships and for pollution prevention. It is mandatory for every ship to have a Safety Management System onboard in order to comply with all safety requirements following the procedures accordingly for every single individual onboard involved in any activity carried out.

Principles of Safety Audits

Generally, a safety audit is a structured process whereby information is collected relating to the efficiency, effectiveness, and reliability of the total health and safety management system of a company. Safety audits are conducted in compliance with legislation, and are used as a guide for designing plans for corrective actions within a health and safety program.

Principles of the onboard safety committee

In order to ensure that the ship and its crew follows all safety procedures while doing work and maintains a safe working environment, a safety committee is formed on ships under the chairmanship of the master.

The safety committee comprises of the safety officer and the safety representative along with other competent persons. More crew members can be included in the committee if the need arise.

The safety committee works with the sole goal of enhancing the safety standard on board ships by ensuring that all safety procedures and practices are followed by the ship's crew members.

Main tasks of the safety committee are:

- To ensure that safe working practices and standards are followed on the ship and are not compromised at any cost
- To improve the standards of safety by enhancing safety-first attitude among crew members
- To make recommendations regarding enhancement of occupational health and safety measures on ships
- To act as the representative of the crew to address concerns and queries to the ship management
- Inspect safety officer's records
- To take appropriate actions pertaining to occupational health and safety policies
- To keep a record of safety meetings, suggestions, progress, and actions taken
- To ensure that necessary safety tools and equipment are available to the crew members, along with safety publications
- To look into the accuracy of accident reports
- To make sure that safety meetings are held every 4 to 6 weeks or whenever need arise
- All the records of the committee are properly noted down in official log book

Principles of Ship's Safety Officer

The role of the Shipboard Safety Officer is to promote Safety Culture by training and motivating the crew. It is the desire of every seafarer to work in a safe and healthy environment.

Safety Officers and Safety Representatives are the key to managing on-board safety and it is critical for them to understand the roles and responsibilities associated with this duty. Motivation is the key element in enhancing and developing a good Safety Culture on board. Safety culture can only be developed with encouragement in implementation of best practices

Principles of incident, near-miss and hazard reporting and reviews

- **Incident.** Any unplanned event resulting in, or having a potential for injury, ill health, damage or other loss.
- **Near-miss.** An incident that could have resulted in an injury or illness to people, danger to health, and / or damage to property or the environment.
- **Hazard.** An object or situation that has the potential to harm a person, the environment or cause damage to property. Reporting incidents, near-miss or hazard give us an opportunity to intervene and prevent more serious injuries.

Principles of Job Hazard Analysis (JHA)

It's a procedure that helps to integrate acceptable safety and health principles and practices into a particular operation. It is based on the idea that safety is an integral part of every job-- not a separate entity. JHA's are sometimes called "task hazard analyses".

Personal Protective Equipment

- Helmet
- Safety Gloves
- Safety Goggles
- Ear Plugs
- Ear Muffs
- Air-Purifying Respirators

- Dust Mist Respirator
- Safety shoes
- Rubber boots
- Safety Harness
- Chemical Suit
- Coverall

Onboard life-saving appliances

- Lifeboats
- Liferafts
- Lifebuoys
- Lifejackets
- Thermal Protective Aids
- Immersion Suits
- Anti-Exposure Suits
- Self-Contained Breathing Apparatus
- Emergency Escape Breathing Device

Onboard fire-fighting appliances

- Fire Retardant Bulkhead
- Fire doors
- Fire Dampers
- Fire Pumps
- Fire Main Piping and Valves
- Fire Hose and Nozzles
- Fire Hydrants

- Portable Fire Extinguishers
- Fixed Fire extinguishing system
- Inert Gas System
- Fire Detectors and Alarms
- Remote Shut and Stop System
- EEBD
- Fire Fighter's Outfit
- International Shore Connection (ISC)
- Means of Escape

Medical Equipment

- Resuscitation Equipment
- Dressing Material and Suturing Equipment
- Instruments
- Examination and Monitoring Equipment
- Equipment for Injection, Infusion and Catheterization
- General Medical and Nursing Equipment
- Immobilization and Transportation Equipment

Oil Spill Equipment

- Absorbent rolls
- Absorbent pads
- Absorbent granules
- Absorbent material
- Brooms
- Shovels

- Mops
- Scoops
- Empty receptacles
- Portable air driven pumps
- Oil boom
- Dispersants
- Disposable bags
- Googles
- Gloves
- Boots
- Cotton rags
- Scupper plugs
- Sand
-

Picture above demonstrate proper use of Personal Protective Equipment (PPE)

On board seafarers can find many dangerous operations like:

- **Loading/Unloading of cargoes.** Transporting loads is a very dangerous operation. It might seem like a simple task of getting stuff from one place and bringing it to another. But loading, unloading and transporting cargo can cause serious injury and even fatality. Workers loading and unloading cargo are exposed to serious danger in that heavy objects may hit or fall on them if they don't follow the right procedures in securing loads.

- **Mooring.** Mooring can be a hazardous activity as there is a risk of a person getting caught in a line or a winch. The lines can be very heavy and awkward, particularly if they are wet, and may break and snap back. All workers carrying out mooring operations should be specifically trained. They should:
  - Wear appropriate personal protective equipment.
  - Stand clear of lines being thrown but be ready to pick them up as soon as they have landed.
  - Only enter the snap back zone if it is necessary to carry out a specific task.
  - Never put their feet in bights or eyes of mooring lines or step over a mooring line under tension.

- **Working aloft.** Falls from height can occur whilst carrying out trimming, sheeting and container lashing, securing loads, accessing ships, working on board a ship or working on heavy machinery.
  - Edge protection must be in place on all open edges where there is a risk of falling from height.
  - Falls through openings in holds or from cargo must be prevented.
  - All access or lashing cages must be appropriately protected with guard rails and toe boards and have robust gates or doors. Documented instructions for their safe use should be available.
  - Wherever possible, avoid the need for people to climb onto high places. If people cannot work from the ground, appropriate safe access must be provided for sheeting etc.
  - Appropriate ship to shore access must be provided and should comply with relevant Marine Notices (see www.dttas.ie/maritime).
  - Appropriate measures and safe systems of work must be in place to prevent falls from height and to ensure compliance with Part 4 of the Safety, Health and Welfare at Work (General Application) Regulations 2007, as amended.

– **Handling of Chemicals.** Most people automatically associate chemicals with scientists in laboratories, but chemicals are also found in many of the products we use at work. While they have a variety of beneficial uses, chemicals can also be extremely harmful if they are misused.

General tips for chemical safe handling

- Always read the label on the chemical bottle.
- Always follow the directions and precautions listed on the label.
- Never use a chemical if you are unsure what it is or how to protect yourself.
- Always take the time to protect yourself and those working around you.
- Always dispose of a chemical properly. Every municipality has a household hazardous waste drop-off location. For safe disposal of chemical products at work, contact your health and safety representative.

- **Engine Room Watchkeeping and Maintenance.** The engine room is a place where accidents and pollution incidents can easily occur if safe working practices and pollution prevention measures are not strictly followed. The Chief Engineer is responsible for ensuring that the importance of accident/incident prevention is fully understood by all engineering staff including the potential risks involved.

- **Lifting Loads (Manually or Mechanically).** Lifting loads is a very sensitive operation. If it is done manually, the person doing the job should be carefull of body injuries when lifting the weight. If it is done mechanically, all lifting equipment must be inspected and tested and records of such tests kept in accordance with the Safety, Health and Welfare at Work (General Application) Regulations 2007, as amended.


- **Entry into enclosed spaces.** Enclose or confined space refers to any place, including any vessel, tank, container, pit, bund, chamber, cellar or any other similar space which, by virtue of its enclosed nature, creates conditions that give rise to a likelihood of an accident, harm or injury of such a nature as to require emergency action due to the presence or reasonable foreseeable presence of:
  - Flammable or explosive atmospheres
  - Harmful gas, fume or vapor
  - Free flowing solid or an increasing level of liquid
  - Excess of oxygen
  - Excessively high temperature
  - The lack or reasonably foreseeable lack of oxygen


- **Hot Work.** Workers performing hot work such as welding, cutting, brazing, soldering, and grinding are exposed to the risk of fires from ignition of flammable or combustible materials in the space, and from leaks of flammable gas into the space, from hot work equipment.

4.3. Precautions to be taken prior to entering enclosed spaces

Enclosed Space. Means a space which has any of the following characteristics:

- Limited openings for entry and exit;
- Inadequate ventilation; and
- Is not designed for continuous worker occupancy.

Cargo spaces, double bottoms, fuel tanks, ballast tanks, cargo pump-rooms, cargo compressor rooms, cofferdams, chain lockers, void spaces, duct keels, inter-barrier spaces, boilers, engine crankcases, engine scavenge air receivers, sewage tanks, and adjacent connected spaces.

The careless entry into an enclosed space might lead a person into an incident or even loss of life due to the rough nature of these spaces which usually are dark, unventilated, may be presence of harmful gases, maybe could be a deep tank which can lead to a fall. In the end if a person suffers any kind of accident inside of these spaces and is not rescued on time, this person may run out of breathable air and die.

Hazards can be divided into:

- **Atmospheric Hazards.** The lack of oxygen and the presence of harmful gases could pose an immediate threat to life or interfere with a person's ability to escape unaided from an enclosed space.
- **Physical Hazards.** Can be considered as hazards that cause the body to become physically stressed and can be detected through the senses and can be caused by moving and rotating equipment, electrical energy, hot or cold conditions, wet or slick surfaces, and excessive noise.

Atmospheric Hazards can result from:

- **Deficiency of Oxygen.** Effects of exposure to low oxygen concentrations can include giddiness, mental confusion, loss of judgment, loss of coordination, weakness, nausea, fainting, loss of consciousness and death.
- **Presence of Hydrocarbon Gas.** Hydrocarbon releases pose more than just the risk of fire and explosion. Exposure to hydrocarbon gas can cause a narcotic effect in concentrations lower than those that represent an explosion or asphyxiation hazard. It may also be a relevant factor in relation to long-term health effects. Depending on the type of hydrocarbon, releases may entail high concentrations of compounds such as benzene, which is carcinogenic.
- **Presence of Toxic Gas.** Toxic gases produced, under many circumstances, have harmful effects on workers exposed to them by inhalation, being absorbed through

the skin, or swallowed. Gaseous toxic substances are especially dangerous because they are often invisible and/or odorless. Their physical behavior is not always predictable: ambient temperature, pressure and ventilation patterns significantly influence the behavior of a gas leak.

A gas leak refers to a leak of natural gas or other gaseous product from a pipeline or other containment into any area where the gas should not be present. Because a small leak may gradually build up an explosive concentration of gas, leaks are very dangerous for this reason. Besides leaks there is also the possibility of to find dangerous gases retained in cargo tanks and/or pipelines after discharge operations in the case of tanker vessels.

Toxic Gases can evolve from cargo as it usually happens in gas carrier vessels or containers carrying dangerous goods, also from ships stores like paint locker or chemical locker and also from ships operation such as ship to ship or ship to shore transfers. When there is presence of toxic gasses in a space, it can cause oxygen deficiency which is harmful for human being.

Toxic Hazard or Toxic materials are substances that may cause harm to an individual if it enters the body. Toxic materials may enter the body in different ways. These ways are called the route of exposure. The most common route of exposure is through inhalation (breathing it into the lungs).

The term Anoxia means a total depletion in the level of oxygen, an extreme form of hypoxia or "low oxygen". The first noticeable symptoms of anoxia can include:

- mood and personality changes
- memory loss

- slurred speech or forgotten words
- changes in judgment
- trouble walking or moving your arms or legs normally
- weakness
- feeling dizzy or disoriented
- unusual headaches
- trouble concentrating

Other symptoms may become noticeable after your brain has been without oxygen for more than four to five minutes.

These include:

- seizures
- hallucinations
- passing out or suddenly losing consciousness

If you or someone around you is experiencing any of the above symptoms, seek immediate assistance.

The deficiency of oxygen which might cause anoxia should be avoided at all times in case a person is going to work inside an enclosed space. First of all, there should be an Enclosed Space Permit carried out by the Safety Officer and approved by the Master stating that the space has been illuminated and ventilated properly and the measured percentage of oxygen should be in between 19.5 and 23.5%, this is done with an Oxygen meter which is a device that measures the oxygen level. This permit should be posted at the entrance of the enclosed space and there should always be a person standing by with communication means to the Bridge, monitoring the whole time during the job and measuring oxygen level from time to time to make sure that the enclosed

space is a workable place regarding this matter. There is also a good practice to have Breathing apparatus and EEBDs by the entrance in case of an emergency.

The person working in an enclosed should be a trained before carrying out this kind of job. PPE will be worn to protect entrants from the hazards associated with the confined space. PPE may include eye protection, hearing protection, hand protection, hard hats, chemically treated protective garments, and respiratory protection, including self-contained breathing apparatus (SCBA) if necessary.

The Safety Officer is responsible for issuing an Enclosed Space Permit, which ensures that all the safety precautions are in place and a formal check has been undertaken before workers are allowed to enter or work in the confined space. The permit specifies the period during which workers may remain safely in the confined space. It is also a means of communication between site management, supervisors, and those carrying out the hazardous work. Essential features of an Enclosed Space Permit are:

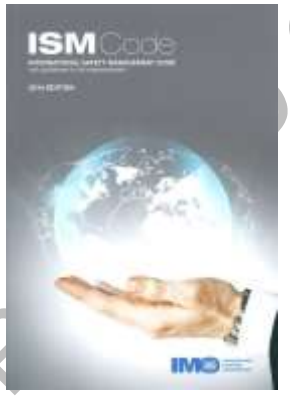
- location of the confined space;
- names of workers who are going to enter the confined space;
- names of persons who may authorize particular jobs and any limits to their authority
- risk control measures;
- name of person who is responsible for specifying the necessary precautions (e.g. isolation, air testing, emergency arrangements, etc.);
- name of person staying outside the confined space;
- period during which workers may remain safely in the confined space.

After the job is done is good to clean the working area and all equipment used during the job.

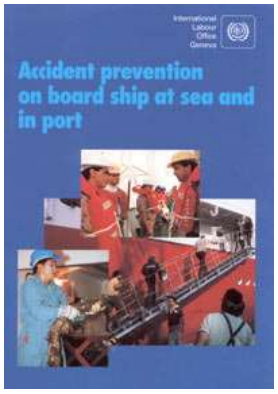
4.4 Familiarization with International measures concerning accident prevention and occupational health

Talking accident prevention and occupational health seafarers can find important points about it in international measures as:

- **International Safety Management - ISM Code.** The objectives of this Code are to ensure safety at sea, prevention of human injury or loss of life, and avoidance of damage to the environment, in particular to the marine environment and to property. The requirements of this Code may be applied to all ships.



- **International Labour Office - ILO Accident Prevention at Sea**. Its object is to provide guidance to shipowners and seafarers. Its practical recommendations are intended for use by all those who have responsibility for safety and health on board ship. Much of the information contained in this code has been taken from national codes of practice and safety related publications.



- **Code of Safe Working Practices for Merchant Seafarers COSWP**. The Code provides guidance on safe working practices for many situations that commonly arise on ships, and the basic principles can be applied to many other work situations that are not specifically covered. It is intended primarily for merchant seafarers on UK-registered ships.

- **STCW regulation 1/14 (International Convention on Standards of Training, Certification and Watchkeeping for Seafarers)**. The objective of this convention is to establish detailed mandatory standards of competence and other mandatory provisions necessary to ensure that all seafarers shall be properly educated and trained, adequately experienced, skilled and competent to perform their duties in a manner which provides for the safety of life, property and security at sea and the protection of the marine environment.

5. Contribute to effective communications on board ship

Effective communication is about more than just exchanging information. It's about understanding the emotion and intentions behind the information. As well as being able to clearly convey a message, you need to also listen in a way that gains the full meaning of what's being said and makes the other person feel heard and understood.

5.1 Understand the principles of, and barriers to, effective communication between individuals and teams within the ship

Communication is the process of exchanging information, knowledge, emotion and understanding between parties. This process can be executed in three ways.

- **One way communication.** Transmission from sender to receiver with no desire or intention for feedback
- **Two way communication.** Transmission of information back and forth between parties
- **Non-verbal communication.** Transmission of information and feelings through gestures and body language

Communications are a very important part onboard for any kind of situation, especially in case of emergency, like fire, person overboard or oil spill. Communication is the way to keep connection between the command center and the person in the place of the

emergency and also is the way to get in touch with external parties for assistance. With an effective communication, operations onboard or external operations can be carried out in a safe and proper way.

The most common or used language for maritime communications is English and seafarers are encouraged to learn it for working communication. Communication in maritime environment should be clear so that the receiving party can decipher the sender´s message correctly. These are the important elements of the communication process:

- **Sender/Encoder**

  The sender also known as the encoder decides on the message to be sent, the best/most effective way that it can be sent. All of this is done bearing the receiver in mind. In a word, it is his/her job to conceptualize. The sender may want to ask him/herself questions like: What words will I use? Do I need signs or pictures?

- **Medium**

  The medium is the immediate form which a message takes. For example, a message may be communicated in the form of a letter, in the form of an email or face to face in the form of a speech.

- **Channel**

  The channel is that which is responsible for the delivery of the chosen message form. For example post office, internet, and radio.

- **Receiver**

  The receiver or the decoder is responsible for extracting/decoding meaning from the message. The receiver is also responsible for providing feedback to the sender. In a word, it is his/her job to interpret.

- **Feedback**

  This is important as it determines whether or not the decoder grasped the intended meaning and whether communication was successful.

- **Context**

  Communication does not take place in a vacuum. The context of any communication act is the environment surrounding it. This includes, among other things, place, time, event, and attitudes of sender and receiver.

- **Noise (also called interference)**

  This is any factor that inhibits the conveyance of a message. That is, anything that gets in the way of the message being accurately received, interpreted and responded to. Noise may be internal or external. A student worrying about an incomplete assignment may not be attentive in class (internal noise) or the sounds of heavy rain on a galvanized roof may inhibit the reading of a storybook to second graders (external noise).

  The communication process is dynamic, continuous, irreversible, and contextual. It is not possible to participate in any element of the process without acknowledging the existence and functioning of the other elements.

- **Modes of data transmission:**

  It can be: Simplex, Half duplex (HDX), Full duplex (FDX)

  - **Simplex:** In Communication Networks, Communication can take place in one direction connected to such a circuit are either a send only or receive only device. There is no mechanism for information to be transmitted back to the sender. Communication is unidirectional. TV broadcasting is an example. Simplex transmission generally involves dedicated circuits. Simplex circuits are analogous to escalators, doorbells, fire alarms and security systems
  - **Half Duplex:** A half duplex system can transmit data in both directions, but only in one direction at a time that mean half duplex modes support two-way traffic but

in only one direction at a time. The interactive transmission of data within a time sharing system may be best suited to half-duplex lines. Both the connected devices can transmit and receive but not simultaneously. When one device is sending the other can only receive and vice-versa. Data is transmitted in one direction at a time, for example a walkie-talkie.

- **Full Duplex:** A full duplex system can transmit data simultaneously in both directions on transmission path. Full-duplex method is used to transmit the data over a serial communication link. Two wires needed to send data over a serial communication link layer. Full-duplex transmission, the channel capacity is shared by both communicating devices at all times.

  Both the connected devices can transmit and receive at the same time. Therefore it represents truly bi-directional system. The link may contain two separate transmission paths one for sending and another for receiving.

Methods of Communication

– **Oral Communication**

The other type of verbal communication includes the spoken word, either over the phone or face-to-face, videoconferencing, voice chat or any other medium. Different types of informal communications like the informal rumor mill or grapevine and formal communications such as conferences and lectures are the forms of effective oral communication. The use of oral communications is made in discussions as well as conversations that are informal and causal. How effective the oral communication is will depend on the speed, volume, pitch, voice modulation, clarity of speech and also the non-verbal communications like visual cues and body language.

- **Face-to-Face Communication**

  This is usually preferred methods of communication although it is not realistic all the time, especially in organizations that are based in several locations around the globe. However, tools like videoconferencing make approximate face-to-face communication possible and help even the large organizations in creating personal connections between the management and the staff.

- **Physical Nonverbal Communication**

  A major role is played by the nonverbal communication in the way you communicate with other people. It cannot be relied as a sole means of communication except in cases where the person makes use of sign language. Physical Nonverbal Communication or the body language consists of body posture, facial expressions, eye contact, gestures like a pointed finger, wave and the like, touch, tone of voice, overall movements of the body and others.

- **Paralanguage**

  A significant component of nonverbal communication is the way something is said, instead of what is said actually. This consists of style of speaking, tone, emotion, stress, pitch, intonation and voice quality. It helps in the communication of interest, approval or the absence of it. According to research, 38% of all communications are accounted for by the tone of the voice.

- **Visual Communication**

  Visual communication is the third methods of communication which takes place through the help of visual aids like color, illustration, graphic design, drawing, typography, signs and other electronic resources.

Types of Communications

- **Verbal communication**, in which you listen to a person to understand their meaning.
- **Written communication**, in which you read their meaning
- **Nonverbal communication**, in which you observe a person and infer meaning.

A communication barrier is anything that prevents you from receiving and understanding the messages others use to convey their information, ideas and thoughts. There are many barriers to communication and these may occur at any stage in the communication process. Barriers may lead to your message becoming distorted and you therefore risk wasting both time and/or money by causing confusion and misunderstanding. Effective communication involves overcoming these barriers and conveying a clear and concise message.

Common Barriers to Effective Communication are:

- The use of jargon. Over-complicated, unfamiliar and/or technical terms.
- Emotional barriers and taboos. Some people may find it difficult to express their emotions and some topics may be completely 'off-limits' or taboo.
- Lack of attention, interest, distractions, or irrelevance to the receiver.
- Differences in perception and viewpoint.
- Physical disabilities such as hearing problems or speech difficulties.
- Physical barriers to non-verbal communication. Not being able to see the non-verbal cues, gestures, posture and general body language can make communication less effective.
- Language differences and the difficulty in understanding unfamiliar accents.
- Expectations and prejudices which may lead to false assumptions or stereotyping. People often hear what they expect to hear rather than what is actually said and jump to incorrect conclusions.

- Cultural differences. The norms of social interaction vary greatly in different cultures, as do the way in which emotions are expressed. For example, the concept of personal space varies between cultures and between different social settings.

5.2 Ability to establish and maintain effective communications

When a communication between two parties is carried out always there is going to be a sender and a receiver for a particular message. Is very important that sender transmits the message using the proper working language which usually in maritime field is English, the sender talking should be loud and clear to transmit his/her idea in a proper way. Sometimes it is possible that people using means of communications might get scared or shy to talk on the radio because other people can hear this person, and this can be an issue because for these reasons mentioned before the message could not be delivered clearly and that is the reason why there should be a feedback coming from the receiver to make sure that the message is well understood.

In the other hand, once the message is sent by the sender, the main task of the receiver is to listen and understand the message. It might happen that a person can hear but cannot listen. This is because hearing is simply the act of perceiving sound by the ear without understanding it, listening, however, is something you consciously choose to do. Listening requires concentration so that your brain processes meaning from words and sentences.

Listening is the ability to accurately receive and interpret messages in the communication process.

Listening is key to all effective communication. Without the ability to listen effectively, messages are easily misunderstood. As a result, communication breaks down and the

sender of the message can easily become frustrated or irritated, causing stress or bad working relationship.

During communication the receiver can experience barriers to communication which might be internal (poor listening skills, lack of concentration) or external (noise and other distractions) that could be a real issue in the beginning, but dealing with this can improve listening skills later.

Ineffective communication at sea can be catastrophic; it could lead to significant accidents that may result in loss of life or damage to environment.

6. Contribute to effective human relationships on board ship.

Human relationship is a relationship between groups of people, especially between workers in a place of work.

6.1 Importance of maintaining good human and working relationships aboard ships

Working on ships is not an easy task and dissatisfaction and demotivation can easily be developed among seafarers as a result of various kinds of stresses. As the number of

people working on board is limited, everyone should try to know each other in order to understand and respect the values, culture, individuality, knowledge and skills each one has.

Some elements that contribute to maintain a good working environment are:

- **Morning meetings (Tool box meeting):** The morning meeting, which is conducted to assign work to team members, is the best time to get all the crew members together. It is necessary that crew members talk to each other during such meetings and discuss their views and opinions.

  Each member should be given a chance to provide suggestions regarding improvement of work process and safety precautions to be taken. This activity gives members a sense of responsibility and importance and also works a great deal in enhancing their performance and interpersonal relationship.

- **Tea-Breaks:** Tea breaks if used efficiently can work wonders towards enhancing “team effort”. It should be made compulsory to get all crew members together during tea breaks to discuss the work in progress and other important things that they feel are necessary.

- **On board training sessions:** On board training session is yet another important opportunity to get crew members together to impart important working knowledge or conduct safety committee meetings.

- **Spending free time together:** It is often seen that post working hours, officers and crew members spend time in their own rooms instead of getting together in officer or crew lounge. Watching movies and playing games in free time is a solid way to know each other and build great relationships both on and off work.

- **Arranging events/sports days**: It is necessary to arrange recreational events or sports days which require crew members to participate in teams. This is a great way to inculcate the importance of team spirit and building interpersonal relationship among crew members.

- **Parties and Get-together**: Everyone likes to party and unwind once in a while. Party is a great method to bond people together and improve scarred relationships on board ships. However, it is necessary that they are arranged in such a way that maximum crew is able to participate. Festival celebrations are also a great way to enhance interpersonal relationships between people onboard.

The above mentioned methods are some of the main ones that are used onboard to enhance relationships on board ships. Doing this would not only ensure smooth and safe operations of the ship but would also improve productivity and employment satisfaction.

6.2 Basic teamworking principles and practice, including conflict resolution

Team building is a collective term for various types of activities used to enhance social relations and define roles within teams, often involving collaborative tasks. On board duties are designed for teamwork and its effective development depends of the effectiveness of each individual team member.

Within any team each member may have a range of different skills. These skills may be complementary in order to take decisions. The effectiveness of team decision-making may depend upon a number of factors:

- **The skills and abilities of the group members.** Teams are often more effective when they have a mix of people who take on a preferred role, for example an effective team could include a person who comes up with ideas. It might also include somebody who could analyze those ideas, one who shows good judgement and

somebody who simply makes sure that the work gets done and that the deadlines are met.

- **The size of the group.** Sometimes the larger the team, the more complex the communication channels become. This can slow down decision making. Larger groups also require more formal structures to co-ordinate responsibilities so as to avoid duplicating efforts.
- **The task to be undertaken.** Small groups may better undertake urgent tasks. This may require their undivided attention. Teams are particularly good for dealing with complex and challenging tasks. This is because teamwork provides an opportunity for combining the skills and knowledge of each of the members. One team member may come up with a more efficient method of tackling a challenge that the other members had not thought of.

Team is a number of people or team members who develop onboard works as a group. Team members are selected because they have particular skills that are required to complete works on board.

The Team Member's role is to successfully perform the tasks that have been allocated, the role often requires team members to work on their own initiative in areas where they are the 'experts'.

Cohesiveness holds a teamwork together voluntarily. As committed participants in the teamwork, they are more productive, communicative, trusting, motivated, and loyal.

Team Resource Management strives to fully utilize all available resources information data, tools, equipment, aids and human appropriately, in order to achieve the optimal efficiency and safety level on board ship.

Teamwork is a big part of getting an onboard work done, so the way those groups function matters. But teamwork has deterrents such as:

- Distortion of aims
- Inflexible behavior of team members
- Groupism
- Status or ego problems
- Hidden Agendas
- Communication problems
- Physical or environmental problems
- Handling of grievances/counselling

The principles that contribute to build a good teamwork are:

- The team should have explicitly stated team goals,
- Professional roles must be clearly defined and understood,
- All team members should contribute to team function through constructive individual behaviors, including leadership,
- There must be effective team communication across all work settings,
- The team must have tools or strategies for the effective management of conflict,
- The team should have explicit rules about participation and decision making,
- The team must be adaptable, responding to new challenges and conditions as they develop over time,
- The team members should be willing to learn from each other.

Conflict is pretty much inevitable when you work with others. People have different viewpoints and, under the right set of circumstances, those differences escalate to conflict. How you handle that conflict determines whether it works to the team's advantage, or contributes to its demise.

There are many responses to conflict within a team, including ignoring the issue, responding with passive aggressive actions, or even blaming the other people involved. Obvious errors usually only appear in retrospect, but here are a few tips for recognizing and solving conflict when working in a group.

- **Acknowledge the Conflict.** Ignoring the issues may save someone's feelings in the short run, but more than likely you will work with this person on future projects. If the issues continue to arise, your built-up resentment may eventually lead to arguments. Avoid anger buildups by facing the conflict head-on and letting your teammate know you disagree with their course of action. While not always pleasant, getting these small disagreements out in the open can help head off future disputes.
- **Stop and Cool Off.** Take a minute to think through the course of action you would like to pursue. Avoid destructive behaviors like:
  - Pointing fingers
  - Insults
  - Ultimatums and rigid demands
  - Defensive attitudes
  - Complaining behind teammates backs
  - Making assumptions about others behaviors

  These negative behaviors cause coworkers to distrust you and view your argument tactics as manipulative. Going directly to the source of the conflict and rationally discussing your issues will gain you a lot more ground in the workplace than using unscrupulous methods.
- **Clarify Positions.** Let everyone voice his or her opinions on the conflict and be heard. Allowing each team member to explain and elucidate his or her stance will prevent miscommunication. Plus, allowing them to rationalize their opinions may bring more agreement and understanding from other team members.

While people are explaining their viewpoints on the issue in question, practice active listening. Pay attention and refrain from jumping to conclusions.

- **List Facts and Assumptions Based on Each Position.** Once each team member has been allowed to explain their stance on the conflict, list out the facts and assumptions that have been made. Simply writing down the complex facets of an argument can make things appear much clearer to the team. If one side of the conflict is lacking in reasoning, it may be obvious during this step. However, examining the information as a group prevents irrational arguments or possible favoritism from team members.
- **Break Into Smaller Groups and Separate Existing Alliances.** Many times, friendships in the workplace can cloud judgments in team projects. Coworkers may feel the need to agree with each other because they fear losing a friendship. By breaking up these existing alliances when discussing the final team positions, you often avoid this behavior and allow people to view conflicts free of persuasion.
- **Reconvene the Groups.** Resolution becomes much easier once these steps have been followed and the team meets again as a whole. After smaller groups have been allowed to freely discuss issues from every angle, viewpoints change, solving the initial conflict. Sometimes team members simply need to have his or her hesitations heard and discussed by the rest of the team. By analyzing the argument together, the team can move forward in agreement or at least a mutual understanding.
- **Celebrate the Resolution as a Team.** Acknowledge specific contributions from individuals in the group. This will make them feel good about working towards a solution and leads to the entire team becoming more cohesive because of their united victory.

Constructive conflict can bring a team closer together if handled properly. Respecting and appreciating your coworker's differences is key to building a strong

team. Resolving conflict when it does arise in a quick and proficient fashion helps maintain a strong and healthy team environment. Remaining open to differing beliefs and ideas is vital, and learning to view conflicts from a coworker's perspective will help you become a more effective team member.

6.3 Social responsibilities, employment conditions; individual rights and obligations; dangers of drugs and alcohol abuse

Fulfilling with social responsibilities on board ship, all crew member has rights and obligations with their ship, their self, and their coworkers, to the company and to the environment. The Maritime Labour Convention establish fundamental seafarers' rights as:

- Every seafarer has the right to a safe and secure workplace that complies with safety standards.
- Every seafarer has a right to fair terms of employment.
- Every seafarer has a right to decent working and living conditions on board ship.
- Every seafarer has a right to health protection, medical care, welfare measures and other forms of social protection.

Besides rights crew members have obligations towards their fellow crew members, the ship and their employee as:

- All crewmembers must be on time in their working places.
- Crewmembers should complete their working hours daily.
- All crewmembers must attend to drills, trainings and exercises carried out onboard unless there is a valid and approved reason for unattendance.
- Crewmembers should respect their coworkers' culture, gender, religion, etc.
- Crewmembers should follow hygiene regulations onboard to avoid diseases.
- Crewmembers must follow drugs and alcohol policies.

The dignity of labour, also known as the dignity of work, is the philosophy that all types of jobs are respected equally, and no occupation is considered superior. Though one's occupation for his or her livelihood involves physical work or mental labour, it is held that the job carries dignity compared to the jobs that involve more intellect than body.

Company Policy is usually a documented set of broad guidelines, formulated after an analysis of all internal and external factors that can affect ship`s objectives, operations, and plans. Formulated by the Company, this document lays down the response to known and knowable situations and circumstances. It also determines the formulation and implementation of strategy, and directs and restricts the plans, decisions, and actions of Officers in achievement of its objectives.

Master and Officers have the responsibility to follow these policies and supervise the crew to do it as well. Crew must have discipline, obedience and respect to superiors in order to make a good teamwork in this task and good working environment overall.

Safety and Environmental Policy usually states guidelines and rules for safe operation and avoidance of internal or external damage. All seafarers must assist other ships or coworkers in case of any kind of emergency or request that might be needed. With a fast response loss of life or damage to environment can be avoided.

On Board Complaint Procedure (MLC Regulation 5.1.5)

Seafarers are entitled to lodge a complaint on board the ship in case of non-compliance with legal dispositions, regulations or agreements made under the MLC, 2006 (including seafarers' rights).

A formal and appropriate complaint procedure for a fair, effective and expeditious handling of seafarer complaints shall be made available on board by the Shipowner.

Seafarers lodging a complaint may be accompanied or represented during the procedure. The complaint system must include safeguards against victimization.

In order to ensure that complaints may be resolved at the lowest possible level, the maritime law provides that:

- A seafarer shall, as soon as possible, after the alleged occurrence of the labour grievance, bring the matter to his immediate Supervisor or to the Head of Department. A solution to the grievance shall be given within seven (7) days. If the complaint cannot be resolved by either the head of department or the superior officer to the satisfaction of the seafarer, then the seafarer may refer the matter to the master within two (2) days. The master has further seven (7) days to bring a solution to the complaint. In any case, a seafarer has the right to lodge a complaint directly with the master and as soon as possible after the alleged occurrence of the labour grievance (same time to give solution).
- If no resolution of the dispute can be obtained on board, the seafarer has ten (10) days to bring it to the shipowner. The seafarer may present his case directly, when appropriate, to the shipowner for example if the complaint is related to the Master. In such a case, the seafarer must refer as soon as possible to the shipowner after the alleged occurrence of the labour grievance. The shipowner and the seafarer concerned shall have a period of twenty (20) days to solve the matter.
- If the dispute can still not be resolved satisfactorily after the aforesaid twenty (20) days, either party shall have further twenty (20) days to bring the matter to the Government Commissioner for maritime affairs.
- In any case, the seafarer is always entitled to complain directly to the master, the shipowner or the Government Commissioner for maritime affairs.

Every seafarer shall be provided with the name of a person on board who can give impartial advice and on a confidential basis.

Employment conditions

The Maritime Labour Convention (MLC) purpose is to ensure that seafarers have decent accommodation and recreational facilities on board.

Some principal conditions of this convention are:

- **Employment Contracts.** The convention makes sure contracts between seafarers and shipowner provide fair living and working conditions.

  Contracts should be in English and include:

  - shipowner's name and address
  - seafarer's name, date and place of birth
  - place and date where agreement signed
  - conditions for the termination of agreement
  - health and social security protection benefits provided by shipowner
  - seafarer's right to repatriation

Seafarers must also be:

- allowed to read and consider contracts before signing them
- given a record of their employment
- given their own copy of their contract (the shipowner should also have a copy)

- **Seafarers' rights and well-being principles**. All seafarers have the right for good living and working conditions, appropriate resting hours, medical care, complain procedures, personal protective equipment and among others.

The Drug & Alcohol Policy for ships

Drug and alcohol abuse and its adverse effects on safety is one of the most significant social problems of our time. The Oil Companies International Marine Forum (OCIMF) recommends that shipping companies should have a clearly written policy on drug and alcohol abuse that is easily understood by seafarers as well as shore-based staff. In order to enforce their policy, companies should have rules of conduct and controls in

place, with the objective that no seafarer will navigate a ship or operate its onboard equipment whilst impaired by drugs or alcohol. It is recommended that seafarers be subject to testing and screening for drugs and alcohol abuse by means of a combined programmed of un-announced testing and routine medical examination. The frequency of this un-announced testing should be sufficient so as to serve as an effective deterrent to such abuse.

The Drug & Alcohol Policy for ships is a mandatory regulation and an important code of conduct, which is to be strictly followed by those working on ships. While some seafarers are often in doubt regarding the consumption of alcohol allowed on ships, for others it is just one of the several regulations of shipping.

According to shipping regulations, it's compulsory for seafarers to follow the "Drug & Alcohol Policy" of the shipping companies they work for. Consumption and possession of drugs and other abused substances is strictly prohibited on all ships, however, permission to consume alcohol on ships depends on the shipping companies.

Either ways there are strict restrictions on the amount and time of alcohol consumed on ships. It is the duty of the captain to ensure that all crew members are aware of the regulations mentioned in the "Drug and Alcohol Policy" followed on the ship.

Mentioned below is a general overview of Drug & Alcohol policy used on ships:

- Officers, crew members, family members, or shore staff visiting the ship is not allowed to bring alcohol or drugs on board ships
- If required by the company policy, seafarers can be screened for alcohol and drug abuse during medical checkups prior to joining a ship

- Consumption of any kind of alcoholic beverages (including beer) during working hours, over time, or within 4 hours prior starting work or watch is strictly prohibited
- In case officers and crew members are returning from shore leave, they must observe a period of total abstinence from all kind of alcoholic beverages prior to their scheduled watch keeping duties
- Some company policies might allow “controlled” consumption of alcohol on ships. However, they would set and enforce limits on consumption of alcohol 4 hours prior to working hours
- Shipping companies make their drug and alcohol policy based on the guides provided by the International Chamber of Shipping (ICS) and Oil Companies International Marine Forum (OCIMF). International Maritime Organization (IMO) recommends a maximum of 0.08% blood alcohol level (BAC) during watch keeping duties as minimum safety standard on ships. However, the amount of BAC allowed differs from company to company, where some allow maximum of 0.04% (During off hours) whereas others prefer 0% BAC. Lately, most of the companies have totally banned possession and consumption of alcohol on board their ships
- Random alcohol and drugs testing of officers can also be done on board ships to ensure that there is no breach in the policy
- Nowadays, most of the shipping companies provide Alcohol test meters (Intoximeter) on board so that ship’s captain or senior officers can check any crew member suspected of having high level of alcohol in his system and is incapable of carrying out his duties
- Seafarers who fail to follow the “Drug and Alcohol Policy” of the company is bound to face disciplinary actions and even dismissal from employment
- In case alcohol is allowed on ships, purchase of the same is allowed only from the master’s bond and bringing alcohol on board ships is strictly prohibited

It is the duty of the captain and senior officers of the ship to ensure that the rules and regulations of drug and alcohol policy is enforced and followed on ships.

As mentioned above, the drug and alcohol policy on ships would differ with each company, depending on the type of ship and nature of cargo. Safety of ships and cargoes, along with the well-being of the seafarers is the main motive of this policy and it is therefore necessary that all seamen take this regulation with utmost seriousness.

A seafarer found guilty of consuming or possessing drugs, is liable to dismissal from his or her job and also subject to legal proceedings. It is to note that certain countries have very strict rules against drugs which involve capital punishment. The act of transporting it is a guaranteed route to really long/lifelong imprisonment; it is therefore advisable to every seafarer to steer completely clear off of any such activity or habits. Not to forget, the risk posed to the safety of the vessel when narcotics are in question, whether it pertains to consumption or transportation, is immense.

Some National and International legislations against the carriage, distribution or use of any illicit drugs onboard ships are:

- United Nations Office on Drugs and Crime (UNODC)
- International Narcotics Control Board (INCB)
- International Criminal Police Organization (ICPO/INTERPOL)
- World Customs Organization (WCO)
- European Monitoring Centre for Drugs and Drug Addiction (EMCDDA)
- The Inter-american Drug Abuse Control Commission (CICAD)

Some cases of recent reports of drugs shipping are:

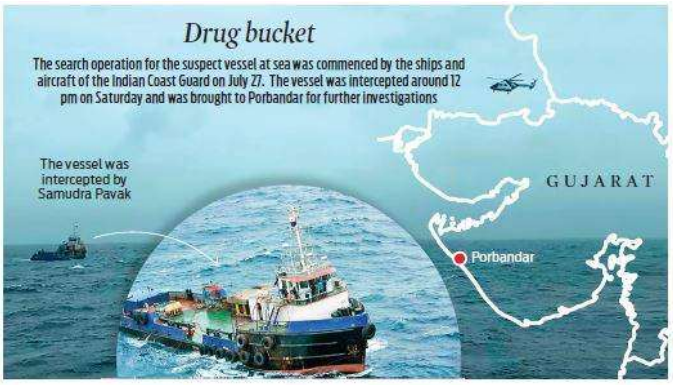
- **Coast guard catches Panamanian ship with 1500 kg heroin worth Rs 3,500 crore off Gujarat coast**

  In the biggest ever drugs seizure along the Indian coast, the coast guard, in a joint operation with Intelligence Bureau (IB) and local police, apprehended a Panamanian ship carrying 1500 kg of heroin valued at Rs 3,500 crore off the Gujarat coast, on Sunday.

  As per reports, the ship MV Henry, was apprehended by Ship Samudra Pavak, a pollution control vessel of the coast guard.

  Sources said, three days back, the coast guard received information from intelligence sources that a big consignment of narcotic drugs was likely to enter Mumbai via Gujarat.

  The vessel, which was found to be registered in Panama, had eight crew members onboard and no cargo. The vessel has been taken to Porbandar, and crew members have been detained for interrogation in the presence of intelligence agencies, police, customs, enforcement, narcotics, and the navy.



- **Cocaine Found in Container Carried by Maersk Ship**

  Mexican authorities have seized some 278 kilograms of cocaine from a container carried by the 63,200 dwt containership Laura Maersk.

  According to the information provided by the Mexican government, the vessel, operated by Danish shipping giant Maersk, brought the container to the port of Manzanillo, where the illicit content was discovered.

  A total of 295 packages were hidden inside a cargo of magnetic rollers.

  The container with the cocaine was reportedly loaded onto the 2001-built vessel in Arica, Chile.

  The illegal cargo was found as part of an inspection launched by the Manzanillo port officials in early November.

- **Drug bust netting 7.9 tons of cocaine dubbed 'one of the largest in history'**

  Anti-drug forces from several European and American countries intercepted a total of eight tons of cocaine in a double bust that is being dubbed as one of the largest in history.

In the larger one, Spanish authorities cooperated with Ecuadorean police to intercept a ship off that Latin American country bringing more than 5.5 metric tons of cocaine to Spain.

The ship was loaded with Colombian cocaine in the Pacific and planned to travel through the Panama Canal and across the Atlantic to Europe, officials said in a statement.

In a separate drug seizure, Spanish police stopped a Venezuela-flagged fishing vessel carrying 2.5 metric tons of cocaine near Martinica.

The ship was intercepted on May 4 and was towed to Las Palmas in Spain's Canary Islands.

The U.S. Drug Enforcement Agency and Britain's National Crime Agency also took part in the joint operation.

The cargo seized off the coast of Ecuador has an estimated value of $250 million. Ecuadorean agents boarded it when it was almost three nautical miles off Santa Elena province.

Spain’s Interior Minister Juan Ignocio Zoido said to El Pais that the first operation resulted in the capture of 24 suspected drug traffickers.

"It is one of the largest cocaine seizures in history and it takes apart a large drug-trafficking organization between South America and Spain," he said.

The massive operation began after Spain found out in January that a South American ring with links in Spain was organizing a large shipment.

That information was corroborated by intelligence also gathered by the U.S., Britain and Portugal, the statement said.

Since the beginning of 2017, Ecuador has confiscated about 30 tons of cocaine.

Large seizures of cocaine and cannabis aren't uncommon in the Iberian Peninsula, which is seen as a drug gateway to Europe.

Spanish police captured almost eight metric tons of cocaine from four vessels in 2015 and 2016 and arrested 80 people, the police statement said.

Drugs and Alcohol Abuse

It should come as no surprise that drugs and alcohol can have negative effects on your life. Although sometimes it may be difficult to imagine, the abuse of these substances can change everything from your body to your bank account. This can include anything

from altered brain chemistry, health complications, infections, legal issues, financial problems, accidental injuries, and even death.

Sure, you may have already heard about these side effects of abusing drugs, but how much do you really know? Understanding the full effects that these substances can have could change your life for the better. You may think that your drinking habits aren't destructive, or your drug use is "just for fun" but this usually isn't the case. The fact is, that while it may seem that drugs are making you feel better, they're actually causing long-term damage, and you're likely better off without it.

So before you reach for that bottle or that pipe, don't forget about these harmful effects of alcohol and drugs.

- **Brain Chemistry.** The human brain is the most complex organ in the human body. Although it may weigh less than 3 pounds, it somewhat mysteriously controls both your thoughts and the physiological processes that keep you alive. Drugs and alcohol change the way you feel by altering the chemicals that keep your brain working smoothly.

  Let's get into the science of things. When you first use drugs, your brain releases a chemical called dopamine that makes you feel euphoric and want more of the drug. After all, it's only natural to want more of the thing that makes you feel good right?

  Over time, your mind gets so used to the extra dopamine that you can't function normally without it. Everything about you will begin to change, including your personality, memory, and bodily processes that you might currently take for granted.
- **Health Complications**. Drug and alcohol use impacts nearly every part of your body from your heart to your bowels. Substance abuse can lead to abnormal heart rates and heart attacks, and injecting drugs can result in collapsed veins and infections in your heart valves.

Some drugs can also stop your bones from growing properly, while others result in severe muscle cramping and general weakness. Using drugs over a long period of time will also eventually damage your kidneys and your liver.

- **Infections.** When you are under the influence of drugs or alcohol, you may forget to engage in safe sex practices. Having unprotected sex increases your chances of contracting a sexually transmitted disease. Sharing the needles used to inject certain drugs can give you diseases like hepatitis C, hepatitis B, and HIV. You can also spread common colds, the flu, and mono from sharing pipes and bongs.
- **Legal Consequences.** Drug and alcohol abuse not only has negative effects on your health but can also have legal consequences that you'll have to deal with for the rest of your life. Many employers require that you take a drug test before offering you a job—many of them even conduct random drug tests even after you become an employee. Refusing to give up drugs could end up making you unemployed, which comes with even more issues.

  Driving under the influence of drugs or alcohol can lead to a suspended driver's license, usually for 6 months to 2 years. You'll also need to pay heavy fines and may even spend some time in jail.
- **Financial Problems**. Drugs and alcohol are expensive, especially when you're using a lot and constantly. Substance abuse also impacts your productivity and success at work and in school. The time spent searching for, using and recuperating from drugs can be better spent learning new skills to advance your career.

  The legal issues tied to drug use will increase your bills as well. Your car and health insurance rates may increase and you will have to find a way to pay for arrest warrants, DUIs, and legal counsel.
- **Injuries and Death.** If you use drugs and alcohol, you're more likely to experience physical injury or be involved in car accidents. Even worse, you also have an increased risk of death through both suicide and homicide.

These drug-related deaths are on the rise, doubling since the early 1980s. Alcohol specifically results in 5.2 million accidental injuries and 1.8 million deaths each year. It's estimated that 1 out of every 4 deaths is caused by drugs and alcohol, according to the World Health Organization.

The port authorities are always in their right to make a random search of drugs or any other illegal substances onboard vessels and port officers can do it with the assistance of canine units, which are dogs trained in finding this substances.

Flag State or shipowners can carry out drugs or alcohol test randomly to the crew. This is one of the most common methods to detect if there is abuse of this substances by crewmembers.

7. Understand and take necessary actions to control fatigue

Fatigue can be defined in many ways. However, it is generally described as a state of feeling tired, weary, or sleepy that results from prolonged mental or physical work, extended periods of anxiety, exposure to harsh environments, or loss of sleep. The result of fatigue is tiredness, impaired performance and diminished alertness.

Human error resulting from fatigue is now widely perceived as the cause of numerous marine casualties, including one of the worst maritime environmental disasters in the last century, the Exxon Valdez.

7.1 Importance of obtaining the necessary rest

The main reasons for fatigue are as follows:

- Excessive stress due to prolonged working hours and lack of sleep
- Disturbed sleep, mainly due to emergencies or health disorders
- Not able to attend personal problems back as home

- Home sick
- Excessive noise levels and high temperature causing physical strain. This is more significant in case of engineers working in ship's engine room
- Poor accommodation condition and improper food
- Elongation of sailing contract
- Adverse weather condition leading to seasickness
- High job demand and consecutive long working days

Seafarer's level of fatigue can be affected for physical, mental and environmental stressors in and outside the ship. The effects of this stressors can be:

- **Physical stressors:**
  - Lack of energy (e.g. worn out),
  - Physical exertion (e.g. out of breath),
  - Physical discomfort (e.g. stiff joints),
  - Lack of motivation (e.g. lack of concern),
  - Sleepiness.
- **Mental stressors:**
  - Language barriers
  - Acculturative stress
  - Unrealistic expectations
  - Crisis originating at home
  - Illness
- **Environmental stressors:**
  - Noise (e.g., from engine room);
  - Motion of the ship;
  - Frequent port turnarounds;

- Sleep quarters too bright;
- Sleep quarters too cold or hot.

These features of the work environment were identified in a review of relevant literature as significant sleep disturbing/impeding factors.

7.2 Effects of sleep, schedules and the circadian rhythms on fatigue

Sleep is an active process; when people sleep they are actually in an altered state of consciousness. All sleep does not have the same quality and does not provide the same recuperative benefits. In order to satisfy the needs of the human body, sleep must have three characteristics to be most effective:

- **Duration:** Everyone's sleep needs are unique; however, it is generally recommended that a person obtain, on average, 7 to 8 hours of sleep per 24-hour day. A person needs the amount of sleep that produces the feeling of being refreshed and alert. Alertness and performance are directly related to sleep. Insufficient sleep over several consecutive days will impair alertness. Only sleep can maintain or restore performance levels.
- **Continuity:** The sleep should be uninterrupted. Six one-hour naps do not have the same benefit as one six-hour period of sleep.
- **Quality:** People need deep sleep. Just being tired is not enough to ensure a good sleep. An individual must begin sleep in synch with the biological clock to ensure quality sleep. If the time of sleep is out of synchronization with his/her biological clock, it is difficult to sleep properly.

There are two main broad types of sleep, each with its own distinct physiological, neurological and psychological features: rapid eye movement (REM) sleep and non-rapid eye movement (non-REM or NREM) sleep, the latter of which can in turn be

divided into three or four separate stages. Non-REM sleep is sometimes referred to as “quiet sleep” and REM as “active sleep”, although these are not scientific terms.

Many factors contribute to sleep disruption, some are within our control while others are not:

- Environmental factors (e.g. ship’s violent movement, weather, heavy vibration, noise or poor accommodation)
- Food and consumption of chemicals (e.g. alcohol intake, coffee, medication, etc.)
- Psychological factors (e.g. stress, family worries, on-duty responsibilities)
- Sleep disorders (e.g. one, insomnia–prolonged inability to obtain adequate sleep or e.g. two, sleep apnea–a condition where breathing stops when sleep occurs due to a collapse of the upper airway or the diaphragm not moving causing the person to wake up)
- Operational factors (e.g. disruptions caused by drills, loading and unloading)

Each individual has a biological clock, and this clock regulates the body’s circadian rhythm. To best understand both of these features, it is first necessary to understand how the circadian rhythm functions. Our bodies move through various physical processes and states within a 24-hour period, such as sleeping/waking, and cyclical changes in body temperature, hormone levels, sensitivity to drugs, etc. This cycle represents the circadian rhythm. The biological clock regulates the circadian rhythm. The biological clock is perfectly synchronized to the traditional pattern of daytime wakefulness and night-time sleep.

The states of sleep/wakefulness and circadian rhythms interact in several ways:

- The two can work against one another and thereby weaken or negate each other’s effect. For example, a well-rested person is still affected by a circadian low-point;

conversely, a person who is sleep deprived may feel a momentary increase in alertness due to a peak in circadian rhythm.

- The two can also work in the same direction, thereby intensifying the effect they each have on a person's level of alertness. For example, when someone is sleep deprived, a circadian low point will further exacerbate the feeling of sleepiness. For many seafarers, working patterns conflict with their biological clock. Irregular schedules caused by shifting rotations, crossing time zones, etc. cause the circadian rhythms to be out of synchronization. Further, the internal clock can only adjust by an hour or two each day. Sometimes, depending on the new schedule, it takes several days to adjust. In the meantime, the internal clock wakes a person up when they need to sleep and puts them to sleep when they need to be awake.

7.3 Effects of Physical Stressors on seafarers

Working on ships is not an easy task. Negligible social life, monotonous routines, and harsh working conditions are some of the many difficulties faced by seafarers on board ships. This leads to both physical and psychological stress.

Maximum of the shipping companies employ multinational crew, which brings along its own set of problems such as language barrier, group formation etc. All these factors along with the reducing number of crew members on board ships have been one of the main reasons for increase in physical and psychological stress on board ships.

Needless to say, conflicts, politics, ego-clash etc. are bound to exist among crew members. These problems further results into a variety of physical and psychological problems among crew members. Some of the main ones are:

- Lack of interest in work
- Lack of motivation

- Short temper
- Careless mistakes while doing work
- Tendency to take short cuts to finish work
- Frustration
- Lack of seriousness towards ones duties and on board safety
- Tendency to blame juniors or colleagues for mistakes
- Frequent absence from work place
- Making professional mistakes

Because of such continuous stress, seafarers are often seen resorting to alcoholism and smoking in spite of company policies prohibiting use of such elements. Prolonged stage of frustration and stress can be extremely harmful to both physical and mental health of seafarers.

7.4 Effects of environmental stressors in and outside the ship and their impact on seafarers

One way to understand the relationship between the environment and the human behavior is to analyze environmental conditions that are capable of interfering with optimal human functioning.

Four general types of environmental stressors have been identified as:

- **Cataclysmic events.** This events are sudden catastrophes that demand major adaptive responses from all individuals directly affected by the event.
- **Stressful life events.** This events are major incidents in the life of people that typically have clearly delineated time referents. Life events include such things as major change in family status.

- **Daily Hassles.** Are the typical events of ordinary life that may cause frustration, tension, or irritation as: environmental events (noisy party, crowded elevator), work issues (arguments, deadline), or interpersonal problems (arguments with friends or family members)
- **Ambient stressors**. Many ambient stressors are background conditions, passing largely unnoticed unless they interfere with some important goal or directly threaten health.

7.5 Effects of schedule changes on seafarers fatigue

Alertness is the optimum state of the brain that enables us to make conscious decisions. Fatigue has a proven detrimental effect on alertness– this can be readily seen when a person is required to maintain a period of concentrated and sustained attention, such as looking out for the unexpected (e.g. night watch). When a person's alertness is affected by fatigue, his or her performance on the job can be significantly impaired. Impairment will occur in every aspect of human performance (physically, emotionally, and mentally) such as in decision-making, response time, judgement, hand-eye coordination, and countless other skills. Fatigue is dangerous in that people are poor judges of their level of fatigue. The following is a sample of fatigue's known effect on performance.

- Fatigued individuals become more susceptible to errors of attention and memory (for example, it is not uncommon for fatigued individuals to omit steps in a sequence).
- Chronically fatigued individuals will often select strategies that have a high degree of risk on the basis that they require less effort to execute.
- Fatigue can affect an individual's ability to respond to stimuli, perceive stimuli, interpret or understand stimuli, and it can take longer to react to them once they have been identified.

- Fatigue also affects problem solving which is an integral part of handling new or novel tasks. Fatigue is known to detrimentally affect a person's performance and may reduce individual and crew effectiveness and efficiency; decrease productivity; lower standards of work and may lead to errors being made. Unless steps are taken to alleviate the fatigue, it will remain long after the period of sustained attention, posing a hazard to ship safety.

The most common symptoms of fatigue are:
Inability to concentrate, diminished decision-making ability, poor memory, slow response, loss of control of bodily movements, mood change and attitude change.

In addition to the behavioral changes mentioned above, there are also a number of other changes associated with fatigue that will manifest in physical discomfort, such as: headaches, giddiness, heart palpitations / irregular heartbeats, rapid breathing, loss of appetite, insomnia, sudden sweating fits, leg pains or cramps and digestion problems.

The most powerful means of mitigate fatigue is to get proper sleep and to rest when appropriate. However, a number of things have been identified as potentially providing some short-term relief. Note, however, that these countermeasures may simply mask the symptoms temporarily —the fatigue has not been eliminated.

- An interesting challenge, an exciting idea, a change in work routine or anything else that is new and different
- Bright lights, cool dry air, music and other irregular sounds
- Caffeine (encountered in coffee and tea, and to a lesser extent in colas and chocolate) may combat sleepiness in some people for short periods. However, regular usage over time reduces its value as a stimulant and may make you more tired and less able to sleep.

- Any type of muscular activity: running, walking, stretching or even chewing gum
- Conversation
- Controlled, strategic naps can also improve alertness and performance (the most effective length of time for a nap is about 20 minutes).

In accordance with MLC 2006 the minimum hours of rest for all seafarers are: 10 hours in any 24 hour period; and. 77 hours in any 7 day period. Hours of rest may be divided into no more than 2 periods one of which shall be at least 6 hours in length.
For the safety of navigation and the whole ship operation is necessary that seafarers report to their supervisors in case they feel fatigue symptoms, even more if they have watch keeping duties, in order to avoid serious consequences to life at sea or damage to the environment.

Hours of Work and Rest. The STCW Code has been amended regarding hours of rest so it is now in line with International Labour Organisation (ILO) and United Kingdom Maritime and Coastguard Agency (MCA) requirements. Known as the 2010 Manila Amendments to the STCW Code, which entered into force on 1st January, 2012, for all parties to the Convention, (except Denmark, Finland, Slovenia, Latvia, Lithuania, New Zealand, the United Kingdom, Ireland and Portugal), the regulations now require a minimum of 10 hours rest in any 24 hour period and 77 hours in any 7 day period. Hours of rest may be summarized as follows:

- A minimum of 10 hours rest is required to be provided in any 24 hour period;
- The periods of rest may be divided into no more than two periods, one of which shall be at least six hours in length.
- Intervals between consecutive periods of rest shall not exceed 14 hours;
- A minimum of 77 hours rest is required in any seven day period. Seafarers should be reminded that rest periods are stipulated in 24 hour periods and seven day

periods, not one day and one week. In other words, the clock does not start ticking at 0001 hours and/or Monday. There should be a standardized table to fill up with this information in s detailed way and a Port State Control or Flag surveyor can check the hours in any 24 hour and/or seven day period.

The above requirements do not apply in the case of emergency or in other overriding operational conditions. Musters and drill shall be conducted in a manner that causes minimum disruption to rest periods and does not induce fatigue.

When a watch keeper is on call, e.g. an engineer officer on UMS duty, adequate and compensatory rest period shall be provided if the normal period of rest is disturbed by callouts to work.

Parties may allow exceptions from the required hours of rest provided that the rest period is not less than 70 hours in any 7 day period and on certain conditions, namely:

- Such exceptional arrangements shall not be extended for more than two consecutive weeks. The intervals between two periods of exceptions shall not be less than twice the duration of the exception;
- The hours of rest may be divided into no more than three periods, one of which shall be at least 6 hours and none of the other two periods shall be less than one hour in length;
- The intervals between consecutive periods of rest shall not exceed 14 hours;
- Exceptions shall not extend beyond two 24-hour periods in any 7-day period.

Exceptions shall, as far as possible, take into account the guidance regarding prevention of fatigue in section B-VIII/1.

Six hours on/Six hours off. Working 'sixes' may, in theory, appear to meet the criteria under STCW 2010, thus avoiding infringements of the Hours of Work and Rest regulations. However, there are other factors which need to be considered.

STCW sets out appropriate guidance for taking over the watch such the procedures will need to be carried out before the relieving watch keeper takes over the watch.
Hence, the relieving officer will need to be at their place of work (bridge, engine control room, etc.) before the commencement of their watch and the officer to be relieved cannot leave until the handover is complete.

Therefore, when watch keepers are working 'sixes', the Master and/or owners will need to be able to demonstrate that the handover period is successfully carried out without reducing the 6 hours rest time.