Safety and Health at Sea

2nd Edition (2020)

By Arne Sagen, FNI, ALCM/USA

A Practical Manual for Seafarers

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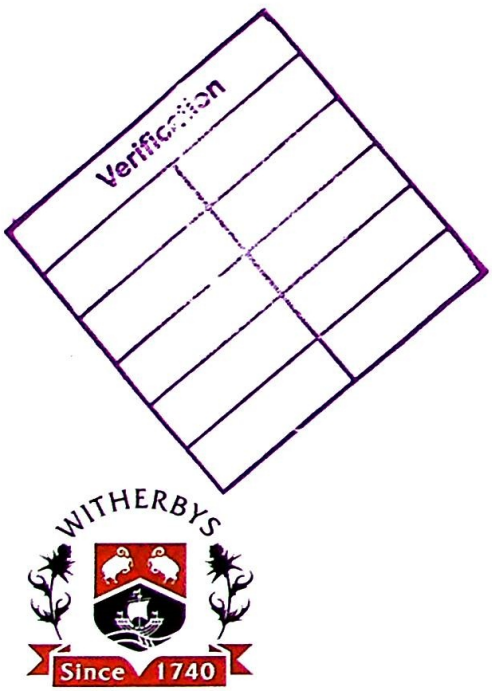

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info@witherbys.com
witherbys.com

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Preface

The safety and health of seafarers is protected by an impressive framework of conventions and legislation. The IMO's International Safety Management (ISM) Code, Maritime Labour Conventions (MLC) and the STCW Conventions (Training and Watchkeeping), together with the European Union Directives for Safety and Health at Work and the legislation of other maritime nations, set the standards for creating a safe and healthy working environment at sea.

The purpose of this manual is to highlight the basic principles that the framework contains and to help seafarers put them into practice.

It describes how to implement the procedures, such as risk assessment and safety inspections, that can prevent accidents. Guidance on how to maintain high levels of health and hygiene on board is provided and checklists will help seafarers focus on the hazards of particular operations on their ships. Finally, there is discussion of the human factor in accident prevention and how understanding it can be used to create a strong and resilient safety culture on board.

Safe and healthy working practices benefit everyone, from individual seafarers to the companies they work for, as well as the customers who rely on the services those companies provide.

Arne Sagen November 2019
Oslo, Norway

The Author

Arne Sagen (MNIF, ALCM, FNI) has a multidisciplinary experience from ship operation ranging from seafarer, shipping company superintendent, Chief Research Engineer, Classification Society Principal Surveyor (DNV), Manager of the Norwegian Shipping Research Program 'Ship Operation of the Future', and the EU 'RACE' Program.

He is authorised as an ISO 9000 Quality Assessor, and has at different times performed as an ISM Code Lead Auditor, appointed flag State inspector for Namibia and Antigua & Barbuda, Port State inspector for Egypt and Trinidad & Tobago and Quality Controller by IACS (International Association of Classification Societies).

He has a US degree (ILCI/USA), qualifying as Accident Investigator and Industrial Hygienist.

He is the author of several textbooks within a number of areas of ship operation.

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Dr Elif Dahl MD, MHA, PhD (Chair, Section of Cruise Ship and Maritime Medicine and Board Member of The International Maritime Health Association) for verifying and amending Section 3 of the manual, Health on Board, and helping us ensure that the terminology used is acceptable to ships' medical staff and seafarers.

Det Norske Veritas for their invaluable encouragement to turn this work from vision to reality. It has been very important to the authors to have the support of a Classification Society with an internationally recognized role in the certification of the ISM Code. Their support has helped us to focus on the ISM Code's objective to 'provide for safe practices in ship operation and a safe working environment'.

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Contents

Introduction

Safety and Health at Sea is a manual designed to help ships' Masters, safety supervisors and officers to create a safe and healthy working and living environment for ships' crews.

There is a large list of conventions, laws and regulations, both national and international, governing safety and health at sea, but the manual is not exclusively about the law. It is about how to put the principles on which the legal framework is based into practice.

The manual is for reference, but its contents should be used selectively for advice and guidance on particular aspects of safety and health.

Everyone involved in shipping benefits from making the industry safer. Accidents cost money and can result in claims from customers, so shipping companies benefit from their reduction. Improvements to safety benefit customers by reducing the damage and delay that accidents create. Seafarers benefit from being able to earn their livings free of the danger of being injured or killed.

Accidents – causes and solutions

Accidents don't just happen, they are caused. In the shipping industry the main causes are:

- **An imperfect safety culture at company level**
  Seafarers who can see that safety is not a major priority for their company are unlikely to make it their own
- **inadequate safety management**
  Accidents on board are much more likely if policies are unclear, responsibilities are undefined, procedures and controls are absent or only exist on paper and training is inadequate or inappropriate
- **individuals with the wrong attitudes to safety**
  Accidents happen when people believe that the rules don't apply to them, that safety is someone else's problem, that their jobs will be easier and quicker if they ignore safe practices or even that working safely is 'soft'.

Companies' safety cultures must be strengthened, effective safety management systems must be put in place and individuals must be shown how to change their attitudes and behaviour.

Two things are key to successfully improving safety on board:

- **A realistic action plan, put into practice with energy and enthusiasm**
  Most ships have rules and regulations governing safety, often written in language that is hard for anyone but lawyers to understand. It is the lack of implementation, not documentation, that is the problem. Seafarers are practical, action-oriented people. They will respond to a clear plan of action, particularly one which they can see is being pursued with determination
- **recognising the importance of the human factor**
  Rules, procedures and controls, although important, will not improve safety on their own. Major improvements will only happen when each individual puts safety first, both for themselves and for their fellow seafarers.

  While this is the case in every industry, it is especially important in shipping. Ships, particularly ocean going ships, are not like workplaces ashore. They are closed communities of people who live and work together 24 hours a day. Individuals are not subject to the same external influences as those who work ashore. And all the motivation to improve safety has to be generated from within the community of seafarers on each ship.

What level of improvement is possible?

Experience from shore based companies, and those in the offshore industry, demonstrate that:

- The application of a properly designed action plan can reduce accidents by at least 50% over a 3 to 4-year period
- improvement need not stop at that point. By updating and implementing the plan again, further reductions of the same order of magnitude can be achieved until accident rates are reduced to a small percentage of their original levels.

That is a goal well worth aiming for in the shipping industry and on every individual ship.

Note: This manual does not extend to advice on guidance on confined space early. Reference should be made to ISGOTT Chapter 10, IACS 'Confined Space Entry' and other sources of specialist advice and guidance within the ship's SMS.

1 Shipboard Safety System

1. Introduction

To be effective, safety management on board must be systematic. It must also be continuous. Safety is not a 'problem' that can be solved and then put aside.

Every ship needs a properly functioning safety management system (SMS). The elements of this system are:

- **Responsibilities**
  Safety is everyone's responsibility, but there must be clarity about what that means for specific individuals on board, particularly the Master, the safety supervisor, safety representatives and the safety committee
- **structure**
  Most flag States and shipping companies require each ship to have a designated safety officer, safety supervisor and a safety committee. The safety supervisor may be an officer (as it is on UK flagged ships), but this is not mandatory in all Administrations. For example, the Danish, Norwegian and Swedish Administrations require the Health and safety supervisor to be elected by and from the ratings.

  Even if an Administration or company does not require a formally designated safety supervisor on the ship, it makes sense to identify who is going to handle aspects of safety management, including carrying out the procedures described below. The ISM Code (Ch. 3.2) requires a company to *'define and document the responsibility, authority and interrelation of all personnel who manage, perform and verify work relating to and affecting safety and pollution prevention'*. Therefore, the person responsible for particular aspects of safety management should be identified
- **procedures**
  Prevention is better than cure, which is why systematic risk assessment, regular safety inspections and permit to work (PTW) systems are an essential part of safety management. Crews must regularly carry out drills so that they are well equipped to deal with any emergencies. Any accidents or 'near misses' must be properly investigated to prevent them happening again.

The principles of SMSs, for both shipping companies and individual ships, are established as an international standard in the IMO's ISM Code. This Code has been incorporated into the SOLAS (Safety of Life at Sea) Convention. The standard that the Code represents is the basis for the much more detailed laws, regulations and codes of practice of individual flag States.

Note: Most flag State Administrations have national regulations covering living and working conditions on board. These often include defined responsibilities, structure and organisation for safety and health. If there should be differences between your national regulations and this manual, the national regulations shall prevail.

1.1 Responsibilities

1.1.1 The Master

The Master carries the overall responsibility and authority for safety on board. The ISM Code states:

> *"The Company should ensure that the SMS* [Safety Management System] *operating on board the ship contains a clear statement emphasising the master's authority. The Company should establish in the SMS that the master has the overriding authority and the responsibility to make decisions with respect to safety and pollution prevention and to request the Company's assistance as may be necessary."*

The Code describes specific responsibilities that should be defined for the Master:

- Implementing the safety and environmental protection policy of the company
- motivating the crew in the observation of that policy
- issuing appropriate orders and instructions in a clear and simple manner
- verifying that specified requirements are met
- reviewing the SMS and reporting its deficiencies to the shore based management.

This list of responsibilities has two important implications for the way a ship's SMS is intended to work.

First, it must be active. It is a mechanism for putting the company's policy into practice and making sure that it continues to operate effectively.

Second, it must be improved, regularly checked and reviewed to correct deficiencies in how safety is managed on board.

Although the Master has the overall responsibility for safety, they are not solely responsible and should delegate authority for particular activities to other officers and members of the crew.

1.1.2 The Safety Supervisor

Even though most flag State Administrations require companies to have designated safety supervisors on their ships, they do not specify these individuals' responsibilities in great detail. Within the principles set out in international and national regulations and codes of practice, and taking into account the type, size and trading patterns of the ships in their fleet, each shipping company must decide what they want their safety supervisors to achieve.

Most importantly, the Master and safety supervisor on each ship must agree to the nature of that person's work.

The best way to do this is to produce a simple, written description of the safety supervisor's job. For example:

SAFETY SUPERVISOR Job Description	
Job purpose	The safety supervisor should take care of the interests of the employees in matters concerning the work environment on board. The safety supervisor must see that the work on board is performed in such a manner that consideration is given to the safety and health of the employees. Where necessary, they will make proposals for new safety measures. Tasks within the responsibility of the safety supervisor may include: • Ensuring that machinery, equipment, chemical agents and work procedures do not expose employees to hazards • ensuring that personal protection devices and accident prevention equipment is in good condition and is used • ensuring that employees receive the required familiarisation, instruction, training and practice • ensuring that work is organised to enable employees to carry it out in a manner consistent with the requirements of health and safety.
Job structure	
• **Authority**	Limits of the safety supervisor's authority (for example, actions about which they must consult the Master in advance)
• **Other responsibilities**	Modifications to the safety supervisor's existing work to allow them time to carry out their safety duties
• **Working relationships**	Relationships with officers, particularly Heads of Departments
• **Reporting**	Arrangements for providing information about safety to the Master (for example, meeting frequency, regular reports)
Job responsibilities	
• **Safety training**	Organisation, delivery, records, shipboard familiarisation, shared responsibility with officers
• **Drills**	Planning, carrying out, assessing effectiveness, shared responsibility with officers
• **Safety representatives**	Details of working relationships
• **Safety committee**	Administration
• **Risk assessment**	Planning, carrying out, reporting, shared responsibility with officers
• **Safety inspections**	Planning, carrying out, reporting, shared responsibility with officers
• **Safety equipment**	Monitoring of provision and maintenance, shared responsibility with officers
• **Permit to work systems**	Monitoring of effective operation
• **Accident investigations**	Carrying out, reporting
• **Emergency procedures**	Monitoring of effective operation
• **Other**	

A blank version of this framework Job Description can be found in Section 2 – Tools for Improving Safety and this can be used to describe and agree the role of the safety supervisor on your ship.

1.1.3 Safety Representatives

Particular groups of the crew (for example, catering personnel on passenger ships) are required, in certain Administrations, to have their own safety representatives to represent their interests in matters of health and safety.

To be effective, their role should be:

- Active. They must be involved in monitoring and improving safety
- 2-way. Representatives should play a key role in ensuring that information and ideas about safe working practices pass in both directions between officers and ratings.

1.1.4 The Safety Committee

Membership of the safety committee may be specified by your Administration or by your company.

As an example, on Scandinavian registered ships the Committee usually consists of the Master, the safety supervisor, up to three safety representatives (depending upon the size of the crew), the chief engineer, the chief steward and the safety officer.

The committee's purpose is to help make the ship a safe and healthy environment for all members of the crew. Its particular concerns are:

- **Risk assessment**
  Ensuring that work and living places and conditions that contain hazards to health or risk of accidents are systematically identified and actions taken to minimise or remove any dangers present
- **information**
  Receiving and disseminating information about safety and health issues, such as the results of risk assessments, safety inspections and accident investigations
- **training**
  Ensuring that new employees are given adequate familiarisation, instruction and training in safety matters, and that this relates to the risks faced by each individual concerned
- **accident investigation**
  Examining and discussing all reports concerning accidents, injuries and 'near misses'. Seeking the causes of injury, sickness or death and discussing proposals for preventive measures. (To be effective, the Committee must have access to, and be able to review, any relevant reports, such as those resulting from the regular maintenance inspections specified in Chapter 10 of the ISM Code)
- **ideas and improvements**
  Discussing and agreeing ideas for improving safety on board and following-up and monitoring the consequences of actions taken.

The safety supervisor and all members of the safety committee must be familiar with current regulations, instructions and recommendations relating to safety and health on board.

1.2 Structure

1.2.1 Safety Representatives

There are three decisions to be taken if a company is either required to or, in the absence of a regulation to do so, has decided to have safety representatives on board.

Election vs Appointment
It is better for representatives to be elected by their fellow seafarers, rather than being appointed. Election gives their position status and authority. It also makes it clear who they represent. Note that some flag States do not permit appointment of safety representatives, even by the Master.

Numbers
The number of safety representatives required will depend on the size of the crew. You may find your Administration's regulations specify the minimum number you must have. For example, the requirements for United Kingdom and Norwegian registered ships are as follows (UK figures are from the Maritime and Coastguard Agency (MCA) *Code of Safe Working Practices for Seafarers*. The Norwegian figures are from the Norwegian Maritime Administration's *Safety and Health Regulation*).

United Kingdom		Norway	
6 – 15 crew	1 elected by officers and ratings	8 – 14 crew	1 elected by the ratings
16 + crew	1 elected by the officers + 1 elected by the ratings	15 – 39 crew	2 elected by the ratings*
30 + ratings	1 elected by the officers + 3 elected by the ratings	more than 40 crew	3 elected by the ratings*
		* One of these representatives acts as safety supervisor	

Distribution
With the exception of ships with very small crews it is good practice to make sure that the different operational areas of the ship – deck, engine room, galley, etc – are all represented.

1.2.2 The Safety Committee

There are four main issues that must be resolved for the safety committee to work effectively:

Membership
In addition to the permanent members of the committee, it is often helpful to invite others to attend particular meetings. For example, if there are contractors' personnel on board it is a statutory requirement in some Administrations for them to provide a representative. Even if not obliged to do this, it is good practice.

If a safety inspection or risk assessment has been carried out in a particular area of the ship, ask the Head of Department to come to the meeting and take part in the discussion of the report.

Roles
Normally the meeting will be chaired by the Master. The safety supervisor will play a leading role in providing information.

Encourage the safety representatives to play as active a part in the meetings as possible. For example, when a safety representative has been involved in a safety inspection in their area of the ship, invite them to present at least part of the report.

Large ships and ferries

To enable discussions to be effective, safety committees must be kept to a reasonable size, usually no more than ten people. Ships with larger crews, such as cruise liners, should set up committees for each area. The main ship's safety committee will consist of a representative from each of these.

On ferries with crews who work shifts, the committee structure must enable each shift to contribute to improving safety and allow lessons learned on one shift to be communicated to the others.

Safety committee meetings:

- **Frequency**

  This will depend on the circumstances and trading pattern of each ship and any minimum frequency specified by the relevant Administration. For example, on Norwegian registered ships there must be no fewer than six meetings per year (with a recommended frequency of one a month). The safety committee should hold as many open meetings as possible for all those working on board.

  Common sense will often be the best judge of when to hold meetings, for example soon after sailing and before docking or prior to formal audits and inspections

- **agendas**
  - » source of items. Many of the items on the agenda will come from the safety supervisor and the company. However, it is important to encourage members of the crew to submit issues for discussion through their safety representatives
  - » submitting items. Agree a cut-off time for submission of items for discussion. For example, if items are submitted not less than 2 weeks before the meeting, the agenda can be produced and circulated 1 week beforehand, giving everyone attending sufficient time to think about the issues. Use 'Any other business' to deal with issues that come up at short notice
  - » structure and detail. Important items should feature early on the agenda, rather than at the end, so that sufficient time is devoted to them. Include enough detail to enable committee members to prepare. For example, let people know if a decision has to be made about a particular issue so that they have time to think about it and, if necessary, consult those they represent
  - » a balance of review and planning. It is important both to review what has happened since the previous meeting and to discuss what is planned before the next one
  - » publicity. In addition to circulating agendas to those who will be taking part in the meeting, give copies to Heads of Department and display them where the remainder of the crew will see them. The company may also require a copy

- **minutes**

  These should be brief summaries, but they must include any actions agreed, the person responsible for carrying them out and timescales for completion. Produce and circulate the minutes as soon as possible after the meeting. As with agendas, display them where they can be read by crew members. The shore office will normally require a copy.

M/S - - - - - - - - - -

Health and Safety Committee

Circulation

Master
Safety Supervisor/Safety Officer
Chief Engineer
Chief Steward
Other safety representatives

Meeting of the safety committee, date ....., time ....., location .....

Agenda

1. **Minutes of previous meeting** (copy attached)
2. **Matters arising**
3. **Tasks for periodic/voyage planning:**
   - Mooring operations.
4. **Accidents or 'near misses' reported since last meeting**
   - Injury by fall on slippery floor in galley in heavy weather: [date]
   - complaints of dizziness experienced when using new 'superpaint' in provision room.

   Discussion/decision about prevention of future problems
5. **Demonstration of training video on fire-fighting drills**

   Discussion of whether/how to use this on board
6. **Any other business**
7. **Date of the next meeting**

M/S - - - - - - - - - -
Health and Safety Committee

Meeting of the safety committee, date ....., time ....., location .....

Minutes

Present
Master (Chair)
Safety Supervisor/Safety Officer
Chief Engineer
Chief Steward
Other safety representatives

	Action
1. Minutes of previous meeting Accepted as an accurate record and signed by the Master.	File. Safety supervisor. Immediate.
2. Matters arising There were no matters arising.	
3. Tasks for periodic/voyage planning Working operations for mooring: Inspection of anchoring/ mooring windlass revealed that the locking pin for the gear handle was missing (chain broken), creating a possible risk of freeing the transmission connection. A temporary locking pin has been made in the workshop - with chain.	
A replacement has been ordered from the supplier. Delivery 6 weeks. Receipt of replacement to be confirmed at the next meeting.	Chief engineer to report.
4. Accidents or 'near misses' reported since last meeting Injury by fall on slippery floor in galley in heavy rolling: Safety supervisor reported that the accident investigation revealed that the skid protection layer in front of the galley was worn out. A new skid protection layer has been fitted.	
Complaints of dizziness experienced when using new 'superpaint' in provision room: The safety supervisor reported that the boxes containing this paint are missing the required paint category or content declaration. This violates both company and statutory instruction for the provision of paint and other hazardous substances. The paint should have been refused on delivery.	Safety supervisor to liaise with HoD to have paint clearly marked 'Only to be used in open areas'. Immediate.
It was decided that: • The rest of the paint in store will only be used in open areas (not in closed compartments) • shore office to be informed about the breaking of the purchase instructions for ships' paints.	Master to e-mail Purchasing Dept ashore. Immediate.
5. Demonstration of training video on fire-fighting drills The video was very good and relevant for our shipboard conditions. It was agreed to keep it on board and arrange short training sessions using it for all crew involved.	Safety supervisor to organise timetable for sessions and agree with HoDs. Programme to be agreed in 2 weeks.
6. Any other business There was no other business.	
The meeting was adjourned at... pm. The next meeting will be on...	

Figure 1 – Typical examples of agendas and minutes

1.2.3 Plans and Instructions

The ISM Code states that:

> *"The Company should establish procedures for the preparation of plans and instructions for key shipboard operations concerning the safety of the ship and the prevention of pollution. The various tasks involved should be defined and assigned to qualified personnel".*

The Code does not attempt to define or list what is covered by 'key shipboard operations'. That task is left not only to companies, but more significantly to national Administrations, many of which lay down very detailed regulations and recommendations. The UK MCA's Code, for example, is several hundred pages long and contains 28 chapters covering activities as diverse as food preparation and anchoring.

The set of documents on each ship containing the various plans and instructions relevant to that ship are often referred to as the ship's Safety Management Manual. To prevent safety management on board turning into a paperwork nightmare, companies, together with ships' Masters and officers, must ensure that:

- The appropriate documents are easy to access for those who need to refer to them
- they are written in language that is as clear and simple as possible
- there is a system for reviewing and updating them including, when necessary, discarding those that are obsolete.

1.2.4 Public Display of Safety Information

For certain safety information, ease of access means more than simply filing it in a convenient place. It must be publicly displayed, both to reassure those on board that the ship conforms to particular regulations and to remind them of specific safety duties and precautions.

The content and display of two of the most important types of safety information – Muster Lists and emergency instructions – are a statutory requirement under the SOLAS Convention.

Most national Administrations have their own additional regulations and these should always be consulted.

1.3 Procedures

The ISM Code states that each company's SMS must include:

"Instructions and procedures to ensure safe operation of ships and protection of the environment in compliance with relevant international and Flag State legislation"

The result of this regulation is that ships should now have a Safety Management Manual covering most operations on board.

In addition, there are five procedures whose specific aim is the general improvement of safe working practices and it is these which this section of the manual will now cover. They are:

- Risk assessment
- safety inspections
- permit to work (PTW) systems
- drills
- accident and 'near miss' investigations.

1.3.1 Risk Assessment

This is the same assessment designated as a Formal Safety Assessment (FSA) by the IMO.

What is risk assessment?
Risk assessment is a formal procedure for identifying hazards, assessing their seriousness, selecting actions to eliminate them or reduce them to an acceptable level, implementing these actions and monitoring their effectiveness.

It is a procedure that can be applied to every type of potentially dangerous situation, for example, navigational hazards at sea. However, this manual looks only at hazards that threaten the health and safety of the crew.

When should risk assessment be carried out?
The EU Standard covering the working environment, health and safety of workers on board ship states:

> *"1. Risk Assessment shall be made on a regular basis and:*
>
> *a) whenever new working equipment or new technology is introduced*
>
> *b) whenever other modifications are made to the organization or planning of the work, which may affect the health and safety of workers.*
>
> *2. The result of the risk assessment shall be documented in writing.*
>
> *If a risk to the safety and health of workers is identified, the necessary measures shall be taken to eliminate or reduce such risk."*

Who should carry out risk assessments?
The company has the overall responsibility for setting up standard procedures for carrying out risk assessments and making sure that they are recorded, implemented and followed up.

Under the ISM Code each company has a legal obligation to do so. (Ch. 1.2.2. *'Safety management objectives of the Company should... establish safeguards against all identified risks'*).

On each ship it is the Master's responsibility to ensure that these procedures are put into practice. Safety supervisors and safety representatives will be responsible for carrying out actual assessments, but it is important to involve those seafarers who work on the activities being assessed. Nobody knows the dangers of a particular job better than those who do it every day.

How does risk assessment work?
The details of risk assessment systems will vary from company to company, but the principles on which they are based are the same. They are:

- **Prioritisation.** Decide which activities, in which areas of the ship, to assess
- **identification.** Systematically identify the hazards of the activity chosen for assessment
- **evaluation.** Decide upon the level of risk that each hazard presents
- **action.** Decide what, if anything, to do about the risk and implement that decision
- **verification.** Monitor the actions taken.

Prioritisation
Remember that the focus of risk assessment is on activities, not areas of the ship. So, for example, you will assess the hazards of loading and discharging cargo and not simply the cargo holds.

Your aim must be to assess all the significant hazards on board and professional judgement should be used to prioritise these. Consider:

- **Change.** New equipment and modified procedures can create new dangers
- **infrequent activities.** Do not confine assessments to familiar, day to day operations.

Identification
What is the difference between a hazard and a risk? According to the MCA:

"A hazard is a source of potential harm or damage or a situation with potential for harm or damage.

Risk has two elements – the likelihood that a hazard may occur and the consequences of the hazardous event."

Evaluation
Risk assessment is about asking 'what if' questions and then making a judgement about the severity of the risk by balancing the likelihood and the consequences.

One major advantage of doing this systematically is that it alerts us to hazards that, although extremely unlikely, might have disastrous consequences.

Why, for example, do ships prepare their anchors for lowering when manoeuvring to come alongside in a busy harbour? Because although main engine failure is most unlikely the consequences if it did happen could be very severe.

Action
Once the hazards have been identified and the risks assessed it is possible to objectively decide what to do about them. Potential actions fall into one of four categories – known as the 4Ts:

T1 **Terminate.** There are some hazards that pose so severe a risk that the only sensible step is to remove them entirely by changing procedures or materials. For example, poisonous chemicals may be replaced by non-poisonous alternatives.

T2 **Treat.** For risks that are reasonably likely (and have consequences that are unpleasant, though not catastrophic) normal precautions are not enough. Something must be added or changed to make the risk acceptable. Safeguards are installed to reduce the likelihood of the hazard occurring and equipment is provided, such as fire extinguishers, to reduce the consequences if it does.

T3 **Tolerate.** Some risks are both unlikely and have trivial consequences. These can tolerated be, so long as the normal precautions are taken, such as by using the correct personal protection equipment (PPE) or choosing an appropriately skilled or experienced person to do the job.

T4 **Transfer.** It may be possible, in some cases, to transfer the risk to someone else who has special competence in the area concerned. For example, specialist travelling squads can be brought on board to carry out difficult hot work. Although this transfers the physical risk, the legal responsibility remains with the ship's Master and the company. Proper insurance would be necessary to guard against the financial risks of an accident.

Once the severity of the risk has been assessed, there will normally be a range of possible actions available to reduce either the likelihood or the consequences of the risk. Factors to consider when choosing the best option include:

- The ability to control the hazard. For example, it may be possible to use less hazardous materials, provide special protective equipment, install guards or give those involved special training
- the cost of reducing the hazard. Cost should never be a reason for tolerating a hazard that poses even a moderately severe risk, but it may result in the decision to treat a hazard, rather than attempting to terminate it
- the amount of effort required to reduce the risk. However, if the proposed action is too complicated, particularly if it involves individuals taking very elaborate, time consuming precautions, there may be the temptation to cut corners and ignore the risks.

Verification
It is important to follow up the actions taken to make sure that they are being implemented as intended and that they do, in fact, reduce the risk.

Using the example of grilling a chicken in the galley, the following example risk assessment can be created:

Risk factors	Low	Some	Medium	High
Likelihood Fire is certainly possible, particularly in adverse weather conditions.			X	
Consequences Any fire on board ship can have serious consequences.				X
Ability to control the hazard Though the hazard cannot be completely eliminated without taking chicken off the menu, there are a number of possible controls available, such as a clear operating procedure, appropriate training for those who use the griller and the provision of a portable fire extinguisher.			X	
Cost of reducing the hazard None of the appropriate actions are particularly expensive.		X		
Effort required to reduce the risk Very little effort is involved.	X			

1.3.2 Safety Inspections

Regular safety inspections are another important method for maintaining and improving safety on board.

Both safety inspections and risk assessments share the same aim – to improve safety. They both use systematic observation; they are both recorded and they both provide the basis for action and improvement.

However, the principal differences between the two are:

- Safety inspections focus on areas of the ship, while risk assessment looks at activities
- safety inspections examine existing circumstances and practices, while risk assessment asks 'what if' questions
- safety inspections should be used to highlight and acknowledge good practice, as well as identifying problems, an aim that does not form part of a risk assessment.

The details of an effective programme of safety inspections will depend on the type and circumstances of each ship but, in every case, it will involve:

- Planning the programme
- carrying out the inspections
- reporting the findings
- following up any actions taken.

Planning the programme

- **Where to inspect**
  All areas of the ship normally accessible to the crew must be inspected. The first step in designing a programme of inspections is to list the different working and living areas on board and put them in priority order for inspection

- **frequency**
  The design of the inspection programme must ensure that all areas are inspected within a reasonable timescale. Some flag States stipulate how often each area must be inspected. For example, on UK registered ships the interval between inspection of each area must not be more than three months. Many shipping companies have similar regulations
- **what to inspect**
  Every inspection should cover:
  - » working/living environment – for example, ease of entry and exit, marking of hazards, state of guards and handrails, lighting, ventilation and noise levels, safe stowage of tools and materials, general cleanliness and tidiness
  - » working/living practices – for example, working within established procedures and regulations, use of PPE, levels of supervision, levels of training
  - » examples of good practice – safety inspections can easily be seen as heavy handed 'policing' activities. Plan your inspections to 'catch people doing something right'
  - » progress and action – improvement comes from building on the results of previous inspections. Use the last inspection report to help plan the next one
- **who to involve**
  Heads of Department and safety representatives should be consulted when planning safety inspections and involved in carrying them out.

Carrying out safety inspections
An effective safety inspection should be:

- **Systematic**
  The best way to achieve this is to use checklists. You will find a range of these in Section 2 – Tools for Improving Safety. Modify and add to these to suit the circumstances of your ship
- **consistent**
  Checklists help in achieving consistency, as does reviewing the results of previous inspections at the planning stage
- **positive**
  During the inspection, congratulate people for good practice and avoid blaming them for unsafe acts and conditions. Instead remind them of the consequences of these and the benefits, to them, of working safely.

Reporting the findings
Safety inspection reports should be:

- **Concise and standardised**
  Busy people tend not to read reports that are too long. A standard format makes it easy to compare one report with another and identify progress and improvement.
- **focused on action**
  The report must say who is going to take what action and by when
- **communicated**
  Written copies of the report should go to:
  - » the Master and, through them, the company
  - » the relevant Head of Department and safety representative
  - » the safety committee.

The report should also be an item for discussion at the next safety committee meeting. In addition, there should be a method for reporting the findings to crew members in the area inspected.

Following up any actions taken
It is essential to make sure that the actions agreed are put into effect and that they achieve the results intended.

1.3.3 Permit to Work (PTW) Systems

The purpose of PTW systems
Some types of work cannot be carried out safely without a formal set of controls, understood by everyone involved and put into operation consistently and systematically every time the work is undertaken. The purpose of PTW systems is to provide these controls.

The type of work covered by PTW systems
These systems are particularly important for work that can only be done by suspending normal safety precautions, for example by removing guards from dangerous machinery.

On board ship, examples of the type of work covered will include:

- Entering enclosed spaces
- hot work/cold work
- working overside and aloft
- electrical maintenance (for non-professionals)
- pipeline breaking
- working on pressure vessels and in cargo tanks.

This list is not intended to cover everything on every ship. Only a proper risk assessment can define every type of work that must be covered by a PTW system.

Those who operate PTW systems

If it is to be effective, the system must clearly define who is to be involved in operating it.

To authorise a PTW an individual must:

- Have appropriate seniority. On most ships, permits can only be authorised by the Master, or by written delegation from them to a responsible officer (in certain Administrations, it is a requirement that the safety supervisor countersigns all PTWs)
- understand the nature of the work
- have the experience and ability to assess the risks involved.

Those who carry out the work must:

- **Be fully capable of doing the job involved.** This may seem obvious, but it is the foundation on which the safe and successful completion of the work is based. No system, however perfect, can ensure the safety of someone who is not entirely sure about what they are doing
- **understand, in detail, how the PTW system operates.** This can be a potential trap when work is to be carried out by contractor's staff or by new crew members. They may have experience of other PTW systems, but do they know precisely how yours operates?
- **work with the person authorising the permit.** It is essential for the person doing the work to contribute to the assessment of risks and the identification of precautions described on the permit. Remember, it will be their life at risk.

How PTW systems operate

While the details of individual systems will depend on a variety of circumstances, particularly the type of ship involved, every system should contain the following steps:

- **Assess the risks**
  Follow the process for systematic risk assessment described earlier in this section of the manual. In particular:
  - » ask 'what if...' questions. For example, what if the work had to be suspended for some reason, what if there is an emergency, what if the job takes much longer than anticipated?
  - » think about the context of the work being planned. For example, if the task involves hot work in a particular cargo space, could this create a hazard for whatever is in the next cargo space? Are there any other jobs being carried out under different PTWs that could be affected by this one?
  - » do not be complacent. Just because this particular job has been done many times before, do not assume that the information on the previous permit is still valid. Perhaps the equipment used will be different this time. Perhaps the physical setting will have changed. Perhaps the person doing the job is planning to tackle it in a slightly different way. Perhaps on this occasion the work will involve a shift changeover. Always look at each job with a fresh eye
- **issue the permit**
  Once again, this is a two-way process. Both the person authorising the permit and the person accepting it must be 100% satisfied that the information it contains will enable the work to be carried out safely. (Be aware of any time limitation on the permit)
- **prepare the work**
  There will be situations when this will be the most time-consuming part of the job. It is essential not to rush preparation or cut corners. Typical preparatory work includes:
  - » disconnecting electrical power supplies
  - » prominently displaying the permit and warning signs
  - » testing and putting on appropriate PPE
  - » ensuring that rescue equipment and personnel are in place
  - » fencing off work areas
  - » ensuring that everyone involved in or affected by the work has been thoroughly briefed and that there are proper arrangements for supervision
- **carry out the work**
  If those doing the job are competent and the previous three steps have been carried out correctly, the work should go safely and smoothly. But watch out for the unexpected – a piece of equipment that fails, the need to fetch an additional tool, etc. If anything arises that has not been anticipated when completing the permit, stop and think. Sometimes it may be necessary to review the permit with the person who authorised it before proceeding
- **formally complete the process**
  Once the work has been satisfactorily completed, the final step is to return everything to normal and sign off the permit. This involves:
  - » replacing any permanent precautions, such as guards on machines, which were removed to do the work
  - » removing the warnings and temporary precautions, such as those used to fence off the work area

- ensuring that rescue equipment and PPE is checked after use and put back in the proper place
- formally handing the workplace back to those who normally work there
- signing off the permit and ensuring that it is properly filed. Do not forget to review how the work went and, in particular, whether any lessons could be learned for the next time that similar work must be carried out

The content of the permit

The PTW form should help communication between everyone involved. It should be designed by the company issuing the permit, taking into account individual site conditions and requirements. Separate permit forms may be required for different tasks, such as hot work and entry into confined spaces, so that enough emphasis can be given to the particular hazards present and the precautions required.

The essential elements of a PTW form are listed in the Figure 2. If your permit does not cover these elements it is unlikely to be fully achieving its purpose.

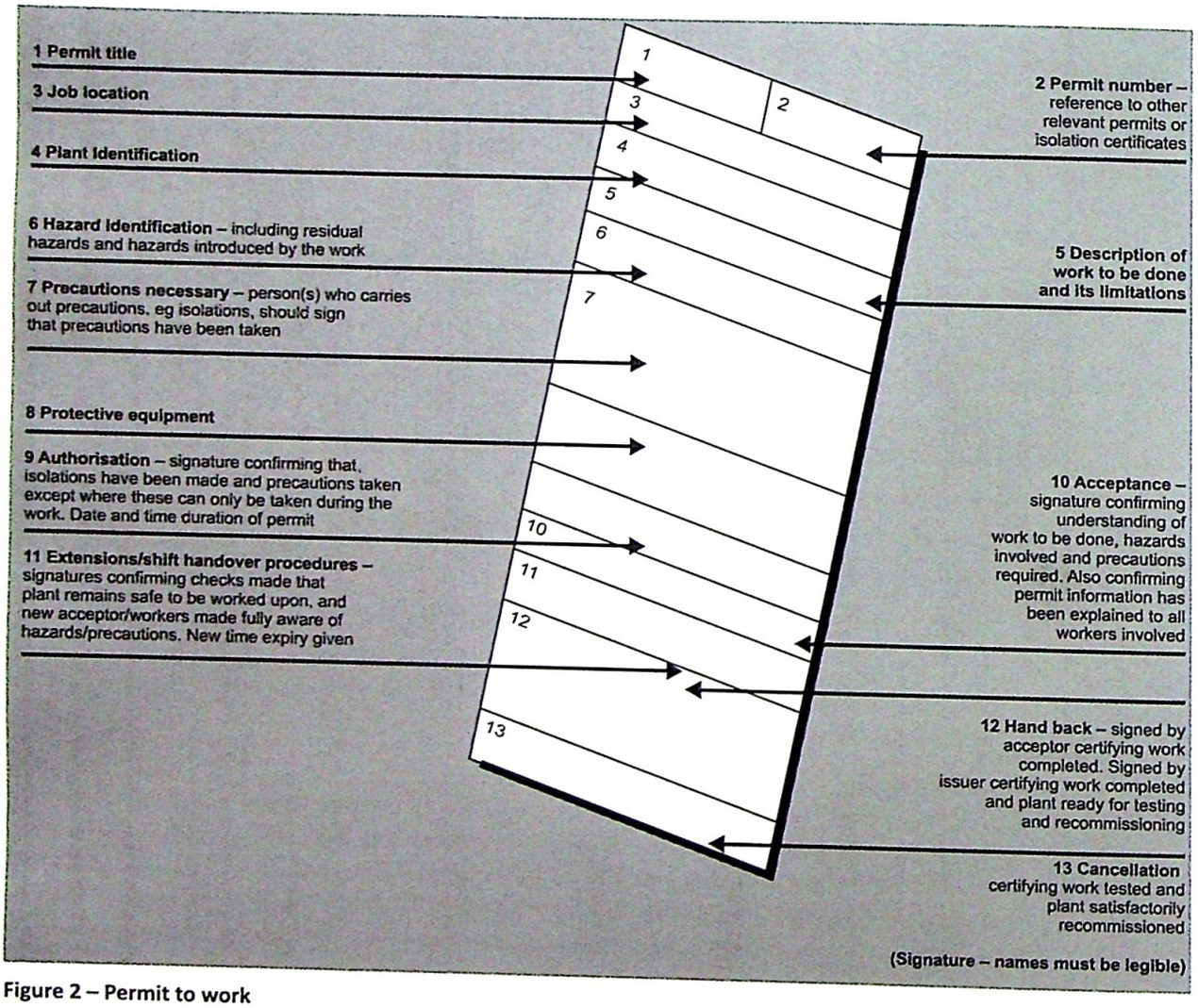


Figure 2 – Permit to work

(Note that limiting the duration of the permit is often a particularly important safety precaution. Some Administrations' guidelines will specify, for example, 'not more than 12 hours for work in confined spaces/tanks'. Check your own national regulations for requirements of this type).

1.3.4 Drills

Everyone hopes that a combination of systematic risk assessment, regular safety inspections and safe working practices (including PTW systems) will keep the ship and its crew safe. However, emergencies can still happen and the crew must be prepared to deal with them effectively. That is why drills are an essential part of a ship's safety system.

Types of drill

Under Chapter III of the SOLAS Convention, ships are legally required to carry out regular drills, including fire and abandon ship drills. The Convention details what these must cover and how often they must be carried out. Since every ship engaged on an international voyage must have a copy of SOLAS on board, these details are not reproduced here. In addition, some national Administrations have even more detailed regulations and recommendations covering fire and abandon ship drills.

> Note: There is a common misinterpretation of the SOLAS regulations related to abandon ship drills. It is not the case that lifeboat launching shall be carried out with all the assigned ratings, ie all crew, on board. Instead, SOLAS Chapter III, Regulation 19, 3.3.3 specifies that only it be 'manoeuvred in the water by its assigned operating crew'. This means it is only necessary, as a minimum, to launch and manoeuvre with the lifeboat's operating crew as detailed on the muster list.

Other types of drill include:

- Man overboard
- rescue from an enclosed space
- rescue of an injured crew member
- emergency steering
- excessive list
- emergencies arising from the carriage of dangerous goods.

There should be a logical, planned programme for carrying out all of the necessary drills, statutory and non-statutory. This programme should also take into account training for emergencies.

Training and drills

It is important to recognise that there is a difference between training and drills. All crew members must learn how to tackle emergencies. Once they have been trained, they must demonstrate that they can tackle the emergency properly.

Other differences between training and drills include:

The person in charge of a training session...	The person in charge of a drill...
• Will be a ship's officer, who... • acts as a *'trainer'*, explaining how to deal with the emergency and providing help, information and advice to those taking part.	• Will be the responsible ship's officer acting as an observer, defining the ground rules for the drill and then watching to see how well it is being carried out • a Port State Control Officer, who may only act as an observer.
A training session may be run...	**A drill will always be run...**
• In a series of stages, with a pause for discussion and instruction between each stage. Sometimes the trainer will ask those taking part to carry out an activity slowly before working up to the required speed.	• At normal pace and without interruption (unless continuing would be dangerous for those taking part or other crew members).
When training goes badly...	**When training goes badly...**
• We identify what went wrong and apply the lessons to help us improve.	• The ship may be detained if the drill has been part of a Port State Inspection.

How to run an effective drill

There are four stages: preparation, briefing, observation and debriefing.

Preparation

- Information you require
  - » Review the notes from the previous drill.
- decisions you must take
  - » what type of drill to run
  - » when to do it. Emergencies sometimes happen at night. Some drills should test the crew's ability to carry out emergency procedures during the hours of darkness
  - » who to involve. It is important (and mandatory in the case of fire and abandon ship drills) for all crew members to take part
  - » where to hold it. Fire drills, for example, will often be held in obvious places such as the galley, but do not ignore the less obvious ones. Fire teams must be able to tackle fires wherever they start
  - » how to make the drill realistic. Ways of doing this include removing the team leader in the middle of the drill to see how the rest of the team cope, not allowing those taking part to use normal entrances, staircases and so on or ensuring that, over a period of time, the programme of drills involves the use of all the ship's safety equipment
- safety precautions you must take
  - » do a risk assessment of each drill. Make sure that equipment is properly maintained and operates correctly. Do not add too much realism to drills of any type. Be particularly careful of methods, such as the use of smoke machines or masks, that restrict visibility

- take weather conditions into account. The intention of drills is to ensure the safety of the ship and its crew. They should not present any inherent hazard to those taking part. Certain drills should not be held during adverse weather conditions
- decide whether to give prior notice of the drill. The less warning people get, the more realistic the drill will be. But providing no warning at all may be unacceptably dangerous under certain conditions
- distinguish between lifeboat mustering and lifeboat launching. It is quite common to combine abandon ship drills (mustering) with SOLAS drills in which the lifeboats are lowered and, on occasion, launched with the 'survival craft crew' on board

> It is a terrible and totally unacceptable fact that this combined procedure has resulted in a large number of deaths and injuries. Launching is intended to be a drill/verification of the proficiency of the qualified 'assigned operating crew' of the lifeboat and should not be extended to include the entire 'survival crew' (or passengers).

- distinguish between drills and the testing of technical appliances. Shipboard drills such as abandon ship and fire-fighting must not be confused with the functional testing of technical appliances or equipment (even if the drills may sometimes reveal malfunctions). The maintenance, inspection and testing of safety appliances is a separate part of the maintenance programme and is intended to ensure that the equipment is in proper working condition before the drills take place.

Briefing

Before taking part in the drill, those involved should be briefed about:

- What the drill is for and the standard they are expected to achieve. Drills are just like any other task. They will not go well if those involved are unclear about their objectives
- how the drill will be run. Of course, variations may be introduced during the drill to add realism
- how the previous drill of this type went. It is important to emphasise what went well and not just what aspects need to be improved
- how to ensure that the drill is safe. Those taking part must understand the hazards, the precautions and, importantly, the order that will be given if it is necessary to stop the drill.

Observation

- Throughout the drill pay attention to:
  - timescales. The drill must be done correctly, but doing it too slowly can lead to disaster in real emergencies
  - what goes well. It is all too easy to concentrate on mistakes, but it is at least as important for those taking part to understand what they have done well
  - improvements. While drills are not training sessions, they almost always provide lessons that lead to better performance the next time around, whether that is another drill or a real emergency
- at the beginning of the drill, observe:
  - how the leader behaves. Do they give clear instructions? Do they assign work to individuals correctly? Do they ensure that everyone is involved? Do they check that everyone understands?
  - how the team behaves. Do they pay attention? Do they ask appropriate questions?

- during the drill, observe:
  - » communication. Are instructions delivered clearly? Do team members listen to one another?
  - » atmosphere. Do those taking part behave calmly or is there evidence of confusion or panic?
  - » teamwork. Do team members help one another? Do they watch out for one another?
  - » adaptability. How do they cope with any unexpected problems, such as having the leader removed from the team or finding that they cannot use the normal entrance to a particular area?
  - » correct use of equipment. Is the right equipment used and is it used correctly?
- at the end of the drill, observe:
  - » how the leader behaves. Do they use praise and encouragement to strengthen the team?
  - » success. Did the drill achieve its objective?

Debriefing

- Once the drill is over:
  - » review your notes. Decide on the successes and improvements that you will want to highlight in the debriefing session
  - » ask the group how they thought the drill went. Encourage them to identify what went well, before focussing on any mistakes
  - » add your own comments. Try to make this as much of a discussion as you can. People learn much more from being encouraged to think through what they have done themselves than they do from simply being told by someone else
  - » avoid personalising criticism. Be as descriptive as possible, particularly when you are talking about things which did not go well. People can change their behaviour much more easily than they can change their personalities
  - » give them hope! It is essential, particularly when drills go badly, for the team to see how they can do better next time
  - » remind them that the 'next time' may be a real emergency.

1.3.5 Accident and 'Near Miss' Investigations

The legal requirements

Chapter 9 of the ISM Code states:

> *"9.1 The SMS should include procedures ensuring that non-conformities, accidents and hazardous situations are reported to the Company, investigated and analysed with the objective of improving safety and pollution prevention.*
>
> *9.2 The Company should establish procedures for the implementation of corrective action."*

As with so many other parts of the Code, national Administrations have created much more detailed regulations and recommendations around these two general requirements and these should always be consulted.

Definitions and the focus of this manual

- A 'non-conformity' is any situation on board that does not meet the requirements of the Code, such as the absence of an established procedure for reporting accidents

- in the regulations of most national Administrations the term 'accident' covers damage to the ship and its cargo, pollution of the environment, as well as injury to individuals. However, since this manual focuses on occupational health and safety, we use the word 'accident' to mean personal injury only
- a 'hazardous occurrence' is an event or situation that might have resulted in an accident but, very often by sheer luck, did not. For example, a spanner dropped by someone working aloft is a hazardous occurrence when it lands harmlessly on the deck. When it kills a passing crew member, that is an accident. However, the term 'near miss' is preferred and that is what will be used throughout this guide.

Why investigate 'near misses'?
There are two reasons. First, it is the law. The second, better, reason for doing so is that experience, backed by research, tells us that serious and fatal accidents are the tip of an iceberg whose base is an enormous number of 'near misses'.

This phenomenon is often called the 'Heinrich Distribution Triangle', after D W Heinrich who carried out the first research on it in the 1930s. Though the exact proportions of each slice of the triangle vary depending on the activity studied, the principle is always the same.

Here are some typical figures from an American study carried out in the shipping industry.

Event	Heinrich's distribution	Average frequency on board
Serious personal injury	1	Seldom
Minor personal injury/Property damage	30	Frequent
'Near misses'	300	Twice daily

'Near miss' investigation – a huge opportunity
Unfortunately, it is very common for ISM Code audits on board to reveal that there has been no reporting of 'near misses' whatsoever, despite the fact that a glance at the medical records reveal a number of minor injuries that have been medically treated.

Given that there is a clearly established relationship between the enormous volume of 'near misses' and the very limited number of serious accidents, investigating 'near misses' and acting on what those investigations reveal offers an opportunity to make ships safer.

The purposes of accident and 'near miss' investigations
There are three different reasons for investigating accidents and 'near misses':

- **The law**
  This procedure is mandatory under both the ISM Code and the laws and regulations of national Administrations
- **prevention**
  The most important purpose of these investigations is to find out what happened, identify the causes and take whatever steps are necessary to prevent similar events occurring in the future
- **facts, not blame**
  On rare occasions accidents are caused by deliberate negligence and, when that is the case, the behaviour of those concerned cannot be overlooked. However, the danger of treating accident investigations as a 'policing' activity (a search for someone to blame) is that everyone involved can become very defensive and reluctant to cooperate. The result is that often the true causes never come to light and the prime purpose, prevention, is not achieved.

How to carry out an accident or 'near miss' investigation

- **The process**
  For simplicity's sake the process described below is for investigating accidents. The same principles apply to investigating 'near misses', with the obvious exception of the references to the treatment of injuries

- **preparation**
  Because accidents cannot be predicted it is essential for the person responsible for accident investigation to be ready to respond quickly. One practical step is to prepare a 'grab bag' containing, for example, a measuring tape, a torch, a light meter, a camera, a notebook and pens, a roll of 'tiger' tape, a handheld tape recorder and, if possible, a video camera

  > People tend to 'borrow' items from the grab bag, so its contents should be checked regularly.

- **the basic procedure**
  Each shipping company will have its own procedure for carrying out these investigations. Although the details will differ, there are five basic steps:

  - respond to the accident
  - collect evidence
  - analyse the causes (immediate causes – basic causes – root causes)
  - plan, record and implement corrective action
  - monitor the action taken

  In some situations, there will be obvious corrective action that must be taken without delay. For example, if someone has been hurt by unguarded machinery, the guard must be replaced as soon as possible

- **respond to the accident**
  - when people have been hurt the priority is to ensure their safety, first at the site of the accident and, as quickly as possible, by removing them to a safe place for treatment
  - if possible, the person who will carry out the accident investigation should not get involved in helping the injured. It is very important to remain objective and start the investigation as soon as possible after the accident

- **collect the evidence**
  Avoid jumping to conclusions at this stage. Stick to collecting evidence.

  - there are three different types of evidence:
    - observations of where the accident occurred
    - interview statements from witnesses, those injured and any others with useful information
    - and relevant documents
  - make as detailed a record of the accident site as possible, including measurements, sketches, photographs and video footage. Remove or isolate any items, such as personal protective clothing, tools or materials, which may be used as evidence in the investigation

- » record the names and, if necessary, addresses of witnesses. Identify anyone else with relevant information, such as those present when a particular order was given. Carry out the interviews as soon after the accident as possible, while those involved can still remember what happened
- » put those being interviewed at their ease. Stress the importance of finding out why the accident happened so that similar events can be prevented in future. Use open questions, those that start with what, how, why, who, where and when, to encourage witnesses to talk. Use closed questions, those designed to get *yes* or *no* answers, to nail down specific matters of fact. For example, *'Were they wearing a safety helmet?'.* It is normally essential to write a summary of what each witness says and get them to read and sign it
- » collect together any relevant documents, such as PTWs and standing orders

- **analyse the causes (immediate causes, basic causes and root causes)**
  - » the starting point for analysing an accident's causes is to ensure that the evidence is complete and consistent. Sometimes a systematic examination of the evidence will reveal the need to collect more information
  - » it is common for there to be more than one cause. Sometimes it is easy to identify and treat merely the immediate causes of an accident without understanding and tackling its basic and root causes and the result of doing this is another similar accident. Keep digging and asking questions until you are satisfied that you have got to the bottom of the problem
  - » find out whether there have been similar accidents or 'near misses' in the past. If this accident is part of a trend, it is likely that the root cause has not been properly identified on previous occasions.

  Figure 3 divides possible causes into three levels, each more important and, normally, less obvious than the one above.

- **plan, record and implement corrective action**
  - » there will often be a range of actions to take, each designed to address different causes
  - » formal accident reports are an essential part of a company's obligations, under the ISM Code, to investigate accidents and 'near misses' and implement corrective action.

- **monitor the action taken — follow up**

Accident investigations can sometimes be quite time consuming. Once they are over and the necessary actions have been implemented there can be a temptation to regard the incident as closed. However, the most important part of the entire process remains, which is checking that the actions taken are being properly and consistently carried out and are, in fact, preventing similar accidents in the future.

<table>
<tr><th colspan="2">IMMEDIATE CAUSES
These are the easiest to spot. They are often obvious and can involve either or both of...</th></tr>
<tr><td>Unsafe site/job conditions

For example, someone falls off a ladder because the handrail was loose</td><td>Unsafe acts by individuals

For example, someone gets an eye injury because of using a lathe without wearing goggles</td></tr>
<tr><th colspan="2">BASIC CAUSES
Don't stop with the immediate causes. Ask WHY?</th></tr>
<tr><td>Why was the handrail broken? There could be a number of reasons. Here are typical answers to that question:

'Handrails are not included in our maintenance and inspection programme'

'Well, it was noticed at the last safety inspection and it was on the list to get fixed. But we've been busy and we haven't got around to it yet'</td><td>Why no goggles?
Again, there could be many answers:

• There were no goggles available at the site
• lack of skill, knowledge or training
• attitude ('It's only a little job. There's no need to bother with goggles')
• belief (These rules are for the company's benefit. Nobody's watching. I won't get caught')
• personality ('I like to get on with things. The occasional short cut saves time)
• emotional state ('I'm under a lot of pressure to get this job finished. I just forgot').</td></tr>
<tr><th colspan="2">ROOT CAUSES
Do not stop asking questions. Is there a failure of management control here?
Are procedures inadequate? Are SMS procedures not implemented or followed up?</th></tr>
<tr><td>For example:

• What is the process for implementing and following up unsafe conditions picked up during safety inspections?
• are timescales too long?
• does the safety supervisor have sufficient authority to make sure that action is taken?</td><td>For example:

• Who is allowed to use machinery in the workshop?
• what supervision is provided?
• what warnings are provided?
• what precautions are specified?</td></tr>
</table>

Figure 3 – Modified Accident Causation Model

2 | Tools for Improving Safety

2. Introduction

This section covers the details of safety inspection and accident prevention in different areas and for different activities on board.

- **Accidents: causes and prevention**
  This is a brief general description of where accidents occur on board and what can be done to prevent them
- **a safety supervisor's job description**
  This is a blank form that safety supervisors can complete and agree with the Master, using the guidance in Section 1 to do so
- **checklists for safety inspections**
  Safety inspections must be carried out systematically and consistently if they are to maintain and improve high standards of safety. It is particularly important to have an established system in place when key individuals, such as the safety supervisor, sign off and are replaced by others unfamiliar with the ship and its operating procedures. Checklists are a simple, powerful method for ensuring continuity

  The following examples of checklists are provided and these can be modified for specific ships:
  - » ship departure
  - » daily inspections
  - » galley
  - » engine room
  - » machinery
  - » living conditions
- **guidance notes for accident prevention**
  These consist of a series of examples covering different areas and working activities on board. They illustrate a systematic approach that can be applied to particular activities on board. Each example covers:
  - » common accidents and injuries
  - » use of protective equipment
  - » actions to prevent accidents
  - » space to add comments relevant to specific ship

The areas covered are:

- **Slips and falls**
- **ship handling**
  - » mooring
  - » anchoring
  - » gangways
  - » bridge watch duties
- **cargo holds and tanks**
  - » winch and crane operation
  - » use of trucks in cargo holds
  - » working on car decks of ferries
  - » tank cleaning
  - » inerting of tanks and holds
  - » tankers: work by/with manifolds
  - » cargo hold cleaning
  - » manual sounding of tanks
- **engine room**
  - » working with oil/fuel separators
  - » working with fuel injection nozzles
  - » working in workshop
  - » working with sanitary plants and sewage
- **general maintenance**
  - » rust removal
  - » painting
  - » working aloft/on scaffolding
  - » use of high pressure equipment
- **storage**
  - » handling and storage of chemicals and solvents
  - » provision stores
- **drills**
  - » abandon ship drills involving lifeboat launching.

2.1 Accidents: Causes and Prevention

The ISM Code requires Companies to *'establish safeguards against all identified risks'*. Detailed risk assessments are essential to identify risks properly, but it is also helpful for everyone on board to be aware, in general terms, of who is most likely to be involved in accidents, where they are most likely to occur and the principal ways in which they can be prevented.

Note: Please refer to the specific comments on confined space entry in the introduction.

2.1.1 People

There are four categories of people who are more likely to have accidents on board:

1. Young people.
2. Inexperienced crew members, particularly those who have signed on for the first time.
3. Non-professional seafarers, such as entertainers and bar staff on cruise ships.
4. Older crew members (as people get older, they often find it hard to recognise or accept the increasing difficulty of tasks that they found easy to handle in their youth).

2.1.2 Activities

Most injuries are caused by:

- Maintenance work on deck
- maintenance work in the engine room
- cargo operations
- anchoring and mooring operations
- cleaning of tanks and holds (falls, lack of oxygen, poisonous gases)
- use and handling of chemicals
- handling and lifting of spares and provisions
- abandon ship drills involving lifeboat launching
- hot work (outside the approved workshop)
- entrance into confined spaces.

2.1.3 Prevention

Accidents can best be prevented through:

- Effective working procedures and instructions
- methods for safeguarding equipment and machinery
- guidelines for the use and maintenance of tools
- thorough basic safety training, vocational training and familiarisation
- active support from qualified individuals of the necessary safety management work on board.

2.2 A Safety Supervisor's Job Description

See Section 1.1.2

SAFETY SUPERVISOR Job Description	
Job purpose	
Job structure	
Job responsibilities	

2.3 Checklists

CHECKLIST: Ship departure			
	OK	**Not OK**	**Notes**
Manning			
Health certificates valid			
Medical supplies			
Fire safety: • Fire hose cabinets • portable extinguishers serviced • gas bottles secured			
Personnel safety equipment: • Davits/lifeboats • life rafts serviced/lashed • life jackets located • escape routes open • survival suits ready • safety stretcher ready • alarm systems working			
Personal protective equipment (PPE): • Helmets, shoes, goggles • jackets, gloves • safety harness • breathing apparatus			
Gas/oxygen meters calibrated			
Hull openings closed			
Date	**Checked by**		**Signature**

CHECKLIST: Daily inspection			
	OK	**Not OK**	**Notes**
• Gangway • access ship/shore • safety net • life buoys • guarding			
Equipment on deck: • Hatch covers closed • low recesses marked • dangerous areas			
Ship's deck: • Portables lashed • ropes/wires clear • deck washed down • walkways skid protected • passage marked • ladders/rails			
Working aloft: • Responsible for work • need for work permit (PTW) • rigging • safety lines with hook • safety harness • ship's side work safety • ladders safe • ladders hand support • ladders back support			
Confined spaces: • Responsible for work • permit to work required (PTW) • gas measurement done • ventilated • outside guard • risk of falls Note: Specific comments on confined space entry in introduction to this manual.			
Date	**Checked by**		**Signature**

CHECKLIST: Galley			
	OK	**Not OK**	**Notes**
Galley personnel: • Only authorised personnel present • if not, closed • qualified personnel with understanding of: » bacteria » infections » damaged food » nutrition » special nutrition » food storage • knowledge of fire-fighting			
Cleanliness: • Daily cleaning rota • hand washing facilities provided • no insects • general cleanliness			
Waste: • Appropriate waste baskets • instructions for garbage treatment			
Fire: • Fire extinguisher • fire blanket • no gas vessels			
Ventilation: • Means of closing ventilation in the event of fire • cleaning of ventilation filter • equipment • general condition • lighting levels • support rails • electrical installation totally enclosed/ watertight • confined spaces alarmed			
Storage areas: • Dry provision room, sufficient shelves • heavy items safely stored • cleaning chemicals properly labelled/ safely stored			

General risks: • Risk of falls • risk of burns • fire risk			
Date	**Checked by**		**Signature**

CHECKLIST: Engine room			
	OK	**Not OK**	**Notes**
Noise levels: • Warning signs • hearing protection provided • hearing protection worn • sound protected rooms effective			
Vibrations: • Vibrating parts checked • extreme vibrations reported			
Ventilation: • Appropriate • quick closing function			
Lighting: • Main lighting • dark areas			
Rotating machinery: • Mechanical protection • critical marked out • exhaust pipes insulated			
Electrical plant: • Main switchboard protected • electrical tools safe			
Cranes and lifting equipment: • Cranes working • tackles working • condition of slings			
Tanks and compartments: • Hazardous tanks and compartments clearly labelled			
Workshop: • Eye protection provided • eye protection used • machine guards in place • electrical supply safe • tool storage • material storage • general cleanliness			

Fire precautions: • Fire detection working • quick closing fuel working • fire-fighting cabinets ready • CO_2 alarm known/OK • no gasoline in engine room • instructions for oily waste			
Escape routes: • Marked • open			
Date	**Checked by**		**Signature**

CHECKLIST: Machinery			
	OK	**Not OK**	**Notes**
Emergency stop			
Prevention of accidental start (labels, signs, marking)			
Prevention of operation without guards			
Rotating parts properly guarded			
Safety pins in place for locking of gears, brakes, etc on winches and capstans			
No temporary replacements of original parts			
Systems of checks in place before operation of new/repaired equipment			
Restriction of operation to properly qualified/ trained personnel			
Date	**Checked by**		**Signature**

CHECKLIST: Living accommodation			
	OK	**Not OK**	**Notes**
Accommodation: • Lights • ventilation			
Cabin: • Bunks • bedclothes			
Showers and toilets			
Mess room and recreation rooms			
Catering: • Nutrition • variety			
Welfare, recreation			
Date	**Checked by**		**Signature**

2.4 Accident Prevention

2.4.1 Slips and Falls

Injuries

Slips and falls account for over 20% of reported accidents and, while injuries sustained are rarely severe, they can result in a temporary inability to work on board or even having to sign off.

Slips and falls
Use of protective equipment
Appropriate footwear is an obvious defence against slips and falls. The soles of the shoes or boots for use on hard surfaces, such as steel decks, must have both shock absorbing material in the heel and a non-skid, soft sole, which adapts itself to the contours of the surface. Some companies supply seafarers with appropriate working footwear and this often conforms to a national or international standard. However, most seafarers will change into casual shoes during their time off. This is when many slips and falls will occur, so proper footwear on its own will not solve this problem.
Preventive actions
• Reduce the likelihood of slips with: » anti-skid coatings and paints » non-skid mats • ensure that safety inspections include attention to: » water penetration under tiles and flooring, causing unevenness under foot » oil stains and other 'housekeeping' issues for immediate correction » common locations of falls and slips, such as steep staircases • use contrast paint to clearly mark obstacles that cannot be removed, such as doorsteps and 'stumbling blocks' on deck • ensure that temporary openings in the deck are fenced off • provide adequate lighting.
Your ship:

2.4.2 Ship Handling

Mooring
Common accidents and injuries:
• Being hit or caught by the hawser (often serious or even fatal) • falls and trips • hand injuries or bruises, especially from handling of worn-out hawsers • skin burns caused by nylon/polypropylene hawsers • back injuries caused by handling of heavy loads/pulling • frostbite in cold climates (temperature and wind chill should always be monitored) • sunstroke/sunburn in hot climates.
Use of protective equipment:
• Helmet • safety shoes • gloves • ear protectors • protective clothing.
Preventive actions:
• Agreed procedures for mooring • present mooring planned • communication signals understood • proper maintenance of equipment (check the safety locking pins) • damaged hawsers replaced • correct location of throwing lines • supporting equipment on fixed brackets • deck area kept clear and free of oil spill • mechanical protection of crew members' positions (avoid coils) • identify safest location for crew members • appropriate use of special protective clothing, depending upon weather conditions • protection from wind and sun covering • ear protection provided for maximum noise level • crew members involved should be properly qualified, trained and familiar with the instructions for the relevant mooring gear on the ship, such as the operation of brakes, gear and transmission functions.
Your ship:

Anchoring

Common accidents and injuries:

- Falling overboard
- being hit by hitting the anchor chain (this is often serious or fatal)
- fall and trips
- damage to the eyes by dust and mud
- inhaling dust
- frostbite in cold climates (always monitor the temperature and wind chill)
- sunstroke/sunburn in hot climates
- damage to hearing (from free fall of the anchor)
- injuries to upper body caused by incorrect operation of brakes and handles.

Use of protective equipment:

- Goggles
- dust mask
- safety shoes
- ear protectors
- gloves.

Preventive actions:

- Plan and agree communication, establish eye contact
- when using walkie-talkies, always use ship's name to avoid confusion with other ships
- familiarise all involved personnel with the relevant procedures and instructions
- skid-protect the deck
- keep deck clear from other objects, check oil spill
- ensure appropriate lighting, have spare flashlight available
- anchor chain to be properly marked
- anchor gear to be well adjusted for smooth operation
- check brake before the release of chain stopper
- keep safe distance from chain (which may break).

Your ship:

Gangways
Common accidents and injuries:
• Fall from gangway into the sea or onto the dock • falls and trips • falling between steps • becoming hooked in the rigging • back injuries during rigging and handling of gangways.
Use of protective equipment:
• When rigging: » helmet » gloves » safety footwear » lifeline • when using: » check and adjust for draught • for passage: » use gloves » avoid carrying heavy loads.
Preventive actions:
• Prepare safety net (obey the regulations for safety net rigging) • ensure proper lighting • ensure a life buoy is available or in the vicinity • establish guarding arrangement (by crew or watchman) • prepare lightweight gangway for transfer ship to ship.
Your ship:

Bridge watch duties
Common accidents and injuries:
• Back pain associated with standing position • development, over time, of injuries caused by static working positions • eye problems caused by continuous concentrated staring • problems from repeated change of temperatures (inside/outside).
Use of protective equipment:
• Ergonomic seating with proper back support • adjustable chart-boards.
Preventive actions:
• Avoid night-blinding by use of proper lighting in wheelhouse area • alternation of duties to avoid repetitive working • simple exercises to avoid stiffness • frequently change working positions.
Your ship:

2.4.3 Cargo Holds and Tanks

Winch and crane operation
Common accidents and injuries:
• Boom falling because of overload or faulty rigging • personnel hit by falling loads/objects • personnel struck while manoeuvring of cargo or loads • back injuries from attempting to move heavy loads manually • hand injuries from sharp edges, etc.
Use of protective equipment:
• Helmet • safety shoes • gloves • safety jacket with reflective material.
Preventive actions:
• Ensure proper lighting in working area • work within specified parameters for lifting equipment, such as range and maximum load • check location and function of emergency stop and safety procedures • clarify standard procedures for communication and signals • ensure proper qualification and training of operators • prepare proper place for goods or provisions in advance • plan further transportation of goods or provisions.
Your ship:

Use of trucks in cargo holds

Common accidents and injuries:

- Collisions with personnel working in the hold
- damage to the ship's structure
- damage to cargo
- cargo falls
- individuals trapped between trucks and bulkheads
- poisoning by truck exhaust in closed holds
- back injuries for truck operator
- damage to truck operators' hearing
- respiratory diseases caused by inhaling exhaust fumes over time.

Use of protective equipment:

- Helmet
- safety shoes
- gloves
- ear protectors
- dust mask
- safety jacket.

Preventive actions:

- Mark out the working area(s) properly
- plan and avoid the need for trucks to negotiate different levels
- prevent slippery decks
- provide appropriate lighting level
- provide appropriate ventilation
- no other work to be done in the operating areas
- establish and enforce the maximum number of trucks allowed
- agree coordination when using several trucks
- plan and agree max speed, and inform truck drivers
- ensure that trucks are in proper working order, including:
  - » proper damping facilities
  - » functioning warning lights
  - » wide side mirrors
- treat goods not suited for truck transportation separately.

Your ship:

Working on car decks of ferries

Common accidents and injuries:

- Personnel hit by car
- individuals trapped between car and ship's structure
- fall and trips
- poisoning by exhaust gas
- respiratory diseases caused, by inhaling exhaust fumes over time.

Use of protective equipment:

- Helmet
- ear protectors
- gloves
- safety shoes
- safety jacket with reflective material.

Preventive actions

- Establish procedures for refusing vehicles carrying dangerous goods, so that they do not enter the ship
- establish and enforce the maximum number of vehicles permitted
- separate trucks and cars
- clearly mark traffic lanes
- install traffic mirrors at hidden areas
- install well-lit signs for drivers to follow
- keep decks free from mud and dirt
- provide car grip or skid protection on decks
- have procedures for lashing of non-standard vehicles
- ensure appropriate ventilation
- use combined ear protectors and communication equipment
- agree who is in charge of operational decisions
- provide sufficient personnel for directing vehicles on and off the ship
- ensure that personnel spend as little time as possible on the car deck
- ensure that all relevant personnel receive prior training and preparation.

Your ship:

Tank cleaning

Common accidents and injuries:

- Explosion
- gas poisoning or lack of oxygen
- serious falls
- claustrophobia
- injuries caused by handling heavy equipment
- long term effects of inhaling poisonous gases.

Use of protective equipment:

- Helmet
- goggles/visor
- gloves for chemical handling
- safety footwear
- appropriate protecting clothing
- appropriate breathing apparatus/filter masks.

Preventive actions:

- PTW system enforced
- examine general procedures, plan for specific tasks
- establish procedures for the handling of sediment
- verify that all personnel are familiar with tank cleaning procedures
- prepare first aid possibilities (eg, eye washing)
- prepare for the use of showers
- establish regular emergency procedures drills
- check the last 3 cargoes for poisonous gas content (H_2S, etc)
- gas and oxygen measurement should be carried out by a qualified person
- continuous gas measurement/personal gas/oxygen warning kit
- continuous oxygen measurement/personal gas/oxygen warning kit
- maintain gas instrument calibration (two sets required for tankers)
- walkie-talkie for communication with bridge/responsible person
- fire alert, as per procedural requirement
- watchman outside entrance, safety lines, portable fire extinguisher
- ensure appropriate ventilation, in accordance with tank design
- provide sufficient lighting
- check and confirm condition of entrance hatch/ladders
- use internal ladders for personnel movement only (no extra loads)
- divide stay in tank into short time periods.

Note: Specific comments on confined space entry in introduction.

Your ship:

Inerting of tanks and holds

Common accidents and injuries:

- Death from asphyxiation – inert gas is extremely dangerous!
- the preliminary symptoms of inhaling inert gas are dizziness, discomfort, disorientation.

Use of protective equipment:

- Same procedures as for working in any gaseous atmosphere on board.

Preventive actions:

- Follow procedures/instructions for the operation of inert gas plants
- for technical procedures, production plant, maintenance, etc, always refer to manufacturers' instructions and regulations
- ensure appropriate ventilation in any closed compartment where inert gas equipment is installed
- ensure that all accesses to inerted tanks or holds are carefully closed
- provide warnings against any movement in areas where inert gas is exhausted
- always be at the 'windward side' of inert gas equipment
- prevent anyone from entering any inerted room or compartment without proper breathing equipment and all associated safety precautions.

Your ship:

Tankers: work by/with manifold

Common accidents and injuries:

- Fire and explosions
- gas poisoning and asphyxiation from lack of oxygen
- skin damage by caustic agents, spraying or flushing
- falls caused by leakage, particularly around oil trough
- eczema, eye and lung diseases
- back or body injuries caused by handling of heavy hoses and equipment
- long term diseases caused by inhaling harmful gases.

Use of protective equipment:

- Helmet
- goggles/visor
- safety footwear
- chemically resistant gloves
- overalls or protective suits, if required
- walkie-talkie.

Preventive actions:

- Prepare datasheets for hazardous cargo content or relevant cargo information, in order to identify adequate protective aids required
- establish and enforce special precautions for cargo with a high content of H_2S (hydrogen sulphide)
- prepare suitable manning for relevant operations
- provide correct lifting gear for hoses and equipment
- skid protect decks, have sawdust or powder available
- safeguard openings
- provide proper lighting
- prepare appropriate and properly maintained tools
- keep working areas tidy (no storing here)
- plan, prepare and mark which manifold to be operated
- ensure no pressure in the deck pipes before any opening
- keep distance before pressurising of the system.

Your ship:

Cargo hold cleaning

Common accidents and injuries:

- Dust explosion
- poisoning caused by dangerous cargo contamination
- dizziness and disorientation, especially in small/deep rooms
- lung diseases caused by dust particles, etc
- eye infections
- allergy and skin infections
- long-time effects from inhaling of dust and vapours.

Use of protective equipment:

- Helmet
- goggles
- gloves
- safety footwear
- overall
- appropriate filter masks the cargo (check work instruction).

Preventive actions:

- Adequate ventilation
- adequate lighting, including possible additional portable lighting in the holds
- effective waterjets or vacuum cleaning (minimise manual handling)
- mechanise traditional heavy work for the removal of cargo remains
- plan and prepare best cleaning procedure depending on cargo condition
- station supervisor/watchman on deck during hold cleaning
- ensure dedicated procedures are in place for the particular ship (do not rely on general advice).

Note: Specific comments on confined space entry in introduction.

Your ship:

Manual soundings of tanks

Common accidents and injuries:

- Nausea and dizziness, caused by oily fumes
- risk of fire
- skin problems, caused by skin contact with oily agents
- breathing problems, caused by inhaling of oily fumes.

Use of protective equipment:

- Helmet
- safety footwear
- chemical resistant gloves
- eye goggles
- half-mask with dedicated/approved filter (A2/P2).

Preventive actions:

- Cleanliness in the sounding area
- sounding equipment to be cleaned when sounding is finished
- avoid skin contact with oily agents
- ensure proper hand hygiene, use protective cream
- ensure that the sounding pipe is properly closed.

Note: Specific comments on confined space entry in introduction.

Your ship:

2.4.4 Engine Room

Working with oil/fuel separators
Common accidents and injuries:
• Nausea and dizziness from oil fumes • skin irritation caused by chemicals • eczema and oil allergy • long term effects: asthma or other diseases.
Use of protective equipment:
• Helmet • eye protection • chemical resistant gloves • safety footwear • breathing protection, such as face mask with approved filter (A2, P2, etc).
Preventive actions:
• Establish and follow written work procedures • ensure that those involved are certified as qualified by a responsible person • plan and schedule the work correctly • check manufacturers' instruction/recommendation for working with separators • use specially designed lifting gear for mounting/dismounting of centrifuge • provide supporting sketches and drawings at the site • agree lifting arrangements to avoid inconvenient manual lifting • use special tools for mounting/dismounting of separator • ensure ample cooling period before work starts • provide good ventilation/exhaust fans when dismantling • close the connection to other systems to avoid blowbacks.
Your ship:

Working with fuel injection nozzles

Common accidents and injuries:

- Eye problems caused by spraying
- lung damage caused by oil fumes (aerosols). This may lead to pneumonia.
- long term diseases of the lung from oil fumes
- fire.

Use of protective equipment:

- Helmet
- safety footwear
- goggles/visor
- filter mask with filter (A2/P2).

Preventive actions

- Discuss and agree proper procedures
- arrange workplace so that face and eyes are protected
- design workplace as a 'box' with a glass window in front
- provide a local exhaust fan
- avoid splashing and fumes
- provide appropriate ventilation in the room
- carry out testing operations in another compartment
- absolutely no smoking.

Your ship:

Working in engine room workshop

Common accidents and injuries:

- Minor and serious cuts and wounds
- back and shoulder injuries caused by heavy lifting
- muscular problems caused by poor ergonomics
- eye injuries from grinding and other metal work
- hearing loss caused by high noise levels
- dehydration caused by high temperatures (in tropic zones).

Use of protective equipment:

- Goggles or other appropriate eye protection
- gloves
- safety shoes
- ear protectors
- equipment for lifting and moving heavy objects
- appropriate chairs and footstools for different working positions.

Preventive actions:

- Do the work in well ventilated or air-conditioned rooms
- provide portable working lamps
- provide goggles beside the workplaces at which they will be needed
- frequently check the balance of grinding wheels
- systematically plan large maintenance tasks
- store dedicated workshop tools systematically
- frequently check the condition of tools. Repair or replace as necessary
- do not disconnect fire detectors for welding work – use a watchman
- identify and provide any special requirements for welding in workshop/engine room.

Your ship:

Working with sanitary plants and sewage

Common accidents and injuries:

- Scratches and cuts on the hands
- serious infection of cuts and scratches
- risk of several serious diseases, such as tetanus and hepatitis A
- infection in breathing organs, caused by bacterial infections
- problems caused by use of chemicals.

Use of protective equipment:

- Gloves (extra long)
- safety footwear
- filter mask
- overalls
- suitable tools to avoid the use of hands inside pipes and tanks
- means of quickly disinfecting scratches and cuts.

Preventive actions:

- Vaccination, in particular for tetanus and hepatitis A
- appropriate cleaning facilities for clothes and equipment
- plan the work to avoid direct contact with sewage
- use system drawings before dismantling to prevent static pressure
- be aware of the risks from poisonous gases
- inform relevant responsible person
- avoid the use of pressurised air for unblocking pipes (splashing)
- be aware of special instructions for passenger ships, as they have comprehensive sewage processing plants with restricted outlets.

Note: Specific comments on confined space entry in introduction to this manual.

Your ship:

2.4.5 General Maintenance

Rust removal

Common accidents and injuries:

- Eye injury caused by rust particles and dust
- cut and bruises on hands, which may become infected
- long term effects, caused by inhaling dust
- muscular injuries from working in inconvenient positions
- serious falls from scaffoldings, etc
- 'white finger' (lack of blood circulation), caused by the use of vibrating tools.

Use of protective equipment:

- Helmet
- safety footwear
- gloves
- goggles
- filter mask (min. P2 filter)
- knee/foot protection or special foundation for 'knee working position'.

Preventive actions:

- Agree procedures for working hours and change of duties
- plan the work to avoid long periods of rust removal
- prepare the workplace to minimise lifting and moving
- use tools with low vibration and low noise levels
- permits to work (PTW) in certain hazardous areas (eg if there is a risk of fire)
- use supports to improve the working position.

'White finger':

EU directives require that the level of vibration has to be marked on the tools.
Basic guidelines to avoid 'white finger' from the use of vibrating tools are as follows:

Vibration level	Max effective working hour per day
140 dB (HA)	0.5 hour
135 dB (HA)	1 hour
130 dB (HA)	4 hours
125 dB (HA)	Limited risk

Your ship:

Painting

Common accidents and injuries:

- Risk of explosion and fire
- poisoning by paint solvents
- irritation of eyes, skin and breathing organs
- blood poisoning through skin bruises and high pressure painting
- development of allergies
- long term illnesses from exposure to solvents
- muscular injuries from working in inconvenient positions
- serious fall when working aloft.

Use of protective equipment:

- Helmet
- safety shoes
- gloves
- goggles
- filter mask.

For high pressure painting, see 'Use of high pressure equipment' below.

Preventive actions:

By the company:

- Clear recommendations and instructions for types of paint to be used for different jobs
- clear highlighting of the risks of different types of paint. For example, 'Very poisonous', 'Poisonous', 'Caustic', 'Corrosive', 'Harmful', 'Less harmful'.

By the ship:

- If possible, avoid the use of dangerous paint with a low code number
- do not choose paint without checking the instructions for use issued by the company
- ensure that everyone involved understands the paint code system, warning labels and signs, etc, together with the written procedures for painting
- provide adequate lighting and ventilation in the paint shop
- provide a separate area in the paint shop for mixing and preparation
- check that the paint shop contains a working fire extinguisher
- ensure that any scaffolding or rigging used is properly erected
- close the area to be painted to those not involved
- properly ventilate closed compartments
- if possible, avoid high pressure painting.

Your ship:

Working aloft/overside/on scaffolding

Common accidents and injuries:

- Falls resulting in serious injuries
- drowning by falling into the sea
- being struck by falling scaffolding or equipment
- muscular injuries from working in inconvenient positions.

Use of protective equipment:

- Helmet
- protective footwear
- gloves
- goggles
- appropriate clothing
- lifeline or harness, depending on the circumstances:
  - » lifelines for working aloft should be no longer than 1.5–2 metres, since a fall involving a longer line can result in injury
  - » lifelines for working overside should be long enough to allow the worker to fall gently into the water and take up an appropriate swimming position while waiting for assistance to pull them from the water. The line must be fixed to a point that the rescue team can get at without difficulty
- life jacket, depending on the circumstances.

Preventive actions:

- Do as much of the work requiring scaffolding or working a loft as possible during shipyard docking
- never carry out work overside while underway
- establish and enforce clear written procedures for working on scaffolding and aloft
- use only approved scaffolding
- ensure that those carrying out the work are properly trained
- do not allow those who suffer from vertigo to work on scaffolding or aloft
- if necessary, use PTWs
- thoroughly inspect the work before starting
- repeat the inspection before changing position
- plan the movement of scaffolding and equipment
- provide continuous of the work
- agree methods of communication.

Your ship:

Use of high pressure equipment

Common accidents and injuries:

- Bruising and cuts
- eye injuries
- breathing problems from inhaling dust.

Note: The use of ultra-high pressure equipment (above 150 bars) is extremely dangerous and can cause serious injuries.

Use of protective equipment:

- Helmet
- visor
- gloves
- safety footwear
- working overalls
- breathing apparatuses or filter mask of relevant category.

Normal protective clothing is not sufficient when using ultra-high pressure equipment. Operators must use special suits, approved for the relevant working pressure.

Preventive actions:

- Heavy equipment should have supporting racks/brackets
- trigger handle must not be of the locking type
- ensure effective ventilation/breathing means for sand-blasting
- check that hoses are certified for relevant working pressure
- feeding lines to be permanently installed (steel pipes)
- check proper installation and function of compressor filters.

Your ship:

2.4.6 Storage

Note: Please refer to relevant national regulations covering the storage and use of substances injurious to health on board. This guidance note is only a short general reminder of the main topics. Refer also to the specific comments on confined space entry in the introduction to this manual.

Storage and handling of chemicals and solvents

Common accidents and injuries:

- Short term effects include irritation of the skin, dizziness, sickness, headache, disorientation and feeling 'drunk'
- diseases caused by contact with skin, eyes, etc
- inhaling dust, vapour, gases, etc
- serious long term effects can include cancer and damage to the brain and central nervous system.

Use of protective equipment:

- It is not possible to generalise about the protective equipment needed for the safe handling of chemicals and solvents. Not only are some substances more dangerous than others, different substances affect human beings in very different ways. It is therefore very important to check the documentation for each substance and follow the instructions precisely. If, for any reason, the documentation is missing or difficult to understand, do not proceed. Seek help from your shore based office.

Preventive actions:

Note: The most effective method of protection against possible damage from dangerous chemicals is not to use them. While that will not always be possible, all of those involved, both at company level and on each ship, should work to minimise their use and establish clear procedures for when they have to be used.

- Secure chemicals in store to remove any danger of spillage
- store chemicals only in their original boxes and cans, properly labelled
- do not accept incorrectly labelled chemicals
- labelling must make clear:
  - » any poisonous effects
  - » risks of fire or explosion
  - » instruction for first aid in the event of an accident
  - » required storage temperature, if any
- keep datasheets in the store room for all chemicals
- keep the chemical store locked, with access under the control of a named responsible person
- establish a detailed record of the use of chemicals, kept up to date by the responsible person
- only allow qualified individuals, who understand the data on the labels (including procedures for first aid) to work with dangerous chemicals.

- When using chemicals:
  - » follow established procedures
  - » arrange 'closed systems', avoiding direct contact with chemicals. If this is not possible, use methods which minimise direct contact
  - » ensure proper ventilation of the workplace
  - » prepare no more than the quantity of chemical required
  - » avoid heavy cans, which are difficult to handle
  - » know the location of the medical cabinet in case of accidents.

Your ship:

Provision stores

Common accidents and injuries:

- Being hit by falling objects
- injuries from the incorrect use of handling gear
- cut from broken glass, sharp edges, etc
- back injuries caused by heavy lifting.

Use of protective equipment:

- Helmet
- safety footwear
- gloves
- appropriate clothing for different temperature zones.

Preventive actions:

- Organise the store layout so that:
  - » the most frequently used provisions are the easiest to get at
  - » shelf heights are appropriate for both light and heavy goods, to avoid the need for heavy lifting
  - » there is adequate permanent lighting and additional portable lighting if necessary
- provide the appropriate tools, which may include:
  - » simple mechanical handling equipment, so that provisions can be moved both horizontally and vertically within the store with a minimum of manual handling
  - » roll wagons with brake
  - » small electrically driven trucks
  - » footstools, portable ladders, etc
  - » tools for opening boxes and packages (to save hands)
- stow provisions safely and efficiently by:
  - » arranging for sufficient manning (this is not a one man job!)
  - » considering unpacking some goods on the quay
  - » planning the sequence of stowage to avoid blocking
  - » checking that shore or shipboard cranes offer convenient access
  - » ensuring that nothing is stowed above 1.5 metres
- work safely and efficiently by:
  - » ensuring that all operators receive training in safe lifting
- whenever possible, using mechanical equipment to avoid manual handling of goods.

Your ship:

2.4.7 Drills

Abandon ship drills involving lifeboat launching
Common accidents and injuries:
• Serious, or even fatal injuries from the accidental release of hooks • injury to the head and body from being thrown against the ship • trapped limbs • falling into the sea.
Use of protective equipment:
• Life jacket • helmet • protective footwear • gloves • appropriate clothing.
Preventive actions:
• During SOLAS drill launching it is specified that the lifeboat is launched with assigned lifeboat operating crew only. All members of assigned crews must have lifeboat competence certificates. The remainder of the lifeboat's complement can then enter the boat after launching to complete the drill. • ensure that all crewmembers are familiar with their duties and assigned lifeboat stations • ensure that there is sufficient free place at the embarkation deck and safeguard the station using rails, etc • consider the possible use of lifelines • check that access to the embarkation station is free of obstacles • ensure regular maintenance, in accordance with manufacturers, of: » davits » lashing equipment » operational gears » safety arrangements » wire, etc • when the drill is finished, check proper lashing and protection.
Your ship:

3 | Health on Board

3. Introduction

This section of the manual covers:

- **A fit and healthy crew?**
  Medical examinations and certificates for crew joining the ship
- **be prepared!**
  - » medical supplies
  - » medical training
  - » requesting assistance from shore based medical personnel
- **general health protection on board**
  - » manual handling
  - » personal protective equipment (PPE)
  - » stress
- **hygiene**
  - » cleanliness on board
  - » food storage and preparation
- **substances hazardous to health**
  - » solvents and other harmful chemicals
  - » asbestos
- **infectious diseases and malaria.**

3.1 A Fit and Healthy Crew?

The ISM Code states that:

> *"The Company should ensure that each ship is manned with qualified, certificated and medically fit seafarers in accordance with national and international requirements."*

To make sure that companies meet this requirement, each Administration has slightly different regulations and recommendations covering pre-employment, return to work after sickness and regular medical examinations.

A useful source of general guidance is 'Guidelines for conducting pre-sea and periodic medical fitness examinations for seafarers', published jointly by the International Labour Office (ILO) and the World Health Organisation (WHO).

Pre-employment medical examinations are conducted ashore and are not the ship's responsibility, however:

- A system should be in place to check that new members of the crew have the proper medical certificates on joining
- be aware that certain Administrations only permit approved doctors to carry out these medical examinations. If a seafarer attempts to join your ship without having had the correct examination, you may find that the nearest approved doctor is a long way from where the ship is docked.

3.2 Be Prepared

3.2.1 Medical Supplies and Equipment

All ships must have a medicine cabinet or chest on board. The medical supplies that it contains will be specified by your Administration (for example, EU directive 92/29/EEC/1992). The contents will be required to be checked regularly (annually in many cases) by an approved doctor or pharmacist. Alternatively, a ship may have an arrangement with an approved medical provider and a responsible deck officer will ensure the inventory is resupplied and kept up to date in accordance with the Administration requirements.

3.2.2 Medical Training

Medical training will vary according to rank. It is a requirement that ships' Masters and senior officers responsible for medical care on the ship have sufficient medical training by possessing a current 'Medical Care on Board Ship' STCW certificate. All officers and those who provide medical first aid must possess a current 'Medical First Aid' STCW certificate. All crew must have an 'Elementary First Aid' STCW Certificate.

In addition, the ship should be equipped with a suitable medical handbook for ships, approved by the Administration. Examples include:

- Maritime and Coastguard Agency: 'The Ship Captain's Medical Guide'
- World Health Organisation: 'International Medical Guide for Ships'.

3.2.3 Requesting Assistance from Shore Based Medical Personnel

There are occasions when illness or injury on board will be beyond the capabilities of senior officers. Help will need to be sought, in the first instance, by contacting shore based medical personnel. Most seafaring countries have set up arrangements for doing so. These include standard checklists of

information that ships must have available to help medical personnel ashore diagnose the problem and suggest treatment.

For example, all member states of the European Union are responsible for maintaining a medical service centre for ships and seafarers. When medical emergencies arise, each ship must be able to supply the centres with the following information:

Patient's details

- Date of birth
- position on board

The ship

- Position or fishing-place
- destination

The problem

- Description
- how long has the problem been present?
- how did the problem start?
- where is the problem located?
- is this the first time the problem has occurred?

Vital signs

- Is the patient conscious?
- can the patient breathe normally?
- what is the patient's heart rate?
- what is the patient's temperature?

Medical history

- Is the patient currently receiving any kind of medication or other medical treatment?
- does the patient have any allergies, including to any medicine?
- has the patient previously suffered from any serious disease or illness?
- does the patient smoke?
- does the patient use alcohol or drugs?

3.3 General Health Protection on Board

3.3.1 Manual Handling

Manual handling is a common source of injury on board. Torn muscles and strained backs may not be the most serious injuries that seafarers can sustain, but they are unpleasant and can prevent individuals from working for some considerable time. If they are not properly corrected or given insufficient time to heal, permanent damage can be done, which in extreme cases may involve seafarers having to give up their jobs.

Fortunately, injuries from manual handling can be avoided in two ways:

- **Don't handle heavy items manually**
  When faced with the need to lift or move a heavy item the first question to ask is *'what mechanical means are available to help me do this?'*. Resist the temptation to 'save time' by trying to do the job manually rather than, say, going to fetch a hand truck.
- **Use proper lifting techniques**
  If manual handling cannot be avoided and the item to be moved is within the capabilities of the individual or individuals involved, injury can be avoided by using the correct technique. The UK's Health and Safety Executive recommends:

Getting to grips with manual handling

Good handling technique

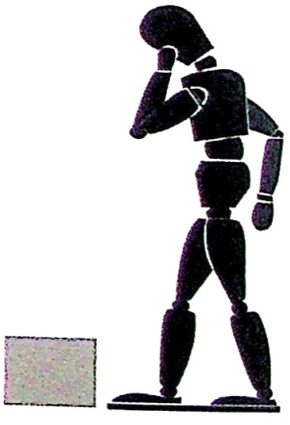
Here are some important points, using a basic lifting operation as an example.

Stop and think

Plan the lift. Where is the load to be placed?

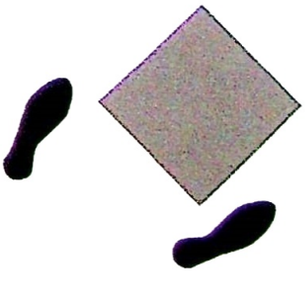
Use appropriate handling aids if possible. Do you need help with the load? Remove obstructions such as discarded wrapping materials.

For a long lift, such as floor to shoulder height, consider resting the load mid-way on a table or a bench to change grip.



Position the feet

Feet apart, giving a balanced and stable base for lifting (tight skirts and unsuitable footwear make this difficult). Leading leg as far forward as is comfortable and if possible, pointing in the direction you intend to go.

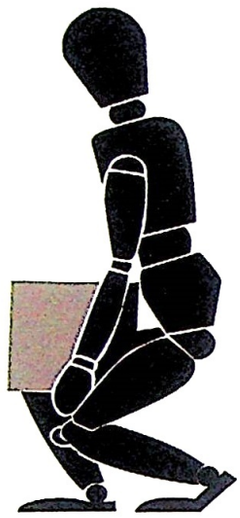


Adopt a good posture

When lifting from a low level, bend the knees. But do not kneel or over flex the knees. Keep the back straight, maintaining its natural curve (tucking in the chin helps). Lean forward a little over the load if necessary, to get a good grip. Keep the shoulders level and facing in the same direction as the hips.

Get a firm grip

Try to keep the arms within the boundary formed by the legs. The best position and type of grip depends on the circumstances and individual preference, but must be secure. A hook grip is less tiring than keeping the fingers straight. If you need to vary the grip as the lift proceeds, do it as smoothly as possible.



Keep close to the load

Keep the load close to the trunk for as long as possible. Keep heaviest side of the load next to the trunk. If a close approach to the load is not possible, slide it towards you before trying to lift.

Don't jerk
Lift smoothly raising the chin as the lift begins, keeping control of the load.

Move the feet
Don't twist the trunk when turning to the side.

Put down, then adjust
If precise positioning of the load is necessary, put it down first, then slide it into the desired position.

How do I know if there's a risk of injury?

It's a matter of judgement in each case, but there are certain things to look out for, such as people puffing and sweating, excessive fatigue, bad posture, cramped work areas, awkward or heavy loads or a history of back troubles. Operators can often highlight which activities are unpopular, difficult or arduous.

There is no such thing as a completely 'safe' manual handling operation. It's difficult to be precise as so many factors vary between jobs, workplaces and people. But the general risk assessment guidelines filter should help to identify when a more detailed risk assessment is necessary. Working within the guidelines will reduce the need for a more detailed risk assessment.

Twisting

Reduce the guideline weights if the lifter twists to the side during the operation. As a rough guide, reduce them by 10% if the handler twists beyond 45°, and by 20% if the handler twists beyond 90°.

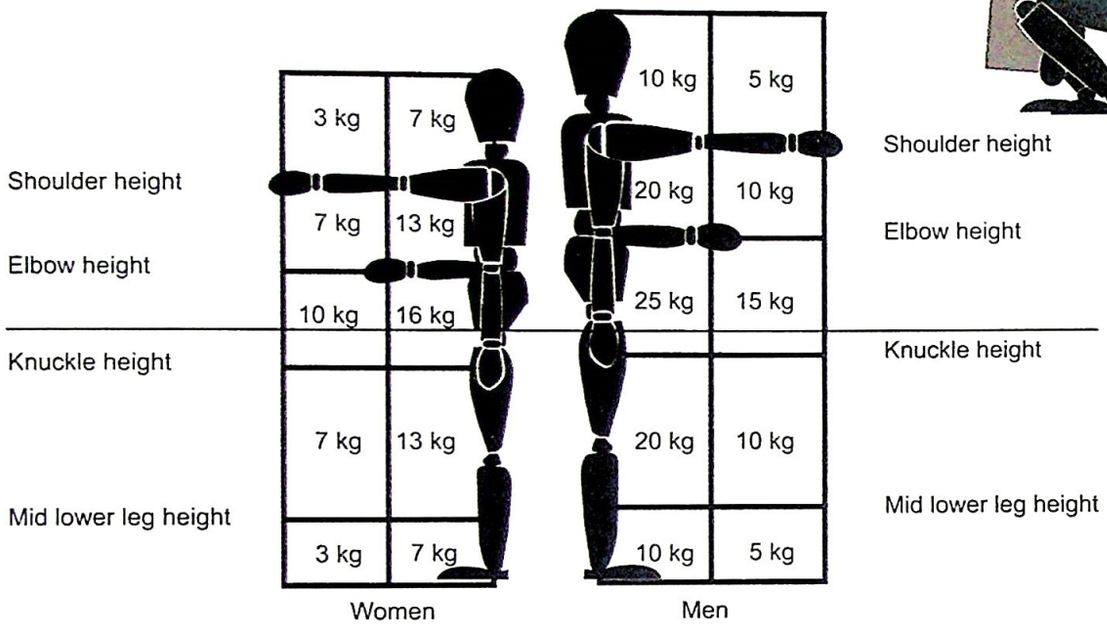
Frequent lifting and lowering

The guideline weights are for infrequent operations, of up to about 30 operations per hour, where the pace of work is not forced, adequate pauses to rest or use different muscles are possible and the load is not supported for any length of time. Reduce the weights if the operation is repeated more often. As a rough guide, reduce the weights by 30% if the operation is repeated 5–8 times a minute, and by 80% where the operation is repeated more than 12 times a minute.

Using the guidelines

The risk assessment guidelines are not safe limits for lifting, but work outside the guidelines is likely to increase the risk of injury so you should examine it closely for possible improvements. You should remember that you must make the work less demanding if it's reasonably practicable to do so.

General risk assessment guidelines



- Each box in the diagram shows guideline weights for lifting and lowering
- observe the activity and compare to the diagram. If the lifter's hands enter more than one box during the operation, use the smallest weight. Use an in-between weight if the hands are close to a boundary between boxes. If the operation must take place with the hands beyond the boxes, make a more detailed assessment
- the weights assume that the load is readily grasped with both hands and that the operation takes place in reasonable working conditions with the lifter in a stable body position
- any operation involving more than twice the guideline weights should be rigorously assessed – even for very fit, well-trained individuals working under favourable conditions
- there is no such thing as a completely 'safe' manual handling operation. Working within the guidelines will cut the risk and reduce the need for a more detailed assessment.

3.3.2 Personal Protective Equipment (PPE)

The protection of individuals from injury on board is a two-way process:

- The company has an obligation, which in some Administrations is backed by law, to:
  - » provide appropriate protective equipment
  - » train individuals where, when and how to use it
  - » ensure that it is properly used through effective supervision, clear working procedure and appropriate safety signs and posters
- individuals have a duty, again sometimes backed by law, to take proper care of themselves and their fellow seafarers.

The different types of PPE are summarised in this table taken from the MCA's *Code of Safe Working Practices for Seafarers.*

Type	Examples
Head protection	Safety helmets, bump caps, hair protection
Hearing protection	Ear muffs, ear plugs
Face and eye protection	Goggles and spectacles, facial shields
Respiratory protective equipment	Dust masks, respirators, breathing apparatus
Hand and foot protection	Gloves, safety boots and shoes
Body protection	Safety suits, safety belts, harnesses, aprons, high visibility clothing
Protection against drowning	Lifejackets, buoyancy aids and lifebuoys
Protection against hypothermia	Immersion suits and anti-exposure suits

3.3.3 Stress

Stress is a condition experienced by individuals as a result of a combination of external and internal factors. Pressures from outside, such as work or family problems, are experienced by different individuals in different ways because of their different ages, length and type of service, personalities, etc. A relaxed, experienced Chief Officer may hardly notice a situation that would cause a high degree of anxiety in a nervous, inexperienced cadet.

Stress creates a feeling of need to 'do something' about the situation causing it. However, that 'something' may be helpful or unhelpful.

One officer may handle the pressure of getting a ship ready to sail against a tight deadline by establishing clear priorities, organising his time efficiently, delegating and so on. Another may simply become inactive through anxiety.

The trick to managing stress is not to avoid it, which is often neither possible nor even, in many cases, desirable. It is to learn how to cope effectively.

Common causes of stress at sea include:

- Life for many seafarers involves spending quite long periods of time, in confined conditions, with a group of people they would not necessarily choose as friends
- isolation. Being away from home and family for a long time creates pressure, particularly if there are problems ashore

- watch patterns. Those who work shifts of any sort, whether ashore or afloat, are more likely to suffer from stress related illnesses than those who do not
- heavy workloads. These can sometimes be self-imposed, particularly since those who work on board ships are not able, unlike their colleagues ashore, to 'shut the office door and go home'
- boredom. It is not always frantic work situations and crises that cause stress. Endless routine and not having enough stimulating work to do can also be a cause.

Symptoms of failing to cope effectively with stress include:

- Different sorts of illnesses. Often these are comparatively minor, such as headaches, loss of appetite, coughs, muscular aches and pains, heartburn and indigestion, diarrhoea, tiredness, inability to sleep properly, etc. Unfortunately, if the underlying cause is not identified and corrected, more serious problems, such as heart attacks, can occur
- anti-social behaviour. When people are failing to cope effectively with stress, they frequently lose their sense of humour and become aggressive and uncommunicative with their colleagues.

The strategies for coping effectively with stress on board are much the same as those for work ashore, although there are certain activities, such as going for a nice long walk in the countryside, that are obviously not feasible on board:

- Exercise. Regular exercise is not simply good for the body, it also benefits the mind
- regular sleep. Exhaustion lowers our resistance to illness and makes it more difficult to maintain the mental sharpness, objectivity and balance needed when faced with stressful situations
- regular, healthy meals. As with exercise, a sensible diet keeps the mind fit as well as the body
- sensible use of stimulants. If possible, avoid tobacco entirely. Aside from the considerable long term dangers to health posed by smoking, using cigarettes as a treatment for stress simply does not work
- moderate use of alcohol is not harmful, but be careful about developing bad habits. Avoid drinking alone or heading straight for the bar at the end of a watch. Have a shower, change and relax first. Alcohol is for the heightened enjoyment of social occasions. It should not be used as an anaesthetic
- interests outside of work. Hobbies such as reading, TV, chess – anything that is not directly connected with the day to day work of being a seafarer helps to provide something else to think about and put problems in perspective.

3.4 Hygiene

3.4.1 Cleanliness

General cleanliness on board and high standards of personal hygiene is one of the most important defences against ill health at sea. When groups of people live together in the compact conditions found on board most ships, dirt and disease go hand in hand.

As with so many other aspects of safety and health, it is the responsibility of all members of the crew to maintain high standards of cleanliness, both for themselves and in their living and working environment.

3.4.2 Food

The storage, preparation and handling of food poses obvious potential dangers on board. The safe management of work in the galley requires standards and procedures for:

- Training of galley staff
- galley equipment
- tools, utensils, crockery, cutlery, etc
- food storage and preparation
- hygienic working practices.

Training
All crew members who work in the galley should have received basic training in food hygiene before taking up their duties. If possible, they should be in possession of a recognised, assessed certificate of food hygiene, such as that issued by the UK's Chartered Institute of Environmental Health.

Galley equipment
There should be a detailed procedure and rota for cleaning all galley equipment, such as stoves and refrigerators. This should specify precisely what is to be cleaned on a daily, weekly, bi-weekly and monthly basis, together with the cleaning methods and materials to be used.

Tools, utensils, crockery, cutlery, etc
All implements used for the preparation and consumption of food must be cleaned as soon as possible after use. Dirty dishes and utensils are a prime breeding ground for bacteria. Dishwashing machines are more effective than hand washing, since they operate at much higher temperatures. Damaged implements must be discarded.

Food storage and preparation
This is a very big subject and many details will depend on the circumstances of a particular ship. However, there are some important principles:

- Storage. All food must be stored in areas which are clean, dry, at the appropriate temperature and protected from vermin and insects

  Note: Chemicals and detergents must never be placed near or stored above food
- segregation. Raw food must be kept separate from cooked food. Work surfaces, chopping boards and implements used for preparing meat must be separated from those used for all other foods. Frozen food must not be defrosted in close proximity to other food. There should be separate facilities for washing food, washing hands and washing equipment used for cleaning. Cleaning materials should be stored in areas separate from those used for food storage and preparation
- temperatures. The bacteria that cause food poisoning thrive in warm temperatures. Wherever possible food should either be piping hot or refrigerated. Once frozen food has been defrosted it should not be re-frozen
- contamination. Food that comes in to contact with damaged crockery or utensils should be discarded. Galley staff must thoroughly wash their hands after handling raw food, particularly meat and fish, before handling other types of food. Equipment that is used for different foods must be thoroughly cleaned between each use
- waste. Galley waste is a particularly potent source of the bacteria which cause disease. It must be kept properly contained and entirely separate from foodstuffs. It must also, of course, be disposed of in accordance with national and international regulations.

Hygienic working practices
Figure 4 shows a typical set of hygienic working practices for galley staff. Staff should be trained in its use, and it should be prominently displayed in the galley and adherence to it should be checked during regular safety inspections.

- Keep yourself clean and always wear clean clothing
- always wear the protective clothing provided
- always wash your hands thoroughly with hot water and soap:
  - » before handling food
  - » after using the toilet
  - » after touching your hair
  - » after handling raw foods or waste
  - » before starting work
  - » after every break
  - » after blowing your nose
- do not report for work in the galley if you are suffering from diarrhoea and/or vomiting. You must obtain medical clearance before reporting for such work again
- report all illnesses immediately, particularly those involving rashes and spots
- report any cuts, however small, immediately and obtain first aid. Untreated cuts are a source of infection
- ensure cuts and sores are covered with a waterproof, high visibility dressing
- do not smoke in food storage areas, the galley or when serving food
- never cough or sneeze over food
- clean as you go. Keep all equipment and surfaces clean
- follow all food safety instructions on food packaging.

Figure 4 – Hygiene working practices for galley staff

3.5 Substances Hazardous to Health

3.5.1 Solvents and Other Harmful Chemicals

A forgotten problem?
It is more than ten years since injuries and illness caused by solvents became widely publicised. The principal problem identified was the widespread use of trichlorethylene (Tri), a solvent regarded at one time as a miracle agent for many purposes on board, from washing clothes to deep cleaning of machine parts.

Because of the focus on this particular chemical there has perhaps been a tendency to think that solvent injuries were caused by our previous lack of understanding and that now we are better informed, the problem has been solved and can be forgotten. Unfortunately, this is not true. Serious health problems continue to occur from the improper use of modern solvents.

Injury and illness
Solvents can create both short term injury and long term illness. Contact can cause rashes, burns and skin diseases. Fumes can cause breathing problems. Sometimes these are minor and disappear quite quickly. However, the effects may remain in the body and be reinforced each time the individual is exposed to the solvent. This can result in serious illness many years after exposure – even years after

the seafarer has stopped sailing. Solvents which have no apparent effect when being used can still cause serious long term problems.

Note: Smoking combined with exposure to solvents increases the risk of illness.

Use of solvents and other dangerous chemicals: principles
There are four basic principles governing the use of solvents and other dangerous chemicals on board. These are often covered by regulations laid down by national Administrations. They are:

- Labelling and information
- a ban on the handling of especially harmful substances
- training
- protective measures during use.

Labelling and information
All chemicals purchased for use on board must be labelled in a proper manner. The following information must be provided:

- Hazard classification and the symbol for health hazard/danger of fire and explosion
- technical name, name of substance/product with indication of contents (harmful components)
- warning of hazards and necessary precautions
- name and address of producer.

No solvents, paints or other chemicals for use on board should be accepted unless this information can be clearly identified.

A ban on the handling of especially harmful substances
There must be a clearly identified list of substances that may not, under any circumstances, be handled by seafarers on board.

Training
It is essential that every individual who may be exposed to solvents and other substances hazardous to health in the course of their work on board should be clear about the dangers posed by the substances they use, how they should be handled and how to protect themselves from harm.

It is particularly important that they understand that these substances can cause major illness long after exposure. Minor rashes and temporary dizziness may not seem too serious at the time, but they can be the first step on the road to lung cancer and premature death.

Protective measures during use
Instructions in the use of solvents and other harmful chemicals, including recommendations for protective equipment and clothing, must be followed precisely. It is sometimes easy for users to think that *'it doesn't really matter – the job will soon be done'.* Twenty years later they will regret taking this attitude, but by then it will be too late.

Assessment of the safe use of solvents and other harmful substances should form part of regular safety inspections.

Records and controls
Accurate, up to date records will help to minimise the risks of using solvents and other harmful chemicals and should prevent improperly labelled substances being accepted on board. In particular:

- Substance file. There should be a substance file and product data sheet for every chemical used on board

- chemicals journal. A journal should be kept of purchases, storage conditions and quantities of harmful substances. It should also provide a record of use, documenting users' awareness of the health risks and necessary precautions.

  Systematic use of such a journal will lead to greater awareness of the dangers involved and, in many cases, reduced consumption of such substances on board
- substitution Systematic identification of the dangers of substances can lead to the use of new products that present less of a hazard.

  These may sometimes appear to be weaker than those they replace and people may be sceptical that they will do as good a job. Often, however, they must simply be used in a different way to achieve the same results, while at the same time reducing the risks to health and the environment.

3.5.2 Asbestos

Because of the hazard to long term health that it poses, the use of asbestos on new ships has been banned by most Administrations since the end of the 1970s.

There are still a number of older ships in which asbestos has been used, particularly as gasket or insulation material in the engine room. National Administrations' provisions typically stipulate that on existing ships all asbestos that needs repair or renewal must be replaced by equivalent, but safer, materials.

Asbestos is a generic term for a number of silicate minerals with a finely threaded, flexible structure. It has high heat resistance and is an effective insulator of both heat and electricity.

All types of asbestos consist of fibres that can easily be separated so that they can be woven into non-flammable materials. Asbestos comes in the form of wool, yarn and board. Typical uses include insulation of pipes, boilers, ovens, heat-resistant gaskets, brake linings and brake pads, in cement products and in protective equipment against high temperatures, such as gloves, aprons, hoods and trousers.

The health hazard

When asbestos dust is inhaled the human body is not capable of breaking down the fibres that penetrate the lungs. These cause serious long term illness, including lung cancer. For this reason, the sale or use of asbestos has been banned in many countries.

There are two important dangers that asbestos shares with harmful solvents:

- The damage it causes is long term. Although the use of protective equipment is mandatory, it is sometimes difficult to persuade younger people to protect themselves against an illness that may not appear for 20–30 years
- the combination of working with asbestos and smoking greatly increases the risk of lung cancer. Smoking destroys the cilia in the bronchi, reducing the body's ability to stop the thin, sharp asbestos fibres from penetrating the lungs.

Identifying the hazard

- Identify and record the location and use of any asbestos on board. It is essential for the ship's management to know where asbestos is located and its current condition
- all seafarers likely to come in contact with asbestos must be made aware of its location and the dangers it poses
- asbestos that is enclosed will not normally cause emission of dust if it remains undisturbed.

Working with asbestos
If asbestos is in poor condition, replacing it with other materials must be considered, particularly if there is any possibility of dust escaping into the ship's atmosphere. Should it be necessary to carry out repairs that include removal of asbestos, this work should be carried out with great care and by specialists.

In many countries (Norway, for example), firms that remove asbestos must be officially approved to do so. This is an indication of the seriousness of the risk involved.

Asbestos – temporary repairs
Should it become necessary to carry out temporary repairs to asbestos in poor condition:

- The objective must be to seal the asbestos in. Replacement must be left to specialists
- protective clothing, protective breathing equipment and other safety measures must be used. Expendable (throwaway) boiler suits are recommended
- the work area must be carefully screened off and ventilated.

3.6 Infectious Diseases and Malaria

3.6.1 Introduction

Ships are compact working and living environments. In many cases they travel the world, visiting places where seafarers can be exposed to diseases to which they have little resistance. Crews often consist of seafarers of different nationalities and backgrounds, which can increase the potential for and seriousness of cross-infection. All of these factors make ships' environments particularly vulnerable to the spread of infectious diseases.

There are two broad strategies for preventing infection on board:

- **Keep disease off the ship**
  This can be achieved by:
  - » carrying out health checks on new crew members before they join the ship to make sure that they are not about to bring any unwelcome 'visitors' on board and that they have been effectively vaccinated against diseases that they may encounter on the voyage
  - » rigorous control over the condition of foodstuffs and drinking water brought on board
- **prevent disease occurring on the ship**
  High standards of hygiene are an essential defence against the onset of disease on board. Individual seafarers must be encouraged and trained to take responsibility for personal hygiene. The ship's management systems must ensure cleanliness is given high priority. Particular care must be taken in areas and activities associated with food storage, food preparation and waste disposal. The growth of bacteria in water stored on board must be prevented.

3.6.2 Vaccination

The purpose of vaccination is to strengthen the body's defences against diseases caused by bacteria and by viruses (these are very small infectious agents that grow in the cells of bacteria, plants and animals, including human beings). The vaccine is a dose of virus or bacteria that has either been weakened or killed so that that it cannot cause disease. Vaccination causes the body to think that it has been exposed to infection. It immediately starts to produce antibodies (protective substances generated when the body detects foreign substances in the bloodstream) against the disease in question.

After vaccination these antibodies are ready to destroy a real infection if it should occur.

3.6.3 Some Diseases for which Vaccines are Available

Note: The information that follows is for general guidance only. Under no circumstances must anyone take decisions about their need for vaccination without first consulting a qualified (and, in certain Administrations, accredited) medical practitioner.

Diseases that may be relevant for people working on ships, and for which vaccines exist, include:

Diphtheria/tetanus
There is a combination vaccine for protection against these two diseases.

- Diphtheria is an acute bacterial infection, where the bacteria produce toxins/poisons that usually attack the tonsils in the throat. The toxin is spread in the blood, where it can attack the heart and nervous system. Diphtheria infects through droplet infection, ie small bacteria that are coughed up by an infected person, which then circulate in the air until another person breathes them in and becomes infected. Basic vaccine: 2 doses at a 6-week interval
- tetanus is sometimes popularly known as 'lockjaw'. It is an acute bacterial infection that arises in the same way as diphtheria. The bacteria only like surroundings poor in oxygen, such as wounds. Tetanus infects by the bacteria getting into the body when a wound is polluted, for example by earth, animal saliva, street dirt, etc. The toxin affects the muscular nerves and results in stiffness in the musculature. High mortality rate. Basic vaccine: 2 doses at a 6-week interval and a third dose after 1 year.

  Revaccination: When someone has received the basic vaccination against diphtheria/ tetanus, it is enough to take 1 dose of vaccine at revaccination. Then the vaccine will provide protection for approximately a further 10 years.

Poliomyelitis (Polio)
This is a viral disease that infects via excrement to the mouth. In connection with large epidemics, it also infects via droplets. Polio results, amongst other things, in paralysis and muscular dystrophy.

Basic vaccination consists of 3 doses, 2 doses at one month's interval, and the third after 7–12 months. Duration: 5 years.

If more than 10 years have passed since the last polio vaccination, 2 doses of vaccine must be taken at approximately a 4-week interval. If less than 10 years have passed, but more than 5 years since the last dose, one dose, a 'booster', must be given.

Yellow fever
This extremely serious viral disease is transmitted by mosquito bite. It occurs in Africa, and large parts of South America. The virus attacks the liver and debilitates its function, jaundice is one of the symptoms. The disease has a high mortality rate.

The vaccine consists of one dose which provides protection for 10 years. A valid yellow fever vaccination is required for entry into several countries.

Cholera
This acute bowel infection is caused by a bacterium that directly affects the bowels. Infection occurs mainly via polluted water or rating contaminated food.

There are 2 types of vaccine. An injection provides very poor protection and must be repeated every 6 months. In addition, there is an oral vaccine (drinkable vaccine), which provides better protection. The vaccine consists of 2 doses at a 2–6 weeks interval.
Duration: 2 years.

Hepatitis A/Hepatitis B
There are separate vaccines against hepatitis A and hepatitis B, as well as a combination vaccine for protection against both diseases:

- Hepatitis A
  This is a viral disease that attacks the liver. It usually infects via polluted food and drink, but in infrequent cases also sexually.

  There are two versions of hepatitis A vaccine. One consists of 2 doses at an interval of 6–12 months. The other consists of 3 doses, of which the first two are given at approximately a 4-week interval, with a booster dose after 6–12 months. Both provide approximately 10 years' protection after the completed vaccination. Gamma globulin can also be given against hepatitis A. However, it only provides short-term protection (2–3 months).
- hepatitis B
  This is a serious viral disease that attacks the liver and debilitates its function It infects sexually and via blood and is extremely infectious. After infection, some people become chronic carriers of the disease and may eventually develop cirrhosis of the liver.

  The basic vaccination consists of 3 doses. The first two at a 4-week interval, the last one 6 months after the first dose. A blood test is recommended after the final dose to see whether the body has produced sufficient antibodies.

  The vaccine provides protection for 5 years after vaccination is completed. The vaccine is strongly recommended for captains/chief officers, or others who are in charge of first aid/treatment of injury.

Typhoid fever
Typhoid is a bowel disease caused by bacteria. It infects via water or polluted foodstuffs.

The vaccine is found in 2 variants. One is taken by injection. The other consists of 4 capsules, one capsule being taken between meals every second day and then the last dose 1 week before travel. The injection method is valid for 2-year periods and the capsule method for up to 5-year periods. Repeated doses are recommended for those at risk.

Tuberculosis
The disease can attack various organs. The most common type attacks the lungs. It infects via coughing and direct contact through sores on the skin, or puncture accidents.

The vaccine is known as the BCG vaccine. Its effectiveness is checked by a test.

Contact your local approved seafarer's doctor to have relevant vaccinations updated. If the doctor does not have the vaccine available, they can refer you to a vaccination clinic.

3.6.4 Diseases for which no Vaccines are Available

Two diseases that seafarers must be aware of, and for which no vaccine exists, are HIV and hepatitis C.

HIV
This virus is transmitted via body fluids, particularly semen and blood. The infection develops into the AIDS disease. There is no vaccine, however, with an early diagnosis and effective treatments, most people with HIV will not develop any AIDS-related illnesses and will live a near-normal lifespan.

The most important preventive measures are:

- Avoid casual sex without protection (condom)
- wear gloves when contact may be made with blood or body fluids, for example in connection with the treatment of sores or wounds
- limit certain medical equipment (including needles, syringes, swabs and other injecting mediums) to single use only.

Hepatitis C
This infects in the same way as HIV. The same protections are strongly recommended.

3.6.5 Malaria

Malarial infection is caused by the bite of a particular mosquito. As a result of the bite a living parasite enters the bloodstream. The disease is still on the increase in many areas around the world.

Prevention has gradually become harder as the malaria parasite has developed considerable resistance to the medicines currently in use for prevention and treatment.

Preventive medicine must be used. Remember that on board there is no doctor who can make a proper diagnosis and provide adequate treatment immediately.

Protection
Those who spend time in malarial areas, even only for short periods, must always protect themselves from infection. This is done both by physical protection from being bitten and by taking preventive medicine. For the best protection use both.

- **Protect yourself physically from mosquito bites**
  Try to avoid mosquito bites completely by covering your body (wear light-coloured, insecticide-treated clothing, long-sleeved shirts and long trousers), applying topical insect repellent onto exposed skin (35% DEET spray), limiting outdoor activities to daytime (the malaria mosquito mainly operates under the cover of darkness, from dusk to dawn) and by sleeping under a mosquito net.

  Substantial protection results when these approaches are combined. However, they may not always work so taking preventive medication in addition is essential

- **take preventive medicaments**
  Most of the available drugs must be started one week before arrival in the malaria area, continue during the whole stay and for four weeks after leaving the malarial area. The reason for continuing to take the medicine so long after departure from the malarial area is that the malarial parasite must be exterminated in the blood stream before the person is safe.

  Chloroquine, the former standard drug for malaria prevention and treatment, is now effective only in limited areas. A combination of chloroquine and proguanil (Paludrine) may be used in areas where parasite resistance to chloroquine is assessed as moderate. The combination provides better protection than either drug alone and is both accessible and affordable in those regions where it is commonly recommended, such as the Arabian Peninsula, Asia (except for Southeast Asia), Mauritania, Namibia and part of Colombia.

  Mefloquine (Lariam) is a highly efficacious drug (>90%) against chloroquine resistant malaria and has been widely used since the 1980s. Mefloquine is generally well tolerated, side effects are typically mild and self-limited, but occasionally they may be serious (dizziness, headaches, difficulty sleeping, anxiety, depression seizures, delirium). Mefloquine has been provisionally recommended for use over a period up to one year, but pregnant women should avoid using it.

  A fixed dose combination of atovaquone and proguanil (Malarone) was developed in the 1990s for the both the prophylaxis and treatment of multidrug-resistant malaria. Side effects are rare and it is better tolerated than either mefloquine or chloroquine/proguanil, but Malarone should not be used by pregnant women. Because of its short pre- and post-exposure dosing regimens, the drug is ideal for short-term travellers: 1 tablet a day, starting 1–2 days before travel and continuing for one week after departure from the mainland area.

Treatment
Because the parasite remains active after the person infected leaves the malarial area, it is important that any inexplicable fever that begins after the seventh day of a stay in a malarial area should be

considered as possibly caused by malarial infection. Therefore, all ships should have medicine that is used for treatment of possible malaria attacks in addition to preventive medication. Radio for advice from a doctor before treating possible malaria attacks.

The need for protection for those who come from malarial areas

People from areas where malaria is widespread, and those who have already been infected by one type of malaria, must also protect themselves, particularly when they are in a different malarial area.

No preventive medication provides complete protection.

4 Safety and Health Training

4.1 Principles

4.1.1 The Legal Framework

The ISM Code states that:

> *"The Company should clearly define and document the master's responsibility with regard to:*
>
> - *Implementing the safety and environmental policy of the Company*
> - *Motivating the crew in the observation of that policy."*

Training has an important role to play in every Master's strategy for meeting these responsibilities.

National and transnational Administrations are often even more specific in stating the importance of health and safety training. For example, EU legislation states that:

> *"The employer shall ensure that each worker receives adequate safety and health training, in particular in the form of information and instructions specific to the workstation or job."*

and

> *"The employer shall ensure that workers from outside undertakings and/or establishments engaged in work in his undertaking and/or establishment have in fact received the appropriate instructions regarding health and safety risks."*

4.1.2 Identifying Training Needs

Much of the work on board ship is relatively routine and covered by standard procedures. There are several mandatory subjects for safety training, such as how to carry out abandon ship drills effectively. Risk assessments are also an important way of identifying training needs.

Because of this, it is often not difficult for an experienced officer or safety supervisor to produce a list of topics to be covered by safety and health training without having to consult anyone else.

Even when that is the case, however, it would be wrong to overlook the advantages of finding out what those who will be trained want and think they need. Doing so helps to focus training more precisely on the details of what is required. For example, all members of fire teams must be able to use breathing equipment properly, but what, specifically, does the particular team you will be training find difficult about doing so? Ask them!

4.1.3 Training Methods

The main methods used for safety training on board ship are:

- **Lectures**
  When the trainer has information that the group being trained need to know about, lecturing is the simplest (as well as the cheapest) way of delivering it.

  But:

  - » keep it short. 10–15 minutes is the maximum amount of time that most people can sit and listen to someone talking at them
  - » keep it simple. Put what you have to say in the everyday language of those you are training. Explain technical terms and acronyms
  - » ask questions. If what you have to say is going to take longer than ten or fifteen minutes, break the lecture up by asking questions and leading short discussion sessions
  - » use examples. People are often bored by accident statistics and irritated or cynical about rules and regulations. But almost all of us are fascinated by stories of accidents. It is examples that bring the subject of safety to life

- **training videos**
  Training videos are a powerful way of explaining and dramatising ideas about how people should work together, demonstrating techniques they might use to tackle particular types of situation, providing examples of novel solutions to common problems and showing situations (such as serious fires) that for obvious reasons cannot be duplicated on board

- **discussion**
  Discussion of how the information, techniques and ideas covered in the training relate to individual's experiences on board should be a major part of any safety training session. When leading a discussion:

  - » ask open questions
  - » give people time to answer
  - » use small groups

- **distance and 'e-learning'**
  Not all training has to be in groups. Individual study can also be a useful means of acquiring information (though not, obviously, of strengthening group safety culture). The methods used can be as simple as reading a book or they can involve the use of a computer and 'e-learning' software.

4.2 How to Plan, Run, Assess and Follow Up a Training Session

4.2.1 Preparation

Think about:

- What you know (and do not know) about the subject. During preparation, identify any gaps in your knowledge and plan how to fill them
- the group size you will be training
- your objectives:
  - » the subject you want to cover
  - » the group's existing knowledge and skills
  - » the time you have available

- the setting
  One great advantage that running safety training on board has over shore based training establishments is access to the most important piece of training equipment of all – the ship. This means, for example, that you do not have to show people pictures of watertight doors. You can show them the real ones.

4.2.2 Delivering a Training Session

- Don't rush
- outline your objectives at the beginning of a training session:
- ask for a reaction:
  - » are there any questions?
  - » what do attendees want from the session?
- encourage participation
  Unless the session is going to be very short, try to get the group talking or doing something as early in the session as you can.

4.3 Basic Safety Training on Board

There are some basic topics that you should cover whatever your type of ship and trading pattern. Some of these are mandatory, legal requirements. Add to them to suit your ship's specific circumstances.

4.3.1 Shipboard Familiarisation

The Seafarers' Training, Certification and Watchkeeping (STCW) Code (Ch. VI, Section A-VI/1), stipulates that:

> *"Before being assigned to shipboard duties, all persons employed or engaged on a seagoing ship, other than passengers, must receive approved familiarisation training in personal survival techniques, or receive sufficient information and instruction, taking account of the guidance given in part B, to be able to..."*

Note that:

- The Code says that crew must be trained *'Before being assigned to shipboard duties'*
- the Code says, *'to be able to'*. This is not simply about giving people information. They must be able to perform the activities specified.

The specified activities are:

> ***1.1 Communicate with other persons on board on elementary safety matters and understand safety information symbols, signs and alarm signals***
>
> ***1.2 Know what to do if:***
>
> ***1.2.1 a person falls overboard***
>
> ***1.2.2 fire or smoke is detected, or***
>
> ***1.2.3 the fire or abandon ship alarm is sounded***
>
> ***1.3 Identify muster and embarkation stations and emergency escape routes***
>
> ***1.4 Locate and don lifejackets***
>
> ***1.5 Raise the alarm and have basic knowledge of the use of portable fire extinguishers***
>
> ***1.6 Take immediate action upon encountering an accident or other medical emergency before seeking further medical assistance on board; and***
>
> ***1.7 Close and open the fire, weathertight and watertight doors fitted in the particular ship other than those for hull openings***

Further safety training is required for those with specific safety or pollution control duties.

The ISM Code states that:

> ***"The Company should establish procedures to ensure that new personnel and personnel transferred to new assignments related to safety and protection of the environment are given proper familiarisation with their duties. Instructions which are essential to be provided prior to sailing should be identified, documented and given."***

The Chapter and Section of STCW quoted above goes on to cover the requirements for individuals with these duties in some detail. The basic regulation is set out below. Refer to your copy of the STCW Code for the details contained in the tables listed.

> ***2 Seafarers employed or engaged in any capacity on board ship on the business of that ship as part of the ship's complement with designated safety or pollution-prevention duties in the operation of the ship shall, before being assigned to any shipboard duties:***
>
> ***2.1 receive appropriate approved basic training or instruction in:***
>
> ***2.1.1 personal survival techniques as set out in table A-VI/1-1,***
>
> ***2.1.2 fire prevention and fire fighting as set out in table A-VI/1-2,***
>
> ***2.1.3 elementary first aid as set out in table A-VI/1-3, and***
>
> ***2.1.4 personal safety and social responsibilities as set out in table A-VI/1-4.***
>
> ***2.2 be required to provide evidence of having achieved the required standard of competence to undertake the tasks, duties and responsibilities listed in column 1 of tables A-VI/1-1, A-VI/1-2, A-VI/1-3 and A-VI/1-4 within the previous five years through:***
>
> ***2.2.1 demonstration of competence, in accordance with the methods and the criteria for evaluating competence tabulated in columns 3 and 4 of those tables; and***
>
> ***2.2.2 examination or continuous assessment as part of an approved training programme in the subjects listed in column 2 of those tables.***

The STCW Code gives Administrations the option to exempt ships, other than passenger ships of more than 500 GT engaged on international voyages and tankers, from the full requirements of this section if it considers these to be unreasonable or impractical.

Check whether this exemption applies to your ship.

4.3.2 Safety Supervisors and Safety Officers

There are certain subjects that those with particular responsibility for safety and health on board must understand. Many of these also require the ability to put procedures into practice and implement improvements:

- The ISM Code
- the role of the safety officer/Supervisor
- the safety committee
- risk assessment
- safety inspections
- accident investigations
- permits to work
- shipboard familiarisation
- safety training
- drills
- promoting a safety culture on board.

4.3.3 Safety Representatives and the Safety Committee

It is not essential for safety representatives and other members of the safety committee to have the same depth of understanding as the safety supervisor of, for example, how to carry out risk assessments and safety inspections, but they should have a thorough grasp of the following principles:

- Preparing for and taking part in meetings
- risk assessment
- safety inspections
- accident investigations
- safety regulations relevant to the ship.

4.3.4 Officers and Ratings

The STCW Code describes in great detail the standard of competence required by ships officers and ratings. The Code defines 'standard of competence' as:

'the level of proficiency to be achieved for the proper performance of functions on board ship in accordance with the internationally agreed criteria as set forth herein (ie in the Code) *and incorporating prescribed standards or levels of knowledge, understanding and demonstrated skill'*

When planning safety training for officers and ratings, use the STCW standards as your guide.

5 | Reviewing Safety and Health on Board

5. Introduction

The purpose of this section is to help the safety supervisor and the safety committee to review the crew's perceptions about safety on board and, in particular, learn the areas where the crew believe that standards could be improved upon. The section contains:

- **A questionnaire for finding out what the crew thinks**
  This covers their perceptions of:
  - » safety information
  - » safety documentation
  - » safety equipment and ergonomics
  - » assessment of risks
  - » health on board
  - » safety and health training
  - » Permits to Work
  - » crew participation in safety on board
  - » company involvement in safety on board
  - » crew members' attitudes to risk

  Most of the questions first ask the crew member to tick 'yes', 'no', or 'not sure' about specific subjects and then to give an overall 'score' of effectiveness from 1 (poor/ineffective, etc) to 5 (excellent, etc)

- **a form to summarise the crew's opinions**
  This simple form allows you to display the average response to the 'overall effectiveness' part of each question. You can, of course, provide the crew with a much more detailed summary by giving them the total number of 'yes', 'no' and 'not sure' answers for each question.

  We recommend using this questionnaire regularly, say every 3 to 6 months. This will provide you with an assessment of the effectiveness of actions you have taken to improve safety.

  (Note that this procedure is not required as part of annual reporting of safety to national Administrations).

5.1 Organisation of Safety and Health on Board

5.1.1 Introduction

The purpose of this questionnaire is to help the safety supervisor and the safety committee find out what the crew think about the strengths and weaknesses of safety and health management on board. This questionnaire will allow the safety supervisor and safety committee to prioritise specific actions to help make the ship a safer and healthier environment.

Most of the questions first ask you to answer 'yes', 'no' or 'not sure' about a specific topic and then to give an overall 'score' of effectiveness from 1 (poor/ineffective, etc) to 5 (excellent, etc).

You do not have to put your name on the Questionnaire. The information you provide is completely confidential.

Once the committee has put together all of the views from you and your fellow seafarers, they will publish a summary.

5.1.2 Questionnaire for individual members of the crew

Q1: Information about safety and health

How do you rate the information about safety and health that you are provided with on board?

1	2	3	4	5
Poor		Average		Excellent

Q2: Documentation on safety and health

Written procedures, permits, safety notices, etc form an important part of your ship's safety system. How do you rate the quality of this documentation on safety and health?

	Yes	No
• Documents are easy to find	☐	☐
• they cover all relevant issues	☐	☐
• they are easy to understand	☐	☐
• they are regularly updated	☐	☐

How do you rate the overall quality of the safety and health documentation on board?

1	2	3	4	5
Poor		Average		Excellent

Q3: Safety equipment and ergonomics

Ships carry a range of equipment, from mechanical handling devices to ear protectors, to help you carry out your work safely. How do you rate this equipment? How well is both the equipment and the organisation of work adapted to suit the characteristics of individuals?

	Yes	No	Not sure
• There is suitable safety equipment for everyone on board	☐	☐	☐
• due consideration is given to differences in skill/body size/ strength	☐	☐	☐
• individual differences are allowed for:			
» fire-fighters' suits come in different sizes	☐	☐	☐
» survival suits fit the individuals who use them	☐	☐	☐
• safety railings are provided where necessary	☐	☐	☐
• sharp edges at head height are protected	☐	☐	☐
• there are warning signs for hazardous spaces	☐	☐	☐
• safety harness/lifelines are always available	☐	☐	☐
• appropriate protective equipment is always issued before work is started	☐	☐	☐
• damaged protective equipment is repaired or discarded	☐	☐	☐
• breathing apparatus is regularly and properly inspected and maintained	☐	☐	☐
• care is taken to ensure that no member of a search and rescue team suffers from claustrophobia	☐	☐	☐
• care is taken to ensure that no-one suffering from vertigo (a fear of heights) is required to work aloft	☐	☐	☐

Overall, how do you rate the equipment provided on board to enable you to do your job safely?

1	2	3	4	5
Poor		Average		Excellent

Overall, how well are the equipment and the organisation of work adapted to suit the characteristics of individuals?

1	2	3	4	5
Not at all		Reasonably		Very well

Q4: Assessment of risks

	Yes	No	Not sure
• Is there a formal procedure for assessing risks on board?	☐	☐	☐

If you are aware of a formal system for assessing risks on board, how well do you think it works?

1	2	3	4	5
Badly		Average		Very well

Q5: Health on board

	Yes	No	Not sure
• Did you have a medical examination before joining this ship?	☐	☐	☐
• were you made aware of any particular health precautions for working on this ship, such as recommended vaccinations?	☐	☐	☐
• were the results of any medical examinations and/or vaccination certificates checked when you joined the ship?	☐	☐	☐
• are you satisfied with the facilities for treating injuries on this ship?	☐	☐	☐

How stressful is working on this ship?

1	2	3	4	5
Very stressful		Reasonably stressful		Not stressful

How do you rate the standard of cleanliness and hygiene on this ship?

1	2	3	4	5
Poor		Reasonable		Excellent

How do you rate the precautions taken for handling dangerous materials, such as chemicals and solvents, on this ship?

1	2	3	4	5
Poor		Reasonable		Excellent

Q6: Safety and health training

	Yes	No
• Did you receive any safety and health training before joining this ship?	☐	☐
• did you receive basic safety familiarisation training after signing on, but before taking up your duties?	☐	☐
• since joining the ship have you received training in the following subjects?	☐	☐
» manual handling?	☐	☐
» protection against noise and vibration?	☐	☐
» use of personal protective equipment (PPE)?	☐	☐
» the company's permit to work system?	☐	☐
» dealing with emergencies (fire, abandon ship, etc)	☐	☐
» dangerous materials: safety and health risks and precautions?	☐	☐

How do you rate the standard of safety and health training on board?

1	2	3	4	5
Poor		Reasonable		Excellent

Q7: Permits to Work

Are you aware of any work being done without the issuing of a formal permit to work:

	Yes	No
• In tanks or other enclosed spaces?	☐	☐
• aloft?	☐	☐

How satisfied are you with the operation of the permit to work system on this ship?

1	2	3	4	5
Not at all satisfied		Fairly satisfied		Very satisfied

Q8: Crew participation in safety on board

	Yes	No	Not sure
• All categories of crew member are actively involved	☐	☐	☐
• safety work is relevant for ratings only	☐	☐	☐
• everybody is free to ask questions or make suggestions about safety	☐	☐	☐
• the safety committee has the required number of meetings	☐	☐	☐

How do you rate the effectiveness of the safety committee?

1	2	3	4	5
Not effective		Reasonably effective		Very effective

How active is the crew in maintaining and improving safety on board?

1	2	3	4	5
Not active		Reasonably active		Very active

Q9: The support provided by the company to safety and health on board

	Yes	No	Not sure
• The company is actively involved in supporting safety and health on board	☐	☐	☐
• the company has qualified people supporting us	☐	☐	☐
• the company pays attention to our safety reports	☐	☐	☐
• the company actively follows up accident reports to identify the causes	☐	☐	☐
• the company provides us with useful information to help us improve safety on board	☐	☐	☐

What is your overall opinion of the support that the company provides to maintain and improve safety and health on board?

1	2	3	4	5
Poor		Average		Excellent

Q10: Your personal attitude to work involving risk

This question is about the state of the safety culture on board and, in particular, the extent to which all members of the crew think actively about safety as they go about their work. Please try to be as honest with yourself as possible when answering this question. Remember that your answers will remain entirely confidential.

You will find that your answers will be more accurate if you think about them in the context of specific examples of work involving potential risks that you have previously carried out on board.

	Always	Sometimes	Never
• When you see someone doing something risky or dangerous, do you warn them?	☐	☐	☐
• when you are working on potentially hazardous jobs, do you:			
» expect to receive information about the risks involved?	☐	☐	☐
» discuss the risks with the safety supervisor?	☐	☐	☐
» check that safeguards are in place before starting work?	☐	☐	☐
» make sure that you are using the correct personal protective equipment (PPE)?	☐	☐	☐
» discuss the risks with everyone involved?	☐	☐	☐
» make sure that everyone involved understands and is using the correct safety precautions?	☐	☐	☐

How do you rate your overall attitude to safety?

1	2	3	4	5
I take too many chances		I am reasonably careful		I put safety first every time

5.2 A Summary of Responses to the Safety and Health Questionnaire

This summary shows the average responses to the 'overall effectiveness' part of each of the 9 questions on the questionnaire.

Total number of questionnaires distributed	
Number of questionnaires returned	
Percentage response	

Question	**Average response:** **1 = poor** **(or equivalent)** **5 = excellent** **(or equivalent)**
Safety information How do you rate the information about safety and health that you are provided with on board?	
Safety documentation How do you rate the overall quality of the safety and health documentation on board?	
Safety equipment and ergonomics Overall, how do you rate the equipment provided on board to enable you to do your job safely?	
Overall, how well is the equipment and the organisation of work adapted to suit the characteristics of individuals?	
Risk assessment If you are aware of a formal system for assessing risks on board, how well do you think it works?	
Health How stressful is working on this ship? How do you rate the standard of cleanliness and hygiene on this ship?	
How do you rate the precautions taken for handling dangerous materials, such as chemicals and solvents, on this ship?	
Permits to work How satisfied are you with the operation of the PTW system on this ship?	
Crew participation in safety on board How do you rate the effectiveness of the safety committee?	
How active is the crew in maintaining and improving safety on board?	
Company support for safety and health on board What is your overall opinion of the support that the company provides to maintain and improve safety and health on board?	
Crew members' attitude to safety How do you rate your overall attitude to safety?	

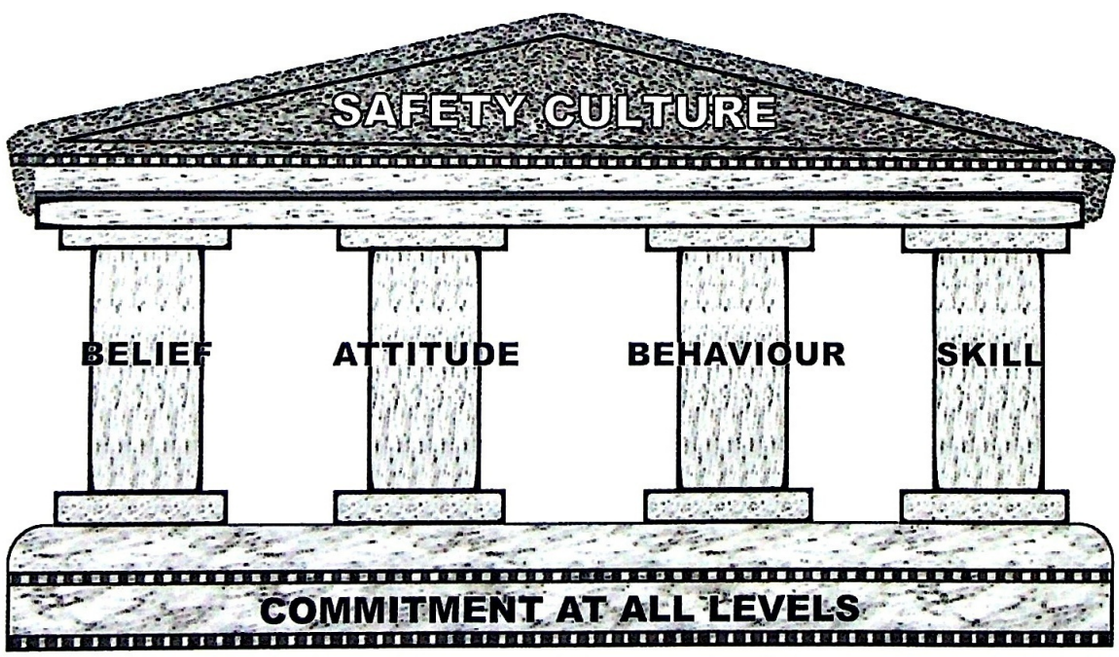
6 The Human Factor

6.1 Safety Culture

"The application of the ISM Code should support and encourage the development of a Safety Culture in shipping."
IMO Resolution A.788 (19), 'Guidelines on the Implementation of the International Safety Management (ISM) Code'

The steps taken by shipping companies to put the ISM Code into practice inevitably, and correctly, result in safety management becoming more formal and systematic. Policies are defined, procedures are written, records are kept. That is all as it should be, but it is not enough. On its own, paperwork will not prevent a single injury. Dramatic improvements in safety only come about when individuals think about and take responsibility for their own safety and that of their fellow seafarers. There must be a culture on board every ship in which safety comes first.

6.1.1 What is 'Safety Culture'?



- **The foundation**
  The ISM Code provides a definition of the foundation on which an effective safety culture rests:

  'The cornerstone of good safety management is commitment from the top. In matters of safety and pollution prevention it is the commitment, competence, attitudes and motivation of individuals at all levels that determines the end result.' [ISM Code, Preamble, para. 6].

Companies demonstrate commitment to safety in the following ways:

- **structure**
  The ISM Code requires companies to describe the functions of all those responsible for safety and to designate the person or persons ashore who will provide the link between the company and those on board

  The Code says that the designated person must have direct access to the highest level of management. To effectively demonstrate commitment to safety it is essential that this access is seen to be in operation by everyone on board

- **policy**
  Safe working practices must be set out and supported by clear statements of policy

- **communication**
  Managers ashore, superintendents and others visiting ships, together with officers on board, must continuously communicate the importance of safety

- **action**
  Action is the most important evidence of management commitment. Unfortunately, there are organisations who practice the opposite of what they preach. Their employees recognise this and act accordingly.

  For example, although a company may have a legally acceptable, written environmental protection policy, if all that the crew hear about from their managers ashore is a continual stress on the high cost of legal discharge of sludge, garbage and sewage in port and the need to save money, no-one should be surprised if they resort to illegal discharge at sea

- **belief**
  Individual seafarers must believe that safety is important. It may seem obvious that they should do so, since no-one, surely, wants to get hurt. But it is not quite as simple as that. Because the nature of seafarers' work is more physically demanding and inherently hazardous than, say, working in an office, there can be a tendency to regard a concern for safety as somehow 'weak'

  > An example of this state of mind was when the author was told, when working in a shipyard as a young man, that *'you can't be a proper engineer if you've got ten fingers!'*

  It is not possible to create a strong safety culture if people believe that safety is unimportant.

- **attitude**
  Creating a safety culture often involves changing the way people think. What attitude do some people have to safety? Here are some examples:

  'It won't happen to me'

  'The officers and the safety supervisor look after safety. It's their job, not mine'

  'There's a procedure for this, so I don't need to worry'

  'It's not my business to point out other people's unsafe actions'

  'Safety precautions are all very well for inexperienced youngsters. But I've been at sea for twenty years. I know what corners I can cut'

- **behaviour**
  It is particularly important for the senior and more experienced individuals on board to behave in ways that demonstrate that, for them, safety comes first. Setting a good example is the most effective way of creating a strong safety culture

- **skill**
  Skilled and experienced people working in unsafe situations can have a better safety record than unqualified and inexperienced people working in safe situations. While it must be the goal of everyone on board to make working conditions as safe as possible, unless those involved are competent, accidents will happen however many precautions are taken.

6.1.2 Practical Questions for Managers and Officers

There are a number of actions that managers and officers can take to strengthen the safety culture on board. The answers to the following questions will help to identify what is appropriate in the circumstances of each ship.

- **What management does**
  - » does management actively and visibly support safety? (what examples are there to justify answering 'yes' to this question?)
  - » are sufficient resources always available for safety (even if providing them means adjusting the allocated budget)?
  - » is safety an issue that is always discussed at management meetings?
- **what management pays attention to**
  - » does management pay attention to the crews' injury and illness records and trends?
  - » do managers systematically investigate the safety implications of change - new ships, new equipment, modified processes, different cargoes, changes to chemicals or materials, etc?
- **what management ignores**
  - » does management pay insufficient attention to shipboard workplace hazards, poorly designed working practices, operations, materials handling and transportation?
- **what measures and controls management uses**
  - » is the control and inspection of safety adequate?
  - » do operational matters ever come before employees' safety?
  - » are injuries and illnesses under-reported?
  - » is the reporting of 'near misses' encouraged (and does it happen)?
  - » is the mandatory reporting of personal injuries to the relevant Administration communicated to the appropriate managers?

    There is an obvious danger in regarding 'management' as a group of people who are in constant and perfect communication with one another. It is therefore very important that the department responsible for informing the Administration about accidents and injuries also passes this information to those colleagues within the company who are in a position to draw lessons from what has happened and who can take steps to prevent similar situations from arising in the future
- **how management responds to accidents and unsafe acts**
  - » are accidents systematically investigated?
  - » are 'near misses' systematically investigated?
  - » what is the primary purpose of accident and unsafe act investigations – to determine the cause or to apportion blame?
  - » do investigations cover any possible managerial responsibility?

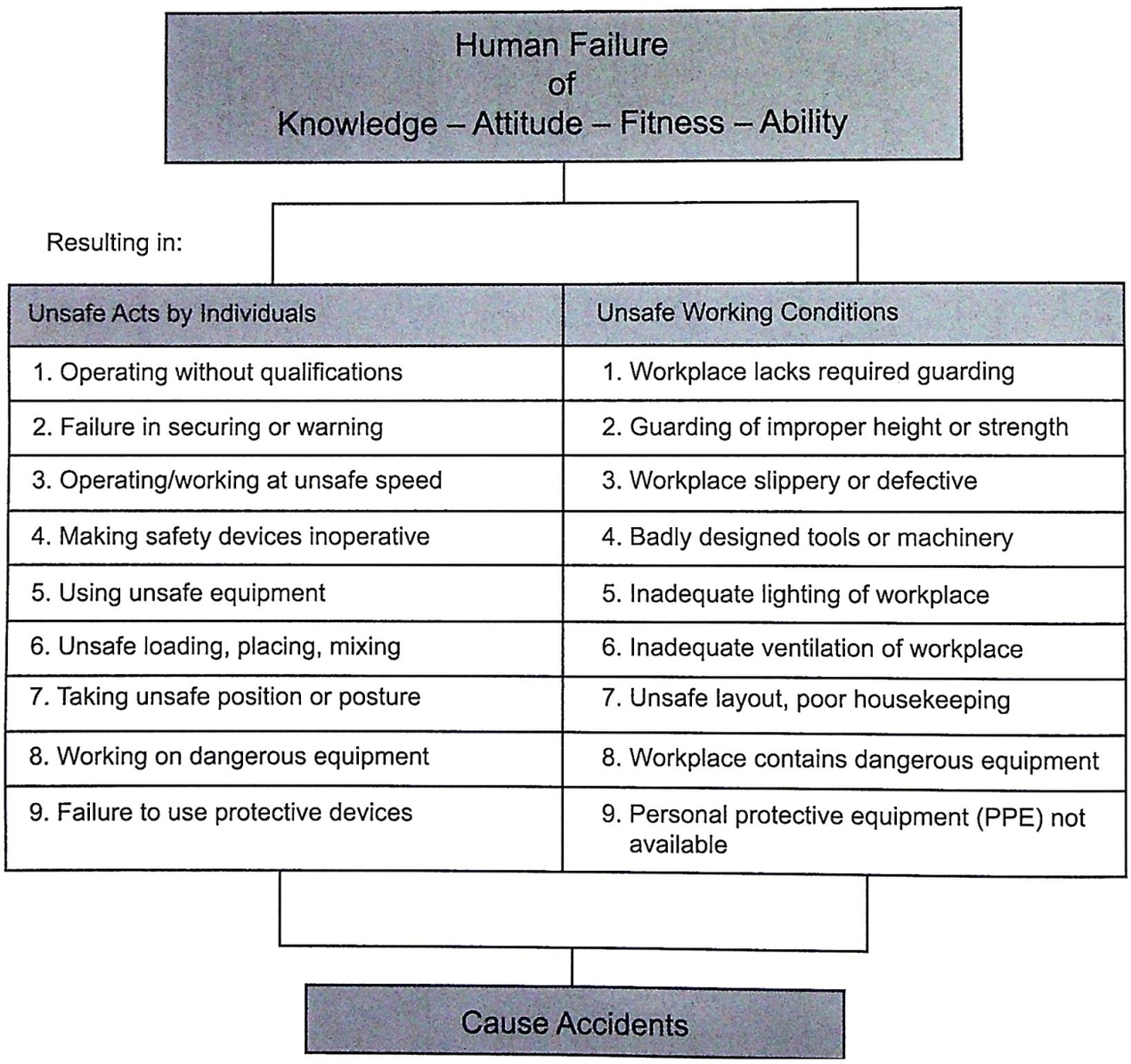
6.2 Understanding Accidents

6.2.1 Accidents – the Basic Causes

There are two basic causes of accidents:

- Unsafe acts by individuals
- unsafe working conditions.

It is important to recognise that these two causes often interact with one another: unsafe working conditions are a consequence of human failure, often on the part of management. Accidents cannot be excused because *'the system failed:* or *'the procedure couldn't cope in these circumstances'*.



6.3 Human Behaviour

Using unsafe equipment or allowing dangerous equipment into a workplace is, on the face of it, seriously irrational behaviour. So why do people do it?

- Basic motivation
- personal ability and attitude.

It is not possible to generate the correct level of enthusiasm and concern for safety amongst people whose work fails to motivate them. Social scientists who study the relationship between motivation and performance at work are generally agreed that the following factors determine whether people are likely to feel motivated:

- **Satisfactory and meaningful job content**
  Work, even unpleasant work, becomes much more acceptable when we understand why we are doing it, when we can see that we have achieved a satisfactory result and when we believe that result to be worthwhile
- **variety**
  An unrelieved diet of chipping paint or cleaning bilges will soon dampen the enthusiasm of even the most dedicated seafarer
- **challenge and development**
  Crew should be constantly challenged in their work and there should be the potential for growth within their roles (or the possibility of advancement)
- **responsibility and control**
  Human beings are not robots. It is an almost universal finding that performance and safety improve, often dramatically, when people are given responsibility for and an appropriate measure of control over their work
- **support and recognition**
  Employees who are highly motivated, and who are praise and encouragement when they do good work are more likely to see themselves as part of a team and to feel more responsibility and pride in their work, resulting in them taking a more active and serious approach to safety and health
- **socially acceptable work**
  Work becomes more motivating when we can see that it contributes to a wider purpose that is valued by other people
- **career progression**
  Although many of us reach a stage in our lives when we are content with the job we have (assuming it meets the criteria above), career progression, particularly when we are younger, can be an important motivator.
- **personal ability and attitude**
  Although accidents can result from many different types of human error, safety professionals recognise that some are much more common than others, particularly the six types described below. It is essential to take these into account when making decisions about equipment and its uses or operating procedures:
  - **lack of skill, knowledge, aptitude or physical ability**
    Many accidents are caused because people simply don't know what they are doing or are physically incapable of performing the work. The remedy (or, better still, the preventive action) for lack of skill or knowledge is proper training and supervision. For aptitude and physical ability, it involves making sure that the right person is chosen to do the work. For example, it makes obvious sense not to ask seafarers who are afraid of heights to work aloft

- **acceptance of unsafe conditions**
  There are two problems here. Those seafarers who have been on board for some time may become complacent and simply stop noticing that standards have slipped. And new crew members may be reluctant to speak up about practices they are not comfortable about and, if they do, may simply accept the reply that *"this is how it is on this ship"*
- **experience, assumptions and a false sense of security**
  Experience can trap people into making false assumptions. Two pieces of equipment may appear to be identical, but there may be important, and potentially dangerous, differences between them. Individuals should always question the assumptions they might make by asking, for example, *"do the brakes on this crane work as well as those on the one I was operating yesterday?"*
- ***"rules are there to be broken"***
  Some people are irritated by rules, regulations and procedures. This is particularly common when no-one has made sure that they understand why these restrictions are necessary.

  It is very important from the point of view both of performance and of safety for individuals to be clear about what decisions they can and cannot take
- **poor communication**
  Even when people get the right information, they sometimes draw the wrong conclusions from it. Safety comes from dialogue, so that everyone understands what is to be done and why
- **stress and fatigue**
  When we are tired or under pressure, we make mistakes. The sinking of *'The Herald of Free Enterprise'* because the bow doors to the car deck were not shut when the ship sailed is a classic example of what can happen when individuals are exhausted and a crew is put under unreasonable operational pressure.

7 Practical Examples

This section is reproduced with permission from The Nautical Institute's Mariner's Alerting and Reporting Scheme (MARS).

How to learn from accidents and 'near misses' on board

The Mariners' Alerting and Reporting Scheme (MARS) is primarily a confidential reporting system run by The Nautical Institute to allow full reporting of accidents (and 'near misses') without fear of identification or litigation.

With access to the Internet from vessels becoming more affordable, the MARS database is a valuable risk assessment, work planning, loss prevention tool and training aid for both the crew on board and the management ashore.

The MARS database contains over 25 years of accident reports.

Example 1: Mooring line pays out too fast

A tanker was berthing at a terminal. At the aft mooring station, a crew member saw that the slack mooring rope was not feeding out the fairlead and they tried to help the feeding to the mooring tug. While they were handling the rope slacks on deck, the rope started to pay out and then accelerated outboard through the fairlead.

The officer in charge (OIC) of the aft mooring station did not notice the developing hazard of the fast-moving mooring line as his attention was on the attending mooring tug. The rope caught the crew member's arm as it slid out, causing a fracture to his left forearm.

First aid was provided and the crew member was sent for shore examination, where it was recommended that they be repatriated.

Figure 5 – Arm injury following mooring line incident

Lessons learned

- Crew should be advised not to take any actions while handling mooring lines unless the OIC has been advised and the action has been approved
- OICs of mooring operations need to closely monitor crew members to ensure they do not become complacent or otherwise inadvertently undertake a dangerous act, putting themselves and others in a dangerous situation
- a fast moving, heavy mooring rope presents a clear hazard. If a mooring line is too heavy to control, take one or two turns around a warping drum and then pay it out using an extra crewman to ease off turns around the drum.

Example 2: Stairs slip-up injures crewman

Some deck crew were engaged in casting off a bunker barge. As they were letting go the lines on the upper deck, they heard a noise at the port side break of the accommodation. Ongoing there, they found an injured crew member lying on the deck.

Apparently, they had been descending the steep steps rather hurriedly, facing forward and possibly not holding the handrail. Additionally, they had not noticed the stairs were wet due to a slight drizzle. All of these factors made him to slip and then slide down the stairs, injuring the back of his head, shoulder and ankle. They were given first aid and taken to hospital.

Lessons learned

- The best way to descend steep stairs is facing the stairs with at least one hand on the railing
- rushing down stairs is not necessarily the fastest way down
- anti-slip strips on stair edges can help prevent slips in wet conditions.

Example 3: Scaffolding comes crashing down

Scaffolding had been erected on top of hatch cover four of a general cargo vessel to allow two crewmembers to paint the crane jib while the vessel was underway. Seas were slight with no swell. A permit to work (PTW) had been issued and the risk assessment was considered. Both crew members were wearing personal protective equipment (PPE) and safety harnesses.

After they had completed painting, the two crew loosened the top securing rope, removed their safety harnesses and started descending the scaffolding from opposite sides. As they were climbing down, the ship suddenly began rolling and the scaffolding tipped over, collapsing on the hatch cover and taking the two crew members with it.

The two victims were badly injured, and the vessel had to urgently deviate to evacuate them. One of them had to undergo surgery and both were subsequently repatriated under medical escort for further treatment in their home country.

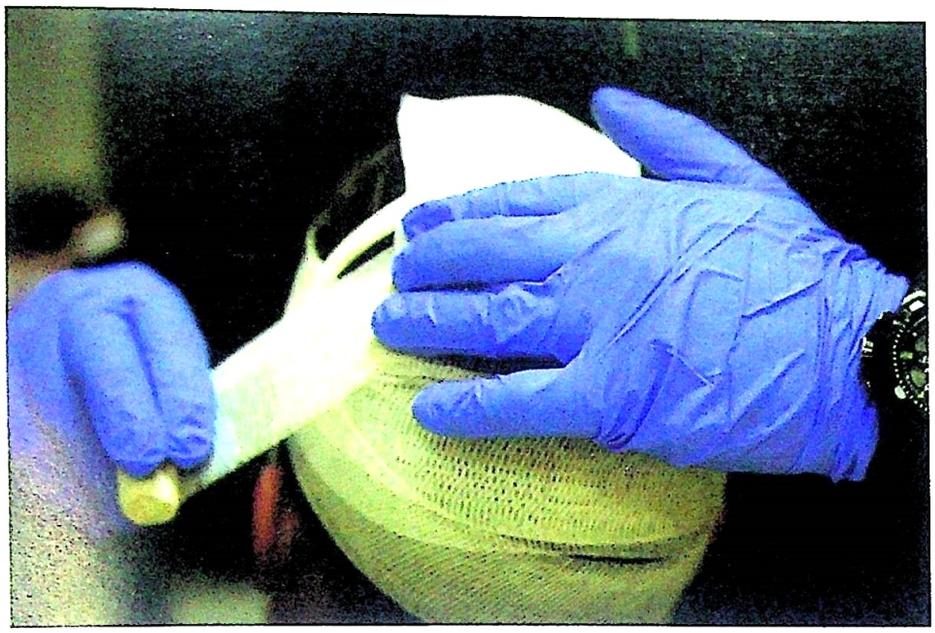


Figure 6 – **Head injury sustained sustained by one victim**

The company investigation revealed that the accident occurred as a result of several substandard practices and conditions on board, including:

- Inadequate work planning/preparation. Not all the risks associated with the assigned work had been considered, particularly not the rapidity with which sea conditions can change, making scaffold work dangerous
- failure to ensure that the scaffolding was properly secured while the two crew members were descending. The top securing rope was loosened, making the scaffolding unstable while crew members were still on the scaffolding
- safety harnesses were not used while the two crew were descending the scaffolding
- the two victims attempted to descend simultaneously. This may have made the scaffolding even more unstable if it was not done in a following sequence.

Lessons learned

- Fall protection should be used in cases where a crew member is at risk of falling two metres or more. An approved safety harness including a fall arrestor, an inertia reel or a safety line should always be used, even when crew are ascending or descending, and should be connected to a strong point on the ship structure
- erecting scaffolding while the vessel is at sea can be dangerous as weather conditions can change rapidly
- scaffolding, when used, should be adequately secured from all sides and especially from the top
- generic risk assessments are often insufficient for many situations — they should always be task specific.

Recommendations

It is recommended that the MARS system is introduced into safety meetings on board in the following ways:

1. Describe the case in simple words.
2. Add photographs or make sketches showing what happened.
3. Discuss the how and why of the case:
   - » external conditions
   - » instructions or procedures broken
   - » was correct PPE used?
4. Discuss the lessons learned:
   - » amendment of SMS procedures
   - » review of ship's equipment.

Appendices

The Most Relevant IMO and EU Regulations

1. The IMO MLC Maritime Labour Convention.
2. The ISM Code, Chapters 1–13 (with items of relevance to safety and health on board highlighted in bold).
3. The STCW Convention and its relationship to the ISM Code.
4. Brief summaries and excerpts from relevant EU Council Directives for ships flying EU flags.

1. The IMO MLC Maritime Labour Convention

The Maritime Labour Convention 2006 (MLC) is an international agreement of the International Labour Organisation ('ILO') which sets out seafarers' rights to decent conditions of work. It is sometimes called the 'Seafarers' Bill of Rights'. It applies to all seafarers, including those with jobs in hotel and other passenger services on cruise ships and commercial yachts,

> As of February 2020, a total of 96 countries had ratified the MLC 2006, which has resulted in more than 92% of the world's shipping fleet being regulated. For more detailed information please visit the ILO website.

More than 100 pages long, the MLC 2006 sets minimum requirements for nearly every aspect of working and living conditions for seafarers including recruitment and placement practices, conditions of employment, hours of work and rest, repatriation, annual leave, payment of wages, accommodation, recreational facilities, food and catering, health protection, occupational safety and health, medical care, onshore welfare services and social protection.

Latest updates

There have been 3 amendments to the MLC. The latest set of amendments to the Maritime Labour Convention (MLC) for improving safety and welfare came into force on 8 January 2019. Account is to be taken of the latest version of the guidance on eliminating shipboard harassment and bullying, jointly published by the International Chamber of Shipping (ICS) and the International Transport Workers' Federation (ITF).

- In addition to the various health and safety matters that the MLC requires should be taken into account, there is, *'problems arising from harassment and bullying'.*

Bullying and harassment, including sexual harassment, are abuses of human rights and living on a ship offers limited alternatives to avoid it. Although these changes are non-mandatory, flag States must give due consideration to implementing them.

A further amendment has been made to mandatory Standard A5.1.3, whereby flag States may extend the validity of a Maritime Labour Certificate (which is otherwise limited to a maximum period of validity of five years) by up to a further five months. This will apply where a ship has successfully completed an MLC renewal inspection, but a new certificate cannot immediately be issued and made available on board. A new amendment will enter into force on 26 December 2020 concerning seafarer's employment agreements remaining in effect during piracy events or armed robbery attacks.

The MLC – Content

The Convention consists of the sixteen articles containing general provisions as well as the Code. The Code consists of five Titles in which specific provisions are grouped by standard (or in Title 5: mode of enforcement):

- Title 1: Minimum requirements for seafarers to work on a ship
- Title 2: Conditions of employment
- Title 3: Accommodation, recreational facilities, food and catering
- Title 4: Health protection, medical care, welfare and social security protection
- Title 5: Compliance and enforcement.

For each title, there are general Regulations, which are further specified in mandatory Standards (List A) as well as Guidelines (List B). Guidelines generally form a form of implementation of a Regulation according to the requirements, but States are free to have different implementation measures. Regulations and Standards should in principle be implemented fully, but a country can implement a 'substantially equivalent' regulation, which it should declare upon ratification.

Title 1: Minimum requirements for seafarers to work on a ship

The minimum requirements set out in this section of the Code are divided in 4 parts and are summarised below:

- *Minimum age requirements*: The minimum age is 16 years (18 for night work and work in hazardous areas)
- *medical fitness*: Workers should be medically fit for the duties they are performing. Countries should issue medical certificates as defined in the STCW (or use a similar standard)
- *training*: Seafarers should be trained for their duties as well as have had a personal safety training
- *recruitment/placement services:* Located in member States or for ships flying the flag of member States should have (among others) proper placement procedures, registration, complaint procedures and compensation if the recruitment fails.

Title 2: Employment conditions

The title on employment conditions lists conditions of the contract and payments, as well as the working conditions on ships.

- *Contracts*: The contract should be clear, legally enforceable and incorporate collective bargaining agreements (if existent)
- *payments*: Wages should be paid at least every month and should be transferable regularly to family, if so desired
- *rest hours/hours of work*: Rest hours or work hours should be implemented in national legislation. The maximum hours of work in that legislation should not exceed 14 hours in any 24-hour period and 72 hours in any seven-day period, or: at least ten hours of rest in any

24-hour period and 77 hours (rest) in any seven-day period. Furthermore, the daily hours of rest may not be divided into more than two periods and, at least six hours of rest should be given consecutively in one of those two periods

- *leave*: Seafarers have a right to annual leave as well as shore leave
- *repatriation*: Returning to their country of residence should be free
- *loss*: If a ship is lost or foundered, the seafarers have a right to unemployment payments
- *manning*: Every ship should have a sufficient manning level
- *development and opportunities*: Every seafarer has a right to be promoted during his career except in cases where there is a violation of a statute or code of conduct, which inevitably hinders such promotion. Also, skill development and employment opportunities should be made available for every seafarer.

Title 3: Accommodation, Recreational Facilities, Food and Catering

The title specifies rules detailed rules for accommodation and recreational facilities, as well as food and catering.

- *Accommodation*: Accommodation for living and/or working should be "promoting the seafarers' health and well-being". Detailed provisions (in rules and guidelines) give minimum requirements for various types of rooms (mess rooms, recreational rooms, dorms, etc)
- *food and Catering*: Both food quality and quantity, including water, should be regulated by the flag State. In addition, cooks should have proper training.

Title 4: Health Protection, Medical Care, Welfare and Social Security Protection

Title 4 consists of 5 regulations about Health, Liability, Medical care, Welfare and Social security.

- *Medical care on board ship and ashore*: Seafarers should be covered for and have access to medical care while on board, in principle at no cost and of a quality comparable to the standards of health care on shore. Countries through which territory a ship is passing should guarantee treatment on shore in serious cases
- *shipowners' liability*: Seafarers should be protected from the financial effects of "sickness, injury or death occurring in connection with their employment". This includes at least 16 weeks of payment of wages after start of sickness. Note, that amendments to the Convention that entered into force on 18 January 2017 require shipowners to have financial liability insurance in place, with certification required on board the ship
- *health and safety protection and accident prevention*: A safe and hygienic environment should be provided to seafarers both during working and resting hours and measures should be taken to take reasonable safety measures
- *access to shore-based welfare facilities*: Port States should provide "welfare, cultural, recreational and information facilities and services" and provide easy access to these services. The access to these facilities should be open to all seafarers irrespective of race, sex, religion or political opinion
- *social security*: Social security coverage should be available to seafarers (and, in cases where it is customary in the flag State, their relatives).

Title 5: Compliance and Enforcement

Title 5 sets standards to ensure compliance with the Convention. The title distinguishes requirements for flag state and port state control.

- *Flag States*: Flag States (the State under which flag the ship operates) are responsible for ensuring implementation of the rules on the ships that fly its flag. Detailed inspections result in the issue of a 'Certificate of Maritime Compliance', which should always be present (and valid) on a ship. Ships are required to have decent complaints procedures in place for its crew and should institute investigations in case of casualties
- *port States*: The inspection in ports depends on whether a Certificate of Maritime Compliance is present (and so a flag is flown of a country that has ratified the Convention). If the Certificate is present, compliance is to be assumed in principle, and further investigations only take place if the certificate is not in order or there are indications of non-compliance. For ships that don't have the certificate, inspections are much more detailed and should ensure, according to a 'no more favorable treatment principle'[5], that the ship has complied with the provisions of the Convention. The Convention is therefore, indirectly, also valid for ships of non-member countries if they plan to call to ports of a member State
- *labour agencies*: Agencies supplying on maritime workers to ships should also be inspected to ensure that they apply the Convention regulations (among others, the regulations relating to social security).

2. The ISM Code

International Safety Management (ISM) Code is the International Management Code for the Safe Operation of Ships and Pollution Prevention as adopted by SOLAS, Resolution A 741 (18).

The most recent version of the Code is the 2018 edition and as all ships operating under the ISM Code will have a copy on board, these details are not reproduced here.

Note in particular:

The Code's objectives (Ch. 1.2.1)

The objectives of the Code are to ensure safety at sea, prevention of human injury or loss of life, avoidance of damage of the environment, in particular to the marine environment, and avoidance of damage to property.

Company's Safety Management objectives (Ch. 1.2.2)

1. Provide for safe practices in ship operation and safe working environment.
2. Establish safeguards against all identified risks.
3. Continuously improve safety management skills of personnel ashore and on board ships, including preparing for emergencies related to both safety and environmental protection.

The SMS – Safety Management System – shall ensure (Ch. 1.2.3)

1. Compliance with mandatory rules and regulations.
2. That applicable codes, guidelines and standards recommended by IMO, Administrations (of the flag State), Classification Societies and marine industry organisations are taken into account.

The Preamble

This is an important and often neglected part of the ISM Code. The preamble is crucial to understanding the Code.

Certification – Validity and Verification

Certificates granted to companies (Documents of Compliance – DOCs) and to their ships (Safety Management Certificates – SMCs) under ISM are valid for five years. In addition, proper functioning of the Code's provisions must be periodically verified. For companies, this involves an annual audit within 3 months of the date of issuing the DOC. For each ship there must be one intermediate audit within the 5-year period and this must take place between the second and third year. Further details are in the IMO Resolution A.788 (19) 'Guidelines for the Implementation of the ISM Code by Administrations'.

Chapters 14–16, cover technical details about interim certification, verification and the forms of certificates.

3. The STCW Convention and its Relationship to the ISM Code

In parallel with complying with the ISM Code, the shipping industry must also comply with the provisions of the STCW 95 Convention for 'Standards of Training, Certification and Watchkeeping for Seafarers'. This is an amendment of the earlier STCW-78 Convention.

The STCW-95 Convention has been amended several times. Following adoption of the Manila amendments on 25th June 2010, the revised International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (the STCW Convention) and its associated Code entered into force on 1st January 2012.

The STCW Code and Convention is too extensive to be quoted in full here so only a short excerpt of the most relevant item is provided. It also shows how, with respect to the health and safety work on board, STCW 95 relates to the STCW-78 Convention and the ISM Code.

Improvements

The STCW 95 Convention contains the following amendments and improvements:

- Crew training and certification will be internationally unified, and where necessary upgraded, in a global scheme
- the seafarer's vocational training syllabus will be more specific and standardised
- seafarers are now obliged to be medically examined by approved and authorised doctors
- seafarers are guaranteed familiarisation training, covering both routine and emergency duties, when they arrive on board. This training must be conducted by an approved, competent person
- there are specified rest periods for seafarers (a minimum of 10 hours per day) to avoid fatigue
- ships must have readily accessible documentation and data for all seafarers employed on board, including certificates and qualification documents and records of experience, training, medical fitness and competence in assigned duties
- there are clear requirements laid down for shipping companies covering training and approval of company personnel for the evaluation, training and continuous assessment of crews
- there are clear requirements for Administrations to ensure that companies comply with their obligations for evaluation, training and assessment of crews
- there are clear requirements for Administrations to provide adequate control of institutions involved in crew training and certification.

Implementation

The basic steps for STCW-95 Convention were as follows:

1. 1st February 1997: The official implementation date. The amendments to the Convention were officially adopted, but Administrations could still allow education, training and certification in accordance with STCW-78.
2. 1st August 1998: After this date Administrations were obliged to have approved educational programmes, training courses and evaluation of new candidates.

But Administrations may still allow education, training and certification of seafarers who have already commenced their maritime education in accordance with STCW-78.

3. 1st February 2002: After this date all transitional measures came to an end and all requirements of the amended STCW Convention must have been implemented.

4. 2012: 'The Manila amendments to the STCW Convention and Code'. These entered into force on 1 January 2012 and were the first major revisions since the Convention and Code were updated in 1995. Amendments included new training guidance for personnel operating Dynamic Positioning Systems and ECDIS.

STCW and the ISM Code

The table below clarifies the relationship between the STCW Convention and the ISM Code.

STCW REQUIREMENT	ISM CODE REQUIREMENT
In general: A Safe Manning certificate is required, issued by the flag State (SOLAS), with reference to IMO Resolution A.481 (XII).	
	Ch. 2. Safety and Environment Policy
1. Training policy required 2. Shipboard familiarisation 3. Fitness for duty	Check the policy statement in SMS Check policy statement and shipboard SMS Check policy statement in SMS Check national requirements for medical fitness Check national requirements for hours of rest
	Ch. 3. Company Responsibility and Authority
4. In-service training. – Has the company's training supervisor, training officer and assessor been defined, documented and assigned?	Applies only when a company performs such in-service training, or to seafarers starting their training/education after 1 August 1998.
	Ch. 5. Master's Responsibility and Authority
5. In-service training. – Has the Master's responsibility for training been defined/documented?	No. 4 above refers
	Ch. 6. Resources and Personnel
6. Familiarisation. – Procedures in place for crew members and other personnel for familiarisation with ship and duties before being assigned? – Is the task of familiarisation assigned to knowledgeable crew members on board?	– Check company's SMS for familiarisation procedures, execution and records. Ensure that sufficient time have been allowed, and the proper language have been understood. Verify the outcome by asking questions relevant to procedures and arrangements.

7. Knowledge of maritime legislation. – Does the company ensure that officers have sufficient knowledge of pertinent legislation?	– Check that relevant personnel are aware of relevant international and national legislation currently applicable. – Check that relevant personnel have knowledge of regulations pertinent to their duties, and that they can refer to or find those regulations.
8. Fitness for duty. – Does the company keep records of work hours and rest hours?	Refer to records of work and rest hours (most flag States have national legislation).
9. Has the company put in place safeguards against drug and alcohol abuse?	Refer to alcohol and drug abuse policy.
10. Has the company routines for training, updating or replacement of the individual crew members?	'Updating' to be included (for present position).
11. In-service training. – Is training conducted according to an approved training programme? – Is training registered in an approved record book?	No. 4 above refers.
12. Special training for tankers. Are training programmes applied as required for: – Oil tankers – Chemical tankers – Liquefied gas tankers?	Verification by course diplomas or other similar means of evidence.
13. Special training for: – RoRo passenger ships – Passenger ships. – Passenger safety – Cargo safety – Hull integrity – Crisis Management – Human Behaviour – (as req. by flag State)	Check relevant procedures and documentary evidence (or similar) to make sure that required training has been carried out. Training in crisis management and human behaviour may be required under national legislation.
14. Common language. – Has the company decided common language for this particular crew?	Check SMS procedures for ensuring a common language, and that a common language has been decided. (Auditors may check by asking several crew members what language they use when carrying out their duties.)

15. Communication. – Designated crew members (as navigating officers) shall have sufficient knowledge of English	Relevant procedures should be in place for effective communication between the ship and DPA, including defined lines of communication.
	Ch. 7. Plans for Shipboard Operations
16. Crew co-ordination. – Are there procedures in place to ensure crew coordination in performing functions vital to safety or pollution prevention?	Check that activities vital to safety and pollution prevention are in place and that there is documentary evidence that drills, and other exercises, have been done. Crew coordination may be verified by questions related to particularly relevant operations, such as bunker operations, lifeboat launching, fire-fighting, etc.
	Ch. 8. Emergency Preparedness
17. Crew co-ordination. – Are there necessary programs for drills and exercises to prepare for emergency actions?	Some Administrations may require demonstrations of lifeboat drills during ISM Code shipboard auditing.
	Ch. 11. Documentation Control
18. Seafarers' documentation. – Are documents and data relevant to all seafarers maintained and readily accessible on board?	Originals of certificates and other relevant crew documentation shall be kept on board.
19. Seafarers' certificates. – Are all certificates and documentation of competence required by STCW verified for authenticity and validity?	Check SMS procedures for this, ensuring these have been carried out. (In addition, Administrations issuing the certificates are required to maintain records and provide information upon request.)

Skill, knowledge and procedures are essential, but on their own they are not enough. High quality standards for less experienced seafarers must also be derived from observation of practical examples set by their more experienced colleagues.

4. Overview of the 4 Main EU Council Directives for Safety and Health at Work. (These Apply to Ships Flying the Flag of EU Member States)

The main framework directive

1. Council Directive 89/391: "The introduction of measures to encourage improvements in the safety and health of workers"

   General provisions:

   - The employer must ensure that an assessment is made of the risks affecting safety and health at work
   - the employer must ensure that the workers of their undertaking receive information on among other things, the safety and health risks, preventive measures, first aid, fire-fighting, risk assessments, etc
   - the employer must consult workers and/or their representatives on matters concerning their safety and health
   - the employer must ensure that each worker receives adequate and job specific safety and health training
   - each worker has an obligation to take care of his/her own safety and health and to make correct use of machinery, dangerous substances, personal protective equipment (PPE), etc.

Individual directives

2. Council Directive 89/655: 'Use of work equipment'

   Main points:

   - The employer must base the choice of work equipment on the specific working conditions and hazards existing for workers to eliminate or minimise those hazards. Where it is not possible to use work equipment that does not jeopardise the health and safety of workers, the employer must minimise the risks
   - adequate instructions and training in the use of work equipment must be provided for the workers by the employer
   - use, maintenance or repair of work equipment involving a specific risk may only be carried out by workers specifically qualified for the task.

3. Council Directive 89/656: 'Use of personal protective equipment'

   Main points:

   - The use of personal protective equipment is required when risks cannot be avoided or limited by technical means or methods or procedures of work organisation
   - personal protective equipment must comply with the relevant community provisions on designs and manufacture
   - all personal protective equipment must be appropriate for the risks involved, without leading to any increased risk. It must correspond to the existing conditions at the workplace and must fit the wearer correctly
   - the employer must provide the personal protective equipment and pay any expense in connection with it and must ensure that it is in good working order and hygienic condition

- training and the organisation of demonstrations in the wearing of the personal protective equipment also lie with the employer.

4. Council Directive 90/269: 'Manual handling of loads'

   Main points:

   - The employer must try to avoid the need for manual handling of loads by workers. They must therefore take appropriate organisational measures or make use of, for instance, mechanical equipment. Where manual handling cannot be avoided, the employer must try to reduce the risk involved
   - it is also the employer's duty to inform the workers of the weight of the load to be carried, the centre of gravity of the heaviest side of the load and the risk of incorrect handling.

EU Standards for 'Health and Safety Work in the Workplace' (EU Commission's Article 117a)

Features of the EU standard for health and safety at work

The EU's Treaty of Rome Harmonisation Clause, Article.100A, deals with special regulations for member States. The EU standards are guidelines, but the long term intention is to establish an EU standard system that is ratified for all member States.

This means that, while individual member States have the freedom to create national regulations and requirements that do not comply with the EU standards, they must be able to demonstrate to the Commission that any differences are justified. Member States whose national legislation complies with the EU standard are not subject to this requirement.

Features of the EU standard related to health and safety training

- They require more active participation from companies
- they require companies to provide qualified safety and health personnel to establish a more active cooperation between companies and their ships
- they expect training of safety and health personnel to be focussed on the particular requirements of the workplace (the ship) and the outcomes of training to be verified
- they require companies to carry out risk assessments for their ships
- they expect the management, follow-up and verification of safety and health on board to be dynamic and continuous, both in general and in particular, after any significant change in personnel, equipment or operating conditions
- companies are required to assess and evaluate satisfactory training methods.

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