# Appendix 8

## New Zealand Accident Investigation Manual

This Appendix contains a number of tips extracted from the NZMSA Accident Investigation Manual for Maritime Safety Inspectors along with an edited version of Captain Tony Legge's introduction.

## Introduction

This manual has been designed for Maritime Safety Inspectors as an aid to the investigation of accidents. The contents of the manual have been the subject of training seminars which Maritime Safety Inspectors have attended over the past four years. It is not a procedure manual but rather a tool to help with your investigations document. It will…be updated as circumstances dictate.

Included in the manual are a selection of interviewing techniques which you might like to consider.

Take note of the taping tips. A good quality transcript can save a lot of time and angst.

Once your evidence has been collected, you need to analyse it to find the contributing factors and cause. I have provided summaries of two accident causation models to help your analyses. These are the SHEL model and James Reason's theory. They are not mutually exclusive.

Finally, the last and most time consuming job in the investigation process is for you to write the report. The last section of this manual explains the difference between Key Events and Key Conditions and gives an example of a basic causal factors diagram which I have always found very helpful.

Tony Legge
February 1999

## Purpose of Investigation

1. To collect information which will enable you to build a reconstruction of the sequence of events which occurred prior to the accident

2. To collect information which will allow you to make suppositions about the factors which may have contributed to the accident occurring

3. To collect information which will support the recommendations you make and MSA's further action

4. To collect other statistical information for analytical purposes at head office.

Information can be collected in two ways: Hardware evidence and interviews.

# Hardware Evidence

Hardware evidence includes:

- charts
- ship log books
- pieces of equipment, materials, wreckage etc.
- photos
- video recordings
- company records and logs
- maintenance records
- certificates and licences
- personnel or training records
- company manuals or operating procedures
- weather forecasts
- medical records & post-mortem results
- VHF radio recordings
- Reports from external consultants, manufacturers, designers, analysts, divers, scientists etc.

# Interviews

## Who should be interviewed?

Interviews need to be conducted with people both directly and indirectly involved with the accident. These might include, for example, victim, skipper, other crew members, vessel owner or manager, survivors, passengers, eyewitnesses, next of kin, friends, colleagues, manufacturer/boat builder/designer, stevedore, Harbourmaster etc.

Interviewing a selection of people will help to confirm, clarify or supplement information received from other sources.

## Planning

First of all, you need to know the circumstances of the accident and then plan the interview. Choose a venue which is free of interruptions and distractions. You may interview people on their own but you must advise the witness of their right to have a lawyer present. If the accident occurs within Harbour Limits, you may like to invite the Harbourmaster to assist in the investigation providing there is no conflict of interest. The flag state may also wish to participate. If so, written consent is required from either the Director of Maritime Safety or the Chief Investigator of Accidents. However, you must maintain control of the questioning and exercise the right to prohibit certain people from attending when their attendance could inhibit an effective interview. This prohibition particularly applies to owners and their lawyers. You may offer to interview the owner separately on their own, but their lawyers cannot participate in anything other than interviews involving their own clients. Prepare a list of points that need to be covered in the interview.

## Timing

Interviews should be conducted as soon as possible after the incident. If there is a delay, details may be forgotten or distorted and evidence at the scene may be tampered with. Give yourself plenty of time and avoid rushing the interview. If people are reluctant to talk, be patient and give them reassurance.

## Rapport

How well the interview goes and the quality of information you obtain will often depend on the rapport you establish. You should introduce yourself and explain the purpose of the interview. Put the person at ease by spending some time in general conversation. Assess the person and decide on the best way to deal with them. Be considerate and courteous, but maintain control of the interview.

## Listening

You should try and minimise your own input and concentrate on listening. Although you have to direct the interview and keep it going, it is important to be actively listening to what is being said so that subsequent questions can relate directly to the witness's experience. Listening can be a very tiring experience. Take frequent breaks so that you and the witness can refresh yourselves.

## Non-verbal communications

While listening to what is being said, also study body language and look for discrepancies. Listen for verbal cues which may indicate whether or not the person is telling you the truth.

Non-verbal communications may be divided into vocal and non-vocal.

*Vocal*
Intonation (certainty, doubt, embarrassment)
Rhythm (relaxed, tense)
Speed, pitch (stress, anxiety, excitement, relief)
Volume (aggressive, defensive, assertive)
Laughter (amusement, nerves, scorn)
Sighing (resignation, exasperation)
Yawning (tired, nervous, lying)
Ums, ahs (buying time, pause for thought)

*Non-vocal*
Body language- use of hands
- touching face, hair or body
- scratching
- facial expression
- leg movement
- feet

Distance - when seated does he/she try to move back or closer

Orientation - sitting face to face may create anxiety that can be reduced by sitting at right angles.

## Silent Pauses

Silent pauses may emerge after a question is asked. This might be due to the person not fully understanding the question or that they are thinking through their answer or they may be nervous and need more time to think. You should refrain from speaking to fill in the pause as the person will usually fill it in themselves. Take advantage of the silence pause to note body language, think up further questions and make a mental check on what you already know.

## Questioning

Once the interview is underway, it is often best to start with a '*free recall'* question where the witness can tell their story without interruption. From here you can ask questions in more detail.

The following are some points to remember when questioning:

- Use plain language and simple words
- Keep the questions brief
- Be sure you convey the meaning you intend when using certain words in a question
- Be sure that the person understands your pronunciation
- Use familiar words and examples
- Avoid ambiguous words or sarcasm

An '*open ended'* question can be non-threatening and the least leading as it allows the individual to answer in their own way and tell what s/he knows. For example, "I don't know very much about long line tuna fishing, could you tell me about the processes involved?" Occasionally, the expected answer is not received so a supplementary question may be required to redirect the witness. Be careful not to be too specific in questioning so as to be leading and pressurise a witness into remembering something they may not have known or observed.

Try and avoid using '*closed'* questions which evoke a yes/no response as they produce limited information. For example, "Did the first mate have problems working with the master?" is the type of question which will elicit a 'yes' or 'no' response and you will have to attempt another question to get a more complete response. Similarly try and avoid using '*negative'* questions such as "You don't remember which way the wheel turned?".

## Closing the interview

The last 10% of the interview is often the most important as this is when the greatest amount of information, per unit of time, is exchanged. You should ask the person if there is anything else they want to tell you or if they have any questions. When closing, the witness should be assured that the interview has been valuable. Thank them and tell them what will happen now. They should be encouraged to contact the investigator at a later date if they want to provide additional information or wish to enquire about the progress of the investigation.

Appendix 6 of the MAIIF Manual gives examples of questions which should be used as a guide when interviewing witnesses involved in accidents such as groundings, loss of stability, personnel injuries, collisions, fires and machinery failures.

# Tips For Getting Good Quality Transcripts

**Before Starting the Interview**

1 Check the sound quality of the tape by recording yourself talking into the tape recorder and then play it back to check if it sounds okay. Also, remember to place the tape recorder at the same distance from each person in the room. You should do another check, with all people in the room talking (one at a time) to see how the tape picks up their voices.

2 Ask the interviewee(s) to speak more slowly than usual, louder and clearly so that the tape recorder picks up their voice. They should also be told to speak one at a time.

3 Ensure that all mobile phones, pagers etc., are turned off during the interview.

4 Post a "Quiet Please" notice on the door.

5 Try to hold the interview away from any background noises, such as fans, air conditioning, traffic, typing, paper rustling, telephones, doors slamming. The tape tends to pick up noises (other than voices) very clearly.

**Starting the Interview**

1 Before you start reading the preamble or beginning the interview, you should start with the following:

*Today's date is [Day] [Date] [Month] [Year]. I have here with me today, [Person's name] the [Insert title, i.e. Master of vessel's name] in relation to the [accident, incident, mishap] on board[Insert name of vessel] on [Day] [Date] [Month] [Year].*

This helps me determine who is being interviewed, and also helps with putting a heading at the top of the page.

Also include the names and titles of anyone else who may be in the interview, i.e. Lawyers, Owner representatives etc. Just in knowing they are present at the beginning of the interview is helpful.

2 Then read the preamble for a full investigation or begin the interview.

**First Six Questions**

I recommend that you begin by asking the following six questions immediately after reading the preamble or at the beginning of your interview.

1 Name (also ask them to spell it if you think they need to)
2 Contact address (ask them to spell street and place names if needed)
3 Contact telephone number(s)
4 Age and Date of Birth
5 Any qualifications they may hold
6 Sea going experience

**During the Interview**

1 Try not to interrupt. It is difficult trying to transcribe two people at the same time. If you must interrupt in order to bring the interviewee back on track, make it decisive.

2 Stop the tape if they/you need to refer to charts, notes, speak to lawyers etc., but make a reference to why you have stopped and again when you resume, make an audio reference.

3 If they begin to speak too quickly, mumble, or speak quietly, remind them to speak slowly, loudly and clearly.

4 If your tape recorder does not give an indication that it has reached the end of one side, keep checking it. This is quite easy to do during the interview. The micro cassettes are generally sold as 60 minutes tapes, which is half an hour on each side. However, on long play it would be one hour each side. Therefore, depending on whether you have the tape recorder on normal or long play, keep an eye on the time to give you an indication of when the tape will reach the end.

5 Ask them to spell place names or vessel names if necessary.

**The Finished Product**

When I have transcribed the interview and returned it to you, you may find it has some dotted lines in it. To help clarify what these mean:

| | |
|---|---|
| ..... | A series of dots, like this, means that I could not decipher the word. If I can't decipher it the first time, I listen to it 3 or 4 more times (and sometimes even ask others to listen) and if I still can't decipher it, then in go the dots. However, if you or the person you interviewed can remember what was said, please feel free to put the word(s) in. |
| . . . | Three spaced dots like this will **always** appear at the end of a sentence/paragraph when the person speaking at the time was either interrupted or trailed off without finishing the sentence. You should **not** complete the sentence. It accurately represents what happened. |
| *(TAPE STOPPED)* | This means exactly what it says. |

When you send the tapes, please indicate whether you would like me to e-mail the document to you (so you can make appropriate changes) or send the hard copy to you. If you would like the hard copy posted to you, could you also please indicate if you require any copies of the transcript.

Also, when you send the tapes to Head Office, please label them. They do come with labels, but if you don't have them, write on a post-it or piece of paper the name of the vessel involved, the name of the person(s) interviewed on the tape, and the date of the interview.

Head Office currently has a standard letter that goes out with the transcripts when they are sent for signature. Generally, the original transcript and a copy are sent to the person concerned. We ask them to send back the original (which we stamp with an "original" stamp) initialled on each page and the declaration that it is a true and accurate account of the interview on the final page signed and dated, and the copy (which is also stamped with a "copy" stamp) is for them to keep. Attached to this document is a copy of the standard letter that we send with the transcripts.

# Accident Causation Models - An aid in analysis

## The SHEL model

The SHEL model is a simple interactive model which focuses on the importance of human interaction and the use of written information and symbology. There are four components of the model. These are **S**oftware, **H**ardware, **E**nvironment and **L**iveware - hence the name SHEL! The liveware, or the human element, is in the centre of the model since this is the pivotal component which interacts directly with each of the other components.

(Source: The SHEL model (adapted from Hawkins 1975) ICAO Circular, Montreal Canada.)

As you can see from the displayed model, the component blocks are not straight. They are jagged and other blocks have to be carefully matched to them in order to fit well. An accident occurs where the blocks are not matched well and the investigation of human factors has to identify where the mismatches occur. That is, what was the breakdown between the components which contributed to the accident? The investigation has to examine each of the components in order to find where the weak links occur at the interfaces.

The central liveware component, the individual, can be broken down into four categories. These are *physical, physiological, psychological* and *psychosocial*.

Firstly, the *physical* factors deal with the physical capabilities and limitations of the person and include their physical condition and strength, their motor skills and various senses. A useful question to put in this regard would be whether the person was physically capable of performing their required task(s).

The *physiological* aspect of a human involves his/her general health, level of stress, degree of fatigue, their tendency to smoke, drink or take drugs, and considers the individuals general lifestyle.

The *psychological* element of the human is complicated as it involves an individual's past knowledge and experience, such as training, and their mental capabilities such as perceptions, information processing, attention span, personality, mental and emotional states, attitudes and moods. Questions surrounding this psychological aspect would include - Was the training, knowledge and experience sufficient? Was there any misperceptions about the task, or did the level of attention needed exceed the individual's limitations? What were the person's attitudes towards work and other employees, and how did these attitudes influence motivation, judgement and quality of work?

*Psychosocial* factors deal with influences external to the work environment which distract or stress the individual. A death in the family, financial troubles or relationship problems are examples of this type of factor. It could be found that the death of a close relative contributed to the amount of fatigue experienced by the person.

The liveware-liveware interface denotes the relationship between the individual and other persons in the same workplace. This relationship can be between fellow workers, staff and management or superiors and subordinates. Human interaction, verbal and non verbal communications and visual signals all need to analysed. Had interactions with others influenced the individual's performance? How did the crew work together as a team? Did visual signals support verbal information? Were management policies regarding working conditions sufficient given the circumstances? These are the types of questions which should be considered when investigating this interface.

The relationship between the human and the machine is represented by the liveware-hardware interface and factors included here are the configuration of the work place, display and control design etc. These are the physical features which could have been factors in the accident.

The liveware-software interface represents the relationship between the individual and the supporting systems in the workplace, such as regulations, manuals, standard operating procedures etc. A breakdown in the match of these components could be due to the manuals, checklists etc. not being readily available, adequate, incomprehensible, or perhaps they have not been consulted.

The relationship between the person and the internal and external environments is described as the liveware-environment interface. The immediate work area includes factors such as temperature and noise variations, lighting and ventilation. This is the internal environment while the weather, terrain, infrastructure, political and economic situation and constraints, denote the external environment. This final interface is relevant in the maritime industry as weather conditions can often be a contributory factor in an accident. However, economic pressures have also shown to hold a strong influence, especially on time constraints in shipping, or the amount of fish caught in the fishing industry.

A systems approach to the investigation of human factors in accidents allows a better understanding of how various components of the system interact and integrate to result in an accident. By adopting a systematic approach to the investigation of accidents the investigator can identify the underlying causes. In addition to the SHEL model above, this interactive approach has been proposed by many other theorists. Another model and theory by James Reason will be discussed next.

## James Reason

The basic proposition of the Reason model is that industrial accidents are the end-results of long chains of events that start with decisions at management level. As a general framework for accident causation Reason

considers the basic elements of production to be: Decision makers, Line management, Preconditions, Productive activities and Defences.

Decision-makers incorporate the architects and the upper management or senior executives. They are responsible for setting the goals for managing available resources (money, equipment, people and time) to achieve not only the goal of punctual cost-effective fishing and transportation of passengers and cargo for example, but also the goal of safety.

The second key element is line management. This is where the decisions which have been made by upper management are implemented. The strategies of the decision makers are implemented in each of the operation spheres such as operations, training, maintenance, finance, safety, engineering support etc.

However, for these upper management decisions and line management actions to be effective and productive there has to be certain preconditions existing. Equipment has to be reliable and available and the workforce has to be skilled, knowledgeable and motivated. Another required precondition is a safe environment. For productive activities there needs to be a good co-ordination between the mechanical and human activities to produce the right task at the right time.

Finally, the element at the end of the complex productive system are the defences. Productive activities involve exposure to hazards and safeguards should be in place for the human and the mechanical components to prevent foreseeable injury, damage or costly interruptions of service.

(Source: James Reason, Human Error, 1990. United Kingdom: Cambridge University Press)

James Reason's model of accident causation shows the various human contributions to the breakdown of a complex system. He believes that accidents rarely originate from the errors made by front-line operators or from major equipment failures but result from interactions of a series of failures or flaws already present in the system. These failures are not readily obvious and usually have delayed consequences.

An active failure is an error made by the operational personnel, such as the ship's crew, which has an immediate adverse effect. The skipper inadvertently switching the bridge control switch to engine room control while the engine room control was at off is an example of this failure type.

A latent failure is the result of a decision or action made well before the accident and usually has been lying dormant for a long time. Such a failure is usually initiated by someone far removed from the event in both time and space who is the decision maker in the line management level. The failure can then be introduced at any time into the system by the human element. For example, upper management make the decision to put a new roster system for pilots into place which is organised by line management. However, the new system brings with it longer working hours which results in a lack of motivation and fatigue.

An actual maritime accident occurred in Zeebrugge when the overworked and undermanned crew of the Herald of Free Enterprise left harbour with the bow doors open. This was an oversight caused by a combination of active failures (Sheen 1987), but it was also compounded by strong management pressures to meet the binding schedule for the Dover docking.

Latent failures can then interact to create a "window of opportunity" for the front line operator to make an active error or failure. When all the defences of the system are inadequate then an accident will ultimately result. Those at the human-machine interface are the inheritors of system defects which are created by poor design, conflicting goals, defective organisation and bad management decisions. In effect, the part played by the front line operators is to create the conditions under which these latent failures can reveal themselves. Although latent and active failures will interact they will not result in an accident when defences work and the system is well guarded. In this instance the "window of opportunity" is not lined up.

This approach to the investigation of human factors encourages the investigator to go beyond the unsafe acts of the front line operator and look for hazards already existing in the system.

# Writing the Report

A good way to start the written report and analysis is to separate the key events of the accident from the key conditions. Accidents are the result of a set of successive events that produce unintentional harm. The accident sequence occurs during the action of some work activity. Every accident involves a sequence of events or happenings that occur during a work activity and there are identifiable beginning and ending points in the sequence of events. Then, there are conditions which are relevant to the accident but which do not fall into the sequence of events. Contributory factors emerge in the accident causation analysis as the sequential events interact with the existing conditions.

As an analytical aid, the use of diagrams or charts are useful in separating the events from the conditions. A causal factors diagram helps in evaluating the evidence during an investigation as well as assisting in the analysis. Firstly, the investigator should break the accident's sequence into a logical flow of events, from the development of the accident to the end. Then the relevant conditions, which affect the events, need to be added to the diagram, where they surround the events.

Each event should describe an occurrence or happening and usually a time can be fixed to it. Therefore, a good rule to follow in determining when a fact is an event rather than a condition is whether a time can be fixed to it within the accident sequence. Conditions differ from events in that they describe states or circumstances rather than occurrences or happenings and are usually passive rather than active. Events are best arranged chronologically, either from left to right if developing a diagram, or from the earliest event to the last event when writing a sequence of events in a report form. The event needs to be accurately described, eg. "Chief Engineer pulled main engine switch to on position" rather than "Chief Engineer turned engine on." Additionally, each event needs quantifying when possible. Therefore, instead of stating "The helm was turned to port" one should write "The helm was turned 20° to port."

Once the key events and key conditions have been identified, it will then be easier to identify specific contributory factors which can then be narrowed down to a root or immediate cause. This is when the use of an accident causation model comes into play.

The following paragraph is a summary of an accident which actually occurred.

A Port of Tauranga pilot suffered a serious mishap when disembarking from *Union Rotorua* to the pilot launch *Tauranga II* using a pilot ladder. He fell about 2 metres onto the deck of the launch and landed on the safety rail fitted above the safety harness track. He had been unable to retain his grip on the manropes which were of a large diameter and wet and slippery from heavy rain. A deckhand hooked a safety line to the pilot's belt to take him on board. He was taken to hospital with cracked ribs and compressed vertebrae.

The accident report is written in the following way. Look at how the report divides the events from the conditions. Also take note of the numbering system used for each sentence and section. Each of your written reports should be written according to this format.

## Key Events

**1.1** At 1642 hours, the pilot boarded MV *Union Rotorua*

**1.2** At 1705 hours, all lines were clear and the vessel left Sulphur Point berth.

**1.3** At 1749 hours, the pilot disembarked the vessel using the pilot ladder on the port side, with the ship heading approximately 330°T.

**1.4** The ship provided a lee for the pilot boat, and the boat was heaving and pitching to give a bow motion of about half a metre.

**1.5** While disembarking from MV *Union Rotorua,* using the pilot ladder and manropes, the pilot fell about 2 metres onto the deck of the pilot launch *Tauranga II.* **1.6** He landed on the safety rail fitted above the safety harness track while still holding the manropes. He then pitched forward.

**1.7** The boat's deckhand hooked the safety line to the pilot's belt and he was taken inside the boat.

**1.8** The pilot went to hospital with serious injuries. He stayed for two nights.

## Key Conditions

**2.1** The wind observed at the Tauranga signal station was: 1600 hours NE 40 knots, 1714 hours ENE 60 knots, 1826 hours NE 65 knots, 2000 hours N 25 knots.

**2.2** Two ships had departed shortly before MV *Union Rotorua*. These were MV *Grand Honest* at 1657 hours and MV *Wisteria* at 1706 hours. The two pilots were on the launch at the time.

**2.3** There was heavy rain and conditions deteriorated rapidly before the accident.

**2.4** The pilot said that the port ladder and manropes were rigged before the ship left the berth, and that the ropes were wet and slippery. He said that there was a lot of water at the side of the deck and it was flowing over the side as the ship rolled, and that he had considered remaining on board the ship which was bound for Auckland.

**2.5** The boat's crew confirmed that water was flowing over the side.

**2.6** The pilot's feet were over 2 metres above the deck of the boat when he lost control.

**2.7** He suffered cracked ribs and a compressed vertebrae.

**2.8** He was off work until 17 August and off pilotage duties for five to six weeks**.**

**Contributing Factors**

**3.1** Water on deck flowing over the sheer strake.

**3.2** The water may have been oily from cargo handling vehicles working on deck.

**Causes**

**4.1** Heavy rain made the manropes wet and slippery

**4.2** The manropes were of a large diameter, possibly 42 mm.

**Opinions and Recommendations**

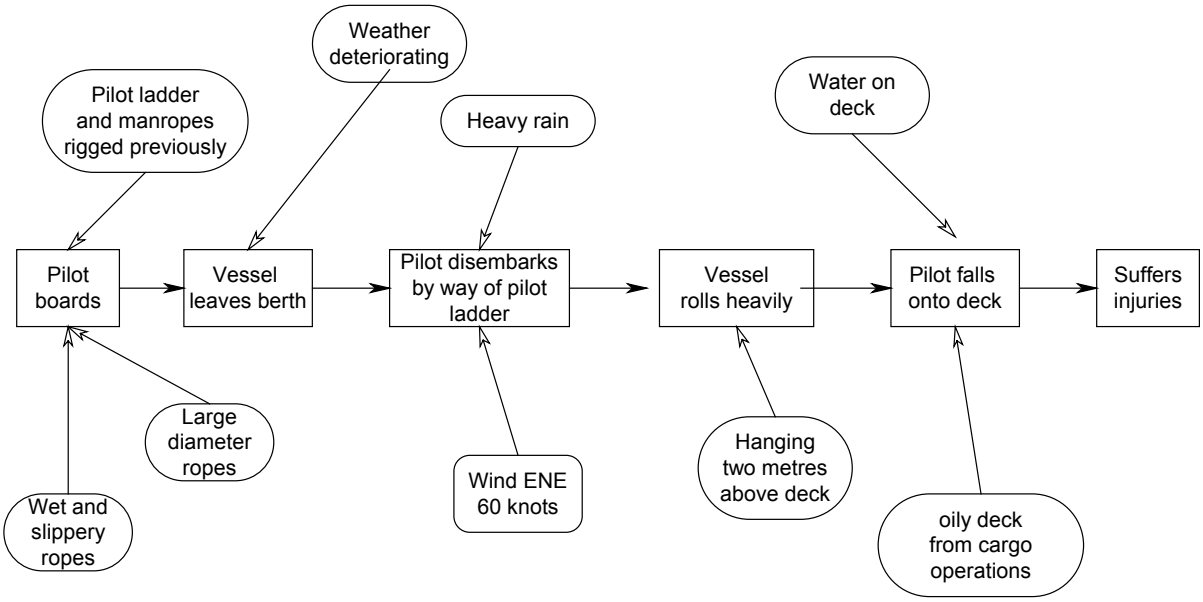
**5.1** The Port of Tauranga senior pilot is assessing various sizes of manrope in order to recommend the most suitable size. The Shipping (Pilot Ladders) Rules 1974 specifies a minimum size of 20mm.

**5.2** Manropes should be stowed in a dry area and rigged shortly before the pilot disembarks. In Tauranga, manropes are used only when disembarking.

**5.3** Ships should ensure that scuppers are clear so that water is not trapped by the sheer strake and deck camber.

**5.4** MSA should circulate to ships' agents advice for rigging pilot ladders which should be forwarded to ships arriving in New Zealand. The circular should recommend a maximum diameter for manropes, and should draw attention to the recommendations of the International Marine Pilots Association, which includes directing the light forward and not fitting a tripping line to the bottom of the ladder.

The following is a basic causal factors diagram of the accident. It will aid in analysis and prompt further questions to analyse deficiencies in the management system.




In summary, the written report, which is finally sent to Head Office, must be written according to the following sections which employs the numbering system illustrated in the example:

**Key Events**

**Key Conditions**

**Contributing Factors**

**Causes**

**Opinions and Recommendations.**

Your report should be accompanied with all the evidence which you collected during the investigation so that a full file can be held at Head Office.

# Definitions

**An accident** means an occurrence that involv-es a ship and in which -

(a) A person is seriously harmed as a result of -

(i) Being on the ship; or

(ii) Direct contact with any part of the ship including any part that has become detached from the ship; or

(iii) Direct exposure to the wash of the ship or interaction (other then direct contact) between 2 ships; or

(iv) Being involved in the salvage of any ship - except where the injuries are self inflicted or inflicted by other persons or when injuries are to stowaways hiding outside the areas normally available to passengers and crew; or

(b) The ship sustains damage or structural failure that-

(i) Adversely affects the structural strength, performance or seaworthiness of the ship; or

(ii) Would normally require major repair or replacement of the affected component; or

(iii) Poses a threat to the safety of people on board the ship; or

(c) There is a complete or partial failure of machinery or equipment that affects the seaworthiness of the ship; or

(d) There is a loss of, or damage to, or movement of, or change in the state of, the cargo of the ship which poses a risk to the ship or other ships; or

(e) There is a significant loss of, or significant damage to, property (not being the cargo carried by the ship) or the property of any person (whether or not on board the ship), whether or not the loss or damage arises from an interaction between 2 ships; or

(f) There is a loss or escape of any substance or thing that -

(i) May result or has resulted, in serious harm to any person; or

(ii) May pose a risk, or has resulted in damage to the ship or other ships; or

(iii) May pose a risk, or has resulted in damage to any property (whether or not on board the ship); or

(g) A person is lost at sea (whether or not subsequently found) or is missing: or

(h) The ship is foundering, capsizing, being abandoned, stranding, missing or has foundered, capsized, been abandoned, stranded, been in a collision, or has had a major fire on board.

**An incident** means any occurrence, other than an accident, that is associated with the operation of a ship and affects or could affect the safety of operation.

**A mishap** means an event that -

(a) Causes any person to be harmed; or

(b) In different circumstances, might have caused any person to be harmed.

**Serious Harm** means-

1. Death; or

2. Any of the following conditions that amounts to or results in permanent loss of bodily function, or temporary severe loss of bodily function: respiratory disease, noise-induced hearing loss, neurological disease, cancer, dermatalogical disease, communicable disease, musculoskeletal disease, illness caused by exposure to infected material decompression sickness, poisoning, vision impairment, chemical or hot metal burn of eye, penetrating wound of eye, bone fracture, laceration, crushing.

3. Amputation of body part.

4. Burns requiring referral to a specialist registered medical practitioner or specialist outpatient clinic.

5. Loss of consciousness from lack of oxygen.

6. Loss of consciousness, or acute illness requiring treatment by a registered medical practitioner, from absorption, inhalation, or ingestion, of any substance.

7. Any harm that causes the person harmed to hospitalised for a period of 48 hours or more commencing within 7 days of the harm's occurrence.

**A Seafarer**

a) Means any person who-

i) Is employed or engaged on any ship in any capacity for hire or reward; or

ii) Works on any ship for gain or reward otherwise than under a contract of employment; but
b) Does not include a pilot or any person temporarily employed on a ship while it is in port

**A Ship** means every description of boat or craft used in navigation, whether or not it has any means or propulsion; and includes-

a) A barge, lighter, or other like vessel:
b) A hovercraft or other thing deriving full or partial support in the atmosphere from the reaction of air against the surface of the water over which it operates:
c) A submarine or other submersible