MAIB

MARINE ACCIDENT INVESTIGATION BRANCH

Bridge Watchkeeping Safety Study

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Safety Study 1/2004
July 2004

Extract from

The Merchant Shipping

(Accident Reporting and Investigation)

Regulations 1999

The fundamental purpose of investigating an accident under these Regulations is to determine its circumstances and the cause with the aim of improving the safety of life at sea and the avoidance of accidents in the future. It is not the purpose to apportion liability, nor, except so far as is necessary to achieve the fundamental purpose, to apportion blame

Note

This report is not written with liability in mind and is not intended to be used in court for the purpose of litigation. It endeavours to identify and analyse the relevant safety issues pertaining to the specific accident, and to make recommendations aimed at preventing similar accidents in the future.

CONTENTS

GLOSSARY OF TERMS AND ABBREVIATIONS

AIS	-	Automatic Identification System
ARPA	-	Automatic Radar Plotting Aid
COLREGS	-	International Regulations for Preventing Collisions at Sea
gt	-	Gross registered tons (measurement of volume)
IMO	-	International Maritime Organization
ISPS	-	International Ship and Port Facility Security Code
ITF	-	International Transport Federation
MAIB	-	Marine Accident Investigation Branch
MCA	-	Maritime and Coastguard Agency
OMBO	-	One Man Bridge Operation
OOW	-	Officer of the Watch
SOLAS	-	Safety of Life at Sea
STCW	-	Standards of Training, Certification and Watchkeeping
UK	-	United Kingdom
UMS	-	Unmanned Machinery Space
VHF	-	Very High Frequency (radio)

EXECUTIVE SUMMARY

At 0515, on 29 June 2003, the general dry cargo vessel *Jambo* ran aground, and subsequently sank, at the entrance to Loch Broom on the west coast of Scotland. The vessel was carrying 3,300 tonnes of zinc concentrate, prompting fears of an environmental disaster (Report 27/2003). This was the latest in a series of remarkably similar accidents, the common features of which included fatigued officers, one man bridge operation at night, missed course alterations and no watch alarms.

This study was commissioned to establish the principal factors that cause nautical accidents, and to consider whether fatigue is as prevalent and dangerous as indicated by the *Jambo* and similar accidents.

The study has reviewed in detail the evidence of 66 collisions, near collisions, groundings and contacts that were investigated by the Branch. It has confirmed that minimal manning, consisting of a master and a chief officer as the only two watchkeeping officers on vessels operating around the UK coastline, leads to watchkeeper fatigue and the inability of the master to fulfil his duties, which, in turn, frequently lead to accidents. It has also found that standards of lookout in general are poor, and late detection or failure to detect small vessels is a factor in many collisions. The study concludes that the current provisions of STCW 95 in respect of safe manning, hours of work and lookout are not effective.

Recommendations have been directed at the MCA to take the conclusions of the study forward to the IMO with the aim of reviewing:

1. The guidelines on safe manning, to ensure that all merchant vessels over 500gt have a minimum of a master plus two bridge watchkeeping officers, unless specifically exempted for limited local operations as approved by the Administration.

2. The requirements of STCW 95 to change the emphasis with respect to the provision of a designated lookout to ensure that a lookout is provided on the bridge at all times, unless a positive decision is taken that, in view of daylight and good visibility, low traffic density and the vessel being well clear of navigational dangers, a sole watchkeeper would be able to fulfil the task.

3. The requirements of STCW 95 so that a bridge lookout can be more effectively utilised as an integral part of the bridge team.

BACKGROUND

In the 10 years, 1994 to 2003 inclusive, 652 collisions and groundings involving merchant vessels of over 500gt, were reported to the MAIB under the UK's Merchant Shipping (Accident Reporting and Investigation) Regulations. There were also 995 near collisions (hazardous incidents) voluntarily reported during this time, 342 of which were between fishing vessels and merchant vessels of over 500gt. Twenty-two people have lost their lives in collisions involving merchant vessels since the MAIB began recording data. Many of these accidents and incidents were the subject of a full MAIB investigation. Following publication of these reports, and those of other investigating authorities, numerous press headlines have reflected the concerns of the industry, typically:

"Officers facing overload" (NUMAST Telegraph October 2003)

"Is Anyone Awake?" (Lloyds List, July 2003)

"UK takes hard line on OMBO" (NUMAST Telegraph Nov 1998)

"Waking up to the nightmare of the sleepless ship's officer" (Lloyds List Feb 1997)

"Fatigue on board kills" (ITF Maritime News 1997)

"Collision regulations flouted" (Safety at Sea April 1997)

"Collision highlights ships' inadequate manning levels" (Lloyds Casualty Week May 1998)

"Did good traditions of Seamanship go out with the ark?" (Safety at Sea Nov 2000)

"Watchkeeping flaws worry British yachting chiefs" (Lloyds List January 2001).

Even a cursory consideration of relevant investigations shows that a small number of causal factors are common to nearly all bridge watchkeeping accidents.

The purpose of this study is to collate the underlying human factors involved in a large number of accidents investigated by the MAIB, to graphically illustrate the principal shortfalls in bridge watchkeeping. The study's overall objective is to produce arguments for change that will result in an improvement in the safety of this key area of marine operational practice.

METHODOLOGY

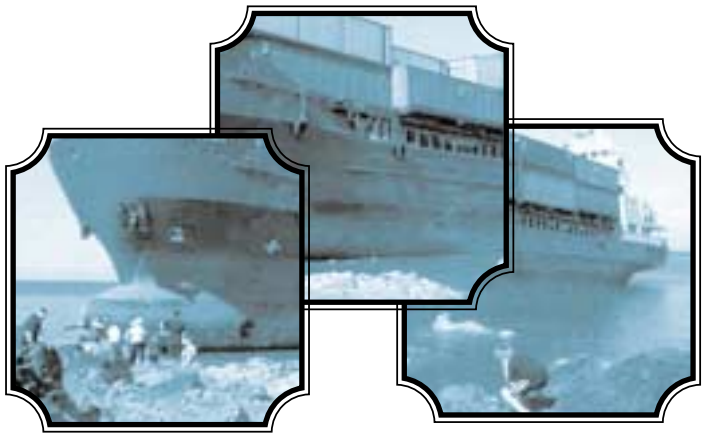
The accidents included in the data for this study were selected using the following criteria:

All collisions, groundings, contacts and near collisions reported to the MAIB, which :

- occurred between 1994 and 2003;
- were the subject of an MAIB investigation or Preliminary Examination;
- involved a merchant vessel of over 500gt;
- occurred in coastal waters, port/harbour area or high seas, where :
  - the vessel was underway; and,
  - a licensed pilot was not carried.

Several factors influenced the use of these criteria. First, the MAIB had collected accident data since it was founded in 1989, but the quality of this data improved considerably in 1994, following a review of its investigation techniques and database management. Second, the study was restricted to the analysis of accidents which had been fully investigated or were the subject of a preliminary examination because of the detailed and accurate data provided by these cases. Other accidents reported to the MAIB, but not investigated, were only used to assess or validate trends, where considered necessary. Third, fishing vessels, and commercial vessels less than 500gt, were excluded because of differences in the applicable regulations, training and guidance, between these vessels and merchant vessels of more than 500gt. Finally, accidents involving vessels berthing, at anchor, or under pilotage, were also excluded to enable the study to focus on the factors affecting bridge watchkeeping when *on passage*, rather than the demands of specific navigational or shiphandling situations.

Once selected, the accidents were then reviewed in detail by MAIB nautical inspectors in order to complete a questionnaire **(Annex A)** covering many aspects of bridge watchkeeping practice, which had been developed for this study. The data gathered was input to a human factors database before analysis.



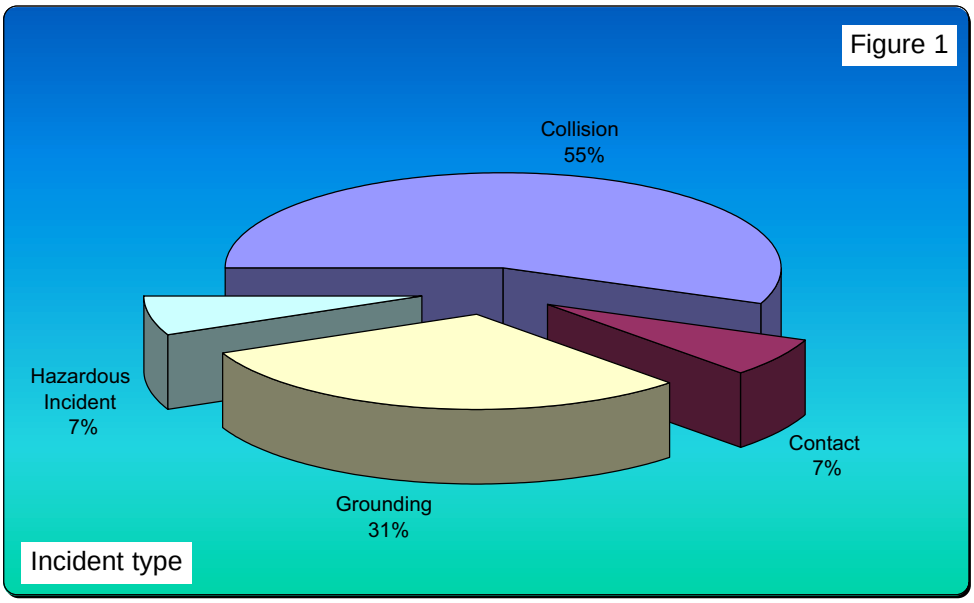
OVERVIEW

Of the 1,647 collisions, groundings, contacts and near collisions that were reported to MAIB between 1994 and 2003, 66 accidents involving 75 vessels met the required criteria. **Figures 1 to 6** show the distribution of these incidents by type, vessel type, daylight or darkness, visibility, diurnal and monthly distribution.

An initial broad review of the detailed data collected highlighted three principal areas of concern as follows:

Groundings and fatigue	A third of all the groundings involved a fatigued officer alone on the bridge at night
Collisions and lookout	Two thirds of all the vessels involved in collisions were not keeping a proper lookout.
Safe manning and the role of the master	A third of all the accidents that occurred at night involved a sole watchkeeper on the bridge.

These areas of concern are considered separately in the following analysis.



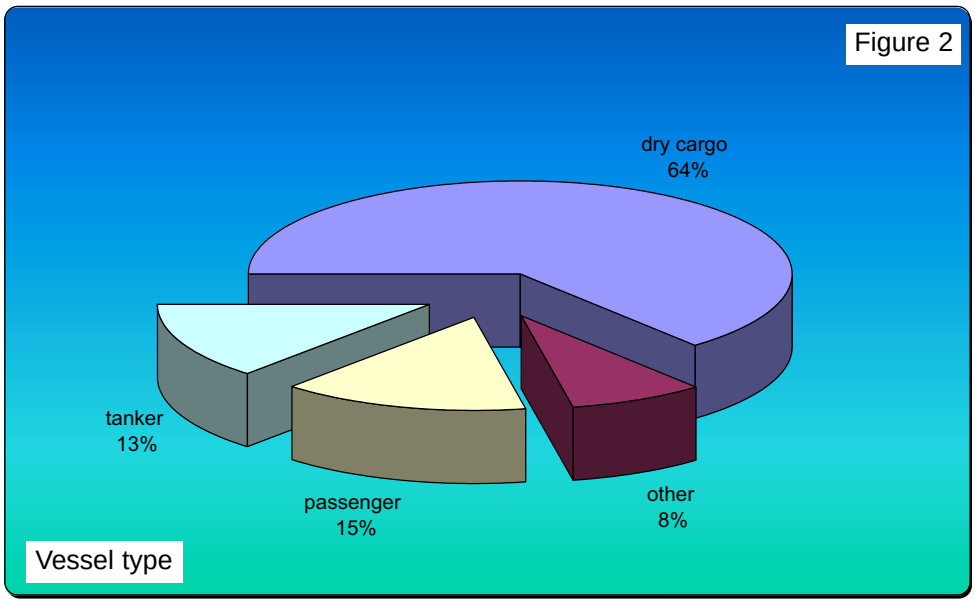


Figure 2
dry cargo
64%
tanker
13%
passenger
15%
other
8%
Vessel type

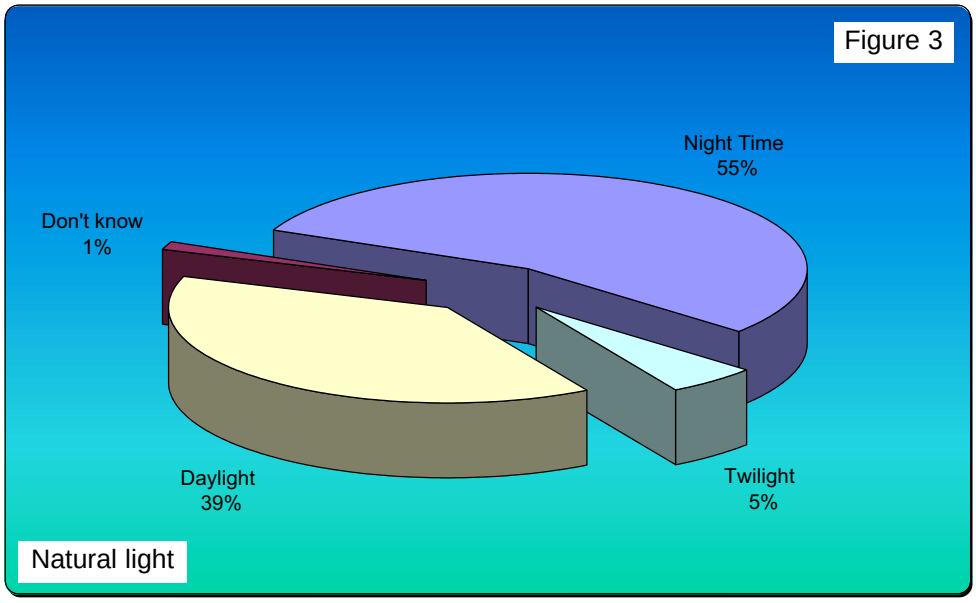


Figure 3
Night Time
55%
Don't know
1%
Daylight
39%
Twilight
5%
Natural light

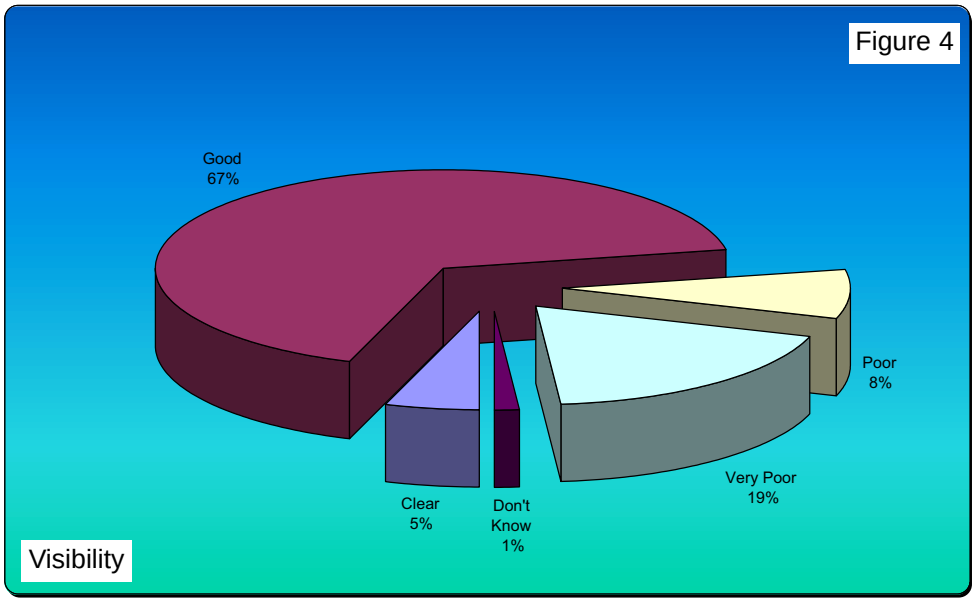
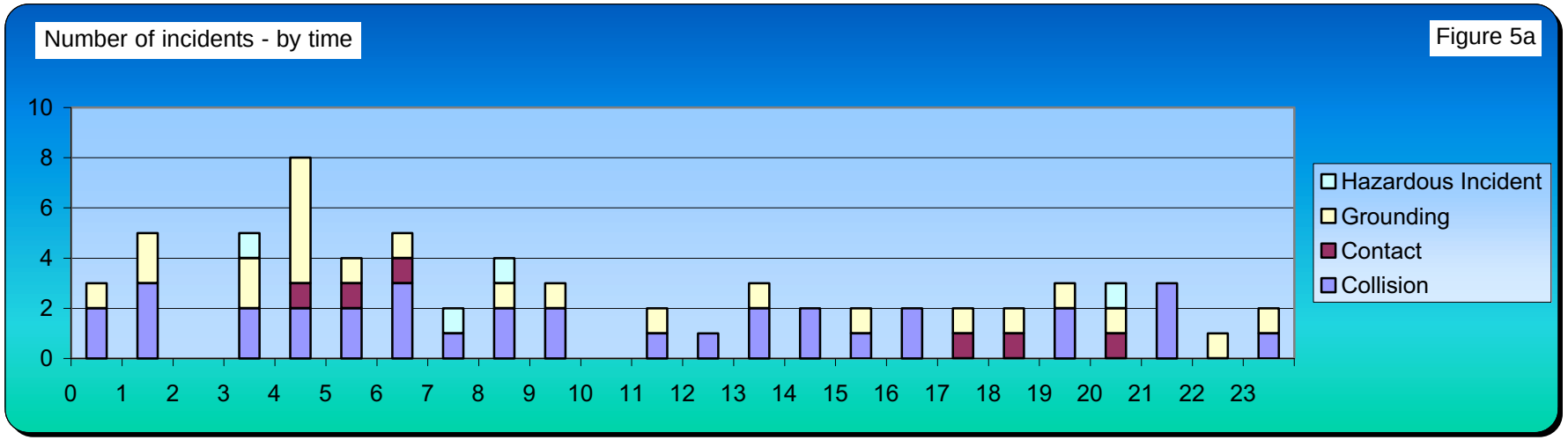
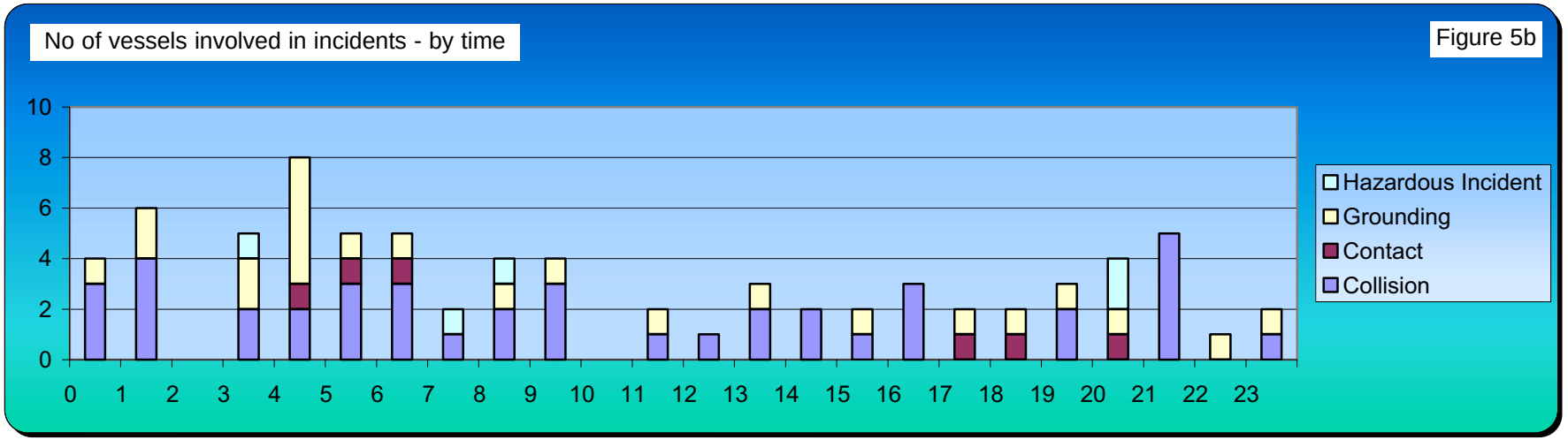
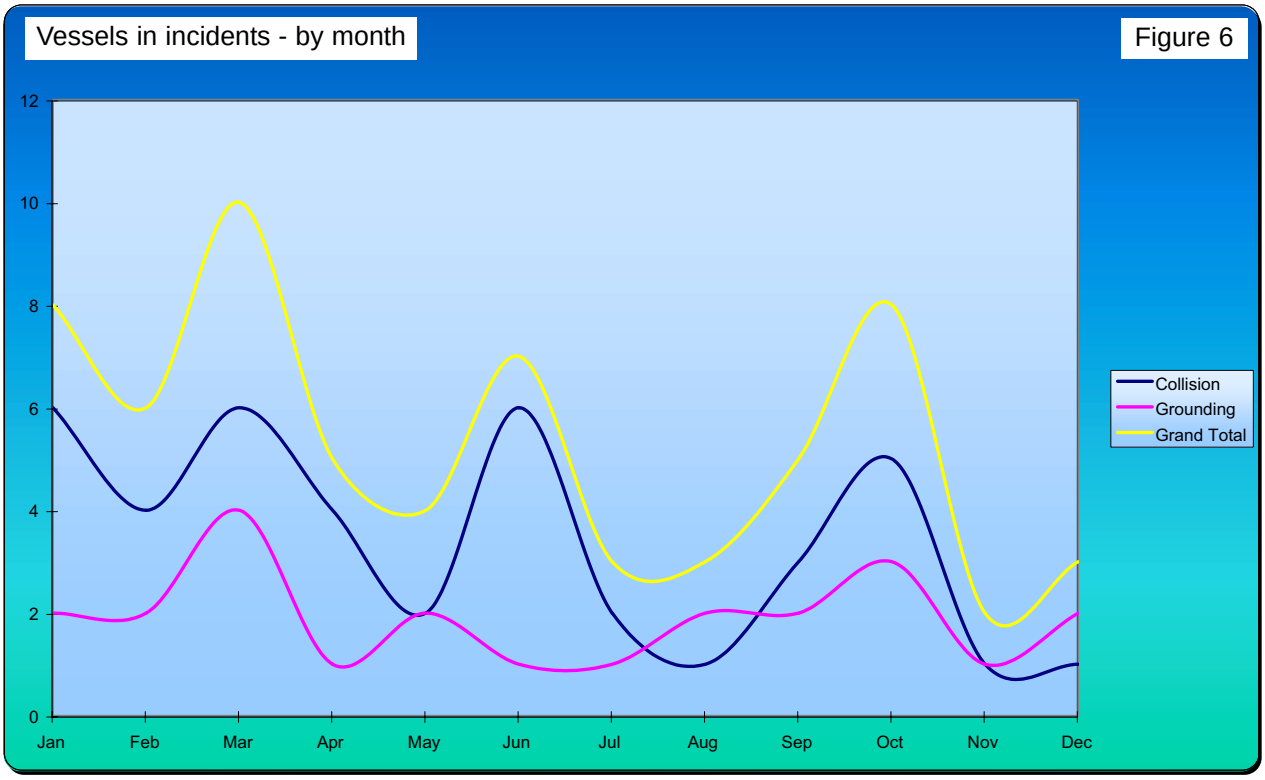


Figure 4
Good
67%
Poor
8%
Very Poor
19%
Clear
5%
Don't
Know
1%
Visibility


Number of incidents - by time
Figure 5a
10
8
6
4
2
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hazardous Incident
Grounding
Contact
Collision


No of vessels involved in incidents - by time
Figure 5b
10
8
6
4
2
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hazardous Incident
Grounding
Contact
Collision


Vessels in incidents - by month
Figure 6
12
10
8
6
4
2
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Collision
Grounding
Grand Total

ANALYSIS

GROUNDINGS

Twenty-three vessels grounded, representing about 30% of the vessels included in the study. It can be seen from **Figure 7** that 11 occurred between 0000 and 0600, with the remainder distributed evenly throughout the rest of the day. This accords with similar data from the groundings of all vessels over 500gt in UK waters **(Figure 8)**, which shows that the majority of accidents occurred overnight. Fatigue was considered to be a contributory factor in nine or 82% of the groundings in the study which occurred between 0000 and 0600.

It is of serious concern that in eight of the nine fatigue-related accidents, the vessels involved carried only two bridge watchkeeping officers. In each case, no lookout had been posted, the autopilot was engaged, a watch alarm was either not fitted or not used and the unaccompanied watchkeeper had fallen asleep. These eight vessels represent 35% of all the groundings in the study.

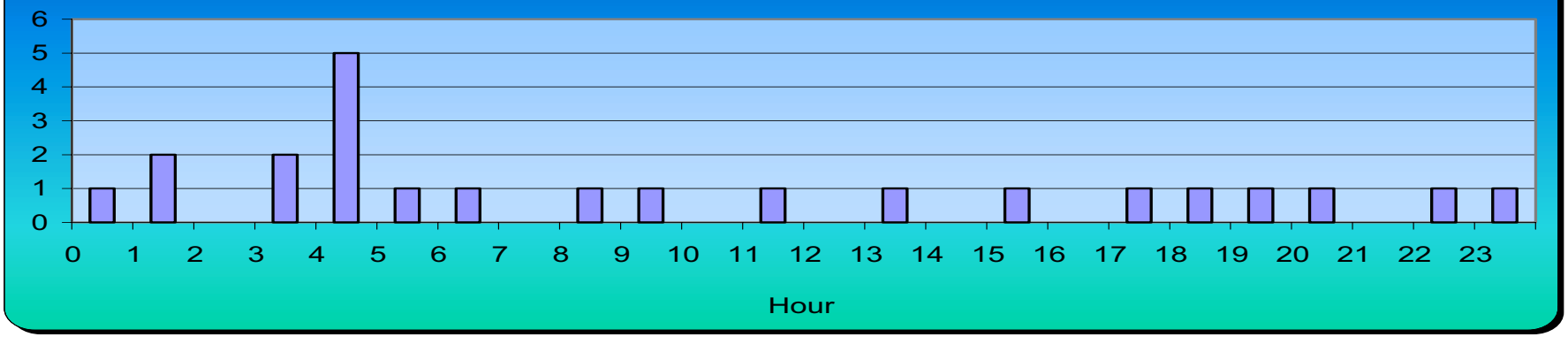
Watchkeeper incapacitation is a serious issue, which leads to a number of groundings in UK waters each year.

EXAMPLE

A typical example of watchkeeper fatigue occurred at 0515 on a June morning when a 1,990gt general cargo vessel ran aground on the west coast of Scotland. The chief officer had been on watch since midnight and was suffering the cumulative effects of fatigue generated by the 6 on 6 off watchkeeping routine punctuated by regular port visits where he was expected to oversee all cargo operations. The chief officer fell asleep standing at the controls between 0405 and 0415 and missed a planned alteration of course. He woke an hour later, still standing, as the vessel grounded.

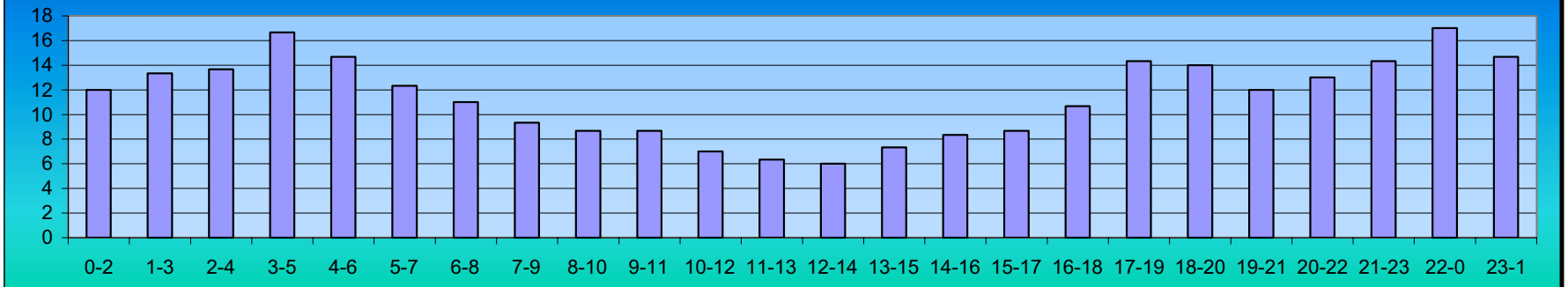
Number of vessels in study grounding - diurnal distribution

Figure 7



Total number of vessels grounding - rolling 3 hour time of accidents to display trend more clearly

Figure 8



MANNING LEVELS AND FATIGUE

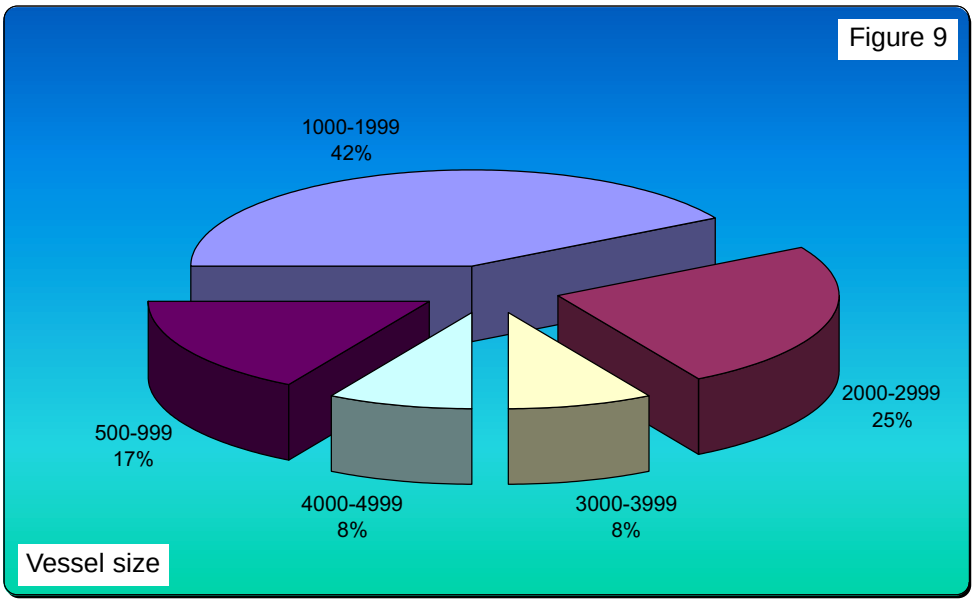
Twelve vessels grounded with sole watchkeepers. All were dry cargo/container vessels, 84% were less than 3,000gt **(Figure 9)**; 92% carried only two deck officers, and all had three or fewer deck ratings **(Figure 10)**. All of these groundings occurred in clear or good visibility, and 75% occurred during darkness. Only one occurred in a port or harbour area, the remainder occurred during coastal passage **(Figure 11)**.

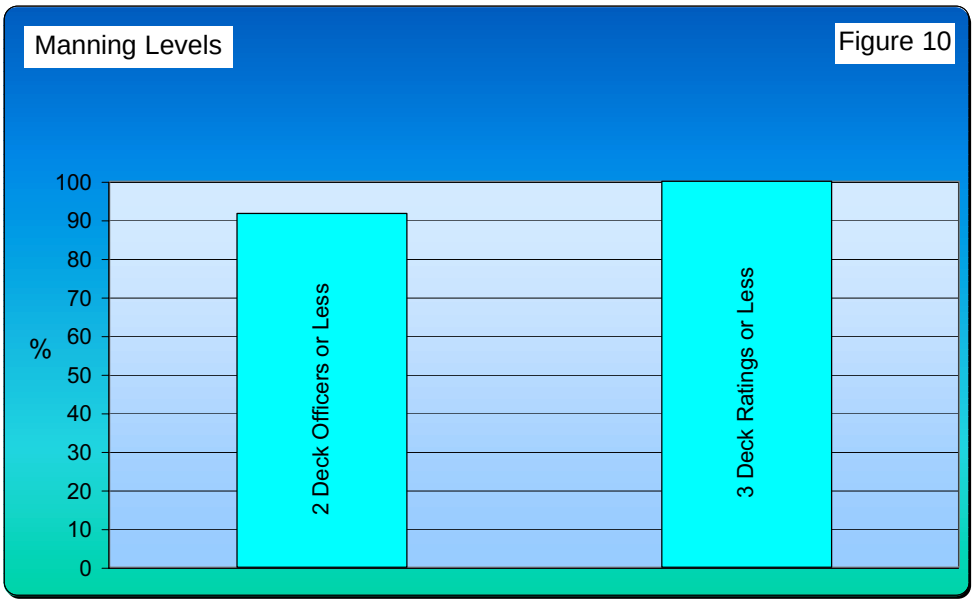
This data highlights the link between small dry cargo ships operating in the short sea trade, manned with just two deck officers, and groundings caused by fatigue. The many factors which probably contribute to this link include: voyage cycle time; disrupted watch patterns; working hours; ships' type and size; sleep problems; stress and work pressures; on board relationships; and the type of cargo carried.

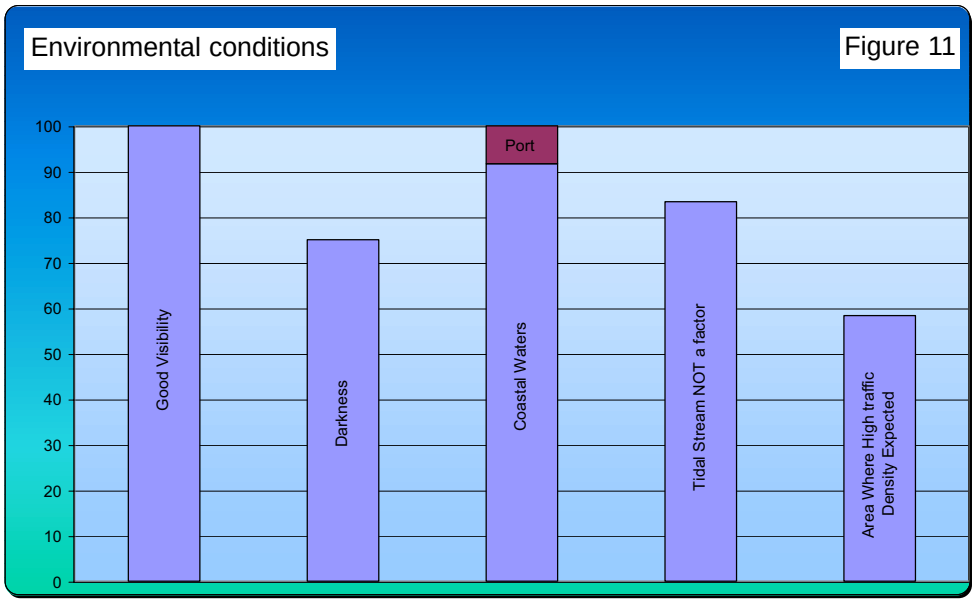
Research has shown that alertness and performance tend to be at their lowest during the early hours of the morning **(Figure 12)**. The human circadian rhythm is synchronised with the normal pattern of daytime wakefulness and sleep at night. Adjustment of the rhythm can be achieved during exposure to consecutive night watches over a period of time. Nevertheless, the distribution of fatigue-related groundings reflects the normal circadian pattern of performance.

Figure 13 illustrates that the OOWs in the majority of the groundings occurring between 0000 and 0600 were following a 6 hours on – 6 hours off working pattern. If uninterrupted, this cycle of work will normally allow an individual's body clock to adapt, resulting in improved levels of performance and alertness during the night-time watches. Uninterrupted cycles of work are possible on longer sea passages, but within North European waters, where voyage lengths vary between several hours and several days, the cycle is disrupted by frequent port visits. During such visits, the demands of pilotage, cargo operations, and the increasing number of audits and inspections, make departure from the watchkeeping patterns inevitable. Also, although a night in port, or a short-term lay up, might appear to be an appropriate solution to offset fatigue, it can in fact be detrimental by further disrupting watchkeepers' sleep patterns. The continual disruptions to sleep and circadian rhythms can lead to the accumulation of fatigue, the longer individuals are subjected to them.

Even when opportunities to rest arise, there is no guarantee that a bridge watchkeeping officer wants to, or is able to, sleep. Personal tasks such as telephoning or writing home still have to be completed, and the noise and motion of the ship, as well as ambient levels of temperature and light, will all affect an individual's ability to sleep. The fact that many of these factors are influenced by the weather might help explain why the majority of groundings occur in the winter months, when outside temperatures are lower, the incidence of higher sea states is greater, and the nights are longer. A similar seasonal distribution of groundings was found among all vessels over 500gt within UK waters between 1994 and 2003 **(Figure 14)**.



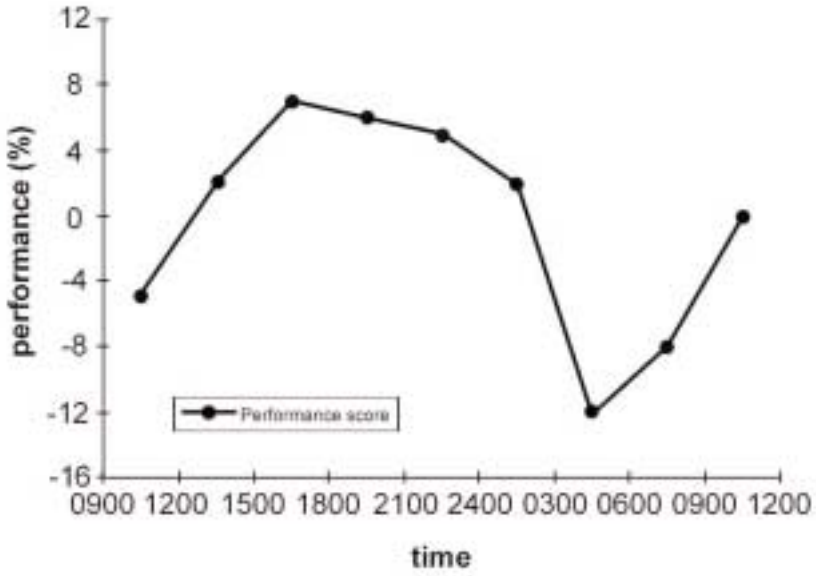




Figures 9 -11 Groundings - Sole Watchkeeper

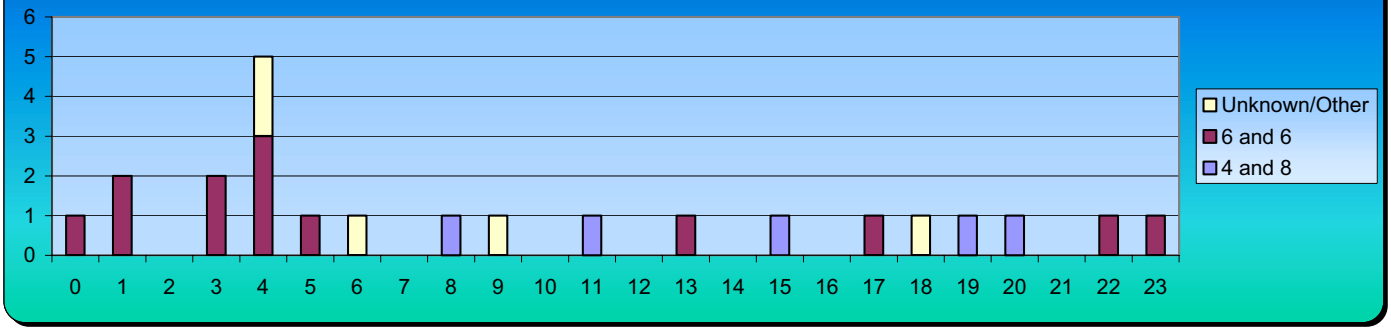
Accepted empirical levels of alertness and mental performance against time

Figure 12



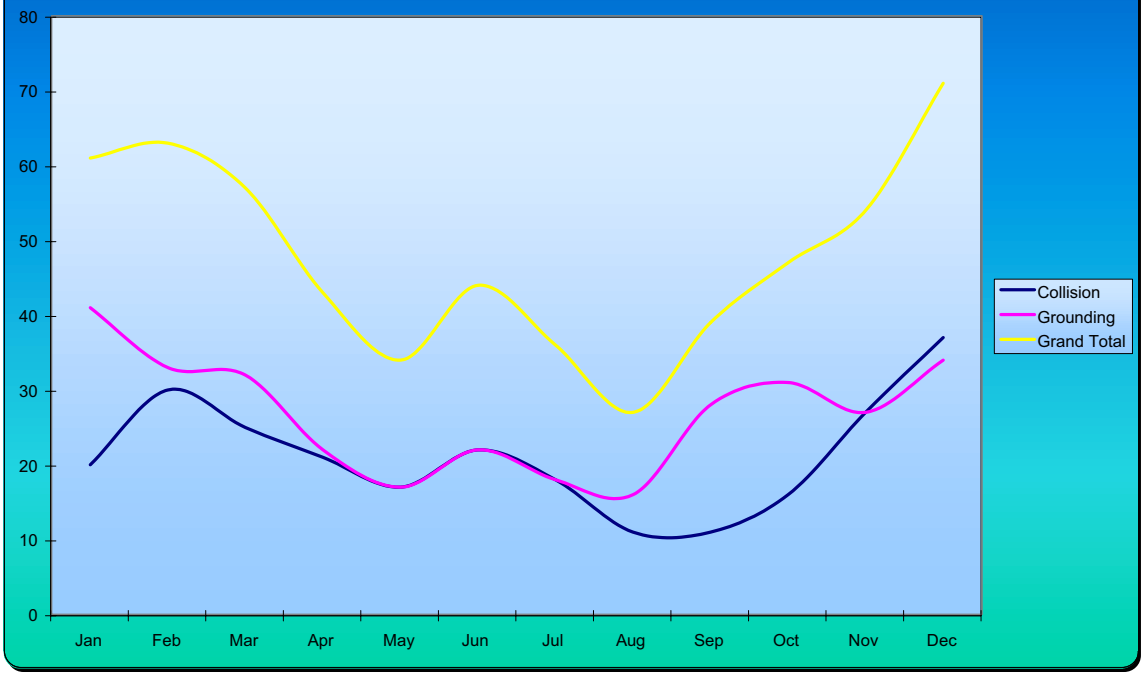
Grounding - watch system

Figure 13



Number of merchant vessels >500gt involved in collisions or groundings in UK waters / month of accident

Figure 14



STCW 95 states that the hours of rest for seafarers shall not be less than 10 hours in any 24-hour period, and 77 hours in any 7-day period. It also adds that the hours of rest may be divided into no more than two periods, one of which should at least be 6 hours long, and the interval between should not exceed 14 hours. When working a 6 hours on – 6 hours off bridge watchkeeping system, these requirements can be adhered to. However, during a 7-day period, a watchkeeper would spend a total of 84 hours on watch. If the minimum 77 hours rest is added to this, this allows only a further 7 hours, ie 1 hour per day for the master and chief officer to fulfil all of their other responsibilities outside of bridge watchkeeping. For the chief officer, these additional responsibilities are likely to include the supervision of cargo operations, the correction of the nautical charts and publications, the supervision and co-ordination of the maintenance of deck fittings and equipment, the maintenance of fire-fighting equipment, and the role of the safety officer. For the master, these will include all of the requirements placed upon him by international conventions such as STCW and SOLAS, the recently introduced ISPS Code, and company commercial and safety management systems. It follows that either some, or all, of these tasks are not completed, or the minimum hours of rest regulations are contravened. In this respect, it is the opinion of the MAIB that the records of hours of rest on board many vessels, which almost invariably show compliance with the regulations, are not completed accurately. The number of recent groundings in which fatigue has been a contributory factor, indicates that the hours of rest regulations are not having significant effect with regard to the bridge watchkeeping arrangements on many vessels. There is also pressure on masters and chief officers to try to do some of their ancillary work whilst on watch, with the inevitable consequence of degraded attention to their watchkeeping duties.

EXAMPLE

Fatigue was clearly established as the principal causal factor in the case of an 80m long bulk carrier, which ran aground on rocks in the Western Islands of Scotland at 0150 on an October morning. The vessel only had two watchkeeping officers including the master. Towards the end of his 1800 to 2400 watch, the master left the bridge and called the chief officer to relieve him. He returned to the bridge, plotted a position on the chart and sat in the wheelhouse chair to await the arrival of his relief. He fell asleep, and the chief officer remained asleep in his cabin. They both woke up as the vessel grounded. There had been no watch alarm fitted to the vessel and there had been no seaman on lookout duty.

In the previous 4 days, the master and the chief officer's workload had been arduous ***(Table 1)*** *and they had not achieved more than 6 hours off duty at any one time. The quality of sleep during some of their rest periods had also been poor because of the uncomfortable movement of the ship in a seaway. In port, their off-duty periods had been disrupted by the need to shift berths because of cargo loading requirements, and at sea the pressures of paperwork and meal times affected their ability to rest.*

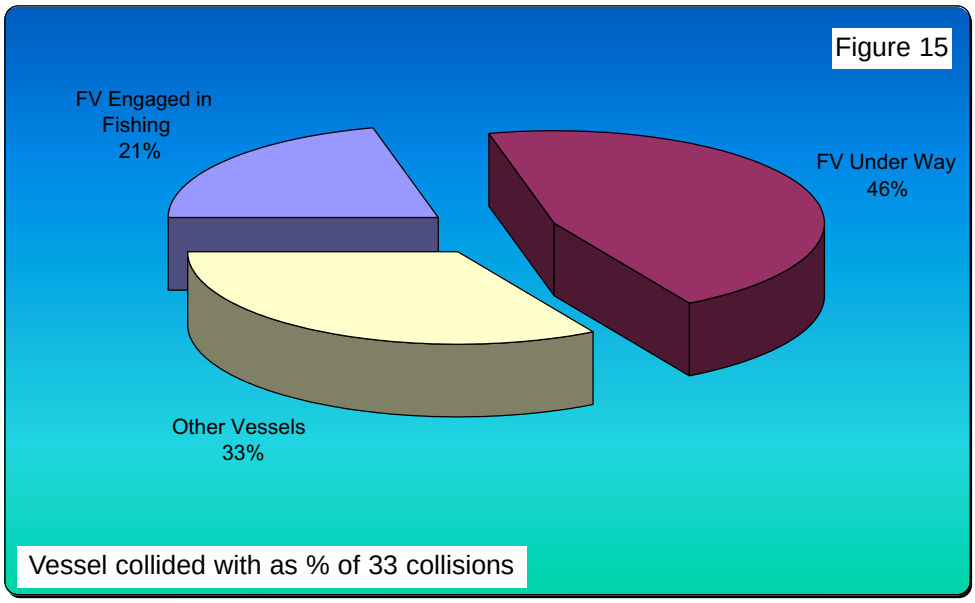
Table 1

DATE	*MASTER*		*CHIEF OFFICER*	
0000 hrs to 2359 hrs	*Total hrs worked*	*Work/rest schedule*	*Total hrs worked*	*Work/rest schedule*
16 Oct	*16*	*6 off/6 on – 2 off /10 on*	*19*	*11.5on/5 off/7.5 on*
17 Oct	*13.5*	*3 on/4.5 off /4.5 on/ 6 on/6 off*	*13.5*	*3 on/4.5 off/10.5 on/6 off*
18 Oct	*18*	*6 off/18 on*	*18*	*18 on /6 off*
19 Oct	*12*	*6 on/6 off/6 on/6off*	*12*	*6 on/6 off/6 on/6off*

Table showing work and rest schedules

COLLISIONS

Collisions should theoretically be avoided if every vessel abided by the International Rules for the Prevention of Collisions at Sea 1972, which came into force in 1977. It is therefore not surprising that these regulations were contravened to varying degrees, and in differing areas, in all 41 of the vessels involved in the 33 collisions included in this study. The most common contributory factors in all of the collisions were poor lookout and poor use of radar. It is of interest that 67% of the collisions were with fishing vessels **(Figure 15)**. This highlights the need for the watchkeepers on merchant vessels to keep an especially good lookout for smaller vessels. Even when fishing vessels were seen, it was often the case that action to avoid collision was not taken in sufficient time by OOWs. A frequent explanation given for this tardiness in taking action, was that fishing vessels' movements were generally erratic, and there was an expectation that they would *usually* be manoeuvred to avoid a collision, albeit at a late stage. The collision statistics indicate that *usually* is not the same as *always*, and there is a need to apply the COLREGS on *every* occasion.



EXAMPLE

An aggregates dredger collided with a fishing vessel in the Dover Traffic Separation Scheme, in daylight, calm conditions and clear visibility. The aggregates dredger had been on passage and following the flow of traffic, and the fishing vessel, not engaged in fishing, had been crossing the scheme. The vessels approached each other on a collision course for 10 to 12 minutes with the fishing vessel on the dredger's port bow. The watchkeeper on the dredger had seen the other vessel and, having identified it as a fishing vessel not engaged in fishing, was expecting her to alter course at the last minute. However, the skipper of the fishing vessel had not been keeping a proper lookout and he took no action. By the time the OOW on the dredger realised, it was too late to avoid the collision.

LOOKOUT

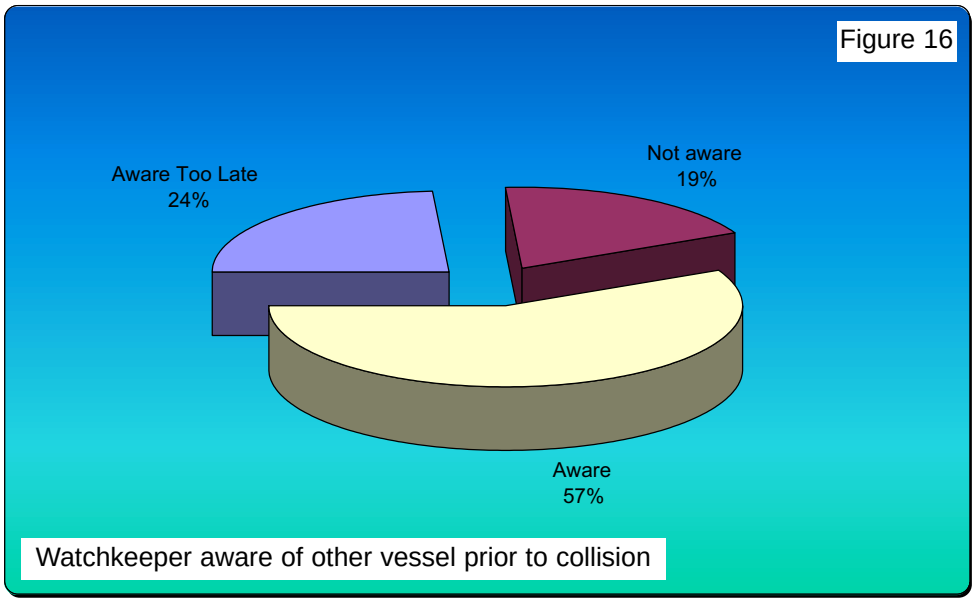
Significantly, 26 of the vessels involved in collisions (65%), contravened Rule 5, which states:

> *"**every vessel** shall **at all times** maintain a **proper lookout** by **sight and hearing** as well as by **all available means** appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and risk of collision."*

STCW 95 requires:

> *A proper look-out shall be maintained at all times in compliance of Rule 5 of the International Regulations for the Prevention of Collisions at Sea, 1972, and shall serve the purpose of…detecting ships or aircraft in distress, shipwrecked persons, wrecks, debris, and other hazards to safe navigation.*

Figure 16 shows that on 19% of the vessels involved in collisions, OOWs were completely unaware of the other vessel until the collision, or in some cases even after the collision.



EXAMPLE

A 40,000gt container ship collided with a 28m- fishing vessel. The officer of the watch on the container vessel did not become aware of the accident until he heard the "Mayday" call made from the fishing vessel just before she sank.

A further 24% of the vessels involved in collisions only became aware of the other vessel's proximity when it was too late for any avoiding action to be successful.

With regard to the provision of a lookout, STCW 95 also states:

The officer in charge of the navigational watch may be the sole lookout in daylight provided that on each such occasion:

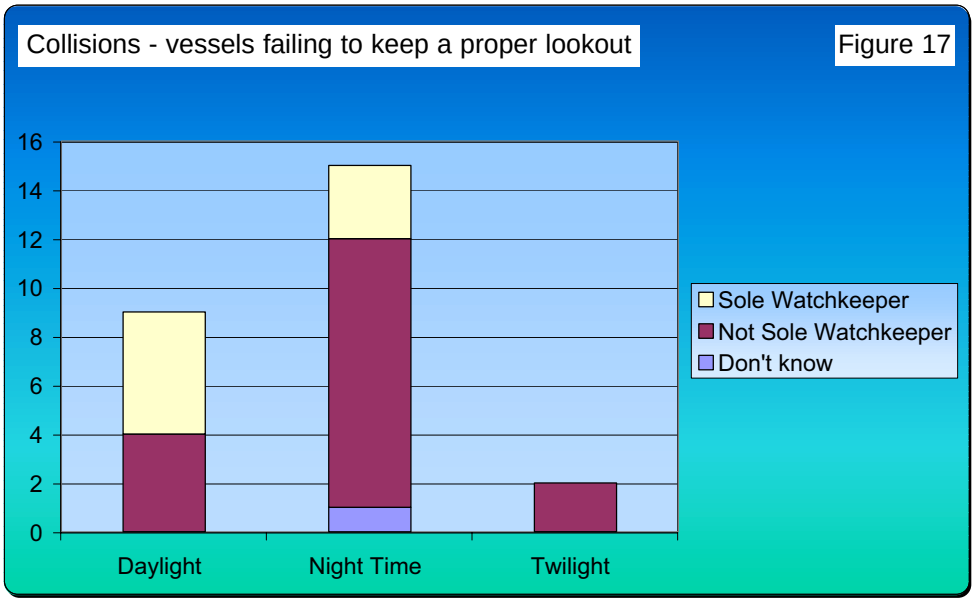
.1 the situation has been carefully assessed and it has been established without doubt that it is safe to do so;

.2 full account has been taken of all relevant factors, including, but not limited to:

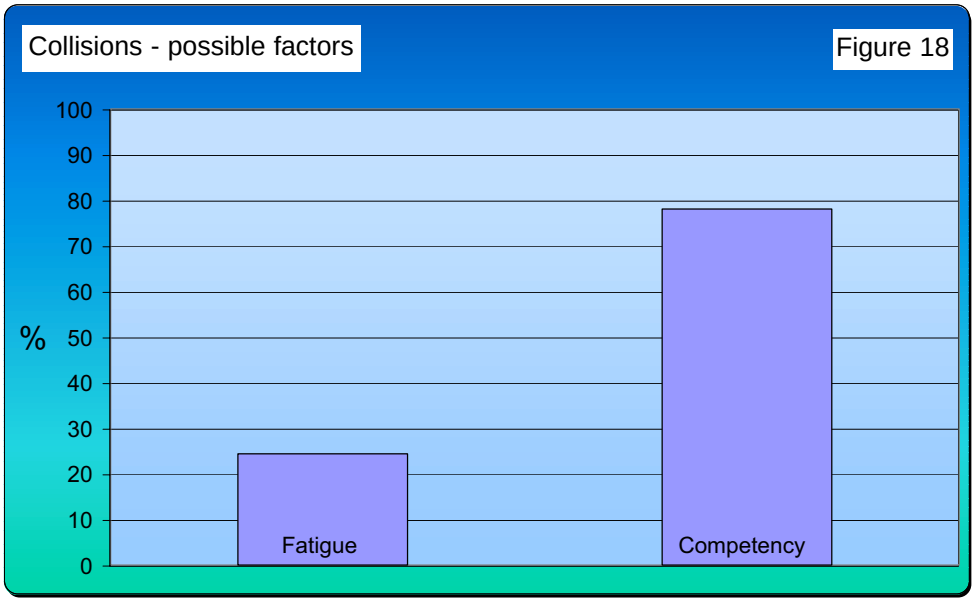
- *state of weather,*
- *visibility,*
- *traffic density,*
- *proximity of dangers to navigation, and*
- *the attention necessary when navigating in or near traffic separation schemes; and*

.3 assistance is immediately available to be summoned to the bridge when any change in the situation so requires.

Despite this requirement, **Figure 17** shows that at least three of the fifteen vessels which failed to keep a proper lookout at night had lone watchkeepers on the bridge. Of the nine vessels not maintaining a proper lookout by day, five had sole watchkeepers; three of these were in an area of high traffic density, and one was in poor visibility. It follows that seven of the eight vessels with sole watchkeepers involved in collision, in which poor lookout was deemed to be a contributing factor, representing nearly one-third of the vessels in this category, were in contravention of this aspect of STCW as well as the collision regulations.



It is also evident, however, that the bridges of 19 vessels were manned in accordance with the provisions for lookout, as set out in STCW 95, yet still failed to maintain a proper lookout. There are several possible reasons for this, and **Figure 18** illustrates that competency may be more contributory in this respect than fatigue. Importantly, however, in the MAIB's experience, poor visual lookout can also be linked to the poor employment of ratings on the bridge. On many ships, although ratings are usually available to provide an additional lookout, they are rarely used for this purpose during daylight. A common view encountered is that ratings are generally of little value on the bridge and are of more use working on the deck. Additionally, although many ships use an additional lookout on the bridge at night, his presence is often seen as a token gesture aimed at meeting regulatory requirements. There is evidence that some OOWs do not even speak to the rating on watch with them, particularly when differing nationalities are involved.



EXAMPLE

It was December, off the east coast of England, and a 52,862gt oil tanker, which had Norwegian officers and Filipino ratings on board, was steering west-northwesterly towards the Pentland Firth. The chief officer, who was the OOW, had stationed his lookout on the open bridge wing for the 1600 to 2000 watch. The tanker collided with a fishing vessel at about 1900, but neither the officer nor the rating knew about it at the time. Two fishing vessels tried to call the tanker on VHF channel 16 just before the collision, but received no response. The officer might have left the bridge unattended for a short time while he visited the toilet, and the rating, who would have been very tired as he had already worked 14 hours that day, could not hear the radio from his lookout position. Those on the tanker only knew of the accident when the coastguard contacted them several hours later while trying to establish the identity of the other vessel involved. It is of further interest to note that the modern radars were not being used on the tanker on the orders of the master.

Not fully involving the lookout in the watch is detrimental to safety, and although meeting the requirement of the regulation, it does not fulfil its purpose. STCW 95 also requires that:

> *The lookout must be able to give full attention to the keeping of a proper lookout and no other duties shall be undertaken or assigned which could interfere with that task.*

Many OOWs seem to interpret this to mean that the lookout must stand on one side of the bridge with a pair of binoculars for between 4 and 6 hours. Performance tests have shown that the alertness and concentration of lookouts diminishes after about 30 minutes, which shows the futility of employing them in this way. A proper lookout is achieved in a number of ways, not only visually; radar, AIS, radio, and telephones all need to be monitored. The provision of some training to bridge lookouts in these areas would at least allow an OOW to use the additional manpower far more effectively. This, however, would only be possible if the OOW was trained in how to manage such an additional resource.

EXAMPLE

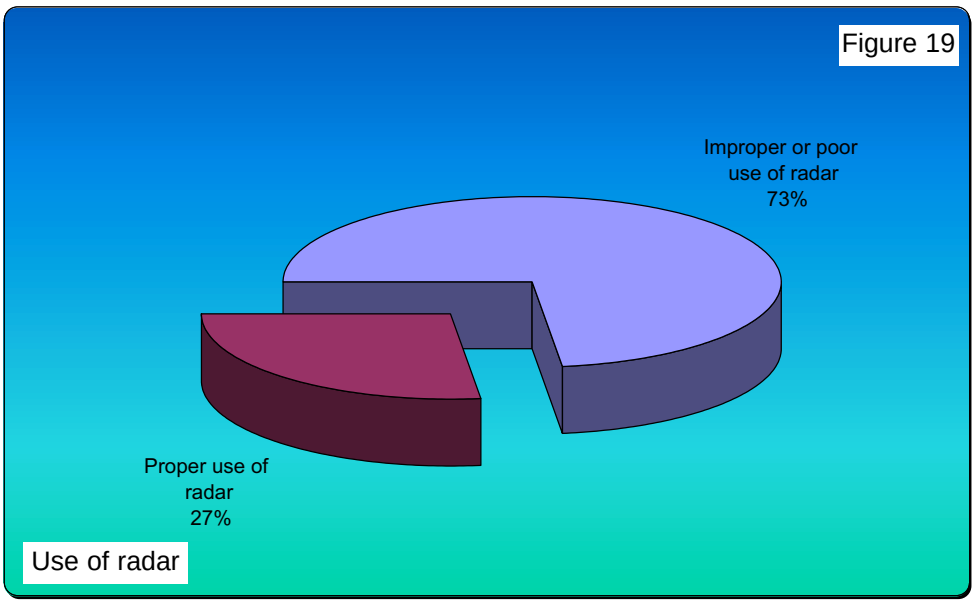
When a 3,790gt feeder container ship collided with a fishing vessel off Land's End, the OOW had been chatting to his watchman in the centre of the bridge despite the fact that containers stacked on deck restricted the view from that position. Both the officer and the lookout had been Cape Verde nationals, and neither person was aware of the developing collision situation.

USE OF RADAR

As technology has advanced with regard to radar and ARPA, and the number of crew on vessels has decreased in parallel with increased automation, it is inevitable that bridge watchkeeping practices have changed in recent years. OOWs place more reliance on radar and ARPA to maintain a lookout, and to assess the risk of collision. Indeed, many newer vessels are not even equipped with a gyro pelorus on the bridge with which to take a visual bearing. It is therefore disturbing that the OOWs on 73% of the vessels involved in collision **(Figure 19)** potentially contravened Rules 7(b) or 7(c), which state:

Rule 7(b)- proper use shall be made of radar equipment fitted and operational, including long range scanning to obtain early warning of risk of collision and radar plotting or equivalent systematic observation of detected objects.

Rule 7(c) - Assumptions shall not be made on the basis of scanty information, especially scanty radar information.



THE USE OF SOUND SIGNALS AND VHF

Unless a vessel approaching on a steady bearing is detected visually or by radar, or heard by a lookout, the remaining collision regulations become irrelevant. A collision will only be avoided if at least one of the vessels is alert to the danger, and takes appropriate action. This might include the application of Rule 34d of the Collision Regulations, which states:

> *….the vessel in doubt **shall immediately** indicate such doubt by giving at least five short and rapid blasts on the whistle. Such signal may be supplemented by a light signal…*

Bearing in mind the apparent prevalence of poor lookout, it is of note that in eleven of the cases where stand on vessels had sufficient time to take the action required by Rule 34d of the Collision Regulations, only two did so.

EXAMPLE

A 4,700gt chemical tanker collided with the stern of a 1,009gt cargo vessel in the south-west lane of the Dover Traffic Separation Scheme in daylight and good visibility. The officer of the watch on the chemical tanker had not seen the cargo vessel he was overtaking, despite it being right ahead or nearly right ahead for up to an hour before the collision. The chief officer, who was the OOW on the cargo vessel, had seen the chemical tanker approaching, but in the period immediately before the collision he had been distracted by an incoming telephone call, which he took in a position where he could not look out astern. In the event, neither vessel took any action before the collision. It was, quite clearly, the first responsibility of the chemical tanker to keep out of the way, but the chief officer on the cargo vessel should have done more to alert the tanker to the danger. A designated lookout on either vessel would have helped prevent the accident.

Examination of the use of VHF in the collisions and near misses showed that it was only used in 14 of the 47 accidents, and was only used to good effect in 3.

EXAMPLE

A 2,446gt dry cargo vessel was outbound from the River Humber in poor visibility. The master of the cargo vessel had the con, a helmsman was steering and the bosun was stationed on the forecastle as a lookout. The master saw the target of an inbound vessel on his radar, and he called the unknown fishing vessel using VHF radio channel 14 with the intention of requesting that the two ships pass each other "green-to-green" in the channel. Spurn Pilot Station overheard the call and advised the master to try using the proper calling channel, 12. Channel 14 was the channel for communications with and between pilots. The master called the fishing vessel on channel 12 saying "green-to-green". He received an instant response but, by then, it was too late. His ship was committed to the manoeuvre, and the fishing vessel was committed to trying to pass red-to-red. They collided, causing extensive damage to the fishing vessel.

SAFE MANNING

All eight of the ships which grounded as a result of a sole watchkeeper falling asleep at night through fatigue, were manned in accordance with their safe manning certificates; all had just two watchkeeping officers, a master and a chief officer. This, together with the fact that a significant number of vessels manned to the same level, were involved in collisions when the watchkeeper was alone on the bridge in conditions which merited additional manning, raises serious doubt on the justifications for operating vessels with just two bridge watchkeeping officers.

THE ROLE OF THE MASTER

The increased propensity for watchkeeper fatigue, on ships within the short-sea trade which are operating with just two bridge watchkeepers, is a key indicator of the inadequacy of such manning. Another, but equally important aspect, is the ability of a master to undertake the functions required of the command when involved in such a demanding and disrupted watchkeeping pattern. STCW 95 requires the following factors to be taken into account when determining the composition of the navigational watch:

> *.1 visibility, state of weather and sea;*
> *.2 traffic density, and other activities occurring in the area in which the vessel is navigating;*
> *.3 the attention necessary when navigating in or near traffic separation schemes or other routeing measures;*
> *.4 the additional workload caused by the nature of the ship's functions, immediate operating requirements and anticipated manoeuvres;*
> *.5 the fitness for duty of any crew members on call who are assigned as members of the watch;*
> *.6 knowledge and confidence in the professional competence of the ship's officers and crew;*
> *.7 the experience of each officer of the navigational watch, and the familiarity of that officer with the ship's equipment, procedures, and manoeuvring capability;*
> *.8 activities taking place on board the ship at any particular time, including radiocommunication activities, and the availability of assistance to be summoned immediately to the bridge when necessary;*

In fact, where the master is employed as one of two watchkeeping officers, he has little choice in this respect. When at sea, working a watch on – watch off routine on the bridge, a master cannot fulfil his obligations without disruptions to his own patterns of rest, which are already disrupted by voyage cycle times. As a consequence, it is neither unexpected nor unreasonable for masters to place a greater reliance on the chief officer when navigating close to navigational dangers, in restricted visibility, and areas of high traffic density, than might ordinarily be the case. Similarly, being empathetic with the demands of the masters' interrupted rest patterns, it is reasonable to expect chief officers in this environment to be less inclined to call a master for situations in which his attendance on the bridge would normally be expected. This undesirable situation is symptomatic of the operational pressures involved, and highlights the inability of masters of ships with only two bridge watchkeeping officers to discharge their duties as master.

EXAMPLE

A general cargo vessel of 794gt sailed from a port on the east coast of England at 0050 bound for Le Havre in ballast. The master and the mate, who were the only two watchkeeping officers, had both been involved with cargo work, hold cleaning and then bunkering on the previous day. They had both slept for about 4 hours between 0200 and 0600, and the mate had been able to sleep between 2200 and the time of sailing, and again between the pilot disembarking at 0100 and 0300 when he relieved the master on the bridge. The usual watchkeeping pattern had been disrupted by the demands of the work in port. The master went straight to bed when he was relieved, and fell asleep almost immediately. He had left no night orders for the mate, who was an experienced officer. However, the mate began to have trouble navigating soon after the master had left the bridge, but he was reluctant to ask the master to return as he knew that he was tired. He had been intending to navigate by eye from buoy to buoy along a pre-planned route. He failed to see one buoy, but carried on. Clutter was seriously affecting the radar picture, and spray was hampering the visibility from the wheelhouse. Despite failing to see the next two buoys, he still carried on, while trying desperately to establish the ship's position, until the vessel eventually grounded on the Goodwin Sands at 0420.

THE PRINCIPLES OF SAFE MANNING

The principles of safe manning, and guidance regarding their application, are laid out in the annexes to IMO Resolution A.890 (21) **(Annex B)**. It is not mandatory for flag Administrations to adhere to these principles and guidelines, but where they are followed, responsibility for the application of the principles rests with the ships' owners and managers, with responsibility for approval falling to the relevant Administration.

Although comprehensive, the principles and guidelines are not prescriptive, and converting them into a set number of persons on a particular ship requires many subjective assessments to be made. In this respect, it must be recognised that when determining safe manning levels, ship owners and managers cannot ignore the commercial pressures of manpower costs. In the same vein, Administrations cannot ignore the pressure owners and managers can bring to bear by threatening to move their ships to Administrations which might interpret the principles and guidelines more leniently.

With this in mind, and in the absence of prescriptive regulation regarding minimum manning levels, it is not surprising that variations in the manning levels in ships of similar size engaged in similar trade in the same area, result. This was shown in a recent investigation, not included in this study, when the Safe Manning Documents of two vessels of similar size, operating with similar cargoes on similar routes, and both with UMS, but registered with different Administrations, were examined. One of the vessels was required to have a crew of seven, which included a master, a chief engineer, a chief officer, plus four ratings. The other required a crew of five, which included a master, a chief officer (who was also required to hold a chief engineer's certificate), and an OOW plus two ratings. Such inconsistencies raise doubt about the effectiveness of the current methods of determining safe manning levels. It is also of concern that Administrations do not tend to review a vessel's Safe Manning Document after issue as a matter of routine. Instead, reliance is placed on owners and managers to inform Administrations of changes in circumstances affecting manning levels.

The guidance provided by IMO Resolution 890(21), with regard to the number of bridge watchkeepers to be carried, states:

> *Except in ships of limited size, the provision of qualified deck officers to ensure that it is not necessary for the master to keep regular watches by adopting a three watch system.*

The definition of *limited size*, as used by the IMO, is open to interpretation and might range between 500gt and 3,000gt depending on the convention, code, or regulation referred to. If IMO Resolution 890(21) is intended to apply to all ships over 500gt, it is clear that this guideline is not being followed by many Administrations. However, if it is intended to apply to vessels over 3,000gt, it follows that there is little or no guidance available for determining the numbers of bridge watchkeepers to be carried for vessels below this size. It should also be noted that two of the vessels in the study were over 3,000gt and carried only two watchkeeping officers.

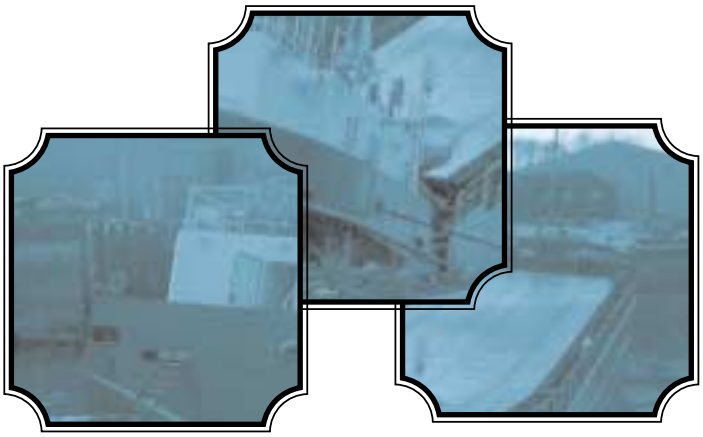
As ships operating with just two bridge watchkeepers including the master, working in opposite watches, are likely to have fatigued OOWs, and the masters of these vessels are frequently unable to discharge all of the duties required of them, the need for more than two watchkeepers is obvious. However, because of the tendency for some owners to move to the flag administration that interprets the guidelines most leniently, this cannot be achieved unless the means for determining the required number of bridge watchkeepers are more precisely defined, and their application made mandatory for all Administrations.

CONCLUSIONS

The statistical base of this study is relatively small, but the quality of the data is good. The study has concentrated on areas where a high degree of confidence can be placed in its accuracy. In this way, the findings of the study, while not unexpected, are important.

The study has confirmed that watchkeeper manning levels, fatigue and a master's ability to discharge his duties are major causal factors in collisions and groundings, and poor lookout is a major factor in collisions. Endorsed by the MAIB's experiences during accident investigation, it illustrates that the hours of work and lookout requirements contained in STCW 95, along with the principles of safe manning, are having insufficient impact in their respective areas. Recommendations addressing the causal factors of fatigue, inadequate manning, and poor lookout are therefore considered to be justified.

To be effective, any action to reduce levels of fatigue, increase a master's ability to discharge his duties, or to improve the standard of lookout, must be taken on an international basis, and must be mandatory. This can only be achieved via the IMO by amending current legislation or by introducing new measures.



RECOMMENDATIONS

To combat fatigue among bridge watchkeepers operating in the short-sea trade, and to improve the standard of lookout on all merchant vessels, the **Maritime and Coastguard Agency** is recommended to:

Take the conclusions of this study forward to the IMO with the aim of reviewing:

2004/206 The guidelines on safe manning to ensure that all merchant vessels over 500gt have a minimum of a master plus two bridge watchkeeping officers, unless specifically exempted for limited local operations as approved by the Administration.

2004/207 The requirements of STCW 95 to change the emphasis with respect to the provision of a designated lookout to ensure that a lookout is provided on the bridge at all times, unless a positive decision is taken that, in view of daylight and good visibility, low traffic density and the vessel being well clear of navigational dangers, a sole watchkeeper would be able to fulfil the task.

2004/208 The requirements of STCW 95 so that a bridge lookout can be more effectively utilised as an integral part of the bridge team.

ANNEX A

Questionnaire

BRIDGE WATCHKEEPING STUDY

Data required from examination of selected reports

Inspectors should aim to answer every relevant question
(refer to investigation file as necessary)

Please be as accurate as possible

Report number

MAIB number

Initials of inspector reviewing report

Initials of person entering data on spreadsheet

General information		
Vessel name:		
Flag:		
Type:		
Gross Tonnage:		
Length:		
Date of accident:		
Ship's time:		
Was the vessel – Underway? At anchor? Moored alongside a jetty?	 Y/N Y/N Y/N	Comments

Environmental conditions					
Daylight	Daylight	Twilight	Nightime	Don't know	
Visibility	Very Poor	Poor	Good	Clear	Don't Know
Sea state	Rough	Medium	Slight	Calm	
Precipitation	Yes	No	Don't know		
Tidal stream – Was it a factor?	Yes	No	Don't know		
Manning					
How many deck officers?					
How many deck ratings?					
Did this meet Safe Manning Certificate requirements	Yes	No	Don't know		
Was the number of available deck officers/crew a factor in the accident	Yes	No	Don't know		
Was there a multi-national crew?	Yes	No	Don't know		
What nationality mix?					
Information on the person having the con at the time of the accident					
Rank on board					
Certificate of Competency held					
Was the certificate obtained	Within last 10 years?	Within last 20 years?	Within last 30 years?	30+ years?	
Nationality					
Age					
What was person's work/rest in previous:	24 hours?				
	72 hours?				
Was the watch system in operation	4 and 8	6 and 6	Other		
What was the average voyage length/duty period					
How far into voyage/duty period before accident					
Was master involved in routine watchkeeping?	Yes	No	Don't Know		

Was the watchkeeper sitting in a chair at the time of the accident?	Yes	No	Don't know	
Was fatigue a contributory factor	Yes	Possibly	No	Don't know
Was watchkeeper asleep?	Yes	Possibly	No	Don't know
Was watchkeeper competency a factor?	Yes	Possibly	No	Don't know
Was the watchkeeper distracted from main task?	Yes	Possibly	No	Don't know
Was the watchkeeper overloaded?	Yes	Possibly	No	Don't know
Accident information				
Was communication a factor?	Yes	No	Don't know	
If so:				
Internal to ship?	Yes	No	Don't know	
Between ships?	Yes	No	Don't know	
Ship/Shore?	Yes	No	Don't know	
Was language a factor? If so:	Yes	No	Don't know	
What was the language of Communication				
What was first language of people involved?				
Was VHF radio used?	Yes	No	Don't know	
If so - Was it used to good effect?	Yes	No	Don't know	
Was the vessel operating in an area where high-density traffic could be expected?	Yes	No	Don't know	
What type of sea area was the vessel operating in?	High seas			
	Coastal waters – if so, give proximity to navigational dangers :			
	Port/harbour area			
Was a failure in machinery, control or navigational equipment a factor?	Yes	No	Don't know	
If so - What?				
Was bridge design a factor?	Yes	No	Don't know	
If so - What aspect?	Visibility		Control ergonomics	
Were the actions of a third party a factor?	Yes	No	Don't know	

General Bridge and Navigational Management				
Who else, apart from the person with the con, was on bridge and what was each person's role/actions	List:			
Was there a sole watchkeeper? (ie no one else on duty on the bridge)	Yes	No	Don't know	
If YES – answer the following				
Was the fact that there was a sole Watchkeeper a contributory factor?	Yes	No	Don't know	
Was a watch alarm fitted?	Yes	No	Don't know	
Was it operational? If not	Yes	No	Don't know	
By choice?	Yes	No	Don't know	
Due to fault?	Yes	No	Don't know	
Were paper charts used? If so :	Yes	No	Don't know	
How often were positions marked on chart?				
Was position taken by two or more Methods?	Yes	No	Don't know	
Were electronic charts used?	Yes	No	Don't know	
Was passage planned?	Yes	No	Don't know	
Was it planned well?	Yes	No	Don't know	
Was vessel following waypoints using An electronic navigation system (GPS)?	Yes	No	Don't know	
Was autopilot engaged?	Yes	No	Don't know	

Was a track control system in use?	Yes		No		Don't know			
Was radar used?	Yes		No		Don't know			
If not – why not?								
If it was:								
Was it on a suitable range scale	Yes		No		Don't know			
What mode was being used:	Relative	North-up		True		Centred		Don't know
		Ship's head up				Offset		
Was ARPA fitted and in use?	Yes		No		Don't know			
If ARPA information used – was it accurate?	Yes		No		Don't know			
Was radar used correctly?	Yes		No		Don't know			
If not – why not?								
Were binoculars available and used?	Yes		No		Don't know			
If not - Would they have helped?	Yes		No		Don't know			
Were alarms on GPS/Radar/Echo Sounder used?	Yes		No		Don't know			
If not - Would they have helped?	Yes		No		Don't know			
Were the standing orders adequate?	Yes		No		Don't know			
Were company/master's night standing orders complied with?	Yes		No		Don't know			

Collision regulations Answer only in relation to the one ship being considered			
Were the Col Regs applied correctly?	Yes	No	
If not – answer the following: What aspect(s) of the regs were incorrectly applied:			
Lookout			
Safe speed			
Assessing risk of collision			
Action by give-way vessel			
Action by stand-on vessel			
Conduct in restricted visibility			
Sound signals			
Other – give number(s)			
Please add any other relevant information/contributory factors			

ANNEX B

Annexes to IMO Resolution A.890 (21)
Principles of safe manning

INTERNATIONAL MARITIME ORGANIZATION

IMO

E

ASSEMBLY
21st session
Agenda item 9

A 21/Res.890
4 February 2000
Original: ENGLISH

RESOLUTION A.890(21)
adopted on 25 November 1999

PRINCIPLES OF SAFE MANNING

THE ASSEMBLY,

RECALLING Article 15(j) of the Convention on the International Maritime Organization concerning the functions of the Assembly in relation to regulations and guidelines concerning maritime safety and the prevention and control of marine pollution from ships,

RECALLING ALSO Article 28(a) of that Convention which requires the Maritime Safety Committee to consider, *inter alia*, the manning of seagoing ships from a safety standpoint,

NOTING that safe manning is a function of the number of qualified and experienced seafarers necessary for the safety of the ship, crew, passengers, cargo and property and for the protection of the marine environment,

RECOGNIZING the importance of the requirements of the pertinent IMO instruments as well as those adopted by ILO, ITU and WHO relevant to maritime safety and protection of the marine environment,

MINDFUL of the provisions of SOLAS regulation V/13 with respect to the issue of an appropriate safe manning document or equivalent as evidence of minimum safe manning,

BEING AWARE that the ability of seafarers to maintain observance of these requirements is dependent upon their continued efficiency through conditions relating to training, hours of work and rest, occupational safety, health and hygiene and the proper provision of food,

BELIEVING that international acceptance of broad principles as a framework for administrations to determine the safe manning of ships would materially enhance maritime safety and protection of the marine environment.

HAVING CONSIDERED the recommendation made by the Maritime Safety Committee at its seventy-first session,

1. ADOPTS the Principles of safe manning, the Guidelines for the application of principles of safe manning and the Guidance on contents and model form of minimum safe manning document, set out respectively in Annexes 1, 2 and 3 to the present resolution;

2. RECOMMENDS that Governments, in establishing the minimum safe manning levels for ships flying their countries' flag, observe the Principles set out in Annex 1 and take into account the Guidelines set out in Annex 2;

3. URGES Governments to ensure that minimum safe manning documents contain, as a minimum, the information given in Annex 3;

4. URGES FURTHER Governments, when exercising port State control functions under international conventions in force with respect to foreign ships visiting their ports, to regard compliance with such documents as evidence that such ships are safely manned;

5. REQUESTS the Maritime Safety Committee to keep this resolution under review;

6. REVOKES resolution A.481(XII).

ANNEX 1

PRINCIPLES OF SAFE MANNING

1 The following principles should be observed in determining the minimum safe manning of a ship:

.1 the capability to:

.1.1 maintain safe navigational, engineering and radio watches in accordance with regulation VIII/2 of the 1978 STCW Convention, as amended, and also maintain general surveillance of the ship;

.1.2 moor and unmoor the ship safely;

.1.3 manage the safety functions of the ship when employed in a stationary or near-stationary mode at sea;

.1.4 perform operations, as appropriate, for the prevention of damage to the marine environment;

.1.5 maintain the safety arrangements and the cleanliness of all accessible spaces to minimize the risk of fire;

.1.6 provide for medical care on board ship;

.1.7 ensure safe carriage of cargo during transit; and

.1.8 inspect and maintain, as appropriate, the structural integrity of the ship; and

.2 the ability to:

.2.1 operate all watertight closing arrangements and maintain them in effective condition, and also deploy a competent damage control party;

.2.2 operate all on-board fire-fighting and emergency equipment and life-saving appliances, carry out such maintenance of this equipment as is required to be done at sea, and muster and disembark all persons on board; and

.2.3 operate the main propulsion and auxiliary machinery and maintain them in a safe condition to enable the ship to overcome the foreseeable perils of the voyage.

2 In applying such principles, Administrations should take proper account of existing IMO, ILO, ITU and WHO instruments in force which deal with:

.1 watchkeeping;

.2 hours of work or rest;

.3 safety management;

.4 certification of seafarers;

.5 training of seafarers;

.6 occupational health and hygiene; and

.7 crew accommodation.

3 The following on-board functions, when applicable, should also be taken into account:

.1 ongoing training requirements for all personnel, including the operation and use of fire-fighting and emergency equipment, life-saving appliances and watertight closing arrangements;

.2 specialized training requirements for particular types of ships;

.3 provision of proper food and drinking water;

.4 need to undertake emergency duties and responsibilities; and

.5 need to provide training opportunities for entrant seafarers to allow them to gain the training and experience needed.

ANNEX 2

GUIDELINES FOR THE APPLICATION OF PRINCIPLES OF SAFE MANNING

1 Introduction

1.1 These guidelines should be used in applying the principles of safe manning set out in Annex 1 to this resolution to ensure the safe operation of, and the prevention of pollution from, ships to which article III of the 1978 STCW Convention, as amended, applies.

1.2 The Administration may retain or adopt arrangements which differ from the provisions herein recommended and which are especially adapted to technical developments and to special types of ships and trades. However, at all times the Administration should satisfy itself that the detailed manning arrangements ensure a degree of safety at least equivalent to that established by these guidelines.

2 Hours of work or rest

2.1 Every company is obliged to ensure that the master, officers and ratings do not work more hours than is safe in relation to the performance of their duties and the safety of the ship. The same responsibility is placed on the master in relation to the members of the ship's complement. Manning levels should be such as to ensure that the time and place available for taking rest periods are appropriate for achieving a good quality of rest. Further guidance about fitness for duty is contained in section B-VIII/1 of the STCW Code.

2.2 A record of the actual hours of work performed by the individual seafarer should be maintained on board, in order to verify that the minimum periods of rest required under relevant and applicable international instruments in force have been complied with.

3 Determination of minimum safe manning levels

3.1 The purpose of determining the minimum safe manning level of a ship is to ensure that its complement includes the grades/capacities and number of persons required for the safe operation of the ship and the protection of the marine environment.

3.2 The minimum safe manning level of a ship should be established taking into account all relevant factors, including the following:

.1 size and type of ship;

.2 number, size and type of main propulsion units and auxiliaries;

.3 construction and equipment of the ship;

.4 method of maintenance used;

.5 cargo to be carried;

.6 frequency of port calls, length and nature of voyages to be undertaken;

.7 trading area(s), waters and operations in which the ship is involved;

.8 extent to which training activities are conducted on board; and

.9 applicable work hour limits and/or rest requirements.

3.3 The determination of the minimum safe manning level of a ship should be based on performance of the functions at the appropriate level(s) of responsibility, as specified in the STCW Code, which include the following:

.1 navigation, comprising the tasks, duties and responsibilities required to:

.1 plan and conduct safe navigation;

.2 maintain a safe navigational watch in accordance with the requirements of the STCW Code;

.3 manoeuvre and handle the ship in all conditions; and

.4 moor and unmoor the ship safely;

.2 cargo handling and stowage, comprising the tasks, duties and responsibilities required to:

.1 plan, monitor and ensure safe loading, stowage, securing, care during the voyage and unloading of cargo to be carried on the ship;

.3 operation of the ship and care for persons on board, comprising the tasks, duties and responsibilities required to:

.1 maintain the safety and security of all persons on board and keep life-saving, fire-fighting and other safety systems in operational condition;

.2 operate and maintain all watertight closing arrangements;

.3 perform operations, as appropriate, to muster and disembark all persons on board;

.4 perform operations, as appropriate, to ensure protection of the marine environment;

.5 provide for medical care on board the ship; and

.6 undertake administrative tasks required for the safe operation of the ship;

.4 marine engineering, comprising the tasks, duties and responsibilities required to:

.1 operate and monitor the ship's main propulsion and auxiliary machinery and evaluate the performance of such machinery;

.2 maintain a safe engineering watch in accordance with the requirements of the STCW Code;

.3 manage and perform fuel and ballast operations; and

.4 maintain safety of the ship's engine equipment, systems and services;

.5 electrical, electronic and control engineering, comprising the tasks, duties and responsibilities required to:

.1 operate the ship's electrical and electronic equipment; and

.2 maintain the safety of the ship's electrical and electronic systems;

.6 radiocommunications, comprising the tasks, duties and responsibilities required to:

.1 transmit and receive information using the radio equipment of the ship;

.2 maintain a safe radio watch in accordance with the requirements of the ITU Radio Regulations and the 1974 SOLAS Convention, as amended; and

.3 provide radio services in emergencies;

.7 maintenance and repair, comprising the tasks, duties and responsibilities required to:

.1 carry out maintenance and repair work to the ship and its machinery, equipment and systems, as appropriate to the method of maintenance and repair used.

3.4 In addition to the factors and functions in paragraphs 3.2 and 3.3, the determination of the minimum safe manning level should also take into account:

.1 the management of the safety functions of a ship at sea when not under way;

.2 except in ships of limited size, the provision of qualified deck officers to ensure that it is not necessary for the master to keep regular watches by adopting a three-watch system;

.3 except in ships of limited propulsion power or operating under provisions for unattended machinery spaces, the provision of qualified engineer officers to ensure that it is not necessary for the chief engineer to keep regular watches by adopting a three-watch system;

.4 the maintenance of applicable occupational health and hygiene standards on board; and

.5 the provision of proper food and drinking water for all persons on board, as required.

3.5 In determining the minimum safe manning level of a ship, consideration should also be given to:

.1 the number of qualified and other personnel required to meet peak workload situations and conditions, with due regard to the number of hours of shipboard duties and rest periods assigned to seafarers; and

.2 the capability of the master and the ship's complement to co-ordinate the activities necessary for the safe operation of the ship and the protection of the marine environment.

4 Responsibilities of companies

4.1 The Administration may require the company responsible for the operation of the ship to prepare and submit its proposal for the minimum safe manning level of a ship in accordance with a form specified by the Administration.

4.2 In preparing a proposal for the minimum safe manning level of a ship, the company should apply the principles, recommendations and guidelines contained in this resolution and should be required to:

.1 make an assessment of the tasks, duties and responsibilities of the ship's complement required for its safe operation, for protection of the marine environment, and for dealing with emergency situations;

.2 make an assessment of numbers and grades/capacities in the ship's complement required for its safe operation, for protection of the marine environment, and for dealing with emergency situations;

.3 prepare and submit to the Administration a proposal for the minimum safe manning level based upon the assessment of the numbers and grades/capacities in the ship's complement required for its safe operation and for protection of the marine environment, justifying the proposal by explaining how the proposed ship's complement will deal with emergency situations, including the evacuation of passengers, where necessary;

.4 ensure that the minimum safe manning level is adequate at all times and in all respects, including meeting peak workload situations, conditions and requirements, and is in accordance with the principles, recommendations and guidelines contained in this resolution; and

.5 prepare and submit to the Administration a new proposal for the minimum safe manning level of a ship in the case of changes in trading area(s), construction, machinery, equipment or operation and maintenance of the ship, which may affect the safe manning level.

5 Approval by the Administration

5.1 A proposal for the minimum safe manning level of a ship submitted by a company to the Administration should be evaluated by the Administration to ensure that:

.1 the proposed ship's complement contains the number and grades/capacities of personnel to fulfil the tasks, duties and responsibilities required for the safe operation of the ship, for protection of the marine environment and for dealing with emergency situations; and

.2 the master, officers and other members of the ship's complement are not required to work more hours than is safe in relation to the performance of their duties and the safety of the ship and that the requirements for work and rest hours, in accordance with applicable national regulations, can be complied with.

5.2 The Administration should require a company to amend a proposal for the minimum safe manning level of a ship if, after evaluation of the original proposal submitted by the company, the Administration is unable to approve the proposed composition of the ship's complement.

5.3 The Administration should only approve a proposal for the minimum safe manning level of a ship and issue accordingly a minimum safe manning document if it is fully satisfied that the proposed ship's complement is established in accordance with the principles, recommendations and guidelines contained in this resolution, and is adequate in all respects for the safe operation of the ship and for the protection of the marine environment.

5.4 The Administration may withdraw the minimum safe manning document of a ship if the company fails to submit a new proposal for the ship's minimum safe manning level when changes in trading area(s), construction, machinery, equipment or operation and maintenance of the ship have taken place which affect the minimum safe manning level.

5.5 The Administration should review and may withdraw, as appropriate, the minimum safe manning document of a ship which persistently fails to be in compliance with rest hours requirements.

ANNEX 3

GUIDANCE ON CONTENTS AND MODEL FORM OF MINIMUM SAFE MANNING DOCUMENT

1 The following information should be included in the minimum safe manning document issued by the Administration specifying the minimum safe manning level:

.1 a clear statement of the ship's name, port of registry, distinctive number or letters, IMO number, gross tonnage, main propulsion power, type and trading area and whether or not the machinery space is unattended;

.2 a table showing the number and grades/capacities of the personnel required to be carried, together with any special conditions or other remarks;

.3 a formal statement by the Administration that, in accordance with the principles and guidelines set out in Annexes 1 and 2, the ship named in the document is considered to be safely manned if, whenever it proceeds to sea, it carries not less than the number and grades/capacities of personnel shown in the document, subject to any special conditions stated therein;

.4 a statement as to any limitations on the validity of the document by reference to particulars of the individual ship and the nature of service upon which it is engaged; and

.5 the date of issue and any expiry date of the document together with a signature for and the seal of the Administration.

2 It is recommended that the minimum safe manning document be drawn up in the form corresponding to the model given in the appendix to this Annex. If the language used is not English, the information given should include a translation into English.

APPENDIX

MODEL FORM OF MINIMUM SAFE MANNING DOCUMENT

MINIMUM SAFE MANNING DOCUMENT

(Official seal) (State)

Issued under the provisions of regulation V/13(b) of the

INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA, 1974, as amended

under the authority of the Government of

.....
(name of the State)

by .....
(Administration)

Particulars of ship[*]

Name of ship .....

Distinctive number or letters .....

IMO number .....

Port of registry .....

Gross tonnage:

National .....

International Tonnage Convention, 1969 .....

Main propulsion power (kW) .....

Type of ship .....

Periodically unattended machinery space yes/no

[*] Alternatively the particulars of the ship may be placed horizontally.

Trading area**

The ship named in this document is considered to be safely manned if, when it proceeds to sea, it carries not less than the number and grades/capacities of personnel specified in the table(s) below.

Grade/capacity	Certificate (STCW regulation)	Number of persons

Special requirements or conditions, if any:

Issued at ..... on the ..... day of .....
(month and year)

Date of expiry (if any) .....

(Seal of the Administration)

.....
(Signature for and on behalf of the Administration)

** Where a trading area other than unlimited is shown, a clear description or map of the trading area should be included in the document.