

Marine Accidents in Harbour Waters: Results from the Marine Safety Pilot Study

1. Summary:

This report summarises the results of the Department for Transport's pilot study which looked at marine accidents in harbour waters. The study collected incident data covering the period 2005-2009 from 13 harbour authorities. The key findings of the pilot study were:

- The overall accident rate for all vessels types reported was about 1 incident per 1000 vessel movements¹, with most incidents occurring in 2008 and the least number in 2005.
- Commercial vessels were over 10 times more likely to suffer an incident than passenger vessels (1 in 240 vessel movements compared with 1 in 3000 for passenger vessels).
- Overall, there was one injury in 42,000 vessel movements (of all types) – and a very high proportion of these (around 30%) were fatalities.
- Over 92% of all incidents types reported were classified as “minor”, with only 1% referred to as “serious”. The most common types of incidents were those that a) took place on board a vessel, b) were due to vessel contact with a fixed object and, c) were due to machinery failure.
- The main factors for marine incidents (table 6) were reported as a) inappropriate vessel navigation (34%), b) mechanical failure (29.5%), and c) breach of regulation (14%). Poor communications, fatigue and inadequate passage planning were not reported as major factors.
- There was significant divergence concerning the location of incidents. For example, most incidents for Dover and Belfast took place at the berthing area, whereas for Southampton it was in the harbour approaches. The extent of its harbour waters and approaches had a big influence on the outcome of this table.
- Most of the results were fairly consistent over the 5 year period, with few significant trends. The exception is that there is a rise in marine injuries with more occurring in 2007-09 than for 2005-06, albeit based on a very small sample size.
- There is evidence of some under-reporting of incidents; both in terms of what are reported to harbour authorities in relation to incidents that take place on-board vessels and in terms of what is reported by the harbour authorities and mariners to the Maritime Accident Investigation Branch.

This was a voluntary survey, which used a template consisting of eight tables and a set of definitions which had been agreed by the participants. Some ports were unable to provide historical data for all the tables or had difficulty representing their data in the agreed format. Nevertheless, most of the tables have provided some potentially useful and valid information.

¹ for the purposes of calculating the incident rate, we only use data from ports which supply complete sets of figures (in this case, figures for vessel movements and incidents)

It is for industry to decide how much of this information is useful for benchmarking purposes, whether a similar exercise for 2010 and 2011 should be undertaken and if the scope should be extended to cover other major UK ports. Collecting information for a single year should be considerably less onerous for the ports, than collecting the historical data for the pilot study. However, ports need to be aware of their coverage; those that handle predominantly commercial vessels are likely to have a higher incident rate than ports that handle predominantly passengers, or fishing and leisure vessels.

In terms of policy development, the accident data for commercial and passenger vessels shown in table 3 is probably the most useful information for DfT.

2. Background:

There are benefits, both in terms of policy development and in terms of benchmarking safety performance for industry, in having better information on marine accidents in harbour waters. The Transport Committee's report on the Draft Marine Navigation Bill noted that the evidence base that was used to support the Bill did not specify the accident figures for harbour authority waters. The report identified the need for a clear understanding of the scale of the problem before proposing additional safety measures, and the need for robust figures to allow meaningful comparisons to be made over time for these measures. In its response, the Department acknowledged the need to have relevant, measurable parameters to assess the impact of new legislation, albeit that there would be practical difficulties in compiling evidence to support every clause in the Bill. As a consequence, the Department agreed to review the options for gathering improved and relevant data, providing this could be done without imposing undue burdens on industry.

The Marine Accident Investigation Branch (MAIB) already has a database of incidents in UK coastal waters and publishes a number of tables in their annual report. Their database is a compilation of returns reported by harbour masters and ship's masters in compliance with the Merchant Shipping (Accident Reporting and Investigation) Regulations 2005. If an incident occurs and is significant enough to meet MAIB's reporting criteria, then harbour masters and mariners are under an obligation to report the incident to MAIB using their reporting form. In practice however, MAIB often have to rely on phone calls or partial information in an email. As a consequence some incident reports are imprecise; for example, a location provided to MAIB as 'off Whitby' is likely to be recorded by MAIB as coastal waters rather than in the local 'port / harbour'. In addition, MAIB suspect there is widespread under-reporting of marine incidents.

Using MAIB data, the Department was able to extrapolate most of the fatal and major injuries which occurred in UK harbour waters. At the end of 2009, DfT published statistics² based on MAIB data showing the level of reported fatalities across all UK ports. However, because of the lack of reliable information and likely under-reporting of non-fatal injuries, it was decided not to publish figures for injuries, accidents and near-misses.

At the same time, the Port Associations (the UK Major Ports Group and the British Ports Association) and several harbour masters expressed an interest in setting up standardised reporting arrangements for marine accidents along similar lines to the

² Transport Statistics (Great Britain) 2009

reporting of land side accidents on the port estate under the aegis of the HSE. There was a widely held view that most of the incidents which occur in harbour waters were either due to mechanical failure or were due to the actions of third parties, and it would be useful to test these assumptions. In view of the difficulty of using MAIB statistics and Industry's desire for a means of benchmarking their performance, it was agreed that the Department should conduct in a limited pilot study with around a dozen ports.

The purpose of the study would be to:

- a) Develop and test a simple, effective reporting system for port marine accidents that can be administered by the ports industry itself, to enable harbour authorities to benchmark their safety performance against other UK ports, based on agreed standards for the industry.
- b) Improve the evidence base to support decisions in relation to harbour waters (particularly, injuries in harbour waters), and which could provide an indicator of compliance by UK ports with the Port Marine Safety Code, and;
- c) To validate MAIB's data and their concerns about under-reporting.

The scope of the survey was restricted to marine activities and did not include land-based activities such as stevedoring. The industry funded body, Port Skills & Safety (PSS) collates statistics for dry-side accidents in ports based on data which its members submit for HSE as part of their RIDDOR³ return. The Department has also recently published a study on Port Employment and Accident Rates for 2009/10.

3. Method:

There are a number of constraints department needs to work within when collecting statistics. These include an obligation to:

- Only collect information which is necessary and which would be used, and
- To aggregate data which is commercially sensitive.

Thirteen UK ports were involved in the study and volunteered to provide data covering the last five years (2005-2009). We deliberately wanted a diverse cross-section of ports, to reflect the different sizes, functions and activities carried out in UK ports. As well as the thirteen harbour authorities, the Maritime Coastguard Agency and industry bodies such as the Port Associations and PSS were involved in the study, along with the Department's statisticians.

The following ports were involved in the study:

Harbour authority:	Type:	Harbour Usage:
Dover	Trust	Ro-ro; ferry terminals, cruise terminal; leisure
King's Lynn	Private	Fishing and leisure
Poole Harbour	Trust	Commercial, Ro-Ro ferry terminal, fishing and leisure

³ The **Reporting of Injuries, Diseases and Dangerous Occurrences Regulations** 1995, also known as RIDDOR.

Harwich Haven	Trust	Leisure, commercial
Aberdeen	Trust	Commercial, ferry terminal, fishing and leisure
Medway	Private	Commercial, fishing & leisure
Teesport	Private	Commercial, Ferry terminal
Bristol	Private	Commercial
Belfast	Trust	Commercial, ferry, leisure
Forth	Private	Commercial
Dundee	Private	Commercial
Port of London	Trust	Mainly commercial, passenger ferried and leisure
Southampton	Private	Commercial, leisure

Most of the work was initiated through correspondence, but an initial meeting was held at the Department in London to agree the purpose, scope and method used for the project.

It was agreed that ports would collate their own data and complete a template that had also been reviewed and agreed by the group. A copy of the template and the combined total of the information we received from the 13 harbour authorities is included as a separate document at appendix F. The Group were asked to provide information covering:

- Vessel movements;
- Injury data;
- Types of cargo goods and passengers handled;
- Number and type of incidents and their severity;
- Factors behind the incident (it was acknowledged that this would be subjective);
- Conditions at time of an incident and its location;
- How many incidents were reported to MAIB and
- Whether any incident led to a significant change in the Harbour Authority's Safety Management System.

We also asked for basic information about the port, such as tonnage of goods, number of berths, and geographical size of the harbour to put the safety information into context. This would make it possible to analyse the information by cargo and by size, which might be useful for benchmarking purposes, although we have not attempted to do this for this report.

We were also aware that some ports would have difficulty providing accurate information concerning vessel movement for leisure and fishing vessels. Some ports provided an estimate whilst other ports did not provide any data. The survey also asked for data on the types of incident and the factor(s) behind each incident. As well as providing useful information in its own right, representatives in the Ports Industry were hoping this data would provide a more balanced picture in terms of who was responsible for an incident. The aim was to avoid giving the impression that harbour authorities were to blame for all the incidents that occur in their waters.

It was agreed that each port would continue to **own** the data collected for the study. Because some of the information is commercially sensitive, the Department has agreed not to publish the data and results for each harbour authorities without first getting agreement from the relevant harbour authority.

4. Definitions and standards:

The reporting requirements for harbour authorities and definitions that were used in this study are attached at appendix A. In the main, these are consistent with the existing definitions and categories used by MAIB. However the categories used to define the severity of injuries as “fatal”, “major” and “serious” (where staff are kept off work for 3 working days) were based on the description used in the new EU directive for injuries, which is slightly different to MAIB’s current classification.

Incidents were categorised as either “serious”, “moderate” or “minor” depending on their severity. This was one of the most difficult classifications to agree, as some ports wanted four, five or even six levels of severity. Indeed, some found it difficult to reconcile their own system of multiple levels with the relatively simple three-level return that was eventually agree upon. To help ensure a consistent standard of returns for all harbour authorities, we asked them to use the attached ‘trigger table’ (appendix D).

5. Results:

Harbour authorities were asked to complete eight tables on the standard pro-forma (appendix F).

Table 1 - Harbour details: This table shows the overall numbers of vessel movements, incidents, tonnage of goods etc, for each port. It illustrates the diversity of ports within the group; for example, the Port of London has harbour waters which cover over 1,000km², whereas Aberdeen has waters of less than 1km². Twelve participants were able to provide figures for the overall number of incidents and the number of vessel movements⁴ for their port.

A detailed breakdown of data for each port is shown at appendix E. The main findings from this table are:

- Overall there were 2,265 incidents compared with a reported 2,307,983 vessel movements (about one incident per 1,000 movements, or 0.1%) over the 5 year period.
- There has been little variation in the overall incident rate against movements over the last 5 years. Most incidents occurred in 2008; the least in 2005.
- There is a significant difference in the rate between ports, ranging from less than one incident in 4,000 reported movements (or 0.025%) over the 5 year period to one incident in 57 reported movements (1.8%).

Different incident rates between ports may reflect coverage of different vessel types and different reporting standards. Both ports with the highest incident rates, also reported significantly more “other onboard incidents” than any other port in the survey. Moreover,

⁴ Some ports have not been able to include vessel movements for leisure and workboats

although the rate was relatively high none of the incidents reported by either port were classified as 'serious'.

Table 2 – Incidents by vessel type: The purpose behind table 2 was to identify the type of vessels which were most likely to be involved in an incident and by inference, may represent a higher risk for the harbour authority. Not all ports were able to supply this data and some classes of vessel (e.g. fishing vessels) only use some of the ports in the survey. However, the majority of ports were able to provide incident and vessel movement information for commercial vessels (other than passenger craft, but including warships) and passenger vessels. The table below includes data for commercial vessels at ten ports and the data for passenger vessels from seven ports. Two ports were able to supply incident data without the vessel movement data, so the total number of reported incidents was actually 1,796 and 241 respectively, for commercial and passenger vessels. However, for the purposes of calculating the incident rate, we only use data from ports which supplied both sets of information.

		2005	2006	2007	2008	2009	Total	Rate:
Commercial vessels	No. in incidents	290	324	293	334	304	1,545	0.42%
	No. vessel movements	77,950	76,858	75,264	73,829	68,351	372,252	
Passenger vessels	No. in incidents	39	33	37	36	37	182	0.034%
	No. vessel movements	114,634	111,545	109,291	106,841	104,291	546,602	

The same principle for calculating the incident rate was applied to other classes of vessel; of the 55 reported incidents with fishing vessels, only three ports had vessel movement data. As a consequence, the incident rate was based on 22 incidents that occurred in these three ports.

The total number of reported incidents for each vessel type was as follows:

Vessel type	Total reported incidents	Incident rates
Commercial	1,796	1 incident in 241 vessel movements (VM) - 0.42% (based on 1545 incidents at ten ports)
Fishing	55	1 in 5,477 VM - 0.018% (based on 22 incidents at three ports)
Passenger	241	1 in 3000 VM – 0.034% (based on 182 incidents at seven ports)
Leisure	221	1 in 7,583 VM - 0.013% - (based on 125 incidents at three ports)
Work boats	72	1 in 3086 VM – (0.032% - based on 13 incidents at three ports)

- Most incidents recorded were for commercial and passenger vessels. The overall incident rate was 0.42% (1 incident per 240 movements) for commercial vessels, and 0.03% (one incident per 3000 movements) for passenger vessels.
- Data from one harbour authority accounts for over a million reported vessel movements out of the total 2,307,983 movements for all vessels types reported by 12 ports.

- Based on the information reported, leisure vessels and fishing vessels have the lowest incident rates in harbour areas, whereas commercial vessels had the highest rate of incidents.

Ports will need to be aware of their coverage for benchmarking purposes; those that handle predominantly commercial vessels are likely to have a higher incident rate than ports that handle predominantly passengers, or fishing and leisure vessels. Given the tighter regulatory regime for passenger vessels, it is not surprising that the number of incidents is lower than for commercial vessels. Fishing vessels and leisure craft had a relatively low incident rate but this result should be viewed with some caution. The sample size for both was small and for leisure vessels in particular, a single harbour authority accounted for 95% of all the returns⁵.

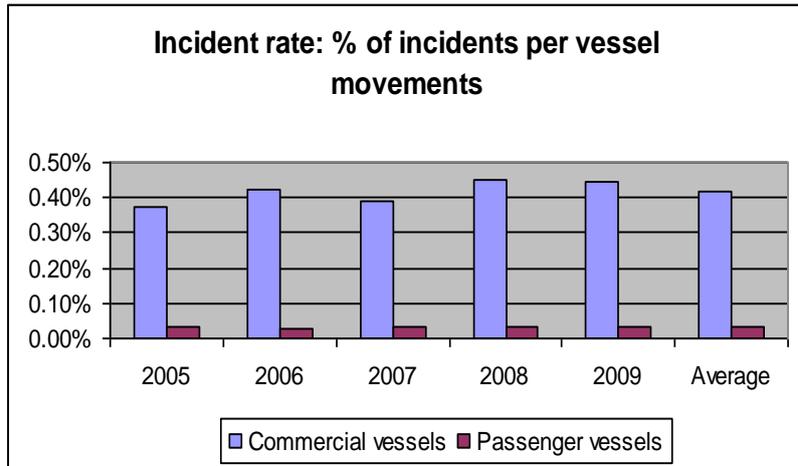
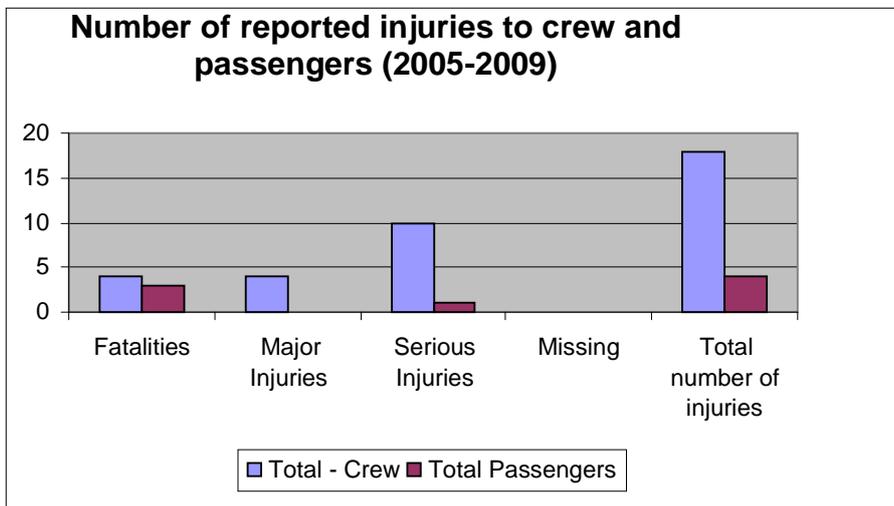


Table 3 - Reported crew and passenger injuries. The purpose of this table is to identify how many injuries have occurred in each port and whether any trends can be identified. Seven ports reported injuries over the period. We were warned however, that not all injuries that occur on a vessel in harbour waters are necessarily reported to the harbour authority. The table below shows the number of reported injuries by type.



The total number of injuries over the past five years is twenty four (4 passenger and 18 crew), so the sample size is very small. In order to assess whether this trend is typical for other UK harbours, it will be necessary to increase the number of harbour authorities in the survey. The following points should be viewed with the above caveat in mind:

- The proportion of fatalities against other injuries is surprisingly high at 32% of all injuries reported. This might be a consequence of the sample size which is very

⁵ If this harbour authority is removed, the incident rate is 1 in 3106 for leisure movements or 0.032%

small, or may indicate that some major / serious injuries are being under-reported or missed.

- Against the 925,623 reported vessel movements by the seven ports who provided injury figures⁶, the combined injury rate for passengers and crew is 0.0023%. For passengers it was 0.0004% and for crew it is 0.0019%
- The trend over the last five years has been for an increase in the number of injuries with those for 2007-09 higher than for those for 2005-06. The worst year was 2009, which had an injury rate of 0.006% for crew and passengers (against all vessel movements at seven ports).

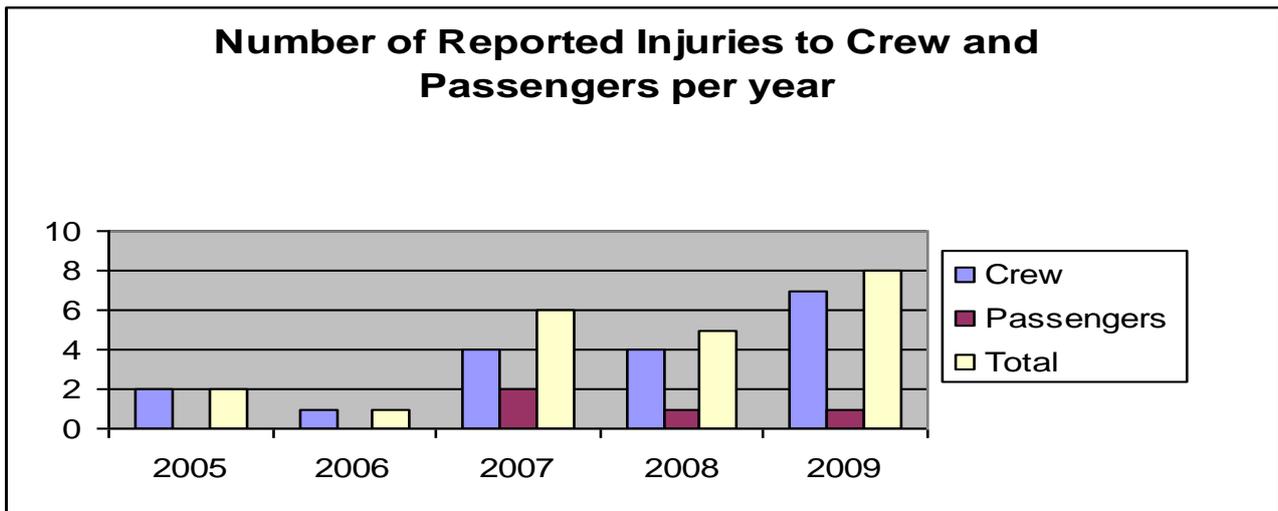


Table 4 - Main Incident types – and their severity

The aim of this table is to categorise incidents into different types and to assess their severity and identify any trends. Twelve ports were able to supply us with data. The total number of incident types listed in this table (2280) is only slightly higher than the figure in table 1 for the number of incidents (2265). Because a single incident may comprise of several different elements or incident types (e.g. a collision may lead to a fire or a sinking), we allowed participants to list up to three ‘incident types’ for each reported incident.

The next two tables summarise the types of incidents and their severity.

	2005	2006	2007	2008	2009	Average
Serious	1.3%	0.2%	0.9%	1.6%	0.4%	0.9%
Moderate	4.4%	6.0%	7.1%	5.3%	9.1%	6.4%
Minor	94.3%	93.7%	92.0%	93.1%	90.5%	92.7%

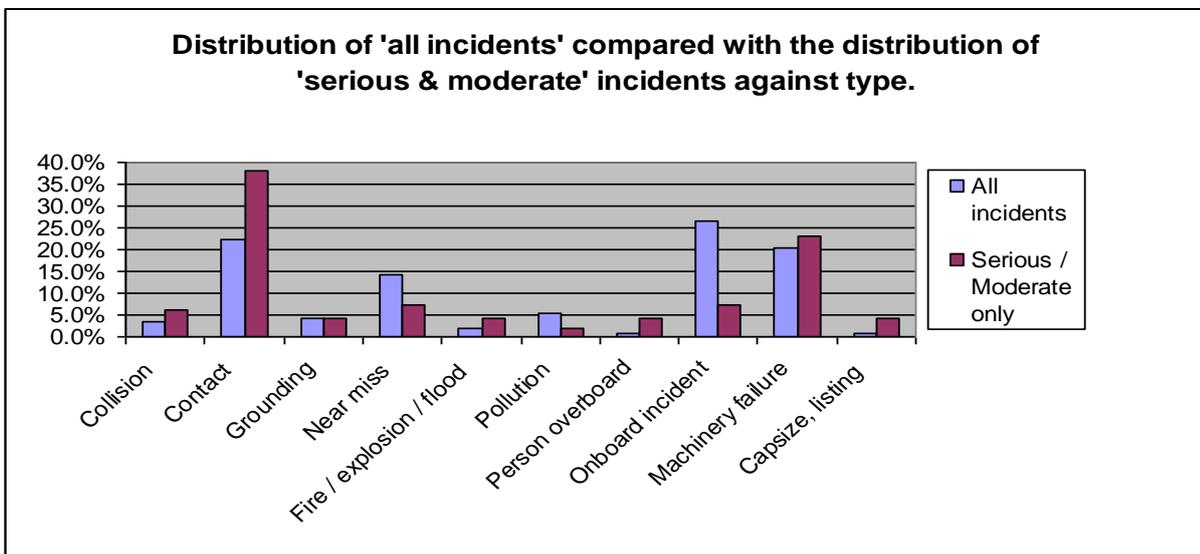
⁶ i.e. Total vessel movements and injuries data covers all vessel types, incl fishing and leisure vessels.

Incident types – numbers

	Serious	Moderate	Minor	Total
Collision	0	10	65	75
Contact	4	59	442	505
Grounding	1	6	87	94
Near miss	1	11	312	324
Fire / explosion / flood	1	6	40	47
Pollution	1	2	122	125
Person overboard	5	2	12	19
Other onboard incid	5	7	591	603
Machinery failure	0	38	430	468
Capsize, listing	3	4	13	20
Totals	21	145	2114	2280

The main findings from this data are:

- Over 92% of incident types reported were ‘minor’ and only 1% were serious. There were no discernable trends over the 5 year period, although fewer serious incidents occurred in 2006 and 2009.
- The most common incident type was “other onboard incident” (26.4% of the total); however, this has been distorted by two ports which listed over 60% of all incident types under this category.
- Vessel contact (22.1%), mechanical failure (20.5%) and near miss (14.2%) are also very common incident types. Capsize and person overboard amount to less than 1%.



The above table compares the distribution of all incidents (which includes minor) for each incident type, with the distribution of just serious and moderate incidents. For example, the number of ‘contacts’ represents 22.1% of all incidents, but almost 40% of all serious and moderate incidents. There is a greater risk of serious / moderate incidents for collisions, contact, fire etc, person overboard, machinery failure and capsized / listing.

Table 5 – Location of incident. The purpose of this table is to determine the proportion of reported incidents in different areas of the harbour – i.e. where vessels are berthing /

unberthing, underway in harbour waters, in the approaches, or whilst a vessel is at anchor. Eleven ports were able to supply this data and as we expected, the size and function of the port has a strong influence on the results.

Overall, most incidents occurred in the berthing area (45%) and the least number occurred in harbour approaches (15.7%) and anchoring area (0.5%). The overall figures are consistent over the five year period, but differed markedly between the ports.

Berthing / unberthing or docking/undocking	44.8%
Underway in harbour waters (not berthing)	39.5%
Underway In harbour approaches	15.7%
Vessel at Anchor	0.5%

Geographical factors / port type contributed towards variations. Poole and the PLA recorded most of their incidents in harbour waters, at almost 90% and 62.5% respectively. Southampton and Harwich had a large number of incidents in their approaches (54% and 36.5% respectively). Dover reported 81% of their incidents had taken place in the berthing and unberthing area which would reflect the frequency and intensity of the ferry schedule.

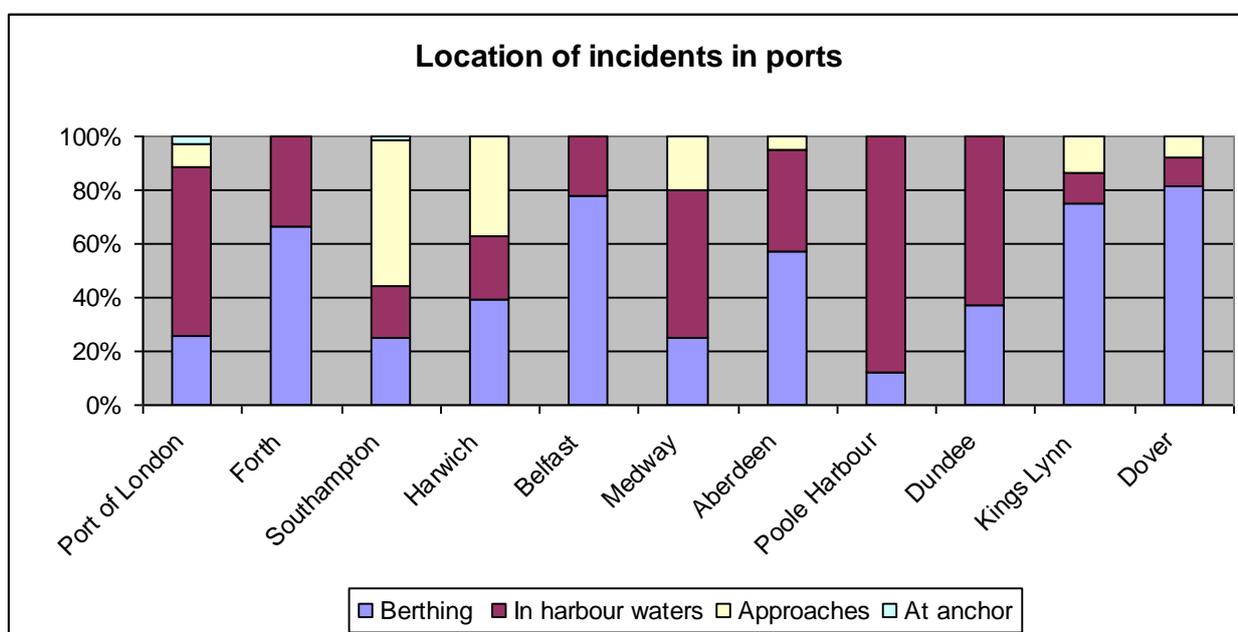


Table 6: Main factors behind an incident:

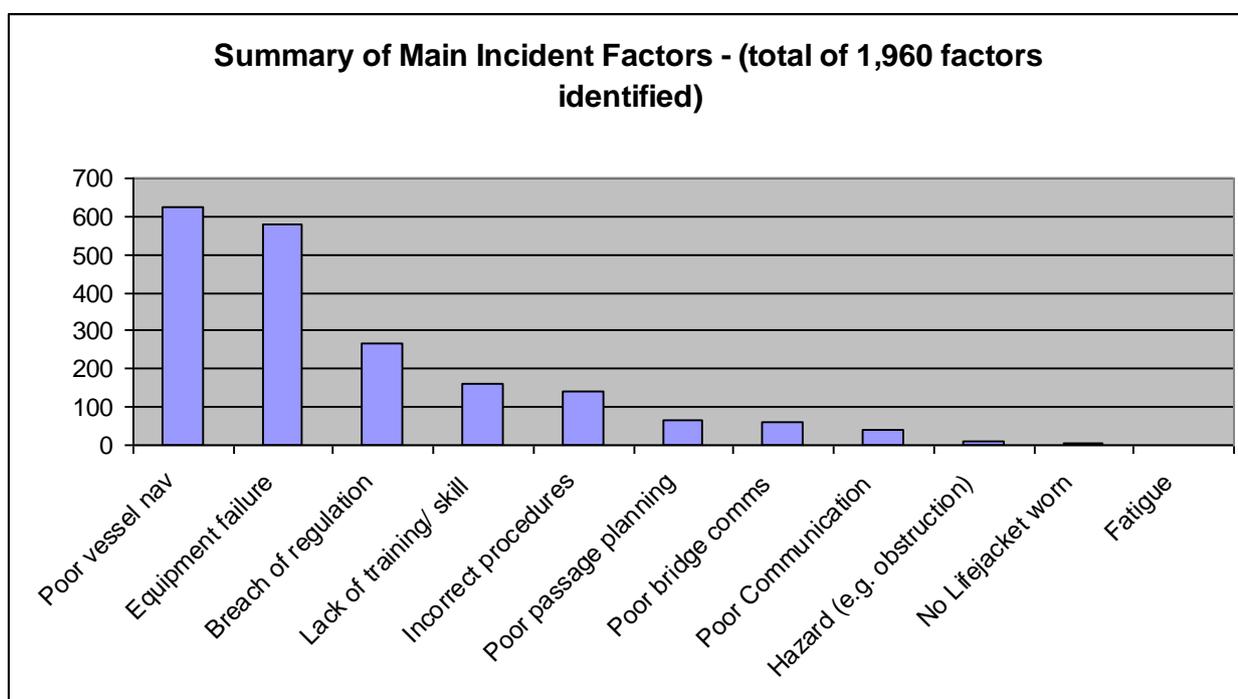
The aim of this table was to identify which factors most commonly led to incidents. MAIB reports commonly cite poor passage planning and poor communication as significant contributory factors in marine accidents. Incidents are caused by a variety of factors, often in combination, and we wanted to see if there was a correlation between MAIB's conclusions and those from this study.

The Ports Industry was also concerned that simply recording the number of incidents which occur in harbours, without any regard for the mistakes and negligence of port users, could give the misleading impression that the ports themselves were to blame for all incidents. This table allowed participants to record factors against criteria that we hoped were objective and in many cases, the same used by MAIB. As with table 4, we allowed ports to record up to three factors for any one incident. The total number of factors listed was 1,960 compared to a total of 2,265 incidents, which means there is

some under-reporting on this table. Nine ports were able to provide factors for all their incidents, two for some incidents and three ports were not able to report any factors. Nevertheless, some of the data could still be useful, if accompanied by a health warning.

The main findings were:

- A substantial number of individual ports listed ‘inappropriate vessel navigation’ and ‘machinery failure’ as the main incident factors (34% and 29.5% respectively of all incident causes). But there was no uniform response to the third and fourth most common factors, breach of regulation (14%) and lack of training (8.3% of all incident causes).
- Some of the issues MAIB tend to flag up in their incident reports were not reflected in the results we received. No one listed fatigue as a factor and concerns about communication (between pilot and master; bridge / shore; and lack of passage plan) accounted for less than 10% of all the factors identified.



- Apart from *equipment failure* and *hazard (e.g. obstruction)* all the factors listed relate to the human element, which is often omitted in surveys.

It is not clear from this information who would be responsible for each incident. We would expect that factors such as a lack of lifejacket and equipment failure tend to be linked to the crew and the vessel. Hazards and obstacles would be the responsibility of harbour authorities. Poor vessel navigation, breach of regulation, incorrect procedures might also be predominantly linked with the vessel; whereas poor communication / poor passage planning might apply equally to both vessels and harbour authorities.

Table 7: Conditions: The aim of this table was to see if there was a correlation between the number of incidents and local weather conditions. A common assumption was that incidents were more likely to occur when conditions are poor. This is a fairly rudimentary indicator, as we have not asked how often the port is prone to poor conditions and what, if any; additional risk mitigation measures are used. Eight ports

were able to either provide the information for all their incidents, or for the vast majority. The main findings were:

- Overall, 68% of incidents occurred in good conditions, with less than 10% occurring in poor conditions. However, without knowing how frequently the sample ports are subject to poor conditions, it is hard to know if there is an increased risk of incidents.
- There was a notable variation for Medway and Belfast who reported that around 25% of incidents occurred in good conditions, 50% in fair and 25% in poor conditions. It is not clear whether this is due to different reporting standards, or if the results reflect different local weather conditions.
- The density of leisure traffic is greatly increased in the summer months which is a likely contributing factor to the number of incidents in good conditions.
- Results are reasonably consistent for each year covered by the survey.

	Good	Fair	Poor
Port of London	97.7%	1.9%	0.5%
Forth	88.6%	8.8%	2.7%
Harwich	64.4%	35.0%	0.6%
Belfast	25.0%	52.8%	22.2%
Medway	25.8%	48.4%	25.8%
Poole Harbour	82.3%	7.4%	10.3%
Dundee	91.1%	0.0%	8.9%
Kings Lynn	72.7%	13.6%	13.6%

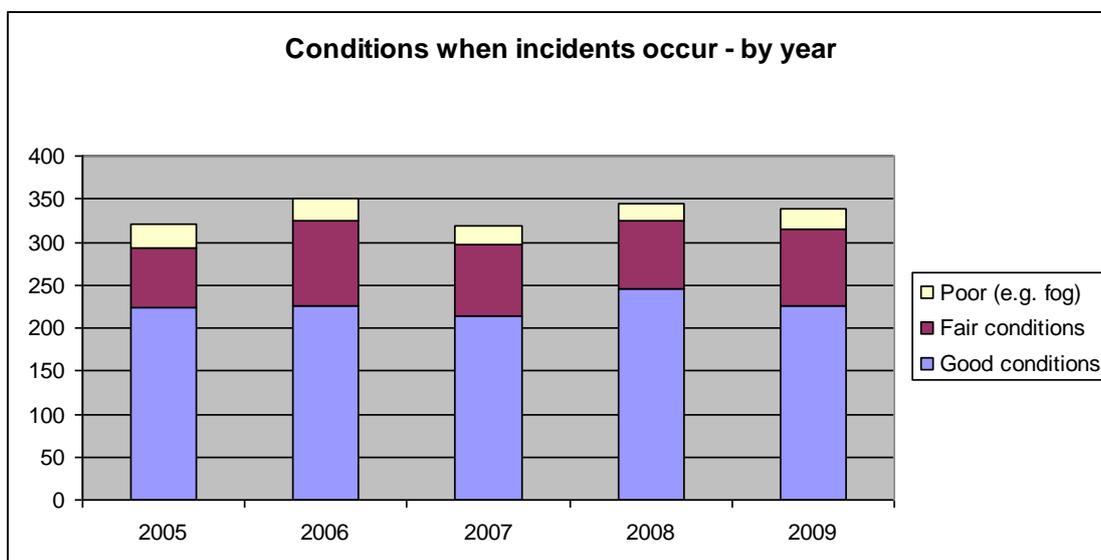


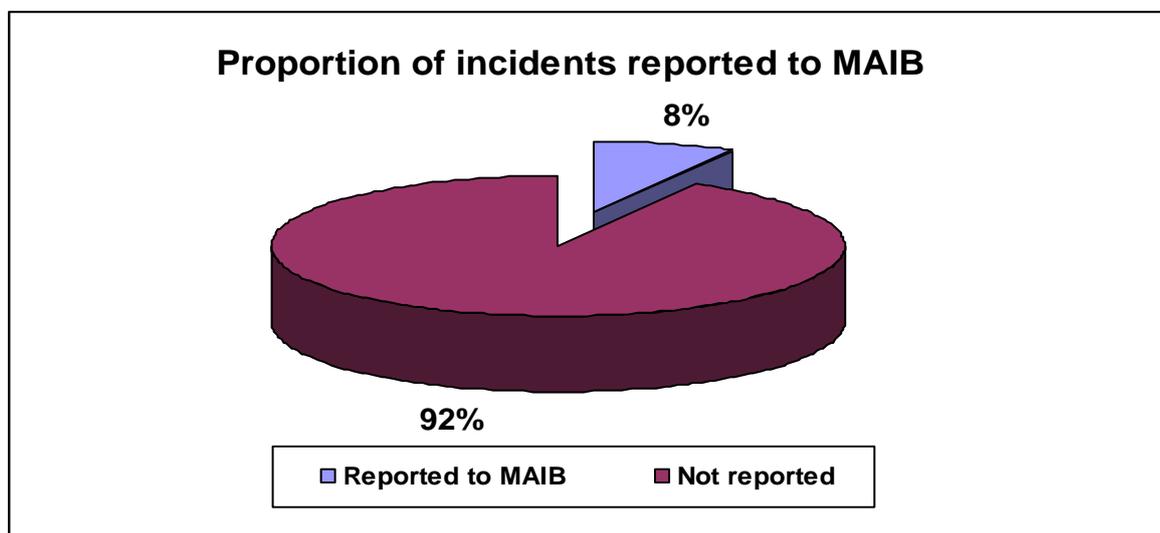
Table 8 - Reporting to MAIB: The purpose of this table was to find out if there is any under-reporting of incidents to MAIB. Although we are not comparing like with like, we would expect the major incidents and fatalities identified in this survey, would also have been reported to MAIB. We also wanted to know if there was any correlation between incidents and significant changes to the ports safety management system – which might indicate that lessons were being learnt.

Around 8% (182) of all incidents were reported to MAIB. This is very similar proportion to the overall number of serious and moderate incidents types which are reported in this study: there were 166 serious / moderate incidents (reported on table 4) compared to

182 incidents reported to MAIB. However, there is little correlation between the two when viewed on a port by port basis. If the criterion for reporting to MAIB was for all incidents that are classified as serious/moderate, then **five** ports would have under-reported significantly and **four** ports would have significantly over-reported incidents. Based on these returns:

- There is evidence that some ports might be under-reporting incidents against MAIB's criteria.
- There appears to be little consistency between the ports in the survey, about how these standards are being applied.

With the exception of one port, very few incidents were reported as leading to a significant change in the marine safety management system. Only six ports supplied any data, and there was very little data provided for 2005-06. Most ports had difficulty providing this data; for example, one port had a system which automatically amends its marine SMS each time an incident occurs. Despite this, they were not able to identify how many of these incidents led to a significant change, and as a consequence gave us a nil return.



6. Strengths and weaknesses of the data:

This was a voluntary survey which was conducted with the cooperation of 13 harbour authorities, the MCA and the Port Associations.

- Not all of the incidents which take place in harbour waters are reported to harbour authorities – something we were warned about at the beginning of the process - so the survey probably under-reports the number of incidents.
- Small sample size and vessel coverage influenced some of the results, so any conclusions based on small quantities of data can only be tentative.
- There is a limit to the amount of analysis that can be undertaken by comparing data in different tables. For example, we cannot extrapolate how many of the 468 incidents of machinery failure (table 4) took place whilst berthing / unberthing (table 5) or how many of these particular incidents were reported to MAIB (table 8).

- Consideration should be given to refining some of the categories in table 4 and table 6. For example 'other onboard incident' in table 4 and possibly 'poor vessel navigation' (table 6) are not very precise and might be used as catch-all categories by harbour authorities. It could also be argued that some a 'breach of regulation' (table 6) is a little too similar to an 'incorrect procedure' or that one could easily lead to the other.
- There are several anomalies with the data supplied – although these are not sufficient to undermine the main findings of the survey. For example, table 2 records the total vessel movement figure of only 2,027,000, whereas table 1 shows a figure of 2,307,000. For this example, harbour authorities found it easier to supply an overall figure for vessels movements (table 1), than to break this down into movements against vessel types.

7. Conclusion

A summary of the key findings from the data are set out on the first page of this paper. Overall the pilot study has been successful, judged against its original purpose.

Benchmarking performance against agreed standards and develop a simple system that can be administered by the Ports Industry:

- As mentioned earlier in this report, the lack of data on movements for certain vessel types means that caution needs to be exercised when using the results for benchmarking purposes. Ports with high amounts of commercial traffic are likely to fall short of the overall rate of 1 incident per 1000 vessel movements.
- For the most part, using MAIB definitions and the trigger table (appendix D) delivered consistent returns to a good standard.
- Smaller ports were just as capable of providing data as the larger ports.
- Collecting data for leisure vessels might be useful for benchmarking marinas and smaller ports, although keeping track of vessel movements could prove challenging. The Royal Yachting Association was not involved in this survey, but might be interested in promoting a similar survey for smaller ports and marinas.
- The Ports Industry should confirm what information is the most useful for benchmarking purposes and whether the collation process can be simplified.

Does the survey provide evidence of compliance with the PMSC?

- In principle, the number of incidents against vessel type and the number and severity of injuries in harbour waters could be used as indicators of marine safety trends in UK ports. Any caveats would need to be taken into account.
- The distribution of factors that lead to incidents could also inform policy decisions.
- Although not an indicator, the number of significant changes a port makes to the safety management system could be used to confirm if lessons are being learnt and applied. In practice however, most ports in the study were not able to provide this data.

Validate MAIB data and the level of reporting of incident to MAIB:

- Harbour authorities did not rate pilotage / passage planning / communications and fatigue as significant incident factors, which appear to contradict the message given

by MAIB. One explanation could be that these are underlying factors which are more likely to surface following a detailed investigation.

- Despite the fact that MAIB definitions for incidents were widely used, we were surprised that there was – on the face of it – considerable under-reporting of serious / moderate incidents to MAIB.

Finally, we are very grateful for the cooperation and the amount of information we received from all the participants in the study. We recognise that it is difficult for ports to extrapolate data from historical records, especially if the information being asked for is either held in a different format. Not all harbour authorities were able to provide all the data and consequently the sample size for some of the data is fairly small. If this exercise is repeated annually and standardised then we expect the quantity and quality of the data would improve. Sample sizes would also benefit from including more ports in any future survey.

Ports Division
March 2011

MARITIME INCIDENT STATISTICS – SCOPE of PILOT STUDY

Reporting Requirements – for Harbour Authorities

To a large extent, the requirements for reporting incidents for this study mirror the standards used for reporting incidents to MAIB under The Merchant Shipping (Accident Reporting and investigation) Regulations 2005 (“The 2005 Regulations”). The 2005 Regulations, and MAIB’s Marine Guidance Note 289 (M+F), set out the requirements for reporting accidents to the MAIB. All incidents reported should involve a vessel / water craft of some type, even if it is because someone has fallen overboard from the vessel. Incidents which do not involve a vessel (e.g. which affect a swimmer, or someone falling of the quayside), should not be reported. You should include:

- any maritime incidents in the harbour area waters or in ports, which relate to ships, crew, pilots (e.g. boarding a vessel before entering the pilotage area) and passengers; but **not** any incidents involving stevedores or shore based workers while a ship is in port.
- all ships, including fishing vessels, pleasure vessels, and recreational craft (including jet skis / ribs).
- all fatalities, major injuries, serious injuries and missing crew / passengers. The definition for major injury and serious injury are included in the attached annex.
- Crew, passengers, pilots etc while embarking on or disembarking from a vessel by whatever means employed.

More specifically, you should include:

- Incidents involving or occurring on board –
 - (a) Any United Kingdom ship.
- Incidents involving or occurring on board –
 - (b) a pleasure vessel (e.g. a yacht)
 - (c) a recreational craft hired on a bareboat basis
 - (d) any other powered craft (e.g. jet skis / ribs) or boat,
- Incidents involving or occurring on board –
 - (a) Any ship (UK or foreign registered) within the jurisdiction of a harbour master, which is in harbour waters or in the approach.
 - (b) Any ship carrying passengers to or from a port in the United Kingdom.
- Incidents where there was a “near-miss” - either between two or more vessels, or between a vessel and a static object (e.g. with a navigation aid, quayside or near grounding), are also included. Other incidents which nearly happen (e.g. nearly had a fire), should also be recorded.

Do not report:

Accidents involving shore based workers (e.g. stevedores) while a ship is in port or in a shipyard within the United Kingdom should be reported by the person’s employer to the Health and Safety Executive. Incidents which do not involve a vessel (e.g. which affect a swimmer, or someone falling of the quayside), should not be reported.

Table notes: Annex A, B and C provide some notes and definitions to help complete the table.

MARITIME INCIDENTS FORM

TABLE NOTES

Table 1 Harbour details – Harbour approaches size-km²:

Incidents and vessel movements: Include the number of incidents (including any near-miss) and the number of vessel movements that have occurred in your harbour waters and its approaches. For the total number of incidents, make a single entry for each incident, (not an entry for each vessel that was involved in the incident).

The “harbour approaches” is not defined in legislation, but for most ports it refers to any area outside harbour waters which the port has some responsibilities for (e.g. pilot boarding areas, VTS area, anchorage points where appropriate). We expect most harbour masters would have a rough idea of the extent of their approaches and that we can rely on your judgement.

Table 2 Vessels involved in an incident (including near misses) – In harbour area waters and approaches: List the number of vessels that have been involved in any incidents in the harbour area (harbour waters and approaches), and list the number of vessel movements. Where two or more vessels have been involved in the same incident, make sure you put an entry in for each vessel. This would normally result in the figure for “*total number of vessels in incidents*” in table 2 being higher than the figure recorded in table 1 for the “*total number of incidents*”. The figure for “overall numbers of vessel movements” should be the same as the figure shown in table 1 and table 3.

We acknowledge that you are unlikely to know about all the minor incidents which occur – particularly those involving leisure vessels. For example, we don’t expect that a minor incident in yacht race would be recorded. For this category, we will rely on your judgement.

Definition of an incident: Comparable to marine accident (as defined in annex B) whether or not it results in injuries, but also includes (for this exercise) any significant near-misses that are reported.

Table 3 Injuries: Number of crew or passengers injured – in harbour area waters and approaches: Injuries to crew and passengers are put in separate columns. The definitions of major and serious injuries shown below are based on MAIB definitions. The figure for vessel movements in table 3 should equal to the figure that is recorded in table 1 and table 2 for “*overall number of vessel movements*”

Definitions:

- **Major Injury:** fracture, loss of limb, or other injury requiring resuscitation or hospital in-patient.
- **Serious Injury:** Injury (other than major injury) which results in incapacity of 3 or more consecutive days – excluding on the day on which the injury occurred.

Table 4 Type of incident (record up to three types per incident) – in harbour area waters and approaches: Identify the Incident type (s) and record it on this table. For the majority of incidents, there may only be one entry made in table 4. But for some incidents, there may be multiple types; for example, a collision may result in a vessel sinking and causing pollution.

The 5 year rate in this table shows the rate of each factor against total number of incidents.

The severity classifications for all categories, is shown below). The degree of severity will depend on the vessel type - particularly for the leisure vessel category. A capsized canoe or a small yacht (e.g. a laser) would not get recorded unless there was an injury, but a capsized cargo vessel (even without injuries) would be serious.

	Safety	pollution
Serious (4-5 on trigger table – annex C)	Resulting in vessel loss or loss of life or major injuries to a person or persons.	Major discharge, jettison or venting of more than 10 tonnes of: Oil; Noxious liquid substances; Harmful substances in package form; Sewage or Garbage if has caused significant harm to the environment.
Moderate (3 on the trigger table)	Resulting in material damage to the vessel [to a degree that is likely to affect the vessel's statutory certification]; serious injury to a person or persons.	Significant discharge, jettison or venting of between half a tonne and 10 tonnes of: Oil; Noxious liquid substances; Harmful substances in package form; Sewage; or Garbage if has caused significant harm to the environment.
Minor (0-2 on the trigger table)	Hazardous incidents. This means any event which results in no material damage and no injury to a person. In addition, a minor incident might relate to an accident that nearly occurred.	Discharge, jettison or venting of less than half a tonne of: Oil; Noxious liquid substances; Harmful substances in package form; Sewage; or Garbage if has caused significant harm to the environment. Or, any other pollution not causing significant harm to the environment

Collision (another vessel) – striking or being struck by another ship (regardless of whether under way, anchored or moored).

Contact – any fixed object, (e.g. dolphin structure or aid to navigation). Striking any fixed or floating object other than those included in Collision or Grounding.

Grounding: Vessel makes involuntary contact with the ground, except for touching briefly so that no damage is caused.

Near miss (best estimate): Any close-quarters situation where a collision or major contact, grounding, capsize, explosion etc, was only narrowly avoided. A near miss is serious, if the consequences of incident occurring would have led to loss of the vessel, or possible loss of life.

Fire / Explosion / Flooding / Heavy weather damage: Self explanatory.

Person overboard: Any person falls overboard from a ship or one of the ship's boats or the ship's gangway while embarking on or disembarking from a vessel. Also applies to a pilot falling overboard whilst attempting a transfer between vessels.

Other onboard incident: Not covered in other categories

Machinery, mechanically disabled or hull failure or: A vessel is disabled for >12 hours or requires assistance to reach port from rescue service etc. The vessel requires assistance from non-official body e.g. friend. A minor incident might refer to a vessel being disabled for <12 hours, or is not damaged or suffers only minor damage.

Capsize / Sinking / Listing – 'capsize' = Overturned/ 'listing' = Permanent angle of heel.

Table 5 Location: Harbour approaches refer to any area outside harbour waters which the port has some responsibilities for (see notes under Table 1). Ports should also use their discretion to decide if an incident occurs in the berthing area or away from the berthing area in another part of their harbour waters.

Table 6 Main Incident Factors (max of 3 factors per incident): List up to three factors for each incident that occurs. List the most significant factors if, in your judgement, there were more than three factors involved. Conversely, do not feel obliged to list two or three factors, if there was only significant factor.

Table 7 Conditions: To some extent this is subjective, but as a guide:

Good Conditions: For example, good visibility (objects visible over 5 miles); a calm sea state (e.g. 0 - 2 height of waves 0 - 2 feet) and light winds speed 1 -10 knots

Fair Conditions: For example objects visible 2 miles to 5 miles; a moderate sea state (3 - 6 height of waves 2 - 13 feet) and / or moderate breeze wind speed 11 - 30 knots.

Poor Conditions: Objects visible less than 2 miles; rough sea state (7 - 6 height of waves 13 - 45 feet), wind speed over 30 knots.

Table 8 Number of incidents reported to MAIB: We assume that for most ports, it will only be the more serious incidents which are reported to MAIB.

Marine Safety Management System: Incidents that led to a significant change in the SMS. Some harbour authorities routinely record all incidents into the SMS and this automatically adjusts the values of a particular risk and hazard. If possible, it would be useful to earmark those incidents that have led to a change in procedures (such as an update to local guidance or revised training etc); identified a new hazard or prompted a modification of an existing hazard requiring a reassessment (could be something quite small). Or prompting a reassignment of resources or which results in the issue of a notice to mariners.

Significant changes to the SMS might indicate weaknesses in the existing regime and possibly, that the actions / inactions of the harbour authority were

a contributing factor in the incident. It also indicates however, that the system is working as it should. No change to the SMS over a long period of time might indicate that the SMS is not fit for purpose.

PORTS Division
Department for Transport

MAIB DEFINITIONS FOR ACCIDENTS and MAJOR & SERIOUS INJURIES

1. **Accident** means any occurrence on board a ship or involving a ship whereby –
 - a) There is a loss of life or major injury to any person on board, or any person is lost or falls overboard from, the ship or one of its ship's boats;
 - b) A ship –
 - i) causes any loss of life, major injury or material damage;
 - ii) is lost or presumed to be lost;
 - iii) is abandoned;
 - iv) is materially damaged by fire, explosion, weather or other cause;
 - v) grounds;
 - vi) is in collision;
 - vii) is disabled; or
 - viii) causes significant harm to the environment.
 - c) Any of the following occur –
 - i) A collapse or bursting of any pressure vessel, pipeline or valve;
 - ii) A collapse or failure of any lifting equipment, access equipment, hatch–cover, staging or boatswain's chair or any associated load–bearing parts;
 - iii) A collapse of cargo, unintended movement of cargo or ballast sufficient to cause a list, or loss of cargo overboard;
 - iv) A snagging of fishing gear which results in the vessel heeling to a dangerous angle;
 - v) A contact by a person with loose asbestos fibre except when full protective clothing is worn; or
 - vi) An escape of any harmful substance or agent, if the occurrence, taking into account its circumstances, might have been liable to cause serious injury or to cause damage to the health of any person.

2. **Major injury** means
 - a) Any fracture, other than to a finger, thumb or toe;
 - b) Any loss of a limb or part of a limb;
 - c) Dislocation of the shoulder, hip, knee or spine;
 - d) Loss of sight, whether temporary or permanent;
 - e) Penetrating injury to the eye; or
 - f) Any other injury –
 - i) leading to hypothermia or to unconsciousness, or
 - ii) requiring resuscitation, or
 - iii) requiring admittance to a hospital or other medical facility as an inpatient for more than 24 hours.

3. **Serious injury** means any injury, other than a major injury, to a person employed or carried in a ship which occurs on board or during access which results in incapacity for more than three consecutive days excluding the day of the accident or as a result of which the person concerned is put ashore and the ship sails without that person, unless the incapacity is known or advised to be of three consecutive days or less, excluding the day of the accident.

Pilot study classification: **Serious** == 4 - 5
Moderate == 3
Minor == 0 - 2

		CONSEQUENCES				
		1	2	3	4	5
SEVERITY		1	2	3	4	5
0	Potential for incident	Damage to Port infrastructure Threat of damage	Injury to person or persons Threat of injury	Damage to the Environment - release of hazardous substance to water column or air- Threat of damage to the environment	Disruption to Business Continuity Threat of disruption to the port or vessels.	Accident to ship (PMSC) One or more of the IMO categories which will result in the following Threat of damage to vessel or marine structure
1	Insignificant incident	Cosmetic damage	Person receives First Aid	Small area of sheen <10msq. Small gas release. No clean up required. No action by workforce	Incident closes port for up to 1 hour. Vessel(s) delayed for a period of up to 6hrs.	Cosmetic damage. Vessel drags anchor but is under control. Vessel sustains major system failure (engines etc.)
2	Minor incident	Loss of timbers from fendering. Bent ladders. Coping stones cracked.	Person visits doctor for treatment (not in ambulance)	Area of metallic appearance <50msq. Pollution team called out - no action. Terminal workforce in containment area onsite	Incident closes port for up to 3 hours. Vessel(s) delayed for a period up to 18hrs.	Bent rails. Vessel anchors against advice. Denting to hull
3	Moderate incident	Bollards broken, berth used with care. Mooring lines part. Tow lines part.	Fracture of fingers or toes. Person taken to A&E but not kept in or injury other than major which results in 3 consecutive days' incapacity	Discontinuous true colour >50msq. Pollution team called out, up to 1 day clean up. Terminal workforce in containment area offsite	Incident closes port for up to 6 hours. Vessel(s) delayed for a period up to 36hrs.	Vessel in collision, ground or floods. Actual damage to hull, cargo gear or accommodation. Vessel fails to respond to instruction to weigh anchor.
4	Serious incident	Fender system compromised, requires repair before use. Pipeline damage	Major injury (MAIB); limb fracture; loss of limb; loss of sight; penetrating eye injury; 24 hrs hospitalisation	Serious pollution (IMO). Pollution team called out, up to 3 days clean up. Local evacuation	Incident closes port for up to 24 hours	Structural damage rendering the ship unseaworthy (IMO). Breakdown necessitating towage. Vessel drags over pipeline
5	Very serious incident	Berth closed for rebuild. Pipeline breach	Loss of life (IMO)	Severe pollution (IMO). Pollution team called out. Up to 7 days' clean up. Large scale evacuation	Incident closes port more than 24 hours	Total loss of vessel (IMO)
						Effect of negative publicity on the company No publicity Incident results in small item on 'Local News' Regional news with press statement required. National news. Journalists attend. Interviews required. National and International journalists attend. Media management required. A 24hr. Response may be needed. World agencies require 24hr. Information for prolonged period.

PORT	TABLE 1 - HARBOUR DETAILS				
	Geographic area			No. of berths	Tonnage of goods (total) - 2009
	Port estate size - km ²	Harbour waters size - km ²	Harbour approaches size - km ²		
Port of London Authority	0	1036	0	70	45,000,000
Forth Ports Plc	6	680	0	68	44,990,000
Southampton	5	30	200	40	41,000,000
Harwich Haven Authority	-	240	150	51	37,000,000
Belfast Harbour	8.1	27.4	31	34	15,700,000
Medway Ports	1.5	43	49	50	11,098,794
Aberdeen	0.83	0.7	15	57	4,540,000
Poole Harbour	2.2	33	6.8	11	1,206,000
Port of Dundee Ltd	6	105	0	7	810,000
Kings Lynn Conservancy Board	1	2	50	19	660,231
Dover	0.923	2.425	3	12	387,765
Avonmouth & Royal Portbury Dock	10.50	160	750	40	0