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FORMAL SAFETY ASSESSMENT, INCLUDING GENERAL CARGO SHIP SAFETY

Reporting of Accidents and Incidents

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SUMMARY

Executive summary:	This paper reviews the requirement for flag States to report accidents and incidents, reports on the factual reporting situation and offers some observations.
Strategic direction:	12.1; 12.3
High-level action:	12.1.1; 12.3.1
Planned output:	12.1.2.1; 12.3.1.1
Action to be taken:	Paragraph 15
Related documents:	MSC 75/INF.19; MSC Circ.829/MEPC Circ.335; MSC-MEPC.2/Circ.12; MSC83/20/3; MSC86/INF.4; MSC 88/19/2; MSC 88/INF.6; MSC 88/INF.8; SLF 55/INF.7; SLF 55/INF.8; SLF 55/INF.9; MEPC58/INF.2; MSC91/INF.5; MSC.1/Circ.1394

Background

1 Under the provisions of many IMO mandatory instruments, Parties are encouraged to, and to some extent, obliged to investigate and report on maritime casualties on their ships or in their territorial waters. These provisions are reviewed at Annex 1 to this paper.

2 The IMO Global Integrated Shipping Information System (GISIS) casualty module database contains two categories of information collected on ship casualties. The first category of information consists of factual data collected from various sources and the second category of data consists of more elaborated information based on the reports of investigations into casualties received at IMO. It is noted that the latter may be full investigations reports to be analysed by the Organization or reporting forms annexed to MSC-MEPC.3/Circ.3. The GISIS casualty module contains information related to marine casualties and incidents, as well as, full marine safety investigation reports submitted to the Organization by reporting Administrations. The module also contains analyses of these reports, which are aimed at identifying overall trends or issues of potential concern to the marine transportation system (or the shipping industry). It is noted that no corroborating data is available and the analysis should not be used for any other purpose.

Formal Safety Assessment (FSA) and the use of data

3 Formal Safety Assessment (FSA) has been used at the IMO since 1997 on a voluntary basis in the rule-making process, based on the framework provided in the initial MSC Circ.829/MEPC Circ.335 to the current version provided in MSC-MEPC.2/Circ.12. It is noted that many FSA studies have been submitted to the Organization. Very few of these studies have been based on the information in this GISIS module and the accident investigation reports provided in accordance with international Conventions. It is considered that this GISIS module is essentially not currently useful for use in FSA studies, because of the lack of programmability and search functions of the database. In addition, the degree of underreporting is large and unquantified. To date, the only FSA studies that have used GISIS have been the FSA study on General Cargo Ships (as reported in MSC 88/19/2, MSC 88/INF.6 and MSC 88/INF.8) and the GOALDS study (SLF 55/INF.7, SLF 55/INF.8 and SLF 55/INF.9). In the FSA study on General Cargo Ships all the relevant Accident Investigation Reports available in GISIS were analysed, which was a very labour intensive and costly job. In GOALDS a few extra collision events were identified in GISIS that were not reported in the IHS Fairplay database. These are exceptions. Most FSA studies have used the LR Fairplay database (now called IHS Fairplay database) as the basis for data analysis, complemented by data from various other sources. For example, in the GOALDS study on damage stability of passenger ships, the IMO damage cards were essential for building up the damage statistics. However, other parts of the risk modelling had to be based on other sources of information, mainly from IHS Fairplay.

4 IACS has delivered FSA training since 1998 (MSC 75/INF.19). In this training course IACS refers to ‘lack of data’, as the most common excuse for not undertaking an FSA study. Obviously, lack of data is lack of knowledge. Lack of knowledge and use of anecdotal information is a bigger challenge for ‘traditional’ decision processes than for an FSA study, in which many alternative methods are available for making reasoned decisions, and all assumptions made are documented and transparent.

5 When it comes to describing human safety in shipping, there are essentially four categories of losses: 1) health effects for crews; 2) injuries; 3) fatalities in personal accidents (slips, trips, falls etc.); and 4) fatalities in ship accidents (fires, collisions, groundings, etc.). Categories 1 and 2 are not systematically reported in any global statistics. Rather the only available information on them is largely taken from research papers, which may have been based on national statistics, statistics from marine insurers or questionnaires completed by various groups of people. For example, Oldenburg *et al.* (2010) is reporting on data for English, Danish and Polish seafarers. In the paper it is stated, as a general observation that ‘most of the available studies about occupational health and safety at sea concerns populations from Europe. However, little is known about the large number of seafarers from South East Asia and other parts of the world’. Category 3 losses are reported sporadically in GISIS, but the underreporting is huge. These accidents are not reported in IHS Fairplay. Again, the only source of available information is in research papers, with analysis from a limited dataset. The available studies (Oldenburg *et al.* (2010), Hansen *et al.* (2002), MSC 83/20/3, MSC 86/INF.4) all indicate that the number of category 3 fatalities is higher than Category 4 fatalities. The indication is that somewhere between 50% and 60% of all fatalities at sea fall in category 3. Still, the focus of data collection is largely on Category 4.

Under-reporting in ship accident databases

6 When comparing accident databases that, in principle, should contain the same reported accidents, it is possible to estimate the degree of under-reporting by the use of statistical methods.

7 Thomas & Skjong (2009) reports on the degree of reporting of accidents for the fire and explosion incidents on Norwegian flagged vessels (NOR/NIS) recorded in LR Fairplay, of which there were 26. These accidents were compared with fire and explosion events documented in the Marine Casualty Database (DAMA) maintained by the Norwegian Maritime Directorate (NMD), of which there were 50. Norwegian flagged vessels account for 107 ships of the type included within this study, which is the seventh largest fleet in the world (3% of world fleet). Therefore, the comparison between fire and explosion accident reporting in LR Fairplay and DAMA is interesting in that it gives an indication of the degree of under reporting that can be expected in accident databases. The paper concludes that only 30% of the total number of accidents was reported in LR Fairplay.

8 Psarros, Skjong and Eide (2010) studied tanker casualty records from NMD (2007) and LR Fairplay (2008) accident databases covering the period from February 1997 to February 2007. The number of records was 2209 from NMD and 2540 from LR Fairplay. To compare the reporting performance of the two databases, only ships in the Norwegian Register (NOR) - vessels trading mainly in Norwegian territorial waters; and the Norwegian International Register (NIS) – vessels trading worldwide; are considered. The upper bound for NMD reporting was found to be 41% and 30% for LR Fairplay. This paper also provides an analysis of flag State reporting performance by comparing reporting on the websites of six flag States with LR Fairplay data. The reporting success rate ranged from 24% to 82% of the estimated total number of accidents.

9 Hassel *et al.* (2011) collected and compared casualty data from 1 January 2005 to 31 December 2009, from IHS Fairplay and the maritime authorities from a set of nations. The data was compared to find common records, and an estimation of the true number of occurred accidents was performed. The estimated upper limit reporting performance for the selected flag States ranged from 14% to 74%, while the corresponding estimated coverage of IHS Fairplay ranges from 4% to 62%. On average, the study results document that the number of unreported accidents makes up roughly 50% of all occurred accidents. Even in a best case scenario, only a few flag States come close to perfect reporting.

10 The papers discussed in paragraphs 7 to 9 above are for all accidents reported in the databases that were compared. Presumably, the reporting success is higher for the severe accidents, and it may be assumed that the reporting success is higher for collisions since this involves two ships and therefore two reporting channels. These are both issues that have not been studied properly. The reporting success to GISIS has also not been reviewed and analysed by researchers.

11 Oil spill accidents are also underreported. This became evident in the review of MEPC 58/INF.2 (SAFEDOR project) and MSC 91/INF.5 (FSA study on crude oil tankers). The expert presenting the SAFEDOR FSA study pointed out that SAFEDOR created a database using other data sources in addition to IHS Fairplay to cross-check amounts of oil spillage and modify them as necessary, particularly those resulting from very serious accidents. The IMO Expert Group on FSA was satisfied with the explanation that the presented information was reliable in view of cross-checking by public domain information. This therefore indicated considerable under-reporting in IHS Fairplay, which was the only source of information used in MSC91/INF.5. Unfortunately, the Expert Group did not attempt to quantify the degree of this under-reporting.

Discussion

12 There may be many effects of under-reporting of accidents. To date, all FSA studies have used the cost effectiveness of Risk Control Options (RCOs) as the criteria for recommending changes to regulations. Therefore, the most obvious consequence is that

some RCOs which have not been put forward as recommendations should perhaps have been recommended if the reporting databases had been more accurate. However, as stated above, FSA studies do not only rely on accident statistics, and lack of data can be compensated for with various risk models, simulations, integration of reliability data etc..

13 In the Goal-Based Standards/Safety Level (GBS/SLA) approach there are two distinct uses of accident data: as input to the FSA study (ex-ante analysis), and for monitoring the safety level (ex-post analysis). As input to the FSA study for justifying the regulations and the safety levels, the comments in paragraph 12 above apply. When it comes to monitoring the safety level, this is meant as a task primarily for IMO (Sub)-Committees (MSC.1/Circ.1394, paragraph 23). This task will involve direct use of data, and will therefore be more severely affected by under-reporting than in the case of FSA studies.

Conclusions

14 Based on the observation that the IMO regulatory development process will, in the future, depend on more accurate accident reporting by flag States, the following observations are offered.

.1 It would provide more robust and valuable input to the Organization if the provisions in the current regulations, which make reporting conditional on subjective judgements (e.g. 'when it judges that such information may assist in determining what changes in the present convention might be desirable'); were to be supplemented by the carrying out and submission of objective analysis. In particular, this objective analysis should identify the weaknesses/limitations of the provisions of relevant/applicable rules, which had a bearing on the materialisation/occurrence of the accident and the manifestation of the consequences.

.2 As demonstrated above, it is possible to rate the quality of reporting by flag States, by comparing to other sources of information. This could be done systematically by the Organization.

.3 There would be significant benefits in the GISIS casualty module database being made fully searchable and programmable.

Action requested of the Committee

15 The Committee is invited to consider the foregoing, in particular the observations in paragraph 14 above, and take action as appropriate.

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Annex 1

Provisions in IMO instruments on investigating and reporting of maritime casualties

1 UNCLOS, Article 94, Obligations of flag States, paragraph 7 states:

7. Each State shall cause an inquiry to be held by or before a suitably qualified person or persons into every marine casualty or incident of navigation on the high seas involving a ship flying its flag and causing loss of life or serious injury to nationals of another State or serious damage to ships or installations of another State or to the marine environment. The flag State and the other State shall cooperate in the conduct of any inquiry held by that other State into any such marine casualty or incident of navigation.

2 UNCLOS, Article 217, Enforcement by flag States, paragraphs 4 to 7 state:

4. If a vessel commits a violation of rules and standards established through the competent international organization or general diplomatic conference, the flag State, without prejudice to articles 218, 220 and 228, shall provide for immediate investigation and where appropriate institute proceedings in respect of the alleged violation irrespective of where the violation occurred or where the pollution caused by such violation has occurred or has been spotted.

5. Flag States conducting an investigation of the violation may request the assistance of any other State whose cooperation could be useful in clarifying the circumstances of the case. States shall endeavour to meet appropriate requests of flag States.

6. States shall, at the written request of any State, investigate any violation alleged to have been committed by vessels flying their flag. If satisfied that sufficient evidence is available to enable proceedings to be brought in respect of the alleged violation, flag States shall without delay institute such proceedings in accordance with their laws.

7. Flag States shall promptly inform the requesting State and the competent international organization of the action taken and its outcome. Such information shall be available to all States.

3 SOLAS regulation I/21 states:

(a) Each Administration undertakes to conduct an investigation of any casualty occurring to any of its ships subject to the provisions of the present Convention when it judges that such an investigation may assist in determining what changes in the present Regulations might be desirable.
(b) Each Contracting Government undertakes to supply the Organization with pertinent information concerning the findings of such investigations. No reports or recommendations of the Organization based upon such information shall disclose the identity or nationality of the ships concerned or in any manner fix or imply responsibility upon any ship or person.

4 SOLAS regulation XI/1-6 states:

Taking into account regulation I/21, each Administration shall conduct investigations of marine casualties and incidents, in accordance with the provisions of the present

Convention, as supplemented by the provisions of the Code of the International Standards and Recommended Practices for a Safety Investigation into a Marine Casualty or Marine Incident (Casualty Investigation Code) adopted by resolution MSC.255(84), and:

.1 the provisions of parts I and II of the Casualty Investigation Code shall be fully complied with;

.2 the related guidance and explanatory material contained in part III of the Casualty Investigation Code should be taken into account to the greatest possible extent in order to achieve a more uniform implementation of the Casualty Investigation Code;

.3 amendments to parts I and II of the Casualty Investigation Code shall be adopted, brought into force and take effect in accordance with the provisions of article VIII of the present Convention concerning the amendment procedures applicable to the annex other than chapter I; and

.4 part III of the Casualty Investigation Code shall be amended by the Maritime Safety Committee in accordance with its rules of procedure.

5 MARPOL, 1973, Article 12 Casualties to Ships, states:

(1) Each Administration undertakes to conduct an investigation of any casualty occurring to any of its ships subject to the provisions of the Regulations if such casualty has produced a major deleterious effect upon the marine environment.
(2) Each Party to the Convention undertakes to supply the Organization with information concerning the findings of such investigation, when it judges that such information may assist in determining what changes in the present convention might be desirable.

6 International Convention on Load Lines, 1966, Article 23 Casualties, states:

(1) Each Administration undertakes to conduct an investigation of any casualty occurring to ships for which it is responsible and which are subject to the provisions of the present Convention when it judges that such an investigation may assist in determining what changes in the Convention might be desirable.
(2) Each Contracting Government undertakes to supply the Organization with the pertinent information concerning the findings of such investigations. No reports or recommendations of the Organization based upon such information shall disclose the identity or nationality of the ships concerned or in any manner fix or imply responsibility upon any ship or person.

7 MODU Code, 2009, section 1.8 states:

*1.8.1 Each Administration and each coastal State should undertake to conduct an investigation of any casualty occurring to any unit subject to its jurisdiction and subject to the provisions of the Code when it judges that such an investigation may assist in determining what changes in the Code might be desirable.**

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** Refer to Casualty Investigation Code*

1.8.2 Each Administration and each coastal State should undertake to supply the Organization with pertinent information concerning the findings of such

investigations. No reports or recommendations of the Organization based upon such information should disclose the identity or nationality of the units concerned or in any manner fix or imply responsibility upon any unit or person.

8 The Casualty investigation Code, resolution MSC.255(84), notes the responsibilities of flag States under the provisions of the International Convention for the Safety of Life at Sea, 1974 (regulation I/21), the International Convention on Load Lines, 1966 (article 23) and the International Convention for the Prevention of Pollution from Ships, 1973 (article 12), to conduct casualty investigations and to supply the Organization with relevant findings. The aim of the Code is to promote a common approach to the safety investigation of marine casualties and incidents, and also to promote co-operation between States in identifying the contributing factors leading to marine casualties. The Code specifies the content of an accident investigation report in paragraph 14.2 i.e.:

14.2 Reports should include, wherever possible:

1. a summary outlining the basic facts of the casualty and stating whether any deaths, injuries or pollution occurred as a result;
2. the identity of the flag State, owners, managers, company and classification society;
3. details of the dimensions and engines of any ship involved, together with a description of the crew, work routine and other relevant matters, such as time served on the ship;
4. a narrative detailing the circumstances of the casualty;
5. analysis and comment which should enable the report to reach logical conclusions, or findings, establishing all the factors that contributed to the casualty;
6. a section, or sections, analysing and commenting on the causal elements, including both mechanical and human factors, meeting the requirements of the IMO casualty database; and
7. where appropriate, recommendations with a view to preventing similar casualties.

9 The IMO Instruments Implementation Code (III Code), resolution A.1070(28), paragraphs 40 and 41 state:

40 Any accidents involving personal injury necessitating absence from duty of three days or more and any deaths resulting from occupational accidents and casualties to ships of the flag State is recommended to be investigated, and the results of such investigations made public.

41 Ship casualties should be investigated and reported in accordance with the relevant international instruments, taking into account the Casualty Investigation Code, as may be amended, and guidelines developed by the Organization. The report on the investigation should be forwarded to the Organization together with the flag State's observations, in accordance with the guidelines referred to above.

10 ILO, Maritime Labour Convention, 2006, Regulation 5.1.6 - Marine casualties, states:

1. Each Member shall hold an official inquiry into any serious marine casualty, leading to injury or loss of life, that involves a ship that flies its flag. The final report of an inquiry shall normally be made public.

2. Members shall cooperate with each other to facilitate the investigation of serious marine casualties referred to in paragraph 1 of this Regulation.

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Annex 2

REFERENCES

1 Hansen, H.L., Nielsen D. and Frydenberg M., (2002) Occupational accidents aboard merchant ships. Occup. Environ. Med., 2002; 59, 85-91

2 Hassel,M BE Asbjørnslett, LP Hole (2011) 'Underreporting of maritime accidents to vessel accident databases', Accident Analysis & Prevention, Volume 43, Issue 6, November 2011, Pages 2053–2063

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6 NMD, 2007. Accident Database. February version

7 LRFP, 2008. Lloyd's Register FairPlay Casualty Database (March version).