FORMAL SAFETY ASSESSMENT
GENERAL CARGO SHIP SAFETY

Report of the FSA Experts Group

General

1. The FSA Experts Group met on 9 and 10 May 2011 under the chairmanship of Mr. K. Yoshida (Japan).

2. The group was attended by experts nominated by the following Member Governments:

   - ARGENTINA
   - CHINA
   - DENMARK
   - GERMANY
   - GREECE
   - JAPAN
   - MARSHALL ISLANDS
   - REPUBLIC OF KOREA
   - SPAIN
   - THAILAND
   - UNITED KINGDOM
   - UNITED STATES

   and experts nominated by the following non-governmental organizations:

   - INTERNATIONAL ASSOCIATION OF CLASSIFICATION SOCIETIES (IACS)
   - OIL COMPANIES INTERNATIONAL MARINE FORUM (OCIMF)
   - THE INTERNATIONAL TANKER OWNERS POLLUTION FEDERATION (ITOPF)
   - CRUISE LINES INTERNATIONAL ASSOCIATION (CLIA)
   - INSTITUTE OF MARINE ENGINEERING, SCIENCE AND TECHNOLOGY (IMarEST)
   - THE ROYAL INSTITUTION OF NAVAL ARCHITECTS (RINA)
   - INTERFERRY

Terms of reference

3. MSC 88 agreed the following terms of reference for the FSA Experts Group, taking into account the comments made and decisions taken at that session (MSC 88/26, paragraph 19.5 and Circular letter No.3146 of 14 December 2010):
.1 review the FSA studies provided in documents MSC 88/19/2, MSC 88/INF.6, MSC 88/INF.8, MSC 87/20/1, MSC 87/INF.3, MSC 87/INF.4, MSC 86/INF.4 and MSC 85/19/1 and, in particular, to:

.1 consider whether the methodology was applied in accordance with the FSA Guidelines and the Guidance on the use of HEAP and FSA;

.2 check the reasonableness of the assumptions and whether the scenarios adequately addressed the issues involved;

.3 check the validity of the input data and their transparency (e.g., historical data, comprehensiveness, availability of data, etc.);

.4 check whether risk control options and their interdependence were properly evaluated and supported by the assessment;

.5 check whether uncertainties and sensitivity issues have been properly addressed in the FSA study;

.6 check whether the scope of the assessment was met in the FSA study;

.7 check whether the expertise of participants in the FSA study was sufficient for the range of subjects under consideration; and

.8 report on the above issues, including discussion of any strengths and weaknesses, and the lessons learned regarding the FSA Guidelines as well as the Guidance on the use of HEAP and FSA;

.2 consider the proposed final recommendations in the FSA study and advise MSC 89 as appropriate.

4 As instructed, the FSA Experts Group reviewed the FSA study on general cargo ship safety, submitted by IACS in several documents (as listed in paragraph 3.1), taking into account document MSC 89/17/1 (Argentina) commenting thereon. The main issues discussed by the group are outlined hereunder (TOR numbers used refer to the subparagraph numbers in paragraph 3).

Whether the scope of the assessment was met in the FSA study (TOR 1.6)

5 The group noted that the FSA study had been prepared based on the data of general cargo ships of 500 gross tonnage and above complying with SOLAS regulations, which were classed by IACS members and had been delivered between 31 December 1981 and 1 January 2009. Whilst recognizing the limited number of sample ships used, the group generally concurred with the scope of the FSA, taking into account document MSC 89/17/1, indicating that there are no substantial deviations between IACS and non-IACS class ships, bearing in mind the increasing trend of "class known" ships among general cargo ships complying with SOLAS regulations.

6 In this context, the group was aware that "class known" ships were not necessarily IACS class ships.
Whether the expertise of participants in the FSA study was sufficient for the range of subjects under consideration (TOR 1.7)

7 Although the group noted that the normal HAZID meeting by experts was not held for the FSA (see paragraph 3.3 of the annex to document MSC 88/INF.8), the group acknowledged that the list of experts, including areas of expertise, of a group for step 3 and 4 was adequately provided (annex A.1 to document MSC 88/INF.6).

The validity of the input data and their transparency (TOR 1.3)

8 The group recalled that, at its previous meetings, it had acknowledged the difficulty in accessing commercial databases (e.g., LRF) due to the cost and recommended to the Committee to improve the GISIS casualty data. Following discussion, the group generally agreed that the FSA provided data sufficient for its purpose, whereas the group could not access and validate all the data referred to in the report.

The reasonableness of the assumptions and whether the scenarios adequately addressed the issues involved (TOR 1.2)

9 The group noted that the normal hazard identification (HAZID) meeting by experts was not held in the conduct of the FSA study, since, according to the explanation, the FSA had conducted a statistical investigation of the general cargo ship fleet and the related casualties and hazards had been identified by that comprehensive investigation. In this regard, the group was mindful that the FSA Guidelines describe (paragraph 5.2.1) that the hazard identification generally comprises a combination of both creative and analytical techniques to ensure that the process is proactive and not confined only to hazards that have materialized in the past. The group also noted that there are some gaps between HAZID (step 1) and risk analysis (step 2) (paragraph 6.1.1 of the Guidelines).

10 In the course of examining the method of the FSA study (e.g., developing fault trees and an FN-diagram), the group found that the scenarios of the FSA study mainly focused on consequences of accidents rather than analysing root causes, which was limited by the data available at that moment.

11 After consideration, the group generally agreed that the accident categories and the consequences were adequately addressed, and that the data analysis and calculated risks provided a valuable contribution.

12 The group noted that many preventive risk control options (RCOs) were identified, although there was insufficient description of analysis for root causes, and was of the view that the method of identifying the preventive RCOs should be clearly indicated.

Whether risk control options and their interdependence were properly evaluated and supported by the assessment (TOR 1.4)

13 The group noted that there was no description of interdependence analysis because there was no proposal for a combination of RCOs.

Whether uncertainties and sensitivity issues have been properly addressed in the FSA study (TOR 1.5)

14 The group found that the cost-benefit analyses (step 4) on identified RCOs were comprehensive, which included sensitivity and uncertainty analysis, and, therefore, generally agreed that the FSA study sufficiently addressed RCOs and their cost-benefit analysis.
Whether the methodology was applied in accordance with the FSA Guidelines and the Guidance on the use of HEAP and FSA (TOR 1.1)

15 The group noted that the FSA study had not addressed the Guidance on the use of HEAP and FSA (MSC/Circ.1022 – MEPC/Circ.391).

16 Following extensive discussion, the group, while noting that there were some deviations (see paragraphs 9, 10, 12, 13 and 15), agreed that the FSA study was generally in line with the methodology of the FSA Guidelines.

Relating discussion, including the lessons learned regarding the FSA Guidelines as well as the Guidance on the use of HEAP and FSA (TOR 1.8)

17 During its review work, the group generally endorsed its previous recommendations (MSC 87/18 and MSC 87/WP.7) and proposals by the correspondence group (MSC 89/16/1) relating to the lessons learned regarding the FSA Guidelines (e.g., need for root cause analysis and improvement of GISIS database). In particular, the group recommended that the FSA Guidelines be amended to strengthen the feedback from step 3 to step 1 and to include, in the final recommendation (step 5), considerations of the application of the recommended measures, and that future FSA studies should more fully take into account the human element issue.

Consideration of the proposed final recommendations in the FSA study (TOR 2)

18 The group noted that the FSA study recommended several RCOs depending on cost-effectiveness calculated in terms of GCAF (Gross Cost of Averting a Fatality) and NCAF (Net Cost of Averting a Fatality) values used in the FSA Guidelines and divided them into three categories as follows (MSC 89/19/2, paragraphs 5, 7, and 8):

with GCAF value below US$3 million:

.1 RCO 27 (technical): Anchoring watch alarm integrated in ECDIS (no additional costs if ECDIS is already integrated on bridge);

.2 RCO 20 (operational/training): Port State Control inspector training for general cargo ships; and

.3 RCO 32 (technical): Combine watch alarm with autopilot,

with negative NCAF value:

.1 RCO 28 (operational/training): Checklist for maintenance procedures;

.2 RCO 26 (operational/training): ECDIS training for all officers of watch;

.3 RCO 23 (operational/training): Simulator training for increasing situational awareness; and

.4 RCO 8 (operational/training): Improving preparation and handling of ship for manoeuvring in restricted waters (crew and pilot),
with positive NCAF value below US$3 million:

.1 RCO 17 (technical/operational/training): Improvement of cargo stowage especially bulk (other than grain) and heavy items;

.2 RCO 19 (operational/training): Extended survey on general cargo ships; and

.3 RCO 2 (technical): ECDIS with AIS and RADAR (only for new-buildings).

19 Since the group agreed that the FSA study was generally in line with the methodology of the FSA Guidelines, it is recommended that the Committee further considers the above-mentioned RCOs for enhancing the safety of general cargo ships.

20 Regarding RCOs 26, 27 and 2, the group noted that the SOLAS requirement for ECDIS applies to ships of a certain size and above. Further, the group noted that additional technical consideration of the RCOs would be necessary, possibly by relevant sub-committees (e.g., RCO 27, 32 and 2 by the NAV Sub-Committee; RCO 20 by the FSI Sub-Committee; RCO 19 by the FSI or DE Sub-Committee; RCO 26, 23 and 8 by the STW Sub-Committee; RCO 28 by the FP Sub-Committee; and RCO 17 by the DSC Sub-Committee).

**Action requested of the Committee**

21 The Committee is invited to approve the report in general and, in particular, to:

.1 endorse the group’s review of the FSA study on general cargo ship safety, in particular regarding the group's agreement that the study was in line with the FSA Guidelines (paragraphs 5 to 16);

.2 endorse the group's recommendation regarding the development of amendments to the FSA Guidelines and the use of human element, and take action as appropriate (paragraph 17); and

.3 consider the group's view on the final recommendations in the FSA study on general cargo ship safety, in particular that some RCOs should be further considered by the relevant Sub-Committees, and take action as appropriate (paragraphs 18 to 20).