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LARGE PASSENGER SHIP SAFETY

Submitted by the United States

SUMMARY

Executive summary:	MSC 74 directed the STW Sub-Committee to evaluate 3 tasks relating to the regulatory framework for both existing and future large passenger ships. To assist the Sub-Committee in this process, the United States performed a gap analysis to identify areas where IMO instruments are satisfactory, areas where gaps may exist, and possible solutions to address these gaps.
Action to be taken:	Paragraph 12
Related documents:	MSC 74/24, MSC 73/WP.20, MSC 74/WP.6, STW 33/11, and STW 33/INF.6

INTRODUCTION

1 The Maritime Safety Committee, at its seventy-fourth session, agreed to include in the work programme and the provisional agenda of the forthcoming session of the STW Sub-Committee an item on "Large passenger ship safety" (MSC 74/24, paragraph 21.4) and assigned 3 tasks to the STW Sub-Committee (MSC 74/WP.6, annex 3). As part of the tasking, MSC 74 issued a finalized philosophical approach, goals and objectives to guide the work of the Sub-Committee, in order to ensure a holistic approach when addressing large passenger ship safety (MSC 74/WP.6, annex 1). The 3 tasks assigned to the STW Sub-Committee were listed in Objective 7, as follows:

- .1 **Objective 7:** To review human element issues with regard to operations, management and training with a view towards improving safety. Tasks to be considered include:

Task 1: Communication and language issues including, crew to crew, crew to passengers and ship to SAR facilities taking into account signage and that the use of multiple languages is typical for large passenger ships.

Task 2: Training issues including additional fire-fighting training for senior officers, frequency of drills and STCW requirements.

Task 3: Crew fatigue issues.

2 In considering the above tasks, the United States conducted a gap analysis of existing IMO instruments (conventions, resolutions, codes, guidelines, circulars and model courses) applicable to the objective and tasks. This gap analysis was performed to determine the adequacy or inadequacy of existing IMO instruments to address these tasks. Where existing IMO instruments do not adequately address the tasks, measures were identified to improve the regulatory framework.

GAP ANALYSIS

3 An expert panel comprised of personnel with experience in large passenger ship operations, personnel, qualifications, training and vessel design, the applicable IMO instruments, and the work of the Sub-Committee was assembled to conduct the gap analysis. The panel evaluated the tasks in terms of the effectiveness of the existing IMO instruments with respect to existing ships, and in light of projected changes in the passenger ship industry for future ships. Details of the process (5 steps) followed are described in STW 33/INF.6 (United States).

4 **Step 1:** The expert panel reviewed the documentation and evaluated all 3 tasks assigned to the STW Sub-Committee listed in paragraph 1. In reviewing the tasks the panel recognized that the instructions from the MSC were restricted to considering human element related issues with regard only to operations, management and training. However, many equipment and design stressors (i.e. vibration, lighting, noise, etc.) also affect crew performance. Therefore, the panel also conducted a separate gap analysis that in addition to operations, management and training also included design and equipment. This is consistent with taking a holistic approach that considers all human element related areas.

5 **Step 2.** The existing relevant IMO instruments were identified.

6 **Step 3:** The effectiveness of existing IMO instruments were evaluated following the “scoring” process noted in STW 33/INF.6. Each of the tasks was considered independently for existing large passenger ships and for future large passenger ships; however, the panel concluded that there was consistency between existing and future large passenger ships. For the gap analysis conducted under the directions from MSC (MSC 74/WP.6, annex 3), existing IMO instruments for each task were evaluated in the areas of operations, management, and training, in terms of five performance measures (e.g. flexibility, prevention, performance, ease of compliance and comprehensiveness). Similarly for the second gap analyses, as explained in paragraph 4, the existing IMO instruments for each task were also evaluated in the areas of equipment and design (in addition to operations, management and training), in terms of five performance measures (e.g. flexibility, prevention, performance, ease of compliance and comprehensiveness).

7 Based on the process (STW 33/INF.6), each score represented a measure of the size of the gap and could range from 0 to 25. A score of 25 implies that the existing instruments fully address the task and a score of 0 implies that a large gap exists between the existing IMO instruments and the IMO regulatory framework. Annex 1 details the scoring based on the gap analyses. Column 2 (Score – O, M, & T¹) shows the results of the gap analyses that included operations, management and training, as per the MSC instructions to the Sub-Committee. Column 3 (Score – E, D, O, M & T²) shows the results of the second gap analyses that, in addition to operations, management and training, also included design and equipment, as explained in paragraph 4 above. Annex 2 of this paper contains an example of how the process was applied.

¹ O, M & T – Operations, Management and Training

² E, D, O, M & T – Equipment, Design, Operations, Management and Training

8 **Step 4:** The details of the scores shown in annex 1 were reviewed along with the tasks. The expert panel felt that tasks with scores of 14 and above (indicative of a small gap in the IMO instruments) were adequately addressed by IMO instruments and do not warrant any further action or consideration by the Sub-Committee. When analyzing scores to meet the MSC tasking (e.g to review human element issues with regard to operations, management and training with a view towards improving safety) all three tasks scored 14 or above, therefore no further action resulted from these gap analyses. The results of these gap analyses are as follows:

- .1 **Objective 7, Task 1:** This task received a score of 23.
- .2 **Objective 7, Task 2:** This task received a score of 17.3.
- .3 **Objective 7, Task 3:** This task received a score of 14.

9 When considering the scores of the second gap analyses that in addition to operations, management and training also included design and equipment, it was noted that Objective 7, Tasks 1 and 2 scored 19 and 17.3 respectively, and do not warrant any further action or consideration by the Sub-Committee. However, the following task was identified as having a gap large enough to warrant additional consideration.

- .1 **Objective 7, Task 3 (Existing and Future ships):** The crew fatigue issue received a score of 12.6.

10 **Step 5:** Measures were identified to address the gap listed in paragraph 8, with an emphasis toward operational measures for existing ships and design and operational measures for future ships. This formed the basis for the following recommendations.

RECOMMENDATIONS

11 The United States recommends that additional measures be considered by the Sub-Committee as described below:

- .1 **Objective 7, Task 3 (Existing and Future Ships) – Crew Fatigue Issues**

Develop training for fatigue prevention and mitigation, taking into account the information in of MSC/Circ.1014.

12 Furthermore the United States recommends that the Sub-Committee forward the results of the gap analysis on crew fatigue issues (Objective 7, Task 3), that included equipment, design, operations, management and training, to the Maritime Safety Committee for consideration by the Design and Equipment Sub-Committee.

ACTION REQUESTED OF THE SUB-COMMITTEE

13 The Sub-Committee is invited to take note of the above discussion as well as the recommendations in paragraphs 10 and 11 for action as appropriate.

ANNEX 1

Large Passenger Ship Gap Analysis

Reference Task Number from MSC 74/WP.6, Annex 3	Existing & Future Ships		
	Score - O, M & T ³	Score - E, D, O M & T ⁴	Comments
Objective 7, Task 1 Communication and language issues including, crew to crew, crew to passengers and ship to SAR facilities taking into account signage and that the use of multiple languages is typical for large passenger ships.	23	19	Internal radio communications are not addressed in the IMO instruments.
Objective 7, Task 2 Training issues including additional fire-fighting training for senior officers, frequency of drills and STCW requirements.	17.3	17.3	The philosophy, goals and objectives addressed in MSC/74/WP.6 Annex 1 would shift the previous focus of training to vessel survivability.
Objective 7, Task 3 Crew fatigue issues.	14	12.6 ⁵	- The instruments address fatigue solely in terms of hours of work. These work hour limitations do not consider issues such as the effects of circadian rhythm, sleep debt, etc. - Instruments do not: - make mandatory the documentation of work and rest hours. - adequately address the design of a vessel in regards to impact on rest periods. - address mariner education on fatigue. - provide management adequate guidance to clearly address all issues. - address equipment that directly affect rest (i.e. bunks, sound proofing, etc.). - Newly developed circular (MSC/Circ 1014) provides only “guidance” on fatigue management and fatigue mitigating techniques, and is not mandatory.

³ O, M & T – Operations, Management and Training

⁴ E, D, O, M & T – Equipment, Design, Operations, Management and Training

⁵ Note Annex 2 for Example Gap Analysis for this Task.

ANNEX 2

Applicable IMO Instruments and Example Gap Analysis

Example Gap Analysis

Issue: MSC 74/WP. 6 Objective 7, Task 3 Crew Fatigue Issues:

Rationale for Score:

Equipment: Assumption – The numbers only consider equipment in bridge and engine control rooms, and working areas, but not other areas of the ship.

Flexibility: The existing instruments allow for some flexibility in developing alternative approaches.

Prevention: Existing fatigue related instruments are moderately effective at addressing prevention of casualties.

Performance: There is moderate guidance in existence, in terms of equipment design.

Compliance: Adequate levels of clarity of regulations exist.

Comprehensive: Guidance exists only in the areas of equipment design for the work areas of the professional maritime crews.

Design

Flexibility: There is limited guidance in developing alternative approaches to managing crew fatigue.

Prevention: Existing fatigue related instruments do not effectively address prevention of casualties.

Performance: Some guidance exist in terms of vessel and arrangement design however not all safety concerns are addressed (i.e. rest and sleep deprivation).

Compliance: Most information is in the form of guidance (e.g. circulars, resolutions) and provides minimal clarity on design issues.

Comprehensive: Some guidance exist in terms of vessel and arrangement design however they fail to address the various aspects of mariner fatigue that can be influenced in the design process (i.e. workplace design, sleep-disruption due to accommodation design, ambient environmental conditions, etc.)

Operations

Flexibility: The existing instruments allow for flexibility in developing alternative approaches to managing crew fatigue.

Prevention: Existing fatigue related instruments do not prevent a casualty from occurring. The focus of the existing international instruments is on limiting hours of work.

Performance: Minimal guidance exists in terms of operational practices. Most safety concerns are not addressed (i.e. rest, sleep deprivation, boredom, etc.).

Compliance: Moderate level of clarity of regulations. Most information is in the form of guidance providing non-mandatory recommendations for documentation of work and rest hours (e.g. circulars, resolutions).

Comprehensive: The focus of the existing international instruments is to control work hours and rely on limiting hours of work. Existing guidance fails to consider other aspects of mariner fatigue that are important (i.e. circadian rhythm, rest, sleep deprivation, etc.).

Management

Flexibility: The existing instruments allow for flexibility in developing alternative approaches to managing crew fatigue.

Prevention: Existing fatigue related instruments adequately prevent a casualty from occurring from the management perspective. The focus of the existing international instruments is to control rest hours and rely on limiting hours of work.

Performance: Existing guidance provides adequate information on practices within the capabilities of the ship owner.

Compliance: Moderate level of clarity of regulations. Most information is in the form of guidance (e.g. circulars, resolutions). Instruments do not provide management adequate guidance to clearly address all issues leaving some open to interpretation

Comprehensive: Instruments do not address non-rest issues, but provide adequate direction to the control of watch hours.

Training

Flexibility: The existing instruments allow for flexibility in developing alternative approaches to managing crew fatigue through training.

Prevention: The existing regulations do not provide fatigue-related training to mariners that can ultimately prevent a casualty from occurring.

Performance: Existing training requirements do not address all safety concerns related to fatigue (i.e. fatigue effects on crew performance).

Compliance: Most information is in the form of guidance (e.g. circulars, resolutions). Existing instruments only provide guidance for training institutions in terms of what the mariner should know about fatigue, but does not provide details on the training.

Comprehensive: Existing training requirements do not provide the mariner with a basic understanding of the physiological and psychological effects of fatigue, nor does it provide an understanding of the relationship between fatigue and performance.

**Results of Gap Analysis for Crew Fatigue Issues
(Existing and Future Ships)**

APPLICABLE REGULATIONS		PERFORMANCE MEASURES				
		Flexibility	Prevention	Performance	Compliance	Comprehensive
STCW 95						
IMO RES A.680 (17)	Equipment	3	3	3	4	3
IMO RES A.741 (18)						
IMO RES A.849 (20)	Design	1	1	1	1	1
MSC/Circ 982						
MSC/Circ 834	Operations	5	1	2	3	2
MSC/Circ 1014						
Res A.772 (18)	Management	5	4	4	3	3
	Training	5	1	1	2	1
Average		3.8	2.0	2.2	2.6	2.0
						SCORE
						12.6