# SAFETY OF LARGE PASSENGER VESSELS

by Allan Graveson, Senior National Secretary, Nautilus UK

## Introduction

Of all the many types of merchant ships, those with the greatest potential for the loss of life are large passenger vessels. Masters of large passenger vessels have considerable responsibility and deserve to be provided with a ship that is "fit for purpose", i.e. one that is able to carry passengers and crew from point of departure to the destination safely and, without damage to the marine environment. The vessel should be adequately manned and provided with the necessary life saving appliances to effect a safe evacuation.

The demand for cruise vessels has increased significantly over recent years. In order to maximise the benefits of the economy of scale, the largest vessels have doubled in size from 80,000 gt to over 160,000 gt. Passenger vessel design has changed significantly to reflect the requirements of customers and the necessity to maximise revenue-earning capacity, with an increase in the number of decks and outer cabins, onboard recreational facilities and retail outlets.

The increase in size of large passenger vessels has resulted in considerable concern being expressed with respect to their watertight integrity and fire-fighting protection. In addition, concern has been expressed with respect to the adequacy of life-saving appliances, and the quality and quantity of crews and their training and experience in operating these vessels and dealing with emergency situations, including evacuation.

Almost without exception, as vessels have increased in size, failures have occurred. This is as a consequence of extrapolation of the rules of construction that have been based upon experience and research, resulting in deterministic or prescriptive requirements. Large passenger vessels have been built to prescriptive requirements based on the extrapolation of the rules of construction determined from smaller vessels. This, together with economic considerations, has resulted in larger compartments and reduced open deck space.

Many large passenger ships are not fit for ocean crossings or operation in adverse weather conditions, let alone to withstand an 'abnormal' wave. Increasingly, these vessels are operating in remote areas. This raises issues concerning Search and Rescue (SAR) and the additional burden of responsibility placed on Masters when vessels are operating in remote areas.

Recently, consideration has been given to a probabilistic or a goal-setting approach in ship construction. The two approaches are not necessarily incompatible, however the latter permits greater flexibility. This new approach has the potential for earlier adoption of new technology; however, it also has the potential to reduce existing requirements - so lowering current levels of safety.

## Notable Incidents

Some large passenger vessels have been built with a relatively shallow draft in order to access ports and avoid the use of tenders. Similarly, the number of decks has been increased, with additional leisure facilities in order to increase revenue-earning capacity. Additional swimming pools, coupled with a number of slack tanks when in operational service, further reduce stability; this is not reflected in trials. Attempts at reducing top weight and ensuring sufficient GM have resulted in the use of combustible materials and additional precautions to constantly monitor vessel stability.

Manning has been reduced, resulting in some instances of a single watch-keeping officer on the bridge. This places additional burdens on Masters where vessels have intensive cruise programmes particularly in areas of high traffic density.

Over recent years, a number of potentially serious incidents have served as a warning to the industry. These have included: *collision* of the "NORWEGIAN DREAM" and the "EVER DECENT" - the *grounding* of "NORWEGIAN CROWN" - and recently the *fire* onboard the "STAR PRINCESS" - and a number of incidents involving *large angles of heel* when turning, including the "CROWN PRINCESS" and "GRAND PRINCESS incidents.

## Action by Industry

The passenger shipping industry represented internationally by the International Council of Cruise Lines (ICCL) and the International Chamber of Shipping (ICS) robustly defends the status quo in seeking to prevent the introduction of new safety measures or changes in construction and design of these vessels. All measures likely to incur additional costs and reduce revenue are vigorously opposed

Historically, the professional organisations and the maritime unions have argued for improved quality of ship construction so as to ensure enhanced levels of safety for their members. Governments and regulators, while expressing concern, are rarely proactive in this area unless fulfilling the recommendations of a post-incident inquiry into a maritime accident or, more recently, as a consequence of intense pressure by environmental groups.

Other interested parties, including shippers of cargo and insurers have an interest in safety. However, there is a general unwillingness by these parties to take on the "burden" of additional costs associated with improved ship construction. While there are some notable, albeit rare exceptions, shipbuilders generally seek to meet competitive tenders by reducing the cost of build - so lowering standards - or choosing not to enhance existing standards for fear of being uncompetitive.

Whilst the dangers associated with large passenger vessels are recognised - including the inherent dangers associated with evacuation and search and rescue - no substantive action has been taken. Privately, many in the industry acknowledge that problems do exist, but are too difficult or too expensive to resolve.

## Action by the IMO

The International Maritime Organisation (IMO) has recently completed a five-year initiative, instigated by the former Secretary General, William O'Neal, to address the concern over the vulnerability of such vessels and the potential loss of thousands of lives. This process has resulted in a considerable amount of discussion within the committees and sub-committees of the IMO, with no measurable improvement in the safety of these vessels.

The whole basis for the review by the IMO was that vessels should safely return to port. Some parties were even referring to the word "unsinkable", whereas in reality extrapolation of the rules of construction and the revision of existing standards has resulted in the vessels being less safe. The return to port concept is, and has always been, questionable, as is remaining afloat for a sufficient time to ensure an orderly abandonment.

As part of the review of SOLAS Chapter II at the IMO, ship stability has come into focus and in particular, that of large passenger vessels. This has involved the harmonisation of much regulation, adopting a probabilistic approach to ships' stability. These concerns came to the fore at the 49$^{th}$

Session of the Sub-Committee on Stability and Loadlines and on Fishing Vessels (SLF 49), in July 2006. The report of the Working Group on Sub-division and Damage Stability (SDS) received close scrutiny as the principal Working Group of the Sub-Committee.

The outcomes of the Group's deliberations and matters related to the development of explanatory notes of the harmonised SOLAS Chapter II/1, the Harmonisation of Damaged Stability Provisions and Other IMO Instruments, the revision of Resolution A.266 (VIII) and the revision of MSC/Circ.650 identified in paper SLF 49/4/7, Section 12, "The s=1 standard is broadly similar to the SOLAS 90 transverse stability requirement, however, it permits emersion beyond the margin line and permits partial flooding of the bulkhead deck". Thus we have a stability standard, which is similar to the existing standard but applied to a damage extent which is considerably less than that defined by SOLAS 90.

Whether or not to abandon a ship is a momentous decision. In order to decide not to abandon a damaged ship, the master must have every faith in the ability of a ship not to sink in a seaway. The stability criteria represented by s=1 would not offer sufficient confidence to a ship's master to have passengers and crew remain onboard.

The United Kingdom (UK), and Germany, spoke against this lowering of standards and requested that this be reflected in the report of the SLF 49; other flag states remained silent. The new provisions were discussed at the 82nd Session of the Maritime Safety Committee of the IMO (MSC 82), November/December 2006, and will subject to further discussion at the next meeting of the SLF Sub-Committee.

The 38th Session of the Sub-Committee on Standards of Training and Watch-keeping (STW 38) in the initial review of the Standards of Training Certification and Watch-keeping 1978 as amended (STCW95), January 2007, rejected the mandatory provision of additional short safety courses for seafarers.

## Key Issues

The over-arching philosophy of the passenger ship initiative was that the ship would be regarded as its own best lifeboat. A stability standard that gives the master insufficient confidence in the ships ability to resist capsize or sinking is not acceptable. In such cases abandonment would be the only course of action. The "return to port" concept is thus discredited and was used throughout the review process as a means of resisting improvements to large passenger ship safety.

The key issues associated with large passenger vessels are: *collision and grounding; fire protection; stability and watertight integrity; life-saving appliances, including abandonment and crew training*.

i) *Prevention of Collision and Grounding* – While a significant hazard, construction of these vessels affords better protection than most other ship types. However, this raises significant issues concerning the quality and training and the adequacy of manning, both on the bridge and in the engine room. Such vessels are in essence small towns and as such need sufficient operational crew not only to meet routine operational requirements but also to be able to meet the demands associated with intensive operations. This requires adequate manning levels, not only to prevent fatigue but also to deal with routine and non-routine operation of the vessel, by responding to emergency situations.

ii) *Stability and Watertight Integrity* – The extrapolation of the rules of construction with respect to large passenger vessels has raised significant questions over their safety; In particular, vessels where vessels have been constructed with a shallow draft in order to improve port access and increased number of decks to provide leisure facilities including

swimming pools, so reducing the GM. The effects of which need to be addressed, particularly in adverse weather conditions and when a vessel is turning.

iii) *Fire Protection* – The increased size of compartments, including shopping malls and atriums, increases the potential for the spread of fire. While effective automated systems may reduce the risk of spread of fire, there is a need for consideration of compartmental size and the adequacy of current fire-fighting arrangements.

iv) *Life-Saving Appliances and Abandonment* – Lifeboats have increased in size and mass evacuation systems have been developed to meet the increasing number of passengers carried. While regulatory requirements have been met, the adequacy of such systems has increasingly been questioned. While occasional reference has been made to innovative systems, i.e. escape modules; the lifeboat and life raft have remained unchanged as the main means of evacuation and survival.

v) *Crew Training (the human element)* – The structural change in the employment of crews on passenger vessels, largely from agencies resulting in casualisation of labour, raises serious questions over the ability to fight fire and ensure an orderly evacuation of passengers. While a core crew in both deck and engine, including the officers, are trained to a high level, the bulk of the catering department receive minimalist training. Safety training is a fraction of the safety training received by aircraft cabin crew.

**IFSMA should:**

i) *Prevention of Collision and Grounding* – Campaign for adequate manning of bridge and engine room, including at least two officers on duty both on the bridge and engine room at all times while the vessel is at sea.

ii) *Stability and Watertight Integrity* – Campaign for the existing standards of the stability and watertight integrity to be maintained and where necessary increased.

iii) *Fire Protection* – Encourage research into existing fire protection systems and adequacy of current protection measures.

iv) *Life-Saving Appliances and Abandonment* – Encourage research into innovative systems for abandonment adequacy of existing evacuation systems and the compatibility of life-saving appliances and equipment.

v) *Crew Training* – Seek additional training requirements for all personnel on large passenger vessels.