



Maritime and Coastguard Agency

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## **Observations and Recommendations arising from a Series of Domestic Passenger Vessel Evacuation Exercises.**

**Notice to all Ship Owners, Operators, Ship Designers and Marine Surveyors**

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**PLEASE NOTE:-**

Where this document provides guidance on the law it should not be regarded as definitive. The way the law applies to any particular case can vary according to circumstances - for example, from vessel to vessel and you should consider seeking independent legal advice if you are unsure of your own legal position.

**Summary**

This guidance reports the findings of a series of trials and evacuation exercises undertaken or witnessed by the Maritime and Coastguard Agency (MCA) during 2006.

The findings are considered relevant to all passenger ships engaged on non-international (domestic) voyages, particularly those operating on rivers with strong currents, as they address a number of generic issues relevant to emergency evacuations from these vessels. The findings and conclusions identify issues that are both equipment related and operational.

Copies of the individual reports of the exercises referred to in this Note are available from the Shipping Safety Branch of the MCA upon request. Contact details are provided at the end of this Note.

### **1. Introduction / Background**

Evacuation of a domestic passenger vessel in the event of an emergency is possible by disembarkation to either dry land, attending vessels or life saving appliances. While it is important to remember that not all of these means may be available to a given vessel in a specific situation, their relative merits should be understood.

Most UK registered passenger vessels operating on domestic voyages are required to carry one or more liferafts. However, the viability of these liferafts, and in particular Open Reversible Inflatable Liferafts (ORILs), as an evacuation platform has been questioned. The main concerns expressed have related to the evacuation procedures and the feasibility of towing an ORIL and its occupants to safety, especially in a river's current or tidal stream.

Consequently, exercises were conducted to ascertain, among other things, the feasibility and effectiveness of an ORIL as an evacuation platform. An evacuation of a passenger vessel utilising attending rescue craft was also undertaken.

Knowing the time that it takes to evacuate a vessel could be critical, particularly in the case of a flooding scenario as hydrostatic stability may be lost very quickly in such circumstances. As an example:

On a 1-compartment damage stability vessel, an assumed damage of 400mm by 30mm at a position 0.25m below the waterline where it breaches the subdivision would cause a total loss of stability after 30 minutes (estimated by calculation).

On the same vessel if the damage in the same location were increased in width to 107mm, the vessel would survive less than 10 minutes.

Apart from providing an assessment of the suitability of ORILs, these exercises also identified other equipment related and operational findings which are reported and discussed in this Note.

## **2. Exercises**

Two exercises were conducted as part of the work that the MCA is currently undertaking in its Domestic Passenger Ship Regulatory Review (DPSRR) – see sections 2.1 and 2.2 below. In addition, one exercise was undertaken by the London emergency services – see section 2.3 below. Two further exercises have been witnessed by surveyors from the MCA's Falmouth Marine Office – see section 2.4 below.

### *2.1 Towing exercise on the River Thames (14<sup>th</sup> July 2006)*

An exercise was conducted by the MCA in partnership with the Royal National Lifeboat Institution, the Metropolitan Police Marine Support Unit, the London Fire Brigade and Seawater Marine Services Limited. The dynamic and lateral stability and general behaviour of an ORIL while under tow in a tidal current were observed. The raft was also observed when drifting freely in the vicinity of obstructions that a deployed ORIL is likely to encounter in a river environment.

### *2.2 Domestic Passenger Ship Evacuation Exercise on the River Thames (19<sup>th</sup> October 2006)*

The Domestic Passenger Ship Evacuation Exercise formed a part of the 2006 training day for Passenger Boat Association members, which was jointly organised by the Association and the MCA. Also essential to the organisation of the event was the assistance received from Seawater Marine Services Ltd., British Waterways and the Disabled Persons' Transport Advisory Committee.

In the exercise, 81 of 82 personnel onboard a twin decked passenger vessel were successfully evacuated after supposed damage resulting from a collision. The chosen methods of exit were recorded, although the majority of the evacuees utilised the liferafts provided. Further trials were conducted after the main evacuation exercise had been completed using persons of reduced mobility to assess the effectiveness of the arrangements (both equipment and operational) for evacuating such passengers.

### *2.3 Exercise Palm Tree on the River Thames (1<sup>st</sup> November 2006)*

Exercise Palm Tree was primarily intended to test the co-ordination and communication between London's emergency services in the event of a major maritime incident on the River Thames. The exercise involved the evacuation of passengers from a passenger vessel moored mid-stream and the search for, and rescue of, persons who had abandoned the vessel

directly into the water (as represented by mannequins for the purpose of this exercise). The participants in this exercise were the MCA, the Royal National Lifeboat Institution, the Metropolitan Police Marine Support Unit, London Fire Brigade, London Ambulance Service, the Royal Air Force, the Department for Transport, the London Boroughs of Hammersmith and Fulham and Wandsworth, and the Port of London Authority.

#### *2.4 Falmouth evacuation exercises (30<sup>th</sup> March and 26<sup>th</sup> September 2006)*

Two evacuation exercises were undertaken in the Falmouth area involving local passenger ship operators, the MCA and the Royal National Lifeboat Institution. In both exercises, there was an assumed fire onboard and an evacuation into ORILs was initiated. The first exercise in March took place in windy conditions (force 5/6, gusting 8 at times) with light rain and the September exercise, whilst winds were light, was undertaken in a swell of 1-2ft. The exercises involved an initial evacuation into an ORIL. The people in the ORIL were then transferred to an attending vessel. Subsequently, this vessel was assumed to be a casualty and these people were evacuated into an ORIL. Finally a third vessel attended to recover the ORIL and embark its occupants.

### **3. Findings from the exercises**

#### *3.1 Liferaft towing exercise (see section 2.1 above)*

The key findings of this exercise are summarised below.

##### Operational

- ◆ A suitable landing site needs to be identified when strong currents and tides are running. Travelling against the direction of flow may not be viable.
- ◆ Manoeuvring ORILs that are being towed, even when passing under bridges, does not appear unduly hazardous. However, in strong currents it may be appropriate to consider allowing the progress of the ORIL to be controlled with the 'towing' vessel upstream of the liferaft.
- ◆ The danger of a drifting liferaft colliding with, or becoming entangled in, a bridge pier or other obstruction appears to be small.
- ◆ Vessels approaching ORILs should be manoeuvred with awareness of the hazards posed by any trailing drogue and painter lines attached to the liferaft.
- ◆ Rescue vessels attending ORILs that have been deployed, especially in rivers with strong currents running, need to have sufficient power and manoeuvrability to control and, where appropriate, tow the liferafts. The crews of such rescue vessels should have the appropriate degree of training and experience and should be aware of the effect of the wash of the rescue vessel when approaching the ORIL.

##### Equipment

The following issues will be further considered by the MCA in consultation with liferaft manufacturers and other interested parties in the DPSRR.

- ◆ The deployment of drogues in river environments may increase the speed of a liferaft. Consequently, consideration will be given as to whether their positions of attachment should be clearly marked on the inside and outside of the liferaft. This comment is equally pertinent to painter lines that assist with recovery.

◆ It is to be considered whether the fitting of a second bridle to the towing points of a liferaft would be beneficial in those cases where the primary bridle is inadvertently cut during the liferaft's detachment from the casualty.

◆ Drogue lines fitted to liferafts carried on passenger vessels operating in river environments could be significantly shorter than those used at sea, to reduce the risk of interference with obstructions.

Overall, the MCA is satisfied that it has been shown that ORILs can provide a safe evacuation platform in environments such as tidal rivers until passengers can be transferred to a more permanent place of refuge.

### *3.2 Domestic Passenger Ship Evacuation Exercise (see section 2.2 above)*

The key findings of this exercise are summarised below.

◆ It is essential that liferafts are installed correctly on vessels in order that they deploy effectively and in a manner which allows them to be handled alongside and boarded as intended. For this reason, liferaft canisters are marked to identify which side should face inboard. Canisters containing multiple liferafts are labelled either Type A or B to indicate the manner of packing within the canister, it is suggested that the cradles for such liferafts should also be marked to indicate Type A or B and with the directions of the operating and bowing lines marked to ensure correct installation.

◆ There is no substitute for regular training based on varied and realistic scenarios, so that the crew have the confidence and abilities to be effective in a real emergency. It is therefore essential that the crew are familiar with emergency procedures and also with their individual responsibilities for directing and assisting passengers, launching liferafts and supervising the evacuation into liferafts. In this regard, an effective Domestic Safety Management (DSM) system must be in place.

◆ Crew members must be easily recognisable in the event of an emergency. It is therefore recommended that what the crew wear, or don in the event of an emergency, should make them readily identifiable to passengers and the crews of attending rescue vessels.

◆ Announcements made, and instructions given, by the crew to passengers in an emergency should clearly explain escape routes and the location of lifejackets. Passenger knowledge or memory of the initial safety announcement should not be relied upon. Readily accessible loud hailers or torches could improve communication during an evacuation. Effective control of passengers boarding liferafts is important, particularly in restricting hazardous items carried and worn by those about to board the liferafts.

◆ The evacuation procedures for persons of reduced mobility need to be properly addressed, as part of the DSM system, to ensure the rapid and safe evacuation of all onboard. This is of particular importance on vessels with higher freeboards to ensure the arrangements are appropriate. Apparatus, such as wheelchairs and pushchairs, should be removed from the evacuation area or jettisoned rather than loaded into the liferaft.

◆ It is recognised that the stowage of large numbers of lifejackets can prove challenging on some passenger vessels. However, stowing lifejackets with the straps in the fully tightened position will cause problems with donning; therefore straps should not be tightened when lifejackets are stowed.

◆ In the event of the vessel sustaining flooding, the emergency procedures should ensure that liferafts are launched and passengers readied for evacuation immediately. Even vessels of a one compartment standard are very vulnerable if damaged on the bulkhead and therefore a quick response is crucial. In deciding when, or whether, a vessel that has sustained flooding

should be evacuated, the master should be aware that there may be an absence of visual clues (for example adverse heel or trim, or reduction in freeboard) before the vessel will founder – in some cases, extremely quickly.

### *3.3 Exercise Palm Tree (see section 2.3 above)*

The key findings of this exercise are summarised below.

- ◆ Lifejackets that are stowed beneath seats may be difficult to access. It may also take some time for lifejackets, which are not stowed in evenly distributed locations around the vessel, to be allocated to all passengers in a timely manner. Consequently, donning instructions may need to be repeated several times.
- ◆ Lifejackets that are stowed adjusted to their smallest size make donning a slow and complex procedure.
- ◆ It is important that announcements and instructions made from the wheelhouse (usually using the public address system) and by the rest of the crew (in the passenger spaces, at the liferaft embarkation stations etc.) are consistent, updated and repeated at regular intervals.
- ◆ In an emergency, there is a natural tendency for passengers to crowd at the sides of the open (often upper) decks. However, this negatively impacts upon the stability of the vessel and so should be controlled by the crew to the best extent possible.
- ◆ As well as ensuring that, in the event of an emergency, communications with the emergency services are initiated as quickly as possible, it is strongly recommended that, to ensure the accuracy of distress messages transmitted by radio, the standard format of a distress broadcast is displayed in the wheelhouse next to the radio installation.
- ◆ Crew members must be easily recognisable to, and distinguishable from, the passengers. This needs to be particularly considered in the situation after lifejackets have been donned by the crew, when uniforms may be covered by the lifejackets.

### *3.4 Falmouth evacuation exercises (see section 2.4 above)*

The key finding of these exercises are summarised below.

#### Equipment

The following issues will be considered by the MCA in the DPSRR.

- ◆ An ORIL provides no protection from the elements. On a day when the air temperature was 9°C and the mean wind speed was 20 - 25 knots, after ten minutes in an ORIL most people were feeling cold. However, there was unanimous agreement among exercise participants that boarding an ORIL is considerably easier and much faster than boarding through the doorway of a canopied liferaft. It was also perceived that persons of reduced mobility would have more difficulty boarding an enclosed liferaft in a seaway.
- ◆ It is to be considered whether a “grab-bag” containing essential equipment should be kept ready at hand in the wheelhouse. Items such as a first aid kit, portable radio, flares, etc. might be placed in a sealed container that will float.
- ◆ The freeboard and high floor of an ORIL generally may make boarding and recovery of survivors easier, particularly from low freeboard passenger ships, as it is simply a case of stepping down when boarding an ORIL from the stricken ship. There are likely to be fewer obstructions, which make it easier for the less agile to board the liferafts. However, where

vessels have a higher freeboard, which is likely to slow down the evacuation process, alternative means of boarding should be considered.

### Operational

- ◆ Comprehensive briefings to passengers before and during the evacuation enhance the speed of the evacuation and help to avoid confusion and panic.
- ◆ Someone must take overall responsibility for the safe evacuation of the vessel. This needs to be addressed in the DSM system.
- ◆ The effective control of passengers is essential to the coordination of orderly evacuation. It is important that frightened or less able passengers are assisted and all passengers should be instructed as to where to sit within the liferaft. It is important that someone onboard the liferaft is in command when passengers disembark to a rescue vessel, to ensure that children, injured or weaker passengers are assisted and disembarkation is conducted in an orderly manner.
- ◆ Lifejackets should be donned as soon as abandonment appears likely.
- ◆ If necessary, able-bodied passengers can be identified by the crew and asked to assist with injured or less mobile passengers, lifejacket donning etc.
- ◆ The number and capacity of liferafts fitted on a vessel should reflect the operating environment. Larger capacity liferafts are more difficult to handle in exposed conditions, yet a number of smaller liferafts would need more crew supervision during an evacuation and multiple boarding points would be required.
- ◆ Holding a liferaft alongside a vessel in strong wind or a swell proved difficult. The raft should be secured fore and aft using the bowsing line and painter around cleats before passengers embark. Careful consideration should be given to identifying what strong points are available on individual vessels for securing liferafts.
- ◆ It is not advisable to split up family or other groups during the evacuation as this is likely to cause unease and panic amongst passengers. Passengers with impaired mobility, disability and/or injury should be identified and assigned a 'buddy' but generally board the liferafts last so that the evacuation process maintains the highest possible level of control and speed.
- ◆ Passengers should be asked to remove shoes with heels before boarding.
- ◆ Exercises to practise crowd control procedures during emergency situations should be held as part of the DSM regime. They do not need to be complicated but could take the form of a discussion to establish sensible guidelines and procedures.

The Falmouth exercises verified that ORILs can provide a suitable evacuation platform in adverse weather conditions, such as high winds and swell. The exercises also demonstrated that passengers can be successfully disembarked from an ORIL to an attending vessel.

### **4. Conclusions and recommendations for immediate consideration/action**

It is critical that the master and crew appreciate the risks of flooding damage and are fully aware of the survivability standard of their vessel. Operators and rescue services need to be fully aware of the danger of moderate damage and the speed with which a vessel can potentially be lost. Analysis has shown that there may not be sufficient visual cues to suggest imminent loss of a vessel due to a flooding situation. In the example of the evacuation exercise discussed in section 3.2 above, at the time of the simulated loss of a typical twin decked passenger vessel operating on a tidal river there was no significant heel, only 2.4 degrees of trim by the bow and 30% of the freeboard remained. An understanding of such

issues would assist Masters and rescue services in appropriately prioritising the recovery of persons from the water and the transfer of persons onboard the vessel to liferafts or attending rescue vessels.

It has been shown that the evacuation of 81 people from a passenger vessel of a similar size and arrangement to that used in Exercise Palm Tree (see section 3.3 above), into liferafts can be accomplished in less than 10 minutes. However, while this time to evacuate will vary depending on such issues as the freeboard and evacuation arrangements on individual vessels, it is expected to compare favourably to the relatively longer time for evacuation to attending rescue vessels. There may be a more significant delay in the arrival of some attendant craft than witnessed during Exercise Palm Tree, merely as a result of the unexpected nature of a real life emergency. Liferafts form a valuable element of evacuation capability if all passengers are to be removed from danger in the available time.

The frequent, considered and clear provision of information, particularly that provided over the public address system, is invaluable for instructing passengers on the correct procedures to be followed in the event of an emergency and providing ongoing additional guidance such as the need to remain low in the vessel because of stability considerations, lifejacket donning instructions and updates to passengers on the progress of the evacuation. Such announcements should be clear and honest and made in a tone which, while not inducing panic, fits the situation. Bland or overly casual messages will not reinforce the authority of the crew and are unlikely to register effectively in the surrounding atmosphere of an emergency situation. The importance of ensuring the effectiveness of communication was a common finding in all of the exercises undertaken.

Training is fundamental to ensure that the crew are confident and effective in emergency situations. Crew members should be readily identifiable, taking into account any personal life saving equipment which may be worn. They must be familiar with procedures and aware of their specific responsibilities for directing and assisting passengers, launching liferafts and supervising the evacuation. The boarding of liferafts and positioning of persons within them should be closely supervised and passengers should be refrained from wearing inappropriate footwear or carrying hazardous items such as umbrellas and bags into the liferafts.

The Domestic Safety Management (DSM) system on board the vessel should be carefully developed and regularly tested. In particular, procedures must be in place to ensure that no passengers remain on board a vessel at the end of an evacuation, bearing in mind the added difficulties which would be presented by a fire scenario. Procedures for evacuation of persons of reduced mobility also need to be clearly defined and well known by the crew. In this regard, it is recommended that passengers with reduced mobility, disability and/or injury should be identified and assigned a 'buddy'. In an emergency situation, reduced mobility passengers may be physically assisted into life saving appliances but due regard must be given to the safety of all on board in order that the evacuation process maintains the highest possible level of control and speed.

As far as practicable, lifejackets should be stowed ready to don, with no additional packaging and with straps in their most relaxed position. They are far easier to tighten than they are to loosen and this would reduce confusion, donning times and errors in donning. Clear guidance as to the method of fastening and appropriate tightening of straps should be given. It should be borne in mind that a person jumping into the water – not necessarily from a great height - while wearing a lifejacket, runs the risk of neck injuries especially if the lifejacket has been incorrectly donned or adjusted.

The exercises have demonstrated that Open Reversible Inflatable Liferafts (ORILs) provide an appropriate evacuation platform for domestic passenger ships. Furthermore, they may be essential in order to achieve a full evacuation within the time limits imposed by the survivability of the casualty.

It is recommended that the findings of this Note, particularly regarding onboard emergency procedures, the stowage and donning of lifejackets and the potential difficulties of evacuation of persons of reduced mobility, should be carefully considered and procedures and training updated as appropriate. The findings from these exercises will also be considered in the further work that the MCA is undertaking, in consultation with industry, in the DPSRR.

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