SP-20

National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: July 21, 1986

In reply refer to: M-86-78 through -93

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About 1710, on December 12, 1985, the 382-foot-long U.S. passenger vessel MISSISSIPPI QUEEN and the U.S. towboat CRIMSON GLORY with its tow of 28 barges, approximately 1,150 feet in overall length, collided on the Mississippi River near Donaldsonville, Louisiana. The MISSISSIPPI QUEEN was holed and began to flood; however, the passenger vessel was grounded after the collision and all 405 passengers and crew were safely evacuated. The CRIMSON GLORY sustained minor damage and stood by to aid the MISSISSIPPI QUEEN. The estimated cost of repair to the two vessels was over $7 million. 1/

The decision to pass in a bend in the Mississippi River or any river or waterway should be made only after considering a number of factors, including the river current, the sharpness of the turn, the width of the river, the depth of the river, the size of the vessels, the draft of the vessels, other traffic, wind, and visibility. Rarely are two vessel passing situations on the Mississippi River exactly the same, and pilots must evaluate every situation. However, the Safety Board believes that pilots of passenger vessels, like the MISSISSIPPI QUEEN, should for the protection of their passengers avoid passing large vessels in bends during high water conditions, particularly large downbound tows, which are difficult to maneuver, in sharp river bends.

A proper lookout should be stationed at a position where the view is clear and unobstructed and sounds outside the vessel can be heard. A proper lookout should be vigilently engaged in his duty and have no other duties. At the time of the accident, the designated lookout on the MISSISSIPPI QUEEN spent most of his 3-hour watch seated in the forward starboard corner of the pilothouse on a couch which faced inboard. The pilot testified that he had a better view than the seated lookout. By facing inboard, the lookout was not effectively performing his task of observing; further his attention could be easily distracted by pilothouse activities. By remaining inside the pilothouse, the lookout was limited in his ability to scan the waterway and hear outside sounds. Because of the arrangement of the vessel, the pilot's view of objects close to the water was obstructed for a distance up to about 400 feet from the vessel depending on the relative bearing and size of the object. The extent of the obstructed area on the MISSISSIPPI QUEEN indicates a need for a lookout to be located on the bridge wings.

1/ For more detailed information, read Marine Accident Report—"Collision Between U.S. Passenger Vessel MISSISSIPPI QUEEN and U.S. Towboat CRIMSON GLORY in the Mississippi River, near Donaldsonville, Louisiana, on December 12, 1985" (NTSB/MAR-86/09).

The circumstances of this accident indicate that the lookout was not provided with adequate instructions or training in his duties since he remained seated inside the pilothouse looking inward most of the time. The pilot on the MISSISSIPPI QUEEN gave the lookout no specific orders and the lookout remained seated until the master went out onto the starboard bridge wing. The lookout then got up and held the starboard pilothouse door open. Had the master not been in the pilothouse, the consequences of the collision would have been more serious because the pilot did not recognize that a risk of collision existed before the master alerted him to it. The pilot did not recognize the risk before the master's warning even though the pilot had a better view of the tow. Later, when the tow was in an area where the pilot's view was obstructed so that he was not able to adequately judge the closing distance between the two vessels, the master provided vital information to the pilot. A properly trained and instructed lookout stationed on the starboard bridge wing during the overtaking maneuver could have provided the pilot with timely information on the closing distance between the two vessels. A properly trained lookout can increase safety and reduce the workload of pilots aboard the MISSISSIPPI QUEEN. Stationed on the bridge wings during close maneuvers, a lookout can effectively compensate for the pilot's obstructed view from the pilothouse. It also would be possible to compensate for the obstructed view by elevating the pilothouse or installing rotatable mirrors or video cameras on the bridge wings.

Calculations performed by the USCG after the accident show that, although the MISSISSIPPI QUEEN could survive flooding of the lower machinery compartment, the additional flooding of the after crew staterooms would have led to the sinking of the vessel had it not been grounded. The after crew staterooms were flooding through the deck drains where check valves had been stuck in the open position from debris. The deck drains led to sumps which vented directly into the flooded lower machinery compartment.

Although the drain system in the after crew stateroom compartment met USCG requirements, the system failed because the check valves were not properly maintained. After the accident, the check valves were made operable and the operators of the MISSISSIPPI QUEEN increased the safety of the vessel by installing check valves in the vents from the sump tanks which penetrate into the lower machinery compartment.

Although the MISSISSIPPI QUEEN's master had some knowledge of stability, the USCG did not require any knowledge of stability in order for him to obtain the license of master (inland waters) or first class pilot. Therefore, it was important that the MISSISSIPPI QUEEN's trim and stability booklet be written in clear and precise language appropriate to the vessel and its operation that could be readily understood by its master. Misinterpretation of the guidance regarding damage stability in the trim and stability booklet could have resulted in the loss of the vessel and many lives. The MISSISSIPPI QUEEN's trim and stability booklet should be rewritten to give clear and complete information regarding accidental flooding and general precautions to minimize progressive flooding.

The majority of the life preservers aboard the MISSISSIPPI QUEEN were stowed in passenger and crew quarters located in the interior of the vessel. As practiced in emergency fire and boat drills and demonstrated during this actual emergency, passengers and crew had to return to their staterooms to obtain and don life preservers. The movement of large numbers of persons to and from their staterooms resulted in a funnel effect and led to crowding in the interior passageways of the MISSISSIPPI QUEEN, even though many of the passengers were already in their staterooms dressing for dinner. Had more passengers and crew been farther from their staterooms and had the nature of the

emergency developed more rapidly, serious overcrowding and confusion in the ship's passageways probably would have occurred and would have worsened as passengers wearing bulky life preservers proceeded to exterior muster stations through narrow passageways. Such overcrowding and confusion would have decreased the potential for survivability of passengers and crew in the event of a rapid sinking or fire. A loss of lighting, even temporary in nature, and the automatic closing of fire doors in such an occurrence would further impede the movement of the vessel's passengers and crew to exterior muster stations.

The availability of life preservers to all passengers and crew of the MISSISSIPPI QUEEN and other passenger vessels is paramount to survival during a disaster. The elimination of a complicated procedure to facilitate the acquisition of life preservers by passengers and crew would reduce potential confusion and panic and increase survivability. The first response of a passenger or crewmember in an emergency should be to move to an exterior area of the vessel rather than enter the interior of the ship to retrieve a life preserver. The movement of persons into the interior of the ship conflicts with the movement of others to the exterior areas and can create delays, generate panic and jeopardize survivability in an emergency.

The stowage of life preservers at muster station locations at or near the exterior of the ship would improve access to life preservers by all persons aboard in emergency situations and permit life preservers to float free in case of a rapid sinking. Life preservers are in exterior locations on USCG cutters and buoy tenders for the same rationale. Availability of life preservers both in staterooms and at muster stations would provide optimum protection, but relocation of equipment currently in use would provide an acceptable safety margin.

The MISSISSIPPI QUEEN receives passengers at various ports of call during the cruise. Because they board the vessel after the majority of passengers, these passengers are not given emergency procedures briefings and they do not participate in fire and boat drills. All passengers on the MISSISSIPPI QUEEN, at any given time when the vessel is underway, should have the benefit of a comprehensive and standardized emergency procedures orientation, including a visit to the assigned muster station. This could be accomplished for passengers, who embark after the fire and boat drills, when they report to the purser's office for stateroom assignments.

The stateroom placards in use aboard the MISSISSIPPI QUEEN provided instructions that were in conflict with the ship's drill procedures. The placards use the marine terms, "port" and "starboard," to describe the locations of emergency muster stations. This use of such language may not have been understood by passengers during the evacuation of the MISSISSIPPI QUEEN. Also, the MISSISSIPPI QUEEN's passenger staterooms placards illustrate a life preserver of a different configuration from those actually carried aboard the vessel.

When integrated with emergency drills that require passengers to report to their assigned muster station, the use of terms familiar to nonmariners would provide a more predictable, organized, and timely passenger response to emergencies. In the event of a rapidly occurring emergency, the crew may not have the opportunity to inspect passengers individually to assure their proper wearing of the life preservers. The stateroom placard should describe accurately the equipment carried aboard the vessel.

A station bill (muster list) enumerating the emergency assignments and crewmember responsibilities was maintained on the MISSISSIPPI QUEEN. However, the station bill was outdated and listed muster station assignments not in use and crewmember emergency duties not required aboard the ship. Specifically, boat station assignments appear for a second rescue boat and crew while only a single rescue boat was in use aboard the MISSISSIPPI QUEEN. The accuracy of a ship's station bill can directly affect the efficiency of the operation of the ship's crew during an emergency.

The operating company does not provide an emergency operations manual setting forth specific guidelines, policies, or required procedures for the master or crew of the MISSISSIPPI QUEEN to follow in an emergency. A document of this nature should be developed to define and standardize emergency procedures to enhance crew coordination and passenger survivability during various emergency situations.

Other than a brief reference to emergency procedures in the document entitled "Living Aboard the MISSISSIPPI QUEEN - a Unique Experience," 30 to 45 minutes of orientation from the master and mates, a six-question test on the crewmember's muster station and alarm signals, and participation in the fire and boat drills held aboard the vessel, crewmembers of the MISSISSIPPI QUEEN received no other training or instruction in general emergency procedures. Crewmembers with emergency assignments requiring the use of special emergency equipment did not actually perform emergency drills using the equipment. The operating company or master maintained no emergency training materials, instructional plans, or crew training records. Evaluation of crewmember proficiency with respect to emergency skills did not occur and there was no in-service emergency training, beyond drills. The crew of the MISSISSIPPI QUEEN is responsible for thousands of passengers during its annual operations. The operating company should have formal policies, should provide crew training and guidance in the proper handling of emergencies which have the potential to affect the persons in their charge, and should require written records to tract crew proficiency levels and skill retention.

During fire and boat drills aboard the MISSISSIPPI QUEEN, passengers were not required to report to their assigned muster stations nor were the crew required to launch the rescue boat or to practice a rescue. Following the collision and during the actual emergency, the majority of passengers reacted in the manner in which they had been drilled, donning life preservers and waiting in the passageways of the ship following the general alarm rather than reporting to their assigned muster stations in accordance with the instructions on the placards in their staterooms. Additionally, passengers reported that they were instructed by individual crewmembers to wait in the passageways of the ship for further instructions after donning life preservers.

The MISSISSIPPI QUEEN was equipped with an emergency loud speaker system that had the capability of informing all persons aboard the ship of the nature of an emergency and the necessary action to take in response to it. The system was designed specifically to provide for an organized and orderly response to the dangers present during an emergency and to increase the potential for survival of persons aboard the vessel.

The master of the MISSISSIPPI QUEEN, after ordering that the general alarm be sounded to alert passengers and crew of an emergency condition, elected not to utilize the emergency loudspeaker system to notify passengers of the nature of the emergency or to broadcast instructions. The master based this decision on his belief that an announcement would generate panic among the passengers. The master ordered members of the crew to pass instructions to all aboard by word of mouth, which delayed the notification process.

While this delay did not adversely affect passenger survivability in this case, passengers reported that they were concerned about not being informed of the nature of the emergency, and that they were confused and were not sure of what to do. Passengers asked other passengers what to do, sought out crewmembers for advice, or simply followed the example of other passengers they observed. Because they received conflicting instructions from the master, crewmembers moved groups of passengers to various locations aboard the ship before finally mustering them in the main lounge.

The lack of specific operational procedures requiring the use of the loudspeaker system in an emergency, especially in a dangerous and rapidly changing scenario, could contribute to the severity of the situation. Although the decision not to use the system may have been made to minimize passenger concern, the opposite effect was reported by some passengers.

Life preservers in use aboard vessels in lakes, bays and sounds, or river service are not required to be equipped with life preserver lights as required for vessels in other types of service. The potentially severe operating conditions in river service indicate the need for such devices. Darkness, rapid river currents, poor visibility, low water temperatures, and other environmental conditions similar to those encountered during the evacuation of the MISSISSIPPI QUEEN would hamper search and rescue operations and reduce the ability to locate victims in the water.

In the event of a serious accident or fire, hundreds of persons could potentially be forced to enter the water, a concern expressed during this accident by the master of the MISSISSIPPI QUEEN as he ordered all persons on board to don life preservers and the crew to launch the liferafts. Even if rescue vessels were available in the vicinity, as was the case in this accident, the rescue of large numbers of victims would require a lengthy period of time. Life preservers equipped with lights could expedite the rescue of victims helping to reduce the period of time needed to complete the rescue process.

Although the MISSISSIPPI QUEEN's rescue boat was not used in the emergency, consideration of various conditions in which the MISSISSIPPI QUEEN operates indicates a need to improve its equipment. The rescue boat provides the primary means for rescue of a person who falls overboard after other rescue attempts have failed. The rescue boat, equipped only with oars, does not provide an effective means to reach rapidly a person in the water and it may not be possible for the MISSISSIPPI QUEEN to maneuver to accomplish the rescue. A nonswimmer or less-than-able person could drift from the vessel quickly in the river currents and, in times of reduced visibility, be difficult to locate. Additionally, heavy vessel traffic on the Mississippi River increases the potential for a vessel to strike a victim in the water before rescuers can reach him. A person carried into the proximity of a fleet of barges stopped on the river could be submerged by the current. Equipping the MISSISSIPPI QUEEN with a motorized rescue boat would greatly reduce the response time to retrieve a victim in the river, and would improve the rescue capabilities of the vessel.

The MISSISSIPPI QUEEN was equipped with primary lifesaving equipment (inflatable liferafts) for 85 persons or slightly more than 13 percent of the 635 persons that were permitted to have been aboard. The USCG regulations and the Certificate of Inspection required that this type of equipment be available for only 10 percent of the persons aboard. Further investigation and review, including information provided by the USCG, revealed that the research history and rationale for the 10 percent are unknown. The USCG's lack of documented research history and rationale for these requirements precludes a meaningful assessment of the specific amounts of such equipment presently

required by USCG regulations for the various services. The inability of the USCG to provide documented research or rationale to support the equipment requirements suggests that current requirements are arbitrary and, therefore, questions the validity of these requirements.

As a result of its investigation of the collision of the YANKEE and HARBELL TAPPER in Rhode Island Sound on July 2, 1983, 2/ the Safety Board recommended that the USCG:

> Reevaluate 46 CFR 75.10-20(a) to determine whether the primary lifesaving equipment required is adequate to safely support the entire crew and maximum embarked passengers in the water pending arrival of search and rescue assistance and amend the regulations, as necessary, to eliminate deficiencies in prescribed primary lifesaving equipment. (M-84-29)

The USCG responded and stated that the regulation should not be amended because, in summary, the accident environment did not pose the immediate threat of hypothermia. The Safety Board responded by pointing out that the USCG had failed to address the problem cited in the accident report. The hypothermia potential was not the primary concern, the problem was that severely reduced visibility would have prevented rescue of passengers if they had been forced to enter the water.

The environmental conditions during the MISSISSIPPI QUEEN's emergency presented problems similar to those encountered by the YANKEE and HARBELL TAPPER, but also presented, in the words of the USCG Operations Center controller, the "very severe" threat of hypothermia. To counter the hypothermia danger, the USCG launched a massive search and rescue response.

The public must be confident that injuries or fatalities will not occur as the direct result of inadequate safety equipment requirements and the lack of lifesaving equipment. Primary lifesaving equipment requirements for all passenger vessels should accommodate all passengers of the vessel, unless research proves that a lesser requirement assures that no passengers will have to enter the water during an emergency. It would be difficult for any person and especially the older persons aboard the MISSISSIPPI QUEEN to swim or even walk ashore in the strong 4- to 6-mph river current and 52° water temperature.

Therefore, as a result of its investigation, the National Transportation Safety Board recommends that the Delta Queen Steamboat Company:

> Require pilots to avoid passing large downbound tows while flanking in sharp bends during high water conditions in the Mississippi River. (Class II, Priority Action) (M-86-78)

> Require masters to train properly lookouts in their duties, and require pilots to use effectively lookouts while underway to reduce the pilot's workload. (Class II, Priority Action) (M-86-79)

2/ Marine Accident Report--"Collision of the U.S. Passenger Vessel M/V YANKEE and the Liberian Freighter M/V HARBELL TAPPER in the Rhode Island Sound, July 2, 1983," (NTSB/MAR-84-05).

Compensate for the obstructed view from the pilothouse on the MISSISSIPPI QUEEN by requiring lookouts to be stationed on the bridge wings during close maneuvers, by making a design change, or by installing equipment to increase visibility. (Class II, Priority Action) (M-86-80)

Review maintenance program and revise as necessary to ensure that all valves in the MISSISSIPPI QUEEN's drain system are in proper working condition at all times. (Class II, Priority Action) (M-86-81)

Rewrite the MISSISSIPPI QUEEN's trim and stability booklet to provide clear, accurate, and complete information to the master in terms readily understood by the master regarding accidental flooding and general precautions to minimize progressive flooding. (Class II, Priority Action) (M-86-82)

Relocate the life preservers aboard the MISSISSIPPI QUEEN and other company vessels to locations at or near exterior muster stations or near disembarkation areas. (Class II, Priority Action) (M-86-83)

Require that all passengers who board the MISSISSIPPI QUEEN receive a comprehensive emergency procedures briefing immediately after boarding. (Class II, Priority Action) (M-86-84)

Modify the MISSISSIPPI QUEEN stateroom placards to illustrate correctly the lifejackets carried aboard the vessel and to eliminate marine terms, which may not be familiar to passengers. (Class II, Priority Action) (M-86-85)

Update the MISSISSIPPI QUEEN's station bill (muster list) to state accurately the emergency duties of all crewmembers and to accurately reflect the emergency equipment aboard the vessel. (Class II, Priority Action) (M-86-86)

Develop and publish for company vessel crews a comprehensive emergency operations and procedures manual which includes: (1) details of passenger safety briefings and passenger and crew fire and boat drills; (2) a crew safety training program; (3) passenger and crew coordination procedures, including the use of the emergency loudspeaker system; (4) damage and fire control; and (6) evacuation procedures. (Class II, Priority Action) (M-86-87)

Develop and administer a comprehensive training program for company vessel crews in emergency procedures that includes demonstrating proficiency in the use of emergency equipment. (Class II, Priority Action) (M-86-88)

Require that during fire and boat drills aboard company vessels, all crew and passengers actually report to their muster stations and the crew regularly launches the rescue boat and simulates a rescue. (Class II, Priority Action) (M-86-89)

Require the use of emergency loudspeaker systems aboard company vessels to instruct passengers and crew during an emergency. (Class II, Priority Action) (M-86-90)

Equip life preservers on company vessels with lights. (Class II, Priority Action) (M-86-91)

Equip the MISSISSIPPI QUEEN with a motorized rescue boat carried in a position for rapid launching. (Class II, Priority Action) (M-86-92)

Provide primary lifesaving equipment for all passengers and crew aboard company vessels. (Class II, Priority Action) (M-86-93)

The National Transportation Safety Board is an independent Federal agency with the statutory responsibility ". . . to promote transportation safety by conducting independent accident investigations and by formulating safety improvement recommendations" (Public Law 93-633). The Safety Board is vitally interested in any actions taken as a result of its safety recommendations and would appreciate a response from you regarding action taken or contemplated with respect to the recommendations in this letter. Please refer to Safety Recommendations M-86-78 through -93 in your reply.

GOLDMAN, Acting Chairman, and BURNETT, LAUBER, and NALL, Members, concurred in these recommendations.

Patricia A. Goldman

By: Patricia A. Goldman
Acting Chairman