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National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: JUN 26 1997

In Reply Refer To: M-97-49 and -50

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On the evening of June 22, 1995, the Liberian-registered passenger vessel *Star Princess*, carrying 1,568 passengers and 639 crewmembers, was en route from Skagway to Juneau, Alaska, via the Lynn Canal under the direction of a southeast Alaska pilot. At 0142 on June 23, the *Star Princess* grounded on the submerged Poundstone Rock in Lynn Canal, about 21 miles north of Juneau. The vessel's bottom sustained significant damage on the starboard side, including the rupture of oil tanks, which resulted in the loss of at least 5 gallons of oil. The vessel was piloted to safe anchorage at Auke Bay, Alaska, (about 10 miles north of Juneau) to assess damage and debark passengers. No injuries or deaths resulted from this accident. The total cost resulting from required repairs and the delay before the vessel could return to service was estimated at \$27.16 million.¹

The National Transportation Safety Board determined that the probable cause of the grounding of the *Star Princess* was the pilot's poor performance, which may have been exacerbated by chronic fatigue caused by sleep apnea. Contributing to the accident was the fact that the pilot and the watch officers did not practice bridge resource management.

The Safety Board examined the possibility that fatigue, associated with previously undiagnosed obstructive sleep apnea (OSA), might have impaired the pilot's ability to safely navigate the *Star Princess* on the morning of the grounding. It was medically determined after the accident that the pilot suffered from OSA, a sleeping disorder. OSA can cause an individual to awaken repeatedly throughout a sleep period, often without being aware of having done so.

¹For further information, read Marine Accident Report -- *Grounding of the Liberian Passenger Ship Star Princess on Poundstone Rock, Lynn Canal, Alaska, June 23, 1995* (NTSB/MAR-97/02).

This situation may have prevented the pilot's obtaining restful sleep, creating circumstances that may have caused fatigue.

The fact that the pilot suffered from a sleep disorder would likely affect any fatigue-based performance criteria. One sleep researcher found that the pilot fell asleep in an average of about 5 minutes when placed in a dark, quiet room. An individual who is not sleep deprived will, on average, require about 20 minutes to fall asleep under similar circumstances. Thus the less time a person needs to fall asleep from the 20-minute average, the more the individual is sleep deprived and in need of rest. In the case of the pilot, during postaccident testing sessions he fell asleep in about one-quarter the time required for rested individuals. OSA is a chronic disorder that is often present for years or decades prior to diagnosis. Since daytime sleepiness is almost uniformly present in patients who suffer from OSA, chronic fatigue is one of the hallmarks of the disorder. Therefore, the Safety Board concluded that the pilot was chronically fatigued as a result of OSA.

The pilot claimed that because he was unsure of what course the *Fair Princess* (another vessel in the vicinity) would take, he paid careful attention to the vessel. If such was the case, the pilot could have concentrated on the *Fair Princess* to the exclusion of maintaining a safe distance from Poundstone Rock. Focus on a particular stimulus to the exclusion of other critical data can be one effect of fatigue on performance. The pilot also stated that when he first felt the ship shudder upon grounding, he was not immediately sure as to the nature of the problem. Only when he moved to the starboard bridge wing and observed the buoy traveling down that side of the vessel did the pilot realize that he had struck Poundstone Rock. Not only should the pilot have been aware of the location of the buoy from transiting the area on previous occasions, he had for several miles been observing the buoy marking the rock. Under normal conditions, such an experienced pilot should have immediately deduced that he had not safely passed Poundstone Rock when he felt the vessel shudder. A fatigued pilot, however, might not be sufficiently alert to realize that he had grounded. Because the available data suggest that the pilot's performance was degraded consistent with the effects of fatigue, the Safety Board concluded that fatigue may have reduced the pilot's ability to appropriately assess and respond to the developing situation.

Investigators found that the *Star Princess* pilot typically navigated the vessel without involving the ship's watch officers in navigation tasks or informing them of his piloting intentions. Watch officers stated that the pilot did not look at the ship's established trackline as drawn on their chart, nor did he inform the watch officers of his own intended tracklines. The pilot transferred the conn without involving the navigational watch, thereby not communicating to the watch officers the information he considered important for the ship's safe navigation. For their part, neither of the watch officers took the initiative to seek such information or to communicate with the pilot regarding navigation issues.

Although the second officer was responsible for the ship's safety during this watch, he did not effectively monitor the pilot's passage. He did not question the pilot's decisions, even when he knew the pilot was not following the vessel's established trackline. Had he discussed the tracklines with the pilot, the pilot might have been more alert to the grounding danger.

The available information indicates that the second officer and third officer left all navigational decisions to the pilot, as they considered him responsible for navigation. While they plotted position fixes according to standing policy, the watch officers did not use the fixes to project the *Star Princess*'s course based on time or distance. In the half hour before the grounding, the watch officers took two fixes but did not make any effort to project the ship's future track from these fixes. Had they done so, they should have perceived that the pilot's course would bring them precariously close to Poundstone Rock. The Safety Board concluded that had the watch officers monitored the pilot's navigation, projected the course ahead from their fixes, and communicated this information to the pilot, he would have had time to take action to avoid grounding.

The pilot and the watchstanders conducted their parts of the watch almost independently of each other. Moreover, neither the pilot nor the watchstanders used the equipment available to them to properly monitor the progress of the *Star Princess*. The Safety Board concluded that effective management of resources and coordination of duties were not practiced on the *Star Princess* at the time of, or immediately before, the accident.

The *Star Princess* master and bridge watch officers had not received bridge resource management (BRM) training before the accident. The Safety Board has advocated BRM training for all bridge watch officers as well as pilots. The Safety Board considers that in Alaska, given the relatively long periods pilots spend on cruise vessels, pilots and bridge watch officers would particularly benefit from attending BRM training together. In the southeast Alaska cruise industry, pilots typically serve aboard cruise vessels for 3 to 12 days. Under such circumstances, watch officers can become used to, and rely too strongly on, the presence of a pilot on the vessel. The watch officers on duty during the *Star Princess* grounding were convinced that the pilot had the situation under control in part because they were used to relying on this pilot and his expertise. They chose not to interfere with his decisions or actions — even though they knew the vessel was approaching dangerously near to Poundstone Rock — because they had full confidence in the pilot's abilities.

Providing BRM training would give pilots and bridge watch personnel the opportunity to interact with each other in a nonconfrontational and safe environment. Joint training could also provide pilots and bridge watch members with greater understanding concerning the problems faced in carrying out their respective responsibilities. According to the director² of a major BRM training center:

- Training attended jointly by pilots and deck officers is more realistic in that the roles during simulations are played by the actual parties.
- Training attended jointly by pilots and deck officers has the advantage of improving communication between the two professions, as they can sharpen

²Information obtained during a March 19, 1997, telephone conversation with Harry J. Crooks, Director, RTM STAR Center, Toledo, Ohio.

communication skills with coaching in an instructional setting rather than within the pressures of the work setting. It should be noted that communication skills tend to be at their optimum at the end of the training period and are expected to decline to some extent when the parties return to their normal work routines. Hence, recurrent training is expected and needed.

- Joint training provides an opportunity for deck officers and pilots to become personally acquainted and to learn how the other reacts during simulated portrayals of critical incidents. In addition, they can learn about the other's corporate cultures and company or organizational procedures.

The mutual understanding developed through joint BRM training would contribute to more efficient use of equipment and better coordination of activities, which would result in enhanced safety. The Safety Board therefore concluded that to learn how to work effectively as teams, pilots and watch officers in Alaska should take BRM training together.

The Safety Board understands that the scheduling of such joint training is difficult. The results, however, would be well worth the time and effort. Training that provides opportunity for interaction between pilots and watch officers could make both pilots and watch officers comfortable with a more supportive model of bridge watch operations. Pilots would learn to view monitoring by watch officers as a useful tool rather than a challenge, and watch officers would learn to contribute to the pilot's effectiveness.

Therefore, the National Transportation Safety Board issues the following safety recommendations to the Alaska Coastwise Pilot Association:

Advise pilots about the effect of fatigue on performance and about sleeping disorders such as sleep apnea. (M-97-49)

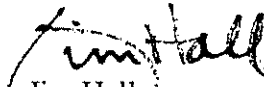
Advise your members about the *Star Princess* accident and encourage those members that navigate on vessels in the Alaska cruise trade to participate in bridge resource management training, including such training with bridge watch officers. (M-97-50)

The Safety Board also issued Safety Recommendations M-97-41 through -43 to the U.S. Coast Guard, M-97-44 and -45 to the State pilot commissions, M-97-46 and -47 to the Alaska Board of Marine Pilots, M-97-48 to the Southeastern Alaska Pilots Association, M-97-51 to the San Diego Bay Pilots Association, Inc., M-97-52 and -53 to Princess Cruise Lines, M-97-54 and -55 to the American Pilots' Association, and M-97-56 and -57 to the International Council of Cruise Lines.

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 interested in any action taken as a result of its safety recommendations.

Therefore, it 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-97-49 and -50. If you need additional information, you may call (202) 314-6458.

Chairman HALL, Vice Chairman FRANCIS, and Members HAMMERSCHMIDT, GOGLIA, and BLACK concurred in these recommendations.

By: 
Jim Hall
Chairman