Log M-411A

National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: JUN 26 1997

In Reply Refer To: M-97-44 through -47

Alaska Board of Marine Pilots
Post Office Box 110806
Juneau, Alaska 99811-0806

Attention: Mr. Bob Berto, Member

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.

[1]For 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.

The Safety Board also evaluated the pilot's use of the antidepressant Effexor in the context of his performance on the accident morning. Besides the postaccident statements made by the pilot about his Effexor use, the Safety Board obtained and reviewed medical opinions concerning the pilot's use of this medication and what effect, if any, it may have had on his performance.

The pilot himself stated that while the medication tended to cause some minor physical side effects, these did not affect his ability to pilot the vessel. The physicians consulted by the Safety Board were in agreement that Effexor would have had no effect on the pilot's behavior. Their consensus was that the pilot was not impaired by his medication at the time of the accident, particularly given the low dosage of Effexor he was taking. Based on the unanimity of the professional opinions of all physicians consulted, the Safety Board concluded that the pilot's use of an antidepressant (Effexor) probably did not affect his performance.

While concluding that the pilot's use of medication was not causal or contributory to this accident, the Safety Board remains concerned about the possible effects of medication on pilot performance. The Alaska Board of Marine Pilots (ABMP) was not aware that the pilot had been regularly taking the prescription medication Effexor, nor was the pilot required to provide this information to the agency. The pilot first provided the information during testimony following this accident.

Use of medication by operators in the transportation industry has been an issue in previous accidents the Safety Board has investigated. For instance, after its investigation into the collision of the towboat *Mauvilla* and its tow with a railroad bridge,[2] the Safety Board recommended to the U.S. Department of Transportation (DOT) that it should:

> I-94-5
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> Require the modal operating administrations to develop and disseminate bulletins, notices, circulars, and other documents that call attention to the need for an employee reporting procedure concerning use of medication (over-the-counter and prescription) while on duty and that urge the transportation industry to develop and implement informational and educational programs related to this subject.

The DOT developed a statement for use by all operating administrations concerning the potential threat to public safety posed by the on-duty use of some over-the-counter and prescription medications by persons performing safety-sensitive duties, strongly urged employers to include appropriate information to address this issue in their employee training materials, and encouraged employers to reiterate to their employees the need to report use of such medications when required by applicable DOT rules or company policies. The DOT circulated this statement to all departmental drug and alcohol program managers, asking that it be made available throughout the regulated industries. Because these efforts satisfied the intent of the recommendation, the Safety Board classified Safety Recommendation I-94-5 "Closed--Acceptable Action" on October 26, 1995.

During the *Star Princess* accident investigation, Safety Board representatives found that, in the marine transportation mode, the issue of medication reporting may not be as familiar with industry members as it could be. As marine pilots are individual contractors rather than employees of firms that may have medication reporting requirements, it would be helpful for them to be made aware of the possible effects that medications could have on their work performance and of the safety benefits provided by medication reporting policies.

Federal pilot licensing procedures require that pilots annually pass a physical examination that addresses vision, color sense, and general physical condition. The *Merchant Marine*

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[2]See Railroad/Marine Accident Report -- *Derailment of Amtrak Train No 2 on the CSXT Big Bayou Canot Bridge near Mobile, Alabama, September 22, 1993* (NTSB/RAR-94/01).

Personnel Physical Examination Report (as revised in March 1995), used to conduct the examination, directs the examining physician to report what medications the pilot is taking.

At the State level, the medication reporting situation is less clear. The Alaska State medical certification procedure for pilot licensing does not specifically require a pilot to declare whether he or she is taking medications. Other States' pilot licensing organizations also do not appear to require pilots to make full disclosure regarding medications they may be taking. Many medications have effects that could negatively affect the performance of persons with safety-sensitive responsibilities. The Safety Board has previously discussed the need for transportation employers to be aware that employees are taking medication so that employers can determine the potential effects of the medication on the employee's fitness for duty.[3] While pilots are not "employees" but self-employed individual contractors, they nevertheless have safety responsibilities in marine transportation of valid concern to licensing authorities.

The ABMP exercises remedial oversight of pilots. The oversight focuses on retraining those pilots who cause serious accidents, thus showing themselves to be negligent or incompetent. Focusing on pilots after they cause accidents is the traditional approach, which many States take, to maintaining high-quality pilotage services. The approach can be very effective in weeding out pilots who perform poorly, but it has a major shortcoming — the oversight authority must wait until a pilot has one or more serious accidents before it takes action.

The Safety Board considers that oversight is more effective before an accident. If pilots are under such observation, deficiencies in their performance can be corrected before they cause a serious accident. Oversight is particularly necessary for pilots operating passenger cruises in Alaska. In the past 10 years, passenger carriage in Alaskan waters has expanded rapidly. Considering the unforgiving nature of the Alaskan marine environment, with its deep, cold waters and rocky shores, and the remoteness of the areas of operation, an accident caused by the poor performance of a pilot cannot be tolerated. Too many lives are at risk.

The Safety Board concluded that pilot performance would be improved if the ABMP had a mechanism for obtaining feedback on pilot performance. The Safety Board further concluded that, considering the accident history and medical condition of the *Star Princess* pilot, the ABMP did not oversee his performance adequately.

In addition, Safety Board 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,

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[3]See, for example, Marine Accident Report -- *Grounding of the Panamanian Flag Passenger Carferry* M/V A. Regina, *Mona Island, Puerto Rico, February 15, 1985* (NTSB/MAR-86/02) and Railroad Accident Report-- *Derailment of Amtrak Train 87, Silver Meteor, Palatka, Florida, December 17, 1991* (NTSB/RAR-93/02/SUM).

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.

On June 25, 1993, as a result of the investigation of the grounding of the United Kingdom passenger vessel RMS *Queen Elizabeth 2* near Cuttyhunk Island, Vineyard Sound, Massachusetts, on August 7, 1992, the Safety Board issued Safety Recommendation M-93-34 to the State pilot commissions, including the ABMP. Safety Recommendation M-93-34 asked that each pilot commission:

> Require pilots, upon boarding a vessel, to conduct a conference with the master and other relevant deck officers that includes a discussion of the pilot's proposed route, including courses, speeds, squat, and unique maneuvers that may be encountered.

By a letter dated July 15, 1993, the ABMP informed the Safety Board that Safety Recommendation M-93-34 had been forwarded to each of Alaska's six pilot associations. In part, the letter stated that:

> The problem of pilot/master communications has been addressed informally during several conversations to which I've [Alaska Marine Pilot Coordinator] been party, and I appreciate the problems which are inherent to faulty or incomplete communications. A recommendation has been included in the report on page 2 for State Pilot Commissions (Boards) to act upon.
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> I will include this item in the September Board meeting agenda, however, I solicit your inputs in advance before public discussion to include in the package for the Board members. I believe there is validity in the recommendation and look forward to receiving your comments. . .

On August 16, 1993, the Safety Board wrote that:

> The Safety Board is pleased that this recommendation will be addressed at the September pilot board meeting and that copies of the recommendation have been forwarded to the Alaska pilot associations soliciting their comments for this meeting. Safety Recommendation M-93-34 will be classified "Open--Acceptable Response" pending notification on the action taken to implement this recommendation. We have also enclosed a draft copy of a paper developed by the Society of Naval Architects and Marine Engineers, Marine Safety Panel, that addresses the intent of M-93-34 and recommend that you pass it along to your constituency.

Alaska has since amended its State regulations to require all new applicants for State pilot licenses to complete BRM training and all renewal applicants for State pilot licenses to have taken refresher BRM training within the previous 6 years. According to the Alaska Marine Pilot Coordinator, Alaska pilot licenses are valid for 2 years, expiring at the end of each even-numbered year. Therefore, as of January 1, 1997, all original and renewal applicants for Alaska pilot licenses are required to have taken BRM training. Accordingly, the Safety Board is classifying Safety Recommendation M-93-34 "Closed--Acceptable Action" for the State of Alaska.

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 director[4] 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 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 Board of Marine Pilots:

> Advise pilots about the effect of fatigue on performance and about sleeping disorders such as sleep apnea. (M-97-44)
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> Review, in consultation with experts in occupational health, your medical standards, guidelines, and examination forms to ensure that they require the disclosure and appropriate evaluation of the history or presence of any medical conditions, symptoms, or medication use that would affect an individual's fitness to pilot a vessel. (M-97-45)

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

Develop and implement a mechanism for monitoring the performance of pilots on a routine basis. (M-97-46)

Encourage or require pilots of passenger vessels operating in southeast Alaska to take bridge resource management training with bridge watch officers. (M-97-47)

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 other 25 State pilot commissions, M-97-48 to the Southeastern Alaska Pilots Association, M-97-49 and -50 to the Alaska Coastwise Pilot 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-97-44 through -47. 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