

Let M 409A



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

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In reply refer to: M-97-34

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On October 15, 1995, the Liberian tank ship *Patriot* came within 10 miles (2-3 hours) of grounding on the north side of the Yucatan Peninsula near Campeche, Mexico, while navigating in rough seas and high winds associated with Hurricane Roxanne. Had the grounding occurred, it could have resulted in significant damage to the ship's structure, injuries or deaths among the 27 crewmembers, and damage to the environment.¹

The National Transportation Safety Board determined that the probable cause of the near-grounding incident was the master's decision to sail his vessel into the predicted path of a hurricane, a decision that resulted from Conoco Shipping Company's ineffective management of the movements of its vessels and inadequate shoreside support for critical shipboard decisions affecting vessel safety.

The first in the sequence of events leading up to the near grounding of the *Patriot* occurred on October 11, 1995, when the *Patriot's* master decided to sail his vessel into an area where National Weather Service forecasts showed he would probably encounter Hurricane Roxanne. Despite the weather predictions, the master chose to maneuver his vessel toward the hurricane rather than away from it. This decision ultimately placed the *Patriot* in the eye of the storm.

This incident demonstrates the potential problems associated with relying primarily on shipmasters to evaluate the risks posed by tropical cyclones and hurricanes. The Safety Board is concerned that the *Patriot's* master would even contemplate operating the *Patriot* near a tropical storm, let alone a hurricane, when it could have been avoided. Had a grounding incident actually

¹For more detailed information, read Marine Incident Summary Report--Near Grounding of the Liberian Tank Ship *Patriot*, Bay of Campeche, Mexico, October 15, 1995 (MAR-97/01/SUM).

occurred, the damage to the ship's structure, salvage expenses, lost revenue, and costs associated with the clean-up of any resulting pollution (the *Patriot* was carrying more than 120,000 gallons of diesel fuel and lubricating oil) could have run into the millions of dollars.

In the view of the Safety Board, the failure of Conoco to anticipate the weather-related problems facing the *Patriot* and to initiate communications with the ship's master before the vessel encountered the storm suggests that, at the time of this incident, company oversight of the activities of its Patriot-class tank ships operating near tropical storms and hurricanes was deficient. The Safety Board concluded that Conoco Shipping Company, at the time of this incident, did not have in place a shoreside multi-disciplinary team specifically responsible for assisting and advising the company's masters in assessing and responding to the risks to vessel safety posed by tropical storms and hurricanes.

As a result of these findings, the Safety Board made the following safety recommendations to Conoco Shipping Company:

Develop and implement procedures whereby Conoco Shipping Company management officials and technical specialists communicate and consult with shipmasters at sea in times of potential or actual emergencies or during safety-critical periods of a voyage. The procedures should be directed toward facilitating timely decisions affecting the safety of company vessels and their crews. (M-97-29)

Develop and implement a heavy weather operations contingency plan similar to your *Vessel Response Plan* that is capable of providing a timely assessment of the risks to vessels in the fleet operating near tropical storms and hurricanes. The plan should, at a minimum, (1) establish a shoreside response team that includes individuals knowledgeable in meteorology and in all engineering, operational, and commercial factors that affect the safety of vessels in the Conoco fleet; (2) outline the duties and responsibilities of the response team; and (3) provide procedures to facilitate coordination and consultation between response team members on shore and Conoco shipmasters at sea. (M-97-30)

The master stated that he believed the *Patriot* had sufficient maneuverability to evade the storm, whether or not it veered off to the northwest as he anticipated. As the circumstances later showed, he clearly overestimated his vessel's ability to maneuver in rough seas while operating in a light ballast condition. Patriot-class tank ships are designed to carry a minimum amount of ballast, thus they tend to roll and pitch heavily in rough seas. Further, few tank ships operating in a light ballast condition in heavy weather and rough seas can be operated safely at their full sea speed. These factors alone make it unlikely that the *Patriot*, without the benefit of a substantial head start, could have outrun the fast-moving Roxanne.

The *Patriot's* ability to maneuver through rough seas was further compromised by unexpected (by the master and chief engineer) incidents of engine overspeed and shutdown the vessel experienced. Following each overspeed incident, shaft speed had to be limited to about 50 rpm, which had a continuous impact on maneuverability. A review of Conoco records revealed

that two of its four Patriot-class tank ships (*Patriot* and *Guardian*) had experienced overspeeding of the main engine on three occasions prior to the near-grounding incident. On two of the three occasions, the overspeed condition occurred while the vessels, in a light ballast condition, were encountering 22- to 33-knot winds and 5- to 10-foot seas. The third overspeed incident occurred aboard the *Guardian* just 6 months prior to this incident, while the vessel was operating in a light ballast condition in heavy weather and rough seas off the U.S. East Coast.

The fact that overspeeding had occurred on Patriot-class tank ships was information needed by the masters and chief engineers of all the company's Patriot-class vessels so they could factor it into their risk assessments. In this instance, the *Patriot's* master and chief engineer lacked critical information concerning the operation of their vessel in rough seas. Because neither individual was aware of the overspeed problem, they were unable to adequately assess its effect on the *Patriot's* ability to maneuver in rough seas. This information would certainly have been a factor in the decision to continue the voyage to Dos Bocas.

While the *Patriot's* master was not aware of the potential for engine shutdown in rough seas, he also did not take into account other operational limitations of Patriot-class tank ships. For example, the master understood that taking on storm ballast would improve the vessel's seakeeping in rough seas. But he apparently did not factor into his decisionmaking either the time it takes to complete the loading of ballast or the fact that exaggerated rolling of the vessel could shut down the auxiliary boilers that supply the steam necessary to drive the ballast pumps, thereby making the task even more difficult and time-consuming. Had the master taken either of these factors into account, he might not have made the decision to continue to Dos Bocas, and he almost certainly would not have delayed his decision to load storm ballast for the second time. The Safety Board concluded that, had the *Patriot's* master better understood the operational limitations of his vessel, had he known the vessel could enter an overspeed condition, and had he considered the effects rough seas could have on his vessel's ability to load storm ballast, he probably would not have entered the Bay of Campeche, much less continued the voyage to Dos Bocas.

A delay in loading storm ballast during the *Patriot's* second encounter with Roxanne had serious safety implications. Because of the reduced engine speed, rough seas, deep swells, and hurricane-force winds out of the west-northwest, the *Patriot* soon lost steerageway, began to drift toward nearby shoals, and began to experience heavy rolling. At one point, the vessel reportedly rolled more than 39 degrees. By 0615, the master had become sufficiently concerned about the situation that he ordered the second officer to transmit a series of distress messages. Despite the master's concern about the danger of grounding, he did not initiate the loading of storm ballast until several hours after the recurrence of the overspeed condition and more than 13 hours after receiving word that Roxanne had turned around and was heading in his direction.

The Safety Board concluded that if Conoco employees and managers having both operations and engineering experience had been in contact with the *Patriot's* master during the critical period leading up to the vessel's second and more serious encounter with the storm, these individuals could have assisted the master with his decisionmaking. This assistance could have

included advice about the benefits of loading storm ballast in a timely manner as a means of avoiding/mitigating an emergency situation.

Active decisionmaking support prior to the vessel's second encounter with the storm would have been particularly meaningful given the conditions under which the master and his crew were working during the emergency. All crewmembers interviewed said that their normal routines were interrupted as a result of deteriorating weather conditions beginning at or about 1600 on Wednesday, October 11. The master essentially remained awake for the next 16 hours, until the morning of Thursday, October 12. Additionally, he stated that about 2 days later, he remained awake and on the bridge for approximately 48 hours straight, during which time he napped for intervals of between 20 and 30 minutes. The Safety Board therefore concluded that the likely fatigue of the master as a result of his lack of rest during the protracted emergency might well have compromised his ability to make good and timely decisions. Under these conditions, assistance from well-rested shoreside experts would have been particularly appropriate.

As a result of these findings, the Safety Board made the following safety recommendations to Conoco Shipping Company, Inc.:

Amend your *Deck/Engine Procedures Manual* and *Fleet Procedures Guide* to ensure that shipmasters and chief engineers assigned to Patriot-class tank ships are aware of the potential for an engine overspeed condition, the circumstances under which this condition can occur, and its effect on vessel maneuverability. Provide the deck and engineering officers aboard these vessels with specific guidance concerning the actions to be taken to prevent a main engine overspeed condition from developing. (M-97-31)

Conduct an engineering and operational analysis of the performance of your Patriot-class tank ships when operating in a light ballast condition in heavy weather and rough seas with the objective of determining the operational actions that should be taken to ensure the safety of those vessels under such conditions. Provide the masters, deck officers, chief engineers, and engineering officers assigned to these tank ships with the training and guidance necessary to ensure that they fully understand the operational characteristics, capabilities, and limitations of Patriot-class vessels and are aware of the actions that must be taken to ensure the safety of those vessels when operating in rough seas. (M-97-32)

The circumstances of this near-grounding incident highlight the types of issues that led the International Maritime Organization (IMO) to adopt, in November 1993, the *International Safety Management Code for the Safe Operation of Ships and for Pollution Prevention* (ISM Code). The ISM Code recognizes and codifies the responsibilities of shipping company management in ensuring adherence to marine safety guidelines and environmental protection standards. According to Conoco officials, the company obtained ISM Code certification on March 13, 1997, and thus is among the first companies to become ISM certified.

The Safety Board recommended that Conoco Shipping Company:

Review the safety management system (SMS) [the company has] developed in response to requirements of the *International Safety Management Code for the Safe Operation of Ships and for Pollution Prevention* (ISM Code) and ensure that it contains provisions that will address the safety issues that were identified during this investigation. (M-97-33)

In the view of the Safety Board, the circumstances surrounding the near grounding of the *Patriot* raise serious issues of marine safety that have application not only to the specific company and vessel involved, but to the marine industry as a whole. This is particularly true in light of the fact that all ship owners and/or operators engaged in international trade will be required to develop safety management systems in response to ISM Code requirements. The National Transportation Safety Board therefore makes the following safety recommendation to the International Association of Independent Tanker Owners:

Disseminate to your members the facts and circumstances of this incident and the National Transportation Safety Board recommendations in order to assist the organization's members in the development of appropriate safety decisionmaking programs, heavy weather operations contingency plans, and safety management oversight systems in response to the requirements of the *International Safety Management Code for the Safe Operation of Ships and for Pollution Prevention* (ISM Code). (M-97-34)

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 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 recommendation in this letter. Please refer to Safety Recommendation M-97-34 in your reply. If you need additional information, you may call (202) 314-6456.

Chairman HALL, Vice Chairman FRANCIS, and Members HAMMERSCHMIDT, GOGLIA, and BLACK concurred in this recommendation.

By: 
Jim Hall
Chairman