

M-128

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: October 1, 1980

Forwarded to:
Admiral John B. Hayes
Commandant
U.S. Coast Guard
Washington, D.C. 20593

SAFETY RECOMMENDATION(S)

M-80-86 through -88

About 2140 e.s.t., on November 22, 1979, while approaching Silver Bay, Minnesota, the U.S. Great Lakes bulk cargo vessel SS FRONTENAC ran aground during a heavy snow squall on shoals extending from Pellet Island. The use of the vessel's engine, rudder, and bow thruster to free the vessel was insufficient to overcome the effects of the wind and sea. Wind and sea actions held the vessel on the shoals and eventually caused the vessel to swing around to the left while pivoting near the midship section of the hull. The vessel sustained heavy damage to the underwater hull and keel. The No. 3 cargo hold was punctured, resulting in flooding of the hold, with some progressive flooding into the No. 2 cargo hold and heavy flooding into the No. 4 cargo hold. The FRONTENAC was declared a constructive total loss since the estimated repair cost exceeded the value of the vessel. ^{1/}

About 1945, the vessel was approximately 15 miles northeast of Silver Bay. Visibility was good, the wind was northeasterly at 20 to 25 mph, and the seas were 6 to 8 feet. The vessel was riding easily with the following wind and seas; however, the master was concerned that the vessel might roll heavily when the vessel entered Silver Bay.

To assess the sea and wind conditions in the immediate vicinity of the entrance to Silver Bay, the master passed the harbor entrance. About 2045, while passing the entrance, the visibility was good and many of the harbor lights, especially the red and green lighted buoys marking the harbor entrance, could be seen clearly. The green navigation light on Pellet Island and the red navigation light on Beaver Island were not observed, but, since they were of substantially less intensity than the lights on the buoys, the master did not expect to see them at his distance of about 1 1/2 miles out.

After observing the conditions at the harbor, the master brought the vessel approximately 3 miles south-southwest of Silver Bay. He then reversed the course to return to the Silver Bay entrance and headed for a point 1/2 mile from Pellet Island. Somewhere along the 3-mile return track to Silver Bay, snow began to fall lightly. Snow had been forecast and was a common occurrence in this area at this time of year; hence, it was not unexpected, nor was it a cause for alarm to the master.

^{1/} For more detailed information, read "Marine Accident Report—Grounding of the SS FRONTENAC in Lake Superior, Silver Bay, Minnesota, November 22, 1979" (NTSB-MAR-80-13).

About 1 mile from Pellet Island, the master noticed that the navigation light on Pellet Island was extinguished. This posed no particular problem since he had observed the island on radar, and shortly afterward, he had sighted it using the searchlight, despite the presence of light snow. The green and red lighted entrance buoys continued to be clearly visible, and the various lights on shore that he had been watching to gage his forward motion were also readily seen. The master and the two mates on the bow said that they did not see the navigation light on Beaver Island.

About the same time, the master felt that he could maneuver closer to the island than the 1/2-mile distance for which he had been maneuvering even though he was aware that the Pellet Island light was extinguished. Accordingly, he ordered various courses to bring the vessel to a point about 0.2 mile from the island. When the vessel was approximately 1,000 feet southeast of Pellet Island, there was a slight increase in wind velocity, and a heavy snow squall abruptly caused Pellet Island and all lights on shore to be obscured. Moreover, the heavy snow return masked the radar screen in the vicinity of Pellet Island and the shore. The flashing green light on buoy No. 1 could still be seen, although at reduced intensity.

The master manipulated the anticlutter and intensity settings on the radar, but he could not pick up Pellet Island. He visually searched for Pellet Island and other lights or objects without any success. However, he made no effort to involve the personnel on the bow in a visual search for Pellet Island or any other specific aid. The two mates on the bow had a slight advantage over the master since their vision had not been affected by sources of light within the pilothouse, such as light from the unshielded radar, gyro repeater, telegraph, rudder angle indicator, engine rpm indicator, and an occasional white light at the chart table.

Shortly before the grounding, both mates on the bow saw the outline of Pellet Island. The chief mate saw the master standing at the port door of the pilothouse looking in the direction of Pellet Island and assumed that the master also saw the island; and he made no report to the bridge. However, it could not be determined if a report by the chief mate would have enabled the master to take sufficient action to avoid the grounding. In addition to seeing the outline of the island, the third mate also saw the structure for the Pellet Island light shortly after the vessel's initial grounding. It appears reasonable to conclude that Pellet Island would have been visible much sooner if the green navigation light on the island had been in operation and probably in time to take some effective avoiding action.

The Reserve Mining Company became aware on November 19, 1979, that the Pellet Island light was extinguished. Since it was after the mandatory maintenance period of April 15 through November 15, the Reserve Mining Company did not deem it necessary to restore the light, despite the fact that in recent years efforts have been made to extend the navigation season and ships call at Silver Bay into December and often into January. Extending the navigation season later into the winter months means that navigation must contend with more hours of darkness and greater potential for inclement weather, thus increasing significantly the need for navigation lights. The Safety Board believes that navigation lights should be maintained throughout the entire navigation season and that the Coast Guard should extend the mandatory maintenance period for private aids to navigation to cover the entire navigation season.

The master estimated that the vessel would have had to make good a course of 030° to pass through the point 0.2 mile from the Island. This estimate was based upon taking radar ranges and bearings of Pellet Island and radar ranges of the shore and by occasionally determining the vessel's position on the chart by using a pair of dividers to transcribe the radar ranges. However, the master did not plot any positions or record their times, nor did he plot any courses to steer by or determine the course being made good by the vessel.

The master was aware of the possibility of being set left of his intended position 0.2 mile off Pellet Island, and he had altered the course to 040° and finally to 050° to compensate for the current being generated by the east-northeasterly wind. He testified that he felt that the 050° course would allow the vessel to pass Pellet Island no closer than 600 feet. His estimate of the amount of course alteration to compensate for the effects of current was based upon adjusting the course, followed by observing the results on radar. Since the master did not actually plot any positions or course lines or record any times to refine his estimates, it is probable that he did not have a timely, reliable approximation of the set and drift being experienced by the vessel.

The master had little time to conduct a plot and also direct the movements of the vessel. During the approach, the master made about six trips between the radar near the window where he looked out and the chart table in the rear of the pilothouse. Each trip required using a white light to read the chart and probably consumed a minute or more of the master's time and attention. The cumulative effect of directing the vessel's movements, watching at the forward window, observing the radar, and working at the chart table resulted in a burdensome workload for one man.

There were no gyro repeaters on the bridge that could have been used to take a true visual bearing of buoy No. 1. It would have been necessary to take bearings using the bearing indicator, a hand-held pelorus-like instrument which was essentially a protractor fitted with a vane for sighting. The master would have used the instrument at the forward window since buoy No. 1 was on the port bow. Since this instrument is unlighted, it would have been necessary to use a flashlight or other external light source to read the bearing, thus, introducing another possibility for disruption of night vision. Once the angular measure of the buoy on the port bow or the relative bearing was noted, it would have been necessary to apply the bearing to the vessel's heading to determine the true bearing for plotting on the chart. This instrument is somewhat cumbersome to use since the vessel must be steady on course or the heading of the vessel must be noted simultaneously with the observation of the bearing; thus it involves the joint effort of the mate and the wheelsman. The application of the relative bearing to the vessel's true heading can be time-consuming where three or more widely separate aids are being used. Furthermore, this calculation allows for the introduction of human error. Widely separate aids may require that some bearings be taken from the front window and some from the side windows, which can introduce some elapse time between bearings and also reduce the reliability of a fix of the vessel's position. The Safety Board believes that gyro repeaters conveniently located on the bridge would greatly facilitate the taking of accurate visual bearings because true bearings can be read directly from a repeater by means of a bearing circle. When land is as close and as hazardous as the area near Pellet Island, frequent fixing of the vessel's position is essential. In this case, the vessel's bridge was ill-equipped and inadequately manned to keep track of the vessel's position.

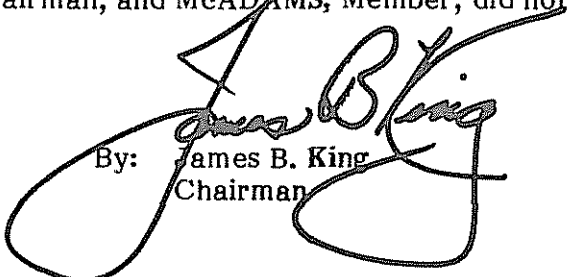
Therefore the National Transportation Safety Board recommends that the U.S. Coast Guard:

Conduct a survey of all publicly and privately maintained navigation lights in the Great Lakes area to determine which should be maintained in operation throughout the entire navigation season and amend its operating guidelines and permits for private aids accordingly. (Class II, Priority Action) (M-80-86)

Revise 33 CFR 164, Navigation Safety Regulations, to incorporate navigation watchkeeping standards which quantify the minimum manning level needed for vessels to safely navigate in ports and their approaches in the Great Lakes area during periods of reduced visibility. (Class II, Priority Action) (M-80-87)

Revise 33 CFR 164, Navigation Safety Regulations, to require each self-propelled vessel of 1,600 gross tons, or greater, operating in navigable waters of the United States, to have gyro repeaters conveniently located on the bridge and to require carrying bearing circles to facilitate the taking of visual bearings. (Class II, Priority Action) (M-80-88)

KING, Chairman, GOLDMAN, and BURSLEY, Members, concurred in these recommendations. DRIVER, Vice Chairman, and McADAMS, Member, did not participate.

By: 
James B. King
Chairman