

SP-20

Log M-279

NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C.

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Forwarded to:

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SAFETY RECOMMENDATION(S)  
M-85-48

About 1130, on July 7, 1984, the uninspected excursion vessel M/V SCITANIC was down bound on the Tennessee River, near Huntsville, Alabama, when strong winds generated by severe thunderstorm activity caused the vessel to capsize. Of the 15 passengers and 3 crewmen aboard the vessel, the crew and 4 passengers were able to escape from the capsized vessel; 11 passengers were trapped inside the vessel and drowned. The damage to the SCITANIC was estimated to be about \$65,000. <sup>1/</sup>

When the SCITANIC got underway, there were no observable signs of inclement weather. The 1000 weather forecast obtained by the captain before he departed the vessel's berth had indicated that thunderstorms could be expected in the afternoon. There were no indications in the weather forecast up to the time the vessel got underway which would have alerted a mariner to the probability of severe thunderstorm activity in the area within the hour. However, the use of one of the two portable radios located in the pilothouse to monitor the latest National Oceanic and Atmospheric Administration (NOAA) weather forecasts would appear to be a reasonable precaution for a vessel carrying passengers in an area of frequent thunderstorm activity, and where thunderstorms can build up quickly. If the captain had been monitoring the weather broadcasts, he could have learned as early as 1050 that thunderstorms could be affecting the area during the next hour. At 1050, it would have been possible for the vessel to return to its berth before the storm broke.

By the time the captain and first mate recognized that the SCITANIC would encounter a thunderstorm, the vessel was about 1.3 miles from its berth at Ditto Landing and the closest refuge. To continue to proceed down the river toward the marina would have resulted in exposing the vessel's port side with its extensive sail area to the increasingly strong westerly winds generated by the approaching thunderstorms. The captain reacted by turning the vessel to head into the wind--a maneuver which had been used successfully on several past occasions when the vessel encountered passing thunderstorms. Turning the vessel into the wind probably would have been successful on the day of the accident except for the occurrence of four microbursts, one about 1/4 mile away, which produced a sudden wind shift with exceptionally strong winds.

<sup>1/</sup> For more detailed information, read Marine Accident Report--"Capsizing of the Excursion Vessel M/V SCITANIC on the Tennessee River, near Huntsville, Alabama, July 7, 1984" (NTSB/MAR-85/05).

The microburst phenomenon first was identified as a cause for some types of wind shear in 1976. It involves a narrow downward moving column of air generally less than 2 1/2 miles (4 km) in diameter associated with the rain shower developed by a thunderstorm. The column of air is generated by the rapid evaporation of water droplets or rain within the thunderstorm. In some microbursts, known as dry microbursts, the shower evaporates before reaching the ground. The evaporative cooling causes the density of air to increase and causes the column to accelerate downward. When a microburst reaches the ground, it spreads out beneath and beyond the thunderstorm cell, causing high and often damaging winds to flow radially from the thunderstorm cell. The horizontal surface winds radiating from a thunderstorm are a vector combination of the outflow of the microburst and the motion of the thunderstorm. Consequently, the strongest winds are usually in the direction of the thunderstorm movement. Microburst winds have been estimated in some instances to exceed 100 knots.

The SCITANIC's GM exceeded the U.S. Coast Guard (USCG) criterion found at 46 CFR 170.170; it had 11 feet of GM, and only 9.7 feet would have been required had it been a vessel of usual proportions. However, the SCITANIC was not a vessel of usual proportions, and if operated under Coast Guard standards, it probably would have been required by the USCG to meet additional criteria similar to that contained in 46 CFR 170.173. Below is a comparison of the USCG requirements in 46 CFR 170.173 with the approximate righting characteristics of the SCITANIC on July 7, 1984, which indicates that the vessel did not meet all of the requirements.

	<u>SCITANIC</u>	<u>USCG Criteria 46 CFR 170.173(b)</u>	<u>USCG Criteria 46 CFR 170.173(c)</u>
Minimum angle of maximum righting arm	10°	25°	15°
Area under righting arm curve up to maximum righting arm (foot-degrees)	8	-	14

Although the calculations show that the SCITANIC met the provisions of 46 CFR 170.170 as loaded on July 7, 1984, they also show that the overturning moment of the 70-knot wind experienced by the SCITANIC would exceed its righting moment and the vessel would capsize. Also, the calculations show that the vessel probably would not have capsized at wind velocities less than 65 knots. However, if the SCITANIC had met the USCG criteria in 46 CFR 170.173, it may not have capsized.

Vessels like the SCITANIC, which have multiple passenger decks above the waterline may tend to be top heavy, and such vessels have a considerable amount of sail area. The stability of the SCITANIC could have been increased substantially by installing an additional small pontoon on each side to increase the vessel's beam. Stability also could have been increased by adding ballast weight to lower the vessel's center of gravity. If the addition of the ballast required an increase in buoyancy, this could have been provided by enclosing some of the space between pontoons to form buoyant tanks. The SCITANIC could have been safer if there had been a procedure for insuring the adequacy of its

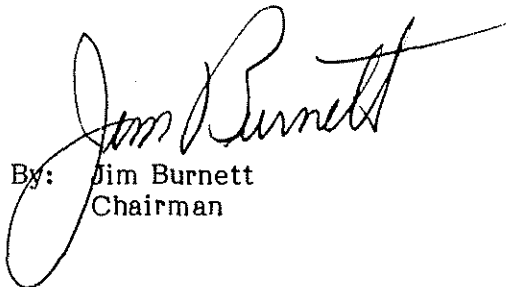
stability before it initially was placed in service. Therefore, the Safety board believes that the State of Alabama should amend its State boating law to require all vessels with more than one deck for passengers above the waterline to comply with USCG stability criteria contained in 46 CFR Subchapter S.

Because stability problems also may exist on recreational vessels registered in other States, as a result of its investigation, the National Transportation Safety Board recommends that the National Association of State Boating Law Administrators (NASBLA):

Issue national guidelines to States recommending that recreational vessels not subject to Federal jurisdiction, having two or more decks for passengers above the vessel's waterline be required by State law or regulations to meet U.S. Coast Guard stability criteria in 46 CFR Subchapter S. (Class II, Priority Action)  
(M-85-48)

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 recommendation in this letter.

BURNETT, Chairman, GOLDMAN, Vice Chairman, and BURSLEY, Member, concurred in this recommendation.



By: Jim Burnett  
Chairman