



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: December 20, 2004

In reply refer to: M-04-04

Admiral Thomas H. Collins
Commandant
U.S. Coast Guard
2100 Second Street, S.W.
Washington, D.C. 20593

On March 6, 2004, the small passenger vessel *M/V Lady D*, a 36-foot-long by 8-foot-wide enclosed pontoon water taxi, was carrying 2 crewmen and 23 passengers en route from Fort McHenry National Monument to Fells Point, Inner Harbor, Maryland, when it encountered a rapidly developing storm with high winds. Witnesses reported that the pontoon vessel began to roll in the waves. As the wind and wave intensity increased, the vessel heeled to starboard and eventually capsized. As a result of the accident, 5 passengers died, 4 passengers suffered serious injuries, and 10 passengers and 2 crewmembers sustained minor injuries.

After the accident, U.S. Coast Guard Sector–Baltimore ordered the *Lady D*'s sister vessel, the *Patricia P*, and a pontoon vessel of similar size, the *W.B. Morgan*, to cease carrying passengers until simplified stability proof tests of the vessels could be completed in accordance with Title 46 *Code of Federal Regulations* (CFR), Subchapter T. On April 14, 2004, Coast Guard inspectors conducted simplified stability proof tests on the *Patricia P* and the *W.B. Morgan* to (1) determine the maximum load each vessel could carry and (2) establish the maximum occupant capacity for each vessel. The maximum occupant capacity was defined as the number of 140-pound persons that could be carried without exceeding the vessel's maximum load.¹

¹ On September 29, 1960, the Coast Guard published regulations for simplified stability test procedures applicable to small passenger vessels carrying not more than 150 passengers. The regulations stipulated that "The weight per passenger shall be taken at 160 pounds except that on protected waters, a weight per passenger of 140 pounds may be used when the passenger load consists of men, women, and children." The allowance of an "average weight of adults and children . . . at 140 pounds" dates to the stability standards promulgated for Subchapter T vessels in October 1957, found at 46 CFR 179.01.

The *Lady D*'s certificate of inspection (COI) stipulated a maximum 25-person capacity, based on the results of a simplified stability proof test weight of 3,500 pounds and the 140-pound-per-person allowance. The accident voyage carried a total of 25 persons (14 men, 8 women, and 3 children), consistent with the COI. However, the Safety Board determined that the average occupant weight (figuring in the children's weight) was actually 168.4 pounds, 28.4 pounds per person above the weight standard. This resulted in an actual total occupancy weight of over 4,200 pounds, 700 pounds above the vessel's stability proof test weight of 3,500 pounds.

On October 4, 2004, the Coast Guard Office of Compliance issued Policy Letter 04-10 to the Officers-In-Charge, Marine Inspection, for evaluating the stability and subdivision requirements of small passenger vessels inspected under 46 CFR Subchapter T. The guidance included a job aid for Coast Guard inspectors to use when calculating stability proof tests for pontoon vessels that operate on protected waters. The job aid reinforced existing weight allowances, stating that, for purposes of testing, the weight per passenger equals 160 pounds, "except when passenger loads consist of men, women, and children," in which case a weight per passenger of 140 pounds "may be used." If the *Lady D* were operational today and had been certificated for carrying passenger loads consisting of men, women and children, the 140-pound weight allowance for passengers would remain the same.

The Safety Board is concerned that the Coast Guard is not using a realistic average occupant weight in calculating the number of people that can be safely carried on pontoon vessels. In addition to the significantly higher average weights found on the *Lady D* accident voyage, U.S. government reports show that Americans of all ages are much heavier today than when the complete rewrite of 46 CFR Part 179 ("Subdivision, Damage Stability, and Watertight Integrity") was promulgated in September 1960. In October 2004, the Centers for Disease Control and Prevention (CDC) issued the report, "Mean Body Weight, Height, and Body Mass Index, United States 1960–2002," based on data collected annually since 1960 by the CDC's National Health and Nutrition Examination Survey (NHANES) program. The report concludes that in the United States, "average weight has increased dramatically in the last 40 years with the greatest increases seen in adults." The respective weight increases are summarized in the table. Average adult weights have increased by nearly 25 pounds in the last 40 years.

Mean body weight of Americans—1960 versus 2002

Population (age)	Weight (pounds)		
	1960	2002	Increase
Men (20-74 years)	166.3	191.0	+24.7
Women (20-74 years)	140.2	164.3	+24.1
Boys (15 years)	135.5	150.3	+14.8
Girls (15 years)	124.2	134.4	+10.2
Boys (10 years)	74.2	84.9	+10.7
Girls (10 years)	77.4	88.9	+11.5

The Safety Board recently evaluated the issue of standard average passenger weight as part of its investigation of the Air Midwest flight 5481 accident in Charlotte, North Carolina, in January 2003.² The airplane crashed shortly after takeoff, killing the 2 flight crewmembers and 19 passengers on board; impact forces and a postcrash fire destroyed the aircraft. The Board determined that contributing factors in the accident included, but were not limited to, the operator's weight and balance control program (formal procedures for ensuring that an aircraft's weight and center of gravity are within the certification limits), the average weight assumptions in the Federal Aviation Administration (FAA) weight and balance program guidance, and the FAA's lack of oversight of the operator's weight and balance program. As a result of the Charlotte accident, the FAA updated its operator weight and balance guidance (Advisory Circular 120-27D) in August 2004, increasing the average adult passenger weight from 160 pounds to 174 pounds, based on summer clothing and the assumption that 50 percent of passengers are male and 50 percent female.³ The FAA based its revised weight allowance on NHANES data published in 2000. As stated in appendix 2 of the new FAA advisory circular, "The data in NHANES cover a broad spectrum of the general population, are based on a large sample size, and are not restricted geographically to a particular area."

The Coast Guard's current 140-pound-per-person weight allowance for operations on protected waters with a mix of men, women, and children does not reflect actual loading conditions. This weight allowance is not supported by recent data from the CDC and is not consistent with the FAA's 2004 update to its weight and balance guidance. Further, the Coast Guard's weight allowance significantly underestimates the total occupant weight on the accident voyage—using the 140-pound standard, the occupant load (over 4,200 pounds) on the *Lady D* accident voyage was equivalent to 30 people.⁴

Vessels operated in an overloaded condition are exposed to a higher capsizing risk. Increasing the average weight used to calculate maximum occupant capacity is one method that should more accurately reflect actual vessel loads. Alternatively, the weight of persons allowed on board could be limited to the weight resulting from the vessel's simplified stability proof test. This could be accomplished, for example, by painting a load reference line on the vessel's pontoons that could be used to limit the occupant weight,⁵ or by summing people's actual weights as they boarded the vessel.

² For additional information, see National Transportation Safety Board, *Loss of Pitch Control During Takeoff, Air Midwest Flight 5481 Raytheon (Beechcraft) 1900D, N233YV Charlotte, North Carolina, January 8, 2003*, Aviation Accident Report NTSB/AAR-04/01 (Washington, DC: NTSB, 2004).

³ See chapter 3, "Methods to Determine the Weight of Passengers and Bags," section 2, "Standard Average Weights," in Federal Aviation Administration, *Aircraft Weight and Balance Control*, Advisory Circular 120-27D (Washington, DC: U.S. Department of Transportation, 2004), pp. 21-26.

⁴ Of interest, most of the adult men and women on the *Lady D* accident voyage weighed more than 160 pounds, and 7 people weighed 200 pounds or more.

⁵ A load reference line is a line marked on the vessel's hull that shows the water level when the vessel is fully loaded.

Coast Guard data indicate that, nationwide, about 270 commercial pontoon vessels transport passengers on protected waters. At any given time, these 270 vessels have a maximum cumulative capacity of about 9,000 occupants. The Safety Board believes that, to ensure occupant safety, the Coast Guard must take immediate action to minimize the possibility that the occupant weight carried on a pontoon passenger vessel exceeds the simplified stability proof test weight.

The National Transportation Safety Board, therefore, makes the following safety recommendation to the U.S. Coast Guard:

Revise your guidance to Officers in Charge, Marine Inspection, to determine the maximum occupant capacity of small passenger pontoon vessels either (1) by dividing the vessel's simplified stability proof test weight by the per-person weight allowance for an average adult stipulated in Federal Aviation Administration Advisory Circular 120-27D (174 pounds per person, assuming summer clothing and a 50-50 gender mix), or (2) by restricting (at the time of loading) the actual cumulative weight of passengers and crew to the vessel's simplified stability proof test weight. (M-04-04)

We urge you to take action on the safety recommendation in this letter. The Safety Board would appreciate a response from you within 90 days addressing the actions you have taken or intend to take to implement our recommendation. Please refer to Safety Recommendation M-04-04 in your reply. If you need additional information, you may call (202) 314-6177.

Chairman ENGLEMAN CONNERS, Vice Chairman ROSENKER, and Members CARMODY, HEALING, and HERSMAN concurred in this recommendation.

By: Ellen Engleman Connors
Chairman