

Log 308-A

NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C.

ISSUED: JAN 15 1986

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Forwarded to:  
  
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SAFETY RECOMMENDATION(S)  
M-85-122

About 2230 on November 17, 1984, the U.S. tug M/V CELTIC and the barge CAPE RACE, which was secured to the tug's starboard side, suddenly sank in Long Island Sound, Connecticut, resulting in the loss of both vessels and the loss of the tug's six-man crew. The tug and the barge, loaded with scrap iron, were en route from Bridgeport, Connecticut, to Port Newark, New Jersey, and were about 6 miles south of Norwalk, Connecticut, at the time of the accident. The value of the two vessels and cargo was estimated to be about \$500,000. 1/

The most probable explanation of the sinking is that the CAPE RACE, which was loaded to a safe freeboard, sustained a hull failure resulting in an opening in the underwater hull. The barge probably took sufficient water forward to plunge the bow underwater, resulting in critical downflooding into the cargo compartment through holes in the coaming, and to sink bow first; as the barge sank it pulled the tug underwater with it.

A few days before the accident a small leak had been discovered in the forward rake of the CAPE RACE, and it had been repaired temporarily with a wooden plug. The leak probably had nothing to do with the accident, since it was a small hole. Also, the compartment had been found to be free of excess water approximately 24 hours after the plug was installed, indicating that the plug was holding securely. It could not be determined if this hole was the result of recent damage or wastage.

A review of television recordings made of the underwater wreckage revealed that except for a horizontal 8-foot-long crack near midships on the port side, all damage appeared to have been caused by the barge striking the bottom. It could not be determined if the crack had occurred before the accident. The crack may have been an old tear that had been repaired, but opened up when the barge struck the bottom. Because of its location the original tear probably was not a structural failure, but probably was instead a tear caused by the barge rubbing against a sharp projection on a pier or possibly on another barge. It does not appear likely that the modest amount of load in the barge of 1,400 tons as compared to its design capacity of 2,050 tons or the mild sea conditions would have caused a crack in this location or any other location to open before the sinking.

1/ For more detailed information, read Marine Accident Report--"Sinking of the U.S. Tug M/V CELTIC and Barge CAPE RACE, Long Island Sound, Connecticut, November 17, 1984" (NTSB/MAR-85/12).

The material condition of the CAPE RACE probably was comparable to that of the barge's sister barges CAPE BORER and HERBERT E. SMITH, which had suffered considerable deterioration in the double bottoms, including the transverse framing that maintains the shape of the bottom shell plating against the force of buoyancy. When the CAPE RACE was drydocked in October 1984, it did not have a dent in the bottom as was observed in the bottom of the HERBERT E. SMITH. The CAPE RACE had a leaking problem when it was drydocked and building up of the midships butt weld, where the leak was located, was attempted in order to restore the weld and to stop the leak. When welding could not be accomplished because wastage had reduced the thickness of the metal adjacent to the weld, the owner decided to have a 1-foot-wide, 36-foot-long doubler plate welded onto the bottom to cover the weld. The sections of doubler plate were attached using only a fillet weld on each side of the plate. A doubler plate attached to the hull with fillet welds provides very little additional strength to the hull. Further, it is possible that some undercutting into the bottom plate of the barge occurred as the welding was performed, and undercutting could have resulted in cracks forming in the bottom plate of the barge. In addition to the potential for undercutting in the bottom plate, a doubler plate creates an area of stress concentration that may induce a fracture in a wasted or thin plate. Installation of the doubler plate to stop the water leak may have weakened the bottom structure of the barge.

The long interval from 1974 to 1984 between drydockings, when there was no periodic repainting of the bottom or replacement of the zinc anodes, probably contributed significantly to the wastage of the welds in the bottom of the CAPE RACE and the plate adjacent to the weld that had become too thin to weld. Concurrent with the deterioration of the bottom plating, there was probably severe wastage in the transverse framing in the double bottoms since this condition was observed in the CAPE BORER and HERBERT E. SMITH. Deterioration of the frames in the double-bottom area would have resulted in unequal stress on the bottom plating, probably allowing some of the plating to be buckled upward by the force of buoyancy and to undergo tension when the barge was loaded. Tension and buckling in the vicinity of doubler plates, weak welds, thin plates, or cracks can lead to major fractures. Calculations indicated that the amount of flooding to reduce the forward freeboard to zero in about 2 1/2 hours would have required an opening in the bottom of about 1 square foot in area, which could have resulted from a fracture 1 inch wide and several feet long. The Safety Board concludes that such a fracture probably occurred in the bottom shell plating of the CAPE RACE, considering the installation of a doubler plate across the entire bottom, the probability of other weak butt welds, and deteriorated internal structure.

In order for a steel vessel like the CAPE RACE to withstand the corrosive effects of salt water, its hull must be protected by the periodic application of anticorrosion paint or coatings and the vessel's hull also must be provided with cathodic protection such as by zinc anodes attached to the underwater hull. Similarly, the internal structure should be protected by paint or appropriate coatings. The Safety Board believes that the lack of maintenance over the past several years allowed the CAPE RACE to deteriorate to such a poor material condition that massive hull failure was probable almost anywhere in its under water hull, and that similar hull failures in sister barges involved in carrying scrap iron, such as the HERBERT E. SMITH and CAPE BORER, are also possible. The deteriorated condition of these three barges could occur since such barges are not required to be inspected by the U. S. Coast Guard (USCG) and therefore are not required to comply with any regulations regarding drydocking and repairs. In contrast to the protracted docking interval of 10 years for the CAPE RACE, barges such as tank barges, which are subject to USCG regulations, must be drydocked and inspected every 2 to 3 years. If the CAPE RACE had been subject to USCG regulations, the use of a doubler

plate to stop a leak in a wasted weld in the bottom plating would not have been permitted. Established USCG practice is to cut out the wasted portion of the plate and install an insert or replacement plate.

The scrap iron trade constitutes arduous employment for a barge, particularly for an old barge that is not well maintained. The loading and unloading of scrap iron through the use of large grapples results in dents and holes. The dropping of large loads from a grapple or an electromagnet also results in dents and holes as well as cracks in the hull. Rather than bear the cost of continually repairing all holes and cracks as they occur, some owners defer some repairs and concentrate on those repairs essential to keeping the barge afloat. Repairs often are accomplished as cheaply as possible, without full regard to the ultimate strength or condition of the vessel. Since there are no minimum standards or any regulations that cargo barges on inland waters must meet, the condition of barges can vary greatly depending upon the maintenance policy of the owner and the trade in which the barges are employed. In particular, the condition of some scrap barges can be very poor, as disclosed by this investigation, and they can pose a danger to the tugs and crews involved in towing them. Also, open sounding holes in the main deck, lack of handrails in certain areas, and deteriorated wooden walking platforms in the rake compartments pose hazards to personnel who routinely must come onboard to take soundings or make repairs.

Since the owner of the CAPE RACE has other barges that need substantial repairs, the Safety Board believes that the owner should obtain a survey to determine what must be done to the barges to ensure that they have watertight compartmentation and are in a material condition adequate to the type of service in which they are engaged, and that the owner should implement a maintenance program to accomplish the necessary improvements. Further, the plan should provide for a continuing maintenance program designed to keep the barges in safe operating condition.

Therefore, the National Transportation Safety Board recommends that the M. J. Rudolph Corporation:

Survey the barges in its fleet, and implement a maintenance program to ensure that the barges have watertight compartmentation and are in a material condition adequate to the type of service in which they are engaged. (Class II, Priority Action) (M-85-122)

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. Please refer to Safety Recommendation M-85-122 in your reply.

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

  
By: Jim Burnett  
Chairman