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NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C.

ISSUED: October 16, 1985

Forwarded to:

Lloyd's Leasing Limited  
57 Southmark Street  
London SE1 1SH  
England

SAFETY RECOMMENDATION(S)

M-85-97

On July 30, 1984, the 689-foot-long United Kingdom tankship ALVENUS, owned by Lloyd's Leasing Limited of London, England, was delivering 53,616 metric tons of crude oil from Venezuela to the Continental Oil Company (CONOCO) at Lake Charles, Louisiana. About 0200 on July 30, 1984, the master of the ALVENUS went to the bridge as the vessel approached the entrance fairway to Lake Charles. About 0930, the master took full navigational control from the officer of the watch as the vessel prepared to pick up a Calcasieu Ship Channel pilot at the entrance buoy to the Calcasieu Ship Channel. It was a clear but hazy day with 10- to 20-knot winds from the southeast and 3- to 5-foot seas. 1/

The master stated that he had been instructed by the owners of the ALVENUS and by CONOCO to arrive in Lake Charles with the ship at an even keel fresh water draft of 40 feet. Upon leaving Venezuela, the chief mate had calculated the arrival draft to be 40 feet even keel in fresh water and a mean draft of 39 feet 3 inches in salt water.

With no other traffic in the channel, the ALVENUS proceeded in the center of the channel passing buoy 8 at 1209 and buoys 15 and 16 at 1227. At this time, the master had gone below to his office, leaving the second mate as officer of the watch. The helmsman was steering, and a lookout was posted on the starboard bridge wing. The master stated that, about 1235, as the ALVENUS was passing buoys 19 and 20, "The vessel smoothly but quickly decelerated." Neither the pilot nor any crewmember felt or heard anything indicating to them that the vessel had grounded. However, the main deck and side plating in the way of the No. 2 port, starboard, and center tanks buckled and fractured, and the pilot and crew could see oil spewing onto the main deck and gushing out the sides of the tankship.

As the ALVENUS proceeded through the Calcasieu Ship Channel at 95 rpm, it would have experienced a phenomenon known as squat (sinkage and alteration of trim). As a vessel's speed is increased, the vessel's hull sinks deeper in the water. This sinkage is caused in part by the increase in relative velocity of the water as it flows under the vessel, and in part by the interaction of the bow and stern wave systems. Depending on

1/ For more detailed information read Marine Accident/Incident Summary Report--"United Kingdom Tankship ALVENUS, Gulf of Mexico, July 30, 1984" (NTSB/MAR-85/02/SUM).

the hull's form, a vessel may trim by the bow or by the stern. A conventional tankship, such as the ALVENUS, normally would trim by the bow. Sinkage and alteration of trim increases in shallow water where the proximity of the bottom causes increased relative velocity as the water flows under the vessel, and the bow and stern waves are more pronounced.

In recent years, there have been numerous reports and studies regarding the minimum bottom (or underkeel) clearance necessary for the safe navigation of vessels in restricted waters. A 1983 report <sup>2/</sup> showed that a tankship of similar dimensions to the ALVENUS would experience about 4.5 feet of squat at 9.5 knots while inbound in the Calcasieu Ship Channel south of Cameron, Louisiana. With the maximum draft of the ALVENUS (39 feet 9 inches) already exceeding the minimum channel depth (39 feet) recorded by the U.S. Army Corps of Engineers in the area where the tankship grounded, the sinkage and forward trim produced by the speed of the ALVENUS would have resulted in the vessel touching bottom and severe grounding forces. Even had the ALVENUS been operated at a slower speed, it still may have grounded but probably without the resulting massive structural damage and pollution. At a slower speed, squat would have been reduced and the soft channel bottom may not have inflicted any major damage. However, with almost 62,000 tons moving at about 10 knots, the resulting grounding caused large compressive fractures in the main deck and upper side plating even though the bottom plating showed no damage. If the ALVENUS had been operated at a slower speed or at a lesser draft, or at a combination of slower speed and less draft, it might not have had the massive structural failure.

Although the master was using National Oceanic and Atmospheric Administration (NOAA) chart 11347, dated July 30, 1983, which indicated that the controlling depth for the channel south of Cameron was 34 feet below mean low water for the Gulf of Mexico (MLG), he relied on the local knowledge of the pilot that a 40-foot draft was safe without questioning the pilot about actual bottom clearances along the length of the channel. The Safety Board believes that the master should have reviewed with the pilot the minimum bottom clearances in the Calcasieu Ship Channel, including the water level above MLG, during the transit of the channel and that he should have discussed with the pilot safe speeds for areas where the depth of water may have been less than 40 feet.

Since the owners of the ALVENUS instructed the master to arrive at the Calcasieu Ship Channel with a fresh water draft of 40 feet, even with the favorable tide condition, the ALVENUS would have experienced zero bottom clearance in portions of the channel. The owners of the ALVENUS should have allowed some bottom clearance for the effects of squat in their instructions to the master who was, for the first time, taking the fully loaded ALVENUS into any port.

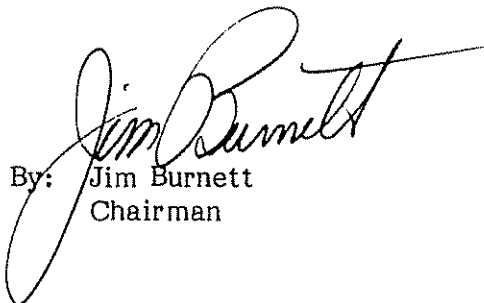
Therefore, the National Transportation Safety Board recommends that Lloyd's Leasing Limited:

Establish minimum bottom clearances for your vessels, and instruct masters to consult with the local pilots concerning actual bottom clearances in channels and, whenever the bottom clearance in a channel is below the prescribed minimums, to proceed at reduced speeds.  
(Class II, Priority Action) (M-85-97)

<sup>2/</sup> Marine Board, Commission on Engineering and Technical Systems, National Research Council, "Criteria for the Depths of Dredged Navigational Channels," 1983.

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.

A handwritten signature in black ink, appearing to read "Jim Burnett", with a long, sweeping horizontal stroke extending to the right.

By: Jim Burnett  
Chairman