

MARINE OCCURRENCE REPORT

PARTIAL LOSS OF TIMBER DECK CARGO

BARGE "OCEAN HAULER"
CARLETON, QUEBEC
07 NOVEMBER 1996

REPORT NUMBER M96L0131

The Transportation Safety Board of Canada (TSB) investigated this occurrence for the purpose of advancing transportation safety. It is not the function of the Board to assign fault or determine civil or criminal liability.

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Summary

On 07 November 1996 the "OCEAN HAULER" was secured starboard side to the dock at Carleton, Quebec, discharging a cargo of pulpwood mainly from the barge's starboard side. After the barge had developed a list to port, about 400 cords of pulpwood fell from the port side of the stow into the water. The barge became upright and rolled quickly to starboard when a further 400 cords fell from the barge onto the dock. No one was injured and there was no pollution.

Other Factual Information

Particulars of the Barge

Name	"OCEAN HAULER"
Official Number	817048
Registered	Canada
Type	Barge
Length O.A.	97.5 m
Beam	20.7 m
Crew	None
Cargo	5,594 tons
Propulsion	None
Owners	McKeil Marine Ltd., Hamilton, Ontario
Charterers	Produits forestiers Anticosti Inc., Sherbrooke, Quebec

Barge Description

The "OCEAN HAULER" is a deck cargo-carrying barge of all-welded steel construction, with a raked transom stern and a modified spoon-shaped bow. The hull is sub-divided by eight transverse and two longitudinal bulkheads, forming 21 watertight compartments, together with separate fore and after peak spaces. Steel bulwarks inboard of the hull sides and extending to within 4.6 m and 6.0 m of the bow and stern respectively, form the boundaries of a cargo box on the main deck, some 87 m long and 18 m wide.

The barge is a conversion. It was built from the redundant mid-body hull of a standard T2-type tanker. The moulded depth of the tanker hull was reduced to 7.3 m, and the steel main deck re-attached.

Due to the heavier steel construction of the original tanker hull, the barge's lightship weight of 1,738 tons is significantly higher than that of barges of similar overall dimensions of conventional construction. Consequently the maximum carrying capacity of the "OCEAN HAULER" is proportionately lower than that of a conventional barge.

Regulatory and Inspection Requirements

As an unmanned barge not engaged in the carriage of pollutants, the "OCEAN HAULER" is not subject to inspection by Transport Canada, Marine Safety, nor required to comply with any Canadian Coast Guard (CCG) regulatory (Interim) stability requirements. Furthermore, the service in which the barge was employed at the time of the occurrence was such that an assigned load line was not required.

¹ Tons are long tons of 2,240 lbs, except where otherwise stated.

Background

The president of Produits forestiers Anticosti Inc. has had 48 years' experience in the forestry business and has shipped timber products from Anticosti on and off for approximately 24 years.

The barge "OCEAN HAULER" and the tug "JERRY NEWBERRY" were bareboat chartered to haul pulpwood from Port-Menier, Anticosti Island, to Cacouna and Carleton. Two voyages to Cacouna were uneventful when pulpwood cargos of 5,600 tons and 6,102 tons, respectively, were carried.

The owners of "OCEAN HAULER" supplied the charterer with a sheet of technical specifications and an outline drawing indicating the principal dimensions of the barge, on which is quoted "Capacity 10,000 tons." The charterer assumed that, as his product was declared, the entire capacity could be loaded/transported on deck. It is, however, unclear whether that capacity is on deck, or in the 21 underdeck tanks, or a combination of both. Furthermore, while deadweight tonnages specified on the sheet of technical information are given in "Short Tons" the type of ton in "Capacity 10,000 tons" is not specified.

Deck Cargo Loading and Distribution

The barge was loaded at Port-Menier by staff employed by the charterer. The skipper of the tug had requested a trim by the stern of 0.6m prior to departing Port-Menier when the intention was to load 6,900 tons of pulpwood. This amount of cargo was not loaded due to the depth of water at the dock at Port-Menier which was calculated to be approximately 5.5 m. Loading was stopped when the after draught of the barge was approximately 5.18 m. Bill of Lading details recorded prior to departure from Port-Menier, show the barge to have been loaded with 5,594 tons (5,684,940 kg) of pulpwood, cut in lengths of 2.7 m.

Reportedly, the longitudinal distribution within the cargo box was such that the maximum height of the timber was some 10 m above the main deck, and the foremost end sloped downward toward the top of the athwartships forward boundary of the cargo box.

The deck cargo stowage on departure was such that all the 2.7 m lengths of pulpwood at the outboard sides were arranged in an athwartships direction, with the remainder aligned fore-and-aft. Vertical steel retaining stanchions and wire rope lashings were not used to secure the deck cargo. Reportedly, on departure, the upper layers of the athwartships-oriented pulpwood protruded beyond the port side boundary of the cargo box.

Departure Trim and Stability

Observations taken shortly before departure showed forward and after draughts of 3.96 m and 5.18 m respectively, and that the barge was virtually upright. There is no evidence to suggest that the barge was not afloat at all times.

² A ton of 2,000 lbs.

Based on the recorded trim and cargo deadweight, and the reported cargo distribution, lightship weight, and absence of any significant amount of bilge water, the barge had positive initial transverse stability on departure, with a metacentric height (Gmt) of approximately 1.0 m. Furthermore, the transverse stability was such that in static calm water conditions and with a secure deck cargo, a maximum righting lever of 0.4 m was attained at 24 degrees of heel, and the range of positive stability was approximately 30 degrees.

While the "OCEAN HAULER" was not required to comply with STAB 8 (Interim Standard for the Intact Stability of Unmanned Barges) of the CCG Stability, Subdivision and Load Line Standards, her transverse stability characteristics on departure exceeded the minimum criteria.

The Discharge Operation

The skipper of the "JERRY NEWBERRY" took into account the protruding stow on the port side of the barge and the fact that there were people on the wharf at Carleton when he decided to put the barge starboard side to the dock.

The barge was discharged at Carleton by staff employed by the charterer. The skipper of "JERRY NEWBERRY", watching the discharge operation, saw that the barge was developing a port list and warned the discharging crew. That advice was disregarded, as were two further warnings. At approximately 0830, 400 cords of pulpwood broke free of the stow on the port side and fell into the water.

Weather

The weather at the time of the incident was fine with south-east winds of 10 knots.

Most Likely Occurrence Sequence

Reportedly, some 240 tons of pulpwood was discharged onto six trucks during the 45 minutes before the occurrence; it was removed from the top of the deck cargo on the starboard side of the barge by two cranes located on the wharf. A third crane, located on board the barge, was mainly employed in transferring deck cargo from port to starboard, and replacing it within the operational lifting outreach of the unloading cranes on the wharf.

Because the rate of discharge maintained by the two shore side cranes was greater than that of the single crane onboard the barge, the resultant athwartships weight imbalance initiated a steadily increasing heel to port.

It is most likely that a relatively small quantity of unsecured cargo then shifted to port and induced the sudden roll and discharge of deck cargo from that side. The subsequent compensatory roll toward the wharf then caused the discharge of the unsecured cargo from the starboard side. Such a sequence is consistent with the events reported by those engaged in the unloading operation.

³ All times are EST (Coordinated Universal Time (UTC) minus five hours) unless otherwise stated.

Analysis

Transverse Stability

Consideration of the reported distribution of the deck cargo and the barge's virtually upright condition observed on departure, shows that the heeling effect due to the pulpwood protruding over the port side of the cargo box was counter-balanced by some asymmetric loading to starboard within the cargo box boundaries.

Removal of a significant asymmetric load from the starboard side without a concurrent compensatory reduction on the port side would cause the barge to heel to port. Without careful co-ordination of the rates of cargo discharge during unloading operations, the occurrence of transitory athwartships weight imbalances would cause the barge to heel and/or roll.

Calculations show that a static imbalance of some 240 tons from the starboard side would cause a permanent heel to port of some 11.5 degrees. However, were a significant imbalance to suddenly occur, the dynamic effect would cause the barge to roll to markedly greater angles than static calculations show. The momentum of such rolling could cause the then broken stow of the fore-and-aft-oriented deck cargo to shift to port—greatly augmenting the roll angle and causing a large quantity of the unsecured pulpwood on the port side to suddenly self-discharge.

The sudden discharge of deck cargo from the port side would result in a marked weight imbalance to starboard, and the subsequent compensatory roll to that side would cause the athwartships-oriented and unsecured pulpwood on the outboard starboard side of the deck cargo to discharge onto the wharf.

Findings

1. No stability, cargo deadweight scale, or deck loading details were provided for the guidance of the barge/tug operators.
2. Barge technical specifications provided for the information and guidance of the operators were inadequate and misleading.
3. The pulpwood deck cargo, loaded to a height of some 10 m, was unsecured.
4. The absence of retaining stanchions and securing wires, in conjunction with the athwartships orientation of the outboard sides of the pulpwood, made the deck cargo highly vulnerable to shifting at relatively small heel or roll angles.
5. The loaded barge was upright on departure, with positive initial transverse stability and an adequate range of stability—provided that the deck cargo remained in its (unsecured) stowed position.
6. The deck cargo unloading sequence was inadequately planned, co-ordinated and monitored.

Causes and Contributing Factors

Although the barge had positive initial transverse stability prior to departure from Anticosti Island, during its passage across the Gulf of St. Lawrence and on arrival at Carleton, an imbalance of weights in the timber deck cargo caused by the discharge operation initiated the sequence of events which led to the violent self-discharge of some of the cargo from both the port and starboard sides of the stow. Contributing factors were that the stowage of the unsecured deck cargo made it vulnerable to shifting at relatively small angles of roll or heel, the unloading sequence was inadequately planned, co-ordinated and monitored, and the barge technical specifications provided for the information and guidance of the operators were inadequate and misleading.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board, consisting of Chairperson Benoît Bouchard, and members Maurice Harquail, Charles Simpson and W.A. Tadros, authorized the release of this report on 02 April 1998.