

MARINE OCCURRENCE REPORT

COLLISION

BETWEEN

THE GENERAL CARGO VESSEL "MALLARD" AND
THE BULK CARRIER "CANADIAN ENTERPRISE"
BELOW LOCK NO. 1, PORT WELLER, ONTARIO
25 NOVEMBER 1996

REPORT NUMBER M96C0088

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.

Marine Occurrence Report

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Between

The General Cargo Vessel "Mallard" and
the Bulk Carrier "Canadian Enterprise"
Below Lock No.1, Port Weller, Ontario
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Summary

The "Mallard" was inbound for Lock No. 1, Welland Canal and was landing at slow speed on the northernmost section of the tie-up wall. The vessel was still making headway when she came bodily alongside the wall. When the vessel's stern became subject to bank suction and was drawn towards the wall, the bow swung to port across the channel. A few minutes earlier, the "Canadian Enterprise" had departed Lock No. 1 outbound and was keeping to the east of the centre line of the channel. As the bow of the "Mallard" swung across the channel towards the "Canadian Enterprise", measures to avoid collision were taken by both vessels but the port bow of the "Mallard" struck the port side of the "Canadian Enterprise". No one was injured but both vessels were damaged. There was no pollution.

Ce rapport est également disponible en français.

Other Factual Information

	"Mallard"	"Canadian Enterprise"
Port of Registry	Limassol	Toronto
Flag	Cyprus	Canada
Registry/Licence Number	709430	391204
Type	General Cargo/ Bulk Carrier	Bulk Carrier
Gross Tonnage	10,999	23,394.5
Length	146.08m: Beam 22.89m	220.63m: Beam 29.17m
Draught	F: 7.5 A: 7.0	F: 7.9, A: 7.92m
Built	1977, Kochi Japan	1979, Port Weller, Canada
Propulsion	Motor - 5884 kW , fixed - pitch propeller	Motor - 6476 kW, controllable pitch propeller
Number of Crew	25	24
Number of Passengers	None	None
Registered Owner	Assent Shipping Co. Ltd., Limassol, Cyprus.	Upper Lakes Shipping Ltd., Toronto, Ontario.

On both vessels, the bridge, accommodation and machinery spaces are located aft.

The Occurrence

At approximately 0830, with a Canadian pilot on board, the "Mallard" had weighed anchor and departed her Lake Ontario anchorage. She was well underway and inbound for Port Weller piers at 0830. At 0835 the "Canadian Enterprise" departed outbound from Lock No. 1 of the Welland Canal. At 0841 there was a brief Very High Frequency (VHF) radio communication between the vessels in which the vessels' positions were given. The "Mallard, now in the canal zone," was abeam of the Canadian Coast Guard station and the "Canadian Enterprise" was halfway out of Lock No. 1.

The "Canadian Enterprise" was steering towards the southern knuckle of wharf No.1. This course would take the "Canadian Enterprise" toward the starboard side of the approach channel and give the up-bound "Mallard" adequate sea room. At 0848, in a VHF radio call, the "Mallard" informed the "Canadian Enterprise" that she was a ship's length (about 150m) from the northernmost part of the approach wall at Lock No. 1. The meeting

¹ Units of measurement in this report conform to International Maritime Organization (IMO) standards or, where there is no such standard, are expressed in the International System (SI) of units.

² All times are EST (Coordinated Universal Time minus 5 hours).

of the two vessels in this area is described by the Seaway and Pilotage as a passing entry. The inbound vessel slides along the approach wall with her bow angled approximately 10 to 15 degrees towards the wall, preventing stern suction by keeping the stern off the approach wall. At the time of passing, this angle must be significantly reduced because of the narrow canal section. The outbound vessel passes close by at slow speed to lessen hydrodynamic interaction between the vessels.

At approximately 0851, the bridge team of the "Mallard" observed that the vessel came up against the approach wall while going ahead at a slow speed. The engine was turning dead slow astern to cant the bow to starboard. The engine was then stopped, but the vessel came up bodily against the wall. At this time the Global Positioning System (GPS) indicated a headway of 3.0 to 3.5 knots. Steerage way can be maintained down to a speed of 3.5 knots. Reportedly, in an attempt to bring the bow back to the wall, the pilot put the engine controls to Dead Slow Ahead, to Half Ahead and to Full Ahead in quick succession for periods of 10 to 15 seconds, with the rudder hard-to-starboard. The pilot realized that the engine movements ahead, with the rudder hard-to-starboard, were not successful in regaining steering and he put the engine Full Astern. At this point the vessels were about 220m apart.

At 0854 the pilot of the "Mallard" pilot broadcast by VHF radio that the vessel's stern 'was sucking the wall'.

According to observers on board the "Canadian Enterprise", the "Mallard" appeared to have considerable headway when she landed on the approach wall. The bow of the "Mallard" was seen to come fairly quickly off the wall after the initial landing and start to swing across the canal. Based upon the observations of the bridge team of the "Canadian Enterprise", the lock personnel and information retrieved after the occurrence from the Differential Global Positioning System (DGPS) component of the vessel's Electronic Chart Display and Information System (ECDIS), the vessel was to the east of the centre line of the canal at this time. In this area, the canal is about 88m wide.

The master of the "Canadian Enterprise" responded to the VHF call made by pilot of the "Mallard" and asked if the pilot could stop his vessel. The pilot informed him that he could not.

The engine controls of the "Canadian Enterprise" were ordered to full speed astern, the general alarm was sounded and a warning broadcast by the vessel's public address system for personnel to clear (leave) the vessel's port side.

At 0855, with her stern against the western approach wall, the bow of the "Mallard" struck the "Canadian Enterprise" in way of hatch No. 2. The bow flare of the "Mallard" rode over the sheer strake of the "Canadian Enterprise", shearing off vents, sounding pipes, stanchions and a panama fairlead which was dragged aft and forced the accommodation ladder away from its mountings. The "Mallard" suffered less damage. Just forward of the collision bulkhead, one metre below the forecastle deck, her bow plating sustained a horizontal cut about 3m long by 15cm wide. In addition, shell plating was indented for 3m forward and 2m aft of the cut.

The collision occurred approximately abeam of the Limit of Approach sign No.3 (L/A 3) at an angle of about 20 degrees. The estimated speed of the "Mallard" was about 3 knots.

The "Mallard" separated briefly from the "Canadian Enterprise" but her bow again made contact with the accommodation area of the other vessel. This second contact caused extensive indentation and abrasion and buckled shell plates in way of the portholes. The pilot then asked the master of the "Mallard" to drop the starboard anchor. About half a shackle of cable was let go to help to control, to stop and to prevent the vessel's bow from swinging further to port and pushing the stern of the "Canadian Enterprise" towards the side of the channel. Except for emergencies, Seaway regulations prohibit anchoring in this area. The master of the "Canadian Enterprise" employed that vessel's bow thruster to advantage to minimize the damage to both vessels and to keep his vessel in the channel. Reportedly, no one was injured on either vessel.

The "Canadian Enterprise" proceeded to the western approach wall and made fast to assess the damage caused to her by the collision. Repairs were made to the satisfaction of the vessel's classification society. The vessel resumed her voyage to Port Cartier at about 1715 the same day.

After a brief inspection, the "Mallard" was allowed by Seaway Welland to transit the locks to Port Colborne, to effect repairs. Further examination of the "Mallard" indicated no rudder or propeller damage which could have affected her ability to manoeuvre. The "Mallard" marginally passed the steering test with a cycle time of 27 seconds in still water conditions with 2 steering engines on. The Seaway maximum time allowance is 28 seconds. According to the pilots who handled the vessel, at dead slow and slow ahead the vessel's response to the helm was poor. The pilots reported that the "Mallard" was a difficult and cumbersome vessel to handle and attributed this to her large beam to length ratio, trim by the head, and slow steering response.

The pilot who was on board at the time of the occurrence was relieved by a pilot who had 18 years experience in the Welland Canal, but he too experienced difficulty in maintaining the vessel's directional stability.

When the "Mallard" was leaving lock No. 7, the vessel sheered to port but there was room to recover. When approaching lock No. 8, the pilot requested that the flow of water over the weir just below the lock be shut off. To maintain control during the approach to the east wall below lock No. 8, the rudder was hard-to-port and the engines were turning full ahead. There was little margin for error.

The Welland Canal engineering branch confirmed that the amount of water flowing over the weir beside Lock No. 1 was normal and that it was unlikely that the flow contributed to the loss of control of the "Mallard".

The Environment Canada Ontario Climate Centre provided information recorded by the automatic weather monitoring equipment at Port Weller Piers at the time of the occurrence. The wind speed recorded varied between zero and five knots. At the time of her departure from the anchorage, those on board the "Mallard" recorded the wind as being NE at 10 to 15 knots. The weather was clear and the visibility was good.

Passing entries are common in the Welland Canal. Apart from minor occurrences where ships have brushed against each other, no similar occurrence has taken place in this area of the canal.

Personnel Information

The master of the "Canadian Enterprise" is the holder of a CN1 certificate. He has served as master with the ULS Corporation for approximately 13 years.

The pilot joined the District II pilotage (Welland Canal area) in August of 1996. Previously he had several years experience as master of bulk carriers trading in the Great Lakes and bulk carriers engaged in deep sea trading. The pilot holds a GLPA District 2 Pilotage Licence as well as a Master Mariner's Certificate of Competency.

At the time of the occurrence the pilot was suffering from Bell's Palsy which affected a facial nerve and the muscles in the right side of his face controlling eyelid movement. When he was not working, he kept a patch over the eye for protection. When he was working, he wore clear, non-prescription glasses.

To alleviate the condition, the pilot had been prescribed medication and an eye lubricant. Three days before the occurrence he finished a course of medication to reduce nerve inflammation. The medication is basically a steroid which is prescribed for a limited period (about three weeks) to reduce side-effects such as an increase in blood pressure.

The eye lubricant is an isotonic solution, used to keep the eyeball moist. Its use may cause blurred vision, however medical opinion varies on for how long the "blurring" continues after use, estimates vary from two to fifteen minutes. Medical opinion stated that once the 'blurring effect' had subsided there would have been no loss in visual depth perception and thus would not have affected the pilot's skills. The pilot stated that his use of another non-prescription topical eye medication did not affect his vision or depth perception.

The pilot was observed to lubricate his eyeball at an interval of several minutes to 10 minutes before the occurrence, the interval depending on the estimates of the observers at interview.

The pilot was adequately rested before commencing his assignment.

Analysis

The pilots interviewed reported that the "Mallard" was a cumbersome and difficult vessel to handle. While the pilot of the "Mallard" had considerable experience of Great Lakes vessels, he had relatively limited seaway experience of the handling characteristics of conventional ocean-going vessels.

Although the pilots who had piloted the "Mallard" attributed the difficulties experienced in handling the vessel to her beam to length ratio, the ratio is usual for sea-going vessels of similar size. Other factors, such as rudder type and size, block co-efficient and under keel clearance also affect steering. On an even keel, the "Mallard", like many full-bodied ships, does not have the same handling characteristics as vessels designed for Seaway service which are proportionally longer. Handling can be significantly improved by trimming the vessel by the stern but because the vessel was at near- maximum Seaway draught and trimmed by the head, this was not an option available to the master.

The hard-over position of the rudders of sea-going vessels is normally 35 degrees and of Great Lakes vessels is about 45 degrees. While not all of this increased steering potential is proportionally useful, this difference, combined with a slower response in manoeuvrability may further explain some of the pilot's difficulties.

The speed of approach of the "Mallard" to the approach wall (3kts) was below the minimum (3.5 kts) at which steerage way could be theoretically maintained. Even when a vessel has directional stability it is difficult to steer if she is allowed to come alongside the wall bodily. The angle of approach to the lock wall, must be maintained to avoid the loss of control until judgement by the pilot or master dictates that the angle needs to be reduced to meet another vessel safely in the narrow canal section.

Due to transverse thrust, a vessel with a right-handed propeller turning ahead has a natural tendency to cant her stern to starboard. When the "Mallard" came bodily alongside the wall, the water displaced by the propeller between her stern and the wall aggravated this tendency and drew the stern further towards the wall. As the vessel's speed (engine revolutions) was increased so did the bank suction effect - to the point where hard-to-starboard rudder was applied. The stern of the "Mallard" was observed to remain close to the lock approach wall and the helm applied had little or no effect on the vessel's heading or in preventing her bow from turning out into the channel towards the "Canadian Enterprise".

At this point, the pilot's options to regain control of the vessel were limited. Despite the stern's proximity to the approach wall, the engine was ordered full astern. This manoeuvre would normally cause the vessel's stern to cant to port and start to reduce headway, however the vessel's stern was already being drawn towards the approach wall and there was insufficient time for the propeller to 'bite' and counter the bank-suction. Because of the cavitation at the stern and the bank suction effect, this manoeuvre was unsuccessful in avoiding collision but it may have reduced the collision's severity.

The angle of collision would appear to have been nearer to 20 degrees rather than the 30 degrees estimated, given the length and positioning of the vessels in the narrow channel.

The area of the collision was in close proximity to a submarine pipeline. Anchoring in this part of the Seaway, except in emergencies, is prohibited and the pilot was reluctant to employ the vessel's anchor because of this. In addition, the "Mallard" had a small under-keel clearance and there existed the very real danger of holing the ship were she to run over the anchor. This danger was minimized because the vessel was nearly stopped when the starboard anchor was let go on a short scope of chain. In the event, neither the pipeline nor the ship was damaged.

Based upon the information supplied by the pilot and the medical opinion of two physicians, it appears unlikely that his use of a topical eye lubricant had an effect on his vision or depth perception at the time of the occurrence. The residual side-effects of the pilot's completed course of prescription medication, however, are unknown.

The vessel's weather observations were taken when she was on the open water of Lake Ontario before the vessel entered the sheltered area of Port Weller piers. The wind strength recorded on the lake was considerably higher than that recorded by the automatic weather recording station at Port Weller. Because the wind speeds and visibility recorded by the station were closer in location and in time to that of the occurrence, these readings have been accepted as being more accurate.

The wind speeds and weather recorded by the automatic weather station make it unlikely that weather was a factor in the occurrence.

Findings

1. The "Mallard" was reported to be a cumbersome and difficult vessel to handle.
2. The manoeuvrability of the "Mallard" was affected by the fact that the vessel was not trimmed by the stern at near-maximum Seaway draft, and relatively slower rudder response to helm instructions .
3. The beam to length ratio of the "Mallard" was not unusual for a vessel of her size and class. The ratio was, however, greater than the Great Lakes vessels of which the pilot had considerable shiphandling experience.
4. The "Mallard" approached the tie-up wall at a speed marginally below the minimum required to maintain steerage way.
5. Directional control of the "Mallard" was lost after her bow landed on the approach wall and the vessel came bodily alongside. The vessel's stern was drawn against the tie up wall by bank suction effect as the engine rpm were increased and her bow swung towards the "Canadian Enterprise".
6. Due to the bank suction effect, the increases in speed ordered by the pilot to attempt to regain control of the vessel were unsuccessful.
7. The order of full astern was given too late to avoid collision with the "Canadian Enterprise" but may have lessened the severity of the impact.
8. The deployment of the vessel's starboard anchor near the centre of the channel probably prevented the "Mallard" from pushing the stern of the "Canadian Enterprise" aground.
9. According to the pilot and to the opinion of two medical practitioners, the pilot's use of a topical eye lubricant about ten minutes before the occurrence was not likely to have affected his vision or depth perception. The residual side- effects, if any, of the pilot's completed course of prescription medication are unknown.
10. Although in restricted waters, the "Canadian Enterprise" did all she could to avert a collision by going full astern the moment she was aware that the "Mallard" had serious difficulty controlling her movements.

11. The action taken by the master and officers of the "Canadian Enterprise" to warn the ship's crew of the impending collision via the vessel's public address system probably prevented injury to personnel, especially those in the port side accommodation spaces.
12. Passing entries are common in the Welland Canal. Apart from minor occurrences where ships have brushed against each other, no similar occurrence has taken place in this area of the canal.

Causes and Contributing Factors

The "Mallard" collided with the "Canadian Enterprise" as a result of a loss of control over the vessel's steering and the angle of approach to the lock tie-up wall which caused the bow of the "Mallard" to swing across the canal. Contributing to the loss of control were the trim of the vessel and the effect of bank suction on the vessel's stern when the vessel came bodily alongside the tie-up wall. The emergency actions taken by both vessels probably lessened the severity of the collision and avoided injury to personnel.

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 16 September 1998.