

MARINE OCCURRENCE REPORT

STRIKING

**OF THE MARINA IN SNUG COVE
BY THE FERRY "MAYNE QUEEN"
BOWEN ISLAND, BRITISH COLUMBIA
07 NOVEMBER 1995**

REPORT NUMBER M95W0195

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

While departing from the Snug Cove ferry terminal and swinging to align with the channel, the ferry "MAYNE QUEEN" sheered into an adjacent marina, striking a floating dock and several small craft before coming to rest on contacting the shore. The floating dock was heavily damaged, with pilings broken, and one pleasure craft was sunk and several others suffered varying degrees of damage. The ferry sustained minor damage to one of her four propulsion units. No injuries were reported as a result of this occurrence.

Ce rapport est également disponible en français.

OTHER FACTUAL INFORMATION

Particulars of the Vessel

	"MAYNE QUEEN"
Official Number	323848
Port of Registry	Victoria, British Columbia
Flag	Canadian
Type	Double-ended ferry
Gross Tonnage	1,476
Length	84.96 m
Breadth	18.75 m
Depth	4.267 m
Draught	Forward: 3.46 m Aft: 3.07 m
Cargo	72 vehicles on deck
Crew	8
Passengers	165
Built	1965, Victoria, British Columbia
Propulsion	Four diesel engines, 890 BHP each
Owners	British Columbia Ferry Corporation
Managers	BCFC

Description of the Vessel

The "MAYNE QUEEN" is a double-ended, open-deck, RoRo coastal ferry designed to carry 75 vehicles and 400 passengers. Originally fitted with two fixed propellers and one rudder at each end, she was modified in the '70s and the propulsion and steerage of the vessel is since effected by four right-angle drives (RADs), one each, port and starboard, at both ends of the hull. The RADs can be controlled either directly from the wheel-house or from the engine control room; when in regular service, the wheel-house control mode is used. The rudders

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.

have been welded in the amidships position and act as skegs.

Two identical consoles, only one of which may be active at any given time, are located one at each end of the wheel-house. The practice is for the console located toward the current forward end to be active. Included in the controls on each console are the following:

- i) a joystick controlling the forward RADs;
- ii) a joystick controlling the after RADs;
- iii) a transfer command push-button;
- iv) "console-in-command" indicator lights;
- v) four thrust direction indicators, one for each RAD; and
- vi) four pairs of lights indicating "coupling in" and "coupling out" for each RAD.

Each joystick has freedom of movement in two planes:

- in the horizontal plane, turning (through 360°) to achieve the RADs' required direction of thrust,
- in the vertical plane, pivoting (through a 90° range) for clutch and throttle control of the RADs.

Transfer of control between the consoles is effected by pressing the transfer push-button after all RADs have been declutched. An electric signal initiates the electric-pneumatic system which completes the transfer. The manufacturer's instructions recommend "... to hold the Transfer Command push-button down for at least 10 seconds to ensure that proper signal is generated". The B.C. Ferry Manual of Administration stated that only five seconds are necessary for this purpose. Notices were posted next to the push-buttons on both consoles with the five-second requirement.

Two console-in-command indicator lights, approximately 5 cm apart, are installed on each console. These lights indicate which console is active. The lights alternate when the transfer command push-button is depressed, i.e. until a full transfer is effected. The lights identifying which console had the control were identical and did not provide a quick confirmation of the status of the control system to the person conning the vessel.

Manning and Watch System

The regular vessel on the Horseshoe Bay - Snug Cove service is the "QUEEN OF CAPILANO" which was undergoing refit at the time of the occurrence. While replacing her, the "MAYNE QUEEN" was manned on a three-crew system by personnel transferred from the "QUEEN OF CAPILANO". Each crew comprised a master and seven crew members, and two crews attended the ferry each day, manning the two work shifts, a morning shift from 0430 till 1330, and an afternoon shift from 1430 till 2230. The crews followed a cycle of five morning shifts, five afternoon shifts and five days off.

Scene of the Accident

The Snug Cove ferry terminal is located at the head of the narrow inlet of the same name and consists of a loading ramp with a wing-wall on the western side. (See Chartlet at Appendix A.) In the loading position, the ferry lies against the western wall with her foredeck under the ramp. Unlike other V-shaped berthing sites for B.C. ferries, this terminal is not provided with a second wing-wall, i.e. it is open to the east where a small craft marina is situated.

The marina facilities consist of several floating wooden docks, extending from the shore and located inside a main floating dock, 95 m long, which is kept in place, parallel to and about 30 m from the ferry track, by four wooden dolphins.

Because the axis of the ferry terminal loading ramp is at an angle of approximately 50° to the ferry's outbound course, the ferry must turn to port immediately upon leaving the ramp. In fact, it was observed during the investigation process that, on departure, the vessel was pivoted to port until she was in line with her outbound course while her starboard quarter was still in contact with the wing-wall.

History of the Voyage

On the morning of 07 November 1995, on her second trip of the morning from Horseshoe Bay, the "MAYNE QUEEN" secured at Snug Cove at 0628. The passages had been uneventful and, as is the routine while loading at Snug Cove, all four RADs were aligned in the fore-and-aft direction to provide thrust to keep the vessel's No. 2 end, the forward end on arrival, under the ramp.

At 0638, after 72 vehicles and 165 passengers were loaded on board, the chief officer reported the deck clear, i.e. all cars parked, ramp lifted and mooring lines let go. The master, who was at the arrival console, began the departure procedure. After declutching both pairs of RADs, he turned the joystick controlling the drives at the inshore end through 180° for an off-ramp thrust and repositioned the joystick controlling the outbound end drives to a 90° angle for an athwartship thrust, away from the wing-wall. He then went to the departure console, checked the RADs' dials, aligned the joysticks with the dials and pressed the transfer command push-button to take over control from the arrival console.

After the "console-in-command" light came on, the master clutched in the RADs and applied approximately 30 per cent throttle to the forward RADs. This was followed, some five to six seconds later, by the application of approximately 10 per cent throttle to the stern RADs. This manoeuvre was intended to swing the vessel through the required 50° to port and to line her up on the outbound track. As

the vessel started coming off the western wing-wall and heading to port, the master commenced turning the joystick controlling the forward RADs to the "ahead" position, but the RADs' thrust direction indicators did not follow; the forward RADs were still pushing the forward end to port, out of the channel and toward the marina.

When he realized that the RADs were not responding to his commands, the master brought both joysticks to the declutch position. Reportedly, the RADs had been clutched in for approximately six seconds. The "MAYNE QUEEN" continued swinging to port, damaging and displacing the marina outer dock and moored pleasure craft, until the vessel's port forward RAD touched the seabed and the vessel came to rest with her hull in contact with the shore.

With the vessel stopped, the master pressed the transfer command push-button for a second time and noted that the RADs' direction indicators now corresponded with the joysticks' alignment. Realizing that he had full control of the vessel, the master ordered a check of the tanks and bilges. He then engaged the RADs, manoeuvred the vessel back into the main channel and proceeded on the passage. No crew was ordered to inspect the damaged pleasure craft but, reportedly, the master made a visual inspection and determined that no assistance was needed prior to leaving the cove.

Shortly after leaving Snug Cove, the chief officer made an announcement on the public address system advising passengers that the vessel had experienced a mechanical malfunction and was now proceeding to Horseshoe Bay terminal. At about 0640, the chief officer, as ordered by the master, reported the accident to the BCFC's Horseshoe Bay terminal control tower using the bridge cellular telephone. The tower does not tape conversations; however, the controller on duty recalled that the main particulars of the chief officer's call were that the "MAYNE QUEEN" had hit the dock at Snug Cove, had one RAD leg damaged and was under way to Horseshoe Bay. Also, the caller requested that the BCFC Assistant Vice-President (VP), Central Area, the highest ranking officer of the BCFC in Horseshoe Bay, be notified. The controller passed this information to his supervisor who, in turn, telephoned the Assistant VP at about 0650, and informed him of the occurrence and indicated that the ferry was on schedule.

The "MAYNE QUEEN" berthed at Horseshoe Bay at 0703. After offloading the traffic, she loaded 21 vehicles and 37 passengers and departed Horseshoe Bay at 0714. At approximately 0725, the Assistant VP arrived at the Horseshoe Bay terminal where he was briefed and updated by terminal personnel. He arranged for a surveyor to board the ferry and, with a relief master already summoned, left for Snug Cove by water taxi.

The ferry arrived at Snug Cove at 0735 and remained there for about one hour while the police and BCFC authorities assessed the damage and conducted a preliminary survey of both the vessel and the marina.

At 0743, the master reported the occurrence to Vancouver VTS.

At 0820, the relieving master assumed command of the vessel, and at 0830 the "MAYNE QUEEN" departed from Snug Cove. At 0850, the ferry berthed at Horseshoe Bay and was held there until a thorough survey of the vessel and tests of the propulsion control system were completed.

Supporting Information

On 02 and 03 November 1995, before the accident, the master on another watch had made entries in the wheel-house log and in a notebook referred to as the "Malfunction Log" to the effect that the RADs did not rotate. These remarks, however, had not been seen by the master who was in command at the time of the accident, nor had he been advised by anyone of such problems. He reported that he did not even know that there was a "Malfunction Log" aboard the "MAYNE QUEEN". Investigation revealed that on this particular route, there is a 45-minute gap between shift changes and, consequently, the masters do not meet at shift changes. No hand-over procedures were established and remarks, if any, for the next master were conveyed on scraps of paper left in the wheel-house.

Several passengers who were aboard the ferry during the accident, some of them standing on the open car deck at the forward end, reported that the propeller noise, deck vibration and rate of swing continued until the vessel stopped well past the damaged marina dock.

During the post-accident surveys at the Horseshoe Bay terminal, a number of tests were conducted to simulate the incomplete transfer of control. These tests included "quick" transfers; the push-buttons were depressed for as little as a second, well below the period required by either the manufacturer or the owner. None of the tests resulted in the condition, as reported by the master, which led to the accident; control was always transferred flawlessly.

In the course of the investigation, it was observed on several occasions that it takes approximately 35 seconds to swing the "MAYNE QUEEN" from her berthing position to the mid-channel position when departing from the Snug Cove terminal.

No light or signal on the console indicates an incomplete transfer of control. There are lights indicating the "coupling in" and "coupling out" status of the RADs; however, the master may positively verify the steering only by observing the dials while turning the joysticks.

The "MAYNE QUEEN" had been designated a substitute vessel on the Horseshoe Bay - Snug Cove run since 01 November 1995 while the regular ferry, the "QUEEN OF CAPILANO", was undergoing her annual refit. The "QUEEN OF CAPILANO" is propelled by four RADs fitted with controllable-pitch propellers and controlled by two joysticks. In

principle, manoeuvring the "QUEEN OF CAPILANO" is similar to handling the "MAYNE QUEEN"; however, they are not sister ships and certain aspects of transferring control and handling the RADs are not identical.

Damage

Damage to the Ferry

It was ascertained during two diving operations, on 07 and 12 November, that the "MAYNE QUEEN" sustained damage to her shell plating, rudder-skeg and one of her propellers at the end that grounded.

The shell plating had abrasion marks, and the rudder-skeg was bent to the side; the damage was consistent with the hull making contact with the steep, rocky shoreline in a sweeping motion. The damage to the propeller indicated that, at the time of bottom contact, the propeller was still clutched in; this finding corroborates observations by engine-room crew and some passengers that there was a rattling noise while the RAD was clutched in and unusual vibration afterward.

To the Small Craft Marina

The 95 m main floating dock at the marina was severed at its mid-length, with four dolphins broken at seabed level and two dolphins displaced. Some of the other docks sustained a lesser degree of damage.

To Other Craft

Several small craft tied up to the marina's docks suffered various degrees of damage and one of them sank. Damage to small craft was caused by direct contact with the "MAYNE QUEEN" and by sections of the docks disturbed by the ferry.

No damage to the environment was observed.

Certification

The "MAYNE QUEEN"

The ferry had been issued a SIC 17 Certificate by the Ship Safety Branch of the Canadian Coast Guard on 12 May 1995 and it was valid until 11 May 1996.

Personnel

The master of the "MAYNE QUEEN" at the time of the occurrence held a Master Foreign-Going Certificate of Competency issued in Canada in 1991.

He had accumulated approximately 40 years of sea service on various vessels, of which approximately 21 years (since 1974) were on BCFC ferries. He had served as master on various ferries and runs since 1976. He had served on the Snug Cove run for approximately three years, most of this time on the "QUEEN OF CAPILANO".

He was on the "MAYNE QUEEN" for some time in 1994 and for one shift on 01 November 1995, six days before the accident. After that one shift, he was on the scheduled five days off, and he returned to his duties on 07 November; the accident happened during his second run that day.

The chief officer, chief engineer and second engineer were all holders of the appropriate grade marine certificates issued in Canada.

The chief officer and the two deck-hands were also on their first shift after a five-day break. They were all familiar with the Horseshoe Bay - Snug Cove run and sailed on this vessel only when she was substituting for other ferries.

The chief engineer, promoted to this position in 1994, had sailed mainly on other ferries. He sailed on the "MAYNE QUEEN" for a total of about six months during various periods when this vessel was substituting for a regular ferry undergoing refit. He was on the "MAYNE QUEEN" from 31 October to 01 November and returned on 05 November after three days off.

The "MAYNE QUEEN" had tied up overnight at the Horseshoe Bay terminal. The engine-room crew had remained on board all night for maintenance purposes while the deck crew and the master arrived at various times between 0430 and 0500. After the first round trip, the engine-room crew changed at Horseshoe Bay.

Weather and Tidal Information

The vessel reported the weather as rain, with good visibility, light wind and rippled sea surface. The weather and current were not considered to have contributed to the accident.

The Canadian Tide and Current Tables, Volume 5, show the following times and heights for Point Atkinson, the nearest reference point, on 07 November 1995:

High Water,	0605,	4.4 m
Low Water,	1130,	3.0 m

The occurrence took place approximately 35 minutes after high water.

ANALYSIS

The information provided by the master and the sequence of events are consistent with the transfer of control from console No. 2 to console No. 1 not having been completed. The RADs responded to the clutch-throttle position of the joysticks but did not follow the rotation. However, this condition could not be duplicated after the accident.

Witness statements did not corroborate the master's testimony that he disengaged the RADs before striking the marina dock. He maintained that the vessel was carried by the momentum she had gained while the RADs were clutched in for approximately six seconds during unberthing. However, it was observed during the investigation that more than 30 seconds of continuous athwartship thrust was required to swing the "MAYNE QUEEN" from the wing-wall to the outbound course. Additional thrust would be required to swing the vessel through the further 40° to contact the marina. In the existing conditions, it is considered that the vessel would not have struck the marina dock if the master had declutched the RADs after six seconds.

The master rotated the RADs to their departure settings on the arrival control console and then engaged them only after transferring control to the departure console. On the arrival console, the master had set the joystick controlling the outbound-end drives to a 90° angle before transferring the control to the departure console. When the master applied thrust at the departure console, the ferry commenced moving laterally off the dock and gained momentum. When he attempted to change the direction by using the joystick, the master realized that he did not have control of the directional component of the drives.

If, on the other hand, the transfer of control from the arrival console to the departure console had been made with the controls in a fore-and-aft position, the loss of the directional component of the drives would have become apparent as soon as the joystick was positioned at the 90° angle and before athwartship thrust was applied.

Because of the sequence and manner in which the controls were transferred, the master did not become aware immediately of the loss of the directional component of the drives.

The master had limited experience of the "MAYNE QUEEN" and was transferred from another vessel without any time being allotted for refamiliarization.

The vessel's quick departure from the scene after the accident without an in-depth assessment of the situation was contrary to the practices of good seamanship. Following bottom contact, the master was engaged in an emergency situation which involved critical vessel manoeuvring, conducting damage assessment of the vessel as well as personally carrying out visual assessment of the damaged pleasure craft, and had travelled a distance of some 500 m to the Entrance Light; all

in a matter of some six minutes. Hence, the master's inspection of the damaged pleasure craft can, at best, be described as cursory, and his assessment of the situation was, in part, influenced by the fact that he had never seen people on these boats at that time of the day. A precise in-depth assessment of the situation was essential to ensure that the pleasure craft involved were not in need of assistance prior to the vessel departing the accident site.

The vessel reported the accident to the Horseshoe Bay terminal but was not held there for further inspection. The only person, apart from the master, with authority to take the vessel out of service was the VP who was briefed by the terminal employee. He wrongly assumed that the ferry had only experienced a "hard landing" at the terminal in Snug Cove, a fairly common occurrence and one that would not justify stopping the vessel and suspending traffic between Bowen Island and the mainland.

FINDINGS

1. Directional control of the vessel's forward propulsion was lost during the unberthing manoeuvre.
2. There apparently had been an incomplete transfer of propulsion/steering control from the arrival console to the departure console.
3. Evidence indicates that the propulsion was not declutched before the marina dock was struck.
4. The master was not given a refamiliarization period before assuming operational command of the vessel.
5. The shift schedules precluded the masters from handing over the command of the vessel in person, and there was no established hand-over procedure in place.
6. The ferry departed the scene of the accident before determining if assistance was required and before ensuring that the vessel was seaworthy.
7. Inadequate communication between the ferry and the terminal resulted in ferry management not stopping the vessel for survey and investigation.
8. VTS was notified one hour after the accident.
9. The control system did not incorporate an alarm to warn the operator of an incomplete transfer of control between the consoles.
10. The lights identifying which console was in command were identical and did not readily indicate the status of the control

system to the operator.

11. The instructions in the BCFC operation manual were at variance with the manufacturer's instructions for the transfer of control procedure.

CAUSES AND CONTRIBUTING FACTORS

The "MAYNE QUEEN" sheered into the adjacent marina when directional control of the forward propulsion was lost while unberthing from Snug Cove terminal. This was apparently due to an incomplete transfer of propulsion/steering control between the wheel-house consoles. Contributing to the extent of the damage was the fact that the forward propulsion was not stopped when control was lost.

SAFETY ACTION TAKEN

The control system on the "MAYNE QUEEN" has undergone a thorough check. Certain aspects of the system have been modified to eliminate the possibility of transferring propulsion without transferring steering. New placards have been affixed next to the transfer command push-buttons indicating the requirement for a 10-second depressing period. The control indicator lights colours have been changed to green and red. Masters have been instructed to test-rotate the RADs before engaging propulsion.

The deck department has been refamiliarized with the propulsion controls, the airphone talk-back and the sound-powered phone.

The BCFC has reviewed its current policy with respect to the following:

- communications procedures following an incident, and
- familiarization/refamiliarization with the vessel for masters and new crew members, with input from the fleet masters.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board, consisting of Chairperson, Benoît Bouchard, and members Maurice Harquail and W.A. Tadros, authorized the release of this report on 09 October 1996.