Transportation Safety Board of Canada
Bureau de la sécurité des transports du Canada

Marine Transportation Safety Investigation Report M19C0043

STRIKING OF A WHARF

Roll-on/roll-off passenger ferry *Apollo*
Godbout, Quebec
25 February 2019

Vessel history

The *Apollo* (International Maritime Organization No. 7006314, Figure 1) is a Canada-flagged roll-on/roll-off passenger ferry[1] built in 1970 in Germany. Most of the *Apollo*'s service was spent in northern Europe, sailing in the Baltic and North Seas. During its life, the vessel was owned and operated by different companies under several names before it was renamed *Apollo* in 1995. In 2001, the *Apollo* was acquired by Labrador Marine Inc., based in Newfoundland and Labrador. The vessel was operated for 18 years between Blanc-Sablon, Quebec, and St. Barbe, Newfoundland and Labrador, until it was sold to the Société des traversiers du Québec (STQ) in 2019. As an emergency measure to restore the marine connection between Matane, Baie-Comeau, and Godbout, Quebec, the STQ acquired the vessel as a replacement for the out-of-service roll-on/roll-off passenger ferry *F.-A.-Gauthier*.

At the time of the occurrence, the vessel was certified by the classification society Bureau Veritas, under the authority of Transport Canada, to carry 240 passengers and 30 crew members.

[1] Roll-on/roll-off passenger ferries are passenger ships designed to carry wheeled cargo, driven on and off the ship on their wheels by means of built-in ramps, located in the bow, stern or sides, or any combination thereof.

Figure 1. The *Apollo* (Source: Richard Bélanger)

History of the occurrence

On 25 February 2019 at 0800,[2] the *Apollo* left the port of Matane for Godbout, Quebec, with 100 passengers and 28 crew members on board. The vessel's vehicle deck was fully loaded with cars and trucks. The voyage proceeded in a routine manner.

At approximately 1000, using the bridge telephone, the helmsman called the master in preparation for arrival. The master arrived in the wheelhouse at approximately 1008. The vessel was about 2 nautical miles (NM) from Godbout, making way at 15 knots while steering with the autopilot mode on. Taking into consideration a starboard beam northeast wind of 25 knots, the master decided to maintain speed to manoeuvre the vessel while maintaining a safe distance from the Godbout ferry wharf.[3] At 1012, the master ordered the helmsman to switch off the autopilot mode and steer manually.

At about 1017, the vessel entered Godbout Bay. The master immediately slowed the vessel speed to 11.7 knots and ordered the helmsman to put the rudder to port and steer toward the Saint-Régis dock,[4] then toward the landing. The manoeuvre caused the vessel to turn toward the wharf faster than expected. While the vessel was turning rapidly, the master took the command of the vessel on the port navigation wing. He immediately turned the helm hard to starboard and again reduced the speed, keeping a forward minimum speed to maintain the ship's steering capabilities.

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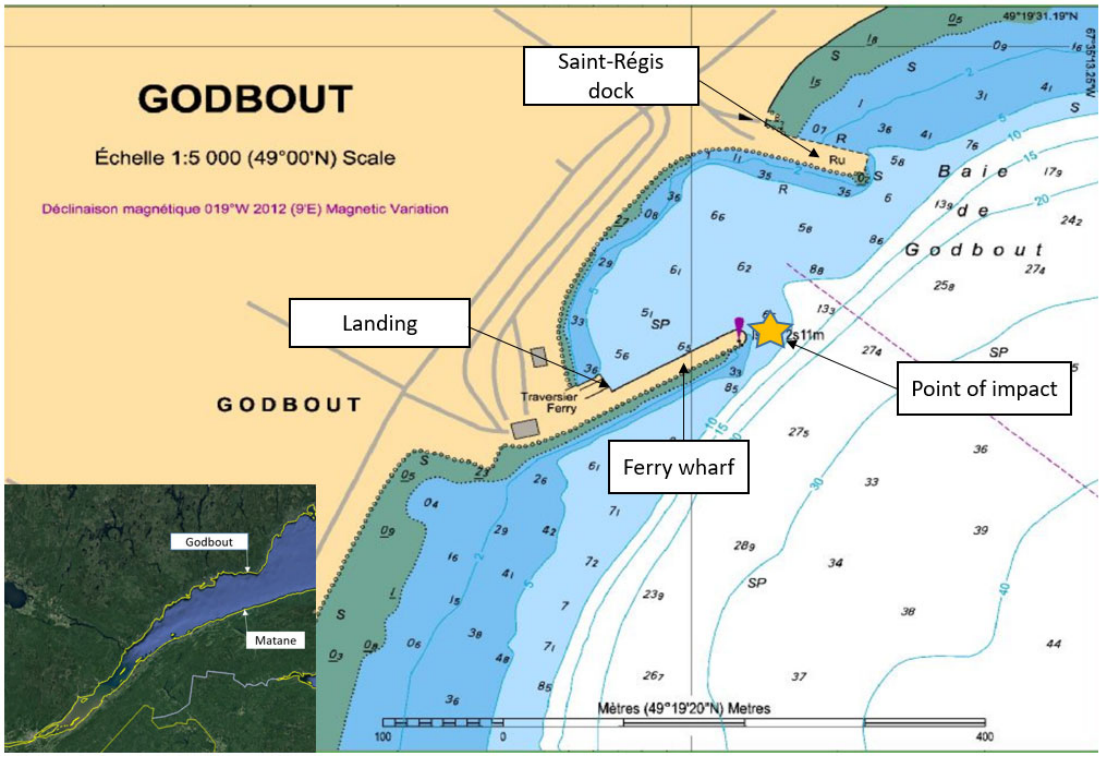
[2] All times are Eastern Standard Time (Coordinated Universal Time minus 5 hours).

[3] According to Fisheries and Oceans Canada's *Sailing Directions ATL 110: St. Lawrence River, Cap Whittle/Cap Gaspé to Les Escoumines and Anticosti Island,* Third edition (Ottawa: 2011), Section 3: Pointe des Monts to Pointe Saint-Pancrace, paragraphs 25 and 26, "[t]he ferry wharf at Godbout is approximately 150 m long. There is a depth of 6.5 m alongside the ferry berth situated on the NW [northwest] side of the wharf. The SE [southeast] face of the wharf is encased with stone, which is submerged at high water. A wharf, in ruins, is situated about 150 m north of the ferry wharf."

[4] This wharf was built by the St. Regis Paper Company in the 1920s and is commonly known as the Saint-Régis dock. (Source: Histoire du Québec, "Municipalité de Godbout," at http://histoire-du-quebec.ca/godbout [last accessed on 08 July 2019])

Figure 2. Site of the occurrence (Main source image: Canadian Hydrographic Service, Chart CA1236, with TSB annotations. Inset image source: Google Earth, with TSB annotations)



The vessel did not respond as expected due to water flow reduction on the rudders caused by the successive speed reductions. To compensate, the master reversed the starboard propulsion while keeping the port propulsion ahead and simultaneously activated the bow thruster. The vessel stopped turning to port but continued moving forward. When it became evident to the master that a collision with the end of the ferry wharf was unavoidable, to minimize the force of impact and subsequent damage, the master reversed the port engine so that both engines were working astern. The vessel continued to move forward slowly and deviated toward the ferry wharf because of the grey ice[5] that covered the harbour.

At 1018, the vessel made contact with the end of the ferry wharf (Figure 2). At 1019, following the impact, the crew briefly inspected the vessel to ascertain the extent of the damage. The inspection revealed a hole in the bow visor of about 1 m high by 2 m wide, with buckling over an area of about 9 m^2. At 1045, the vessel was secured at the ferry berth and the passengers disembarked. Despite the damage from the impact, the crew was able to open the visor and proceeded to unload the vehicle deck.

[5] Grey ice is young ice that is 10 to 15 cm thick and that usually rafts (one layer over the other) under pressure. (Source: Fisheries and Oceans Canada, Canadian Coast Guard, *Ice Navigation in Canadian Waters*, Annex A: Terminology For Ice, Navigation And Ship Design)

Figure 3. The damage to the *Apollo*'s bow visor (Source: Alexandre Boudreau)

At around 1500, the *Apollo* was inspected by 2 Transport Canada marine safety inspectors. Following the inspection, the ship was allowed to proceed to Matane for repairs. At 1600, the *Apollo* departed Godbout without any passengers on board, escorted by the Canadian Coast Guard vessel *Des Groseilliers*. The *Apollo* arrived in Matane at 1930.

Environmental conditions

On 25 February, at the time of the occurrence, it was snowing and visibility was about 1 NM in Godbout, Quebec. The wind was from the northeast at 25 to 30 knots. The air temperature was approximately –6 °C. The ice coverage was 8/10.

Master's experience

The master of the *Apollo* joined the STQ fleet in 2015 as a second officer and as a relief chief officer. In November 2016, after obtaining a Master, Near Coastal certificate of competency, he began sailing as a relief master. He became a permanent master for the STQ in March 2017. Since his employment, he had completed approximately 400 landings in Godbout, many of which in winter conditions, on other STQ vessels without any incident.

The master was part of the STQ team sent to Newfoundland and Labrador to take possession of the *Apollo*. The former owner's crew was in charge of the vessel transit from St. Barbe, Newfoundland and Labrador, to Matane, Québec. The master's familiarization with the vessel took place during this voyage. Additionally, as part of his training, sea trials were made outside of Matane and a landing exercise in Baie-Comeau and Godbout was performed to verify the compatibility of the vessel with the modifications that the STQ had recently made to its shore infrastructures.

Before the date of the occurrence, the master had completed 7 round trips from Matane to Baie-Comeau with the *Apollo*. On the day of the occurrence, the master was on his first voyage from Matane to Godbout with passengers on board.

Description of the vessel's propulsion and manoeuvring systems

Built in 1970, the *Apollo* was equipped with a conventional propulsion system consisting of two 4-stroke, single-acting diesel engines each rated to deliver 3330 kW, reduction gears, and 2 screw shafts each driving a variable-pitch propeller. The vessel was equipped with a fixed pitch electrical bidirectional bow thruster.

In 2005, the vessel's port engine was replaced by a main engine rated at 4000 kW. The response time of the new engine is faster than that of the starboard engine, which is older. The difference in response times must be taken into consideration when manoeuvring the vessel.

The vessel's steering is provided by 2 semi-balanced[6] rudders. Generally, all rudders experience decreased efficiency during low speed manoeuvring operations. This is caused by a decrease of water flow at the stern which affects the pressure acting on the rudders.

The *Apollo*'s electrical power is supplied by 3 auxiliary engines generating 3-phase alternating current with a nominal power output of 500 kW each. The mechanical condition of the generators' diesel engines is such that they cannot operate at more than 50% of their load.

The 478 kW electrical transverse fixed-pitch bow thruster is designed to operate at 3 different speeds and provides the *Apollo* with transverse thrust during low speed manoeuvres. In spite of its design, the thruster can only be operated on its first speed for about 1 minute, and on its second speed for 15 seconds. The thruster's third speed is unusable given the limitations of the electrical supply. Prolonged use of the bow thruster causes the auxiliary engines to overheat, which in turn causes their overheat protection to automatically shut them down, creating a possible blackout situation on board. The inability to use the bow thruster to its full design capacity is an additional constraint on the master's ability to manoeuvre the vessel.

The vessel's navigation bridge consists of a wheelhouse that contains all the navigation instruments and controls, and of 2 open bridge wings. Each bridge wing is equipped with a console that has controls for the bow thruster, rudders, and engines. From the bridge wings, the navigation personnel have a full view of the wharf to aid in the docking manoeuvres.

Safety message

This investigation revealed the following conditions on board the *Apollo*:

- The 2 main engines had different power outputs and response times. The slower response of the starboard engine reduced the counteracting torque required during the approach manoeuvre.
- The inability of the auxiliary engines to operate at more than 50% of their nominal power rating prompted the master to minimize the use of the bow thruster while manoeuvring the vessel.
- The master's limited training and experience in manoeuvring the newly acquired vessel led to an incorrect assessment of the vessel's speed and course, and of the effects of ice and wind when approaching the Godbout ferry wharf.

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[6] A semi-balanced rudder is a rudder with a small part of its area (less than 20%) forward of the turning axis and for which the axis of rotation is less than 20% of its length. (Source: Marine Insight, "Types of Rudders Used for Ships," at https://www.marineinsight.com/naval-architecture/types-rudders-used-ships/ [last accessed on 08 July 2019])

For the safety of the vessel, its passengers, and the environment, it is important that all machinery designed to assist the master in manoeuvring the vessel be fully operational, and that the master be familiar with the machinery's responses and operational limitations.

ABOUT THIS INVESTIGATION REPORT

This report is the result of an investigation into a class 4 occurrence. For more information, see the Policy on Occurrence Classification at www.tsb.gc.ca

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.

TERMS OF USE

Citation

Transportation Safety Board of Canada, *Marine Transportation Safety Investigation Report* M19C0043 (released 01 November 2019).

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Marine transportation safety investigation report M19C0043

Cat. No. TU3-12/19-0043E-PDF
ISBN: 978-0-660-33011-2

This report is available on the website of the
Transportation Safety Board of Canada at www.tsb.gc.ca

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