



Transportation
Safety Board
of Canada

Bureau de la sécurité
des transports
du Canada

Marine Transportation Safety Investigation Report M19C0387

BOTTOM CONTACT

Bulk carrier *Kaministiquia*
Kahnawake, Quebec
27 November 2019

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Description of the vessels

The *Kaministiquia* (International Maritime Organization No. 8119285, Figure 1) is a 222.54 m-long and 23.17 m-wide bulk carrier, registered in Canada and owned by Lower Lakes Towing Ltd. It was built in 1983 and is equipped with a single controllable pitch propeller housed in a steerable Kort nozzle, and a bow thruster.

Figure 1. The bulk carrier *Kaministiquia* on the day of the occurrence, secured alongside the north wall of lock No. 4 in Beauharnois, Quebec (Source: TSB)



The *Algoma Discovery* (International Maritime Organization No. 8505848; Figure 2) is a 222.4 m-long and 23.14 m-wide bulk carrier, registered in Canada and owned by Algoma Central

Corporation. The vessel was built in 1987 and is equipped with a controllable pitch propeller and a bow thruster.

Figure 2. The bulk carrier *Algoma Discovery*, secured alongside the Cargill grain terminal in Baie-Comeau, Quebec (Source: TSB)



History of the voyage

Kaministiquia

On 26 November 2019, at 2205,¹ the *Kaministiquia* departed from Sorel, Quebec in ballast, for Thunder Bay, Ontario, under the conduct of a pilot. The vessel's forward draft was 5.18 m, and its aft draft was 7.01 m.

On 27 November 2019, at 0319, the *Kaministiquia* arrived at the Saint-Lambert Lock, which is the first lock located at the entrance to the South Shore Canal of the St. Lawrence Seaway. The pilot from the Laurentian Pilotage Authority handed conduct of the vessel to the master and subsequently disembarked. At 0339, the vessel departed from the lock.

Algoma Discovery

On 26 November 2019, at 0144, the *Algoma Discovery*, loaded with 25 200 tonnes of soya beans in bulk, departed from Johnstown, Ontario, for Baie-Comeau, Quebec. The vessel's forward draft was 8.1 m and its aft draft was 8.14 m.

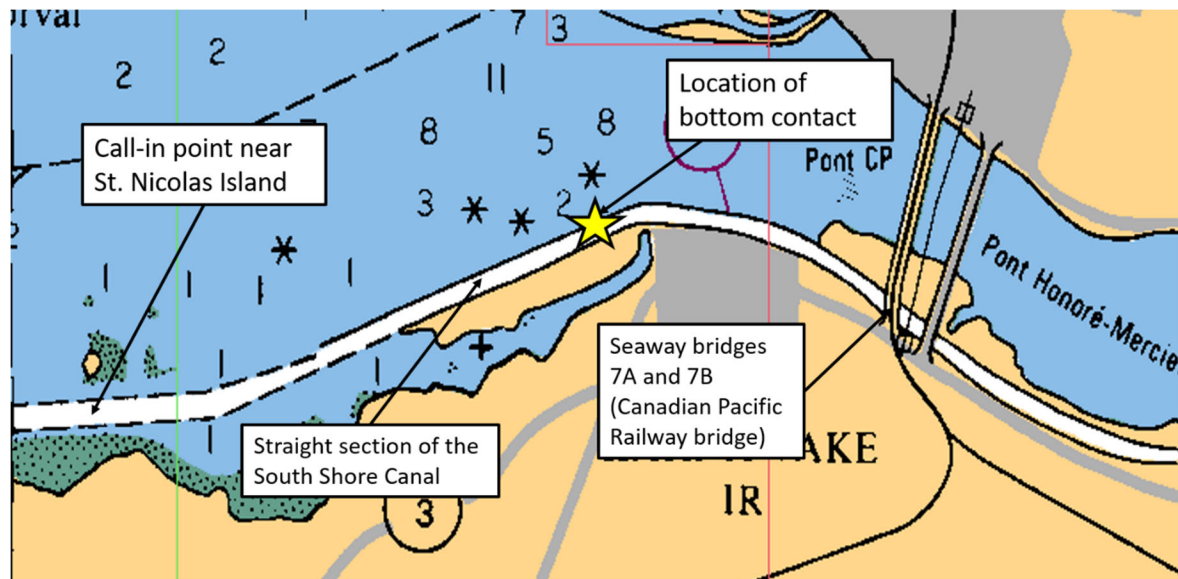
On 27 November 2019, the vessel was proceeding downbound in the St. Lawrence Seaway with the vessel under the conduct of the master. At 0514, the vessel departed from the lower lock in Beauharnois, Quebec. The bridge team consisted of the master, a helmsman, and a third officer as officer of the watch (OOW).

¹ All times in the report are Eastern Standard Time (Coordinated Universal Time minus 5 hours).

Meeting sequence and bottom contact

At 0540, the *Kaministiquia* departed from the Côte-Sainte-Catherine Lock. The bridge team consisted of the master, a helmsman, and the chief officer as OOW. As the vessel exited the lock, the master of the *Kaministiquia* contacted the master of the *Algoma Discovery*, who proposed that the vessels meet and pass somewhere in the straight section of the South Shore Canal, upstream of Seaway bridges 7A and 7B, which is the Canadian Pacific Railway bridge at Kahnawake, Quebec (Figure 3). The master of the *Kaministiquia* agreed to the proposal. Some time later, the master of the *Kaministiquia* called the Seaway traffic controller on VHF radiotelephone and arranged to pass under Seaway bridges 7A and 7B, between 0611 and 0654.²

Figure 3. Image depicting the occurrence location (Source: Canadian Hydrographic Services, Chart No. 1409, with TSB annotations)



Around 0606, the *Kaministiquia* passed the Côte-Sainte-Catherine Wharf at a reduced speed of 3.5 knots. The speed reduction was required by the Seaway traffic controller to accommodate 3 vessels that were moored at the wharf.

At 0610, the master of the *Algoma Discovery* called the master of the *Kaministiquia* on VHF radiotelephone to confirm that the meeting would take place upstream of bridges 7A and 7B in the straightaway to the west of the curve.³

Around 0614, the master of the *Algoma Discovery* made another VHF call to the master of the *Kaministiquia*, and suggested that the *Kaministiquia* increase its speed. The *Algoma Discovery's* speed at the time of the call was 6.9 knots. However, the *Kaministiquia* maintained its speed of 5.9 knots.

At about 0617, the *Algoma Discovery* made a VHF call to the Seaway traffic controller, to report that it had just passed its call-in point near Saint-Nicolas Island. The master then arranged with the

² Passenger trains were scheduled to cross Seaway bridges 7A and 7B at 0611 and 0654. The *Kaministiquia* arranged to pass under Seaway bridges 7A and 7B during this timeframe to accommodate the passenger train schedule.

³ The curve in question is located approximately 1.1 NM northwest of Seaway bridges 7A and 7B.

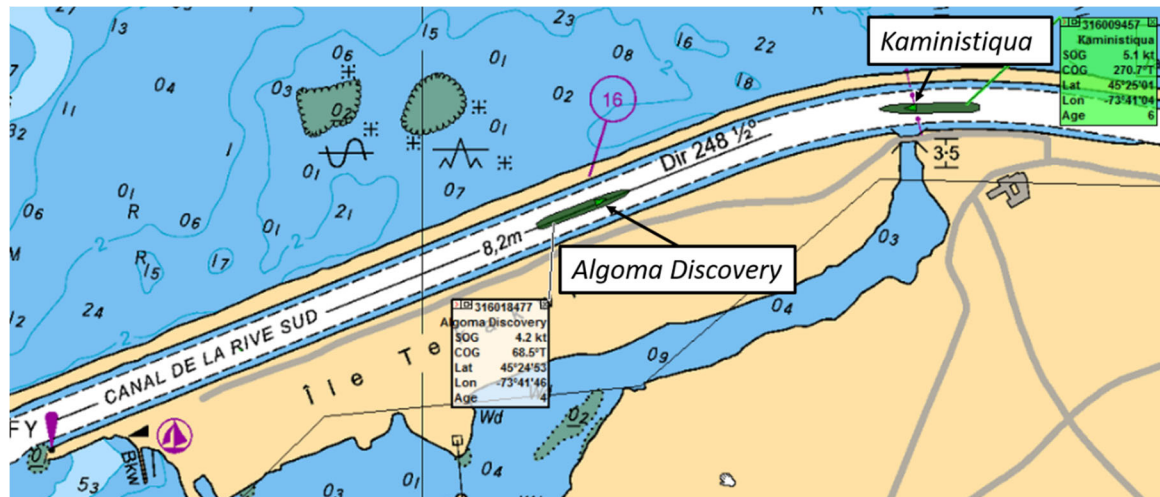
Seaway traffic controller for the vessel to pass under Seaway bridges 7A and 7B between 0654 and 0700.

At 0629, the *Algoma Discovery* entered the South Shore Canal and broadcast a security call to nearby vessels on VHF, announcing that the *Algoma Discovery* was entering the South Shore Canal, eastbound. The vessel's speed was 4.9 knots.

Meanwhile, the *Kaministiquia* approached Seaway bridges 7A and 7B at a speed of 5.9 knots, and passed under them at 0634. Just before 0644, while rounding the curve, the vessel proceeded close to the north bank and then deviated toward the centre of the canal. To correct the deviation, the *Kaministiquia* altered course to starboard at 0646:18.

At 0646:23, as the *Kaministiquia* was altering its course away from the centre of the canal, the *Algoma Discovery* was approaching the curve at a speed of 4.9 knots. The *Algoma Discovery* was positioned close to the centre line of the canal, and the vessels were approximately 0.4 NM apart (Figure 4). The master of the *Algoma Discovery* made a VHF call to the *Kaministiquia*, requesting that it give the *Algoma Discovery* more room. The *Kaministiquia* did not acknowledge the *Algoma Discovery*'s call.

Figure 4. Electronic chart capture depicting the vessels' positions before their meeting. Vessels are not to scale. (Source: St. Lawrence Seaway Management Corporation, with TSB annotations)

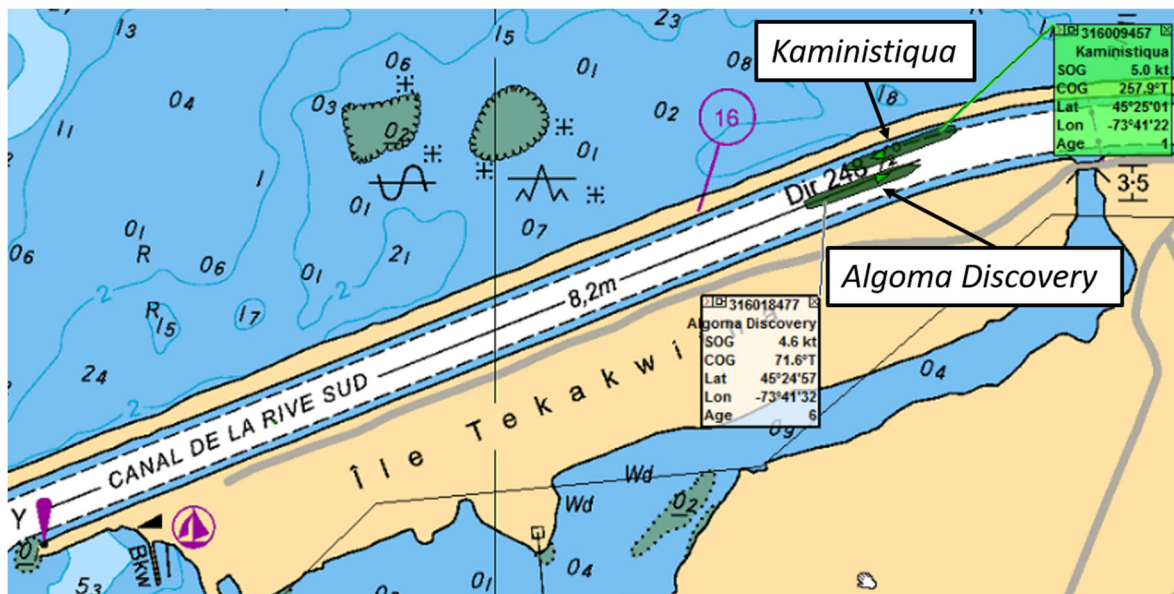


At 0647:45, the *Kaministiquia* altered its course to port to enter the straight section of the canal. Soon after, the master ordered the chief officer to monitor the distance from the vessel to the north shore of the canal.

At 0648:50, the 2 vessels were abeam each other (Figure 5). The *Kaministiquia* was slowly changing course to port, toward the centre of the canal. The *Algoma Discovery* was still positioned close to the canal's centre line, just before the curve, and maintaining its course. While manoeuvring, the *Kaministiquia*'s starboard quarter came within approximately 7 m of the north bank of the canal⁴ and the vessel made bottom contact. Seconds later, the vessels passed each other and continued their intended voyages.

⁴ The width of the navigable part of the canal is approximately 80 m.

Figure 5. Electronic chart capture depicting the positioning of the vessels during their meeting. Vessels are not to scale. (Source: St. Lawrence Seaway Management Corporation, with TSB annotations.)



Post-occurrence events and damage to the *Kaministiquia*

Bridge personnel on the *Kaministiquia* had no immediate indication that the vessel had touched bottom. At approximately 0700, the *Kaministiquia* developed a port list due to the loss of the starboard ballast water; damage to the starboard side ballast tank No. 6 was suspected.

At about 0710, the master of the *Kaministiquia* contacted the Seaway traffic control centre by cellphone to report the incident. The master reported that his vessel had not had enough room to meet and pass the *Algoma Discovery*, and that bank suction effect had contributed to the vessel's bottom contact and suspected damage. The Seaway traffic controller authorized the *Kaministiquia* to proceed to the locks at Beauharnois, Quebec, for examination.

At 1000, the *Kaministiquia* was secured on the north wall of the lock No. 4 in Beauharnois, Quebec. Authorities inspected the vessel later that day.

The following day, 28 November 2019, the vessel's classification society reported that the *Kaministiquia* had sustained damage to its No. 6 starboard side hopper and double-bottom ballast tank. Temporary repairs were carried out before the vessel resumed its normal operations.

Environmental conditions

At the time of the occurrence on 27 November, the sky was overcast and visibility was about 10 NM. The wind was from the northeast at 5 to 10 knots, and the current was set in an easterly direction at a rate of 1 to 1.5 knots.⁵ The air temperature was approximately 1 °C.

⁵ Canadian Hydrographic Service, *Sailing Directions CEN 301: St. Lawrence River (Montreal to Kingston), Second Edition* (2010), Chapter 1, p. 6, line 65.

Personnel certification and experience

The master of the *Kaministiquia* had joined Lower Lakes Towing Ltd. in 2007. He held a Master, Near Coastal certificate of competency, and had been master on the *Kaministiquia* since 2016. He also possessed a Restricted Radio Operator's Certificate (ROC-MC) and a valid pilotage certificate,⁶ and had 10 years' experience performing pilotage as a chief mate and then master in the St. Lawrence Seaway.

The master of the *Algoma Discovery* held a Master Mariner certificate of competency. He started sailing with the Algoma Central Corporation in 1989 and became a master in 2003. He possessed a RTR - Restricted RT Operator Certificate (old), a valid pilotage certificate, and had been performing pilotage as a master in the St. Lawrence Seaway since 2003.

Regulations applicable to vessels transiting the St. Lawrence Seaway

International Regulations for Preventing Collisions at Sea, Canadian Modifications

The *International Regulations for Preventing Collisions at Sea* (COLREGs) are an international convention that establishes, among other things, the rules of conduct at sea when a risk of collision exists between vessels. Rule 9(a) of the COLREGs indicates that a vessel proceeding along a narrow channel shall keep near to the outer limit of the channel on its starboard side.⁷ This means vessels are to pass port-to-port.

The Canadian Modifications to the COLREGs require that, in a narrow channel where there is a current and 2 vessels are meeting from opposite directions, "the vessel proceeding with the current or tidal stream shall be the stand-on vessel and shall propose the place of passage [...]"⁸ and the side on which the vessel will pass. The Canadian Modifications further specify that vessels may use a bridge-to-bridge radiotelephone instead of the prescribed sound signals to reach agreement in a meeting.⁹

As the *Algoma Discovery* was proceeding downbound as the stand-on vessel (i.e., with the current) along the South Shore Canal, it was required to propose meeting and passing arrangements to the *Kaministiquia*. While the masters of the 2 vessels did agree to a planned location of passage, they did not revise or update the plan as it became apparent that they would not meet in the agreed location.

St. Lawrence Seaway Management Corporation requirements

The St. Lawrence Seaway Management Corporation's *Seaway Handbook* prescribes the maximum speeds allowed in the different Seaway sections. According to the handbook, the maximum speed in all canals, including the South Shore Canal, is 6 knots.¹⁰ Vessels may travel at a higher speed,

⁶ Canadian vessels may be exempt from mandatory pilotage if their masters or deck watch officers (who are regular crew members) are certified to perform pilotage duties.

⁷ International Maritime Organization, *Convention on the International Regulations for Preventing Collisions at Sea* (COLREGs), 1972, Section 1, Rule 9(a).

⁸ Transport Canada, C.R.C., c. 1416, *Collision Regulations*, Schedule 1, Rule 9(k)(i).

⁹ Ibid., Rule 34(l).

¹⁰ St. Lawrence Seaway Management Corporation, *Seaway Handbook*, Practices and Procedures (2019), Part 3, Section 28: Speed limits, p. 18.

depending on their particulars and weather conditions, for short periods of time to ensure safe navigation.

In this occurrence, both the *Kaministiquia* and *Algoma Discovery* maintained speeds of under 6 knots while transiting the South Shore Canal. Although the *Algoma Discovery* requested that the *Kaministiquia* increase its speed, the *Kaministiquia* maintained its speed within the acceptable limit.

Vessels may also meet within the Seaway, except at places designated as no-meeting areas, or if otherwise instructed by the Seaway traffic controller.¹¹ Masters and pilots may arrange meetings of vessels, and the Seaway traffic controller may assist in such arrangements upon request. Two vessels may meet each other in the curve of the South Shore Canal, as the *Kaministiquia* and *Algoma Discovery* did in this occurrence. However, it is common practice for masters and pilots to meet in the canal's 2 straight sections, either upstream or downstream of Seaway bridges 7A and 7B.

Navigation in narrow channels

When navigating in restricted waters, a vessel is subject to the following effects:

- In narrow channels a vessel tends to find the centre of the channel. A vessel approaching one bank of the channel tends to be pushed away by the build-up of water on that side, commonly referred to as bank cushion effect.
- Another effect is bank suction. This is caused by the asymmetrical flow of water around the vessel sailing in the proximity of one of the banks, which may pull it towards the bank.
- Vessels experience hydrodynamic interaction when passing or overtaking one another in close proximity. The interaction forces may cause an uncommanded yaw.^{12, 13}

These hydrodynamic effects may cause problems in manoeuvring, which can lead to grounding or collision. The *Kaministiquia* and *Algoma Discovery* were subject to these effects when transiting the Seaway, and the effects may have been amplified when the 2 vessels manoeuvred to meet and pass in the South Shore Canal.

VHF radiotelephone communications between the vessels

A few brief exchanges over VHF radiotelephone occurred between the master of the *Kaministiquia* and *Algoma Discovery* as they made their meeting and passing arrangements. The exchanges did not follow standardized bridge-to-bridge VHF radiotelephone communication procedures and phraseology as prescribed by Industry Canada's Syllabus for the Restricted Operator's Certificate – Maritime Commercial (ROC-MC).¹⁴

In this occurrence, no communication occurred between the masters regarding their ability to meet at the intended passing point, given their vessels' respective speeds and operational constraints. Once it became obvious that they would not be able to meet in the straight section of the canal, no

¹¹ St. Lawrence Seaway Management Corporation, *Seaway Handbook*, "Practices and Procedures, (2019), Part 3, Sections 31(2), 31(3), Meeting and passing, p. 21.

¹² An uncommanded yaw occurs when hydrodynamic interaction causes a vessel to move independently from side-to-side, without direction from the vessel rudder.

¹³ J.F. Kemp and P. Young P, *Seamanship Notes, Fifth edition* (Butterworth-Heinemann, 1992).

¹⁴ Industry Canada, "Syllabus for the Restricted Operator's Certificate - Maritime Commercial (ROC-MC)", RIC-25, Issue 3 (April 2008), at <https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf05269.html> (last accessed 30 June 2020).

communication occurred to update their plan. The lack of communication and explicit coordination between the vessels may have impaired the masters' shared understanding of the situation.

Safety messages

Bridge teams must establish and implement comprehensive meeting and passing arrangements and communicate effectively to ensure a common understanding if circumstances change.

Additionally, it is important that bridge teams consider the hydrodynamic effects their vessels are subject to while navigating and manoeuvring in narrows such as the St. Lawrence Seaway.

This report concludes the Transportation Safety Board of Canada's investigation into this occurrence. The Board authorized the release of this report on 02 July 2020. It was officially released on 08 July 2020.

Visit the Transportation Safety Board of Canada's website (www.tsb.gc.ca) for information about the TSB and its products and services. You will also find the Watchlist, which identifies the key safety issues that need to be addressed to make Canada's transportation system even safer. In each case, the TSB has found that actions taken to date are inadequate, and that industry and regulators need to take additional concrete measures to eliminate the risks.

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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

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