

Transportation Safety Board
of Canada



Bureau de la sécurité des transports
du Canada

MARINE INVESTIGATION REPORT
M04L0099



COLLISION

BETWEEN THE PLEASURE CRAFT *MONDISY*
AND THE CONTAINER SHIP *CANADA SENATOR*
OFF SAINT-NICOLAS, QUEBEC
11 AUGUST 2004

Canada

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 Investigation Report

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and the Container Ship *Canada Senator*
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Summary

At 0530 eastern daylight time on 11 August 2004, the container ship *Canada Senator* was proceeding downbound on the St. Lawrence River under the conduct of a pilot when the sailboat *Mondisy*, under power, was sighted by the bridge team on board the *Canada Senator* about two nautical miles ahead in the main channel. The distance between the *Canada Senator* and the *Mondisy* decreased, but the *Mondisy* remained in the main channel. Because the pilot of the *Canada Senator* was in doubt about the intentions of the *Mondisy*, warning signals were sounded on two occasions on the ship's whistle but to no avail. Avoidance manoeuvres were carried out by the *Canada Senator*, but a collision ensued.

As a result of the impact, the ferro-cement sailboat *Mondisy* sank almost instantly. Two of the four persons on board the *Mondisy* were recovered from the water and survived with minor injuries and the other two persons lost their lives.

Ce rapport est également disponible en français.

Other Factual Information

Particulars of the Vessels

Name	<i>Canada Senator</i>	<i>Mondisy</i>
Official Number	90324	–
Port of Registry	Monrovia, Liberia	Montréal, Quebec
Flag	Liberia	Canada
Type	Container	Sailboat
Gross Tons	30 567	–
Length ¹	202.5 m	18 m
Draught ²	F: 9.05 m A: 9.15 m	–
Built	1992, Gdansk, Poland	1967, home-built, ferro-cement
Propulsion	Sulzer diesel, 16 260 kW, one propeller	Diesel motor, one fixed-pitch propeller
Cargo	Containers	–
Crew Members	28	Skipper and one crew
Passengers	1	2 guests
Owners	NSB Niederelbe Schiffahrtsgesellschaft mbH	Private owner

History of the Voyage

Aboard the Canada Senator

At 2118 eastern daylight time³ on 10 August 2004, the container ship *Canada Senator* left the port of Montréal, Quebec, outbound for Gioia Tauro, Italy. The river was calm and the weather conditions were reported to be clear, with light winds, and good visibility. The ship was under the conduct of a pilot, with the master, the helmsman, and the chief officer acting as officer of

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 of units.

² See Glossary at Appendix B for all abbreviations and acronyms.

³ All times are eastern daylight time (Coordinated Universal Time minus four hours).

the watch also on the bridge. At 0208 on August 11, after changing pilots off Trois-Rivières, Quebec, the ship continued down the St. Lawrence River, making about 16 knots.⁴ Traffic was reported to be light with three other ships encountered.



Photo 1. The *Canada Senator*

Some time after 0530, in daylight, upstream of Saint-Nicolas, Quebec, a sailboat, later identified as the *Mondisy*, was spotted by the bridge team approximately two nautical miles ahead of the *Canada Senator*. From a distance, the sailboat appeared to be proceeding under power down river, but the bridge team later realized that the boat was moving in a zigzag movement across the main navigation channel. The pilot reported the vessel's arrival at the "Saint-Nicolas" calling-in point to the Marine Communications and Traffic Services (MCTS) centre in Québec, Quebec, a little early (approximately two minutes) to avoid being distracted and to pay attention to the movements of the *Mondisy*. At about 0545, while navigating on the Pointe à Basile ranges, the pilot sounded five to six short blasts on the ship's whistle to warn the *Mondisy* of the increasing danger and then requested a course alteration to starboard of some three degrees as the *Mondisy* was now seen to be crossing the river from starboard to port.

Almost immediately, the *Mondisy* crossed over the track of the *Canada Senator* from port to starboard; the pilot sounded the warning signal once again. The helm was put hard-a-port and the pilot ran to the starboard wing to see if the sailboat would clear the bow. The sailboat crossed close in front of the ship, but then turned again across the track of the *Canada Senator*. Hard-a-starboard helm was ordered, but a collision occurred within the buoyed channel between buoys Q19 and Q18. There is conflicting information as to whether the collision took place before or just after the last hard-a-starboard order. On coming in contact with the bow of the *Canada Senator* at approximately 0554, the hull of the *Mondisy* was breached and the sailboat sank almost immediately. The Québec MCTS centre was immediately informed.

One person was spotted in the water but a lifering was not released. The ship's speed was reduced, and the container ship was manoeuvred back towards the accident position. Meanwhile, some 35 minutes after the collision, the Canadian Coast Guard (CCG) search and rescue (SAR) vessel CCGC *Sterne* arrived on the scene and, at 0630, recovered two survivors hanging on to flotsam. One of the survivors had tried to inflate the liferaft. However, the painter was too long to work while swimming and he was unable to inflate the liferaft. At 0648, the *Canada Senator* anchored near the collision site and, at 0654, launched its rescue boat to join in the search operation. A CCG helicopter as well as CCG auxiliary vessels searched for the remainder of the day without success.

⁴ All speeds, unless otherwise indicated, are over the ground.

At 0754, the Québec MCTS centre requested that the *Canada Senator* proceed to anchorage B at the port of Québec. At 0918, after having recovered the rescue boat and weighed anchor, the ship reached the port of Québec. The pilot disembarked at 0936. By this time, the pilot was reportedly exhausted. Before the ship weighed anchor, a relief was neither provided by the Laurentian Pilotage Authority nor was it requested by the pilot.

Visibility from the Bridge of the Canada Senator

After the accident and while anchored in the port of Québec, measurements were taken and it was determined that the *Canada Senator* had containers stacked to a height that obscured the horizontal field of vision to a distance of approximately 610 m forward of the bow. The International Convention for the Safety of Life at Sea⁵ required the *Canada Senator* to ensure that, where practicable, the view of the sea surface was not obscured by more than two ship lengths, that is 405 m.

Aboard the Mondisy

At 1200 on 10 August 2004, the sailboat *Mondisy*, with an enclosed cockpit and under power, departed Longueuil, Quebec, with four persons on board. The owner of the sailboat was accompanied by a co-worker, a companion and an 18-year-old crew member. The owner planned to sail with a small crew, including the crew member, to South America in December after cruising in eastern Canada during the fall.



Photo 2. The *Mondisy*

The *Mondisy* maintained speeds of between five and seven knots during the downbound voyage to Québec. The trip was scheduled to take some 24 hours to complete; no formal voyage plans were prepared. The owner, the co-worker, and the crew member relieved each other at the helm on an as-needed basis throughout the day until approximately 2230, when the owner and his companion retired to their cabin. From about 2230 to some time after 2300, the crew member and co-worker shared the helm until the vessel arrived at the port of Trois-Rivières. Thereafter, the owner conned the sailboat through the port and then returned to bed.

Throughout the night, the crew member and the co-worker resumed alternating the workload on an as-needed basis as the vessel continued making way towards Québec. Under directions from the owner, the vessel was navigated using the electronic chart system (ECS) and kept to the right side of the navigable channel, very close to the green buoys. Around 0300 on August 11, the owner and his companion were inadvertently woken up by the noise created by the crew member as he lifted deck plates in the engine room to change the supply from one fuel tank to another. Both the owner and his companion returned to sleep around 0400. Shortly

⁵ SOLAS, Chapter V, Safety of Navigation, Regulation 22, Navigation Bridge Visibility

thereafter, the crew member was relieved at the helm by the co-worker because the former was feeling tired. With the co-worker now assuming helm and lookout duties, the crew member fell asleep while sitting in the companionway. This is the last known event on board before the collision.

Shore Side Observation

A sailboat making unusual movements caught the attention of an observer located high on an overlooking cliff in Saint-Nicolas. The *Mondisy* was observed circling to port, that is counterclockwise, for at least 15 minutes, and possibly for as long as 25 minutes before the collision.

Injuries to Persons

Two survivors were recovered from the water and admitted to hospital. They were later released with minor injuries.

The co-worker on duty at the time of the collision and the owner asleep in his cabin died as a result of the accident. The owner's body was found within the sunken wreck by divers soon after the accident. The co-worker's body was found on August 16 a short distance down river from the collision site.

According to the Coroner's report, the injuries sustained by the co-worker were consistent with severe trauma and, as such, were probably as a result of the impact. Toxicology results were found to be negative and there is no information to suggest that alcohol had been consumed.

Damage to the Vessel

The wreck of the *Mondisy* was salvaged from the river bottom 22 days after the collision in position latitude 46°42'54" N, longitude 071°25'42" W. Damage was extreme as the entire hull had collapsed under the force of the impact with the *Canada Senator*. The laptop computer used for navigation was recovered, but information pertaining to the last voyage was not retrievable from the hard disc because of water damage.

Training and Experience

The master and the officer of the watch of the *Canada Senator* were duly certified officers as per international standards with 23 and 20 years of experience respectively. The pilot on board the *Canada Senator* was also a mariner of experience, having been at sea since 1976 and a pilot since 1986. He had obtained a Class A pilotage licence in 1990.

The owner, co-worker and crew member aboard the *Mondisy* were not experienced navigators. The *Mondisy*, however, was equipped with global positioning system (GPS) navigation integrated to an ECS application on a laptop computer. The crew used the software to navigate the sailboat under power down the St. Lawrence River, in daytime and at night. No one on board the *Mondisy* had formal navigation training and only the owner held a Pleasure Craft

Operator Card (PCOC). Due to transitional provisions that will only apply in 2009, neither the owner nor the co-worker were required to hold this certification. The 18-year-old crew member was, however, required to have a PCOC to operate the *Mondisy*.⁶

Pleasure Craft Operator Card

The *Competency of Operators of Pleasure Craft Regulations* provide a potential mechanism for risk mitigation through the self-study and testing process prior to being awarded a PCOC.⁷ Although this program covers many aspects of pleasure craft operation, including keeping an effective audible and visual lookout, voyage planning is not part of the syllabus. Tests are also administered via the Internet and the validation is done by use of proctors. Procedures are in place that define the roles and responsibilities of course providers and proctors.

Analysis

Movement of the Sailboat Mondisy

The movement of the sailboat was reported as being unusual, but many pilots report similar experiences with pleasure boats. To the bridge team who observed the *Mondisy* on board the *Canada Senator*, the sailboat was moving back and forth across the river. A shore-based observer very close to the collision site and high on the overlooking cliffs indicated that the sailboat had in fact been circling to port (counterclockwise) for at least 15 minutes before the collision. The *Mondisy* was also drifting down river with the ebbing tidal current at between 2 and 3 knots.

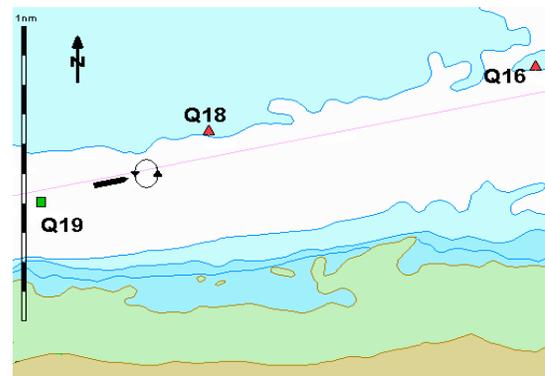


Figure 1. *Mondisy* track (not to scale)

From the nearby cliffs and looking down at the *Mondisy*, the sailboat's true movement could be observed, that is circling. However, from a distance such as on board the *Canada Senator*, the circular movements of the *Mondisy* appeared as a zigzag manoeuvre. Repeatedly turning in circles is consistent with either a mechanical malfunction related to the steering, or the helm simply being left unattended for some time before the collision. There was no sign of activity on deck during the 15-minute period before the collision.

⁶ Since September 1999, PCOC cards are mandatory for persons born after 01 April 1983 who operate a pleasure craft.

⁷ *Canada Shipping Act, Competency of Operators of Pleasure Craft Regulations*, Transport Canada, SOR/99-53

Ferro-cement Construction

Although reports of pleasure craft hindering large vessels in the main shipping channel is a common occurrence, collisions are rare. In 1986, a 12 m fibreglass sailboat and a laker were involved in a collision in the main shipping channel near Chippewa Point, New York, United States.⁸ The sailboat remained perched on the bulbous bow of the laker for several minutes and, when way was taken off the laker, the sailboat slipped off and remained afloat. The sailboat sustained only minor hull damage and the occupants sustained some bruises. The *Mondisy*, of ferro-cement construction, was made of materials without inherent buoyancy and relatively unresilient. Upon impact with the steel bow of the *Canada Senator*, the ferro-cement hull was breached and the sailboat quickly sank.

Watchkeeping Schedules and Fatigue

The crew of the sailboat relied on an unstructured single-person watchkeeping system that required the watchkeeper to also act as the helmsman/lookout and did not provide time for scheduled rest. Individuals were temporarily relieved from duty when they requested a break or when the owner of the sailboat felt he should operate the boat through difficult areas. The unstructured watchkeeping continued throughout the evening and night. At about 0400, the crew member requested relief from the co-worker. The fact that the crew member fell asleep in the companionway moments after being relieved is an indication that he had reached a level of fatigue that made him unfit for duty.

At the time of the occurrence, the lookout and helm duties had been conferred on the co-worker. By this time, the co-worker had accumulated some 18 hours of on-duty, off-duty activity on board the sailboat as well as some four to six hours of morning preparation time before departure; this translates into being awake continuously for at least 22 hours. After long periods of continuous wakefulness, sleepiness becomes profound in the early morning hours.⁹ When coupled with a monotonous task, such as steering a boat essentially alone (all others were sleeping) and the resounding rhythm of the motor, falling asleep becomes difficult to avoid.

There is no information to suggest that alcohol was consumed during the trip and because the co-worker's toxicology result was negative, the impact of drugs on his performance can be ruled out. It is therefore likely that the unstructured watchkeeping system aboard the *Mondisy* led to a sleep debt that caused the co-worker to fall asleep while on duty at the helm. Once asleep, he would have lost muscle tone and hence released the steering wheel. The vessel would then eventually have begun to track in a closed circle in the direction of the last rudder input. In this case, the wheel was turned counterclockwise, making the vessel turn to port.

⁸ Marine Casualty Report 454 (1986)

⁹ Many studies have shown that sleepiness is most profound in the early morning hours. See for example T. Akerstedt and M. Gillberg, "Experimentally displaced sleep: Effects on sleepiness," *Electroencephalography and Clinical Neurophysiology*, 1982, 54: 220-226.

A recent study has indicated that watchkeeping schedules employing two or less people can lead to accidents caused by fatigue and that poor watchkeeping standards on commercial vessels decreases the likelihood of detecting collision risks.¹⁰ The risks due to improper watchkeeping practices on pleasure craft may be even greater than those found on commercial vessels because pleasure craft operators are neither required to follow any prescribed watchkeeping standard nor have they necessarily acquired proper training or awareness of these issues.

Ship-to-Ship Communications

Ship-to-ship communications are primarily carried out on very high frequency (VHF) radiotelephone frequencies. Notwithstanding this type of communication, vessels are also required to communicate using light and sound signalling devices pursuant to the *International Regulations for Preventing Collisions at Sea* (Collision Regulations). Radio communications between ships and with local MCTS centres are carried out by continuous monitoring of dedicated radiotelephone frequencies. When a vessel's intentions are found to be ambiguous, a "Security" radio message can be transmitted or relayed through a MCTS centre directly to the bridge team members concerned, thereby alerting the vessel to impending danger.

Commercial vessels do not readily make use of VHF radiotelephones to communicate with pleasure craft in spite of the availability of these instruments on board many pleasure craft such as the *Mondisy*. As radio watchkeeping is not mandatory aboard pleasure craft, operators of commercial vessels are not inclined to communicate with pleasure craft by this means, as in this instance. More often than not, sound signals are used. Light and sound signals have limitations that decrease their effectiveness. For instance, light signals are less effective during the day. Local engine noise and/or an enclosed cockpit/bridge makes hearing of sound signals difficult, thereby reducing their effectiveness.

In this instance, the sailboat's engine was operated throughout the voyage down river. The engine noise, together with the enclosed cockpit of the *Mondisy*, would have made the two warning signals by the *Canada Senator* difficult to hear.

Operational Environment and Safety

Experience has shown that pleasure craft keep out of the way of large vessels that can only navigate within the confines of the channel. This expectation is further reinforced by the Collision Regulations¹¹ that require them to do so. For many pilots, the sounding of the warning signal, that is at least five short and rapid blasts on the ship's whistle, usually produces the desired effect of getting attention and appropriate action.

¹⁰ Marine Accident Investigation Branch (MAIB), *Bridge Watchkeeping Safety Study*, Southampton, United Kingdom, 2004

¹¹ Rule 9 (b) of the Collision Regulations states that small vessels shall not impede the passage of a vessel which can safely navigate only within a narrow channel or fairway.

Commercial vessels often meet pleasure craft that are being operated in an apparently erratic and unpredictable manner in the main navigation channel. Under such conditions, it is often difficult to assess whether a risk of collision exists¹² and substantial course alterations or speed reductions are seldom necessary or even possible in the time available.

Action by Stand-on Vessel

Under the Collision Regulations, the *Canada Senator* was required to maintain its course and speed, but as soon as it became apparent that the *Mondisy* was not taking appropriate action to keep out of the way, the *Canada Senator* was required to take such action as would be best to avoid collision.¹³ In this case, course alterations were carried out, but the *Canada Senator* was not slowed down either to give it more time to assess the situation¹⁴ or when collision was imminent.

Technological Advances

The sailboat was equipped with an ECS programmed on a laptop computer and linked to a GPS navigation device. The navigational channel below Trois-Rivières is relatively difficult and the use of an ECS or effective use of radar is valuable for navigating safely through the channel. The crew lacked knowledge of night navigation using aids such as a radar. However, the presence of an ECS provided the crew a means to navigate within the confines of a channel, especially at night due to its relative ease of monitoring the vessel's position and in accordance with the operator's directions. The decision to undertake the long passage that included night navigation ought to have taken into consideration, among others, the ability to effectively monitor the vessel's progress, density and movement of traffic in the vicinity, and the fact that sufficient well-rested personnel are on watch (effective watchkeeping system). In this occurrence, the owner lost his life, and this precluded the investigation from ascertaining the factors that influenced his decision making to undertake this trip without stopping over for the night. Additionally, an operator lacking experience and training in navigation is likely to be overreliant on the ECS, a potentially risky situation when operating in restricted waterways at night or in poor visibility.

Pleasure Craft Operator Training

Of the three persons operating the *Mondisy* during the trip down river, only the owner held a valid PCOC. The crew member, being 18 years of age, was required to, but did not have this proficiency.

¹² TSB Marine Investigation Report M92L3008, collision between the *Amelia Desgagnés* and the pleasure craft 6E7221

¹³ Rule 17 (a)(ii) of the Collision Regulations

¹⁴ Rule 8 (e) of the Collision Regulations

Keeping a proper lookout and ensuring that a well-rested crew operate the vessel makes good common sense; the principle of rest and maintaining a vigilant lookout for oncoming traffic is intuitive. Nonetheless, research has shown that fatigued individuals do not reliably estimate their own level of alertness and performance.¹⁵ Effective training, such as afforded through the PCOC, can help disseminate best practices and reinforce good seamanship practices. However, PCOC certification is not mandatory for the majority of pleasure craft operators until 2009.

Proper voyage planning, including the planning of rest periods for the crew to operate the vessel safely at all times, is not presently part of the PCOC syllabus.

The crew of the *Mondisy* did not fully appreciate the benefits of keeping a good lookout, both auditive and visual,¹⁶ as well as the risk of fatigue when under way for an extended period of time without a structured relief system.

Post-Collision Safety Risks

Appropriate decision making and use of proper rescue equipment are critical to avoid additional risks after an accident occurs. Although not causal factors in this occurrence, the following situations had the possibility of exacerbating an already poor situation:

- After the collision, the survivors found themselves in the water without personal flotation devices. The liferaft, uninflated and floating on the surface of the water, was approached by one of the survivors but he was unable to deploy it because the painter proved to be too long to work with while swimming. The deployment painter must be pulled to activate the compressed air bottle. Safety issues with respect to liferaft inflation have been addressed in past TSB reports.¹⁷ During abandonment, the cumulative effect of anxiety resulting from the situation and the loss of valuable time associated with hauling the length of painter to inflate the liferaft may decrease the survival time of a non-swimmer.
- The *Canada Senator's* man overboard lifebuoys and smoke flares were not released and the rescue boat was not operational within an effective time period.¹⁸ Although the collision took place at approximately 0554, the *Canada Senator's* rescue boat was not lowered into the water until 0654, one full hour after the occurrence. Such a delay has the potential to reduce the chances of survival of persons in the water. A CCG SAR vessel was in the area by 0627. The *Canada Senator's* rescue boat should have been launched once the vessel slowed down to bare steerageway.

¹⁵ Mark R. Rosekind, Philippa L. Gander, Linda J. Connell, et al., *Crew Factors in Flight Operations X: Alertness Management in Flight Operations Education Module*, NASA Ames Research Center, 2001

¹⁶ Rule 5 of the Collision Regulations

¹⁷ TSB reports M95W0005 (*Pacific Bandit*) and M95W0013 (*Hili-Kum*)

¹⁸ SOLAS, Chapter III, Regulation 14 states that "Rescue boats shall be stowed in a state of continuous readiness for launching in not more than 5 minutes."

- The pilot was not immediately replaced by a substitute once the *Canada Senator* was safely anchored near the collision site. In the absence of a formal post-accident relief policy by the Laurentian Pilotage Authority and/or the *Corporation des pilotes du Saint-Laurent central*, the pilot chose to remain on the *Canada Senator* during the SAR operation and then to weigh anchor, navigate down river, and then re-anchor the vessel at the port in Québec; a process that took over three hours to complete. This is not an unreasonable amount of time under normal circumstances; however, in this instance, the pilot reported being exhausted by the time he disembarked. A relief was not requested. In previous reports and in a safety communication addressed to the Laurentian Pilotage Authority in 2001, the TSB emphasized that the lack of a formal post-accident pilot relief policy increases risks.¹⁹ This risk has been recognized by the Great Lakes Pilotage Authority which has had such a policy for some time. Collision with another vessel whose occupants are thrown into the water and with two persons missing is a very stressful event. Functioning under stress can cause decrements in performance such as narrowing of attention, reduction in working memory, and decrease in cognitive processing speed.²⁰ These decrements are known precursors to increased risk of human error.

Findings as to Causes and Contributing Factors

1. It is likely that the unstructured watchkeeping system aboard the *Mondisy* led to a sleep debt that caused the co-worker to fall asleep while on duty at the helm.
2. The warning signals sounded on the ship's whistle of the *Canada Senator* did not produce the desired effect, that is arousing attention and indicating to the pleasure craft that it was standing into danger. Alterations of course without reduction in speed did not prevent the collision.
3. The *Mondisy*, of ferro-cement construction, was of materials without inherent buoyancy and relatively unresilient. Upon impact with the *Canada Senator*, the hull was breached and the sailboat quickly sank.

¹⁹ Marine Safety Information Letter 05/01 and TSB Report M99L0126 (*Alcor*), sections B 2.3 and E 4.1.5.1

²⁰ See discussion of stress and performance found in S. Sonnentag and M. Frese, "Stress in Organizations," in W. Borman, D. Ilgen., & R. Klimoski (Eds.), *Handbook of Psychology Vol. 12, Industrial and Organizational Psychology*, New Jersey: John Wiley and Sons, 2003, pp. 471-473.

Findings as to Risk

1. Pleasure craft operators may not be sensitized to the fact that long voyages will require a crew that is well rested and alert and that a structured relief system is necessary.
2. The lack of a formal post-accident pilot relief policy on the part of the Laurentian Pilotage Authority and/or the *Corporation des pilotes du Saint Laurent central* increases risks.
3. On the *Canada Senator*, lifebuoys were not deployed and the rescue boat was not readied and launched in an appropriate time to be effective.
4. It is difficult to inflate a liferaft while swimming because the person in the water has to haul the painter and remain afloat. Since the liferaft could not be inflated, the crew was deprived of a primary mode of rescue.

Other Findings

1. An operator lacking experience and training in navigation is likely to be overreliant on the electronic chart system, a potentially risky situation when operating in restricted waterways at night or in poor visibility.
2. Even though the sector of obscurity forward of the bow as seen from the bridge of the *Canada Senator* was greater than that required by the International Convention for the Safety of Life at Sea (SOLAS), the *Mondisy* was seen from a distance and monitored by the bridge team; therefore the issue of visibility is not a factor in the collision.
3. The very high frequency radiotelephone was not used to advantage by either vessel.

Safety Action

Safety Concern

Pilot Relief Subsequent to an Occurrence

One of the elements of system safety in the marine environment is a pilot's performance and his/her ability to retain full concentration at all times. In order to ensure such a level of concentration, the pilot needs to be well rested and ideally emotionally removed from the occurrence. While there are provisions made to contact pilots in emergency situations and offer relief, the decision to request relief or assistance rests with the occurrence pilot. To date, there is no mandatory pilot relief policy in place at the Laurentian Pilotage Authority (LPA) nor at the *Corporation des pilotes du Saint-Laurent central*. However, it is reported that the LPA intends to take measures to have the pilots relieved following serious occurrences.

Both fatigue and stress associated with having been involved in an occurrence may have an impact on a pilot's ability to perform his/her duties. It has long been known that stress can induce certain types of error. Finally, human nature and professional pride can hinder any objective self-assessment of a pilot's need to be relieved or assisted.

In 1997, the bulk carrier *Venus* grounded near Bécancour, Quebec. The pilot, under contract to the LPA, had elected neither to seek relief nor to request an additional pilot to share the workload, and had remained on board for an extended period. In 1999, a similar situation arose on board the grounded bulk carrier *Alcor*. Both the *Venus* and the *Alcor* ran aground for a second time after refloating. While not necessarily causal, degradation in pilot performance due to fatigue has been identified as a factor in the second groundings of these vessels. The TSB identified these safety issues in Marine Safety Information Letter 05/01 addressed to the LPA in 2001.

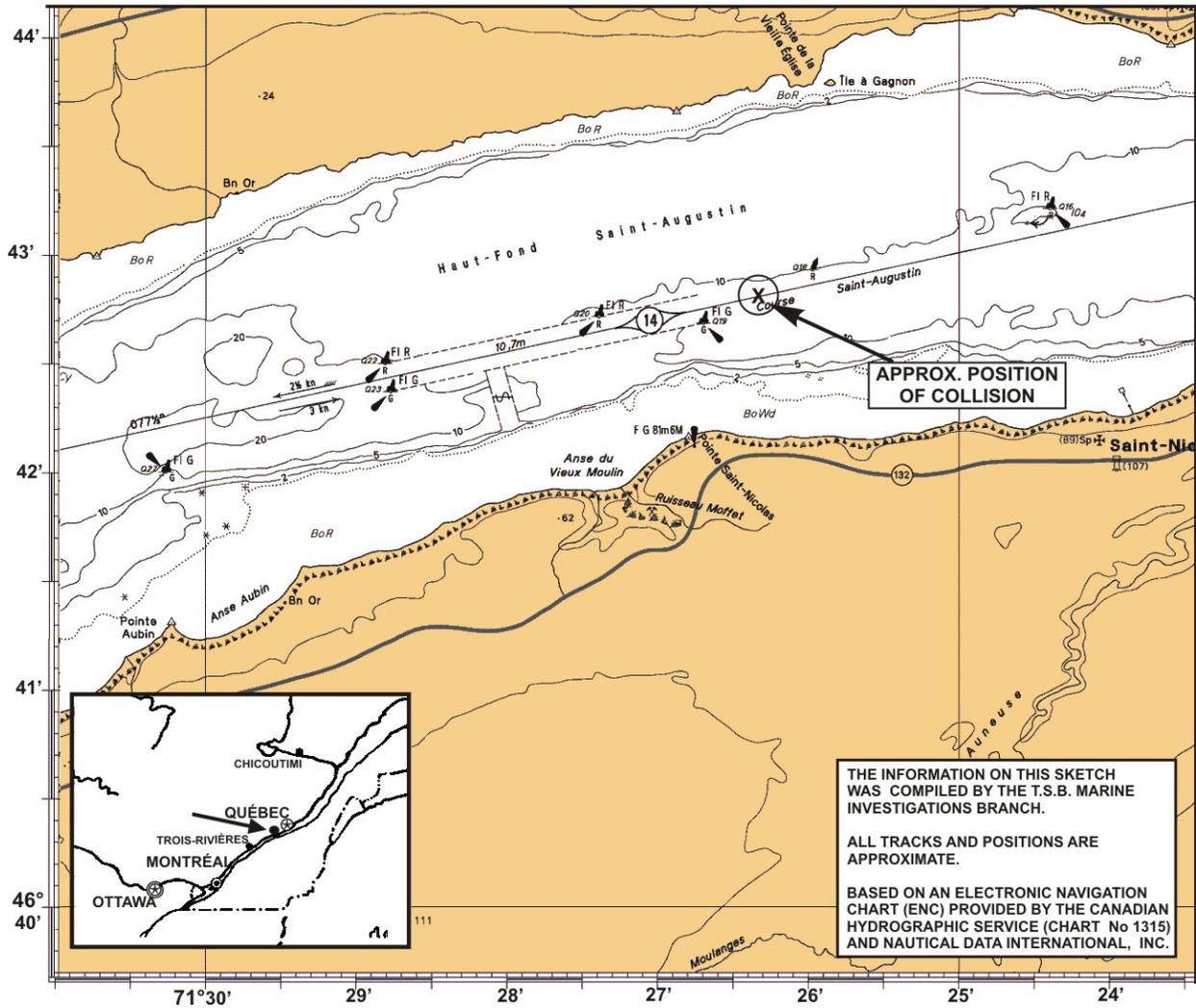
While the need for relieving a pilot involved in an occurrence has been recognized by the Great Lakes Pilotage Authority, the LPA does not require such relief, even though it does recognize the need to relieve a pilot under normal conditions when a voyage is extended due to a slow ship or in winter conditions. In the absence of clear criteria regarding relief of pilots subsequent to an occurrence, a pilot is placed in the difficult position of making a decision on whether to request relief or assistance. Under the circumstances, a pilot may not be best suited to make this decision – a decision that can have an impact on navigational safety.

The Board remains concerned that, subsequent to a serious marine occurrence, the LPA continues to operate without the benefit of a mandatory pilot relief policy, thus compromising safety and increasing risks.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 10 January 2006.

Visit the Transportation Safety Board's Web site (www.tsb.gc.ca) for information about the Transportation Safety Board and its products and services. There you will also find links to other safety organizations and related sites.

Appendix A – General Chart Area



Appendix B – Glossary

A	aft
CCG	Canadian Coast Guard
CCGC	Canadian Coast Guard cutter
Collision Regulations	<i>International Regulations for Preventing Collision at Sea</i>
ECS	electronic chart system
ENC	electronic navigation chart
F	forward
GPS	global positioning system
kW	kilowatts
m	metres
MCTS	Marine Communications and Traffic Services
N	north
PCOC	Pleasure Craft Operator Card
SAR	search and rescue
SOLAS	International Convention for the Safety of Life at Sea
TSB	Transportation Safety Board of Canada
VHF	very high frequency
W	west
°	degrees
'	minutes
"	seconds