

Transportation Safety Board
of Canada



Bureau de la sécurité des transports
du Canada

MARINE INVESTIGATION REPORT
M15C0094



PASSENGER OVERBOARD AND SUBSEQUENT LOSS OF LIFE
PASSENGER VESSEL *NORTHERN SPIRIT I*
TORONTO, ONTARIO
13 JUNE 2015

Canada

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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 M15C0094

Passenger overboard and subsequent loss of life

Passenger vessel *Northern Spirit I*

Toronto, Ontario

13 June 2015

Summary

On 13 June 2015, at approximately 1930 Eastern Daylight Time, the *Northern Spirit I* was on an evening cruise when a passenger fell overboard. The vessel was in a position approximately 4 nautical miles west of Toronto, Ontario at the time. Search and rescue authorities were notified and conducted a search of the area without success. The passenger's body was recovered 18 days later in Humber Bay by a Toronto Police Service marine unit.

Le présent rapport est également disponible en français.

Factual information

Particulars of the vessel

Table 1. Particulars of the vessel

Name of vessel	<i>Northern Spirit I</i>
International Maritime Organization (IMO) number	8870073
Port of registry	Toronto, Ontario
Flag	Canada
Type	Passenger vessel
Gross tonnage	488.90
Length overall	38.71 m
Draft at time of occurrence	Forward: 2.77 m Aft: 2.77 m
Built	1983, Blount Marine Corp. (Warren, Rhode Island, United States)
Propulsion	2 high-speed 2-stroke diesel engines driving 2 fixed-pitch propellers (403 kW)
Crew	22
Passengers	437 (maximum capacity 588)
Registered owner/manager	Spirit Cruise Line Limited, Toronto, Ontario

Description of the vessel

The *Northern Spirit I* is a passenger vessel that conducts public and private cruises¹ within the Toronto harbour area on Lake Ontario (Appendix A). The company that operates the *Northern Spirit I* also has 5 other passenger vessels.

The *Northern Spirit I* has a main deck, an upper deck, and a bridge deck (Appendix B). The bridge is located forward on the bridge deck and is equipped with a magnetic compass, an echo sounder, a global positioning system (GPS), and a very high frequency (VHF) radiotelephone.

Photo 1. *Northern Spirit I*



¹ A public cruise is accessible to the general public and has a scheduled departure time, while a private cruise is chartered by a person or company and is tailored to the charterer's requests; the general public does not have access.

The vessel also has a public address (PA) system. The engine room is located aft and can be accessed from the main deck.

The *Northern Spirit I* is fitted with an emergency boat that is stowed in launching davits at the stern of the vessel on the main deck (Photo 2).

History of the voyage

In the early evening of 13 June 2015, the master and crew of the *Northern Spirit I* prepared the vessel for a private cruise in the Humber Bay area. At approximately 1815,² the passengers assembled at section 253 in Toronto's inner harbour. The passengers checked in at the charterer's table located on the dock. They were then pre-screened for boarding by crew members (the chief officer [CO] and deckhand) and security guards. The security guards established a checkpoint at the entrance to the gangway where they checked to see if anyone was bringing alcohol on board and verified passenger identification to ensure passengers were of legal drinking age. The passengers were counted as they came on board by the deckhand who was located at the entrance to the gangway. The total number of passengers was noted in the logbook. The CO was positioned on board the vessel at the gangway and monitored the passengers as they came on board.

The vessel departed from section 253 at 1840 with a complement of 22 crew members that included the master, CO, deckhand, and disc jockey (DJ). There were a total of 437 passengers on board, 10 of whom were security guards.

Shortly after departure, the vessel's DJ made a passenger safety briefing announcement over the PA system using a portable microphone. The safety briefing covered topics that included the location of the lifejackets and what to do in an abandon ship or emergency situation.

The vessel's outbound track passed through the Toronto inner harbour's western gap toward Humber Bay. While the vessel was underway, the CO made a security round and observed a passenger who had entered a restricted area on the bow of the vessel. He requested that the head of security post 2 security guards on the vessel's bow. At approximately 1900, 2 security guards were posted at this location to monitor the passengers for unsafe behaviour. The guards observed that one of the passengers was behaving erratically and appeared to be intoxicated.

The passengers on the bow socialized while the vessel entered Humber Bay and proceeded west. At around 1925, the passenger who had been behaving erratically began to make inferences about jumping overboard. At approximately 1930, one of the security guards posted on the bow observed the same passenger leaning over the upper deck railing on the

Photo 2. Position of the emergency boat on the stern



² All times are Eastern Daylight Time (Coordinated Universal Time minus 4 hours).

starboard side. The 2 security guards rushed over to the passenger as the passenger began to go overboard and one of them attempted to grab the passenger's pant leg, but the passenger fell overboard. The security guard then shouted that a person had gone overboard and proceeded aft with a life ring. The other security guard immediately climbed the forward ladder and verbally advised the master, who was on the bridge, of a person overboard on the starboard side.

The master stopped the engines for a short time, altered course to starboard, and then, when clear,³ manoeuvred the vessel in order to return on a reverse track. At 1933, the master called the Toronto Police Service (TPS) marine base on the VHF radiotelephone and reported a person overboard. The master then activated the PA system override and instructed the DJ to stop the music. The man overboard signal was not sounded so as not to alarm the passengers. At 1938, the last known position of the person overboard was relayed to the authorities.

The deckhand, who was amidships on the upper deck, was advised of the situation by word-of-mouth and proceeded aft to prepare the emergency boat for launching. He was accompanied by 3 other crew members, one of whom the deckhand designated as a messenger. Once the crew members arrived at the emergency boat station, the person overboard was observed in the water about 50 metres off the stern. The deckhand instructed one of the crew members to point at the passenger in the water, but shortly afterwards the passenger disappeared from view.

Meanwhile, the CO was proceeding to the upper deck and overheard people shouting "man overboard" from the aft section of the vessel. As well, he noticed some crew and passengers pointing to the water on the vessel's starboard side. The deckhand sent the messenger to get orders from the CO. The CO met the messenger and told the messenger to relay to the deckhand that he should stand by. The messenger returned to the emergency boat station and conveyed the message to the deckhand.

The CO then proceeded toward the emergency boat station. On his way, the CO asked the crew and passengers to point to the passenger in the water if they could see the passenger. Once the CO arrived at the emergency boat station, he threw a life ring in the water. The deckhand had prepared the emergency boat for launching but was advised by the CO not to launch it because the *Northern Spirit I* was still making way. The CO and deckhand proceeded to the bridge at separate intervals to receive instructions from the master.

While the CO was on the bridge, Toronto Police Service Marine Unit (TPS MU) 23 came alongside the vessel's stern. The CO went down to the MU to explain the situation. He returned to the bridge, but shortly thereafter was called back down to clarify the communication frequencies. The CO was then informed by TPS MU 23 to return to the bridge to receive an emergency tasking.

³ In this case, "clear" indicated a safe distance from the person overboard in order to avoid injuring the passenger with the vessel or the vessel's propeller.

At 2009, Joint Rescue Coordination Centre (JRCC) Trenton tasked the *Northern Spirit I* to assist them in the search for the person overboard. At 2012, TPS MU 23 relayed a tasking from JRCC Trenton to the *Northern Spirit I* with instructions to launch the emergency boat.

The CO and deckhand then proceeded aft and the emergency boat was launched at 2016. The CO and deckhand proceeded in the emergency boat toward the Sunnyside beach area to commence a search because the water depth was insufficient for the TPS MUs. One hour later, the emergency boat returned to the *Northern Spirit I* and was brought back on board. At 2138, after being released from the search, the *Northern Spirit I* departed the Humber Bay area and proceeded inbound toward the Toronto inner harbour. The vessel was secured alongside at section 253 at 2230.

Search and rescue

At 1938, TPS MU 23 arrived on scene and assumed the responsibilities of on-scene commander. TPS MU 11 and MU 21 also arrived and, along with MU 23, began the initial search for the overboard passenger. The TPS marine base advised JRCC Trenton of the situation, and JRCC Trenton subsequently notified Marine Communications and Traffic Services (MCTS) Prescott, which issued a Mayday relay at 1958 to alert vessels in the area.

At 2000, JRCC Trenton tasked TPS MU 11, 21, and 23 to follow specific search patterns.

Between 2017 and 2313, the following search and rescue (SAR) resources joined the search: the Canadian Coast Guard Cutter (CCGC) *Cape Storm*, the Toronto Fire Department MU *William Lyon Mackenzie*, and the Peel Regional Police *Marine 1*. The Royal Canadian Air Force (RCAF) search-and-rescue (SAR) helicopter *Rescue 432* also participated in the search. These SAR resources were all assigned specific search patterns by JRCC Trenton via MCTS Prescott. At 2045, MCTS Prescott rebroadcasted the Mayday relay. At 2136, the CCGC *Cape Storm* assumed the role of on-scene commander. At 2153, MCTS Prescott again rebroadcasted the Mayday relay.

At 2311, JRCC Trenton transferred the search to the TPS. The search for that day was suspended at 2317, and all SAR units were ordered to stand down. At 2319, MCTS Prescott cancelled the Mayday. In the following days, the TPS continued their search. The passenger's body was recovered on 01 July by a TPS MU.

Environmental conditions

At the time of the occurrence, the weather was clear and visibility was good. The water surface was calm and the winds were easterly at 5 knots. The air temperature was 20 °C and the water temperature was 9 °C. The sunset was at 2100 and nautical twilight was at 2223.⁴

⁴ Nautical twilight occurs when the geometrical centre of the sun is between 6 degrees and 12 degrees below the horizon. This twilight period is dimmer than civil twilight, and artificial light is generally required for outdoor activities.

Vessel certification

The *Northern Spirit I* was certified and equipped in accordance with existing regulations, and was subject to annual and intermediate inspections by Transport Canada (TC).

Personnel certification and experience

The master of the *Northern Spirit I* held a Master 3000 Gross Tonnage, Domestic certificate of competency issued in April 2011. He had worked for the company since 1990 and had performed the duties of master since 1998.

The CO held a Chief Mate, Limited for a Vessel of 60 Gross Tonnage or More Capacity certificate of competency issued in April 2011. He also held a Master, Limited for a Vessel of 60 Gross Tonnage or More certificate of competency issued in June 2013. He had been employed with the company since 2009 and had worked as CO on company vessels since 2011. He had also occupied other positions within the company, having served as CO on the company's larger vessels and as master on the smaller vessels.

The deckhand had worked for the company since 2012 as a deckhand and, in 2014, obtained a Chief Mate, Limited for a Vessel of 60 Gross Tonnage or More certificate of competency. Since that time, he had worked occasionally in the capacity of CO on the company's vessels.

Emergency preparedness

Company training and familiarization practices

The company provides a crew training and safety manual, called Crew Training and Safety Standards. The manual includes an overview of the company, the vessel's organization, fire and boat drill participation, and information about a safety tour. The manual states that all new crew members must participate in a safety tour prior to their first cruise and it must be noted in the logbook. All new hires are also required to attend an annual "Safety Day" that is hosted by local vessel operators. As well, crew members are also required to sign an "Acknowledgement of Duties and Responsibilities" form.

Drills and safety meetings

Drills were regularly conducted on the *Northern Spirit I* under the direction of the master and/or the CO. Drills to practise various scenarios, such as those involving a fire, were conducted on a bi-weekly basis. These drills included safety meetings with crew members where topics such as donning lifejackets and starting the fire pump were discussed. Fire and boat drills of approximately 60 minutes in length were conducted every 14 days. In conjunction with the TC inspection, a boat and fire drill was conducted annually under the supervision of the master and witnessed by a TC marine safety inspector.

Man overboard procedures

When a crew member observes that a passenger or crew member has fallen overboard, it is standard to advise the bridge team of a “man overboard to starboard (or port).” The master or officer of the watch then signals the man overboard, which may take the form of the International Code of Signals’ signal flag “O” or the Morse code sound signal “O” (3 long blasts on the vessel’s whistle). This can be supplemented by the sounding of the general alarm, which can also be used to activate the muster list. Simultaneously, the master or officer of the watch orders the wheel hard over to the side to which the person fell, ensures that a lifebuoy (preferably lighted) is released, and ensures that a lookout has been appointed. Techniques such as the Williamson Turn, a Single Delayed Turn, or a Double Turn can be used by the vessel to recover the person overboard.⁵ If the vessel is equipped with a smaller craft approved for this use, the craft can be deployed in the recovery.

According to the *Northern Spirit I’s* muster list (Appendix C), the man overboard procedure was to begin with the initial action of sounding 3 long blasts on the vessel’s whistle and maintaining a constant watch on the person in the water. The master was assigned to the bridge, and the DJ was to turn off the music and make announcements as directed by the master. The CO was responsible for deploying a lifesaving appliance and launching the emergency boat. The main deck bartender, deckhand, and engineer were to assist the CO, while the rest of the crew was instructed to do a multitude of tasks such as performing first aid, maintaining control of the passengers, and assisting the cruise manager. For internal communications, a crew member was designated on the muster list as a messenger and a telephone unit with a direct link to the bridge was located at the stern of the vessel. The emergency team leaders had no portable means of communicating with the master on the bridge.

In conjunction with the muster list, the company’s Safety Management Manual also contains a specific emergency man overboard procedure, as follows:

1. Turn wheel hard-over towards side that person fell and/or stop engines until you are assured person is clear of propeller(s). Ensure life rings and other flotation devices have been released.
2. Have crew member maintain constant visual contact with MOB [man overboard] throughout.
3. Update emergency responders as to vessel manoeuvres and recovery operations.
4. Do NOT allow any other person(s) to enter the water.

⁵ Graham Danton, *The Theory and Practice of Seamanship* (New York: Routledge, 1996) pp. 196-198.

Sale and service of alcohol

The Alcohol and Gaming Commission of Ontario (AGCO) administers the *Liquor Licence Act* (LLA), which provides the regulatory requirements for the responsible sale and service of alcohol. At the time of the occurrence, the *Northern Spirit I* held a valid Liquor Sales Licence.

Section 45 of Regulation 719 of the LLA requires that licensees, including vessels, “not permit drunkenness...to occur on premises that are under the exclusive control of the licence holder.”⁶ It further requires that the licence holder “maintains control over the premises, including exercising control over who is permitted to enter the premises or remain on the premises and the activities that are permitted to occur on the premises.”⁷

The operator of the *Northern Spirit I* had a signed contract with the charterer that contained the following stipulation concerning responsible beverage service: “Any passenger who is suspected of intoxication or under the influence of any illegal substance at boarding will be refused entry.”

Pre-boarding verification

It is the responsibility of the licensee (the vessel) to implement and manage pre-boarding verification procedures that are in compliance with the LLA. The company’s customer policy⁸ gives the cruise manager and the vessel’s master authority to deny boarding “to any person who appears to be intoxicated.” The passengers registered at the charterer’s table located on the dock. Before passengers boarded on the evening of the occurrence, security guards hired by the *Northern Spirit I* searched them to verify that alcohol was not being brought on board and checked their identification to ensure that they were of legal drinking age. The passengers were counted as they came on board by the deckhand who was located at the entrance to the gangway and this information was noted in the logbook. The CO was positioned on board the vessel at the gangway and monitored the passengers as they came on board. No passengers were denied boarding the vessel due to signs of intoxication. The crew of the *Northern Spirit I* had previously turned away several passengers from boarding due to intoxication in 2013 and 2014.

Underway

Section 29 of the LLA states that, “no person shall sell or supply liquor or permit liquor to be sold or supplied to any person who is or appears to be intoxicated.”⁹ The company’s staff policy¹⁰ advises vessel bartenders not to serve guests “to the point of intoxication” or those who are “already intoxicated or apparently becoming intoxicated.” The policy includes the

⁶ *Liquor Licence Act*, R.R.O 1990, Regulation 719, *Licences to sell liquor*, sub-section 45(1).

⁷ *Liquor Licence Act*, R.R.O 1990, Regulation 719, *Licences to sell liquor*, section 45.2.

⁸ Mariposa Cruises Bartender Manual, Mariposa Cruises Customer Policy.

⁹ *Liquor Licence Act*, R.S.O. 1990, c. L.19, section 29.

¹⁰ Mariposa Cruises Bartender Manual, Staff Policy and Procedures - Alcohol Sales and Service.

provision that staff may “remove guests from the ship (via water taxi or docking) who are intoxicated.”

After the vessel departed, the CO performed a security round and noticed that a passenger had climbed onto the bow area near the chain locker. This area was restricted and access to passengers was not permitted. The CO requested that the head security officer post 2 security guards at the bow of the vessel. On arriving in the bow area, the 2 security guards observed a group of passengers, which included the passenger who later fell overboard. This passenger appeared to be intoxicated and was behaving erratically.

Effects of alcohol on the human body

Behaviour

Alcohol impairs human performance, having negative effects on virtually all cognitive functions and psychomotor abilities. The effects of non-lethal blood alcohol concentrations (BAC) between 0.18% and 0.30% include confusion, dizziness, blurred vision, decreased pain sensation, impaired balance, staggering gait, slurred speech, and muscle incoordination.¹¹ Alcohol also increases risk-taking behaviour by disinhibiting impulsive acts without the individual having a full appreciation of, or concerns about, the potential negative consequences of their actions, a condition known as alcohol-induced myopia.¹²

BACs will vary among individuals who have ingested the same amount of alcohol because of factors affecting the rate of absorption and metabolism of alcohol such as gender, body mass, metabolic rate, the presence and type of food ingested, and gastric mobility.¹³ According to the United States Centers for Disease Control (CDC),¹⁴ for the average person, a BAC of 0.15% would result from drinking about 7 standard drinks.¹⁵

The investigation found that the passenger who fell overboard in this occurrence had been consuming alcohol, an estimated 10 to 12 drinks, before boarding and while on the vessel. Shortly after boarding and while on board, the passenger was observed being loud and stumbling.¹⁶ A significant BAC (190 mg/100 mL, or 0.19%) was found to be in the

¹¹ M.J. Antunano and G.J. Salazar, *Alcohol and Flying: A Deadly Combination*, Federal Aviation Administration: Publication AM-400–94-2, 1994, available at: <https://www.faa.gov/pilots/safety/pilotsafetybrochures/media/alcohol.pdf> (Last accessed 03 August 2016).

¹² R.A. Josephs and C.M. Steele, “Alcohol myopia: Its prized and dangerous effects,” *American Journal of Psychology*, 45, 1990, 921-933.

¹³ A.C. Stein, “Factors affecting blood alcohol on driver decision-making and risk-taking,” *Proceedings of the American Association for Automotive Medicine*, 30, 1986, 59-73.

¹⁴ Centers for Disease Control and Prevention, “Impaired Driving, Get the Facts,” available at: http://www.cdc.gov/motorvehiclesafety/impaired_driving/bac.html (Last accessed 17 May 2016).

¹⁵ One standard drink is defined as containing 14 g of alcohol.

¹⁶ Alcohol and Gaming Commission of Ontario, “(3057) Recognizing Intoxication,” available at: www.agco.on.ca/pdfs/en/tip_sheets/3057.pdf (Last accessed 13 July 2016).

passenger's blood at the autopsy. The autopsy also found that the passenger did not have any pre-existing medical condition(s) that would indicate significant or chronic alcohol use.

Body temperature regulation

Submersion in cold water lowers core body temperature much more rapidly than exposure to cold air, because the thermal conductivity of water is 32 times greater than that of air.¹⁷ Significant alcohol ingestion increases the risk of hypothermia by causing vasodilation of the skin, impairment of the shivering mechanism, and hypothalamic dysfunction, and by decreasing one's awareness of environmental conditions.¹⁸

The average water temperature for the month of June in Toronto is 14.7 °C.¹⁹ Common hypothermia tables²⁰ indicate that, at a water temperature of 15 °C, loss of dexterity would occur in 10 to 15 minutes, exhaustion or unconsciousness would occur in 1 to 2 hours, and the expected survival time would be 1 to 6 hours for the average non-intoxicated person. For water temperatures between 4.5 and 10 °C, loss of dexterity would occur in under 5 minutes, exhaustion or unconsciousness would occur in 30 to 60 minutes, and the expected time of survival would be 1 to 3 hours.

Alcohol and Gaming Commission of Ontario licensing and inspections

Under the LLA, all licensed establishments, including vessels, are subject to regular full compliance inspections. Additionally, inspectors conduct periodic routine inspections on board vessels, including spot inspections, or inspections to address a complaint. Inspections are conducted on a risk basis. Risk analysis is ongoing, and includes the identification of infractions.

As part of the liquor licensing process, Alcohol and Gaming Commission of Ontario (AGCO) inspectors provide a consultation with licensees upon issuance of a licence, whereupon the licensee's responsibilities under the LLA are reviewed and an AGCO "toolkit" is provided. The toolkit contains a number of tip sheets, including one on how to identify the signs of intoxication.

AGCO also offers regular educational seminars and individual training sessions to liquor licence holders and their staff, where information for detecting intoxication is provided. Between 2010 and 2016, AGCO inspectors conducted 5 risk-based inspections of the *Northern Spirit I* and provided 5 educational sessions to *Northern Spirit I* staff. A toolkit was also provided in 2013. Since 2008, this licensee had no recorded violations. The cruise manager,

¹⁷ J.B. Reuler, "Hypothermia: Pathophysiology, clinical settings and management," *Ann Intern Med*, 89, 1978, pp. 519-527.

¹⁸ A.D. Weinberg, "Hypothermia," *Ann Emerg Med*, 1993, 22(2), pp. 370-377.

¹⁹ World Sea Temperature, "Toronto Average June Sea Temperature," available at: <http://www.seatemperature.org/north-america/canada/toronto-june.htm> (Last accessed 17 May 2016).

²⁰ For example: University of Sea Kayaking, "Hypothermia Table," available at: http://www.useakayak.org/references/hypothermia_table.html (Last accessed 17 May 2016).

deckhand, 7 bartenders, and 4 waiters on board the *Northern Spirit I* at the time of the occurrence had completed the Smart Serve Training Program. This program is approved by AGCO as a server training program for the Ontario hospitality industry.

Safety management system

The principal objectives of safety management on board vessels are to ensure safety at sea, prevent human injury or loss of life, and avoid damage to the environment. Ideally, to manage safety, a vessel operator would identify existing and potential risks, establish safety policies and procedures to mitigate the risks, and then provide a means to continuously gauge effectiveness so as to improve organizational safety where necessary. A documented, systematic approach to safety management (known as a safety management system, or SMS) helps ensure that individuals at all levels of an organization have the information and the tools needed to make sound decisions in both routine and emergency operations.

Although not required to have an SMS, the company that owned and operated *Northern Spirit I* had voluntarily developed an SMS that covered the fleet. TC's proposed amendments to the *Safety Management System Regulations* would require an SMS on vessels 24 metres or greater in length or carrying more than 50 passengers.

Emergency boat

The *Northern Spirit I* was brought under the Canadian Ships Registry in 1989 and was required to carry a Class II lifeboat under davits by the regulations in effect at that time. The owners of the vessel applied to Transport Canada Marine Safety and Security (TCMSS) for an exemption from this particular regulatory requirement. The TCMSS Board²¹ decided to exempt the *Northern Spirit I* from carrying the required lifeboat under 2 conditions: the vessel must carry one 5-person approved emergency boat with a means of launching, and the vessel must carry inflatable rescue platforms with aggregate capacity to accommodate 600 persons.²² On the muster list on board the *Northern Spirit I* at the time of the occurrence, however, the emergency boat was identified as a lifeboat. As well, this same emergency boat was identified as a rescue boat in the life saving equipment plan.

Stability requirements with regard to on-board distribution of passengers

Using the measurements taken during the vessel's inclining experiment carried out on 21 March 2005, a stability assessment of the *Northern Spirit I*, pursuant to the regulatory requirements and following the publication TP10943, was produced by a marine consulting firm and approved by TCMSS on 27 April 2012. Among other particulars, the approved stability booklet stipulated the maximum allowable distribution of passengers on each deck of the vessel in order to avoid excessive heeling moments that would compromise the stability of the vessel, as follows:

²¹ Known in 2016 as the Marine Technical Review Board (MTRB).

²² Decision #4713, effective as of 20 July 1989.

- 112 passengers on the bridge deck
- 325 passengers on the upper deck
- 148 passengers on the main deck

The usual means of ensuring that the maximum distribution is adhered to is to display the number of passengers beside the means of access to each deck. On the *Northern Spirit I*, this information was not displayed. As well, the operators and crew members were unaware of the maximum number of passengers allowed on each deck.

Voyage data recorder

In addition to bridge audio, a voyage data recorder (VDR) continuously records data such as the time, vessel heading and speed, gyrocompass, alarms, VHF radiotelephone communications, radar, echo sounder, wind speed and direction, and rudder/engine orders and responses. The VDR's save button must be activated following an occurrence in order for the data to be retrievable.

The *Northern Spirit I* did not have a VDR on board, nor was one required by regulation.

Previous occurrences

On 16 May 2013, at approximately 1435 Eastern Daylight Time, the passenger vessel *Louis Jolliet* ran aground off Sainte-Pétronille, Île d'Orléans, Quebec, while on a cruise with 57 passengers on board²³. Following the grounding, the master chose not to sound the alarm. As a result, the crew did not muster at their stations and some crew members performed functions that were not assigned to them. The emergency procedures were also not complete and missed key details, particularly in relation to passenger safety.

On 07 November 2013, at 1200 Atlantic Standard Time, the roll-on/roll-off passenger ferry *Princess of Acadia*, which was carrying a total of 87 passengers and crew, sustained a main generator blackout and grounded while approaching the ferry terminal at Digby, Nova Scotia²⁴. The investigation found that blackout drills had not been performed for the 2 years preceding the occurrence, and that fire and boat drills were not practised in a realistic manner as they employed only crew members and not passengers. Furthermore, no emergency alarms were sounded following the blackout. As a result, the crew was not alerted that there was an emergency and did not proceed to their emergency stations, limiting the number of qualified crew members available to assist with troubleshooting the blackout.

On 11 August 2014, at approximately 1335 Eastern Daylight Time, the passenger vessel *La Relève II*²⁵ was on a sightseeing cruise off Havre Saint Pierre, Quebec, when a fire started in

²³ TSB Marine Investigation Report M13L0067.

²⁴ TSB Marine Investigation Report M13M0287.

²⁵ TSB Marine Investigation Report M14C0156.

the engine compartment. The 33 passengers were evacuated onto 2 of the vessel's life rafts, and then transferred onto 2 commercial vessels that were responding to the emergency. The fire was extinguished by the crew. One passenger was injured during the evacuation of the vessel. The investigation found that the crew did not have written procedures or assigned duties in the event of an emergency, nor did they conduct fire and boat drills. As a result, the emergency response had several shortcomings such as the fact that the actions of the master and deckhand were improvised and not always prioritized in the best order, the passengers were not notified of the emergency by the crew at the onset, and the passengers donned lifejackets by themselves without assistance from the crew.

On 28 April 2015, at approximately 0230 Eastern Daylight Time, a fire broke out on the fishing vessel *Frederike. C-2*²⁶ shortly after it departed Rimouski, Quebec. The crew had informally discussed emergency preparedness and designated specific duties to each crew member. However, these duties were not formalized or practised in fire and boat drills to ensure that the assignment of duties was feasible. The investigation found that if crew members do not practise emergency duties, there is a risk that their emergency response will be delayed or uncoordinated.

²⁶ TSB Marine Investigation Report M15C0045.

Analysis

Factors leading to the passenger overboard and loss of life

The *Northern Spirit I* passenger who fell overboard had been consuming alcohol before boarding and while on the vessel. Although the passenger was intoxicated, this was not detected by the crew or security guards at the time of boarding, nor was the passenger denied service by the bar staff of additional beverages while on board. However, it is possible that when he was boarding and on board in the vicinity of bar staff, he did not display behaviour indicating that he was intoxicated. As such, the passenger's level of intoxication may not have been apparent to the crew and bar staff.

At around 1925, approximately 40 minutes after departure, that passenger was on the upper deck socializing with friends and began to make inferences about jumping overboard. While doing this, the passenger began to lean over the railing and, before the nearby security guards were able to stop the passenger, the passenger fell overboard.

After the passenger fell, the master stopped the engines for a short time, altered course to starboard, and attempted to return on the vessel's original course. The emergency boat was not deployed right away due to its position on board. It was positioned in davits on the stern of the vessel and if deployed while the vessel was underway, it would capsize in the vessel's wake.

The emergency signal to initiate the man overboard procedures was not sounded so as not to further alarm the passengers. As a result, the crew's response to the emergency was uncoordinated, and the roles and responsibilities they assumed did not correspond with those detailed in the vessel's muster list.

The overboard passenger's high blood alcohol concentration (BAC) negatively affected the passenger's motor skills and increased the passenger's risk of hypothermia, decreasing the passenger's chances of survival in the water. A Toronto Police Service marine unit arrived shortly after being notified of the situation, but was unable to locate the passenger. The search for that day was suspended at 2317. The TPS continued the search in the following days and the passenger's body was recovered on 01 July.

Screening and monitoring of passengers' intoxication levels

The *Northern Spirit I* held a valid liquor sales licence that is regulated by the Alcohol and Gaming Commission of Ontario (AGCO) under the *Liquor Licence Act* (LLA). The Act prohibits its licensees from selling or supplying alcohol to those who appear to be intoxicated, and also requires that the licence holder "maintains control over the premises, including exercising control over who is permitted to enter the premises or remain on the premises and the activities that are permitted to occur on the premises."²⁷

²⁷ *Liquor Licence Act*, R.R.O 1990, Regulation 719, *Licences to sell liquor*, section 45.2.

Immediately after boarding and while on board, the passenger who fell overboard was displaying outward signs of intoxication such as being loud and stumbling. The investigation determined that this passenger was likely intoxicated at the time of boarding. However, in this occurrence, no passengers were refused entry due to being intoxicated during the vessel's pre-boarding process. It is possible that, at the time of boarding, the passenger did not display these outward signs, and thus the fact that the passenger was intoxicated was not detected by the security guards. The passenger was served alcohol while on board as well, although the passenger was intoxicated. This is also prohibited by the LLA and is detailed in the company's staff policy, which advises vessel bartenders not to serve guests "to the point of intoxication" and not to serve those who are "already intoxicated or apparently becoming intoxicated." The investigation could not determine why the passenger's level of intoxication was not detected during the pre-boarding process or by the bartenders while on board, but one possibility is that the passenger was acting within the realm of normal behaviour at those times.

If intoxicated passengers are not detected by the crew during the pre-boarding process and are served alcohol while on board, there is a risk that they may participate in unsafe activities on the vessel.

Signalling of emergency procedures

The sounding of emergency alarms on a vessel warns everyone on board to proceed immediately to their designated station and perform their emergency duties. The alarm must be sounded as soon as the emergency happens, or even sooner if it is apparent that there is a risk to the vessel or to personnel.

In this occurrence, the muster list procedures for a man overboard state that the master is to initiate the listed procedures by sounding 3 long blasts on the vessel's whistle (Appendix C). The master did not sound the whistle so as not to further alarm the passengers. The crew members were made aware of the person overboard by word-of-mouth as the situation unfolded.

The crew's response to the person overboard was thus ad hoc and did not correspond to the roles and responsibilities as set out in the muster list. The deckhand took on the duties of readying the emergency boat, assigning a crew member to act as a messenger to relay information to the chief officer (CO), and instructing a crew member to point at the passenger in the water. The CO also asked crew and passengers to point to the passenger in the water and deployed the life ring into the water. According to the muster list, however, the deckhand was assigned to assist the CO as part of the primary response team. Furthermore, several crew members that were set to be part of the key primary response and passenger control teams were not involved in the emergency response as it unfolded.

In this occurrence, the critical crew members were aware of the emergency situation, and the lack of an alarm was not found to be a causal factor. However, if the signal to initiate a set of emergency procedures is not given on a vessel in an emergency situation, the emergency response by crew members may be less effective.

Adequacy of man overboard emergency procedures

A documented, systematic approach to safety management (known as a safety management system, or SMS) helps ensure that individuals at all levels of an organization have the information and the tools needed to make sound decisions in both routine and emergency operations. SMS are often available to crew members in the form of a published document. Muster lists, on the other hand, are displayed on board. An effective muster list provides crew members with a succinct plan to manage emergency situations, with clear instructions to be followed in the event of an emergency for every person on board. The muster list also ensures that, on the sounding of the emergency signal, crew members and passengers know where to muster.

In this occurrence, the company SMS contained only a very short section on man overboard procedures (section 1.7.3) that did not have the level of detail present in the muster list. For example, it did not include reference to the audible signal to be made by the master to begin the man overboard procedures, nor did it make reference to the emergency boat. The muster list was much more detailed, with designated teams for procedures and defined roles and responsibilities. However, neither set of procedures fully accounted for the different situations that may occur with a person overboard and lacked details that may be essential. For example, the following items were not included:

- What actions to take while the vessel is underway if the emergency boat cannot be deployed;
- How and when the emergency boat should be deployed; and
- Types of vessel manoeuvres that can be used to recover persons overboard (Williamson turn, Roundabout, Double turn)

If the emergency procedures developed by a company in its SMS or muster list lack key details and do not fully address or account for contingencies, there is a risk that opportunities to recover a person overboard may be missed.

Drills

Although emergency procedures may be well documented and visually displayed in the form of a muster list, crew may not recall their roles and responsibilities when an emergency occurs. Emergency procedures are best learned through regularly practised drills. Drills allow for testing crew performance, training of crew members, and refining and improving the procedure itself. Drills can also demonstrate where there is missing information and where a procedure needs to be changed to be more effective.

Although the crew members of the *Northern Spirit I* performed some drills (such as those for dealing with a fire emergency), launched and tested the emergency boat itself, and conducted regular crew safety tours of the vessel to show the locations of different safety equipment, they did not perform any man overboard drills. This may have prevented the crew from being able to easily recall the roles and responsibilities to assume in the person overboard situation. In this occurrence, the crew's response to the person overboard was ad hoc and disorganized.

Drills also allow crew the opportunity to test out the procedures to see if they are missing any steps, if any contingencies need to be addressed, or if any of the roles and responsibilities need to be changed.

If crew members do not practise drills for emergency procedures, they may not be able to carry out these duties effectively in an emergency situation and opportunities to improve these procedures may be missed, increasing the risk of death or injury during emergencies.

Voyage data recorder

The purpose of a voyage data recorder (VDR) is to create and maintain a secure, retrievable record of information indicating the position, movement, physical status, and command and conduct of a vessel for the period covering a minimum of the last 12 hours of operation. Objective data are very helpful for accident investigators seeking to understand the sequence of events, identify operational problems, and investigate human factors issues.

The *Northern Spirit I* did not have a VDR on board, nor was one required by regulation. If VDR data are not available to an investigation, this may preclude the identification and communication of safety deficiencies to advance transportation safety.

Findings

Findings as to causes and contributing factors

1. One of the passengers on the upper deck was socializing with friends and began to make inferences about jumping overboard. While doing this, the passenger began to lean over the railing and, before the nearby security guards were able to stop the passenger, the passenger fell overboard.
2. The passenger was intoxicated and had been consuming alcohol before boarding and while on the vessel. This was not detected by the security guards and crew members pre-screening passengers as they entered the vessel, nor was the passenger denied service of additional beverages while on board.
3. The emergency signal to initiate the man overboard procedures was not sounded; therefore, the crew's response to the emergency was uncoordinated, and did not correspond with the procedure in the muster list.
4. The high blood alcohol concentration of the passenger negatively affected the passenger's motor skills and increased the passenger's risk of hypothermia, decreasing the passenger's chances of survival in the water.
5. A Toronto Police Service marine unit arrived shortly after being notified of the situation, but was unable to locate the person overboard.

Findings as to risk

1. If intoxicated passengers are not detected by the crew during the pre-boarding process and are served alcohol while on board, there is a risk that they may participate in unsafe activities on the vessel.
2. If the signal to initiate a set of emergency procedures is not given on a vessel in an emergency situation, the emergency response by crew members may be less effective.
3. If the emergency procedures developed by a company in its safety management system or muster list lack key details and do not fully address or account for contingencies, there is a risk that opportunities to recover a person overboard may be missed.
4. If crew members do not practise drills for emergency procedures, there is a risk that they may not be able to carry out these duties effectively in an emergency situation and also that opportunities to improve these procedures may be missed, increasing the risk of death or injury during emergencies.
5. If voyage data recorder data are not available to an investigation, this may preclude the identification and communication of safety deficiencies to advance transportation safety.

Other findings

1. Although the *Northern Spirit I* carried an emergency boat on board, it was identified as a lifeboat on the muster list and as a rescue boat in the life saving equipment plan.
2. The emergency team leaders as identified on the muster list had no portable means of communicating with the master on the bridge, although they could access a telephone unit with a direct link to the bridge at the stern of the vessel.
3. The vessel notified the Toronto Police Service marine base, but did not notify Marine Communications and Traffic Services (MCTS) Prescott. MCTS was advised of the person overboard by Joint Rescue Coordination Centre Trenton.
4. The operators and crew members of the *Northern Spirit I* were unaware of the maximum number of passengers allowed on each deck, and this information was not indicated (by a means such as signage) on the vessel.

Safety action

Safety action taken

Transport Canada

The lifesaving equipment plan was re-approved by Transport Canada Marine Safety and Security on 26 September 2015, changing the designation of the craft carried by the *Northern Spirit I* on the plan from a rescue boat to an emergency boat.

Mariposa Cruises

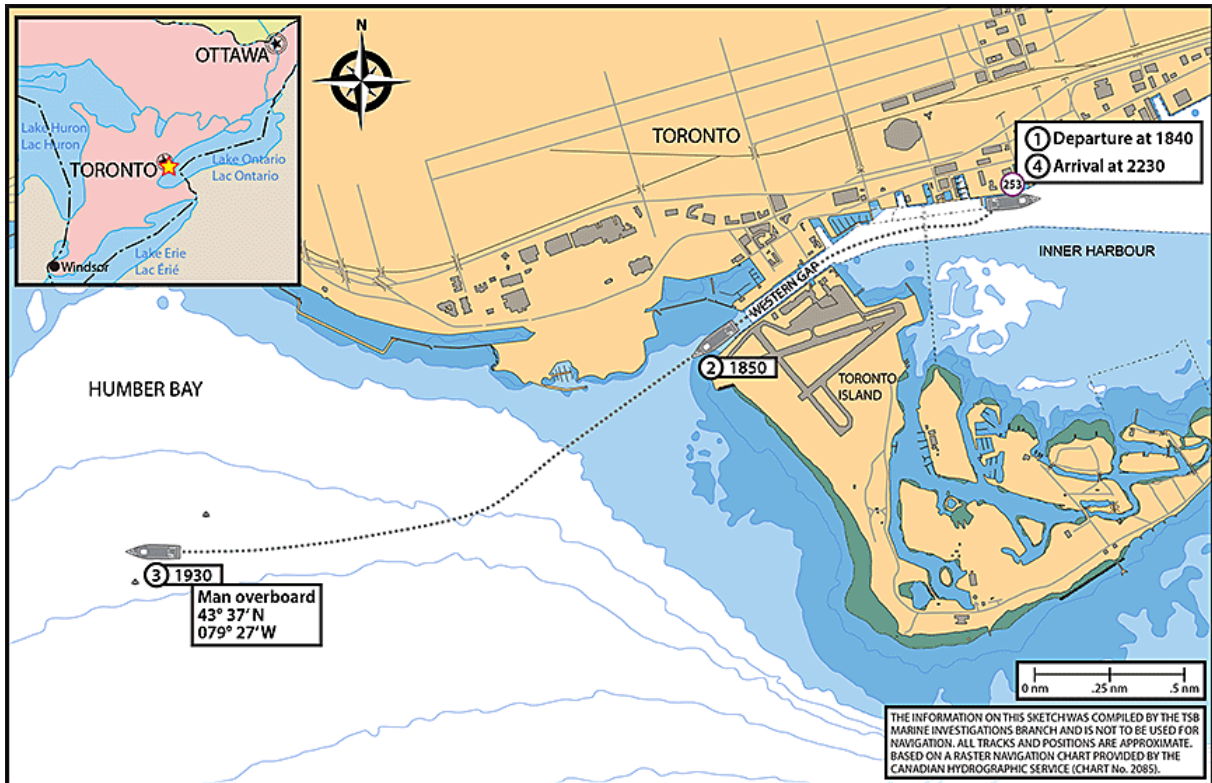
The company changed the designation of the boat carried by the *Northern Spirit I* on the muster list from lifeboat to emergency boat.

This report concludes the Transportation Safety Board's investigation into this occurrence. The Board authorized the release of this report on 10 August 2016. It was officially released on 29 September 2016.

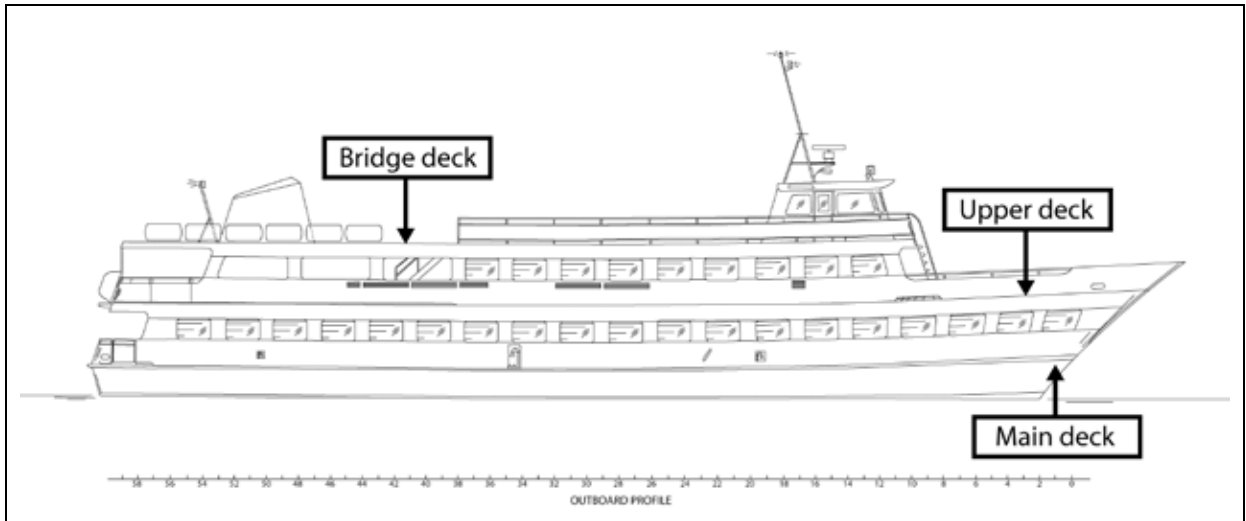
Visit the Transportation Safety Board's website (www.tsb.gc.ca) for information about the TSB and its products and services. You will also find the Watchlist, which identifies the transportation safety issues that pose the greatest risk to Canadians. In each case, the TSB has found that actions taken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

Appendices

Appendix A – Area of occurrence



Appendix B – Vessel plan view



Source: Transport Canada, with TSB annotations.

Appendix C – Muster list

Emergency	Team A Command and Communication	Team B Primary Response	Team C Passenger Control	Team D Engineering	Team E Additional Crew
Fire	<p>Captain DJ</p> <p>On Bridge Direct Crew Call for Assistance</p> <p>DJ: Turn Off Music Make Announcements as Directed by Captain</p>	<p>Mate Main Deck Bartender Deck Hand</p> <p>Isolate Fire Deploy Hose Engage Fire</p> <p>Main Deck Bartender Get Fire Axe Assist Mate</p> <p>Deck Hand Assist Mate</p>	<p>Manager Server 1 Server 2 Server 3 Server 4</p> <p>Manager 2nd Deck Muster Station Issue Life Jackets Direct Passengers to Muster Stations Maintain Passenger Control</p> <p>Server 1 Bow Muster Station Sweep Lower Deck - Check for Passengers with Disabilities Issue Life Jackets</p> <p>Server 2 Bow Muster Station Sweep Main Deck - Check for Passengers with Disabilities Issue Life Jackets/Passenger Control</p> <p>Server 3 2nd Deck Muster Station Assist Manager</p> <p>Server 4 Bridge Deck Muster Station Messenger</p>	<p>Engineer</p> <p>Close All Vents and Water Tight Doors Shut Down ME/Genset as needed Close Fuel Lines Engage Fire Pump (main or auxiliary) Maintain Communication with Bridge</p>	<p>Chief Cook Second Cook 2nd Deck Bartender Server 5 Server 6</p> <p>Chief Cook Bow Muster Station Shut Down Galley Equipment Close Galley Windows and Doors Issue Life Jackets/Passenger Control</p> <p>Second Cook Second Deck Muster Station Assist Manager</p> <p>2nd Deck Bar Bow Muster Station Issue Life Jackets/Passenger Control</p> <p>Server 5 2nd Deck Muster Station Assist Manager</p> <p>Server 6 2nd Deck Muster Station Assist Manager</p>
	<p>Captain: General Alarm and/or 7 Short Blasts on the Ship Whistle</p>	<p>Mate:</p>	<p>Close all Windows and Doors</p>	<p>Engineer</p>	<p>Chief Cook Bow Muster Station</p>
Man Overboard	<p>Captain:</p> <p>On Bridge Direct Crew Call for Assistance</p> <p>DJ: Turn Off Music Make Announcements as Directed by Captain</p>	<p>Mate:</p> <p>Deploy Life Saving Apparatus Launch Life Boat Recover Person and Apply First Aid</p> <p>Main Deck Bartender Get Boat Pole Assist Mate Launching Life Boat and recovery passenger when boat returns.</p> <p>Deck Hand Assist Mate on board Life Boat</p>	<p>Manager:</p> <p>Direct Passengers to Maintain Watch on Person in Water Maintain Passenger Control</p> <p>Server 1</p> <p>Server 2</p> <p>Server 3</p> <p>Server 4 Report to Bridge</p> <p>Messenger</p>	<p>Engineer</p> <p>Assist Mate in Launching Life Boat and recovery of passenger when boat returns.</p>	<p>Chief Cook Second Cook 2nd Deck Bartender</p> <p>Assist Manager Prepare to remove wet clothing, ready rescue blanket</p> <p>Server 5</p> <p>Server 6</p> <p>Assist Manager Assist Manager</p>
	<p>3 Long Blasts on Ship Whistle</p>	<p>Maintain constant watch on person in water</p>	<p>Manager:</p>	<p>Engineer</p>	<p>Chief Cook</p>
Abandon Ship	<p>Captain:</p> <p>On Bridge Direct Crew Call for Assistance Board Platform after Last Passenger</p> <p>DJ: Turn Off Music Make Announcements as Directed by Captain</p>	<p>Mate:</p> <p>Launch Life Boat and Shepherd Platforms to Embarkation Stations</p> <p>Main Deck Bartender Assist Mate Launching Boat and Shepherding Platforms</p> <p>Deck Hand Launch Platforms</p>	<p>Manager 2nd Deck Muster Station Issue Life Jackets Direct Passengers to Muster Stations Maintain Passenger Control</p> <p>Server 1 Aft Deck Muster Station Sweep Lower Deck - Check for Passengers with Disabilities Issue Life Jackets/Passenger Control</p> <p>Server 2 Aft Deck Muster Station Sweep Main Deck - Check for Passengers with Disabilities Issue Life Jackets/Passenger Control</p> <p>Server 3 2nd Deck Muster Station Assist Manager</p> <p>Server 4 Bridge Deck Muster Station Messenger</p>	<p>Engineer</p> <p>Maintain Equipment Operational as long as possible</p> <p>Maintain Communication with Bridge</p> <p>Launch Bow Platforms</p>	<p>Chief Cook Aft Deck Muster Station Shut Down Galley Equipment Close Galley Windows and Doors Issue Life Jackets/Passenger Control</p> <p>Second Cook Bow Muster Station Assist Engineer Launch Bow Platforms</p> <p>Upper Deck Bar Aft Deck Muster Station Issue Life Jackets/Passenger Control</p> <p>Server 5 2nd Deck Muster Station Assist Manager</p> <p>Server 6 2nd Deck Muster Station Assist Manager</p>
	<p>7 Long Blasts on the Ship Whistle and 1 Short Blast followed by instructions over the P.A.</p>	<p>Mate:</p>	<p>Manager 2nd Deck Muster Station</p>	<p>Engineer</p>	<p>Chief Cook Aft Deck Muster Station</p>

Source: Mariposa Cruises, Northern Spirit I Muster List