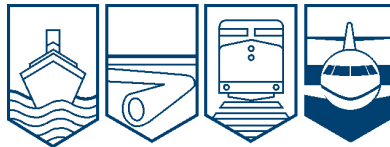


Transportation Safety Board  
of Canada



Bureau de la sécurité des transports  
du Canada

## MARINE INVESTIGATION REPORT M12L0095



**STRIKING**

**BULK CARRIER *COMMON SPIRIT***  
**TROIS-RIVIÈRES, QUEBEC**  
**29 JULY 2012**

**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

### Striking

Bulk Carrier *Common Spirit*  
Trois-Rivières, Quebec  
29 July 2012

Report Number M12L0095

### *Summary*

On 29 July 2012, at 1708 Eastern Daylight Time, the bulk carrier *Common Spirit* struck the corner of the dock at sections 16 and 17 in Trois-Rivières, Quebec, while manoeuvring under the conduct of a pilot. The vessel was being assisted by 2 local tugs at the time. There were no injuries or pollution, but the vessel and the dock sustained damage requiring repairs.

*Ce rapport est également disponible en français.*

## *Factual Information*

### *Particulars of the Vessel*

Name of vessel	<i>Common Spirit</i>
Registry number	12080
IMO number	9594717
Port of registry	Piraeus, Greece
Flag	Greece
Type	Bulk carrier
Gross tonnage	32 987
Length <sup>1</sup>	189.99 m
Draught	Forward: 7.31 m Aft: 8.41 m
Built	2010, Cosco Dalian Shipyard, China
Propulsion	Two stroke, single-acting diesel engine developing 9480 kW at 127 rpm, driving a single fixed-pitch propeller
Cargo	Pig iron and ilmenite slag (21 500 tonnes)
Crew	24
Registered owner	Common Life Compania Naviera S.A., Panama
Manager	Common Progress S.A., Athens, Greece

### *Description of the Vessel*

The *Common Spirit* is a bulk carrier made of steel with machinery spaces and accommodations located aft (Photo 1). The vessel has 5 cargo holds and hatches that are serviced by four 36-tonne electric-hydraulic cranes mounted on the centreline of the vessel. A bulbous bow encloses the forepeak water ballast tank, and a collision bulkhead segregates the



**Photo 1.** *Common Spirit*. Source: Jacques Gauthier.

<sup>1</sup> Units of measurement in this report conform to International Maritime Organization Standards or, where there is no such standard, are expressed in the International System of units.

forepeak from the port and starboard fuel oil deep tanks immediately aft.

The bridge is equipped with the required navigational equipment, including 3 cm and 10 cm radars situated on the starboard side. The vessel is also fitted with a voyage data recorder (VDR). The steering stand is located in a central console on the centreline of the vessel; this console also includes the bridge telegraph. The indicators on the central console provide information on engine rpm and direction.

### *Pilot Assignment*

On 29 July 2012 at 0800,<sup>2</sup> a pilot was assigned by the Laurentian Pilotage Authority (LPA) to board the *Common Spirit* in the port of Sorel, Quebec. The vessel was scheduled to leave at 1200 the same day, bound for section 16 in the port of Trois-Rivières. Before leaving for the assignment, the pilot referred to notes taken during his apprenticeship in order to review the details of the manoeuvre required to berth a vessel at section 16.

### *Berthing Manoeuvre at Section 16*

In the port of Trois-Rivières, section 16 is located on the south side of a basin that also contains sections 14 and 15 (Appendix A). Section 16 is recognized as a challenging location for berthing by the Corporation des Pilotes du Saint-Laurent Central (CPSLC), the corporation contracted by the LPA to provide pilotage services in this port. The entrance to the basin is approximately 110 m wide and is perpendicular to the flow of the current in the river. The dock at section 16 runs on an axis of 273°T/093°T;<sup>3</sup> in contrast, the dock at section 17 runs on an axis of 210°T/030°T (Appendix A). The dock at section 16 is 175 m in length,<sup>4</sup> and it extends 1.9 m above the highest high water mark.

Although there are several methods for berthing a vessel at section 16, CPSLC apprentice pilots are taught the following recommended manoeuvre (Figure 1):

#### 1. Approach

Helm and propulsion are to be used initially to bring the vessel from the lower part of the river (section 10) to the entrance of the basin at a distance of approximately 3 vessel widths off the docks. Tugs, which may be used at the pilot's discretion, are to be positioned on the starboard side of the vessel, one forward and one aft.

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<sup>2</sup> All times are Eastern Daylight Time (Coordinated Universal Time minus 4 hours), unless otherwise stated.

<sup>3</sup> These are reciprocal bearings.

<sup>4</sup> This measurement was obtained from the Canadian Hydrographic Service *Sailing Directions*, St. Lawrence River: Cap-Rouge to Montreal and rivière Richelieu (ATL 112), 3<sup>rd</sup> Edition, 2009.

## 2. Use of Anchor

The starboard anchor is to be let go early in the approach (near section 11, approximately 440 m from the corner of the dock at sections 16 and 17) to ensure that it is effective in reducing the vessel's speed and assisting with the turn.

## 3. Turn

The vessel is to be initially turned to starboard at a distance of approximately 20 m from the corner of sections 16 and 17 through a combination of helm, engine propulsion, and tugs. The aft tug provides the pivoting motion while the forward tug assists with maintaining the bow on position and counteracting the increased effect of the current on the vessel's hull. This turn of approximately 50° is to be initiated with a speed over the ground nil or slightly above in order to control the advance into the basin.

## 4. Final Position

Helm, engine propulsion, and tugs are used to counteract the increased effect of the current and to advance the vessel as far as possible into the basin, parallel to section 16. The vessel is then brought alongside and moored.

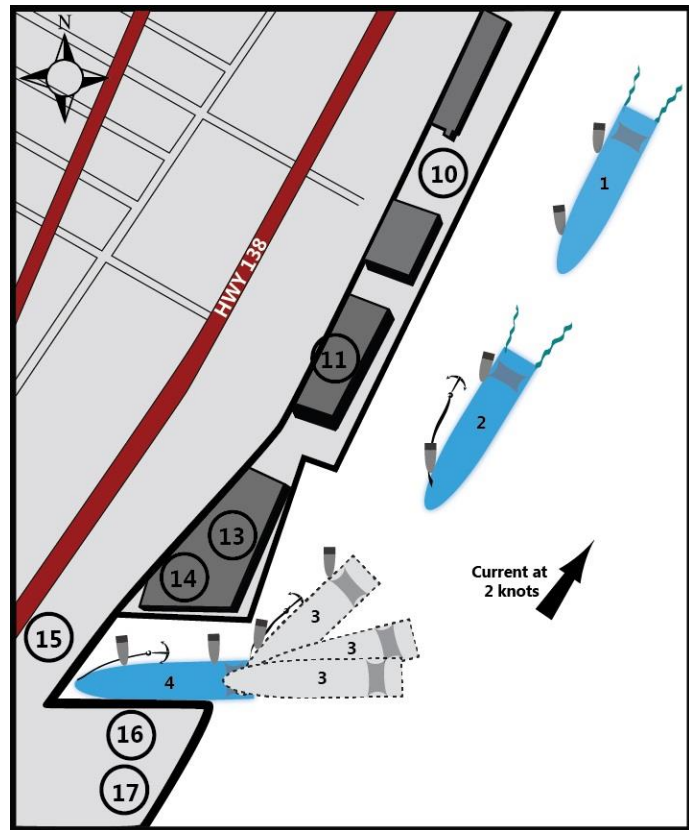


Figure 1. Layout at section 16 and berthing manoeuvre recommended by CPSLC (not to scale).

## History of the Voyage

On 29 July 2012 at approximately 1150, the pilot boarded the vessel, set up his portable pilot unit (PPU), and prepared the bridge for departure. At 1315, the *Common Spirit* departed Sorel for Trois-Rivières partially loaded with 21 500 tonnes of bulk cargo. The bridge team was made up of the pilot, the master, the second officer acting as the officer of the watch (OOV), and the helmsman.

While proceeding down the St. Lawrence River, the pilot received a cell phone call from a colleague, who was a pilot on another vessel, inquiring about the availability of the berth at Sorel that the *Common Spirit* had just vacated. During their conversation, the pilot on the *Common Spirit* and his colleague discussed manoeuvres to dock at section 16 in Trois-Rivières.

Later in the voyage, the pilot explained his planned manoeuvre to berth the vessel at section 16 to the master; the manoeuvre included the assistance of 2 tugs.

The *Common Spirit* arrived off section 17 in Trois-Rivières at 1615 and the pilot began turning the vessel 180° in order to stem<sup>5</sup> the current. Along with engine propulsion and rudder movements, the starboard anchor was used to assist with the turn. Two tugs were standing by in the vicinity, but had not yet begun to assist the vessel.

At approximately 1630, the vessel had completed the turn and was maintaining position on its anchor. The 2 tugs, *Ocean Bravo* and *Avantage*, came alongside the starboard side of the vessel and secured fore and aft respectively.

At 1636, the anchor was raised and the pilot requested that it be left at the waterline and ready to be let go; the pilot then slowly manoeuvred the *Common Spirit* downriver, bringing the vessel approximately 100 m off section 10 (Figure 2).

At 1657, the vessel was off section 10 and the approach towards section 16 began with the bridge telegraph set at dead slow ahead, a speed equivalent to 2 knots.<sup>6</sup> The vessel's heading was 216° gyro (G). While manoeuvring, the pilot used rudder commands to provide helm orders to the helmsman and engine orders to the OOW, who was responsible for adjusting the bridge telegraph.

At 1706, the vessel had reached a position approximately 100 m off section 13 with a speed of 2.1 knots and a heading of 216°G. The pilot instructed the master to inform the chief officer, who was posted at the bow of the vessel, to prepare to let go the anchor and to begin providing the distances to the corner of the dock at sections 16 and 17. The chief officer started providing these distances at regular intervals to the master on the bridge. The chief officer was providing the distances in Greek via a very high frequency (VHF) radiotelephone, and the master was translating the information into English for the pilot.

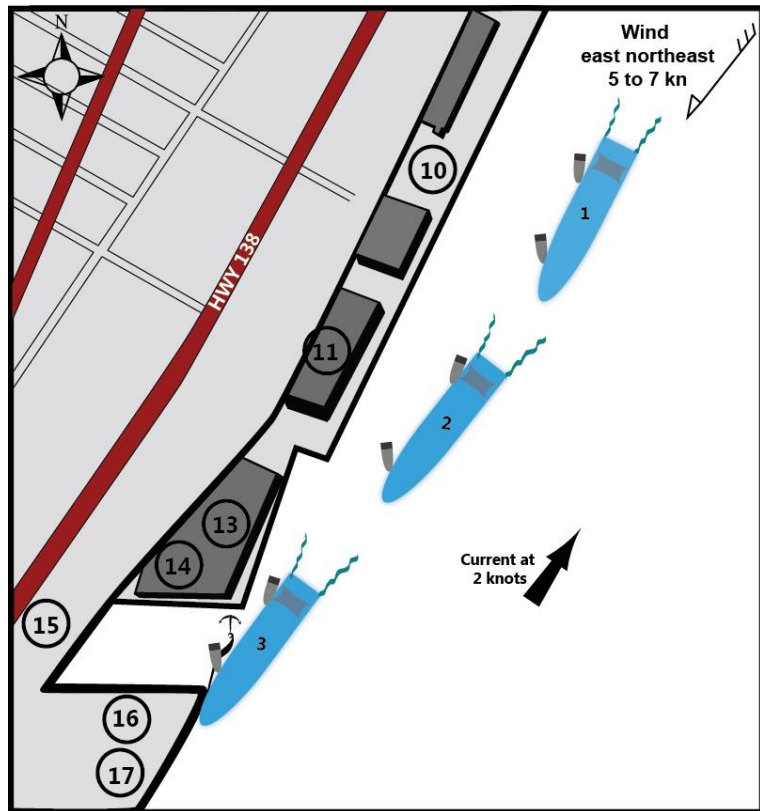


Figure 2. Pilot's manoeuvre at section 16 (not to scale).

<sup>5</sup> Make headway against a tide or current.

<sup>6</sup> All speeds are speed over the ground (SOG), unless otherwise stated.

Soon after, the master of the forward tug advised the pilot that the vessel's bow was passing the corner of section 14. The pilot asked the master of the forward tug if it was safe to let go the starboard anchor and the master of the tug replied that it was okay. The pilot then asked the master of the *Common Spirit* to let go the anchor. After asking the pilot for confirmation, the master ordered the chief officer to let go 1 shackle (90 feet) of chain on the starboard anchor.

At 1707, when the vessel's bow was midway between section 14 and the corner of sections 16 and 17, the distance from the corner was reported to be 50 m. The chief officer let go the starboard anchor and paid out approximately 1 shackle of chain in the water, as he had been ordered to do. Once the requested length of chain was paid out, the brake was applied on the windlass to prevent the chain from slipping. At approximately 1707:30, as the vessel advanced at a speed of 1.9 knots and a heading of 217°G, the distance from the corner of the dock was reported to be 30 m and decreasing rapidly.

At this time, the master expressed concerns to the pilot about the vessel's speed and angle of approach to the corner of the dock. The pilot then ordered the forward tug *Ocean Bravo* to push. Soon after, at approximately 20 m from the dock, the pilot ordered the engine to be put at slow ahead and the rudder hard to starboard. The pilot also ordered the forward tug to pull full. The vessel's speed at this time was 1.8 knots and the heading 222°G. Shortly afterwards, the master advised the pilot that the distance from the corner of the dock was now 15 m and that a collision was imminent. The pilot then ordered the OOW to stop the engine.

At 1708:26, the vessel's starboard bow hit the corner of the dock at a speed of 1.7 knots, puncturing the hull.<sup>7</sup> After the striking, the pilot backed the vessel off the corner and, after evaluating the situation with the master, resumed the manoeuvres with the tugs assisting. The vessel was eventually brought alongside section 16 under the conduct of the pilot at 1733.

### *Damage to the Vessel*

As a result of the impact, the *Common Spirit's* side shell was punctured and deformed between frames 224 and 229 on the starboard side in way of the forepeak. The perforated flats at 6.9 m and 11.9 m from the keel also sustained damage.

### *Damage to the Dock*

The dock sustained damage to its sheet pilings and the concrete ring beam located at the corner of sections 16 and 17. Numerous cracks extending the full height of the concrete ring beam were visible. As well, a diving inspection revealed that 1 sheet piling was severed and another was cracked. The sheet pilings support and ensure the stability of the dock's concrete ring.

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<sup>7</sup> Marine Communications and Traffic Services was advised of the striking by a Transport Canada Marine Safety and Security marine safety inspector at 1715.

## *Environmental Conditions*

On the day of the occurrence, the weather was clear and winds were from the east-northeast at 5 to 7 knots. Low tide was at 1742, and the water level was predicted to be 1.1 m above chart datum at low tide. The tidal influence at Trois-Rivières is minimal; the maximum rise and fall of the tide is about 0.3 m. However, during the year, the monthly mean water level varies between 0.7 and 3 m above chart datum. The average rate of the current in the harbour is 1.5 knots.

## *Voyage Data Recorder*

In addition to bridge audio, a VDR is capable of recording such items 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 button to save VDR data on the *Common Spirit* is located on the vessel's console above a sticker instructing the crew to press and hold the save button after an incident.

The VDR's save button must be pressed within 12 hours following an occurrence in order for the data to be retrievable. The VDR data on the *Common Spirit* could not be retrieved because the bridge team did not press the save button within the 12 hours following the occurrence. Therefore, VDR data were not available to assist the Transportation Safety Board (TSB) with this investigation. There are no protocols for Canadian authorities that advise masters of any action to take with respect to a VDR following an incident.

International Maritime Organization (IMO) guidelines on VDRs state that "recovery of the VDR information should be undertaken as soon as possible after an accident to best preserve the relevant evidence for use by both the investigator and the ship owner. As the investigator is very unlikely to be in a position to instigate this action soon enough after the accident, the owner must be responsible, through on-board standing orders, for ensuring the timely preservation of this evidence." <sup>8</sup>

## *Vessel Certification*

The *Common Spirit* was certificated and equipped in accordance with existing regulations.

## *Personnel Certification and Experience*

The crew of the *Common Spirit* were all properly certified for their positions on board. The master had held the position of master on various vessels since 2006 and became master of the *Common Spirit* in June 2012. This was the master's first berthing at section 16. The OOW had been sailing as a deck officer since May 2012, the date at which he joined the *Common Spirit*. The helmsman had been sailing since 2002, and joined the *Common Spirit* as a helmsman in October 2011.

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<sup>8</sup> International Maritime Organization, *Guidelines on Voyage Data Recorder Ownership and Recovery* (MSC/Circ. 1024), 29 May 2002.



## *Pilotage Authorities*

In Canada, there are 4 pilotage authorities, each governed by the *Pilotage Act*,<sup>9</sup> operating in the following regions: Pacific, Great Lakes, Atlantic, and Laurentian. Each region has its own set of governing regulations.

The LPA is a federal Crown corporation responsible for providing safe and efficient pilotage services within the St. Lawrence River area. The LPA's major responsibilities include establishing compulsory pilotage areas and issuing pilot licences and pilotage certificates. The LPA contracts licensed pilots and apprentice pilots for operations within 3 districts. District No. 1 covers an area between Montreal and Québec and is divided into 2 sectors, Montreal/Trois-Rivières, and Trois-Rivières/Québec. District No. 1-1 covers the Port of Montreal, and District No. 2 covers the area between Québec and Les Escoumins. Approximately 185 pilots are currently under contract with the LPA.

While training of apprentice pilots is contracted by the LPA to the CPSLC, the LPA retains the responsibility for ensuring pilots are duly trained and licensed.

The LPA also works with the CPSLC to determine the demand for pilots and recruit the required number of apprentices. On average, the LPA recruits 5 new apprentices per year. In some years, the number of applicants exceeds the demand, in which case the LPA and CPSLC screen and select the best candidates. In 2007, the year that the pilot involved in this occurrence applied for apprenticeship training, the LPA and CPSLC established a requirement for 7 new apprentices and received 7 applicants, all of which successfully completed the required examinations and were accepted. Of these 7 applicants, all completed the apprenticeship training and became licensed pilots.

## *Corporation des Pilotes du Saint-Laurent Central*

The CPSLC is a private company of pilots contracted by the LPA to provide pilotage services in District No. 1 and 1-1.<sup>10</sup> As part of the contract, the CPSLC is also responsible for coordinating the training of apprentice pilots within District No. 1. Apprentice pilots train with CPSLC pilots on vessels of all sizes for a minimum of 2 years before they become eligible to take examinations for a Class C pilot's licence. A Class C licence, which is issued by the LPA, permits pilots to work within their assigned sector in District 1 on vessels of a specified maximum length.<sup>11</sup>

## *Pilot Certification and Experience*

The pilot on the *Common Spirit* held a Master Intermediate Voyage certificate issued on 12 December 2006 and had sailed as an OOW since 2002. On 08 January 2010, the pilot obtained

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<sup>9</sup> *Pilotage Act*, R.S.C., 1985. Act current to 16 September 2013 and last amended on 17 October 2011.

<sup>10</sup> The CPSLC has been providing pilotage services in District 1-1 since 16 September 2011.

<sup>11</sup> The LPA has 3 licence classes: A, B, and C. Each licence class has certain stipulations, such as maximum vessel length, that a pilot must comply with.

a Class C, District 1<sup>12</sup> licence for the Montreal/Trois-Rivières sector, which allowed for pilotage of vessels up to 165 m in length. After obtaining 1 year of experience as a Class C, District 1 pilot within this sector, he became eligible to pilot vessels up to 185 m in length. On 08 January 2012, the pilot upgraded to a Class B, District 1 licence, which allowed for pilotage of vessels up to 195 m in length within the Montreal/Trois-Rivières sector.

## *Pilotage Training and Licensing, District No. 1 (Montreal/Trois-Rivières)*

### *Admission Procedures*

Candidates wishing to apply for pilot training must first meet the minimum requirements of the *Laurentian Pilotage Authority Regulations*<sup>13</sup> and pass a written entrance examination. They are then interviewed by an admissions board consisting of 2 pilots from the Corporation des Pilotes du Bas-Saint-Laurent (CPBSL),<sup>14</sup> 2 pilots from the CPSLC, 1 representative from the LPA, and a psychologist.

The written entrance exam assesses the candidate's general knowledge on a range of subjects, some of which include meteorology, tides, rules and regulations, ice navigation, and vessel manoeuvring. The interview assesses the candidate's situational judgement and suitability for the pilotage profession. At the end of the interview, the psychologist rates the candidate as recommended, recommended with caution, or not recommended. At that point, the board decides on the admissibility of the candidate. Once a candidate is accepted, the LPA issues the candidate a Class D apprentice pilot permit. A Class D permit allows the apprentice to undertake pilotage training in the presence of a licensed pilot on any vessel in the Montreal/Trois-Rivières sector.

### *Two-year Apprenticeship*

The CPSLC is responsible for coordinating the minimum 2-year pilot apprenticeship training, which includes a combination of technical courses and on-board training under the supervision of an on-duty licensed pilot.

In the first year, apprentices complete a number of technical courses and written tests on manoeuvring and general knowledge of the river. As well, under the supervision of a CPSLC pilot, apprentices observe or assist with a minimum of 138 intermediate and full transit voyages (including a minimum of 6 during the winter navigation season) and a minimum of 83 dockings and departures from specific areas and ports within their sector. However, there are no guidelines specifying the amount of time an apprentice spends observing versus the amount of time an apprentice spends piloting the vessel under the supervision of a CPSLC pilot. Additionally, there are no standardized criteria or formal records for evaluating and tracking an apprentice's on-board performance.

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<sup>12</sup> District 1 is a pilotage area between Montreal and Québec.

<sup>13</sup> *Laurentian Pilotage Authority Regulations*, C.R.C., c. 1268, Section 26.2. Regulations current to 16 September 2013 and last amended on 01 January 2013.

<sup>14</sup> CPBSL is the corporation of pilots for District No. 2.

In comparison, the Pacific Pilotage Authority (PPA) in British Columbia uses qualified pilot assessors<sup>15</sup> to evaluate apprentice pilots every 3 months using standardized criteria that assess an apprentice's proficiency with regard to voyage preparation, bridge resource management, the passage of the vessel, and berthing and unberthing manoeuvres.

The Great Lakes Pilotage Authority (GLPA) has developed a standardized trainee handbook that helps trainers to evaluate an apprentice's required knowledge and identify skills to be developed. The GLPA requires apprentice pilots to complete a specified number of trips with licensed pilots. After the apprentice pilot has completed the required trips, the trainers' team<sup>16</sup> will meet to assess the level of learning. The GLPA trainee handbook specifies that "evaluation should follow a strict procedure to guarantee objectivity."<sup>17</sup>

The Atlantic Pilotage Authority (APA) does a standard review of each apprentice's training trips on a monthly basis, and discussions take place periodically between the APA director and the respective chairperson regarding the progress of certain individuals. After having been licensed, the pilot is subject to continued performance monitoring by the APA. In some instances, APA pilots approved for work under a certain tonnage license have been reassigned to a limited work assignment or training role in order to assist them in meeting the specific goals and/or time limits set by the authority.

CPSLC apprentices, at the end of their first year of training, must pass a written and oral examination administered by the CPSLC. The minimum passing mark for both exams is 70%, and the exams evaluate general knowledge of the river and knowledge of manoeuvres. Candidates are questioned on information such as the length of docks, the depth of water available alongside various berths, the characteristics of currents, the need for tugs in certain areas, and the particularities of certain vessels.

In the second year of training, apprentices complete further technical courses and on-board training; as in the first year of training, each apprentice's level of on-board practise may differ and there are no standardized criteria or formal records to evaluate and track an apprentice's performance. As of October 2011, the CPSLC started requiring apprentices, at some point during the 2-year apprenticeship, to complete 3 days of simulator training on manoeuvres at specific docks and areas within their assigned sector.

At the end of the second year, apprentices will have been present, either observing or piloting vessels under the supervision of a pilot, for a minimum of 276 trips and 166 dockings and departures and must once again pass both a written and oral examination administered by the CPSLC. If an apprentice successfully obtains the 70% pass mark on both exams, the CPSLC will then favourably recommend the apprentice to the LPA for a Class C pilot licence examination.

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<sup>15</sup> Qualified pilot assessors, or check pilots, are pilots who have been trained to assess the proficiency of their peers.

<sup>16</sup> The trainers' team is made up of the GLPA director and other individuals involved in the training process.

<sup>17</sup> Great Lakes Pilotage Authority, "Great Lakes Pilotage Trainee's Book," 23 January 2001.

### *LPA Class C Pilot Licence Examinations*

To obtain a Class C pilot licence, candidates must complete a written and oral examination administered by the LPA. The minimum passing mark for each of these exams is 70%. The exams evaluate candidates on local knowledge of the river, meteorology, winter navigation, pilotage rules and regulations, and vessel manoeuvring.

The oral examination takes place before an examination board committee consisting of 1 LPA representative, 3 CPSLC pilots, and 1 Transport Canada Marine Safety and Security examiner.<sup>18</sup> An observer with experience of the river is also present; for the past few years, the LPA has nominated a retired Canadian Coast Guard captain to act in this position. The duration of the oral examination will vary depending on the candidate's ability, but normally lasts a full day. The questions are generally situational in nature. Failure of either exam makes the candidate ineligible for a Class C licence. In the case of failure, the apprentice pilot's training can be extended at the discretion of the LPA and CPSLC. Apprentices have a maximum of 3 years to complete all training and examinations.

An apprentice becomes ineligible to apply for a Class C pilot licence after failing any of these LPA examinations 3 times.

### *Licence Upgrade*

Upon obtaining a Class C licence, a new pilot is limited to working on vessels of a specified maximum length.<sup>19</sup> The pilot does not undergo any formal evaluation during this time. After obtaining 2 years of experience in this licence class, the pilot becomes eligible for a licence upgrade. The CPSLC requires pilots to complete 2 days of simulator training before recommending them to the LPA for their licence upgrades.

The simulator training includes various exercises, one of which involves bringing vessels of gradually increasing size<sup>20</sup> alongside challenging docks such as section 16. During this exercise, a pilot must complete 1 successful berthing on each size of vessel. Whenever an attempt is failed, the exercise restarts and can be repeated as many times as necessary in order for the pilot to complete a successful berthing. The number of unsuccessful attempts is not recorded. After completing simulator training, pilots who have obtained 2 years of experience on Class C

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<sup>18</sup> The TCMSS examiner certifies candidates under the *Marine Personnel Regulations*.

<sup>19</sup> Class C pilots are limited to working on vessels and tankers of a maximum length of 165 m for the first 6 months after licensing. After these initial 6 months, the vessel length limitation increases to 175 m. After 12 months, the vessel length limitation increases to 185 m, and it remains at 185 m for any subsequent years at this licence class. The length restriction for tankers remains at 165 m as long as the pilot remains at this licence class.

<sup>20</sup> Pilots upgrading to a Class B licence practise on vessels of gradually increasing sizes within Class B.

vessels may then request that the CPSLC recommend them to the LPA for a Class B licence. The CPSLC checks the pilot's record <sup>21</sup> and then makes the recommendation.

Once a Class B licence is issued by the LPA, a pilot must work for 3 years on vessels of a specified maximum length before becoming eligible to upgrade to a final Class A licence. The pilot does not undergo any assessment during his 3 years as a Class B pilot. In order to upgrade to a Class A licence, pilots must complete another 2 days of simulator training involving various manoeuvring exercises at challenging locations within their sector. <sup>22</sup> The pilot must also complete 5 days of manoeuvring training in a CPSLC-approved ship model training facility. However, there are no formal records used to assess the pilot's performance during this manoeuvring training. Once pilots complete the required training, they receive an attendance certificate verifying that they were present for training. The CPSLC then checks the pilot's record and recommends the pilot to the LPA for a final Class A licence.

### *Training and Licensing of the Common Spirit Pilot*

In the spring of 2007, the pilot in this occurrence applied to the LPA to become an apprentice; he was issued a Class D permit on 01 April 2007. <sup>23</sup> Shortly afterwards, he began apprenticeship training within the Montreal/Trois-Rivières sector of District No. 1.

During the 2-year apprenticeship, the LPA record shows that the apprentice went to section 16 at 5 occasions on vessels varying in size from 185 to 222 m in length. On these occasions, the apprentice's experience consisted of taking notes while watching the pilot manoeuvre the vessel. Prior to October 2011, pilots were not required to take simulator training; as such, the apprentice did not receive this training.

In the spring of 2009, after the apprentice had completed 2 years of training, the CPSLC, concerned by certain weaknesses overall during the 2-year apprenticeship, did not recommend the apprentice to the LPA to be examined for a Class C pilot licence. <sup>24</sup> Although the apprentice was not recommended by the CPSLC, the LPA advised the CPSLC that since the apprentice's training had terminated, the apprentice was to present himself at the written exam. The apprentice's first attempt at the written exam on general knowledge of the river was

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<sup>21</sup> The LPA maintains a database of reported accidents, incidents, or complaints, which is used to complete these checks.

<sup>22</sup> Pilots upgrading to a Class A licence practise on vessels of gradually increasing size within Class A, for which there is no maximum length.

<sup>23</sup> In 2007, when the pilot was accepted into the apprenticeship program, a written entrance exam was not required. The candidates were evaluated based on cumulative points assigned for their sea time, their certificate of competency, and other criteria. Six months after acceptance, the apprentices wrote a general knowledge exam. Since that time, the rules have changed and candidates are now required to pass a written entrance exam followed by an interview in order to be eligible for admittance.

<sup>24</sup> The CPSLC was not able to provide the TSB with copies of the examinations that the pilot completed after both his first and second year, nor were they able to provide any evaluations of the pilot's on-board performance.

unsuccessful, and therefore he was not admitted to the oral exam. At this time, the LPA and CPSLC decided to extend the apprentice's training by 6 months.

In the fall of 2009, after completing the additional 6 months of training, the CPSLC favourably recommended the apprentice to the LPA for the Class C pilot licence examinations. After passing the written exam, the apprentice was admitted to the oral exam, but was unable to attain a passing mark. The LPA and CPSLC extended his apprenticeship for an additional 3 months, during which time the apprentice was sent for further ship handling training with the Montreal harbour pilots. During this additional training, the apprentice spent approximately a third of the time in the Montreal harbour practising ship handling, while the rest was spent training in the river between Montreal and Trois-Rivières. At the end of the 3 months, there was no formal assessment of the apprentice's performance by the Montreal harbour pilots.

Following the additional 3 months of training, the CPSLC recommended the apprentice to the LPA. The apprentice passed the written exam and was admitted to the oral exam, achieving a score just over the passing requirement of 70% on the oral exam. The apprentice therefore became eligible for a Class C licence, which the LPA issued on 08 January 2010.

After completing the mandatory 2 years of experience as a Class C pilot, the pilot became eligible to upgrade to a Class B licence. The pilot completed simulator training for a Class B licence 9 months before fulfilling the mandatory 2 years' experience.<sup>25</sup> The CPSLC could not provide the TSB with a record of the number of attempts that had been made in order to complete the section 16 berthing exercise but could confirm that the pilot had passed.

The pilot requested a recommendation from the CPSLC for a Class B licence, and was issued one by the LPA on 08 January 2012. For the first 12 months after being issued a Class B licence, the pilot was eligible to work on vessels up to 195 m in length.

### *Assessment of Pilot Proficiency*

In 1999, the Canadian Transportation Agency (CTA) issued a *Review of Pilotage Issues* to the Minister of Transport identifying concerns about the lack of pilot assessments. The report recommended that "the pilotage authorities be required to develop and implement a fair and reasonable system for assessing pilots' competence and quality of service, after consultation with interested parties. This assessment process should take place regularly and not less than every five years."<sup>26</sup>

In 2008, the Canadian Marine Pilot's Association and the 4 pilotage authorities in Canada, including the LPA, developed a set of guiding principles<sup>27</sup> to help the authorities implement

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<sup>25</sup> Simulator training may be completed before a pilot completes the required 2 years of experience, as scheduling is based on the availability of the simulator and the pilot.

<sup>26</sup> Canadian Transportation Agency, *Review of Pilotage Issues*, Panel Recommendation No. 9, August 31, 1999.

<sup>27</sup> Canadian Marine Pilot's Association and Canadian Pilotage Authorities, *Guiding Principles for Pilotage Authority Quality Assurance Programs for Assessing Pilot Proficiency and Quality of Service*, 2008.

programs to assess pilot proficiency. The guiding principles were intended to allow authorities to meet Recommendation No. 9 of the CTA's *Review of Pilotage Issues* and IMO Resolution A.960.<sup>28</sup>

There are 9 guiding principles in total, 4 of which are listed below and suggest that pilot assessments be

- applicable to all pilots;
- conducted regularly (not less than once every 3 years);
- conducted using multiple means of assessment; and,
- focused on offering specific and practical steps to remedy situations should a pilot's proficiency and/or performance need to be improved.<sup>29</sup>

The PPA, which operates on the west coast of BC, requires pilots to undergo assessment by a qualified pilot assessor at least once every 3 years. A copy of the pilot's assessment is then submitted to the PPA. These assessments provide valuable feedback to the pilot, create a record for the PPA, and form the basis for further training as necessary.

The PPA also requires check rides<sup>30</sup> to regularly assess an apprentice's on-board proficiency. The PPA uses standardized evaluation procedures and qualified pilot assessors to regularly assess apprentices' on-board training and provide ongoing feedback so that both apprentices and the PPA are aware of areas of weakness. Regular feedback based on standardized evaluation criteria gives apprentices an opportunity to focus on improving any identified areas of weakness and documents the apprentice's performance throughout the apprenticeship and subsequent licensing.

The Great Lakes Pilotage Authority (GLPA) and the Atlantic Pilotage Authority (APA) have also established pilot assessment programs. The GLPA established a Pilot Quality Assurance program in 2010 that requires pilots to spend a week training in the simulator at least once every 5 years. The week of simulator training includes 2 days spent practising emergency situations. At the end of the week, the pilots are assessed on an exercise using a standard evaluation form that is then kept on file. The Atlantic Pilotage Authority (APA) has also recently implemented a pilot assessment program that includes check rides. Within the next year, the APA aims to have all pilots complete an assessment.

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<sup>28</sup> IMO Resolution A.960 was adopted in 2003 and makes recommendations on training, certification, and operational procedures for maritime pilots other than deep-sea pilots.

<sup>29</sup> Canadian Marine Pilot's Association and Canadian Pilotage Authorities, *Guiding Principles for Pilotage Authority Quality Assurance Programs for Assessing Pilot Proficiency and Quality of Service*, 2008.

<sup>30</sup> During a check ride, a qualified assessor boards a vessel and assesses a pilot or apprentice while in the act of piloting.

In 2009, the LPA commissioned a report <sup>31</sup> that examined methods for competency assessment in 6 pilotage organizations, including 2 in Australia, 3 in the United Kingdom (UK), and 1 in the Netherlands. The report identified that both Australia and the UK have guidelines in place to regularly assess pilot competency: the UK's *Port Marine Safety Code* requires that pilots revalidate their authorizations every 5 years, with the revalidation process including a competency assessment. The *Guidelines for Marine Pilotage Standards in Australia* require ongoing competency assessments using check pilots and marine simulators. The report recommended that the LPA take certain steps to develop an ongoing pilot competency assessment program, including the following:

- bring in a third party such as Det Norske Veritas to work with pilots to define pilotage competencies and standards of assessment for each;
- involve pilots in developing competency assessment tools;
- introduce simulator-based competency assessments on a voluntary basis using senior pilots as assessors;
- after a suggested grace period of 2 years, introduce mandatory simulator-based assessments; and,
- after 3 years, introduce check rides for competency assessment.

The LPA does not currently have a pilot competency assessment program.

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<sup>31</sup> Robert G. Friend Consultants Inc., *Assessment of Pilotage Quality and Competency of Service Final Report*, May 20, 2009.



## *Analysis*

### *Events Leading to the Striking*

The manoeuvre to berth a vessel alongside section 16 is challenging due to the layout of the dock and the requirement for several actions to be undertaken in sequence or simultaneously. These actions are coordinated by the pilot and involve several personnel. The length and width of a vessel such as the *Common Spirit* adds to the complexity, given the limited manoeuvring space between sections 14 and 16. During this occurrence, the following factors contributed to the striking: the timing of the order to let go the anchor, the speed of the vessel's approach, the uncoordinated use of tugs, the continuation of the manoeuvre, and the pilot's experience.

#### *Use of the Anchor*

Ordering the anchor to be let go off section 11 allows time for the order to be carried out, the anchor to deploy, and the vessel's speed to reduce in preparation for the starboard turn toward section 16. It also ensures the pilot has sufficient time to assess the effectiveness of the anchor before undertaking subsequent actions and modifying the planned manoeuvre if necessary. In this occurrence, the anchor was let go after the bow had passed section 14, and it had little effect in reducing the speed of the vessel and assisting with the starboard turn.

#### *Vessel's Speed on Approach*

To initiate a starboard turn towards section 16, a vessel of the *Common Spirit's* size would reduce its speed over ground to nil or slightly above. In this occurrence, as the vessel approached the corner of sections 16 and 17 at a speed of 1.8 knots, the master was relaying distances between the bow and the corner to the pilot. Although the vessel was not effectively slowing in preparation for the starboard turn towards section 16, the pilot continued with the manoeuvre.

At approximately 20 m from the corner of sections 16 and 17, the pilot ordered the engine slow ahead, and the rudder hard to starboard, attempting to turn the vessel. However, given the *Common Spirit's* speed and the vessel's advance,<sup>32</sup> the change of helm had minimal effect in turning the vessel within the space available.

#### *Use of Tugs*

In order to assist berthing a vessel at section 16, tugs are used to help turn a vessel, to counteract the increased effect of the current, and to help maintain the vessel's position parallel to section 16 as the vessel advances into the basin. The aft tug provides the pivoting motion while the forward tug assists with maintaining the bow on position. In this occurrence, no orders were given to the aft tug. The pilot first ordered the forward tug to push, and then ordered the forward tug to pull full in an attempt to slow and turn the vessel. Given the *Common Spirit's*

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<sup>32</sup> The distance a vessel continues to travel on a course before responding to a change of helm; a vessel's advance varies depending on its speed, size, and draught.

speed of approach, the forward tug had a limited ability to slow the vessel. Without the coordinated use of the tugs, the vessel did not turn as the aft tug was not used and the forward tug was limited in its ability to turn the vessel.

### *Continuation of the Manoeuvre*

When a berthing manoeuvre is not proceeding according to plan, the pilot or the master must take appropriate action. In this occurrence, although there were indications that the vessel was not turning and that its speed was excessive, the pilot continued with the manoeuvre because he had underestimated the vessel's advance and believed that the vessel would respond in the space available. Pursuing the manoeuvre is indicative of plan continuation bias,<sup>33</sup> which occurs when a person or team continues with a plan although conditions have changed to an extent that would not have necessarily been acceptable if they had been present at the beginning of a task.

The master advised the pilot of an imminent collision when the distance to the corner of sections 16 and 17 was less than 20 m; however, being unfamiliar with the berthing manoeuvre at section 16, the master left the conduct of the vessel with the pilot. Evasive action was not taken, as the pilot believed there was sufficient space to complete the starboard turn, while the master relied on the pilot's expertise to carry out the manoeuvre. As a result, the vessel continued towards the corner of sections 16 and 17 and struck the dock at a speed of 1.7 knots.

### *Pilot Experience at Section 16*

The pilot had recently upgraded his licence, and this was the pilot's first assignment to section 16 on a vessel of the *Common Spirit's* size. Before boarding the vessel, the pilot referred to the notes taken while an apprentice to verify the manoeuvre required at section 16. During the previous 2 years, the pilot had performed the manoeuvre once before on a vessel of approximately 140 m in length. However, because that vessel was smaller than the *Common Spirit*, the berthing manoeuvre at section 16 involved a lesser degree of difficulty. As an apprentice, the pilot had observed the berthing at section 16 five times and had practised the manoeuvre in the simulator approximately a year and a half before the occurrence.

In this occurrence, the following actions by the pilot impacted the success of the manoeuvre at section 16: the delay in dropping the anchor, the initiation of the turn at a speed that was excessive for a vessel of this size, the uncoordinated use of the tugs, and the continuation of the manoeuvre despite indications that it would not be successful. The sequence of events indicated that the pilot lacked proficiency and experience berthing vessels of the *Common Spirit's* size at section 16.

### *Training and Evaluation of Apprentice Pilots*

Evaluations with feedback are important in measuring an individual's performance, identifying strengths and weaknesses, and allowing time for improvement during training. The

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<sup>33</sup> Plan continuation bias is the unconscious cognitive bias to continue with the original plan in spite of changing conditions.

Corporation des Pilotes du Saint-Laurent Central (CPSLC) administers regular written tests and yearly written and oral examinations to evaluate the progress of apprentices, but it does not have a standard process to maintain records of these evaluations. Additionally, while apprentice pilots may receive feedback from the pilots during on-board training, there are no standardized procedures to evaluate the proficiency of apprentices while piloting and manoeuvring the vessel. Although there are requirements for the number of voyages that an apprentice must complete, there are no guidelines stipulating the amount of time the apprentice must have the conduct of the vessel while under the supervision of a pilot. As such, each apprentice's level of practise may differ and some apprentices' manoeuvring experience may be limited. Additionally, there are no records kept to document the performance of apprentices while the vessel is under their conduct.

In this occurrence, the Laurentian Pilotage Authority (LPA) and CPSLC extended the pilot's apprenticeship because the pilot was unsuccessful on 2 examinations at different periods during the apprenticeship. No records were available with respect to the apprentice's on-board performance during this additional training, nor were any records of assessments maintained by the CPSLC during the 2-year apprenticeship, suggesting that the monitoring and assessment of the apprentice's ongoing performance during the apprenticeship was limited.

In order for the CPSLC to recommend an apprentice to the LPA for a Class C licence, it must be confident that the apprentice will succeed on the LPA examinations. To determine an apprentice's ability, the CPSLC must thoroughly supervise and evaluate apprentices throughout their apprenticeship. However, the CPSLC's current evaluation procedures for apprentices do not include documented on-board evaluations that use standardized criteria. Without standardized and documented evaluations of apprentice pilots' on-board performance during training, there is a risk that apprentices may become licensed pilots without having obtained the skills and expertise necessary for safe pilotage.

### *Proficiency Assessments for Pilots*

It is common practice in most workplaces for employees to undergo regular performance assessments to ensure they continue to possess the knowledge and skills required to effectively perform their duties. These assessments are usually kept on file to create a record of the employee's performance. Pilots under the authority of the LPA are not required to undergo any formal assessments once they have been issued a licence. In contrast, the 3 other Canadian pilotage authorities have established procedures for ensuring the continued proficiency of their pilots. The primary tool that the LPA currently uses to check a pilot's record is a database of reported accidents, incidents, or complaints. If regular proficiency assessments of pilots are not carried out, there is a risk that pilots may not have adequate skills to conduct a vessel safely.

The licence upgrade process is an opportune time to provide pilots with additional training and on-board assessments to ensure they are proficient at the next licence class. Under the *LPA Regulations*, pilots become eligible to upgrade their licences after working for a specified period of time on vessels within their licence class, but they are not required to undergo on-board assessments. The CPSLC requires that pilots complete 2 days of simulator training prior to each

upgrade.<sup>34</sup> Although there is an instructor present during a pilot's simulator training, there are no standardized criteria to assess a pilot's performance, nor are there any standards for maintaining records. Without standardized assessments and record-keeping during the licence upgrade process, the CPSLC and LPA have limited information to draw upon when attempting to establish a pilot's level of proficiency at each licence class, and there is a risk that pilots may not be proficient at their next licence class.

### *Ship-Handling Training at Challenging Locations*

The CPSLC recognizes that some locations, such as section 16, are more challenging for berthing. As such, apprentices must spend time observing pilots and training in the simulator at these challenging sections<sup>35</sup> and, before upgrading their licences, pilots must also complete simulator training at these sections.

Although simulator training may provide apprentices and pilots with an understanding of the manoeuvres required at docks such as section 16, it does not fully represent the experience of berthing a vessel in actual conditions. For example, the effectiveness of the anchor in the simulator is unrealistic, as is the interaction with bridge personnel.

While apprentices may observe pilots berthing vessels at challenging locations, the experience of observing does not necessarily provide apprentices with the skills required to perform the manoeuvre themselves. Additionally, when pilots upgrade their licences, their previous experience berthing smaller vessels, although relevant, does not guarantee that the pilots will have obtained the skills to berth vessels of a larger size.

Without adequate on-board ship-handling training and assessment at challenging locations prior to licensing and licence upgrades, there is a risk that pilots may not be sufficiently prepared to safely berth vessels at these locations.

### *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 control of a vessel for the period covering the most recent 12 hours of operation. Objective data are invaluable to investigators when seeking to understand a sequence of events and identify operational problems and human factors.

Because the save button on the *Common Spirit* was not pressed by the bridge team, the VDR continued to record data after the striking, overwriting the data recorded at the time of the striking. If VDR recordings are not available to an investigation, this may preclude the identification and communication of safety deficiencies to advance transportation safety.

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<sup>34</sup> Class B pilots upgrading to a Class A licence are required to complete an additional 5 days of training at a CPSLC-approved ship model training facility.

<sup>35</sup> Simulator training, some of which focuses on these challenging locations, has been a requirement for apprentice pilots since October 2011.

## *Findings*

### *Findings as to Causes and Contributing Factors*

1. The anchor was let go late and had little effect in reducing the vessel's speed and assisting with the starboard turn.
2. The *Common Spirit's* speed was excessive for a vessel of its size; as such, the vessel did not respond to the change of helm due to its advance and the space available.
3. The aft tug was not used to assist in pivoting the vessel, and the forward tug was limited in its ability to turn the vessel; therefore, the *Common Spirit* continued on its course.
4. Evasive action was not taken by the pilot, and the master relied on the pilot's expertise to carry out the manoeuvre. The vessel continued towards the corner of sections 16 and 17 and struck the dock at a speed of 1.7 knots.
5. The pilot lacked experience berthing vessels of the *Common Spirit's* size at section 16 and therefore was not proficient at this manoeuvre.

### *Findings as to Risk*

1. Without standardized and documented evaluations of apprentice pilots' on-board performance during training, there is a risk that apprentices may become licensed pilots without having obtained the skills and expertise necessary for safe pilotage.
2. Without standardized assessments and record-keeping during the licence upgrade process, the Corporation des Pilotes du St-Laurent Central and Laurentian Pilotage Authority have limited information to draw upon when attempting to establish a pilot's level of proficiency at each licence class and there is a risk that pilots may not be proficient at their next licence class.
3. Without adequate on-board ship-handling training and assessment at challenging locations prior to licensing and licence upgrades, there is a risk that pilots may not be sufficiently prepared to safely berth vessels at these locations.
4. If regular proficiency assessments of pilots are not carried out, there is a risk that pilots may not have adequate skills to conduct a vessel safely.

### *Other Findings*

1. If voyage data recordings are not available to an investigation, this may preclude the identification and communication of safety deficiencies to advance transportation safety.

## *Safety Action*

### *Safety Action Taken*

Following the *Common Spirit* occurrence, the Corporation des Pilotes du St-Laurent Central sent the pilot for further simulator training, under the supervision of an experienced pilot, in order to practice exercises in bringing vessels alongside section 16.

### *Safety Concern*

#### *On-board Assessment Process for Pilots and Apprentice Pilots*

In 1999, the Canadian Transportation Agency issued a *Review of Pilotage Issues* to the Minister of Transport identifying concerns about a lack of pilot assessments. The report recommended that “the pilotage authorities be required to develop and implement a fair and reasonable system for assessing pilots’ competence and quality of service...”<sup>36</sup> As a result, 3 of the 4 pilotage organizations in Canada (the Pacific Pilotage Authority, the Atlantic Pilotage Authority, and the Great Lakes Pilotage Authority) implemented on-board assessment processes that are standardized and documented. The Laurentian Pilotage Authority (LPA) has no standardized and documented process to ensure that apprentice pilots are evaluated during their on-board training and that licensed pilots have their on-board proficiency assessed at regular intervals. As such, apprentice pilots can be certified and pilots can have their licences upgraded by the LPA without ever having undergone an on-board assessment.

The Board is concerned that, without standardized and documented assessments of on-board performance, there is a risk that apprentices without the necessary skills and expertise may be issued pilot licences. Furthermore, if periodic, standardized, and documented proficiency assessments are not carried out, the Board is concerned that licensed pilots may not maintain the skills and expertise necessary for safe pilotage.

*This report concludes the Transportation Safety Board’s investigation into this occurrence. The Board authorized the release of this report on 19 September 2013. It was officially released on 14 November 2013.*

*Visit the Transportation Safety Board’s website ([www.bst-tsb.gc.ca](http://www.bst-tsb.gc.ca)) for information about the Transportation Safety Board 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.*

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<sup>36</sup> Canadian Transportation Agency, *Review of Pilotage Issues*, Panel Recommendation No. 9, August 31, 1999.

# Appendices

## Appendix A – Area of the Occurrence

