

MARINE INVESTIGATION REPORT
M02C0018

FOUNDERING

WORKBOAT *36E33460*

ANSTRUTHER LAKE, ONTARIO

15 MAY 2002

The Transportation Safety Board of Canada (TSB) investigated this occurrence for the purpose of advancing transportation safety. It is not the function of the Board to assign fault or determine civil or criminal liability.

Marine Investigation Report

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Summary

On the afternoon of 15 May 2002 at approximately 1700 eastern daylight time, the workboat *36E33460* was being used to transport a roofing crew of four and a cargo of used shingles from a construction site on Anstruther Lake, Ontario. In mid-lake, the deeply-laden vessel began taking water over the bow. Shortly thereafter, the vessel swamped and sank. The four roofers swam to shore. The operator drowned.

Ce rapport est également disponible en français.

Other Factual Information

Particulars of the Vessel

Workboat		
Licence Number	36E33460	
Port of Registry	Peterborough, Ontario	
Flag	Canada	
Type	Workboat (Skiff)	
Gross Tons ¹	Less than 5 tons	
Length	4.8 m	
Draught	Forward: Approx. 60 cm	Aft: Approx. 60 cm
Built	Unknown	
Propulsion	22.3 kW Gasoline-powered outboard motor	
Cargo	Used asphalt shingles, two 24' ladders, and roofing tools	
Crew Members	One	
Passengers	Four roofers, one dog	
Owner	Private individual	

Description of the Vessel

The vessel was of welded steel construction with a single hard chine at the turn of the bilge. Two bench seats were built into the vessel which incorporated steel buoyancy chambers underneath. The bow was flat with a slight rake aft. The operator sat aft on a swivel seat adjacent to the outboard motor.

Description of the Voyage

In early spring of 2002, a roofing contractor (the contractor) obtained a contract to re-roof two cottages on Anstruther Lake. As the cottages were located in a remote location accessible only by water, the contractor made arrangements with a local commercial barge service operator (the operator) to transport material, tools and 12 personnel to and from the job sites.

At 0700 eastern daylight time², on the day of the occurrence, the roofing material, consisting of 105 bundles of asphalt shingles, was loaded on a motorized barge and transported to the job sites by the operator. While the barge was being loaded, the operator transported six roofing

¹ Units of measurement in this report conform to International Maritime Organization (IMO) standards or, where there is no such standard, are expressed in the International System (SI) of units.

² All times are eastern daylight time (coordinated universal time [UTC] minus four hours), unless otherwise stated.

personnel to the job site in the workboat. Upon his return, he delivered the barge-load of material, while the owner of the roofing company used the steel workboat to transport the remaining roofing personnel to the job sites.

At approximately 1500, the operator transported a load of used shingles in a dump trailer on the barge from the job sites to the government landing. Leaving eight workers to finish up the remaining roofing work, the contractor took three employees back to the landing to offload the barge and transport the used shingles to the local landfill. Simultaneously, the operator transported four roofing personnel back to the landing and returned for the remaining debris, tools and four employees, arriving at the job site at approximately 1630.

The vessel was loaded with used shingles up to the level of the gunwales in the centre between the seats, and in the area forward of the seats, until a freeboard of approximately 0.2 metre (m) remained. Two aluminum ladders, two bundles of new shingles, and roofing tools were also placed on board.

The roofers expressed reluctance to board the heavily-laden workboat, however the operator reassured them that the boat had previously been similarly loaded. The operator, his dog and four roofers departed the work site at 1700, and as the boat entered the open waters of the lake and turned south-west into the prevailing wind and waves, it began to take water over the bow. In an effort to reduce the amount of water coming on board, the operator increased speed in an attempt to raise the bow. The vessel continued at higher speed for five to ten minutes and then suddenly slowed. The bow immediately dropped and descended into an oncoming wave, which swamped the boat. The vessel began to capsize to port and simultaneously sank by the bow $\frac{1}{2}$ kilometre from shore, in 20 m of water.

When the vessel sank, two personal flotation devices (PFDs), two seat cushions, a gas can and the plastic bin containing the PFDs floated free. The operator was thrown a PFD, however he was not seen to don it. Two of the roofers used the seat cushions to float on, one used the gas can, and the last used the plastic bin for flotation. The roofers, following the lead of the owner's dog, decided to swim to a nearby island, however the operator indicated that he would rather try to reach the opposite, more rocky shoreline. As the roofers swam away they became separated from each other and the operator. Two of the roofers reached the island first and huddled together to stay warm. It is estimated that they had been in the water for $\frac{1}{2}$ hour before reaching the shore. The third roofer reached the island in a more advanced condition of hypothermia than the first two, after being in the water approximately 40 minutes. Once on the island, one roofer decided to swim the short distance (70 m) to the mainland to call for help from a cottage. At this point, the fourth roofer had not been accounted for.

Search and Rescue

Upon returning from the landfill site at 1700, the roofing contractor noticed that the operator had not yet returned with the remaining roofers. At 1720, he and an employee decided to take a 4 m aluminum boat to search for them. After visiting the job sites, and the operator's lake-front home, the roofing contractor began a search of the lake at 1800. Within 10 minutes, he spotted and recovered the final member of the roofing crew floating on the gas can, and dragged him to the nearby island. After the other three survivors on the island were located, they were transported by boat to the nearby cottage on the mainland and treated for hypothermia.

At 1834 the contractor called his girlfriend from the cottage and requested that she call 911 for help. At 1850, once the survivors were safely sheltered in the cottage, the roofing contractor proceeded to search for the operator. Within 10 minutes, the operator was found partially submerged, with his arm through a PFD, approximately 150 m from the south-east shore opposite to the island. He was immediately pulled to shore where cardiopulmonary resuscitation (CPR) was begun. Shortly thereafter, a team from the North Kawartha Fire and Rescue service arrived to assist, however the operator could not be revived.

Three of the four roofers were transported to the Peterborough regional hospital for observation. The fourth declined treatment. The Peterborough coroner determined the cause of the operator's death to be hypothermia and drowning.

Inspection by Ontario Provincial Police Search and Recovery Dive Team

On 16 May 2002 the Ontario Provincial Police Search and Recovery Unit located the vessel in 20 m of water, recovered the fuel tank to prevent pollution, and marked the wreck location with a buoy. The Ontario Provincial Police returned the following day with a Transportation Safety Board of Canada (TSB) investigator to document the disposition of the vessel on the bottom. An underwater video was taken of the vessel which showed that it was in an upright position, partially embedded in the bottom sediment. Used shingles were piled in the forward and midships areas to a level above the gunwales. The outboard motor control was engaged in the ahead position with the throttle wide open. Although various possibilities exist, the reason for this cannot be determined. Built in buoyancy tanks located under the seats were partially crushed by the water pressure.

Environmental Conditions

At the time of the occurrence, the weather was clear and sunny with a temperature of 25 °C. Winds were gusting to 25 km/h from the south-west. The wave height was estimated to have been 0.6 m. The surface water temperature was 8 °C at the site of the occurrence.

Lifesaving Appliances and Passenger Safety Briefing

It is reported that the vessel carried PFDs, stored in a plastic bin, however neither the bin, nor the PFDs were located. In addition, two PFDs, the owner's anti-exposure work coat and two buoyant seat cushions were available near the passenger seats. On 01 May 2002, an amendment to the *Small Vessel Regulations* came into force requiring passenger safety briefings on small passenger vessels. No formal passenger safety briefing was carried out, however it is reported that the operator pointed out the location of the PFDs to the passengers. Notwithstanding this, when the vessel sank, one survivor used the bin itself for flotation; he and the other survivors being unaware that the plastic bin contained PFDs.

Regulations pursuant to the *Occupational Health and Safety Act of Ontario*³ governing construction projects require that any worker who is at risk of drowning must wear a lifejacket. Further provisions for construction projects require that workers be trained to perform rescue operations and that there be a means of warning workers at risk. It is not clear whether these requirements would extend to the carriage of workers in a vessel to and from a construction site.

Certification of Vessel and Operator

³

Occupational Health and Safety Act - O. Reg 213/91, Section 27

Information obtained from Canada Customs in Peterborough, Ontario indicates that the vessel was licensed to the operator in July, 1990 however the license issued does not indicate the intended use of the vessel. The steel vessel's licence however indicates that it is constructed of aluminum.

According to Transport Canada:

If a ship is chartered by an employer to transport workers to or from a work site, the employees are considered passengers ...⁴

As a result, the roofing crew being carried by the vessel on the day of the occurrence are considered to be passengers, and the vessel involved in the occurrence was operating as a small passenger vessel. Due to its size (under 15 gross registered tons [grt]) and the number of passengers carried (12 or fewer) the vessel was not subject to compliance with the *Hull Construction Regulations* or the *Hull Inspection Regulations* made pursuant to the *Canada Shipping Act*. However, it was subject to compliance with other regulations, including the *Small Vessel Regulations*, in particular the safety equipment carriage requirements.

As a commercial passenger vessel under 15 grt carrying not more than 12 passengers the workboat was subject to the requirements of the Small Vessel Monitoring and Inspection Program (SVMIP), that evolved from the Interim Small Passenger Vessel Compliance Program (ISPVCP).⁵

The SVMIP is a voluntary compliance program in which all small vessel owners and operators are encouraged to adopt a self-monitoring inspection regime. In this manner, they can ensure that vessels are in compliance with the safety requirements that pertain to their operation. The perception within Transport Canada (TC) however is that the SVMIP, being a program and not a regulation, cannot be enforced. At the time of the occurrence, TC was not aware that the vessel was engaged in commercial work or in transporting passengers and it had not been inspected by TC.

The operator had extensive experience on the water and was a longtime resident of Anstruther Lake, but held no marine certificate of competency nor was he required to under the *Crewing Regulations*. The operator was however required to have undertaken Marine Emergency Duties training. The owner of the roofing company had no formal marine experience.

⁴ TC Website, www.tc.gc.ca/marinesafety/CES/small-commercial-vessels/Passenger-Vessels/FAQ.htm,
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⁵ This ISPVCP program was developed in response to an amendment to the *Canada Shipping Act* which raised the inspection threshold from a gross tonnage of 5 to 15. A policy implementing an Interim Passenger Vessel Compliance Program was introduced in June 1999 (SSB 11/99).

Provincial Initiatives

In February 1998, in the interests of the safety of passengers travelling on small uninspected passenger vessels, the Province of Quebec passed a decree⁶ requiring all small passenger vessels under 5 grt and carrying 12 or fewer passengers to be inspected (by a professional surveyor approved by TC) and to carry at least one million dollars of liability insurance. The survey includes inspection of the vessel as well as boarding and landing sites. The surveyor will issue a letter of compliance stipulating that the vessel meets TC regulatory requirements and is appropriately equipped to operate a safe service (as described in the surveyor's report), and that the operating crew is knowledgeable to conduct the specified commercial activity in a specified area/territory. The provincial *Commission des transports du Québec* then issues a permit to the operator.

Prior Occurrences

On 03 December 2001, a small commercial workboat carrying five construction workers on Lac des Deux Montagnes, Quebec, was swamped and sank, causing three fatalities. The vessel had not been identified by TC or inspected as a commercial vessel, nor had the owner requested the inspection. Investigation by the Quebec provincial *Commission de la santé et de la sécurité du travail* revealed that the workboat lacked reserve buoyancy, that the available rescue boat was not suitably equipped, that the cold water conditions contributed to the fatalities and that the passengers were not wearing lifejackets.

On 22 March 1998, the small passenger vessel *Ocean Thunder*⁷, with one operator and three passengers on board, capsized off Tofino, British Columbia. The Board found, *inter alia*, that the operator did not fully appreciate the conditions the boat would meet at the time of the accident, and that the absence of emergency communications equipment delayed the search and rescue response. The Board expressed concern that, because current regulations did not reflect the need for thermal protection, mariners and passengers on small vessels may be exposed to undue risk from hypothermia.

Analysis

Vessel Loading

In the late afternoon when the operator began to load the workboat with used shingles, he was faced with the choice of making two trips with a reduced load, or taking a risk by heavily loading the vessel for one trip. It was reported to the TSB that the owner claimed to have loaded the vessel to this draught in the past.

⁶ Number 147-98, 4/2/98

⁷ TSB Occurrence No. M98W0045

People who successfully perform risky acts on the job often change their attitudes or opinions about the personal risk involved. They tend to discount the risk and may even come to believe that the activity is no longer risky. They may also develop a sense of their own invulnerability. The more often they succeed at the dangerous act, the more likely they are to believe that, although the practice may be dangerous in a general sense, nothing bad will happen to them. This attitude can lead them to repeat the act, and repeated success further reinforces the behaviour. The more often they do it, the more they feel justified in their sense of invulnerability. The more comfortable they become with the risky behaviour, the more likely they are to reduce the margin for safety.⁸ On the day of the occurrence, the operator was willing to accept the risk involved in loading the excessive weight of shingles because he had heavily loaded the vessel in the past without adverse consequences.

Reducing freeboard on any vessel results in lower margins of safety in rough weather. For small vessels of open construction, it is essential that adequate freeboard be maintained in relation to weather conditions. The load of shingles taken on board just prior to the occurrence reduced the effective freeboard of the vessel to 0.2 m. Upon reaching unprotected water in mid lake, the vessel was travelling almost directly into the prevailing weather. Wave heights were 0.6 m and the vessel began to ship water over the bow. It is possible that the operator slowed down suddenly to prevent further water coming over the bow, or to avoid debris in the water. However, the amount of shingles carried on the voyage had reduced the vessel's freeboard such that the sudden and rapid deceleration of the vessel caused the bow to immediately drop onto an oncoming wave and swamp the boat.

Regulatory Overview

All passengers (whether they are tourists or construction workers) travelling on commercial vessels, regardless of size, have an expectation that the vessel is safe, the operator competent, and that they will not be put at undue risk by the voyage. In Canada, the use of small commercial vessels to carry passengers engaged in the construction industry is not uncommon. Workers carried as passengers on small commercial vessels are subject to a combination of federal and provincial regulations.

There are no clear provincial requirements to lessen the risk of drowning for workers being transported over water to and from construction projects. Federal regulations, while specifying what safety equipment is to be on board, do not require passengers to wear lifejackets. Further, neither Ontario nor federal regulations contain provisions to protect workers against hypothermia when travelling as passengers on small commercial vessels, should the vessel sink or capsize.

⁸ S. E. Taylor and J. D. Brown, "Illusion and Well Being: A Social Psychological Perspective on Mental Health," *Psychological Bulletin* 1988, pp. 103,193-210.

Without the aid of a lifejacket or a thermal protective aid, hypothermia rapidly reduces an individual's ability to stay afloat or swim. Muscles in the arms and legs become rapidly numb, leading to paralysis. Sudden immersion in cold water may also cause hyperventilation and associated panic, further reducing a person's ability to remain afloat.⁹ At the location of the occurrence, the minimum distance to shore was 500 m. Immersed in water of 8 °C, a person without a flotation device has between 30 and 60 minutes, and less than a 50 per cent chance of swimming 50 m, before becoming incapacitated to the point that they cannot stay afloat. Being employed in the roofing trade, the roofing crew's level of fitness was relatively high, which gave them the stamina required to swim to shore. However, as a result of the low water temperature—brought about by spring runoff conditions on Anstruther Lake—and the lack of thermal protective aids, the roofing crew experienced advanced hypothermia and the ability of these workers, and of the operator, to stay afloat unaided, or swim to shore, was compromised.

Responsibility for assessing the condition of the vessel and the competence of operators of commercial passenger vessels falls under the jurisdiction of TC. TC provides operators with a national regulatory system that applies to the structural and operational safety of the vessel, to ensure that the vessel can be navigated safely. Due to the size of the vessel, (under 5 grt) and number of passengers carried (12 or fewer) the vessel involved in this occurrence was not required to undergo annual inspections by TC, however an initial inspection prior to entering service was required. While the operator was required to have taken Marine Emergency Duties training, he was not required to hold a certificate of competency.

However, as a commercial passenger vessel under 15 grt carrying not more than 12 passengers, the workboat was subject to the requirements of the SVMIP. It is unknown whether the operator was aware of the SVMIP or the benefits that voluntary compliance with the program could bring. At the time of the occurrence, however, TC was unaware that the vessel was operating as a small passenger vessel and neither the vessel nor its lifesaving equipment had been inspected by TC.

Provincial governments have the responsibility to ensure that construction activities necessitating the use of small commercial vessels are conducted in a safe manner. In the absence of a mandatory inspection by TC, there is still a need to ensure that construction crews are afforded a minimum level of safety. The proactive measures taken by the Province of Quebec in 1998 have effectively linked the requirements for vessel inspections and insurance with the province's business licensing system. In this manner, the province ensures vessels in the construction and small passenger vessel industry are vetted and a minimum level of safety established.

At the time of the occurrence, at least one other commercial vessel service operating on Anstruther Lake was not listed in the TC ship inspection database. Similar commercial marine services supporting the construction industry are common across the country. Programs similar to the Quebec initiative do not exist in other provincial jurisdictions. In the absence of effective federal and provincial regulatory requirements, passengers on small commercial vessels may be put at undue risk.

Findings

Findings as to Causes and Contributing Factors

⁹ K.E. Cooper, S. Martin, and P. Simper. *Factors Causing Hyperventilation in Man During Cold Water Immersion*, Faculty of Medicine, University of Calgary, 1982.

1. The operator heavily loaded the vessel because he had done so previously without adverse consequences.
2. The shingles reduced the vessel's freeboard such that, when the vessel was suddenly slowed, the bow immediately dropped onto the oncoming wave which swamped the vessel.

3. As a result of the low water temperature—brought about by spring runoff conditions on Anstruther Lake—and the lack of thermal protective aids, the roofing crew experienced advanced hypothermia and the ability of these workers and of the operator to stay afloat unaided, or swim to shore, was compromised.

Findings as to Risks

4. Neither Ontario nor federal regulations make provisions to protect workers against hypothermia when travelling as passengers on small commercial vessels—should the vessel sink or capsize.
5. In the absence of effective federal and provincial regulatory requirements, construction workers being carried as passengers on small commercial vessels may be put at undue risk.
6. As a result of an inadequate safety briefing prior to departure, the roofers did not make use of all the available flotation devices, such as those stored in the plastic bin.

Other Findings

7. Transport Canada was unaware that the vessel was operating as a small passenger vessel and had not inspected either the vessel or its lifesaving equipment.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 23 October 2003.

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

Appendix A - Sketch of the Occurrence Area

