Transportation Safety Board of Canada

Bureau de la sécurité des transports du Canada

MARINE INVESTIGATION REPORT

M03N0050

FIRE ON VEHICLE DECK

ROLL-ON/ROLL-OFF PASSENGER FERRY

JOSEPH AND CLARA SMALLWOOD

8 NAUTICAL MILES SOUTH OF PORT AUX BASQUES, NEWFOUNDLAND AND LABRADOR

12 MAY 2003

Canada

Marine Investigation Report

Fire on Vehicle Deck

Roll-on/Roll-off Passenger Ferry
Joseph and Clara Smallwood
8 Nautical Miles South of Port aux Basques, Newfoundland and Labrador
12 May 2003

Report Number M03N0050

Synopsis

On the afternoon of 12 May 2003, the roll-on/roll-off passenger ferry *Joseph and Clara Smallwood* departed North Sydney, Nova Scotia, on a regularly scheduled six-hour crossing to Port aux Basques, Newfoundland and Labrador. The trip was uneventful until approximately eight nautical miles from Port aux Basques, when a fire was discovered on the lower vehicle deck. The deluge system was activated and the fire was fought as the vessel continued on to its destination. Shortly after midnight, the vessel docked at Port aux Basques and the passengers were evacuated. Assisted by the local volunteer fire department, the crew continued to fight the fire. Two hours after arriving in Port aux Basques, the fire was declared under control, and 1 ½ hours later, the fire was declared extinguished.

Ce rapport est également disponible en français.

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1.0 Factual Information

1.1 Particulars of the Vessel

	Joseph and Clara Smallwood	
Official Number	811386	
Port of Registry	St. John's, Newfoundland and Labrador	
Flag	Canada	
Type	roll-on/roll-off passenger and vehicle ferry	
Gross Tons	27 615	
Length[1]	172.76 m	
Draught [2]	Forward: 6.90 m	Aft: 6.00 m
Built	MIL Davie Inc., Lauzon, Quebec, Canada (1989)	
Propulsion	three MAK 8M552 diesel engines and one MAK 6M43 diesel engine, totalling 20 600 kW and driving two controllable-pitch propellers	
Cargo	On Board	Capacity[3]
• private motor vehicles	55	370 or
• tractor-trailers	27	77
• drop trailers[4]	24	unknown
Crew Members	80	87
Passengers	138	1353
Owner	Marine Atlantic, St. John's, Newfoundland and Labrador	

[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] See Glossary at Appendix D for all abbreviations and acronyms.

[3] Capacities given for vehicles refer to the total capacity where that type of vehicle only is being carried. Normally, a combination of vehicle types are on board. Crewing levels may vary according to passenger load as per the vessel's Ship Inspection Certificate.

[4] A drop trailer is a stand-alone trailer with no tractor attached.

1.1.1 Description of the Vessel

The *Joseph and Clara Smallwood* was built in 1989 as a roll-on/roll-off (ro-ro) ferry to transport passengers and vehicular traffic between Nova Scotia and Newfoundland. The vessel has two vehicle cargo areas on decks 1 and 3, and passenger facilities on decks 3 through 7 (for outboard profile, see Appendix B). The vessel has the capacity to carry up to 1353 passengers, 370 automobiles or 77 tractor-trailers and may have a crew of up to 87. The *Joseph and Clara Smallwood* and its sister ship, the *Caribou*, are the two largest passenger ferries presently operating in Canada.

Photo 1. The *Joseph and Clara Smallwood*

1.2 History of the Voyage

At 1807 Newfoundland daylight time[5] on 12 May 2003, the passenger ferry *Joseph and Clara Smallwood* with 138 passengers and 80 crew departed on a scheduled crossing from North Sydney, Nova Scotia, to Port aux Basques, Newfoundland and Labrador.

The voyage was uneventful until 2310 when, with the vessel in position latitude 47°26.5' N, longitude 59°08' W, approximately 8 nautical miles from Port aux Basques, two heat detection alarms sounded on the bridge. Almost simultaneously, the vehicle deck watchman (VDW), while making his rounds on vehicle deck 1, discovered a fire around a tractor-trailer (see Figure 1). The VDW exited the deck through the forward-most door on the port side and proceeded directly to a manual fire alarm pull station located just outside the door. He activated

[5] All times are Newfoundland daylight time (Coordinated Universal Time minus 2.5 hours).

the pull station, but no audible alarm sounded; he then proceeded up to deck 3 and activated a second alarm. Still hearing no audible alarm, he ran aft to the VDW's station on deck 3, where he contacted the bridge by telephone and informed them of the fire.

When the first two heat detector alarms rang on the bridge, the officer of the watch (OOW) went to the fire detection panel to determine the origin of the alarm. While in the process of silencing and accepting both heat detector alarms, one manual pull station alarm, followed quickly by a second, registered on the panel. Shortly afterwards, the telephone rang on the bridge with the call from the VDW. In accordance with the vessel's Emergency Response Manual (ERM), the OOW commenced the emergency response for fire.

The OOW immediately called the machinery control room (MCR), informed the engineer of the watch (EOW) of the fire and instructed him to shut down the ventilation to vehicle deck 1. After securing the ventilation for the vehicle deck, the EOW in turn commenced his respective emergency protocol by contacting the senior chief engineer and informing him of the fire. The OOW attempted to contact the master by telephone but was unsuccessful. He was, however, able to contact the senior chief officer (SCO) and the bosun.

On being informed of the fire, the SCO immediately located the master and apprised him of the situation. The time was approximately 2316. The master instructed the SCO to proceed to the vehicle deck to investigate the fire and report back. The senior chief engineer, on his way to the MCR, opened an access door to vehicle deck 1 (see Figure 1) but was unable to see anything due to the thick smoke. After ensuring that the door to the vehicle deck was closed, he proceeded to the MCR.

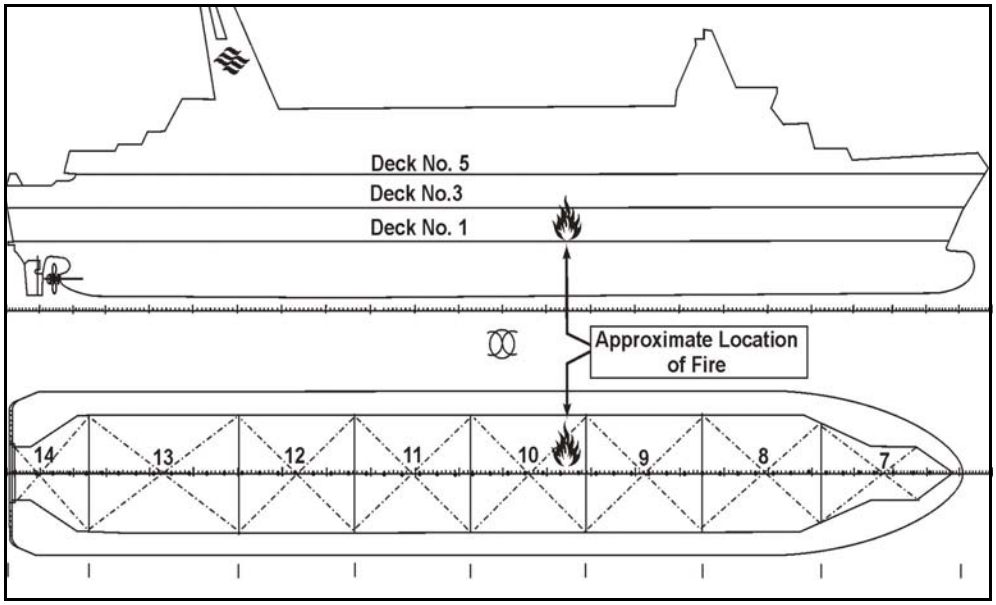

Figure 1. Deck 1 – Deluge zones and location of fire

As the OOW was making a second attempt to call him, the master arrived on the bridge. Shortly afterwards, the master was informed by the SCO that there was heavy black smoke on vehicle deck 1 and access to the fire from his location was virtually impossible. At approximately 2320, the master sounded the general alarm followed by a public address (PA), into the crew areas only, instructing the fire parties to muster on vehicle deck 3 and indicating that it was not a drill.

The SCO then proceeded up to vehicle deck 3 where he witnessed indications of heat transfer to the deck immediately above where the fire was thought to be. He also made contact with the master and, in accordance with the ERM, it was decided to activate the deluge system. The SCO proceeded aft on deck 3 and then down to deck 1. When he arrived on deck 1, he met up with the two VDWs who were already in full fire protective gear. The SCO directed them to ready a fire hose and proceed forward. The SCO then proceeded back to deck 3, where he met members of the now forming fire party. He directed the fire party to set up boundary cooling in way of the deck area that was showing signs of extreme heat.

Following his conversation with the SCO, the master contacted the senior chief engineer and, after a brief discussion, directed him to activate the deluge system. The senior chief engineer proceeded directly to the emergency control room (ECR), where he activated the deluge system for zone 7. The time was 2322. Shortly thereafter, zones 8 and 9 were activated, but it was quickly determined that the fire was most likely in zones 9 and 10, so zone 10 was activated and zone 8, isolated.

With the deluge system now activated, two fire parties using hose lines attacked the fire. To ensure that the fire did not spread to adjacent units forward and aft, deluge zones 8 and 11 were alternately activated from time to time, to bracket the fire. Access to the fire was difficult due to the close spacing of the tractors and trailers, in addition to the weight and rigidity of a pressurized, two-inch-diameter fire hose. Despite this, the fire party continuously fought the fire, rotating personnel when the air in the self-contained breathing apparatus ran low.

At approximately 2327, the Marine Communications and Traffic Services at Port aux Basques was informed of the occurrence and the services of the local volunteer fire department were requested for arrival.

Meanwhile, as soon as the general alarm was issued to the crew areas, the members of the Passenger Service Department (PSD) started checking crew and passenger cabins and other areas accessible to passengers, requesting the occupants to vacate them and proceed to deck 5 (see Figure 2).

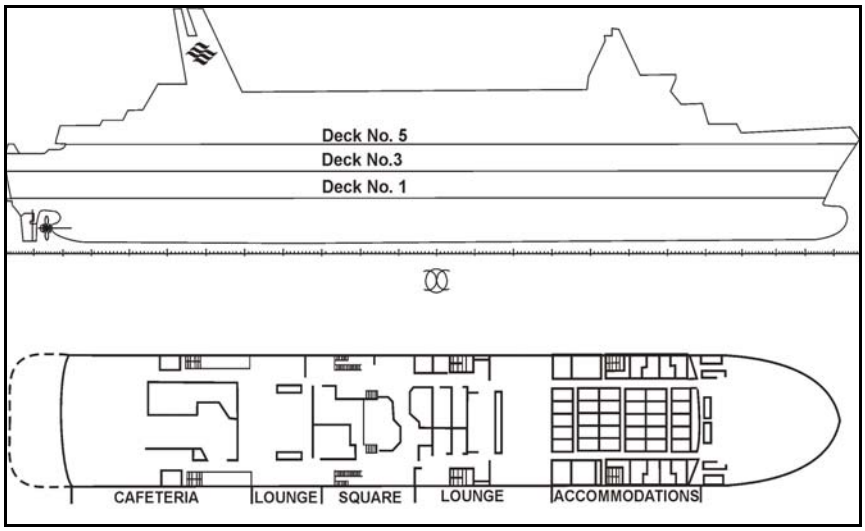

Figure 2. Deck 5

At approximately 2330, the master contacted the senior chief steward (SCS) and was advised that there was smoke in the forward section of deck 5. As a result, all passengers were directed to muster in the cafeteria by means of a PA announcement. At 2340, a second PA announcement requesting all passengers to muster in the cafeteria was made. Shortly thereafter, the master contacted the SCS with the procedure to be followed for evacuating passengers once they arrived at Port aux Basques.

The vessel continued to steam towards its destination and arrived at Port aux Basques at 0008, on 13 May 2003. On arrival, the local volunteer fire department boarded the vessel and, under the direction of the SCO, assisted the ship's crew in fighting the fire. Although the deluge system had contained and knocked down the flames prior to arrival, the fire parties continued to fight the fires in the tractor-trailer where it had started and in two adjacent units that had subsequently caught fire. At 0012, the master gave the order to evacuate the passengers as planned.

The vessel's crew, assisted by the Port aux Basques Volunteer Fire Department, continued to fight the fire. At 0057, the stern door was opened allowing access to vehicle deck 1, enabling the fire department to lay out 1 ½-inch-diameter fire hoses, which were more manageable. As the smoke cleared, the rows of trucks became visible and accessible. Drivers who were able to identify their vehicles were asked to reboard the vessel and drive them off. Eventually, sufficient vehicles had been driven from the deck to allow the firefighters better access to the fire. Disembarkation continued until all the vehicles except one[6] had been removed. At 0210, the fire was declared under control. The deluge system was shut down 35 minutes later and, at 0254, the vessel's fire pump was shut down. At 0335, the fire was declared out.

[6] The tractor-trailer where the fire is believed to have started was too badly damaged to be easily removed. It was finally towed off the vessel later in the morning.

1.3 Injuries to Persons

One crew member suffered from minor smoke inhalation, while a second suffered a strained back. Both went to the hospital for treatment and were released. Two passengers were examined by paramedics and released.

	Crew	Passengers	Others	Total
Fatal	–	–	–	–
Missing	–	–	–	–
Serious	–	–	–	–
Minor/None	2/78	2/136	–	4/214
Total	80	138	–	218

1.4 Damage

1.4.1 Damage to Vessel and Cargo

When discovered, the fire was burning in one of the tractor-trailers on vehicle deck 1; however, the precise origin and cause of the fire has not been determined. The resulting damage to the vessel included, but was not limited to, the following:

- Some 40 m^2 of deck plating above the origin of the fire was buckled.
- Some 40 m^2 of thermal insulation was damaged.
- Various electrical fixtures (for example, lighting fixtures, heat detectors, annunciators, associated wiring) were damaged.
- Various internal and external areas were smoke damaged.

Subsequent to an inspection by authorities, the vessel was permitted to return to North Sydney that afternoon for repairs, with a cargo of drop trailers only.

Photo 2. Damage to deckhead

Damage to the vessel's cargo (see Appendix C) included the following:

- One tractor truck was completely destroyed. Its attached trailer was heavily damaged and the cargo of orange juice destroyed.
- The contents of a moving and storage company trailer sustained heavy damage.
- A drop trailer with building supplies sustained heavy damage.
- Several other tractor-trailer rigs suffered varying degrees of smoke and water damage.
- A private motor vehicle sustained heat damage to the rear bumper, left tail-light and rear tires.

1.4.2 Damage to the Environment

There was no damage to the environment.

1.5 Certification

1.5.1 Vessel

The *Joseph and Clara Smallwood* is subject to regular inspection by Transport Canada (TC) as a non-Convention[7] passenger ship and was last issued a Ship Inspection Certificate on 10 December 2002. The vessel maintains Lloyd's Register Class ✠100A1, with ice class notation

[7] A Convention vessel is one to which the International Convention for the Safety of Life at Sea (SOLAS) applies; typically, a vessel operating on international voyages.

1A Super. Lloyd's Register also certified that the safety management systems for both the vessel and the operating company (Marine Atlantic) complied with the International Management Code for the Safe Operation of Ships and for Pollution Prevention (ISM Code).[8]

1.5.2 Personnel

The master and officers of the *Joseph and Clara Smallwood* held certificates valid for the class of vessel and the type of voyage being undertaken. Furthermore, all the officers and crew had Marine Emergency Duties (MED) training, which was consistent with TC requirements, according to the position they held on board the ship. Marine Atlantic policy also required every crew member to complete a familiarization program when joining the company and when signing on to any of their vessels for the first time.

1.6 Personnel History

The master had 42 years of service at sea and approximately 32 years as a master. He had sailed as master of the *Joseph and Clara Smallwood* since its delivery in 1989. The SCO had 32 years of experience at sea with Marine Atlantic, 4 years of which were on board the *Joseph and Clara Smallwood*. The SCS had 32 years of experience with Marine Atlantic, 16 years of which were as senior chief steward. The VDW had approximately 24 years of sailing experience and was issued a first mate, intermediate voyage certificate in 2000. He had served with Marine Atlantic for one year, normally in the position of second mate.

1.7 Weather

The weather was light airs, calm seas and a low easterly swell. The skies were overcast with a visibility of eight miles. The air temperature was 2°C and the sea temperature was 5°C.

1.8 Emergency Response

1.8.1 Deluge System

An underlying principle of fire safety on board passenger vessels is that a fire be detected, contained and extinguished in the space of its origin. On vessels where large, open areas are necessary for the operation of the ship, such as the vehicle deck spaces on ro-ro ferries, the fitting

Photo 3. Deluge spray head

[8] Under the *Canada Shipping Act*, ISM Code certification is not required for Canadian vessels that operate on non-Convention voyages.

of a fixed fire extinguishing system replaces the typical structural bulkhead as the means of containing a fire. Accordingly, both vehicle decks on the *Joseph and Clara Smallwood* were protected by a pressure water-spraying, or deluge system. The system consisted of a fixed pipe array divided into 15 individual zones. Each zone was independently controlled and designed to deluge water through open spray heads once manually activated from the ECR.

The primary function of the deluge system is to contain and control the fire and to provide cooling, thus allowing the crew an opportunity to better fight the fire. In this occurrence, the deluge system on board the *Joseph and Clara Smallwood* effectively limited the fire to the underside of the three burning vehicles.

1.8.2 Fire Detection and Alarm System

The vessel was equipped with a fire detection system consisting of automatic heat and smoke detectors, as well as manual pull stations fitted throughout the vessel. The activation of any of these detectors or pull stations would send a signal (pre-alarm) to the bridge. A bridge officer could then either acknowledge the signal and investigate its cause before sounding the alarm or immediately sound the alarm. If the pre-alarm was not acknowledged within a preset time,[9] the fire detection system would automatically activate the general alarm.

The alarm panel had two options for sounding the alarm: "crew" or "all." By selecting the "crew" option, the alarm would sound in the crews' working areas and their quarters. This did not include the vehicle parking areas of the vehicle decks, but it did include the VDW's stations. If "all" was selected, the alarm would ring in the crew spaces, plus all passenger accommodation areas. This selection included the vehicle parking areas.

The manual pull stations on the *Joseph and Clara Smallwood* require the user to pull a lever down in order to send a pre-alarm signal to the bridge. No feedback is provided to the user about whether an alarm signal has been successfully transmitted until a bridge officer elects to sound the alarm, or the alarm is automatically activated after the preset time.

Photo 4. Typical manual pull station

Crew members lacked understanding as to exactly what should occur when a manual pull station is activated. Some knew that the alarm would initially sound only on the bridge; some thought an audible

[9] Transport Canada, Ship Safety Bulletin 02/2004, *Ship's Alarm and Internal Communication System*, states that the maximum time delay is two minutes.

alarm would immediately follow; others simply did not know. Weekly fire drills did not address the steps to be taken when a fire is discovered, such as the operation of the manual pull stations. The normal practice used during drills was for the master, after discussion with the SCO, to decide on a location for the drill to take place. The fire alarm would then be activated at that location by a designated crew member. This was done as a random check of the fire detection system. The master would then communicate the location of the fire to the crew using the PA system.

1.8.3 Fire Hoses

The fire hoses on the *Joseph and Clara Smallwood* were of two-inch nominal diameter, fitted in accordance with existing regulations.[10] The automatic fire pump and the general service pump are capable of delivering 120 m^3 and 135 m^3 of water per hour, respectively, at a pressure of approximately 10.7 bar.[11]

1.8.4 Vehicle Stowage

Vehicle deck 1 accommodates six lanes of tractor-trailer traffic. When operating with full load, clearance between vehicles in adjacent lanes may be reduced to 30 centimetres.

Photo 5. Typical spacing between vehicles and deck perimeter

1.8.5 Emergency Duties and Procedures

As part of the safety management system documentation, the vessel carried on board an ERM, which dealt with various emergency procedures and outlined, in point form, the tasks to be performed in the event of a subject emergency (for example, damaged or disabled vessel, collision, person overboard or pollution discharge). The tasks were further identified as being the responsibility of either the "bridge" or the "engine room." The ERM did not include a procedure for dockside evacuation as a result of an on-board fire.

The procedures relevant to this occurrence were "Fire" and "General." The "General" procedure is applicable in any emergency where the vessel is damaged or disabled.

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[10] *Fire Detection and Extinguishing Equipment Regulations*, *Canada Shipping Act*

[11] One bar is equivalent to 100 kPa or 14.5 psi.

Further to the ERM, specific emergency duties were assigned to crew members by means of the Emergency Procedures List, otherwise known as a muster list, which was posted on board the vessel. Among the many tasks detailed on this muster list were assignments related to the checking of accommodation areas and directing of passengers to the appropriate muster station. Checking vehicle deck areas specifically for passengers was not assigned to any crew member as part of this process.

1.8.5.1 Bridge Emergency Response

In this occurrence, while most of the responsibilities of the bridge personnel, as defined by the vessel's ERM, were carried out, several key considerations were not performed, as described below:

- **"Sound internal and external emergency alarm and initiate response as per muster list."** Approximately 10 minutes after the VDW called the bridge to confirm the existence of a fire on deck 1, the alarm was sounded in crew accommodation and working areas. The alarm was not sounded in passenger areas, including the vehicle areas, at any time during the occurrence.

- **"Ensure automatic fire doors and watertight doors are closed."** Fire doors were not closed using the central control on the bridge, nor did the bridge personnel give the order to close the doors. Fire doors on deck 5 were eventually closed by PSD crew on the suggestion of a deckhand who had come up to deck 5 from a lower deck.

- **"Check for missing persons."** No steps were taken to determine or verify that all passengers and crew were accounted for.

- **"Keep passengers advised and updated."** No announcements were made to inform and/or update the passengers regarding the occurrence, nor was this task delegated to other crew.

1.8.6 Communications

1.8.6.1 Fire Party

Communications between the fire party and the bridge were conducted using a portable, very high frequency (VHF) radio. During the occurrence, communications were intermittent, requiring the SCO, who was the officer in charge of the fire party, to continuously move around in order to establish and carry on communications with the bridge—a process disruptive to the coordination of the firefighting effort.

While a VHF radio is an established method of ship-to-ship and ship-to-shore communications, it is not well suited where radio waves must penetrate steel structures, as with internal shipboard communication. Instead, portable, ultra high frequency radios are accepted and widely used devices for such communications.

1.8.6.2 Vehicle Deck Watchman

When the vessel was in transit, one person was assigned to patrol the perimeter of each vehicle deck approximately every 30 minutes. During these rounds, the VDW was responsible for monitoring the vehicle deck for such things as fire, loose or shifting cargo (vehicles), vehicles and trailers leaking fluids, security of lashings on the vehicles (if fitted), security of the forward and after loading doors, and passengers who may have remained with or returned to their vehicles. In the event of an anomaly, the VDW was to report it immediately to the bridge.

Communications between the VDW and the bridge were conducted using fixed telephones connected to the vessel's internal communications system. On each vehicle deck, there were two such telephones, one forward and one aft. VDWs were not equipped with a portable means of communication, nor were they required to be by regulation.

1.8.7 Dangerous Goods

The sailing manifest for the voyage indicated that there were five drop trailers and one tractor-trailer carrying dangerous goods on the trip. The dangerous goods loading plan, which is intended to show the location of those vehicles on board the vessel, identified the locations of the five drop trailers, which were on deck 3. However, the position of the sixth vehicle[12] was not shown on the plan. Following the occurrence, it was determined that this vehicle was also loaded on deck 3, but its exact location on the deck could not be identified.

At an early stage in their response, the shore-based firefighters asked Marine Atlantic terminal personnel for information regarding the dangerous goods being carried on board the vessel. Marine Atlantic personnel was unable to provide definitive information.

[12] This vehicle was carrying ammonium nitrate fertilizers, Class 5.1 (oxidizer), UN 2067. These substances will accelerate burning when involved in a fire and some may decompose explosively when heated.

1.9 Passenger Safety[13]

1.9.1 Passenger Service Department Crew – Emergency Duties

Under normal operating conditions, the primary responsibility of crew members employed within the PSD is the provision of "guest" services, such as food and beverages and accommodation services. However, in the event of an emergency, the focus of their responsibilities shifts to the safety of passengers. The vessel's posted muster list called for the SCS, the senior ranking crew member of the PSD, to be in overall charge of the passengers during the occurrence. The emergency duties of crew members employed within the department included:

- assisting, directing and controlling passengers;
- promoting feelings of trust and safety among passengers;
- checking crew and passenger areas on decks 3 to 7;
- assembling passengers at muster stations; and
- being in charge of muster stations.

Within the Canadian passenger ferry industry, it is common practice for crew members employed in passenger service–related positions to be assigned such duties in an emergency.

1.9.1.1 Passenger Service Department Crew – Emergency Response

The following observations were made with respect to the PSD crew's response to this occurrence:

- A radio was used to monitor conversations between the bridge and the fire party regarding the ongoing status of response measures, but the other PSD crew members were neither informed nor updated.

- Initially, the crew did not take any measures to ensure that passengers remained within the muster station. Approximately 25 passengers left the area without the crew's knowledge. Shortly thereafter, a crew member discovered them on deck 6 and escorted them back to the muster station. Crew members were subsequently stationed at exit doors.

[13] Throughout Section 1.9 of this report, the terms "crew" and "crew member(s)" refer exclusively to employees of the Passenger Service Department, unless specifically stated otherwise.

- The crew concluded that all passengers were accounted for without making a head count. In fact, two passengers were missing and were trapped in their vehicle on deck 1.

- When PSD crew members cleared passengers from decks 3, 4, 6 and 7 and instructed them to report to deck 5, they did not tell the passengers what was going on or why they were being gathered. A total of 53 per cent of respondents to a post-occurrence questionnaire[14] indicated that they had requested information regarding what was happening. The PSD crew members did not provide such information to the passengers because they believed that it would lead to panic. Later, when the passengers were mustered in the cafeteria, no announcement was made informing or updating them regarding the fire, nor was the bridge advised that passengers were seeking information.

- The PA system was not used to give the emergency evacuation instructions. The crew believed that it was better to address the passengers personally, while they were mustered in the cafeteria. A total of 23 per cent of respondents to the questionnaire had difficulty hearing the instructions.

- The crew did not identify able-bodied passengers (military personnel, police officers, etc.) who, because of their occupation, had the ability to provide assistance with respect to crowd management in emergency situations. One such passenger's offer to help was not acted on.

- After the general alarm was activated in the crew spaces, one crew member did not immediately carry out his/her duties as per the muster list, but had to be directed to do so. This resulted in a short delay in clearing some passenger accommodations.

1.9.1.2 Passenger Service Department Crew – Training

Marine Atlantic provided the following initial training to PSD crew:

- on-board familiarization,
- MED A1 – Basic Safety,
- MED B1 – Survival Craft, and
- MED B2 – Marine Firefighting.[15]

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[14] Following the occurrence, the TSB was able to contact 98 of the 138 passengers who were on board at the time of the occurrence with a Passenger Safety Questionnaire. Of those mailings, 55 responses were received.

[15] Twenty-four of the 36 PSD crew on board at the time of the occurrence had received this training.

Ongoing crew training was provided during regularly scheduled boat and fire drills, as required by regulations.[16] Crew members were informed in advance when drills would be held. Although drills were conducted when there were no passengers on board, occasionally, a crew member was assigned to play the role of an incapacitated passenger.

The syllabuses of the aforementioned training courses did not include elements of crowd management, nor did the PSD crew's training program include TC-approved courses in crowd management or crisis management and human behaviour. Such training is not required for crew of Canadian non-Convention passenger ships, irrespective of the emergency duties they are assigned.[17]

1.9.2 Identification of Crew in Emergencies

At the time of the occurrence, 14 of 36 PSD crew members were on duty and wearing the company-supplied uniform. Most of the 22 crew members who were off duty responded wearing their personal clothing. In addition to uniforms, Marine Atlantic also supplied all crew members with reflective vests and coveralls with reflective material attached. No PSD crew reported for emergency duty wearing either of these items. Off-duty crew members were not required to don uniforms prior to commencing their emergency duties, nor did the procedures call for donning their reflective clothing in such circumstances. Some off-duty crew members who had ready access to their lifejackets reported for duty carrying or wearing them as per their emergency training. However, the lifejackets were set aside when it became apparent that an evacuation was not imminent.

In general, passengers identified PSD crew members by one of two means: uniforms or lifejackets (45 per cent and 34 per cent of respondents to the questionnaire, respectively). Passengers reported that the most common obstacle to crew identification was the lack of uniforms, as in the case of off-duty crew.

Marine Atlantic does not have a policy addressing the need for PSD crew to be readily identifiable to passengers in emergencies. While there are no regulatory requirements regarding ready identification of crew members in emergencies, TC encourages passenger vessel operators to implement International Maritime Organization (IMO) guidelines with respect to crew identification. These guidelines highlight the need for crew members to be readily identifiable as such to passengers. To facilitate this, it is recommended that both on-duty and off-duty crew

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16 *Boat and Fire Drill Regulations*, *Canada Shipping Act*

17 Some crew members were trained in these subject areas as a result of having worked on a vessel previously operated by Marine Atlantic that had undertaken Convention voyages.

members should wear some type of distinctive feature or identifier.[18] The guidelines do not speak to the need for such identifiers to be effective in adverse conditions, such as reduced visibility.

1.9.3 Access to Cabins

Emergency duties assigned to PSD crew members and practised during regular drills included the checking of crew and passenger cabins. While checking the crew cabins, crew members encountered a locked cabin. They knocked loudly on the door and shouted a warning. Although mumbling was heard, there was no definitive response. They continued pounding on the door and shouting loudly for several more seconds but, still receiving no response, they moved on and completed checking the remaining crew cabins. They reported their observation to the SCS and one crew member was directed to go back and check the room again. The crew member was not offered the master key for the crew cabins, nor was the crew member aware that a master key was available. Upon return, the cabin was unlocked and empty.

PSD crew members responsible for clearing passenger cabins were provided with an appropriate master key, while those responsible for clearing crew cabins were not. Procedures for clearing crew cabins, as practised during drills, did not include the hand-over of a master key to the appropriate crew members.

1.9.4 Emergency Communications Equipment

Throughout the occurrence, the SCS and the master communicated without difficulty by the ship's internal telephone system. As a contingency, both were equipped with portable, two-way VHF radios. PSD crew communicated with each other and with the SCS, either face-to-face or by relaying information through "runners"; they were not provided with portable communications equipment.

The order for passengers to muster in the cafeteria was made using the ship's PA system. Passengers heard the announcement without any difficulty (85 per cent of respondents to the questionnaire). The vessel was equipped with megaphones to amplify the voice when making announcements, but the PSD crew members were not aware of their existence and/or location.

[18] Ship Safety Bulletin 02/1996, *Passenger Safety Instructions*, 17 January 1996

1.9.5 Passenger Information

In accordance with TC guidelines,[19] Marine Atlantic established a passenger count that was provided to the master prior to departure. Although these guidelines do not address the recording of passengers' names, it was Marine Atlantic's practice to record the names of passengers and retain them ashore. Prior to sailing, the vessel was provided with the names of motor vehicle drivers (lead passengers) and those boarding the vessel on foot (foot passengers).[20] However, this information did not include the names of passengers who boarded the vessel in private motor vehicles, other than the drivers.

1.9.6 Passengers Remaining in Vehicles During Transit

Three passengers (two commercial truck drivers and a passenger travelling with one of the truck drivers) had remained in their vehicles during the transit from North Sydney to Port aux Basques. Both vehicles were located on vehicle deck 1, with the result that the occupants were trapped in their vehicles by the smoke.

Early in the occurrence, one of the truck drivers signalled for help by blowing the truck horn. Two crew members on their way to fight the fire heard the horn, located the vehicle and directed the occupant to deck 5.

The two remaining trapped passengers radioed to shore for help using the citizens' band radio in their truck. When the vessel arrived in port, shore-based emergency responders advised the ship's crew, who were not aware of the situation. A search was initiated; however, the passengers could not be located until the stern door was opened and they were seen to be in the first row. By this time, the passengers had been trapped for approximately two hours.

While the issue of access to the ro-ro decks by passengers while the vessel is under way is recognized by the IMO and the International Convention for the Safety of Life at Sea (SOLAS),[21] Canadian regulations do not address the issue of passengers remaining in their vehicles during transit. Marine Atlantic's policy, however, prohibits this practice. Passengers are advised of the policy through Marine Atlantic's Web site, signage posted on shore and on board, and announcements made on departure and during transit. However, passengers are not told that they are prohibited from remaining in their vehicles for safety reasons. In situations where passengers require access to their vehicles during transit, they may be escorted there by a crew member.

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19 Ship Safety Bulletin 16/1999, *Information on Passengers*, 07 December 1999

20 Marine Atlantic Trip Traffic Count and Sailing Manifest

21 IMO, SOLAS, 1974, and its Protocol of 1988, Chapter II-1, Regulation 20-3

Marine Atlantic has implemented several measures to deter passengers from remaining in their vehicles with varying levels of success. These measures include:

- locked doors to prevent entrance to the vehicle parking areas;[22]
- monitoring by vehicle deck watchmen;[23]
- financial incentives by reducing accommodation rates for commercial truck drivers; and
- penalties including banning passengers from future ferry travel.

Notwithstanding, Marine Atlantic reports that, on virtually every crossing, some passengers, particularly commercial truck drivers, remain in their vehicles.

Other passenger ferry operators also contend with passengers remaining in their vehicles during transit, despite policies and information campaigns against the practice. According to the *Société des traversiers du Québec*, some passengers, particularly commercial truck drivers, routinely remain, or attempt to remain, in their vehicles during transit. On the west coast, it is BC Ferries' experience that the passengers who remain, or attempt to remain, in their vehicles are those who live in the area and travel frequently by ferry.

1.9.7 Low-Location Lighting

All lights comprising the emergency lighting system on board the *Joseph and Clara Smallwood* were positioned at, or near, ceiling level and were consistent with TC regulatory requirements.

However, because ceiling-level lighting will be obscured in a smoke-filled environment, safety design principles recommend that lighting and/or markings intended to identify emergency escape routes be located at, or near, deck level. This principle is recognized by the IMO in that SOLAS contains specific requirements for the provision of low-location lighting on Convention passenger vessels:

> In addition to the emergency lighting required . . . the means of escape, including stairways and exits, shall be marked by lighting or photoluminescent strip indicators placed not more than 300 mm above the

[22] Marine Atlantic has since discovered that, even when properly locked, these doors can be forced open by anybody with the knowledge of how to do so.

[23] The design of some vehicles (recreational vehicles, trucks equipped with sleeping accommodation, etc.) limits the vehicle deck watchmen's ability to determine whether or not a vehicle is occupied.

> deck at all points of the escape route. . . . The marking must enable passengers to identify the routes of escape and readily identify the escape exits.[24]

Any passenger and ro-ro vessel registered in Canada that has been constructed in accordance with SOLAS, or to which the Convention applies, is required to be provided with low-location lighting to mark escape routes. However, there are no similar regulations or requirements in place for Canadian, non-Convention vessels.

1.9.8 Passenger Evacuation

In response to the emergency, the master developed two evacuation plans. Plan A called for foot passengers and passengers with vehicles on deck 1 to walk off using the starboard gangway, and for passengers with vehicles on deck 3 to drive off the vessel through the stern ramp. Vehicles on deck 1 would be discharged later when it was safe to do so. In formulating this plan, consideration was given to the conditions on vehicle deck 3, which, at 2325, were depicted as clear with very little smoke. Shortly thereafter, the master briefed the SCS on Plan A for evacuation.

The master also had a standby plan, Plan B. If the fire escalated, all passengers would proceed aft from the cafeteria to the stern and down the exterior stairs to the open area of deck 3, where they would walk off by means of the vehicle ramp. In this way, passengers' exposure to the hazards typically associated with fire, such as heat, smoke and toxic fumes, would be minimized.

On arrival at Port aux Basques at 0008, under direction of the master, the vessel was prepared for evacuation. As the vessel was being secured, an update regarding the conditions on deck 3 was requested. The ensuing report indicated that, although there was more smoke than before, it was still possible for passengers to drive off the vessel and that the interior, aft stairs were the safest route to deck 3. Based on this information, the master chose to implement Plan A for evacuation of the passengers.

At the time this decision was made, the status of the fire was as follows:

- the fire party could no longer see flames outside the vehicle that had been burning; however, there were still indications of smouldering and signs of fire around the wheel wells;

- the contents of several trailers alongside the vehicle appeared to be burning;

[24] IMO, SOLAS, 1974, and its Protocol of 1988, Chapter II-2, Regulation 13.3.2.5

- some buckling of the deck had been reported on deck 3 due to the heat from the fire below; and

- the fire had not been declared under control.

The vessel docked at 0010, and at 0012, the evacuation of passengers as per Plan A was commenced. PSD crew members, stationed at the head of the stairs and at each landing, directed passengers to deck 3 and provided assistance as required. Throughout this process, the stern door to vehicle deck 1, where the fire was located, remained closed.

Passengers with vehicles on deck 3 encountered several obstacles that hampered their evacuation:

- the number of exit lanes was reduced from two (normal operating conditions) to one because four drop trailers were located across the vehicle lanes at the stern;

- some passengers were forced to back up their vehicles before being able to access the exit lane, causing one vehicle, which was towing a trailer, to jackknife;

- one vehicle would not start, forcing the crew to redirect the other vehicles around it;

- two groups of passengers were late arriving at their vehicles; and

- at least one passenger was reported to have ignored the directions of the marshallers and jumped ahead in the line.

During the evacuation operation, the amount and density of smoke on vehicle deck 3 increased. At dock, the direction of the airflow around the vessel changed, causing smoke to be blown back into the vehicle parking area through the stern opening. As passengers entered the vehicle parking area, some were given paper towels and instructed to cover their nose and mouth in an attempt to mitigate the effects of inhaling smoke. It was reported that visibility in the area was reduced such that crew members could not see across the deck and had to cover their nose and mouth with their jacket in order to breathe. Given the density of the smoke and the delay in driving the vehicles off the deck, some passengers considered abandoning their vehicles to evacuate on foot.

At 0026, 14 minutes after the evacuation was initiated, all passengers had disembarked and deck 3 was clear of vehicles, with the exception of the one that would not start. Under normal operating conditions, the time required to disembark the vessel ranges from 5 to 10 minutes.

2.0 Analysis

When it was discovered, the fire was emanating from one of the tractor-trailers parked on vehicle deck 1. The fire was effectively managed by the ship's crew and was eventually extinguished with the assistance of the Port aux Basques Volunteer Fire Department.

In Canada, ferry services transport a high volume of passengers and vehicles to meet the needs of the community.[25] The combination of freely moving passengers in an unfamiliar environment for relatively short periods of passage time poses unique challenges for operators in the management of emergencies, particularly with respect to passenger safety.

The Board, concerned about inadequacies in passenger vessel operations with respect to the managing of passengers in an emergency, has analyzed these events within the framework of emergency response–related issues and passenger safety–related issues.

2.1 Emergency Response

2.1.1 Access to the Fire

During the occurrence, dense black smoke resulted in poor visibility, and the close spacing between the vehicles made it extremely difficult to access the fire. The fire team was also hampered by the physical limitations of a fully pressurized two-inch fire hose with which they were required to crawl around and under the trailers to gain access to the fire. These conditions increased both the amount of time required to access the fire and the physical effort expended by the firefighters. As a result, the ship's crew was unable to extinguish the fire, even though it had been effectively contained by the deluge system. Eventually, the stern door was opened and the deck was cleared of vehicles. This provided better access to the fire, which was then extinguished with the assistance of shore-based firefighters using their smaller (1 ½-inch-diameter) fire hoses.

The difficulty of fighting a fire in restricted spaces is currently recognized by TC in that, under certain conditions, vessels may be permitted to use reduced diameter fire hoses in machinery spaces.[26] The application of this principle to the restricted spaces of the *Joseph and Clara Smallwood*'s loaded vehicle decks would similarly provide firefighting crew with improved access to these areas.

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25 In 2002, Canadian ferry services transported 39 million passengers and 15.4 million vehicles (source: http://www.tc.gc.ca/pol/en/report/anre2003/toc_e.htm, accessed 15 August 2005).

26 *Fire Detection and Extinguishing Equipment Regulations*, Schedule II, *Canada Shipping Act*

2.1.2 Firefighting

Despite difficulties encountered in accessing the fire, once the existence and location of the fire was verified, the ensuing firefighting effort was organized and efficient.

With signs of extreme heat radiating from a localized area on vehicle deck 3, boundary cooling was quickly applied. Subsequently, based on telltale signs (that is, heat, steam and the deformation of deck plating) on deck 3, the deluge system was used effectively to contain the fire and extinguish the flames on the exterior of the vehicles. This allowed the firefighters to concentrate their efforts on the interiors and undersides of the vehicles, which were difficult to access and were areas where the deluge system could not reach.

When the vessel docked in Port aux Basques, the local volunteer fire department boarded the vessel to assist with the firefighting effort. In keeping with best marine practice, the SCO maintained control over both the vessel's fire party and the shore-based firefighters.

2.1.3 Fire Detection and Alarm System

2.1.3.1 Manual Pull Stations

When the VDW did not hear an immediate alarm after activating the first pull station, it was interpreted as a fault in the system. As a result, a second alarm on a different deck was triggered. The actions of the VDW in this occurrence were the result of two factors: a lack of understanding of how the system works and the design of the mechanism.

The conduct of regular fire drills is intended to maintain knowledge and skills relating to the ship's equipment and its usage, including the response to expect when a fire alarm is pulled. However, as the drills carried out on board the vessel did not include the response to finding a fire and activating a manual pull station, this knowledge was not reinforced. This lack of understanding was prevalent and is indicative of a deficiency in crew training and drills on board the vessel.

Notwithstanding the knowledge level of the crew with respect to alarm system operation, the provision of clear and timely feedback in response to user actions is an essential element of system design. Alarm systems that are not centrally monitored provide feedback to the user immediately following his/her actions through an alarm bell and/or a visual strobe. Some alarm call points within centrally controlled systems provide feedback to the user by activating a light-emitting diode (LED) on the call point when the alarm circuit is activated. In the case of the alarm pull station on board the *Joseph and Clara Smallwood*, no specific feedback is provided to indicate whether it has functioned correctly. In this occurrence, feedback was received when the bridge was contacted.

The absence of feedback at the pull station, coupled with the VDW's lack of understanding of the fire detection system, had the potential to generate confusion leading to an inappropriate response or a delay in commencing a response, thereby placing passengers and crew at risk.

2.1.3.2 Automatic, Local-Sounding Alarms

When an emergency situation arises on board a vessel, adequate warning must be provided to passengers and crew to allow the maximum possible time for people to take appropriate action. This is particularly true in the case of fires, which may quickly develop into dangerous environments for humans (smoke, heat, gases, etc.). On the *Joseph and Clara Smallwood*, the primary means of warning passengers and crew of an emergency is the alarm system. This alarm system is typical of that found on other passenger vessels in that alarms are sounded by the bridge following the validation of a pre-alarm signal and assessment of the risks. The benefit of this type of system is particularly apparent for large public areas, in that it allows the warning of passengers to be delayed until crew members have had the opportunity to evaluate the risk and deploy as required, thereby minimizing chaos among the passengers.

The vehicle spaces of the *Joseph and Clara Smallwood* may be occupied by a small number of passengers or crew at any time during the voyage. In this occurrence, the alarm was sounded in crew working areas approximately 10 minutes after the fire was initially detected, and was not sounded in the space of origin, vehicle deck 1. One of the occupants of the vehicle deck required assistance from the fire party to evacuate the space due to the deteriorating conditions. The other two occupants remained trapped in their vehicle until the vessel docked and the stern door on deck 1 was opened. Timely warning of the fire would have provided the occupants of the vehicle an opportunity to evacuate the space safely.

Investigations by the National Transportation Safety Board (NTSB)[27] have addressed the issue of warning provided to passengers and crew in the event of fire on board a vessel. As a result, recommendations were made that the cruise ship industry install automatic, local-sounding smoke alarms in crew and passenger accommodation areas so that people "will receive immediate warning of the presence of smoke and will have the maximum available escape time during a fire."[28] Further to this, the International Council of Cruise Lines (ICCL) recognized that the installation of local-sounding smoke alarms in passenger and crew cabins, in conjunction

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[27] NTSB Marine Accident Report MAR-98/02, fire on board the Panamanian passenger ship *Universe Explorer* in the Lynn Canal near Juneau, Alaska, 27 July 1996

NTSB Marine Accident Brief MAB/98-01 regarding fire on board the Bahamian-registered passenger ship *Vistafjord*, 06 April 1997

NTSB Marine Accident Brief Report MBR-01/01, fire on board the Netherlands-registered passenger ship *Nieuw Amsterdam*, Glacier Bay, Alaska, 23 May 2000

[28] NTSB Safety Recommendations M-00-6 and M-00-7, dated 18 July 2000

with the ship's centrally monitored alarm system, will increase the level of safety in the event of a fire. To this end, ICCL members have agreed to install such alarms in all new and existing vessels.[29]

The fire alarm systems currently in use on board large passenger vessels provide the benefit of a delayed warning to passengers in large public areas; however, they do not realize the benefit of providing immediate, local warning to small or isolated spaces, such as berthed accommodations or vehicle decks. As such, they do not provide the necessary balance that will help ensure that passengers and crew are alerted in a timely manner consistent with emergency response needs.

2.1.4 Bridge Emergency Response

During the occurrence, the bridge personnel did not ensure that several key responsibilities, as outlined in the vessel's ERM, were carried out. These inactions potentially placed the safety of passengers and crew at undue risk:

- **Sounding the alarm** – Because the alarm was not sounded in passenger areas, passengers were not fully aware of the emergency situation. Without the heightened sense of alertness that occurs when an alarm is sounding, passengers may not be mentally prepared to react as quickly or appropriately to the instructions of the crew.

- **Closing fire doors** – Fire doors are designed to provide a barrier to smoke and flames spreading throughout the vessel. As such, these doors must be closed as soon as possible during a fire situation. In this instance, there was a delay in closing the fire doors.

- **Checking for missing persons** – A full account of passengers and crew at an early stage in an emergency provides responders with an insight as to where to begin a search and enables them to provide a focussed response, optimizing the use of valuable resources.

- **Informing/updating passengers** – Passengers were not informed or updated regarding the emergency situation for fear that such information would create panic. Literature concerning human behaviour in emergencies indicates that anxiety and stress increase when passengers are not provided with information. This is particularly true when there are physical indications of danger, such as smoke or crew members wearing lifejackets, as was the case in this occurrence. Furthermore, high levels of anxiety and stress can lead to counter-productive behaviour, or panic.[30]

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[29] ICCL Industry Standard S-4-01, *Local Sounding Smoke Alarms*, 06 November 2001

[30] M. Edwards and E. Edwards, *The Aircraft Cabin: Managing the Human Factors*, Brookfield, Vermont: Gower, 1990, pp. 204-212

2.1.5 Emergency Procedures

Procedures are an essential component of an effective safety management system. The use of written procedures during an emergency situation can guide the crew with respect to essential actions to be taken at a time when there may be other, competing demands for time and attention, and stress levels are high. Considering the key role that procedures can play during an emergency response, it is essential that they be written in a manner that is clearly understood and reflective of the systems on board the vessel. Furthermore, if crew members are to rely on them to provide guidance, they must also be thorough.

Shortcomings in the written emergency procedures, which have the potential to impede or interfere with an effective response, were identified:

- **Sound internal and external emergency alarm** – Although the wording of this procedure implies that the alarm should be sounded throughout the entire vessel at once, this may not be the ideal choice under all circumstances. There are situations where the prudent option is to first sound the alarm to crew alone for risk assessment and deployment, and then to sound the alarm to passengers if necessary. The procedure is not consistent with the alarm controls on bridge, which give the option of selecting "crew" or "all." This inconsistency may result in unnecessary confusion when responding to an emergency.

- **Check for missing persons** – The muster list assigns various crew members the task of searching the vessel, gathering people and directing them to muster stations. However, with the absence of detail in the procedure and muster list, a head count or roll call was not taken to determine if any person (passenger or crew) was actually missing. Furthermore, the muster list assigns crew to search and/or check all crew and passenger accommodation areas; however, the vehicle deck areas, which are known to be occupied by passengers and/or crew, are not assigned.

2.1.6 Dangerous Goods

Although the sailing manifest identified six loads of dangerous goods, the deck loading plan only identified the position of five trailers. The location of the trailer containing ammonium nitrate fertilizer was not documented and, therefore, was not readily available for the firefighting parties.

Where dangerous goods are carried, it is essential that all pertinent information with respect to stowage position, identity and properties is readily available for the safety of personnel, be they passengers, crew or shore-based. Such information is also used by emergency responders to assess risk and to implement a safe and effective response. This principle is embedded in the

regulations that govern the transportation of such goods by any mode.[31] Additionally, in the case of ships, the master is required to have readily available information on or near the bridge that identifies the location of the dangerous goods on the vessel.[32]

In this occurrence, not all the information was readily available to shipboard and shore-based responders to enable them to assess the level of danger and ensure an appropriate response. This situation subjected them to undue risk.

2.2 *Communications*

In an emergency, effective and timely communication is essential for a coordinated and effective response – an essential element to the success of a mission.

The following difficulties were experienced in on-board communication during the emergency:

- **Adequacy/Lack of Equipment** – The fire party was not provided with an adequate method of portable communications to exchange information with the bridge. Neither the VDW nor the PSD crew were provided with a portable means of communication.

  The PSD crew relied, in part, on "runners" to communicate messages, which resulted in a delay in relaying important information and necessitated the use of a valuable resource for repetitious work.[33] Such a delay in assisting a potentially incapacitated person may place his or her safety, as well as the crew member's safety, at risk. Furthermore, the lack of portable communications equipment prevents a crew member from calling for help or assistance if needed.

  Without the benefit of portable, two-way communication, there is the potential that critical information transmitted through a third party will be misinterpreted or misrepresented. It also precludes the ability to ask questions or receive clarification regarding the information and has the potential to generate confusion, speculation and inaccurate information. Additionally, it prevents a team leader from communicating important instructions or information simultaneously to all crew members, who may be spread throughout the ship.

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31 *Transportation of Dangerous Goods Regulations*, *Transportation of Dangerous Goods Act*

32 *Dangerous Goods Shipping Regulations*, *Canada Shipping Act*

33 The crew member who was unable to clear the locked cabin was required to return to deck 5 (from deck 7), report the anomaly and then return to the cabin a second time.

- **Quality of Communication** – Passengers had difficulty hearing important instructions regarding evacuation. Although the vessel was equipped with a PA system, it was not used to transmit critical information for safe evacuation. Additionally, being unaware of the existence or location of megaphones on board, the PSD crew did not use them to enhance the audibility of instructions communicated locally to passengers.

In this instance, the effectiveness of communications was diminished due to a lack of, or inappropriate, communications equipment and the ineffective means used to communicate instructions to passengers. This situation, therefore, reduced the crew's ability to coordinate an effective response and exposed the passengers and crew to undue risk.

The need for appropriate and effective means for two-way communication during an emergency has been recognized by the IMO[34] and TC, but this requirement is limited by TC to Canadian vessels operating on Convention voyages. Although the risks associated with ineffective communication on Convention and non-Convention passenger vessels are essentially the same, this safeguard is not afforded to Canadian passenger vessels on non-Convention voyages.

2.3 Passenger Safety[35]

2.3.1 Emergency Duties Performance and Training

A review of the emergency duties assigned to the PSD crew revealed that those duties fell largely within the domain of crowd management. Therefore, to successfully perform such duties, PSD crew would require knowledge and skill in this area, as well as a basic understanding of crisis management and human behaviour in emergencies.

In this occurrence, the PSD crew:

- did not initially confine passengers within a designated safe area;
- did not accurately account for all passengers;
- were not briefed regarding the emergency situation and were ill-prepared to answer passenger questions regarding the nature of the emergency;
- were unable to promote feelings of trust and safety and adaptive passenger behaviour;
- did not effectively communicate emergency instructions to passengers; and

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34 IMO, SOLAS, 1974, and its Protocol of 1988, Chapter II-2, Regulation 7.8.3

35 Throughout Section 2.3 of this report, the terms "crew" and "crew member(s)" refer exclusively to employees of the Passenger Service Department, unless specifically stated otherwise.

- did not identify able-bodied passengers who may have been able to assist in the emergency situation.

An analysis of the PSD crew members' performance indicates that they did not possess the knowledge or skill to perform their emergency duties adequately. Although the crew members were trained to meet regulatory requirements, additional training in crowd management, crisis management and human behaviour would have better prepared them to respond to passengers during the occurrence. In this instance, the crew had not received such training, either formally, or in the form of on-board training and drills.

The Board, concerned about the lack of knowledge and skills to effectively manage passengers during emergencies, has issued two Marine Safety Advisories (MSA), 18/92 and 24/92,[36] and has also recommended that "the Department of Transport require that officers and crew members of all federally inspected ferries and passenger vessels receive formal training on crowd control and relevant emergency procedures" (M93-07).[37]

In response, TC advised that applicants for all grades of certificate as master, mate or engineer are required to undertake MED training and that the training for masters and mates includes passenger control. It was the position of TC that this, in conjunction with the master's responsibility to organize and train the crew, should enable abandonment to take place safely.

In 1998, TC revised its MED training programme (TP 4957), enhancing awareness of crowd control and relevant emergency procedures by incorporating provisions of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, as amended in 1995 (STCW Convention), at the MED A2 and C levels, for officers.

An evaluation of the current TC syllabuses for officer and crew training related to crowd control, crisis management and human behaviour[38] is summarized in the following table:

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[36] TSB reports M92W1022 and M92L3011, respectively

[37] TSB report M90M4053

[38] The requirements for training are specified in the *Marine Certification Regulations* and the *Crewing Regulations*. The corresponding course syllabuses are outlined in the *Training Standards for RO-RO Passenger Ships Personnel* (TP 13024) and the *Marine Emergency Duties Training Programme* (TP 4957).

		Ro-Ro Passenger Vessels on Convention Voyages	Passenger Vessels on Non-Convention Voyages	
			Limited Voyages[39]	Other Voyages
Officers: (master, first mate, chief engineer, and second engineer)	Crowd Management	Syllabus is drawn from the STCW Convention.	Syllabus is similar to that of the STCW Convention; time allocated: 2 hours.	Syllabus includes many, but not all, components of the STCW Convention; time allocated: 1 hour.
	Crisis Management and Human Behaviour	Syllabus is drawn from the STCW Convention.	Syllabus includes few components of the STCW Convention for both crisis management and human behaviour as part of the crowd management training.	Syllabus includes many components of the STCW Convention for crisis management; time allocated: 7 hours. Syllabus includes no components of the STCW Convention for human behaviour.
Other Crew: (Personnel assigned to assist passengers or ensure passenger safety in an emergency)	Crowd Management	Syllabus is drawn from the STCW Convention.	No requirement	No requirement
	Crisis Management and Human Behaviour	No requirement	No requirement	No requirement

[39] As used here, "limited voyages" refers to voyages within the minor waters of Canada, as defined by the *Canada Shipping Act*, as well as ferries operating between terminals that are no more than seven miles apart.

In summary, the evaluation indicates the following:

- Senior officers of Canadian passenger vessels (including ro-ro ferries) operating on non-Convention voyages that are not "limited," such as the *Joseph and Clara Smallwood*, receive training in crowd management and human behaviour that is less extensive than that received by officers of Canadian passenger vessels on limited voyages or ro-ro vessels on Convention voyages. The reverse is true for crisis management training: officers on limited voyages receive less training than those on other voyages.

- Crew members, other than senior officers, of Canadian non-Convention passenger vessels (including ro-ro ferries) who are assigned duties that include assisting passengers or ensuring passenger safety in an emergency are not required to receive formal training in crowd management, crisis management or human behaviour. The foregoing equally applies to any crew member who may be assigned overall responsibility for passenger safety during an emergency, such as the SCS of the *Joseph and Clara Smallwood*.

TC recognizes the need for training in crowd management, crisis management and human behaviour when it comes to the officers and crew of ro-ro passenger vessels operating on Convention voyages. However, the risks to passengers during an emergency on board a vessel are similar regardless of whether the vessel is a ro-ro ferry or other type and despite whether the voyage is classed as Convention or non-Convention. Therefore, the provision of training that is commensurate with the individual's responsibility for passenger safety, and is consistently applied to the officers and crew of all passenger-carrying vessels, would help mitigate the risks to those passengers, thereby furthering passenger safety.

2.3.2 Identification of Crew in Emergencies

"In an emergency, passengers must be able to distinguish crew members, who can guide and help them, from other passengers."[40] If not, there is a risk that the following situations may arise:

- Passengers who are unable to identify crew members (that is, those who are "in-control") may try to take control of the situation themselves, resulting in inappropriate behaviour and/or actions that lead to adverse consequences.

- Passengers may be less willing to immediately respond to, or take direction from, someone who is not readily perceived to be a crew member, thereby delaying the initiation of required behaviour and/or actions.

[40] IMO, MSC/Circular 699, *Revised Guidelines for Passenger Safety Instructions*, 17 July 1995

- Passengers may not be able to report critical safety information to crew members in time for them to take the appropriate safety measures.

In this occurrence, the uniformed crew members were readily identifiable to passengers. Although not in uniform, off-duty crew members who responded with lifejackets were also readily identifiable, but only temporarily. As soon as they put aside their lifejackets, which served as impromptu identifiers, these crew members had no distinctive feature by which they could be readily identified.

As such, a significant portion of the crew was not readily identifiable. Furthermore, although in this occurrence uniformed crew members were readily identifiable, it is unlikely that they would have been in an occurrence where visibility was reduced by factors such as dense smoke, darkness or high crowd density, because their uniforms would not be conspicuous in these conditions.

To enhance crew identification in adverse conditions, some marine operators[41] have provided specialty clothing (caps and/or vests) made of luminescent fabric or marked with luminescent tape to identify the crew. They have also adopted policies regarding the use of such clothing in an emergency. Luminescent fabric/tape is successfully used in other industries for similar purposes and is commonly used by members of the public such as cyclists, joggers.

Although Marine Atlantic provides reflective clothing, it does not provide PSD crew members, who are responsible for the immediate safety of passengers in an emergency, with a protocol to ensure that they are readily identifiable in all conditions, including those where visibility is reduced. When passengers are unable to readily identify such crew members, they may respond inappropriately, thereby placing themselves and others at risk.

2.3.3 Passenger and Crew Information

During an emergency, there are many competing interests and time is of the essence to bring about a successful outcome. A complete list of passengers and crew, which is readily available, provides information regarding the identity of any missing person. Such information may indicate the best area to begin the search and would enable the crew's time to be used effectively.

[41] One ferry operator has adopted the policy of donning reflective vests and crew identification labels and requiring all crew in control of passengers to wear bright orange vests with reflective tape during emergency situations.

The need for systematic procedures to account for passengers and crew by name is recognized by the NTSB.[42] This is promoted in courses addressing the issue of emergency preparedness on passenger ships, jointly developed by the United States Coast Guard and the marine industry. The benefits realized from such a system were apparent in an occurrence involving the passenger vessel *Nieuw Amsterdam*, when a fire broke out in a crew cabin.[43] Roll call quickly identified the missing passengers, enabling the crew to focus their search near the passengers' cabin. The two passengers were quickly located en route to the muster station.

The importance of recording the names of passengers is addressed by the IMO. Convention vessels are required to record, among other items of information, the name and gender of all persons on board, distinguishing between adults, children and infants. This information is to be kept ashore and made readily available to search and rescue services if needed.[44]

TC guidelines regarding the recording of passenger information do not refer to the collection of passenger names. While the IMO does recognize the benefit of recording passenger information from the search and rescue perspective, the benefits of having such information available on board for use in emergencies is not recognized. Passenger and crew information that is readily available for use on board in an emergency provides crew with a valuable opportunity to apply a roll-call methodology to account for personnel, thereby enhancing safety.

2.3.4 Passengers Remaining in Vehicles During Transit

Passengers remaining in their vehicles during transit is a common practice among ferry passengers, particularly commercial truck drivers. This not only places the safety of those passengers at risk, but it also hinders the response to an emergency and has the potential to place the emergency responders at risk.

TSB data indicate that, over a 28-year period, 43 occurrences took place on or near vehicle decks. Those occurrences included fires/explosions, shifting/falling cargo and dangerous goods leaks. While the environments created by these types of emergencies are hazardous to anyone in the area, they are particularly hazardous to passengers because they may not have the knowledge, skills, experience and/or equipment to adequately protect themselves.

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42 NTSB Marine Accident Report MAR-01/01, fire on board the Liberian passenger ship *Ecstasy*, Miami, Florida, 20 July 1998

43 NTSB Marine Accident Brief Report MBR-01/01, fire on board the Netherlands-registered passenger ship *Nieuw Amsterdam*, Glacier Bay, Alaska, 23 May 2000

44 IMO, SOLAS, Chapter III, Regulation 27

Factors that may influence the decision of truck drivers and vehicle passengers to remain in their vehicles during transit include the following:

- The vehicle provides a quiet, comfortable, and familiar environment in which to sleep at no cost.
- Although all passengers are told not to remain in their vehicles, they are not told the reason why. Consequently, they may not realize that they are at risk.
- Behaviour routinely practised by peers may be regarded as acceptable.
- Passengers who have remained in their vehicles before without any negative consequences are more likely to do so again.

Despite the measures being taken by ferry operators, passengers, particularly commercial truck drivers, continue to remain in their vehicles during transit, placing their personal safety at risk.

2.3.5 Passenger Evacuation

In an emergency situation, decisions are often made in an environment involving stress and heavy task load, and with the threat of significant consequences for errors made. Recognizing the risks associated with decision making in emergency situations, contingency plans form part of the emergency preparedness requirement under the ISM Code; ship evacuation is one such contingency plan. The preparation of contingency plans provides the necessary framework for evaluating risk and considering risk-mitigation options to arrive at a decision. In the absence of a contingency plan, difficult decisions are made based on the individual's understanding of the risk and past experience.

In this occurrence, directing passengers to drive their vehicles off deck 3 before the fire was extinguished, and with increasing amounts of smoke entering the area, exposed the passengers to undue risk. Such exposure may cause panic and lead to inappropriate action. Allowing passengers to operate their vehicles under these conditions of distress reduces the crew's ability to effect an orderly evacuation. As demonstrated by this occurrence, various obstacles disrupted a smooth evacuation process.

The vessel's ERM provided no guidance with respect to passenger evacuation under the circumstances presented by this occurrence. However, in any emergency, the safety of passengers is paramount. In this occurrence, passengers were unnecessarily exposed to a potentially unsafe environment by driving their vehicles off deck 3, rather than evacuating the vessel through the gangway.

The events of this and another similar occurrence[45] highlight the principle that, in an emergency situation, the first priority of contingency plans must be to minimize the passengers' exposure to risk.

[45] TSB occurrence M03W0073: Faced with similar circumstances following an engine room fire on board the BC Ferries vessel *Queen of Surrey*, the master immediately evacuated all passengers by foot once the ferry docked. Passengers were permitted to return and remove their vehicles after shore-based and ship-based personnel confirmed that the fire had been completely extinguished.

3.0 Conclusions

3.1 Finding as to Causes and Contributing Factors

1. The fire originated in or around a tractor-trailer parked on vehicle deck 1; the cause of the fire was undetermined.

3.2 Findings as to Risks

1. While many of the emergency procedures for fire were carried out in accordance with the vessel's Emergency Response Manual, some potentially critical procedures were not followed: the alarm was not sounded in passenger areas, the fire doors were not closed using the central control, passengers and crew were not accounted for, and passengers were not advised or updated regarding the situation.

2. Very high frequency (VHF) radio communications between the bridge and fire party were intermittent during the firefighting effort.

3. The firefighting effort was hampered by the close confines of the loaded vehicle deck and unwieldy fire hoses.

4. Passengers were unnecessarily exposed to a potentially unsafe environment by driving their vehicles off deck 3, rather than evacuating the vessel through the gangway.

5. Crew members of non-Convention passenger vessels are not required to have crowd management training and crisis management and human behaviour training; Passenger Service Department (PSD) crew members were unaware that megaphones were available on board the vessel.

6. Not all PSD personnel was readily identifiable to passengers during the occurrence.

7. PSD personnel responsible for clearing crew cabins was not provided with a master key to access any locked cabins.

8. There was no mechanism provided to allow for direct and/or timely communications between the members of the PSD.

9. Other than a telephone at either end of the vehicle deck, there was no mechanism provided to allow for direct communications between the vehicle deck watchmen and the bridge.

10. There was a general lack of understanding by many of the vessel's crew members with respect to the operation of the fire detection system.

11. Convention and non-Convention passenger vessels are not required to record and retain the names of passengers on board, with the exception of disabled persons.

12. Non-Convention passenger vessels are not required to be fitted with low-location lighting systems designed to assist passengers and crew to identify escape routes and exits.

13. The location of a dangerous goods cargo was not documented on the vessel's loading plan, with the result that complete information was not readily available to shipboard and shore-based responders to enable them to better assess the level of danger and ensure an appropriate response.

14. Passengers, particularly commercial truck drivers, continue to remain in their vehicles during transit despite risks inherent in doing so.

3.3 Other Finding

1. Under difficult conditions, the firefighting effort was efficiently and effectively carried out. The effective use of the deluge system contained the fire, and the shore-based firefighting support was effectively supervised by the vessel's personnel.

4.0 Safety Action

4.1 Action Taken

4.1.1 Fire Detection and Internal Communications

In August 2003, the Transportation Safety Board of Canada (TSB) issued Marine Safety Information (MSI) 08/03 addressed to Marine Atlantic with a copy to Transport Canada (TC), advising them of TSB observations regarding the shipboard fire detection system and internal communications on board the *Joseph and Clara Smallwood*.

TC has indicated that it considers this item to be one of proper training rather than an inadequacy of equipment. Following receipt of MSI 08/03, TC issued Ship Safety Bulletin (SSB) 02/2004, *Ship's Alarm and Internal Communications System*. The SSB states, among other things, the following:

> To avoid delays in raising the alarm in a real fire situation, fire patrols should have an efficient direct *Radio* communication with the bridge and all crew members *must* have familiarization training with the alarm system on board their vessel and for alternate communication arrangements. Manual pull stations with a time delayed alarm should be appropriately labelled such that those activating them will know if an alarm should be sounding.

TC has further indicated that, under the International Convention for the Safety of Life at Sea (SOLAS), 1974, and its Protocol of 1988, Chapter II-2, Regulation 7.8.3, the fire party is required to be in contact through two-way communication. As part of TC's regulatory reform, this requirement will be included in the proposed Fire Detection and Extinguishing Equipment Regulations.

In June 2005, in addition to annual inspections in accordance with provisions under the *Canada Shipping Act* and occupational safety and health inspections in accordance with requirements under Part II of the *Canada Labour Code*, TC Atlantic Region completed special audits with respect to operational readiness on board the Marine Atlantic vessels *Atlantic Freighter*, *Caribou*, *Leif Ericson* and the *Joseph and Clara Smallwood*.

The audits revealed satisfactory results with respect to the adequacy of the crew members assigned passenger safety–related duties. The focus of the special audits on operational readiness was to test the ability of the crew to act in emergency situations with particular emphasis on crowd control and passenger safety.

In response to MSI 08/03, Marine Atlantic indicated that, for each vessel, a description (including pictures) of the fire detection system has been included in the training manual and that a layman's description of the system has been developed, discussed with staff and posted at various locations on board the vessel. To improve portable radio communications, booster systems have been tested and installed on the three passenger ferries and watchmen have been equipped with mobile very high frequency (VHF) radios. The doors behind which the vessel's internal telephones are located have been highlighted.

To further improve internal communications, Marine Atlantic has provided additional megaphones on board the vessel, strategically located in the Passenger Service Department (PSD). Also, new radios are being sourced for increased communication within the PSD.

4.1.2 Positioning of Emergency Lights

In December 2003, the TSB issued MSI 12/03 addressed to TC with a copy to Marine Atlantic and the Canadian Ferry Operators Association, advising them of TSB observations regarding the positioning of emergency lights.

In response, TC indicated that, as part of its regulatory reform, a Fire Regulatory Reform Working Group is reviewing all fire safety regulatory requirements, together with other international standards. Low-location lighting, emergency lighting and supplemental lighting requirements will be included in the review. TC anticipates that the new Fire Safety Regulations will come into force by November 2006.

Marine Atlantic indicated that photoluminescent signage has been installed at the 0.3 m level at the exits.

4.1.3 Passengers Remaining in Vehicles

In December 2003, TSB issued Marine Safety Advisory (MSA) 08/03 addressed to TC with a copy to Marine Atlantic and the Canadian Ferry Operators Association, advising them of TSB observations regarding passengers remaining in their vehicles during transit.

TC indicated that proposed new Hours of Service Rules may provide an incentive for commercial drivers to comply with Marine Atlantic rules prohibiting them from remaining in their vehicles. To receive credit for the transit time towards meeting the mandatory rest time (8 consecutive hours of rest every 24 hours), commercial drivers will be required to produce receipts for both the transit and rest accommodations for the ferry. The expected implementation date of these proposed regulations was 01 September 2004; however, discussions with the industry are ongoing and it is now anticipated that the new regulations will come into force by late 2006.

Following an internal review, an amendment to the proposed new Cargo Regulations was discussed during the Canadian Marine Advisory Council national meeting in November 2004. A provision would need to be in place to prohibit passengers remaining in their vehicles in enclosed vehicle spaces during passage. Drafting is ongoing and there is now a section in the draft text that addresses this issue; it builds on the requirements of the *International Maritime Dangerous Goods Code* and reads as follows:

> **Closed Vehicle Decks**
>
> 50. (1) Every passenger shall keep off a closed vehicle deck on a vessel that is underway unless accompanied by a crew member.
>
> (2) Subsection (1) does not apply when passengers are directed to return to their vehicles before the vessel docks.

Marine Atlantic indicated that its Vehicle Deck Patrol procedures will be revised and will provide more clear instructions for terminal personnel and crew. A copy of the revised procedures will be provided to the trucking industry through the Atlantic Provinces Trucking Association.

4.1.4 Passenger Safety – Adequacy of Crew Training

In January 2004, the TSB issued MSA 01/04 addressed to TC with a copy to Marine Atlantic and the Canadian Ferry Operators Association, advising them of TSB observations regarding the adequacy of training for crew members tasked with passenger safety–related duties.

In response, TC indicated that it will issue an SSB, addressing training for crew members assigned passenger safety and crowd control duties on passenger vessels. TC also indicated that it has adopted International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, as amended in 1995 (STCW Convention) regulations V/2 and V/3 for Canadian domestic passenger vessels on the subject and will be implementing them as follows:

- A training course in passenger safety management will be required under Section 76 of the proposed Marine Personnel Regulations.

- Another course under Section 77 (advanced passenger safety management course) will be required for the personnel staffing ro-ro ships.

Endorsements to the individual's certificate are proposed to be issued under the STCW Convention upon successful completion of these courses.

Marine Atlantic indicated that a crowd control training program has been developed and training is presently being provided to the required personnel. Marine Atlantic has also developed, in cooperation with the Marine Institute in Newfoundland, a training package for its marine evacuation system. A component of this training addresses crowd control.

4.1.5 Vehicle Deck Fire Hoses

Marine Atlantic has sought TC's approval to convert the vehicle deck fire hoses on its passenger vessels to 1 ½-inch fire hoses. Approval was granted and the vessels are currently being converted.

4.2 Safety Concerns

4.2.1 Automatic, Local-Sounding Alarm

The *Joseph and Clara Smallwood*'s primary means of warning passengers and crew of fire emergencies is the alarm system. This alarm system, typically found on other passenger vessels, is sounded by the bridge following a pre-alarm signal and assessment of the risks. This type of system allows the warning of passengers to be delayed until the crew has had the opportunity to evaluate the risk and deploy as needed.

In the case of a fire, an early warning increases awareness, and, in a rapidly developing fire situation, it allows passengers and crew to take actions to vacate the area. Without the immediate warning, passengers and crew may become trapped by the fire and suffer serious injuries. Current systems used on board passenger vessels do not provide the benefit of immediate local warning to smaller or isolated spaces, such as berthed accommodations or vehicle decks, and consequently do not allow passengers and crew occupying those areas to take immediate action to protect themselves.

In this occurrence, although not allowed to be there, passengers occupying the vehicle deck areas did not receive any warning of the fire, and some were unable to escape the area, while others were able to get assistance from the crew. The current fire alarm system did not provide an immediate local warning.

Investigations by the National Transportation Safety Board have addressed the issue of warning provided to passengers and crew in the event of fire on board a vessel. As a result, recommendations were made that the cruise ship industry install automatic, local-sounding smoke alarms in crew and passenger accommodation areas so that people "will receive immediate warning of the presence of smoke and will have the maximum available escape time during a fire." The International Council of Cruise Lines (ICCL) recognizes that the installation

of local-sounding smoke alarms in passenger and crew cabins, in conjunction with the ship's centrally monitored alarm system, will increase the level of safety in the event of a fire, and ICCL members have agreed to install such alarms in all new and existing vessels.

Current systems as installed on many domestic passenger vessels, regardless of their size and areas of operation, do not provide the benefit of an immediate local alarm.

The Board is concerned that, without the benefit of an automatic local fire alarm, the delay between the discovery of a fire and warning the public and crew may put those located in isolated spaces or vehicle decks at risk.

4.2.2 Inadequate Identification of Crew by Passengers

In this occurrence, passengers identified the uniformed personnel. Other personnel, even though not in uniform, were recognized by the lifejackets they were wearing. However, this was only temporary because, once these crew members disposed of their lifejackets, they had no distinctive feature by which they could be identified.

In an emergency, passengers who are unable to determine who is a crew member may be less willing to immediately respond to, or take direction from, someone who is not a crew member or perceived as one. Furthermore, reporting critical safety information to crew members in time for them to take the appropriate safety measures may be hampered by the lack of proper identification of who is a crew member. Passengers who can readily identify crew members may respond better, thus mitigating the risk to themselves and others.

To enhance crew identification in adverse conditions, some marine operators provide specialty clothing (caps and/or vests) made of luminescent fabric or marked with luminescent tape to identify the crew and have adopted policies regarding the use of such clothing in an emergency. Luminescent fabric/tape is successfully used in other industries for similar purposes and is commonly used by members of the public such as cyclists, joggers.

Although Marine Atlantic provides reflective clothing, it does not provide PSD crew members, who are responsible for the immediate safety of passengers in an emergency, with a protocol to ensure that they are readily identifiable in all conditions, including those where visibility is reduced.

TC SSB 02/1996 encourages all those responsible for the operation of passenger ships to implement International Maritime Organization (IMO) MSC/Circular 699, *Revised Guidelines for Passenger Safety Instructions*, 17 July 1995, as appropriate. Although the IMO Circular is directed to Convention passenger vessels, the SSB is addressed to all passenger vessels. Item 5 of the circular, addressing the need for crew identification, states:

> In an emergency passengers must be able to distinguish crew members, who can guide and help them, from other passengers. To facilitate this, the crew should wear uniforms, uniform clothes or other distinctive features such as caps or vests marked "CREW". It is recommended that vests marked "CREW" are placed at emergency stations, for the use of crew members off duty and out of uniform.

Although crew members may be provided with specific clothing, including reflective items, procedures in case of an emergency do not necessarily address the donning of such clothing.

The Board is concerned that crew members on Canadian passenger vessels are not sufficiently identified through the use of specific clothing and that, in emergencies, passengers are subjected to unnecessary risk.

4.2.3 Passenger Safety Management Training

The emergency duties assigned to any crew members relating to passenger safety fall largely within the domain of crowd management. Therefore, to successfully perform such duties, crew members require knowledge and skill in this area, as well as a basic understanding of crisis management and human behaviour in emergencies.

TC indicates that STCW Convention regulations V/2 and V/3 will be adopted for Canadian domestic passenger vessels, in the proposed Marine Personnel Regulations, Part 2, Division 2, sections 37 and 38, which state the following:

> 37 (1) Every master, chief mate, chief engineer, second engineer and other persons employed on a ro-ro passenger ship of more than 500 tons engaged in voyages beyond sheltered waters shall hold an advanced passenger safety management (ro-ro ships) endorsement or certificate, if their assigned duties include immediate responsibility for:
>
> a) Loading, discharging or securing cargo;
> b) Closing hull openings; or
> c) Ensuring passenger safety in emergency situations. 37.1(1)

37 (2) Every person, other than the persons referred to in subsection (1), employed on a ro-ro passenger ship of more than 500 tons engaged in voyages beyond sheltered waters, shall hold a passenger safety management certificate or endorsement, if their assigned duties include responsibility for:

a) Assisting passengers in emergency situations;
b) Providing direct service to passengers in passenger space; or
c) Embarking or disembarking passengers. 37.1(2)

38 Every officer and personnel designated on the muster list on a passenger ship of more than 500 tons, other than a ro-ro passenger ship, engaged in voyages beyond sheltered waters shall hold a passenger safety management certificate or endorsement if their assigned duties include responsibility for:

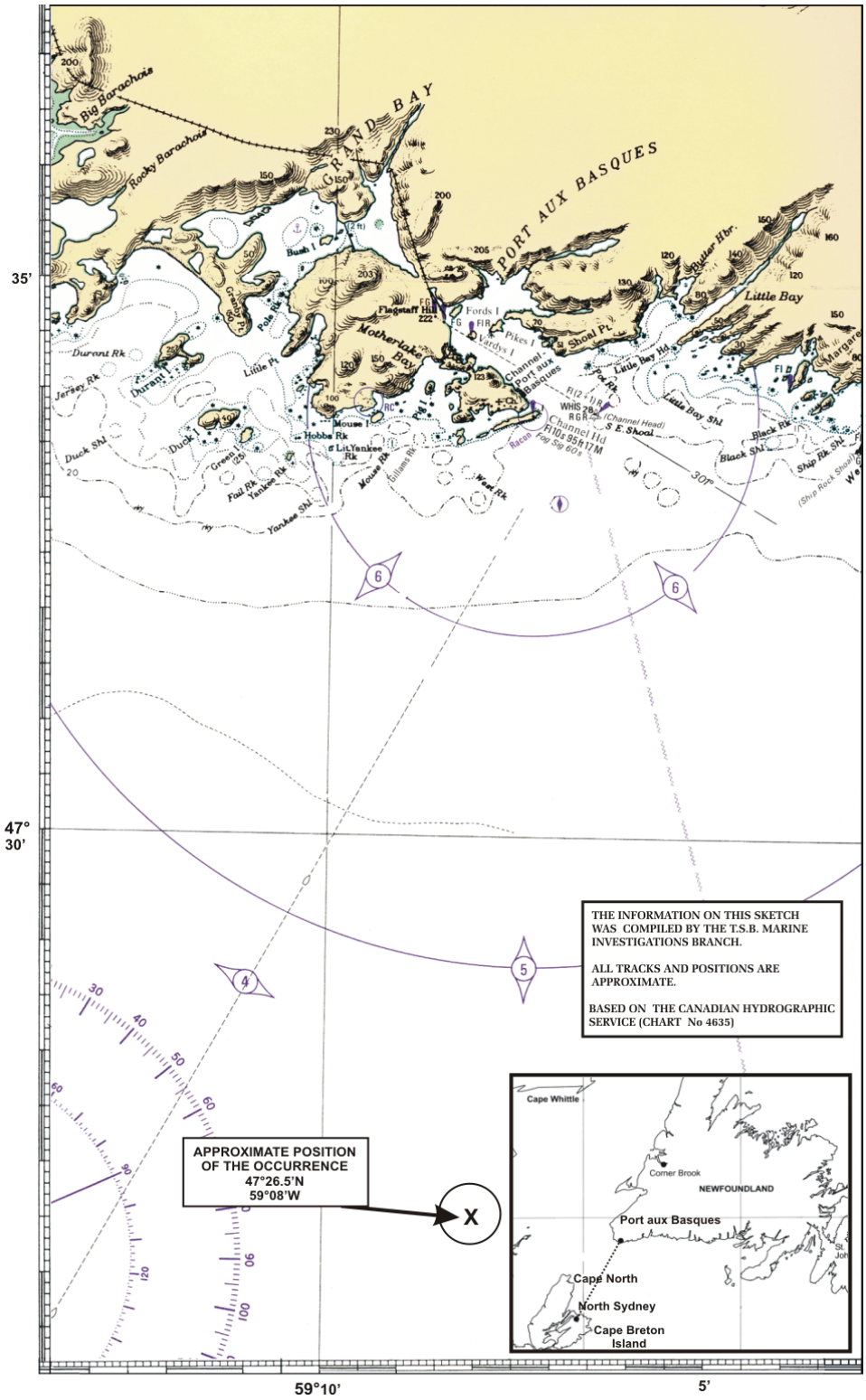
a) Assisting passengers in emergency situations;
b) Providing direct service to passengers in passenger space; or
c) Embarking or disembarking passengers.

Although TC has adopted STCW Convention regulations V/2 and V/3, only proposed regulations have been drafted at this point in time. Furthermore, TC indicated that it will issue an SSB addressing training for crew members assigned to passenger safety and crowd control duties. Based on the proposed regulations, the risk remains for all those vessels falling outside the scope of application, and passengers on vessels with a gross tonnage of 500 or less are still at risk because they do not have the benefit of crew trained in passenger safety management. Passengers on all Canadian passenger vessels only benefit from an appropriate training of the officers and crew with respect to passenger safety management if there are no tonnage and voyage limits. No safety action has yet been taken to address the fact that crew members on passenger vessels with a gross tonnage of 500 or less, regardless of the voyage parameters, will not require such training.

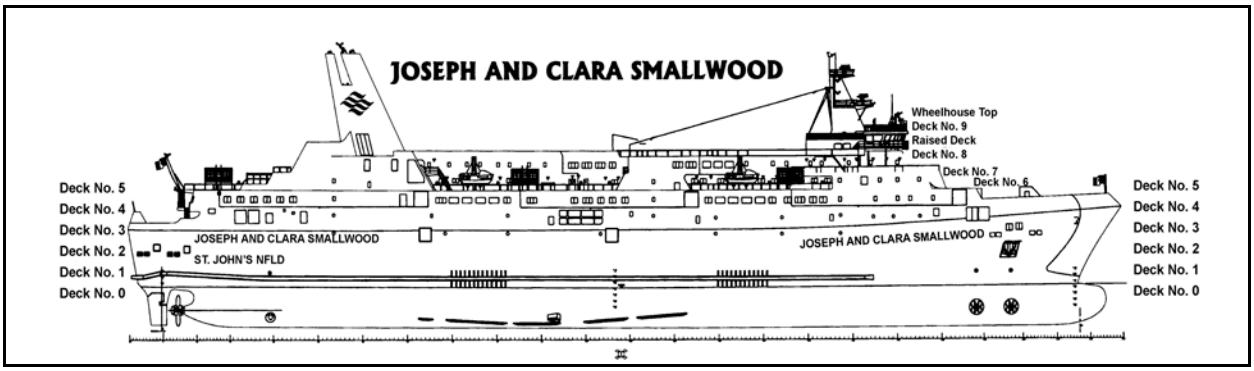
The regulatory process has just begun and is time consuming. There is no set time frame allocated for its adoption and implementation. Also, additional time will be required for all personnel involved in passenger safety management to be trained. In the interim, passengers and crew on passenger vessels will continue to be at risk. Furthermore, when the regulations come into force, those persons aboard vessels with a gross tonnage of 500 or less, in sheltered waters, will still be at risk. The Board will monitor the situation.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 17 August 2005.

Appendix A – Sketch of the Occurrence Area



Appendix B – Outboard Profile



Appendix C – Damage to Vehicles

Tractor fire damage

Trailer fire damage

Moving and storage trailer fire damage

Drop trailer fire damage

Private motor vehicle heat damage

Appendix D – Glossary

ECR	emergency control room
EOW	engineer of the watch
ERM	Emergency Response Manual
ICCL	International Council of Cruise Lines
IMO	International Maritime Organization
ISM Code	International Management Code for the Safe Operation of Ships and for Pollution Prevention
kPa	kilopascals
kW	kilowatts
LED	light-emitting diode
m	metres
m^2	square metres
m^3	cubic metres
MCR	machinery control room
MED	Marine Emergency Duties
mm	millimetres
MSA	Marine Safety Advisory
MSI	Marine Safety Information
N	north
NTSB	National Transportation Safety Board (United States)
OOW	officer of the watch
PA	public address
PSD	Passenger Service Department
psi	pounds per square inch
ro-ro	roll-on/roll-off
SCO	senior chief officer
SCS	senior chief steward
SI	International System (of units)
SOLAS	International Convention for the Safety of Life at Sea (IMO)
SSB	Ship Safety Bulletin (Transport Canada)
STCW Convention	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, as amended in 1995 (IMO)
TC	Transport Canada
TP	Transport Publication
TSB	Transportation Safety Board of Canada
VDW	vehicle deck watchman
VHF	very high frequency
W	west
°	degrees
°C	degrees Celsius
′	minutes