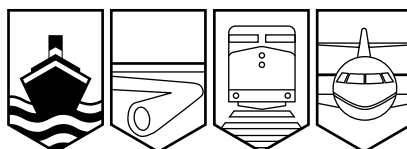


Transportation Safety Board
of Canada



Bureau de la sécurité des transports
du Canada

MARINE INVESTIGATION REPORT
M99W0133



COLLISION

**BETWEEN THE PLEASURE CRAFT *SUNBOY* AND THE
TUG *JOSE NARVAEZ* TOWING THE
BARGE *TEXADA B.C.*
VANCOUVER HARBOUR, BRITISH COLUMBIA
7 AUGUST 1999**

Canada



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

Marine Investigation Report

Collision

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Tug *Jose Narvaez* Towing the
Barge *Texada B.C.*
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Synopsis

The tug *Jose Narvaez* was outbound from Vancouver harbour, at night, towing the coal-laden barge *Texada B.C.* on a 274 m cable towline. The operator of the pleasure craft *Sunboy* did not realize that they were approaching a tug/tow combination and passed between the tug and the barge. The propellers of the *Sunboy* became fouled in the towline, and the pleasure craft was struck by the on-coming barge, and capsized. As a result, some people were thrown into the water and others were trapped within the vessel's enclosed spaces. Of the 14 people who had been on board the *Sunboy*, nine were rescued and survived, four drowned and one remains missing and is presumed drowned.

Ce rapport est également disponible en français.

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1.0 Factual Information

1.1 Particulars of the Vessels

	<i>Sunboy</i>	<i>Jose Narvaez</i>	<i>Texada B.C.</i>
Official Number	Washington State No. WN5022RG	331836	814139
Port of Registry	Bellevue, Washington, USA	Vancouver, B.C.	Vancouver, B.C.
Flag	USA	Canada	Canada
Type	Pleasure craft	Coastal tug	Non-self-propelled barge
Gross Tonnage ¹	17.4	149.63	2,966.32
Length	13.29 m (length overall)	24.63 m (registered)	95.10 m (registered)
Draught (approx.)	Forward: 1.1 m Aft: 2.0 m	Forward: 3.6 m Aft: 4.5 m	Forward: 3.35 m Aft: 3.96 m
Built	1997, Arlington, Washington, USA	1969, Vancouver, B.C.	1969, Portland, Oregon, USA
Propulsion	Two 250-horsepower diesel engines, driving two fixed-pitch propellers	One 1,450-horsepower diesel engine, driving a single fixed-pitched propeller in a fixed Kort nozzle	N/A
Cargo	N/A	N/A	5,200 tonnes of bituminous coal
Crew	1	5	0
Guests	13	0	0
Owner(s)	Lijun Song, Bellevue, Washington, USA	Lafarge Canada Inc. Surrey, B.C.	Lafarge Concrete Inc. Vancouver, B.C.

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

1.1.1 Description of the Vessels

Sunboy

The *Sunboy* is a Bayliner pleasure craft (1998 model 4087), constructed of glass-reinforced plastic. It has three decks. The lowest of these consists of sleeping accommodation forward of an engine compartment; above it is a weather deck superstructure fitted with a control station on the starboard side of the salon. Atop the superstructure is an exterior command bridge deck with built-in seating and a second control station. Manufacturer's information states that the vessel has a cruising speed of approximately 15 knots.



Photo 1

A Bayliner pleasure craft similar to the *Sunboy*

Jose Narvaez

The *Jose Narvaez* is a single screw, steel-hulled tug. The weather deck is fitted with an enclosed deckhouse forward of a main working deck. Atop the deckhouse is the boat deck with an enclosed wheelhouse with centreline helm, and windows providing an unrestricted view ahead but a restricted view astern. At the exterior, after end of the boat deck is a second set of clutch controls, an emergency towing winch release and a 150,000 candela searchlight. The vessel's service speed is approximately 7.5 knots. The vessel is equipped with 790 m of 45 mm diameter steel wire towline on a single drum towing winch. The winch has one local and two remote emergency release stations.



Photo 2

The tug *Jose Narvaez*

Texada B.C.

The *Texada B.C.* is a flush-decked steel barge used for hauling aggregate and coal products between West Coast ports in Canada and the United States. The hull is painted black and the 3 m high box walls are painted grey. There is reflective tape approximately 1 m long and 0.25 m to 0.30 m wide on the top of the box walls facing forward on both the port and starboard sides. At the time of the occurrence the barge was loaded with 5,200 tonnes of coal.



Photo 3
The barge *Texada B.C.*

The barge is connected to the main towline by a towing bridle consisting of two 20 m lengths of 32 mm diameter steel wire rope. The bridle is led forward from the port and starboard bollards of the barge and is shackled to the towline.

1.2 *History of the Voyage*

1.2.1 *Sunboy*

The *Sunboy*, which is licensed in the United States, arrived in Canadian waters on the evening of 3 August 1999. The operator found a temporary berth at the waterfront premises of the Bayshore Hotel in the Coal Harbour area of Vancouver's inner harbour. On board were the owner/operator, his wife and their two children. On the following day, the family used the vessel to attend a nighttime fireworks display south of the Lions Gate Bridge, in a part of Vancouver's outer harbour known as English Bay. The fireworks are ignited from a barge anchored in English Bay near Vancouver's English Bay Beach. Two days later, on August 6, the operator found a new berth for the *Sunboy* at Thunderbird Marina, located in Fisherman's Cove in the nearby municipality of West Vancouver.

During the late afternoon and early evening of August 7, the operator, his wife and two children along with 10 invited guests (three men, three women, one adolescent and three children) boarded the pleasure craft in preparation for an excursion to Burrard Inlet to view

another fireworks display, scheduled to begin at 2215 Pacific daylight time,² one and a half hours after sunset. At approximately 2100 the vessel departed from her berth at Thunderbird Marina with 14 people on board and made her way towards the fireworks barge anchored in English Bay, approximately 4.5 nautical miles (nm) southeast of the cautionary light buoy "QB". This buoy marks the terminus of the outbound lane of the vessel traffic separation scheme in Vancouver's outer harbour (see Appendix A).

Prior to the accident, the *Sunboy* was proceeding at a speed estimated to have been between 14 and 15 knots, on a course later calculated to have been approximately 116°(T). During the voyage, the operator had control of the vessel from the command bridge station, where he was joined by three children, one adolescent and three adults. In the salon of the main deck superstructure were four adults and one child. Another child was resting in the sleeping area forward of the salon. Two children were wearing lifejackets; the rest of the people were not.

At approximately 2135, four persons were aboard a 5.3 m open pleasure craft ("speedboat") making its way toward English Bay to starboard of the *Sunboy*. After rounding Point Atkinson it reached a position north of Vancouver harbour's outbound traffic lane. Seconds prior to the collision, the speedboat's operator became aware that the *Sunboy* was in danger of crossing between an outbound tug and its tow. In an effort to warn the *Sunboy* of impending danger, he shone a flashlight's beam in the direction of the *Sunboy* and then turned it *on* and *off* rapidly. Receiving no response, the speedboat operator reduced the vessel's speed, altered course to port and passed astern of the *Sunboy* to avoid the danger.

At about 2142, having not recognized the tug/barge combination, the operator of the *Sunboy* steered his vessel between the tug *Jose Narvaez* and the barge *Texada B.C.* being towed 274 m astern. The pleasure craft came to a stop when, in rapid succession, her propellers and rudders fouled first the towline and then the starboard component of the barge's towing bridle. Unable to break free, the pleasure craft was forced onto a heading almost reciprocal to that of the on-coming barge. Within moments, the upper portion of the barge's port forward rake collided with the port side of the pleasure craft's command bridge. The *Sunboy* heeled quickly to starboard and capsized (at position 49°18'53" N, 123°13'57" W).

As a result of the capsizing, some people were thrown into the water and others were trapped within the vessel's enclosed spaces. Survivors were rescued and taken by ambulance to a nearby hospital where they were treated and released.

² All times are Pacific daylight time (coordinated universal time minus seven hours) unless otherwise noted.

1.2.2 *Jose Narvaez/Texada B.C.*

At 1800 on August 7, the master of the tug *Jose Narvaez* assumed conduct of the tug, which was engaged in towing the loaded gravel barge *Empire 40* toward the False Creek area of Vancouver harbour. During this transit, the unit was escorted by another tug through dense pleasure craft in English Bay. At about 1955 the *Empire 40* was handed off to a local assist-tug and the *Jose Narvaez* proceeded out of False Creek, toward Vancouver's inner harbour via a five-cable-long, two-cable-wide waterway known as First Narrows, over which spans the Lions Gate Bridge. About an hour later, she approached a navy mooring buoy adjacent to the north shore of Vancouver's inner harbour, where the coal-laden barge *Texada B.C.* was secured pending the tug's arrival. In accordance with scheduling arrangements made via cellular telephone between the tug's dispatch office and the master, the tug was manoeuvred into position and her crew secured the barge to the tug by means of a steel wire rope bridle and towline.

At 2100 the tug's master reported to Vancouver Marine Communications and Traffic Services (MCTS) via very high frequency (VHF) radio Channel 12 that the tug and barge were departing the navy buoy bound for a cement production plant in the Fraser River.

At 2120, as the tug and tow were transiting westward through First Narrows into Burrard Inlet, MCTS advised the tug's master of the large number of pleasure craft and charter vessels gathering in the area in anticipation of the fireworks display. Consistent with normal practice, when the unit was one mile west of First Narrows, the towing cable was lengthened from approximately 60 m to 274 m and the tug's speed increased to approximately 7.4 knots. The on-watch deckhand left the wheelhouse after having been there with the master since their departure from the navy buoy.

At about 2135 the *Jose Narvaez* was abeam of navigation buoy "QB". Sometime later a spotlight was shone on an unidentified vessel believed to be a pleasure craft. By about 2137, the tug and tow were established on a course of 245°(T), toward buoy "QA" to create more sea room between the tug and tow and small vessel traffic in the vicinity of Point Atkinson. In so doing, the tug and tow eventually entered the separation zone between the inbound and outbound traffic lanes.

Steering was by automatic pilot and her engines were on wheelhouse control. The master decided to summon the deckhand to the wheelhouse using the intercom. As the intercom was not working, he descended a set of interior stairs in order to find him. After a brief search, the master found the deckhand in the galley and asked him to report to the wheelhouse. The master then left the galley and entered his stateroom to retrieve a cellular telephone, which lay ringing on his desk. Finding that the caller had terminated the call, the master then followed the deckhand up to the wheelhouse.

Upon his arrival in the wheelhouse, the deckhand glanced out the starboard windows and then walked directly to the port side of the area. As soon as he had done so, both he and the master (who had also entered the wheelhouse) felt a jerk on the towline. The master quickly took all way off the vessel and proceeded directly to the control station located on the after, exterior boat deck; the time was about 2143. When he shone a searchlight upon the port side of the barge *Texada B.C.*, he saw a grey object laying alongside the barge. The object was later identified as the upturned hull of the *Sunboy*.

The speed boat operator, who had seen the occurrence, proceeded to assist and pick up survivors. The *Jose Narvaez* also stood by the area to assist until released by the Canadian Coast Guard (CCG) on-scene commander at 2251. The *Jose Narvaez* resumed towing the barge toward its Fraser River destination, arriving there at 0505, August 8.

1.2.3 *Events Following the Occurrence*

At 2145 the *Jose Narvaez* reported to MCTS via VHF Channel 12 that the *Texada B.C.* was involved in a collision with a pleasure craft. Two minutes later, at 2147, MCTS initiated a Mayday call on behalf of the *Jose Narvaez* via Channel 16, which was answered by CCGC *Osprey* and CCG hovercraft *HC-O45*. By 2156 the *Osprey* was on-scene and by 2210 she had retrieved people from the water. Survivors picked up by the speedboat were also transferred to the *Osprey*, which, at 2217, arrived at a Department of Fisheries and Oceans research facility in the city of West Vancouver, which borders Vancouver harbour to the northwest. One minute later, at 2218, the first Emergency Health Services (EHS) ambulance arrived at the Fisheries dock and its attendants began first aid.

At 2222 CCG divers entered the water and began a search of the capsized hull. At 2330 the first ambulance left for Lions Gate Hospital, in the adjacent city of North Vancouver. Subsequently, two more ambulances left for the same hospital. By 0500 on the morning of August 8, the wreck of the *Sunboy* had been towed in a capsized condition to the Fisheries dock, and later righted.

The search for the missing person continued until 0143, August 8, at which time the Royal Canadian Mounted Police officially assumed responsibility for the search, which continued for a further 48 hours, but was unsuccessful.

1.3 Injuries to Persons

Sunboy

	Crew	Passengers	Others	Total
Fatal	0	4	0	4
Missing	0	1	0	1
Serious	0	0	0	0
Minor/None	1	8	0	9
Total	1	13	0	14

Survivors were rescued and taken by ambulance to a nearby hospital where they were treated and released. Nine persons survived, including the operator. Four persons drowned, including a five-year-old child, two women and one man. One man remains missing and is presumed drowned. The bodies of the man and child were located within the confines of the capsized hull and those of the women were found in the water, free of the vessel.

Jose Narvaez/Texada B.C.

No one on the tug was injured.

1.4 Damage to Vessels and Environment

Sunboy

The pleasure craft was extensively damaged, particularly on her port side. The significant structural damage was identified as follows:

- port propeller blades were bent and fractured
- starboard propeller blades were bent, fractured or missing



Photo 4
Damaged hull of the *Sunboy*

- port rudder was bent back and upward sufficient to puncture the hull
- port portion of the underwater hull, keel and chine were heavily scarred
- port lifeline stanchions were torn away from their main deck fittings
- entire bridge superstructure was dislodged and broken in many places
- port salon window was dislodged and missing
- forward window directly ahead of the interior helm was missing.

The small amount of diesel fuel released from the capsized vessel quickly dissipated.

Jose Narvaez

The tug was undamaged.

Texada B.C.

The barge had three minor abrasions on the port side of the forward rake 1 m below the main deck. Abrasion marks were found approximately 4 m from the towing eyes on the port bridle of the *Texada B.C.* The abrasions were consistent over an area of approximately 4.5 m.

1.5 *Certification of Vessels*

Sunboy

The *Sunboy* carried a Washington State Vessel Registration Number reserved for recreational vessels. United States regulations do not require that pleasure craft such as the *Sunboy* be inspected.

Jose Narvaez

The *Jose Narvaez* is an inspected vessel and her current Transport Canada, Marine Safety (TCMS), Safety Inspection Certificate (SIC 22), to operate as a non-passenger vessel on Home Trade Class II and III voyages, was valid at the time of the occurrence.

Texada B.C.

The *Texada B.C.* was unmanned and carried no petroleum products or pollutants. Consequently, she was not inspected by TCMS, nor was she required to have been.

1.6 *Vessel Crewing and Personnel Certification and History*

Sunboy

The operator of the *Sunboy* did not hold a marine certificate of competency at the time of the occurrence, nor was he required to under United States federal or Washington state legislation. He had not attended formal navigation courses and had little boating experience, either before the purchase of this, his first vessel, in July 1997, or during the subsequent two years, when the vessel's engines had operated for 300 hours.

Jose Narvaez

The tug was routinely manned by two 5-person crews. At the time of the accident, the on-board crew was beginning a second consecutive week of work. Each deck watch was six hours in length and was kept by two persons: an officer of the watch who was either the master or mate, and one of two cook/deckhands. An engineer was in charge of machinery but was not part of the watch crew. Two 5-person crews normally rotated their duties aboard the vessel every Sunday. At the time of the accident, the on-board crew was completing the final day of its regular shift and was to begin a second week of work, after having made arrangements to do so with members of the alternate crew and the vessel's owners.

The master of the *Jose Narvaez* held a valid Certificate of Competency. He had earned his livelihood in the B.C. towboat industry since 1953. After working 15 years for various B.C. tugboat companies, he satisfactorily completed Transport Canada (TC) examinations, and was issued a "Master Home Trade 350 Ton" Certificate of Competency in 1968. The Certificate was renewed in 1997 and was valid at the time of the collision. He had been employed by the owner of the *Jose Narvaez* since 1981, and since 1996 had held the position of "Posted Master" (Designated Master) aboard the tug.

The engineer and mate both held valid certificates. The on-watch deckhand had no certification, nor was he required to have any.

1.7 *Weather and Tidal Current*

1.7.1 *Weather Forecast*

The collision occurred in darkness, about one hour after sunset, which was at 2044 on August 7. The marine forecast for Vancouver harbour, issued by the Weather Centre of Environment Canada at 1600 on that date, predicted winds from the southeast at 10 to 20 knots with mainly cloudy skies and scattered showers or isolated thundershowers. On-scene weather was reported as being choppy seas, overcast skies, light southeast winds and good visibility.

1.7.2 *Tidal Current*

The Canadian Hydrographic Service Tide and Current Tables, Volume 5, indicate that, on the evening of August 7, low water at Vancouver harbour was predicted for 2120, with a height of 3.3 m above chart datum, and the current at First Narrows was predicted to turn to flood at 2155. At the time of the occurrence, 2143, the tide was ebbing and the current was estimated to have been setting in a westerly direction at a rate of less than one knot.

1.8 *Operating Environment*

1.8.1 *Geographical Information*

Vancouver harbour comprises two geographical entities: a relatively narrow industrial area east of First Narrows known as the “inner harbour”, with a rarely used eastern extremity known as Indian Arm. West of First Narrows is a wider area extending west to an imaginary line between Point Grey and Point Atkinson. This area, known as the “outer harbour”, consists of Burrard Inlet, English Bay and False Creek (see Appendix A).

The fireworks display on August 7 was one of four held annually in the outer harbour. There are two displays each week for two consecutive weeks, beginning in the last week of July or the first week of August. Each event begins at 2215 and lasts 30 minutes. The four events are known collectively as the “Symphony of Fire”. Each display is ignited from a barge anchored at position 49°17'35" N, 123°10'00" W, directly off English Bay Beach.

1.8.2 *Traffic*

Before each fireworks event, including that of August 7, hundreds of pleasure craft depart numerous mooring sites in greater Vancouver and make their way through Burrard Inlet toward English Bay. Typically these vessels transit the inlet over a period of between two and four hours leading up to the beginning of the event at 2215. When the fireworks end at 2245, these same vessels return to their moorings over a much shorter period of between one half and two hours. Often, this leads to congestion around First Narrows, where numerous close-quarters situations occur both between pleasure craft and between pleasure craft and commercial vessels. Vancouver’s traffic separation scheme begins approximately 2.5 nm west of First Narrows.

1.8.3 *Traffic Separation Scheme*

A traffic separation scheme is a routing measure that provides for the separation of opposing streams of traffic, through the establishment of traffic lanes. The scheme in the Strait of Georgia begins north of Boundary Pass and leads north along the east side of the strait into Burrard Inlet. The scheme is recommended for use by all ships, particularly those 20 m or more in

overall length. At the time of the collision, the tug and barge had left the outbound traffic lane before its natural terminus and entered the traffic separation zone on a southwesterly heading toward buoy "QA". The pleasure craft was in the process of crossing the same traffic separation zone in a southeasterly direction (see Appendix A).

1.8.4 MCTS Centres

The CCG provides communications and traffic services for the marine community through MCTS.³ One of the primary functions of MCTS is to monitor the movement of vessels 20 m or more in length in coastal waters.

At the time of the collision, there were two MCTS centres using radar to monitor the movement of marine traffic in Vancouver's outer harbour. MCTS communication with vessels was maintained by means of the assigned VHF reporting frequency, Channel 12. In addition, vessels were required to monitor the international distress and calling frequency, VHF Channel 16. Having an overall length of less than 20 m, the *Sunboy* did not participate in the Vancouver MCTS system of August 7, nor was she required to have done so. The *Jose Narvaez* was required to participate in the system, and did.

Three times daily, MCTS broadcasts to mariners safety significant information it has received from interested parties. These broadcasts are known as "Notices to Shipping", and on August 7 they were made routinely at 0810, 1410 and 2210. It is standard practice to abbreviate the text of a Notice to Shipping after it has been broadcast for 48 hours. As this was the third night of fireworks, an abbreviated version of the following text was broadcast:

A fireworks display will take place in English Bay from 2215 until 2245 PDT Saturday Aug 07 1999. Heavy congestion is expected at First Narrows and in False Creek as spectators return from the display. Mariners are advised to exercise caution and where possible remain clear of these areas during times of heavy congestion.

All MCTS radar surveillance and radio communications equipment was reported to have been operating normally at the time of the accident. At 2145 Vancouver MCTS received an initial report of the collision from the *Jose Narvaez* on VHF Channel 12, the MCTS working channel. This report was in non-standard format, in that the prefix of "Mayday" was not used. The traffic-regulating officer then advised the MCTS safety officer, who initiated a three-second, continuous alarm signal and, at 2147, transmitted a Mayday call on VHF Channel 16. The

³ Details of MCTS in Canadian waters may be found in Notice No. 25 of the Annual Edition of the 1999 *Notices to Mariners*, 1 to 46.

broadcast advised of the possibility that people might be in the water and requested mariners to proceed to the area to assist. Six minutes later a MCTS safety officer informed the Rescue Co-ordination Centre (RCC) in Victoria of the occurrence.

1.9 Navigation

Sunboy

The *Sunboy* was fitted with an interior control station and a command bridge. The navigation equipment at the interior control station included a magnetic compass, a marine radar, a digital depth sounder, a global positioning system device, a VHF transceiver and an electric horn. The command bridge was equipped with a magnetic compass, a VHF transceiver and an electric horn. The compass was the only appliance in use at the time of the occurrence; VHF safety communication channels were not being monitored.

The navigation lights aboard the pleasure craft conformed to the number and location of those prescribed by the *International Regulations for Preventing Collisions at Sea, 1972* (COLREGS). The switch controlling the activation of the navigational lights was found in the “on” position at the time the *Sunboy* was salvaged. The lights were lit at the time of the occurrence. No radar reflector was observed at the time of salvage and its presence or absence at the time of the occurrence could not be determined.

While piloting his vessel between Seattle and Vancouver, the operator relied upon a type of publication known as a “coastal cruising atlas”, in which the editor typically prints a statement to the effect that the charts contained in the atlas are not intended for use in navigation. The operator carried no Canadian or United States hydrographic service charts aboard the vessel. On the evening of the occurrence, one of the guests brought a nautical chart aboard. The operator did not use this chart, and it was not found at the time of salvage.

The operator was navigating with reference to a congregation of lights he saw ahead of him in the distance. He understood them to be those of other pleasure craft gathered in English Bay awaiting the beginning of the fireworks.

Jose Narvaez

The navigation equipment in the wheelhouse of the *Jose Narvaez* included two marine radars, a magnetic compass, an auto pilot, two VHF transceivers, a Loran-C receiver and a ship’s whistle. At the time of the collision, the tug was on automatic pilot, with all of these aids operational except for one radar unit, which was turned off.

The *Jose Narvaez* was displaying the navigation lights for a vessel of her size and type. They comprised three masthead lights, each with a minimum visibility range of five miles. She displayed sidelights, stern light and a towing light, each of which had a minimum visibility range of two miles. The master of the tug was navigating with reference to Canadian Hydrographic Service Chart 3481.

Texada B.C.

Originally, the barge had been fitted with permanent port and starboard sidelights and a stern light. On August 5, during a nighttime passage from Seattle to Vancouver, the master noticed that the barge's starboard sidelight was flickering. On August 7 the barge was prepared for the passage to the Fraser River. The deckhand turned on the switches for navigation lights and checked that the photo cells were operating. He then positioned a (temporary) "Scotty" lantern that had been improvised and used as a portable starboard sidelight. The lantern was secured with twine to the appropriate side screen of the barge. At the time of departure and when off buoy "QB", the master observed the green sidelight of the barge approximately 300 m astern of the tug.

1.9.1 *Portable Navigation Lights*

The substitute light in use aboard the *Texada B.C.* on the night of August 7 is commonly referred to as a "Scotty" lantern. It was a 6-volt lantern battery atop which was secured a light assembly with a green lens cap over a clear light bulb. The height of the combined battery and light assembly was approximately 25 cm. Attached to the battery was a wire carrying-handle rising approximately 25 cm above the battery. Tied to the top of the handle of the lantern was a coiled length of twine. The lantern weighed approximately 2.5 kg. Its type is catalogued in the manufacturer's sales material as a barge, boom or portable anchor light designed to be used with a clear lens. It is identified in its packaging as a "Barge and Boom Lantern". (The manufacturer indicated that, with a clear lens, the visibility range is approximately 1 nm.) However, the design permits the clear lenses to be replaced with coloured lenses. The TSB had the lantern tested in an independent laboratory five weeks after the collision, in the presence of representatives of both the owner and the TSB. With a green



Photo 5
The lantern that had been aboard the
Texada B.C.

(starboard) lens, the lantern was found to have a maximum visibility range of less than four cables (0.4 nm). International regulations required the sidelight to have a minimum visibility range of 3 nm. The owners of the tug and barge maintained an inventory of these lanterns and occasionally used them on barges as temporary sidelights.

This investigation revealed the widespread use of portable kerosene- and battery-operated navigation lights in the West Coast towing industry, particularly on barges and log booms. The visibility range of these lights—most frequently used as navigation lights—is substantially below that required for safety as specified in the COLREGS, which in this instance was 3 miles. These navigation lights have not been tested in accordance with the Transport Canada publication entitled *Standards for Navigation Lights, Shapes, Sound Signal Appliances and Radar Reflectors 1991 - TP1861*.

Navigation lights that meet regulatory requirements are sold with proof of compliance documentation, be it in the form of a document or a label securely affixed to the light.

1.9.2 Previous Safety Communication Regarding Navigation Lights

Ship Safety Bulletin (SSB) 13/88, Annex, entitled *Recommendations for the Safety of Towed Ships and Other Floating Objects* states, in part:

2.1 Tows should exhibit the navigation lights . . . required by the International Regulations for Preventing Collisions at Sea, 1972, as amended. Due consideration should be given to the reliability of the lights . . . and their ability to function for the duration of the voyage. It is most desirable that a duplicate system of lights be provided.

Over the past 10 years the TSB has issued safety communications concerning the substandard display of navigation lights, especially aboard working barges. Of specific concern have been lights that were incorrectly configured, had insufficient range, or were not functioning. Any of these deficiencies can seriously compromise the ability of mariners to see another vessel and take timely collision-avoidance action.

The following is a summary of these communications:

- Marine Safety Information Letter 04/91, issued in January 1991, stated that a barge carried no lights after sunset. A 4.8 m (16 ft.) pleasure boat collided with the bow of the barge *CPR No. 1* pushed by two tugboats *Brymay* and *Telkwa Queen* (TSB Report M90W1039).
- Marine Safety Advisory (MSA) 03/94, issued in May 1994, suggested that the CCG, then part of TC, examine towing industry practices on the West Coast to confirm the adequacy of navigation lights and their display. This MSA was issued during the

investigation of the collision involving fatalities between the tug-barge unit *Arctic Taglu/Link 100* and the fishing vessel *Bona Vista* (TSB Report M93W1050). With the investigation report, the TSB issued Recommendation M95-13 in November 1995, proposing that TC ensure that the navigation light requirements for tug-and-barge operations facilitate vessel detection and collision avoidance under all operating conditions, regardless of the tug/barge configuration.

- MSA 01/99, issued in January 1999, reiterated that TC should ensure that the navigation light requirements for tug-and-barge operations facilitate vessel detection and collision avoidance under all operating conditions, regardless of the tug-barge configuration. Another collision had occurred involving the barge known as *Barnston Island No. 3*, towed alongside by tug *Centurion VI*, and the tug *Harken No. 5* (TSB Report M98W0239).

In response to Recommendation M95-13 and other associated correspondence, TC issued SSB 3/96, which warns the marine community of the dangers associated with the use of navigation lights that do not comply with the COLREGS, be it with respect to the proper carriage, display or technical details. It also advises builders, owners and operators who are unclear as to the requirements for navigation lights on their vessels to contact a TCMS office. TC also advised that initial consultation with the industry had taken place in May 1996, regarding the navigation light arrangements on the type of tug/barge combination, and the industry Working Group is still active in this regard.

1.10 *Owners' Directives Regarding Marine Operations*

1.10.1 *Planned Maintenance*

Sunboy

Following the occurrence, the TSB determined that the main engines of the *Sunboy* were nearly new at the time of the accident and no major maintenance was planned or required. The engines had operated for a total of 300 hours.

Jose Narvaez and Texada B.C.

Prior to this occurrence, the *Jose Narvaez* completed her most recent TCMS inspection in May 1997, and was scheduled for her next inspection in May 2001.

When equipment aboard either the tug or barge is found to be defective, it is the owners' standard procedure that a responsible crew member report the fact to the shore engineer by VHF radiotelephone. Subsequently, a written description of the defective equipment is

submitted to the same shore engineer. The description is made using a Maintenance Order Requisition. Once the equipment has been repaired or replaced, the Maintenance Order Requisition is not retained.

In this instance, the non-functioning starboard sidelight on the *Texada B.C.* and the non-operational intercom system on the *Jose Narvaez* were not reported to the shore engineer until after the accident.

1.10.2 *Tug Company's Instructions to Master*

The company's principles and philosophy include a long-term approach to operating performance, quality assurance (business, products and safety of all employees), the development of employee skills, and sound environmental practices.

In keeping with their human resource and operating philosophy, the Master Standing Orders outline the company's policies for shipboard and shore-based personnel. The instructions include some reference to the responsibilities of the master and the crew and their duties to both navigational and maintenance requirements.

Among other requirements, the Master Standing Orders stipulate that:

- the master is responsible for the safety of the vessel, including crew training;
- the master should ensure that the efficiency of all equipment is maintained;
- navigation personnel should comply with COLREGS, (including that navigation lights are properly displayed and working satisfactorily, and that a proper look-out is maintained);
- extra precautions should be taken in high density traffic which may include reduction in speed and/or posting of extra lookouts; and
- log books should include entries with respect to high traffic density and deficiency of equipment.

In this instance there was no entry in the log book to indicate that the intercom was not functioning satisfactorily or that the barge's permanent starboard sidelight was inoperative. Also, while operating in the vicinity of a relatively high level of pleasure craft traffic, the master did not post a lookout. Upon deciding that a lookout was required, and without the benefit of the intercom, the master left the bridge unattended and proceeded below decks to summon the deckhand.

1.11 *Collision Avoidance*

Sunboy

The vessel's radar was next to the main deck interior control station and any navigational information displayed on it was unavailable to the operator seated at the control station on the command bridge. The operator did not recognize the tug *Jose Narvaez* despite its being lit with the appropriate navigation lights.

The operator recalls seeing a dark object to port, which he identified as an island but which was in fact the hull of the barge *Texada B.C.*, against the dark background of Stanley Park, seen at close range seconds before the collision. Neither the operator of the *Sunboy* nor others who observed the accident saw a green sidelight aboard the barge.

Jose Narvaez

When the tug was approximately one mile west of First Narrows, the towline was extended to 274 m and the deckhand went below decks, having been given permission to do so. Being alone in the wheelhouse, the master assumed the dual responsibilities of navigator and lookout. While aware that there were many pleasure craft in the area, the master did not identify the *Sunboy* or effectively monitor other vessels in the area. The tug's heading was maintained by automatic pilot. After passing buoy "QB" and established on a heading of 245°T, the master proceeded below decks in search of the on-watch deckhand. Once he had arrived back in the wheelhouse, seconds prior to the collision, he remained unaware of the presence of the *Sunboy*.

1.12 *Emergency Planning and Response*

1.12.1 *Management of Traffic during Special Events*

Between 2,800 and 3,000 deep sea vessels arrive in the Port of Vancouver each year. The Harbour Master (HM) directs the operations of the Vancouver Port Authority and uses a Standard Operating Procedure for judging the acceptability of all special event applications involving Vancouver Harbour. Approximately three to four applications are processed weekly. The approval process may require only a cursory examination of the event's requirements and potential impact on port operations, or it may demand in-depth study requiring consultation with shipping agents, police, fire and ambulance services, the CCG, MCTS, and others.

Fireworks displays have been held annually in English Bay since 1990. There are two displays each week for two consecutive weeks, beginning in the last week of July or the first week of August. Each event begins at 2215 and lasts 30 minutes. Each year, months in advance of the first display, members of the CCG, Emergency Health Services, MCTS, Vancouver Police Department, Vancouver Port Authority, and the event's corporate sponsors meet on several

occasions to coordinate the best use of available resources. Strategies are developed for restricting pleasure craft from entering an area dangerously close to the fireworks barge, communication protocols are established between designated patrol vessels, and plans are made for inspecting life-saving equipment aboard pleasure craft bound for English Bay on event evenings. On August 7 some 10 vessels of various types were engaged in the task of patrolling English Bay, where the majority of pleasure craft had gathered.

The Vancouver Port Authority provides the services of one or more vessels to assist commercial traffic through First Narrows. This policy is in effect year round and is not restricted to special events. However, the offer is conditional upon the availability of vessels to perform the service. At the time of the accident, the Vancouver Port Authority considered its policy to be known generally by commercial shipping using Vancouver Harbour.

During the four Symphony of Fire events of 1999, the Vancouver Port Authority coordinated the patrol vessels at the event in Vancouver harbour, through collaboration with the CCG and CCG-auxiliary personnel, the Vancouver police and fire departments, Vancouver Life Guards and Jericho Rescue.

To ensure the unimpeded transit of commercial vessels and the safety of all traffic in the area, including that of pleasure craft, the HM carefully examines events with the potential to affect commercial ship movements. In anticipation of high levels of pleasure craft traffic in the harbour on the nights of the Symphony of Fire, the Harbour Master had initiated a Notice to Shipping.

The Port of Vancouver Harbour Operations Manual states that escorts will be provided as follows:

- For tankers, the HM's launch will be available to clear traffic and provide services through First and Second Narrows.
- During high-traffic times, the HM's launch will be available to provide escorts for cruise ships through First Narrows.
- In extraordinary circumstances the HM's launch will be available to provide escorts through Vancouver Harbour for other vessels, if requested.
- Further requirements for tankers include tugs escorts through the harbour and tugs to stand by tankers at anchor in English Bay.

Tug assistance is at the cost of the ship's owners.

The collision took place approximately 3.5 miles west of First Narrows and some 3.5 miles northwest of the fireworks barge, in the area of the traffic lanes. It is an extremely popular area with the pleasure boating community, with marinas and yacht clubs located on both the north and south shores of Burrard Inlet. Escorts are provided to commercial vessels in this area in unusual circumstances or upon request.

On the night of the accident, MCTS evaluated commercial vessel participation in the traffic scheme as being light to moderate. However, as a result of the fireworks display, an unusually large number of recreational water craft were observed by radar to be gathering in Burrard Inlet in the vicinity of the fireworks barge before the start of the fireworks display. The CCG estimated that between 1,000 and 1,200 vessels attended the August 7 event, including a cruise ship, small commercial passenger vessels, numerous recreational power and sail boats, as well as canoes and kayaks.

On the day of the occurrence, the Vancouver Port Authority vessel *Klawichan* was available as an escort vessel during the early evening hours, but by 2030 it was fully engaged in patrolling the area next to the fireworks barge. Hence, when the 236.45-m-long, 36,028 gross tonnage container vessel *P&O Nedlloyd Seattle* requested an escort (prior to the occurrence), the vessel was informed by MCTS that none was available. The vessel transited the area without an escort.

Four days later, on August 11, during another fireworks event, the 199-m-long general cargo vessel *Star Hosanger* (33,364 gross tonnage) was observed inbound approaching First Narrows at about the same time as many pleasure craft were transiting the Narrows. On that occasion, two vessels provided an escort, one on either side of the commercial vessel. Sirens were sounded, searchlights were trained on the vessel's hull, and loudhailers were used to draw the attention of pleasure craft—to warn them to keep clear of the commercial vessel.

1.12.2 Search and Rescue

Search and rescue (SAR) service is initiated by RCC Victoria, which in turn notifies EHS, in Vancouver. EHS coordinates and provides the first response, which is typically ambulance and first aid assistance.

West Vancouver Fire Hall No. 3 is within five minutes' driving time of the Fisheries dock (where the victims were brought ashore). The firefighters on duty that night were qualified to provide skilled emergency assistance, and they held a key to unlock the gate leading from a public roadway to the Fisheries dock. However, EHS did not immediately inform personnel at Fire Hall No. 3, and their assistance was not sought until 25 minutes after the first ambulance had arrived at the landing site.

2.0 *Analysis*

2.1 *Impact of Navigational Practices and Safety*

Navigating personnel are required to employ sound navigational practices aboard their respective vessels. Such practices include maintaining a constant awareness of prevailing circumstances so as to be able to accurately gauge risk of collision with another vessel. To this end, the COLREGS require that a proper look-out be maintained at all times by sight and hearing and using all available means appropriate to the prevailing conditions and circumstances.

Both vessels were fitted with working radars. The *Jose Narvaez* had one of its two radars operating. The information on the radar was not used to advantage, proper radar watch was not maintained, and the wheel-house was left unattended at a critical time prior to the collision. No dedicated look-out was posted and there was higher-than-normal volume of recreational craft transiting the area at the same time as the tug and barge. Cues, both visual and on radar, were available to the tug's navigating personnel but were not used to advantage. No attempt was made to use the VHF for communicating with the approaching vessels. No additional safeguards (such as use of a searchlight trained on the barge, or any other action) taken to warn other vessels (including the *Sunboy*) that they were running into danger.

Given the level of training and experience of the operator of the *Sunboy*, emphasis was placed on visual navigation to the exclusion of equipment, such as radar, that could have provided additional information. Additionally, the operator of the pleasure craft did not recognize the significance of the pattern of navigation lights displayed by the tug, and consequently was unaware that there was a risk of collision with the tug/tow combination. The situation was further compounded by the low visibility range of the starboard sidelight on board the *Texada B.C.*, which deprived the operator of a vital collision-avoidance cue with respect to the presence and location of the barge.

All of the above would indicate that an effective look-out was not maintained by either vessel nor was the risk of collision properly assessed. The maintenance of a proper lookout and the display of a sidelight with the appropriate range of visibility by the *Texada B.C.* could have given the navigating personnel on board both vessels an opportunity to better appreciate the developing collision situation in ample time to effect remedial measures.

2.2 *Navigation Lights*

2.2.1 *Recognition of Navigation Lights*

The tug was displaying the required sidelights, three vertically arranged masthead lights, and a yellow towing light above a stern light. The recognition of the masthead lights at the prescribed range of five miles would have given the operator of the *Sunboy* an opportunity of some 16 minutes to effect collision-avoidance action. Also, recognition of these lights would have indicated to him that the tug was pulling a tow astern, and that the distance between the sterns of the tug and the tow exceeded 200 m. This, in turn, would have alerted the operator of the *Sunboy* to the danger of passing close astern of the tug.

2.2.2 *Visibility Range of Barge Lighting*

The visibility range of navigation lights is an important factor in maintaining vessel safety. For this reason, sidelight visibility ranges are prescribed by the COLREGS. These international regulations help ensure that mariners can detect nearby vessels and make navigational decisions best suited to safe passage. Vessels that do not display navigation lights, or that display lights with an insufficient visibility range, run the risk of being undetected or of being detected too late to avoid a mishap.

The barge's sidelights are required to have a minimum visibility range of three miles. However, an independent laboratory test conducted on the Scotty lantern that was aboard the *Texada B.C.* showed that on a clear night and with the battery fully charged, the light had a visibility range of less than four cables. On the night of August 7, the visibility was good. According to the laboratory test results, the visibility range of the Scotty lantern, with a green lens having been substituted for its clear lens, would have been, at best, only one tenth of the range required by regulations. Any vessel approaching the barge and relying solely on the barge lighting would have had substantially less time to take timely collision-avoidance action.

Neither the occupants of the *Sunboy* nor others who observed the accident (from other vessels) saw a green sidelight on the barge. The tested visibility range of the barge's starboard sidelight, in conjunction with the closing speed of vessels, would have allowed the operator of the *Sunboy* one minute to observe and identify the barge and then act to avoid colliding with it. Generally, a sidelight with a visibility range of the prescribed three miles would have given a vessel some 10 minutes to respond to the situation. In this instance the starboard sidelight of the *Texada B.C.* could only have been sighted once the *Sunboy* was around Point Atkinson, the distance separating the two vessels being about 2.1 nm. A sidelight, with the required visibility range, would have given the operator of the *Sunboy* some seven minutes to perform the same procedures.

This occurrence highlights the importance of using appropriate navigation lights that can be detected at a range necessary for taking collision-avoidance action.

2.2.3 *Widespread Use of Substandard Navigation Lights in the Towing Industry*

Canada's largest tug boat fleet is located in B.C., where log booms and barges ply the coastal waters in all conditions of visibility, often near commercial and recreational vessels. In a congested area at night, tugs and their tows pose a greater threat to maritime safety than do most other vessels because the cable connecting them lies hidden a short distance below the surface of the water and there is no visible link between the two. A vessel operator who attempts to pass astern of a working tug without being aware of navigation lights displayed by tugs and tows is in danger of colliding with the submerged towline or the towed object. The danger of such an occurrence increases as the visibility range of critical navigation lights aboard the tug or tow decreases.

"Scotty" lanterns, like that tested by the TSB, were manufactured with a maximum visibility range of one mile (using a clear lens). They were marketed and distributed to wholesale and retail suppliers as barge, boom or anchor lights, and subsequently were sold to customers in the industry, who used them as navigation lights. While manufactured as an all-round white light, the light was subsequently modified, for use as a sidelight, by substituting the clear lens with a coloured lens. The owners of the tug and barge maintained an inventory of these lanterns and used them from time to time on barges, as temporary sidelights, despite their visibility range being significantly below the requirement of three miles, which was set for safety purposes.

To help ensure that only navigation lights that meet regulatory requirements are used by owners/masters of vessels, the regulations call for "proof of compliance", be it in the form of documentation or a label.⁴ Consequently, the industry, including the owners of the tug and tow, ought to have been aware that lights meeting regulatory requirements are available on the market and must be carried on board all tugs and tows. Approval from TC had not been received to permit "Scotty" lanterns to be used as a substitute for navigation lights required by regulations. The "Scotty" lanterns sold by manufacturers did not carry a proof of compliance document or label. In this instance, the navigation lights, including a spare set (oil lanterns), were carried by the tug.

Further, unmanned barges such as *Texada B.C.* are not subject to inspection by TC. As such the onus is on the owners/masters to ensure that navigation lights used on barges meet the prescribed safety range requirement and carry proof of compliance document or label.

⁴ Section 5 (1) (a) (b) of the COLREGS.

Given the long history of the use of these navigation lights within the industry, and given that these lights are supplied by the company for use as navigation lights, the ship's complement had no reason not to accept them as such. Consequently, the risk associated with the use of these lights was unrecognized and the safety threshold was thus lowered. Reason's model of accident causation is used to illustrate, from a systemic perspective, a number of safety defences that had been breached. The result is the widespread use of lights for navigation purposes that do not meet the safety range of visibility (see Figure 1).

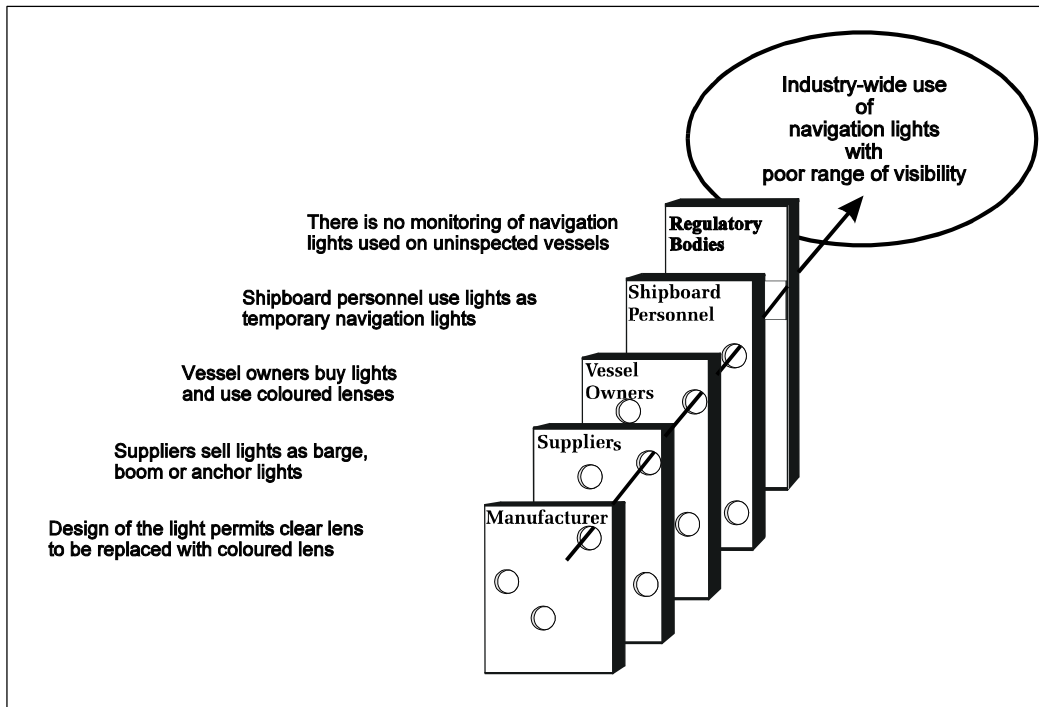


Figure 1
Factors influencing the industry-wide use of lights for navigation with poor range of visibility
(after Reason's model of organizational failure)

In 1988, TC issued SSB 13/88, which cautioned industry participants to use navigation lights that conform with international standards. Further, in SSB 3/96, TC advised owners and operators who were unclear as to the requirements for navigation lights to contact a TCMS office. Nevertheless, the use of substandard navigation lights continues.

2.3 *Effect of Background Lighting*

An observation of the view that would have been seen from the flying bridge of the *Sunboy*, as it made its way between its West Vancouver moorage and Burrard Inlet, was carried out on the night of August 11 (the next fireworks night). The observation revealed that from the command

bridge one could see, from left to right, the north shore of Burrard Inlet, buoy “QB”, the unlit area of Stanley Park, a large group of boats assembled around the fireworks barge and, behind them, the shore lights along English Bay beach towards False Creek. As the *Texada B.C.* and the *Sunboy* were on a near-collision course, the bearing of the barge from the *Sunboy* would have remained constant. Hence, the predominately dark barge moving in front of Stanley Park would have been difficult to discern. Given the visibility range of the barge’s starboard sidelight, the sighting of the barge from the *Sunboy* would have been made all the more difficult. This is consistent with the operator’s perception that the barge was an island.



Photo 6

View from the area of the accident looking east. On the right is Stanley Park, which offers a dark background at night.

2.4 Proficiency of Pleasure Craft Operators

2.4.1 *Sunboy*

Safe vessel operation depends on an operator’s experience in applying sound navigational principles. In this instance, the operator of the *Sunboy* had received no formal nautical training. His training was limited to a three-hour vessel-familiarization briefing provided by two representatives of the agency from which he had purchased the vessel, in July 1997. The operator’s inability to recognize the tug’s navigational lights contributed to the pleasure craft passing astern of the tug and onto the cable of the towing bridle. The operator’s knowledge of navigational practices, which would include COLREGS, was limited and is reflected in the following:

- he did not use appropriate nautical charts despite being unfamiliar with Burrard Inlet;
- his method of navigation was to follow other vessels ahead of him;

- he did not carry nautical publications that could have provided valuable navigational information;
- he elected to position himself on the command bridge while operating in the vicinity of heavy traffic. The absence of radar at this location precluded its use for navigation and collision avoidance, and limited the cues available to the operator; and
- he was unable to recognize the tug/tow navigation lights.

2.4.2 *Domestic and Foreign Regulations*

In the USA, regulation of pleasure craft operations is within the domain of individual states. The need for formal training of pleasure craft operators has been recognized by some states, but not by all. The State of Washington, where the *Sunboy* was licensed, does not require pleasure craft operators to demonstrate proficiency. A minimum level of skill and knowledge is required of those who operate an automobile or aircraft for recreational purposes, but no such requirement exists for the majority of pleasure boat operators.

The need for formal training of pleasure craft operators has been recognized by the CCG and a number of states in the USA. The *Competency of Operators of Pleasure Craft Regulations* made pursuant to the *Canada Shipping Act* are intended to address this need. The Regulations came into effect on 1 April 1999. While initially targeted at young boaters, by September 2009 the Regulations will extend to all Canadian operators of pleasure craft. With respect to foreign flag pleasure craft, although a certificate or similar document issued by an operator's state or country is accepted as proof of competency, the Regulations apply only to those pleasure craft that have remained in Canada 45 days or longer. As such, the Regulations do not apply to the majority of foreign operators of pleasure craft in Canada, whose visits are typically shorter than a month and a half. Hence, many foreign pleasure craft will continue to operate in Canadian waters for up to 45 days without their operators having met a proficiency requirement. As these pleasure craft operators have a potentially limited knowledge of COLREGS, the absence of a proficiency requirement increases the risk of marine accidents.

2.4.3 *Navigation Light Recognition in CCG-accredited Courses*

CCG-accredited courses are designed to teach "basic boating safety" and are targeted at operators of pleasure craft using visual navigation. While these courses are required to include a review of the COLREGS, they do not impart a comprehensive knowledge of navigation lights fitted aboard commonly encountered commercial vessels such as tugs, barges, commercial fishing vessels and dredges. The lack of such knowledge has the potential to compromise safety, in that the danger associated with passing between a tug and tow, or between a fishing vessel

and its fishing gear, or navigating into the path of an encumbered vessel is not recognized. Hence, a large number of pleasure craft operators plying Canadian waters may not be aware of these risks.

2.5 Operational Decisions

Jose Narvaez

Several publications are available to the mariner for navigational watchkeeping guidance. These include the COLREGS, the TC publication *Recommended Code of Nautical Procedures and Practices, 1985* (TP 1018), and the International Chamber of Shipping publication *Bridge Procedures Guide*.

Among other requirements, these publications, together with the owner's Master Standing Orders provide guidance in passage planning, determining the composition of the bridge watch and, in particular, the need for maintaining a proper lookout.

As part of his passage plan, the master was required to consider the most appropriate method of towing a loaded barge, at night, through a part of the harbour where he could expect to encounter more pleasure craft than normal. The owners and the master of the tug were aware of the high level of pleasure craft traffic in Burrard Inlet and had readily available access to communication with each other through cellular telephone, but made no additional arrangement to ensure a safe passage, either before the night of the occurrence or at the time of sailing.

The following factors highlight the absence of safety-oriented decisions including those made by the master while the tug and barge were being operated in an area of increased pleasure craft traffic:

- The starboard navigation light on the barge was known to be defective for a period of about 48 hours, during which period the barge was in port. Also, the intercom was defective for a period of time. However, the master did not inform the shore engineer that equipment which was essential for safe navigation of the tug/barge unit was defective.
- A large number of pleasure craft was known to be operating in the general area, including open boats with no provision to affix a radar reflector, which made their detection on the radar difficult. However, no dedicated lookout was posted.
- No escort vessel had been requested for this transit.

- At no time was a searchlight trained on the barge to highlight the danger.⁵
- No safety message prefixed “SECURITÉ” was broadcast to warn other vessels in the area of the approaching tug and barge.
- The on-watch deckhand was allowed to proceed below decks while the vessel was in an area of heavy traffic.
- The wheelhouse was temporarily left unattended at a critical time in the transit while the tug was being steered by automatic pilot.
- No vessel was targeted for close monitoring.

2.6 *Company Operating Practices*

Jose Narvaez

An effective long-term safety management system would foster continuous improvement in safety awareness and safety management skills and would provide a method of identifying and addressing non-conformities (be they compliance with a regulatory regime, or the company’s policies, practices, and instructions). The International Maritime Organization (IMO) has recognized the merit of such an approach and, in 1993, adopted the International Safety Management (ISM) Code as a best practice for SOLAS (International Convention for the Safety of Life at Sea) vessels. Neither the *Jose Narvaez* nor the *Texada B.C.* are SOLAS vessels. As such, their owners are not required to develop a safety management system based on the ISM Code. However, the company *has* a safety management system in place. But because it is not effectively monitored, it does not achieve its stated objective.

The safety documentation provided during the investigation, entitled Master Standing Orders, outlines the company’s policy for shipboard and shore-based personnel. The policy places the responsibility for safe operation of the tug on the master, but there is no method identified to monitor the effectiveness of safe operational practices.⁶ The reporting of deficiencies and the repairing and replacement of equipment has a direct impact on the ongoing safe operational performance of a vessel.

⁵ Care should be exercised in directing a searchlight on a vessel, especially small vessels as it has the potential to impair vision of personnel crewing the targeted vessel.

⁶ The marine arm of the company is a small part of the overall company’s operations.

The company's operating policy took a long-term approach to operating performance, assuring the quality of the way in which its business is conducted, and assuring the safety of its employees. Nevertheless, the following safety-related shortcomings were identified:

- Although the company's instructions to the vessel called for the OOW to ensure that proper navigational lights were up and working properly, the company supplied, as a common practice, improvised substandard navigation lights ["Scotty" lanterns] for use as temporary navigation lights.
- The shortcoming with respect to the absence of guidance to tug/barge crew on the loading or securing of barges identified in Finding 13 of TSB Report No. M95W0095 to date remains unaddressed in the Master Standing Orders.⁷
- Vessel and company record-keeping were not adequate, in that equipment deficiencies were not recorded in the ship's log nor were written records kept of the equipment that had been repaired ashore and returned to the vessel. In fact, the documentation was not retained after the item was returned to the vessel.
- For some two and a half months prior to the occurrence, no safety meetings were recorded or held. Of those recorded safety meetings between 18 February 1999 and 24 May 1999, the entries were related to housekeeping matters and not related to the operational safety of the vessel.
- The company was aware of the higher-than-normal risk associated with a tug and tow operating in the vicinity of high-density pleasure craft traffic during special events in Vancouver harbour. Nevertheless, the company neither provided guidelines to the master nor initiated additional safeguards that would have helped ensure the voyage could be completed safely.

2.7 *Event Planning and Traffic Management*

The Vancouver Harbour Master's office (HMO) plays a central role in the safe management of commercial and recreational marine traffic. In this instance, the HMO permitted the simultaneous operation—during the fireworks display—of commercial vessels and large numbers of pleasure craft. To enhance safety in these circumstances, the HMO office contacted the MCTS Vancouver Regional Marine Information Centre for the promulgation of a Notice to Shipping, engaged vessels to control traffic at the fireworks site, and made limited provision of escorts for commercial vessels passing through First Narrows.

⁷ TSB Report No. M95W0095 - *Seaspan 195*, Finding No. 13 reads, in part: "At the time of the occurrence, nothing in the company Standing Orders offered guidance to tug/barge crews on the loading or securing of barges"

2.7.1 Risk Assessment/Acknowledgement

The movement of commercial traffic through the harbour at the time of the fireworks presented a risk that was noted, on the day of the occurrence. The HM Notice to Shipping warned of heavy congestion in the area and advised mariners to exercise caution and remain clear of this traffic where possible.

Traffic Patterns and Traffic Control Measures

In Burrard Inlet, pleasure craft and commercial vessels cross paths over a wide area. During the fireworks display, many pleasure craft from yacht clubs and marinas on the north shore of Burrard Inlet pass across the paths of commercial vessels. In the inner harbour, the movement of both commercial and pleasure craft traffic is generally east and west (with some traffic crossing the harbour to loading and docking facilities on both the north and south shores). Upon completion of the fireworks display in the outer harbour (Burrard Inlet), a large number of pleasure craft head towards First Narrows, and thence the inner harbour.

Given that some 1,000 to 1,200 pleasure craft depart from a congregation point, it is difficult to facilitate an orderly flow of traffic. There are a number of traffic control measures that may help ensure that commercial traffic can safely traverse the area, unimpeded by pleasure craft. These include: controlling the flow of pleasure craft to and from the fireworks site, using vessels to direct pleasure craft traffic on site, and the establishment of corridors for traffic movement, possibly through the deployment of vessels stationed at intervals and/or the use of floating aids, etc.

Vessels that are deemed to pose a high risk (either to human life, in the case of large cruise ships, or to the environment, in the case of tankers) are routinely escorted through First Narrows. The need to escort these vessels is acknowledged in the *Port of Vancouver Harbour Operations Manual*, and in the fireworks event plan. A tug with a tow is not considered a high risk vessel by either of these criteria, and does not receive an escort as a matter of course.

Prior to the fireworks display, the *Jose Narvaez* was outbound and west of First Narrows. Neither the company nor the master of the *Jose Narvaez* requested an escort vessel, nor was one provided by the Vancouver Port Authority. At about the same time, a container vessel, which was inbound to Vancouver harbour, had requested an escort but none was available. On August 7, one vessel was available as an escort vessel during the early evening hours for a limited time (up to 2030). After the fireworks display, there were three commercial vessels outbound and approaching First Narrows between about 2320 and 2400. None of these vessels were escorted.

Given that the pleasure craft crossing Burrard Inlet proceed across the commercial traffic lanes, the provision of escort vessels to keep pleasure craft from impeding the transit of commercial vessels in the given circumstances, especially at night, could have provided the commercial vessels with a greater measure of safety. This view has already been acknowledged: four days after the occurrence, on another evening of fireworks, two vessels were provided to escort inbound the 199-m-long general cargo vessel *Star Hosanger* (33,364 gross tonnage) through First Narrows.

Amid pleasure craft, at night, tugs with tows pose a higher risk than do other vessels. A tow line can vary substantially in length and, as it is under water, it is not visible. Many pleasure craft operators have limited knowledge of the COLREGS, and so are unable to interpret the navigation lights displayed by tugs with tows. During fireworks events, this risk is further heightened by the presence of pleasure craft operators who are relatively unfamiliar with nighttime navigation. The risk associated with a tug and tow (or other hampered commercial vessel) was not fully recognized in the event plan.

2.7.2 *Risk Management*

On the evening of the occurrence some 10 vessels, of various types, were engaged in the task of patrolling English Bay, where the majority of pleasure craft had gathered. The primary task of these vessels was to keep pleasure craft a safe distance from the fireworks barge, and to inspect pleasure craft for the presence of proper life-saving equipment. However, there is also a high risk of an accident occurring when a large number of pleasure craft are operating in the same area as commercial vessels. By focussing the patrols in the area of the fireworks display barge, commercial vessels transiting the Burrard Inlet and entrance to the inner harbour were exposed to high risk. The high risk associated with the transit of commercial vessels has not been fully addressed.

2.8 *Emergency Response*

Timely notification of agencies is essential for prompt and efficient deployment of all resources and is critical to the success of a SAR mission. In this instance, there was a time lag in involving the West Vancouver fire department stationed a short distance away from the Fisheries Research Dock. As a result, during this occurrence the resources closest at hand were not dispatched by the EHS in a timely manner, although this had no detrimental effect on the success of the rescue.

2.9 *MCTS—Limitations Imposed by Traffic*

Many pleasure craft were known to be operating in the general area, including open boats with no provision to affix a radar reflector, which makes their detection on the radar difficult. Further, a large number of these craft are not required to participate in the Vessel Traffic

Services (VTS) system. In the given situation, vessels would pass each other at close range, which would make merging of targets a common event. Given the bearing and range discrimination of radar sets and given the volume of non-commercial vessels operating in the area, MCTS monitoring and communication of information respecting merging of targets is not considered practical.

3.0 *Conclusions*

3.1 *Findings as to Causes and Contributing Factors*

1. The *Sunboy* operator's knowledge and understanding of navigational practices was such that he did not fully recognize navigational cues that posed a danger to his vessel.
2. The *Sunboy* was navigated between the tug and the barge, struck by the barge and capsized, resulting in the loss of five lives.
3. The navigational practices on board the *Jose Narvaez*—especially that of leaving the tug's wheelhouse unattended—resulted in the crew being unaware of the presence of the *Sunboy* at a critical time during the passage.
4. The intercom on the bridge of the *Jose Narvaez* was not working at the time of the occurrence, leading the master of the tug to go below decks to find the on-watch deckhand.
5. The absence of an effective side light, with a range of visibility of 3 nm, on the barge *Texada B.C.* deprived the operator of the *Sunboy* of a vital collision-avoidance cue to the presence and location of the barge.

3.2 *Findings as to Risk*

1. The risk of a collision is increased by the use within the West Coast marine towing industry of temporary side lights that do not have the prescribed range of visibility.
2. In contrast to the tug company's safety policy, its safety management system was not effectively monitored to achieve its objective.
3. The lack of marine navigational knowledge on the part of pleasure craft operators poses undue risk when they are operating in waters shared with commercial traffic.
4. Training on the identification of light configurations on commonly encountered commercial vessels is not a requirement of CCG-approved navigation courses for pleasure craft operators. Such identification can be critical to the safe operation of pleasure craft near commercial traffic.
5. The State of Washington does not require operators of pleasure craft such as the *Sunboy* to have a minimum level of proficiency. Canadian regulations allow visiting operators of pleasure craft to ply Canadian waters without any navigational training, except where their stay exceeds 44 consecutive days.

6. The transit of many pleasure craft and commercial vessels during fireworks evenings in Vancouver harbour results in situations where there is a high risk of collision—risk that has not been fully addressed by the precautions taken.

3.3 *Other Findings*

1. EHS personnel did not notify the closest first-response agencies of the accident in a timely manner (although this had no detrimental effect on the success of this rescue).

4.0 *Safety Action*

4.1 *Action Taken*

4.1.1 *Inadequacy of Navigation Lights*

In January 2000, the TSB sent Marine Safety Advisory (MSA) 04/00 to Transport Canada (TC). The Advisory expressed that, notwithstanding the issuance of Ship Safety Bulletin (SSB) 3/96,⁸ navigation light deficiencies persist along with an accompanying loss of life and that TC may wish to initiate additional measures to ensure navigation lights carried aboard vessels, in particular tugs and tows, have ranges of visibility which minimize the risk of collision.

TC has advised, by letter, the Council of Marine Carriers in British Columbia of the importance of having towing-related vessels display navigation lights that conform with the *International Regulations for Preventing Collisions at Sea, 1972* (COLREGS) requirements for intensity, range and arc of visibility. TC sent copies of that letter to the Workers' Compensation Board of British Columbia, the B.C. Maritime Employers Association, the editors of the publications *West Coast Mariner* and *Harbour & Shipping*, and all TC Pacific marine inspectors.

On 23 June 2000, TC issued SSB 09/2000, entitled *Navigation Lights and Ranges of Visibility*. The Bulletin refers to COLREGS, and reminds shipowners, agents, vessel operators and, in particular, masters of vessels towing or pushing non-propelled vessels that the towed and pushed vessels are required to exhibit the prescribed navigation lights. It highlights that tests conducted on battery-operated lights such as "Scotty" lanterns manufactured by Scott Plastics Ltd. of Victoria, B.C., and kerosene/oil lanterns indicated a marked decrease in range of visibility. It stipulates that:

- not all of these lights may be marketed or manufactured for the purpose of navigation lights meeting the requirements of the COLREGS;
- mariners should ensure that the navigation lights used are in fact designed and manufactured for that purpose; and
- non-compliance may result in detention of the vessel and fines imposed.

⁸ SSB 3/96 warns the marine community of the dangers associated with the use of navigation lights that do not comply with the COLREGS, be it with respect to the proper carriage, display or technical details. It also advises builders, owners and operators who are unclear as to the requirements for navigation lights on their vessels to contact a Transport Canada, Marine Safety, office.

Canadian industry has worked with Transport Canada to produce a portable navigation light acceptable for use on barges. Two major barge-towing companies on the West Coast are working to obtain Transport Canada approval for a portable barge navigation light approved by the United States Coast Guard.

4.1.2 *Celebration of Light Event Plan*

The search and rescue (SAR) operation order for the Celebration of Light (formerly Symphony of Fire) event is reviewed and updated annually. On 15 June 2001, Rescue Co-ordination Centre (RCC) Victoria issued "SAR Operation Order 2001 Celebration of Light" intended to protect the public and the Celebration of Light employees. The components of the Order include both SAR operations and event contingency planning.

RCC Victoria is responsible for SAR response; the Vancouver Port Authority is responsible for overall safe operation of the harbour and provides clearance to commercial vessels to enter the harbour. The plan is a joint effort and was produced following meetings with all interested parties. In keeping with the local Incident Command Structure, meetings were chaired by the Harbour Master and the final "RCC Victoria SAR Operation Order 2001 Celebration of Light" document was agreed to by the Harbour Master and all concerned.

The command and control of the SAR Order falls under the auspices of the Commander, Maritime Forces Pacific, who has responsibility for SAR in the area, and any amendments would be issued by the Officer-in-Charge at RCC Victoria. Emergency Health Services (EHS) personnel would be available on one of the support vessels and a list of evacuation locations, descriptions and contact numbers would be available. Other support services identified include Marine Communications and Traffic Services (MCTS), the Pacific Weather Centre, Public Affairs, Canadian Coast Guard (CCG) marine resources, and Department of National Defence air resources. Also, police, fire, amateur radio, ambulance, sailing clubs and the Vancouver Parks Board would assist.

A safety issue identified in this accident report was the risk of collision associated with commercial vessels and a high density of pleasure craft in the same area. Under the SAR Order, commercial traffic would be assisted by a Port Authority vessel in the First Narrows area. Further, to help ensure the safe transit of both commercial vessels and pleasure craft in Burrard Inlet, escort vessels are strategically positioned, at the periphery of the pleasure craft congregation area, to keep pleasure craft from impeding the passage of commercial vessels.

The Board believes that these measures will further transportation safety by mitigating some of the risks associated with special events. However, the impact of these changes on safety cannot be fully determined at this stage—continuing evaluation of the plan is encouraged.

The Board noted that in situations where there is a larger-than-usual volume of pleasure craft operating near commercial traffic, there is an elevated risk of collision. This is compounded by the fact that pleasure craft operators may be operating their vessels without adequate navigational knowledge. Over-water displays are also held at a number of other Canadian ports, including Halifax, Québec, Montréal, Toronto and Windsor. These ports have in place plans and procedures to reduce this risk.

In light of this occurrence, and given the dynamic nature of these special events, the Board further encourages those responsible for organizing and coordinating special events to periodically review their arrangements and contingencies to identify and mitigate newly arising risks. To this end, the Board has communicated this concern to the various responsible organizations across Canada, through targeted distribution of a marine safety information letter, and of the final report of this investigation.

4.1.3 MCTS

Following the occurrence, MCTS reviewed its Vancouver operations' procedures, training and equipment efficiency. The following recommendations made to CCG management, to optimize MCTS Centre performance, have been implemented:

- Standards and procedures have been reviewed and amended accordingly at both the local and national levels to ensure consistency and provide further clarification to operational staff.
- A new Vancouver Centre Operations Information Manual has been created to incorporate the revised local/national standards, replacing the old manuals in the operations room.
- Training needs have been reviewed and provided as required, including Distress Refresher training, to operational personnel on a cyclical basis.
- Equipment has been upgraded to better address operational needs.

4.1.4 CCG

The CCG, aware that the absence of knowledge on the identification of light configurations on tugs increases the risk of marine accidents, has introduced the following safety information message in its 2001 edition of the *Safe Boating Guide*:

Tugs may be towing barges or other ships on a long tow-line astern. Often, the length of the tow is so great that the towline hangs below the surface of the water and is virtually invisible. If a small vessel strikes the submerged towline it could

capsize and then be run down by the barge. Never pass between a tug and its tow and make sure that you are aware of the special lights displayed by tugs towing barges or other vessels or objects.

This guide is distributed free of charge and is also available on the CCG Web site.

In addition, the CCG has formed working groups to assess the Operator Competency Program and will make recommendations for improving the implementation of the program. This could result in a review of the CCG Boating Safety Course Standard for the inclusion of more COLREGS knowledge for boaters.

4.1.5 *Lafarge Canada Inc.*

Corporate safety initiatives applicable to the marine arm, in place since 1999, are as follows:

- the formation of a North American Lafarge safety council
- the issuance of a North American safety policy by the President
- the publication of a North American Lafarge safety manual, and
- monthly reporting from each operation.

4.2 *Safety Action Required*

4.2.1 *Continued Use of Substandard Navigation Lights on Barges and Booms*

The Board noted the safety action taken by the industry to make available portable navigation lights meeting the regulatory requirement. However, the Board is concerned that although navigation lights meeting the safety visibility range are available on the market, substandard navigation lights continue to be used by the towing industry.

There is no system in place, either regulatory or through an industry initiative, to ensure the use of lights that meet the safety range prescribed in the COLREGS.⁹ Currently, unmanned barges are not subject to inspection by Transport Canada, Marine Safety, and the onus is on the owner/operator of the vessel to ensure that proper navigation lights are used.

⁹ The required range of visibility of sidelights is as follows: 3 miles for vessels of 50 m or more in length, 2 miles for vessels 12 m to 49 m in length, and one mile for vessels less than 20 m in length.

Navigation lights that meet the prescribed range of visibility are available, the risks associated with the use of substandard lights have been identified, and steps have been taken to address this safety issue. Nevertheless, the use of such lights continues, and with it the attendant risk of collisions.

The Board, therefore, recommends that:

The Department of Transport, in collaboration with the Council of Marine Carriers and other industry representatives, ensure that tugs and tows are equipped with navigation lights that meet the safety range of visibility.

M01-04

4.2.2 *Pleasure Craft Operator Competency*

Both Canada and the United States have recognized the need for proficiency of pleasure craft operators.

The lack of adequate navigational knowledge has been identified as a factor in a number of TSB marine accident reports involving small vessel operators, be they on fishing vessels or on recreational craft. The CCG Office of Boating Safety introduced the *Canadian Operators of Pleasure Craft Regulations* in April 1999 to mitigate risks in pleasure boating. While initially targeted at young boaters, the regulations will not extend to all Canadian pleasure craft operators until September 2009. This will result in the continued presence of pleasure craft crewed by untrained pleasure craft operators in Canada.

However, a review of the CCG-accredited training courses revealed that they do not impart comprehensive knowledge of navigation lights fitted aboard commonly encountered commercial vessels such as tugs, tows, fishing vessels, etc. Such identification is critical to the safe operation of pleasure craft, particularly in areas regularly used by commercial traffic. The CCG has formed working groups to assess the operator competency program and recommendations are expected that could result in a review of the CCG Boating Safety Course Standard.

In the United States, the National Transportation Safety Board (NTSB), the United States Coast Guard, and the National Association of State Boating Law Administrators have recognized the risks associated with inadequate competency of pleasure craft operators. NTSB recommendations M-93-01 and M-93-14 recommend to the governors and legislative leaders of the 50 states, and the National Association of State Boating Law Administrators, the implementation of minimum recreational boating safety standards, including demonstration of operator knowledge of safe boating rules and skills, and operator licensing. A number of states

have recognized the need for, and implemented, operator training and proficiency requirements. However, the State of Washington does not require operators of pleasure craft like the *Sunboy* to have a minimum level of proficiency.

Provisions in the Canadian regulations allow visiting operators of foreign pleasure craft (mostly from the United States, including the State of Washington) to ply Canadian waters without such training, except where their stay in Canada exceeds 44 consecutive days. Similarly, provisions in the United States regulations allow Canadian operators up to 59 consecutive days without navigational training. However, operators pose a greater risk during their initial period in foreign waters, being unfamiliar with the area, routines and practices. By these provisions, boaters who may be without adequate safety training and navigational skills are allowed to operate side by side with commercial traffic.

Untrained pleasure craft operators will continue to pose a risk to the marine environment, given the implementation time frame for the certification of Canadian pleasure craft operators and the cross-border provisions in the regulations. The Board believes that additional measures are warranted to reduce the risk—both to pleasure boaters and commercial traffic—of the current situation, which allows untrained personnel to operate pleasure craft.

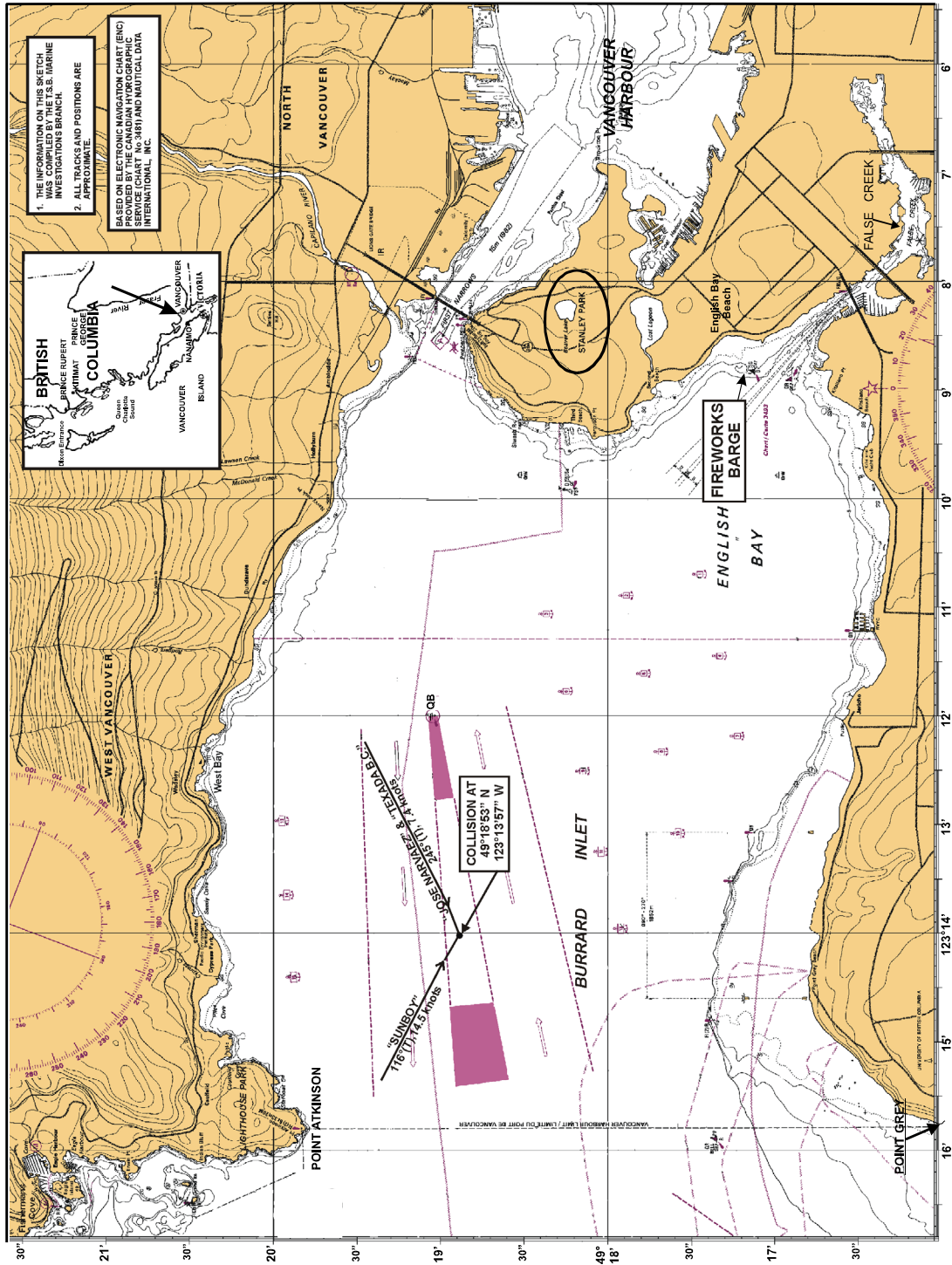
The Board, therefore, recommends that:

The Department of Fisheries and Oceans, in conjunction with the appropriate authorities in the United States, explore ways to ensure that operators of pleasure craft in their respective jurisdictions possess adequate competency and basic knowledge of navigation safety, including the requirements of the *International Regulations for Preventing Collisions at Sea*.

M01-05

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 18 October 2001.

Appendix A - Sketch of the Occurrence Area



Appendix B - Glossary

CCG	Canadian Coast Guard
CCGC	Canadian Coast Guard Cutter
COLREGS	<i>International Regulations for Preventing Collisions at Sea, 1972</i>
EHS	Emergency Health Services
HMO	Harbour Master's office
ISM	International Safety Management
m	metre(s)
MCTS	Marine Communications and Traffic Services (include Vancouver Traffic, Vancouver Vessel Traffic Services, and Vancouver Coast Guard Radio)
MSA	Marine Safety Advisory
N	north
nm	nautical mile(s)
NTSB	National Transportation Safety Board
OOW	officer of the watch
PDT	Pacific daylight time
RCC	Rescue Co-ordination Centre
SAR	search and rescue
SSB	ship safety bulletin
SIC	safety inspection certificate
SOLAS	International Convention for the Safety of Life at Sea
T	true
TC	Transport Canada
TCMS	Transport Canada, Marine Safety
TSB	Transportation Safety Board
USA	United States of America
VHF	very high frequency
VTS	Vessel Traffic Services
W	west
°	degree(s)
"	minute(s)
'	second(s)