

MARINE INVESTIGATION REPORT

M98L0149

SWAMPING AND SINKING

OF THE SCALLOP DRAGGER "BRIER MIST"

OFF RIMOUSKI, QUEBEC

27 NOVEMBER 1998



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

Swamping and Sinking of the Scallop Dragger “BRIER MIST” off Rimouski, Quebec 27 November 1998

Report Number M98L0149

Synopsis

On 27 November 1998, while crossing between Les Escoumins and Rimouski, Quebec, in foul weather, the master of the scallop dragger “BRIER MIST” informed the Marine Communications and Traffic Services that he thought the hold and afterpeak were taking on water and that the pumps were not able to cope with it. At about 1500, the vessel foundered some 10 nautical miles off Rimouski. Despite the search and rescue operations, no trace of the wreck or of three of the five crew members was found. The two recovered victims had drowned.

Section 3 of this report contains the Board’s findings as to causes and contributing factors and other findings. In Section 4, the Board has identified safety deficiencies related to the inspection of hatch covers on small fishing vessels, the absence of automatic release mechanisms on liferafts and the absence of emergency position indicating radio beacons. The Board has issued four safety recommendations to address these safety deficiencies.

The Board is concerned by the lack of safety action taken following recommendations previously issued by the Board on water level detectors, protection from hypothermia and drowning, and marine emergency duties training for fishermen, and recommendations on the same issues by the Chief Coroner as a result of this accident.

Section 4 also lists the relevant safety action taken by Transport Canada, the Quebec Chief Coroner’s Office and the TSB.

Ce rapport est également disponible en français.

1.0	Factual Information	1
1.1	Particulars of the Vessel.....	1
1.1.1	Description of the Vessel	1
1.2	History of the Voyage	1
1.3	Search and Rescue (SAR) Operations	3
1.4	Injuries to Persons	4
1.5	Damage.....	4
1.5.1	Damage to the Vessel.....	4
1.5.2	Damage to the Environment.....	4
1.6	Certification	5
1.6.1	Certification of the Vessel and Inspections	5
1.6.2	Personnel Certification	5
1.7	Personnel History	5
1.7.1	Master	5
1.7.2	Crew Members	6
1.8	Weather Conditions and Current Information	6
1.8.1	Weather Forecasts	6
1.8.2	Weather Reported by the Master of the Vessel	6
1.8.3	Weather Recorded by the Nearest Station	6
1.9	Navigation Equipment.....	7
1.9.1	Navigation Instruments	7
1.9.2	Aids to Navigation	7
1.10	Radio Communications	7
1.10.1	Marine Communications and Traffic Services (MCTS).....	7
1.11	Mechanical Systems and Bilge Pumping.....	8
1.11.1	General Mechanical Information	8
1.11.2	Detection and Pumping Systems.....	8
1.12	Emergency Equipment	8
1.12.1	Life-saving Equipment.....	8
1.12.2	Immersion Suits - Regulatory Requirements	9
1.13	Hatch and Lazaret Covers	9

1.14	Modifications to the Vessel.....	10
2.0	Analysis	13
2.1	Method of Navigation	13
2.2	Decision to Cross	13
2.3	Reconstruction of the Vessel’s Route	13
2.4	Wind Direction and Wave Height.....	13
2.5	Fish Hold and Lazaret Covers.....	14
2.6	Hold Flooding Detection.....	14
2.7	Regulations and Inspection Program	15
2.8	Distress Signals	15
2.9	Abandonment of the Vessel	16
2.10	Personal Flotation Devices (PFDs).....	16
2.11	Training	17
2.12	Crew	17
3.0	Conclusions.....	19
3.1	Findings as to Causes and Contributing Factors.....	19
3.2	Findings as to Risk.....	19
4.0	Safety Action	21
4.1	Action Taken	21
4.1.1	Coroner's Recommendations.....	21
4.1.2	Transport Canada Response	22
4.1.3	Inspection of Fishing Vessels.....	25
4.2	Action Required	25
4.2.1	Hatch Covers	26
4.2.2	Liferaft Release Mechanisms	28
4.2.3	Emergency Position Indicating Radio Beacons (EPIRBs)	29
4.3	Safety Concerns.....	33
4.3.1	Water Level Detectors.....	33
4.3.2	Protection from Hypothermia and Drowning	34

4.3.3 Marine Emergency Duties (MED) Training 36

5.0 Appendices

Appendix A - Sketch of the Occurrence Area 39

Appendix B - Photographs 41

Appendix C - List of Reports 43

Appendix D - Glossary 45

1.0 *Factual Information*

1.1 *Particulars of the Vessel*

	"BRIER MIST"
Official Number	392721
Port of Registry	Yarmouth, N.S. ¹
Flag	Canada
Type	Scallop dragger
Gross Tonnage ²	45.8
Length	13 m
Draught	F: 1.2 m A: 1.5 m
Cargo	Scallops
Crew	5 persons
Built	Fibreglass, 1981, Gilfords Ltd., Dartmouth, N.S.
Propulsion	One Cummins NT855M2 265 BHP diesel engine
Owner	Bastien Lévesque, Maria, Que.

1.1.1 *Description of the Vessel*

The "BRIER MIST" was a series-produced vessel built in 1981 by Gilfords Ltd. in Dartmouth, N.S., according to plans approved by the Canadian Coast Guard (CCG) in 1979. Several fishing vessels were built from the same mould. Although these vessels have reinforced polyester hulls from the same mould, a number of variants were produced for various Nova Scotia fisheries.

1.2 *History of the Voyage*

The "BRIER MIST" was purchased in the spring of 1998, but because much of the summer was spent on repairs to the hydraulic system, the vessel did not begin fishing until early September. On 25 November 1998, the vessel began fishing in the St. Lawrence River in fishing area 16A near the mouth of the Saguenay River. Because fishing was good and the vessel had caught her quota, the master agreed to fish for another fisherman.

¹ See Appendix D for all acronyms and abbreviations.

² 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.

There were a number of fishing days remaining in the area, so the master continued fishing despite the fall storms.

The routine on board the “BRIER MIST” was to fish until the hold was full, and then return to port immediately to unload and sell the catch before resting. For some time, the price for fresh scallop in Rimouski had been higher than at Sept-Îles, Que. The master therefore sold his catch on the south shore.

On November 26, after fishing, the vessel departed with a partial load of about 11 tons of scallops; the vessel had a capacity of 13 tons. After weathering a storm the previous day (46 km/h north-east winds), the vessel took shelter at the Les Escoumins pilot station wharf for the night of 27 November 1998. The next morning, the weather forecast indicated that the wind would soon turn to the north-west. According to the official weather data, at about 0900 eastern standard time (EST)³, the strong north-east wind quickly turned to the west-north-west (44 km/h). The sea near the north shore of the river calmed, but the swell was still from the north-east. The “BRIER MIST” departed at 0938, and the master informed the Les Escoumins CCG Marine Communications and Traffic Services (MCTS) that he expected to arrive in Rimouski at about 1400. The distance is about 34 miles.

At 1258, the estimated time of arrival was changed to 1530; the vessel was then 15.5 nautical miles (M) from Rimouski (see Appendix A). At about 1340, during a call made on a cellular telephone, the master told his agent in Rimouski that the sea was washing over the vessel and that there was about a foot of water permanently on the deck.

At about 1346, the “BRIER MIST” informed the MCTS centre that she was experiencing pumping problems and was taking on some water in the hold. The master also believed that the afterpeak was full of water and that the pump was not able to cope. The master indicated that there was no water in the engine-room. The MCTS Marine Traffic Regulator (MTR) then asked him for his position. The master gave the following coordinates: latitude 48°28.29' N, longitude 068°46.81' W. The MTR then asked him if he expected to be able to reach Rimouski on his own. The master replied in the affirmative, adding that he expected to reach the south shore with a great deal of water in the hold. He also stated that he did not have engine problems for the moment, and added that the fish hold pump was operating, but he did not know whether it was capable of keeping the vessel afloat. At about 1348, he indicated that the vessel was making way at four knots and was 10.76 M from Rimouski. The MTR asked the “BRIER MIST” to stand by and call him back if there was any change. He then asked how many persons were on board. The master replied that there were five persons on board.

At about 1349, the MCTS centre contacted the “BRIER MIST” to ask the master to call every 30 minutes to monitor the situation. At about 1352, the MCTS centre contacted the Québec Marine Rescue Sub-Centre (MRSC) to inform it of the status and position of the “BRIER MIST”. The MRSC requested details on the life-saving equipment on board and mentioned thinking about activating the alert system to go to the rescue.

³ All times are EST (Coordinated Universal Time [UTC] minus five hours) unless otherwise stated.

At 1355, the MCTS centre contacted the “BRIER MIST” and asked the master to list the life-saving equipment available to him if they had to abandon the vessel. The master replied that he had a liferaft; then the conversation was cut off. The master subsequently said that the crew members were having a fair amount of difficulty, and that they would be launching the liferaft. Communication then became difficult. The MCTS centre asked whether they would be able to reach Rimouski in those conditions. The master replied that it was not going any better. At 1357, the MCTS centre asked whether there was a cellular telephone on board. The master replied that there was, and that he would go and get it. The MCTS centre asked for the telephone number. The master only had time to give the first digit (7), and the communication was cut off again. After 1358, all attempts to contact the vessel were unsuccessful. Further attempts at about 1413 were also unsuccessful.

At 1409, the MCTS centre informed the MRSC that the “BRIER MIST” was no longer responding to calls. At 1410, a search and rescue (SAR) operation was initiated.

1.3 Search and Rescue (SAR) Operations

On November 27 at about 1352, the MCTS centre informed the Québec MRSC that the “BRIER MIST” had water in the hold and that the pump was no longer coping. At 1400, a call was made to have a Fisheries and Oceans craft stand by at Sainte-Flavie or Rimouski.

At about 1413, the Rimouski Fire Department was alerted and asked to prepare a rigid inflatable rescue craft. At 1416, the MCTS centre broadcast a PAN PAN. At 1417, air support was requested from the Halifax Rescue Coordination Centre (RCC). At 1420, the MCTS centre asked the vessel “MENOMINEE”, which was in the area east of Île du Bic, if she could see anything offshore or detect something on radar to the east of her position. At 1422, the “MENOMINEE” reported that no fishing vessel could be seen in the area.

At about 1425, the MCTS centre broadcast a MAYDAY RELAY and asked vessels in the area to head for the presumed position of the sinking. At 1426, the “CANADIAN MINER” headed for the last known position of the “BRIER MIST”. At about 1428, a Hercules aircraft from Canadian Forces Base Greenwood and a Griffon helicopter from the Bagotville base were assigned to the mission. The CCGS “GEORGE R. PEARKES”, which was in Sept-Îles, was also assigned to this mission.

On November 28 at 1116, the body of one of the victims was recovered; at 1144, the body of a second victim was recovered. Over the three-day search, CCG ships, SAR aircraft and four merchant vessels combed an area of about 50 km². During this period, two lifebuoys, one floater

jacket and other debris from the “BRIER MIST” were recovered. Despite the efforts of a number of search units to locate the other three victims, the search was unsuccessful. The intensive search was called off on November 29 at 1700.

On 02 December 1998, the TSB attempted to locate the wreck of the “BRIER MIST” using the “CALANUS II”, a Fisheries and Oceans oceanographic research vessel. Despite two days of searching using sophisticated sonar equipment, no trace of the wreck was found in the area combed. The search covered a rectangular area centred on the probable route of the lost vessel from 4.5 M north-east of Île du Bic.

1.4 *Injuries to Persons*

Of the five persons on board, only two bodies were recovered; the others have been declared missing and are presumed drowned.

	Crew	Passengers	Others	Total
Fatal	2	-	-	2
Missing	3	-	-	3
Serious	-	-	-	-
Minor/None	-	-	-	-
Total	5	-	-	5

1.5 *Damage*

1.5.1 *Damage to the Vessel*

The vessel is presumed to have sunk approximately 4.5 M north-east of Île du Bic and about 10 M from Rimouski. In two days of underwater searching for the “BRIER MIST”, the wreck could not be found. Before the sinking, the master did not indicate whether there was any damage to either the hull or the structure of the vessel.

1.5.2 *Damage to the Environment*

At the time of the sinking, the vessel contained diesel fuel. No trace of oil was found on the water or along the shoreline.

1.6 *Certification*

1.6.1 *Certification of the Vessel and Inspections*

Under existing regulations, the “BRIER MIST” had to be inspected every four years. Since she was built in 1981, the vessel had undergone five regular inspections⁴ by Transport Canada Marine Safety (TCMS) in Yarmouth, N.S. At the last inspection on 08 August 1997, a ship inspection certificate (SIC 29) was issued to the vessel. The certificate was valid for coastal navigation Class III voyages in Nova Scotia, with a distance of not more than 20 miles from shore. This was a short-term certificate; the original expiry date was 29 October 1997, but it had been extended to 08 August 2001. The certificate indicates that the vessel could not be used to fish for herring or capelin unless the stability data were approved in advance. The inspection report indicates that the condition of the hull and deck was satisfactory.

A marine surveyor also had inspected the vessel at Digby, N.S., for insurance purposes. According to the inspection report issued on 17 February 1998, the hull was above average and the maintenance was average. The report does not mention any shortcomings in the vessel’s seaworthiness.

Because the fishing vessel owner had not requested financial assistance from the *ministère de l’Agriculture, des Pêches et de l’Alimentation du Québec* (MAPAQ) after his vessel was put in service in the Laurentian region, the MAPAQ had not inspected the vessel.

1.6.2 *Personnel Certification*

To date, any vessel under 70 gross tons is not required by the *Canada Shipping Act* (CSA) to carry certified personnel on board. However, the master of the “BRIER MIST” held a Class IV fishing vessel master’s certificate issued by Transport Canada (TC) in 1986. None of the four other crew members was certificated. Under the regulations, the seamen were not required to hold certificates or take training.

1.7 *Personnel History*

1.7.1 *Master*

The master of the “BRIER MIST” began fishing in 1980. He learned his trade from an experienced fisherman in the region. In 1986, he attended the *Centre spécialisé des pêches* in Grande-Rivière, Que., where he took courses in marine chart work and navigation, first aid, shiphandling and seamanship, marine emergency duties (MED) and radio communications. He passed the TC examinations and obtained his certificate as fishing vessel master Class IV in 1986.

From 1987 to 1990, he owned the 12 m fishing vessel “LE CAYEN” (official number 346262) and then a 13 m wooden trawler, the “DAWN H.”, fitted to fish groundfish and scallops. Because the “DAWN H.” was extensively damaged in the fall of 1997, the master purchased the “BRIER MIST” in February 1998 from a

⁴ In 1981, 1985, 1989, 1993 and 1997

fishing company in Westport on Brier Island, N.S. This was the vessel's first fishing season in area 16A in the estuary of the St. Lawrence River.

1.7.2 Crew Members

None of the other four crew members on board the "BRIER MIST" had taken MED training, and none had attended the *Centre spécialisé des pêches*, which gives training to fishermen. The experience of the seamen on board the vessel was limited to working as fisherman's helpers for a few seasons on fishing vessels in the region. In the case of the youngest, it was his first trip to sea.

1.8 Weather Conditions and Current Information

1.8.1 Weather Forecasts

The CCG radio station was broadcasting weather bulletins continually. The weather bulletins for the area from Tadoussac to Pointe-des-Monts, Que., issued by Environment Canada at 1530 on Friday, 27 November 1998, indicated the following conditions: Gale warning in effect (. . .) Winds north-west 25 to 35 knots this evening. Visibility fair to poor under snow flurries. Low -4°C, high 2°C.

1.8.2 Weather Reported by the Master of the Vessel

At 1349, when the MTR contacted the master of the "BRIER MIST", he asked about the wind speed in the area of the vessel and whether the winds were still from the east. The master replied: east wind, possibly about 20 to 25 knots. However, when the "CANADIAN MINER" reached the presumed position of the sinking at about 1430, she reported that the wind was from 345 degrees at 20 knots. According to the MCTS log, the wind had turned from east to north at 0745 that morning.

1.8.3 Weather Recorded by the Nearest Station

According to the Environment Canada weather office, the most representative wind observations (speed and direction) for the Les Escoumins-Rimouski area are those from Île Rouge, opposite Les Escoumins. The observations indicate that, when the "BRIER MIST" took shelter at the Les Escoumins pilot station, the wind was north-east at 39 km/h. When she departed on the morning of November 27, the wind had shifted to the north-north-west at 35 km/h, then to the north-west at 39 km/h at 1500. At 1200 on November 27, on Île Bicquette,

five miles west of the presumed position of the sinking, the wind changed to the north at 43 km/h, then to the north-north-west at 35 km/h at 1400, and finally to the north-west at 22 km/h at 1600. The Les Escoumins pilot boat also recorded strong north-west winds.

1.9 Navigation Equipment

1.9.1 Navigation Instruments

The “BRIER MIST” was equipped with an Internav LC-300 Loran C, interfaced with a Raytheon Rayplot 700L video plotter. She was also equipped with a Micrologic Mariner global positioning system (GPS), a Furuno FR-240 MKII/JMA 301 radar and a Wagner MK IV automatic pilot.

1.9.2 Aids to Navigation

There was no report of any malfunction in land-based aids to navigation that could have played a role in the occurrence.

1.10 Radio Communications

The “BRIER MIST” was equipped with two very high frequency (VHF) radiotelephones: a King 7000 and a President MC722. Radio communications reception was loud and clear on departing Les Escoumins.

1.10.1 Marine Communications and Traffic Services (MCTS)

Vessel movements in the St. Lawrence River are governed by the *Vessel Traffic Services Zones Regulations* applicable to the St. Lawrence Seaway between 066°00' W and the upstream limit of the Montreal Harbour. Participation in the traffic system is not compulsory for fishing vessels under 24 m and up to a gross tonnage of 150.

At 0938 on November 27, the “BRIER MIST” informed the MCTS of her destination and estimated time of arrival in Rimouski. The MCTS centre asked the master to contact the centre as soon as the vessel had reached her destination. The MCTS centre called the vessel a few times to inquire about the situation on board and to revise the estimated time of arrival.

The 1302 and 1349 communications on VHF radiotelephone channel 9 recorded by the MCTS centre show that reception was good. However, the 1355 communication was poor and broken. During that conversation, the master of the “BRIER MIST” mentioned that he was having difficulties. At no time did the master request assistance. He began giving a number for the cellular telephone on board, but the conversation was cut off before he could finish. No distress call or further communication was received from the “BRIER MIST” after 1357.

1.11 Mechanical Systems and Bilge Pumping

1.11.1 General Mechanical Information

The vessel inspection reports by TC and the insurer indicate that the engine of the “BRIER MIST” was in good condition. The mechanical difficulties that delayed the start of operations with the vessel in the spring mostly had to do with the hydraulics of the winches on the after deck.

1.11.2 Detection and Pumping Systems

The vessel was not equipped with a water level detector in the fish hold, and it was not required to have one.

According to the TCMS report, the 38 mm-diameter bilge suctions were located in the forepeak, the engine-room and the fish hold. Pumping was normally initiated from the wheel-house. In an emergency, the auxiliary pump could be started manually. System capacity was 0.3 m³ per minute.

According to the report of the marine surveyor hired by the insurer, the bilge pumping system consisted of a pump driven by the main engine and another powered by 32-volt batteries. The afterpeak was not connected to the pumping system, but it had a drainage hole. The insurer’s report states that these pumps were not started up during the inspection.

1.12 Emergency Equipment

1.12.1 Life-saving Equipment

According to the report of the last inspection, the vessel carried a Class A emergency pack containing 6 type A distress flares and 12 type C hand-held flares. The vessel was equipped with two lifebuoys, one with a light manufactured by McMurdo Marine in 1986 and identified as model L41B with an expiry date of July 2001.

A Dunlop-brand six-person inflatable liferaft had last been inspected by TC on 28 July 1997, and was considered in good condition at the time. The raft was located on top of the wheel-house, exposed to the wind and seas, and was held in a cradle by a gripe attached to a senhouse slip hook; this arrangement would require manual release. Existing regulations did not require the liferaft to be equipped with a hydrostatic release unit or any other automatic release device. The raft was not found.

Under the *EPIRB Regulations*, the “BRIER MIST”, being less than 20 m long, was not required to carry an emergency position indicating radio beacon (EPIRB).

1.12.2 Immersion Suits - Regulatory Requirements

The “BRIER MIST” did not carry any immersion suits, and the *Small Fishing Vessel Inspection Regulations* did not require that immersion suits be carried on board. However, in accordance with the regulations, there were at least four lifejackets on board, and even though it was not mandatory, the master had also purchased

two nose-to-toes personal flotation devices (PFD)⁵ [floater suits/worksuits], in addition to the two floater jackets he already owned. These items were usually stored in the wheel-house and the engine-room. One of the two seamen recovered was wearing his own floater suit/worksuit.

1.13 *Hatch and Lazaret Covers*

The fish hold of the “BRIER MIST” had four circular scuttles approximately 35 cm in diameter and a hold hatch one metre square with a coaming about 40 cm high. To close the fish hold, the main hatch was covered by two fibreglassed wood covers. These covers were simply placed on the coaming flange. There was no watertight seal for the main hatch. Because there was a gap of about 2 cm between the two covers, water could enter the hatch. One of the two covers became dislodged and was found on the shore 100 km downstream of the position of the sinking. Because there was no system for permanently securing or lashing these covers in place, routine practice on board the “BRIER MIST” was not to secure or cover these panels. Since the vessel was built in 1981, no owner had considered it necessary to install a permanent lashing device for these main hatch covers. TC had not required the two covers to be watertight.

The only watertight covers were the four scuttles on the deck. These openings were equipped with watertight seals and covers with locking devices. However, according to the information available, when the crew washed the deck, water entered through the seal in at least one of these scuttles.

The lazaret manhole cover was normally kept closed and secured. It was reported that it was difficult to open.

After the sinking of the scallop dragger “CAPE ASPY” in January 1993 (TSB report No. M93M4004), the Board found deficiencies similar to those found during the investigation into the sinking of the “NADINE” (TSB report No. M90L3034). The TSB recommended that the Department of Transport develop and implement measures to ensure that owners, operators and masters of vessels under its jurisdiction have effective training and procedures for securing all exterior and interior openings sufficient to preserve the watertight integrity of the hull for the environmental conditions being encountered (recommendation M93-01, issued March 1993).

TC replied that the importance of watertight integrity and its effects on the vessels’ stability would be brought to the attention of the industry by the examiners of masters, mates and engineers by intensifying the examination in these areas. Furthermore, TC issued a Ship Safety Bulletin (SSB) urging mariners and operators to keep watertight openings securely closed at all times, except when it is absolutely necessary to open them to gain access to spaces (SSB No. 16/92). TC also re-circulated SSB Nos. 1/83 and 4/87 on the same subject.

Furthermore, the CCG document entitled *Small Fishing Vessel Safety Manual* (TP 10038) stipulates that crews must keep all watertight closures closed, especially before oncoming heavy weather. SSB No. 06/98, issued 08 April 1998, reminded vessel masters and owners of the importance of carefully closing exterior openings, such as doors, hatches and scuttles, on a vessel.

⁵ Mustang Integrity model MS-195

Also, the IMO *Code of Safety for Fishermen and Fishing Vessels* states, under the heading “Safety of the Vessel,” that “the fittings for closing and securing hatches should be kept in good condition,” that “all hatches and flush deck scuttles should be closed and properly secured when not in use during fishing,” and that, “in bad weather, inspections should be made to ensure that hatch covers and lashings are in order.”

1.14 Modifications to the Vessel

A few months after purchasing the “BRIER MIST”, the owner made a number of modifications to facilitate fishing from the stern. In April 1998, a plate consisting of a protective metal bar was bolted to starboard, in way of the propeller, to prevent the scallop drag from becoming caught while being hoisted laterally. During the summer of 1998, the owner installed a crane and a net drum he had recovered from his former fishing vessel. In September 1998, 42 ingots of 102 pounds each were added in the bottom forward section of the vessel to compensate for the weight of the net drum and crane on the after deck. Some modifications were completed in Matane, Que., to add weight to the scallop drag. A box of stones that had been stowed in the hold to act as a counterweight for the lateral trawl was removed. Together, these modifications did not change the draught and trim significantly.

The CSA requires small fishing vessels to be inspected every four years at which time modifications and/or additional equipment can be inspected by TCMS. The onus to inform TCMS rests with the owner. The Gaspé regional office of TCMS did not have a record of these modifications; therefore, no inspector was called upon to certify the vessel from a safety point of view after the modifications or to assess the impact of these changes on the operation of the vessel. There is no notification system between the regional offices of TCMS when ownership of a vessel is transferred from one region of the country to another.

Many fishermen and fishing vessel operators apparently do not know that modifications and added equipment can affect a vessel’s stability and jeopardize crew safety. In 1994, following its investigation into the sinking of the fishing vessel “LE BOUT DE LIGNE” in the Gulf of St. Lawrence on 13 December 1990 (TSB report No. M90L3033), the Board recommended that the Department of Transport emphasize, through a safety awareness program for owners, operators and officers of fishing vessels, the adverse effects of structural modifications and additional items on vessel stability (recommendation M94-31, issued December 1994). In recommendation M94-32 (issued December 1994), the Board recommended that means be explored to ensure that structural modifications and the addition of weight items are recorded and accounted for in re-assessing the stability of small fishing vessels.

2.0 *Analysis*

2.1 *Method of Navigation*

The master of the “BRIER MIST” had on board the navigation instruments and communication equipment he needed to navigate safely. The precision of the position and speed information given by the master at 1347 suggests that the position was a GPS or Loran C reading. The distance of 10.76 M from Rimouski also suggests a reading from a very precise navigation instrument such as GPS or radar. The sinking cannot be attributed to a lack of navigation equipment.

2.2 *Decision to Cross*

On the morning of 27 November 1998, after stopping overnight at the pilot station wharf, the master continued his voyage, believing that the crossing would be made without too much of a problem. At the onset, there was nothing to suggest that the vessel would not complete the voyage. Because the wind was north-westerly, the waves were not as high near the shore as offshore. The master had confidence in his vessel, which was reputed to have a very strong hull. Also, one crew member had a toothache, and he had an appointment with a dentist in Rimouski at 1500.

2.3 *Reconstruction of the Vessel's Route*

Staff at the MCTS centre observed the vessel leaving the north shore heading for Île du Bic, but they lost sight of her in snow flurries a few miles offshore. At 0938, the master reported that he expected to arrive in Rimouski at about 1430. At about 1230, during a telephone call to his home, he said that the voyage was going well. However, at about 1330, during a call to his agent in Rimouski, he stated that waves were washing over the vessel and that speed was reduced. He then indicated that he expected to arrive at about 1500, but he did not mention if he intended to change routes. Finally, according to the position given at 1347, the vessel was 10.76 M from Rimouski, at 48°28.29' N and 068°46.81' W (see the route followed in Appendix A).

2.4 *Wind Direction and Wave Height*

The MCTS centre log indicates that, at 0745 on November 27, the winds were from the north at 15 to 20 knots. Although the winds had been easterly the day before, the weather data taken at Île Rouge and on board vessels in the area clearly indicate that the wind had shifted to the west-north-west during the morning. The MCTS centre MTR on duty seems to have forgotten that the wind had changed direction when he asked the master whether the wind was still easterly in his area. However, this confusion had no repercussions for the operator of the first vessel on scene to search the area.

When the vessel left the Les Escoumins pilot station, the waves were not as high as they had been the day before, because the wind had turned to the north-west. As the vessel proceeded to cross the river, the effect of the wind on the waves increased. When the vessel reached the shallower section of the Laurentian Channel, with a depth of 20 to 30 m, the wave amplitude may have been increased by the rise in the sea bottom. Also,

the ebb tide amplified the turbulence of the waves and the swell. While the vessel was navigating in a rough sea, the sea washed over the after deck, and downflooded into the hold.

2.5 *Fish Hold and Lazaret Covers*

The two fibreglassed wood covers used to close the main fish hold hatch were simply placed on the hatch coaming flange. Because there was no permanent securing system to prevent the hatch covers from moving, routine practice on the “BRIER MIST” was not to secure them. One of the two covers was found on the south shore 100 km downstream from the position of the sinking. It is possible that the movement of water in the hold or a breaking wave raised these covers and caused the hold to be flooded. However, the covers could also have floated free as the vessel sank.

Also, the four after deck scuttles were probably not all watertight: available information indicates that, when the crew washed the deck, water passed through at least one of these scuttles into the fish hold. Thus, there was no truly watertight device for the hold openings, and despite repeated inspections, no one took action to make these access hatches comply with the existing regulations.

The communications with MCTS did not mention the lazaret manhole being open. The master mentioned that there was water in the lazaret and in the fish hold. Those interviewed reported that there were two one-inch drainage holes between the lazaret and the fish hold. This could explain the movement of water between the two compartments.

2.6 *Hold Flooding Detection*

The first vessel to reach the scene of the sinking estimated that the wind was north-west at up to 25 knots, and that the waves were 2 to 3 m high. Such conditions were conducive to flooding of the after deck, because on the “BRIER MIST”, it was not uncommon to find a foot of water on the deck in 20- to 25-knot winds. Also, in foul weather, the vessel was likely to take some time to drain the water retained on the after deck.

The fact that there was water in the afterpeak and the fish hold suggests that some of the deck scuttles were not completely watertight, and the water on the deck may have leaked in over a period of five hours or more. Initially, the water could have entered through the gap between the two main hold hatch covers and the non-watertight seal of at least one of the four scuttles on the deck. Since the vessel was not equipped with a water level detector in the fish hold, it would have been some time before the crew realized that water was entering the compartment. As the master did not mention any water ingress during the 1230 and 1330 telephone conversations, the flooding was probably gradual before 1330. At 1340, he said that the sea was washing over the vessel and that there was a foot of water on the deck. Under those conditions, the hatch covers could have become dislodged. Because the two covers were not secured nor watertight, they were likely to open. While the hold was filling with water, the vessel would have settled further by the stern. Breaking seas must have washed over the after deck and over the main fish hold opening.

Small fishing vessels like the “BRIER MIST” are not required to have a water level detector in the fish hold. Therefore, there was no alarm to warn the crew in the wheel-house of the flooding. When the master realized that the vessel was taking on water, he started up the bilge pumping system, but to no avail.

2.7 Regulations and Inspection Program

Since she was built in 1981, the “BRIER MIST” had been inspected five times by TCMS inspectors. Despite this, the hatch covers had not been modified to comply with the safety standards. The former and new owners had not considered it necessary to modify the hold closure system.

After purchasing the vessel in February 1998, the master-owner carried out a number of repairs, and he did not hesitate to acquire equipment he deemed useful or necessary for the safety of the vessel. However, he had not replaced the main hatch covers, and apparently no one on board thought that this could be a serious hazard.

Many small fishing vessels in the Atlantic region are equipped with hold hatch covers similar to those on the “BRIER MIST”. Canadian regulations governing hold closure systems are found in the *Small Fishing Vessel Inspection Regulations*. Subsection 23(2) dealing with fish hold hatches states that they must “be provided with efficient means for battening them down and making them watertight.” This was not the case on the “BRIER MIST”, and over the 17 years the vessel was in service, no one saw the need to modify the closure system to make the hold watertight.

2.8 Distress Signals

At no time did the master state that he was in distress, nor did he clearly ask for assistance. No distress message was officially transmitted but the precarious situation of the “BRIER MIST” indicated that she would be facing serious problems. After assessing the situation, the MTR alerted the Québec MRSC.

Like most small fishing vessels, the “BRIER MIST” was not required to carry an EPIRB. Canadian regulations do not require small fishing vessels like the “BRIER MIST” to carry EPIRBs.

2.9 Abandonment of the Vessel

Although the master knew that the vessel was taking on water for some time and was having pumping problems, he hoped to be able to reach the shore without having to abandon the vessel in bad weather and did not declare an emergency. Given that one seaman was found with a lifebuoy and the other partly dressed in a PFD, and that the liferaft and several other life-saving appliances were not found, the three remaining crew members were likely unable to clear the sinking vessel wearing the proper life-saving equipment.

During the abandonment, one seaman took the lifebuoy which was equipped with a light and a rope about one metre long. He attached this light to his arm to be more visible. The TSB Engineering Laboratory analysis found that the filament of the 2.5-volt, 0.7-ampere bulb was intact and that the light was in good operating condition. Its magnesium/silver chloride battery is activated by contact with water, and it provides about two

hours of light. There is every reason to believe that the light was operating when the ship was abandoned, as it was immersed in salt water.

Because the fish hold was downflooded first, the vessel probably settled by the stern, and the trim increased as water flooded the vessel. Once the reserve buoyancy was lost, the vessel probably sank by the stern or capsized after losing stability.

2.10 Personal Flotation Devices (PFDs)

The three missing seamen may have gone down with the vessel or been drowned on abandoning her without lifejackets or nose-to-toes PFDs. One of the seamen who was recovered was wearing a floater suit pulled only to the waist. The other victim did not have a floater suit. Without a nose-to-toes PFD, no one could survive for more than a few minutes in the cold waters of the St. Lawrence River.

The regulations governing fishing vessels over 150 gross tons require the carriage of a sufficient number of immersion suits for the ship's entire complement. However, these regulations do not apply to small fishing vessels under 150 gross tons. The "BRIER MIST" was not required to provide immersion suits for the crew members on board.

2.11 Training

Except for the master, none of the four other seamen held a certificate or had taken any training courses for fishermen or MED training. In situations involving similar weather conditions with the potential to have to abandon a vessel, being trained in the application of emergency procedures would enhance the probability of survival of the crew.

2.12 Crew

According to the coroner's report, the results of the analyses to detect the presence of alcohol or drugs in the blood of the two recovered victims were negative. The vessel stopped at the pilot station wharf overnight on November 27, giving the crew the opportunity to shower and rest for about six hours before returning to sea.

3.0 Conclusions

3.1 Findings as to Causes and Contributing Factors

1. As the vessel crossed the river, the effect of the north-west wind over the more open water increased the height of the waves from that experienced near the north shore.
2. The “BRIER MIST” was sailing in a 25-knot north-west wind and seas broke on the deck at such a rate that the vessel was unable to clear the water. As the “BRIER MIST” settled, she became more vulnerable to shipping seas.
3. Water was able to enter through a gap between the two panels covering the main hatch.
4. There were no watertight seals on the covers and no means to effectively secure the hatch covers to the coaming. During the events culminating in the sinking of the vessel, the hatch covers lifted off the coaming leaving the hold open.
5. The bilge pumping system was not capable of controlling the flooding.
6. After being downflooded, the vessel eventually lost all reserve buoyancy and sank.

3.2 Findings as to Risk

1. The vessel was taken to the south shore because the price for scallops there was higher than on the north shore, which increased the vessel’s exposure to bad weather.
2. The practice on the “BRIER MIST” was not to secure the panels or cover them with a tarpaulin.
3. The vessel was not equipped with a water level detector to give early warning of flooding.
4. Despite the risk of downflooding, no modifications to the hatch covers had been made by the owners over the years.
5. Over the 17 years the vessel was in service and in five regular inspections, neither the owners nor the regulator required the hold to be equipped with a watertight, effectively secured cover.
6. During the events leading up to the sinking of the vessel, the master reported the deteriorating conditions but did not state that the vessel was in distress or required assistance.
7. The vessel did not carry an emergency position indicating radio beacon which, if operated, would alert the search and rescue system and provide ongoing information with respect to the vessel’s position.

8. The liferaft, which was not recovered and presumably sank with the vessel, could not deploy automatically as it was not fitted with a hydrostatic release and, as a result, did not provide life-saving support to persons in the water.
9. The seamen had not been trained in marine emergency duties. Such training would have increased their knowledge of emergency procedures and the probability of successfully abandoning this vessel.
10. The master-owner of the "BRIER MIST" had made major modifications and had not determined the effect of those modifications on the vessel's stability.

4.0 Safety Action

4.1 Action Taken

4.1.1 Coroner's Recommendations

The coroner in charge of the inquest into the deaths of the five seamen of the "BRIER MIST" released his report on 21 January 2000. On the basis of the information gathered during his inquest, the coroner made a finding of violent accidental death. His report contains eight recommendations. The coroner recommended to Transport Canada (TC):

1. That all commercial fishermen receive training in marine emergency duties (MED), and that this training be reviewed periodically with fishermen.
2. That fishing vessels like the "BRIER MIST" be required to be fitted with a water level detector in the fish holds.
3. That fishing vessels like the "BRIER MIST" carry an inflatable liferaft fitted with an automatic release mechanism.
4. That vessels like the "BRIER MIST" have watertight and airtight hatch covers on deck, and that the existing regulations be enforced by TC inspectors.
5. That fishing vessels like the "BRIER MIST" be required to be equipped with a Class I emergency position indicating radio beacon (EPIRB).
6. That fishing vessels like the "BRIER MIST" be equipped with survival and floater suits for each crew member, and that emergency drills be conducted periodically with crews.
7. That shipyards or other companies that perform work on fishing vessels like the "BRIER MIST" (work that increases the vessel's weight) inform Transport Canada Marine Safety (TCMS) of the name of the vessel on which the work has been performed.

The coroner further recommended:

8. That Fisheries and Oceans Canada inform TCMS regional offices of the presence of fishing vessels in their regions engaged in a fishing activity during hazardous navigation periods (which may vary from one fishing region to another in Canada) to facilitate the inspection of vessels during such periods.

4.1.2 Transport Canada Response

TC provided the following explanations in response to the coroner's recommendations:

1. **Marine Emergency Duties (MED) Training**

Section 21 of the *Crewing Regulations* currently states that "Every member of the complement of a ship shall, before the member has completed six months on board ships, obtain a certificate of the member's successful completion of training, at a recognized institution, in marine emergency duties with respect to basic safety" (A-1). This section applies to all registered vessels other than pleasure craft. Hence, section 21 applies to all fishing vessels.

However, it is important to note that an amendment has been submitted to delay the application of that section until 30 July 2002 for members of the complement of a fishing vessel who are not required to hold a certificate because the vessel does not make voyages beyond the limits of a fishing voyage Class II. A fishing voyage Class II is a voyage bounded in North America between longitude 030°00' W and 180°00' W and north of latitude 06°00' N. This amendment and the delay occasioned by it are due to the fact that MED courses are not as readily available as they need to be.

The submitted amendment is presently part of a group of amendments that have been processed through the required channels of regulatory change. It is expected that all the submitted amendments will become law by the end of 2000.

The training requirements needed to be met under basic safety are defined as MED course A-1. This course is offered at all main marine training institutions. In order to meet the needs of those marine communities which do not have easy access to a marine training institution, some of the institutions are also equipped with a vehicle, provided by TCMS, that is fitted with all the required training equipment.

All fishermen who have already taken an MED course will not be required to repeat any part of the MED training. This applies mainly to fishermen who hold a fishing vessel master's certificate.

2. **Fish Hold High Water Level Detector**

While TC agrees with the concept of fish hold high water level detectors on small fishing vessels, the feasibility of fitting such detectors and the subsequent proper operation of the detectors in the fish hold, considering the harsh ambient conditions

in such a space, is a concern. The subject of high water level detectors along with the associated audible and visible alarms is currently an item of discussion with the Small Fishing Vessel Steering Committee.

3. **Liferaft Automatic Release Mechanism**

The subject of requiring liferafts on small fishing vessels and many other types of small vessels to be equipped with an automatic release mechanism (hydrostatic release unit) has been debated for some time. One of the major problems in fitting a hydrostatic release mechanism on the liferafts of any small vessel is that, in normal operating conditions, the decks of such vessels and the areas where liferafts are stowed may be subjected to seas washing over them. In many cases, the volume of water that washes over the area can be sufficient to activate the liferaft's hydrostatic release, thereby resulting in the loss of the liferaft.

TCMS will continue to discuss the issue with the marine industry to find solutions to the problems.

4. **Watertight and Airtight Hatch Covers**

The current regulations for small fishing vessels already require that hatch covers be watertight. Subsection 23(2) of the *Small Fishing Vessel Inspection Regulations* (Chapter 1486) states that "Hatchways on a fishing vessel shall be provided with efficient means for battening them down and making them watertight."

TCMS is aware of the problems concerning the watertight integrity of hatch covers on small fishing vessels. As a result of the "BRIER MIST" occurrence, targeted inspections are now carried out on certified vessels to ensure, among other things, that all openings on fishing vessel decks are adequately protected.

5. **Emergency Position Indicating Radio Beacon (EPIRB)**

The "BRIER MIST" was certified for voyages of Home Trade Class III.⁶ In 1999, TC has proposed, in modifications to the *Ship Station Radio Regulations*, that by 01 April 2001, all vessels of 8 m or more in length and of closed construction, on all Home Trade voyages (with the exception of Home Trade IV voyages in a Vessel Traffic Services (VTS) zone) be required to carry a very high frequency (VHF) radio with digital selective calling (DSC). Vessels fitted with radio navigation receivers will be required to interface the navigation receiver to the DSC transceiver so that an up-to-date position of the vessel will be transmitted if the distress alert button is activated. Vessels similar in size and voyage class to the "BRIER MIST" would be required to comply with these proposed requirements.

⁶ A home trade voyage, Class III, allows the vessel to go to New York along the coast no more than 20 miles offshore.

6. Survival and Floater Suits (Immersion Suits)

There has been much discussion of requiring immersion suits on small fishing vessels. This issue is also currently under discussion within the Small Fishing Vessel Steering Committee.

The issue of requiring immersion suits on small fishing vessels has always presented two main obstacles:

- a) Unlike a large fishing vessel, where such suits are required to be carried, a capsizing or a sinking of a small fishing vessel, in most cases, happens very quickly, as in the case of the "BRIER MIST". Therefore, crew members, in many cases, do not have the advance warning time to don an immersion suit. Also, as immersion suits by their design make it nearly impossible for crew members to perform shipboard functions, a small fishing vessel crew member wearing an immersion suit may be restricted, due to the suit and the limited space on such a vessel, from performing functions which may be necessary to prevent the vessel from foundering.
- b) Due to the limited space on a small vessel, there is, in many cases, simply not enough room to store immersion suits. Also, because of the tight working conditions and the rough character of the work performed on such vessels, the incidence of damaging the immersion suits would be very high.

7. Vessel Alterations

Part V, subsection 377(2), of the *Canada Shipping Act (CSA)* states that, "Where . . . any part of the hull, equipment or machinery has been altered . . . so as to affect its compliance with the regulations . . . the owner or master shall forthwith report the matter to the Chairman [of the Board of Steamship Inspection], . . . and the ship shall not go from any place in Canada until it has been re-inspected and a certificate issued in accordance with the conditions found to exist." Further to the requirements contained in the CSA, TCMS has previously issued numerous Ship Safety Bulletins (SSBs) addressing this subject, in particular the effect that some modifications have on the stability of the vessel. SSBs are a communication tool issued to a wide audience of the marine industry (vessel operators, owners, builders, designers, etc.) to alert them to potential hazardous situations or practices.

Furthermore, it could prove difficult from a legislative point of view to require dockyards, shipyards and other companies that perform work on vessels to report that work to a TCMS office because TC's enforcement responsibilities and mandate are directly connected to ships and their crews, but do not extend to the marine infrastructure such as shipyards and ship repair facilities. TC will however continue to recommend to those types of facilities to inform the nearest TCMS office when modifications to a vessel are carried out.

4.1.3 *Inspection of Fishing Vessels*

In February 1999, a Marine Safety Advisory (MSA No. 03/99) was sent to TC pointing out the deficiencies found in the investigation. The advisory states that, when conducting inspections, TC inspectors often find fishing vessels having main hatch covers with deficiencies similar to those found on the “BRIER MIST”. Some inspectors have indicated that they sometimes have difficulty enforcing the regulations because the problem is so widespread and because of the expenditures the owners must incur to correct these deficiencies. These difficulties have resulted in some discrepancies in the application and enforcement of the *Small Fishing Vessel Inspection Regulations* respecting hold covers. Given the associated risks, it was suggested that the matter be discussed with TC regional offices with a view to ensuring more consistent enforcement of the regulations across the country. Finally, the MSA states that it would be advisable to inform fishermen and builders of small fishing vessels of the increased risk associated with non-watertight hold hatch covers.

TC replied that the weathertight integrity of fishing vessel hold openings remains a constant concern for its inspectors, and that it has published several SSBs on the subject (Nos. 16/92, 4/87 and 1/83). TC notes that, after the quadrennial inspections of these vessels carried out by TCMS, it has no control over hold cover maintenance by the vessel owners. TC believes that new vessels are generally equipped with weathertight hold covers with proper closures, as required by the regulations. According to TC, most vessels inspected, with few exceptions, are equipped with proper closures. TC nevertheless notes that several small fishing vessels not subject to inspections may not be adequately protected. TC plans to target vessels deemed to be at risk under a special inspection program.

4.2 *Action Required*

The sinking of the “BRIER MIST” demonstrates the risks to which small fishing vessel crews may be exposed. The main deficiencies brought to light in this occurrence are the watertightness of hatches, the detection of flooding in the fish hold and emergency training for fishermen. Furthermore, the lack of life-saving equipment, such as anti-exposure floater suits, EPIRBs and liferaft automatic release mechanisms, is likely to increase the risks of fatalities when mariners are forced to abandon fishing vessels.

4.2.1 *Hatch Covers*

From 1975 to 1999, some 236 fishing vessels have been involved in fatal shipping accidents. Of those, 125 capsized or foundered, causing 260 fatalities. In 196 investigated Canadian fishing vessel accidents, about half involved downflooding due to inefficient, defective or ineffectively secured hatch covers and/or scuttle covers.

Canadian Fishing Vessel Capsizing and Foundering Accidents
Resulting in Loss of Lives—1975-1999⁷

⁷ Percentages have been rounded off.

By Gross Tonnage	Capsizing and Foundering Fatal Accidents				Canadian Fishing Fleet	
	Fishing Vessels	Percentage of Accidents	Fatalities	Percentage of Fatalities	Est. Number of Fishing Vessels ⁸	Estimated Percentage of the Fleet
Less than 15	90	72%	159	61%	21,669	83%
15 to 150	33	26%	88	34%	4,471	17%
150 and over	2	2%	13	5%	368	1%
Total	125	100%	260	100%	26,508	100%

For example, on 10 April 1995, the vessel "HILI-KUM" (TSB report No. M95W0013) was being operated in following high winds and rough seas with the fish hold hatch cover not battened down. Because the custom-designed fish hold hatch covers were not used and the temporary plywood hatch cover was not watertight, seawater washing over the after deck poured into the hold.

⁸ Estimates are based on TCMS inspection statistics and Department of Fisheries and Oceans licensing statistics.

There is an unnecessary risk to fishing vessel crews unless they are provided with an effective means of battening down hatches and making them watertight. Further, the risk is compounded where the means of making the hatches watertight is not employed. The *Small Fishing Vessel Inspection Regulations* have stated the requirements to the industry, but the problem was evident on the “BRIER MIST” and these following other examples:

Date	Occ. Number	Type of Accident	Vessel Name	GRT	Fatalities	Injuries	Total Loss
11/02/95	M95W0005	Foundering	“PACIFIC BANDIT”	49	1	0	Y
10/04/95	M95W0013	Foundering	“HILI-KUM”	44	2	1	Y
27/11/95	M95M0128	Foundering	“LADY CANDACE”	27	0	0	Y
01/07/96	M96N0063	Capsizing	“NANCY PAULA”	25	0	0	Y
22/01/97	M97M0005	Flooding	“SCOTIA GOLD”	51	0	0	N
02/12/97	M97W0236	Capsizing	“PACIFIC CHARMER”	142	2	0	N
25/08/98	M98W0189	Capsizing	“ELDORADO”	42	2	0	N
14/10/99	M99M0142	Foundering	“JOSEPH & SISTERS”	24	1	0	Y

During the summer of 1996, the TC (Laurentian Region) inspection service conducted checks of the Îles-de-la-Madeleine fishing fleet and found several tonnage and certification deficiencies. The deficiencies observed related to watertight bulkheads, flush-deck scuttles, bilge pumps, freeing ports and emergency exits.

The watertightness of the closures on the decks of small fishing vessels like the “BRIER MIST” is seriously compromised when the hatch covers are not held in place efficiently by a locking system. The “BRIER MIST” occurrence shows how the absence of a securing system and lack of maintenance of watertight seals can have serious consequences.

TC’s efforts have not been entirely effective in achieving industry compliance with the safety requirement of ensuring that the fish holds can be made watertight.

In its response to the coroner’s Recommendation No. 4, TC has indicated that it is aware of the problems with the watertight integrity of some small fishing vessel hatch covers and that action will be taken to ensure that openings on fishing vessel decks are adequately protected. However, given the deficiencies noted over the past 10 years in the design, manufacturing,

installation, maintenance and inspection of small fishing vessel hold closure systems, the Board is still very concerned about the loss of lives in this sector of the marine industry. Accordingly, the Board recommends that:

The fishing industry and the Department of Transport give increased attention to small fishing vessel hatch covers to help ensure that these covers are watertight and can be effectively secured.

M00-06

4.2.2 *Liferaft Release Mechanisms*

The crew's chances of survival in an emergency depend on the capacity, reliability and availability of life-saving equipment. There are regulatory requirements which state that a fishing vessel like the "BRIER MIST" must be equipped with a liferaft which is to be stowed so as to permit manual release from its securing arrangements. However, if owners of small fishing vessels exceeding 12 m in length wish to carry two inflatable liferafts, then they must equip one of the rafts with a hydrostatic release.⁹

Further, the *Small Fishing Vessel Safety Manual*, TP 10038,¹⁰ recommends having the liferaft inspected and repacked and the hydrostatic release tested according to the requirements of the Canadian Coast Guard (CCG) and the manufacturer. This manual therefore contains valuable recommendations that are not prescribed in the regulations.

More deficient liferafts have also been identified in the last five years suggesting that there is a significant number of inadequate life-saving survival craft aboard small fishing vessels.¹¹

In his inquest report, the coroner recommended that fishing vessels like the "BRIER MIST" carry an inflatable liferaft fitted with an automatic release mechanism. TC has indicated that it is going to continue to review this issue with the marine industry to find solutions to the problems.

The Board has already expressed its concern that the absence of automatic release mechanisms on liferafts on small fishing vessels needlessly compromises the chances of survival of crews in an emergency at sea when the liferaft goes down with the vessel. As the chances of survival of fishermen on abandoning the vessel depend on launching the liferafts, and considering the extremely difficult conditions in which abandonments are often carried out on small fishing vessels, the Board is of the opinion that liferafts should be easy to release when the vessel sinks in order to allow the crew members to access the liferafts on abandoning ship. Accordingly, the Board recommends that:

⁹ Board of Steamship Inspection Decision No. 4391

¹⁰ TP 10038, p. 65, item 5

¹¹ Other recent TSB reports discussing the inadequacy of liferafts include: M95W0005, M95W0013, M95M0128, M97W0236, M98F0009, M98W0189.

The Department of Transport alert builders and owners of fishing vessels to the need for the liferafts on all vessels to be stowed with a launching system fitted with a release mechanism that allows the inflatable liferaft to be easily released when the vessel sinks.

M00-07

and that:

The Department of Transport examine the effectiveness of liferaft automatic release mechanisms to prevent premature activation of these mechanisms on small fishing vessels in rough sea conditions.

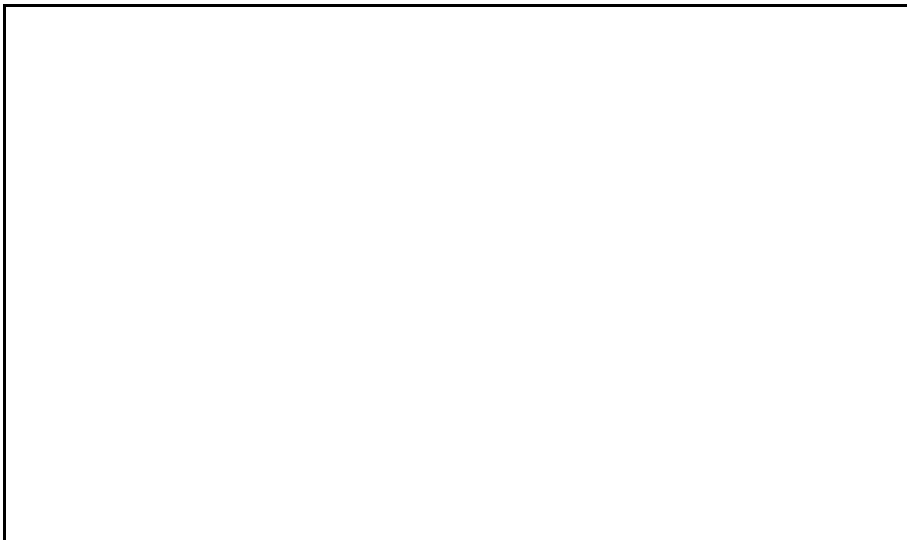
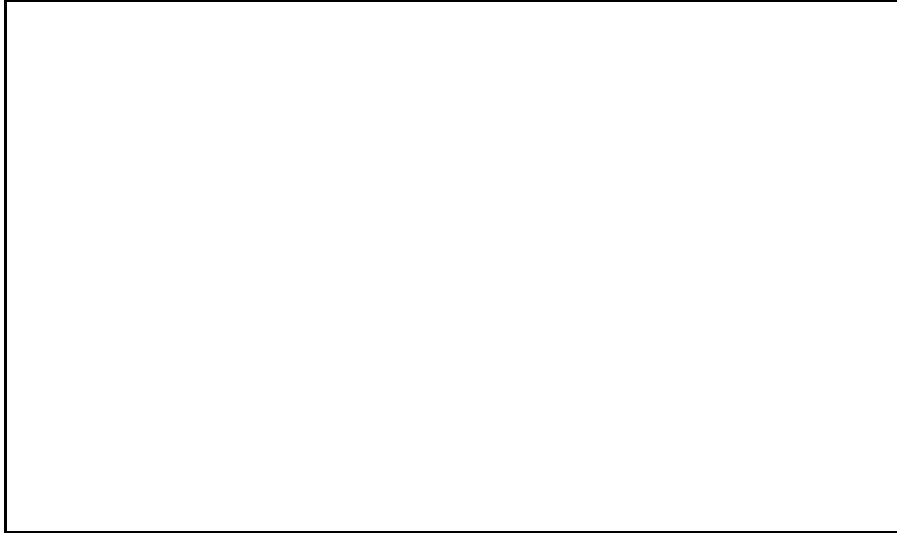
M00-08

4.2.3 *Emergency Position Indicating Radio Beacons (EPIRBs)*

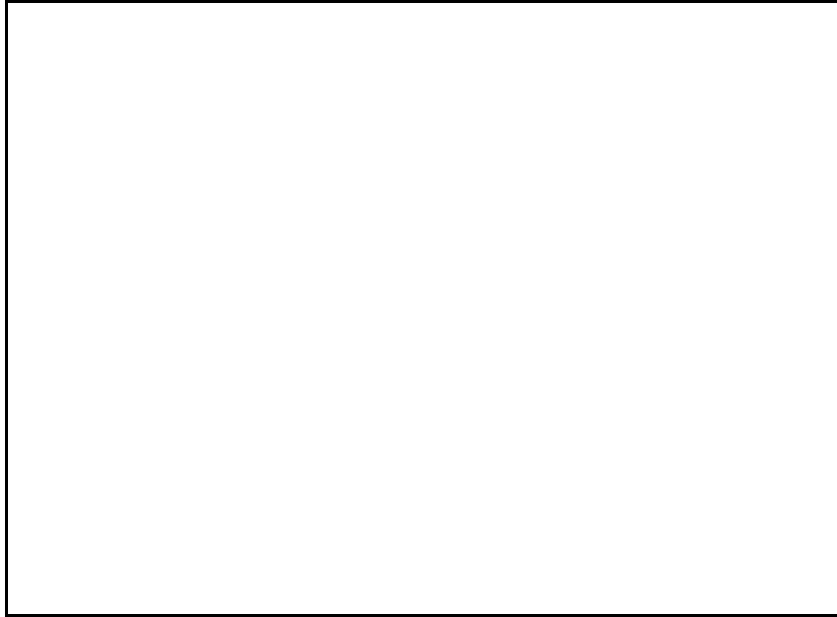
In a distress situation where a vessel sinks and the EPIRB is deployed and emits a signal, the search and rescue (SAR) resources are alerted which allows them to initiate action. After approximately 90 minutes, they are able to have a reasonably accurate position. The signal includes an identifier which enables the SAR controller to have valuable information about the vessel and the owner. Further, as the SAR craft respond to the site, the beacon continues to send its position and can be homed in on, thus substantially reducing search time and improving the probability of survival.

The Canadian regulations do not require all fishing vessels to be equipped with EPIRBs. A fishing vessel such as the "BRIER MIST" is not required to carry an EPIRB due to its length (13 m) and the fact that the vessel is limited to voyages not more than 20 miles from shore. Similarly, fishing vessels that are 20 m or more in length and voyage north of the latitudes of New York, New York, and Portland, Oregon, within 120 miles of shore and 200 miles between a suitable port of refuge, are also not required to carry an EPIRB. There is a requirement to carry an EPIRB only when a vessel is 20 m or longer and can voyage anywhere in North America, including the north shore of South America. Then, such a vessel is required to carry two EPIRBs that are readily accessible and stowed on each side of the vessel so they can be placed in survival craft.

Of the fatal and non-fatal accidents since 1975, 592 fishing vessels less than 150 gross tons have capsized, foundered or were reported missing in Canadian waters resulting in 316 fatalities. The “BRIER MIST” had a gross tonnage of 45.8 and a length of 13 m, placing it within the 15 to 60 gross-ton range, in which there were 76 fatalities. The following figures provide a geographic presentation of the location of fatal shipping accidents showing that they occur close to shore.



Fatalities resulting from shipping accidents represent about 72 per cent of the total number of fatalities in marine accidents involving fishing vessels. More than half of the fatalities in shipping accidents result from capsizing or foundering accidents; another 22 per cent involve accidents classed as “other,” mostly vessels that went missing (see Figure 3).



In 1992, a CCG cost-benefit analysis for amendments to the *EPIRB Regulations* concluded that 214 deaths in 1990 were attributable to accidents involving vessels of various categories, including fishing vessels, that were not equipped with EPIRBs. Out of the 990 SAR missions involving fishing vessels between 8 and 12 m in length, only 6 vessels were carrying EPIRBs.¹²

According to Canadian ship registration records, there are approximately 27,000 fishing vessels in Canada. The vast majority of small fishing vessels (83 per cent of the total) engaged on voyages in the territorial waters of Canada and beyond sheltered waters are not equipped with EPIRBs.

In its report on the investigation into the sinking of the small fishing vessel “3J’S ‘93” on 23 September 1996 (TSB report No. M96M0128), the Board noted that the absence of an EPIRB on the vessel had played a role in the outcome of the occurrence as the vessel capsized with such a speed that the operator was not able to issue a distress message by VHF. In another occurrence, on 12 October 1994, the “PATRICK & ELIZABETH” disappeared about 40 miles north-east of Bay Bulls, Newfoundland. After receiving the alert at 0936, Newfoundland

¹² Canadian Marine Advisory Council, *Proposed Amendments to EPIRB Regulations Cost/Benefit Analysis Update*, 12 May 1992, Plenary Item 9.

daylight time, a SAR controller coordinated a search where a SAR aircraft, following search patterns based upon drift plots, found debris approximately eight hours later. None of the five crew members was found (TSB report No. M94N0021).

Conversely, in the sinking of the “CAPE ASPY” off Nova Scotia on 30 January 1993, the EPIRB signal was picked up a few moments after the vessel sank, and the Halifax Rescue Coordination Centre was therefore able to undertake a SAR operation in less than 10 minutes. The saving of several lives has been attributed mainly to the automatically deploying EPIRB (TSB report No. M93M4004).

The above accident record shows that fishermen continue to be exposed to risks even when operating close to the Canadian coast, resulting in accidents involving the loss of the vessel and the loss of lives. In such circumstances, the crew members have to rely on others being alerted to their distress and being aware of their position. Some key factors affecting SAR by reducing the search time and increasing the probability of survival are:

- a timely distress alert,
- an updated position of the vessel, survival craft, or person in the water,
- characteristics of the vessel such as size and colour,
- the name of the vessel,
- information about the crew (i.e. number).

An EPIRB that will float free and activate automatically when the vessel sinks provides SAR personnel with this information.

The coroner recommended that there should be a Class I EPIRB (float-free) fitted on fishing vessels like the “BRIER MIST”. TCMS responded by noting that such a vessel will be required to carry a VHF radio installation with DSC. Such an installation will be required to interface with the navigation receiver so that an up-to-date position of the vessel will be transmitted if the distress alert button is activated. This response addresses only part of the safety deficiency and has to be considered in conjunction with proposed amendments to the *Small Fishing Vessel Inspection Regulations* that are currently planned to come into force on 01 April 2001.

The proposed amendments delete the requirement for EPIRBs on those vessels on unrestricted voyages about North America and require that such a vessel carry a search and rescue transponder (SART) such that it is accessible for immediate use and for placing in a survival craft. For those fishing vessels which are required to carry a SART, the International Maritime Organization (IMO) performance standards specify that the responder must be capable of being interrogated at a range of 5 M by a navigation radar and 30 M by an airborne radar providing limited information to the SAR responders. In an accident where a fishing vessel sinks, the crew members failing to activate their distress signal and relying solely on a SART would only have some limited capability to alert passing ships or aircraft of a distress situation.

These changing regulatory requirements do not address the risks to which fishermen working in coastal areas are exposed. The VHF with DSC requires a power source, someone to activate it, and the information it

provides is only as accurate as the last position which is fed from the navigation receiver. If the fishing vessel were the size of the "BRIER MIST", there would be no ongoing position information if the vessel sank as there is no SART or EPIRB.

The Board is of the opinion that all fishermen should have a distress-alerting capability that should not rely on human intervention. Further, fishermen forced into the water or survival craft should have the capability to continuously update their position to SAR coordinators and responders as the effects of wind and current cause them to drift. Therefore, the Board recommends that:

The Department of Transport require small fishing vessels engaging in coastal voyages to carry an emergency position indicating radio beacon or other appropriate equipment that floats free, automatically activates, alerts the search and rescue system, and provides position updates and homing-in capabilities.

M00-09

4.3 Safety Concerns

4.3.1 Water Level Detectors

The flooding of the fish hold and afterpeak of the "BRIER MIST" gradually reduced the vessel's stability until the reserve buoyancy was eliminated and the vessel sank. Flooding of the hold poses a hazard that is the source of many fishing vessel accidents.

The installation of a water level alarm system in a compartment below the waterline is an inexpensive way to detect flooding before the vessel's stability is compromised. The audible and visible alarm alerts the watchkeepers to search for and repair the source of the water ingress. As soon as it becomes clear that the flooding cannot be controlled, the crew must prepare to abandon ship. Early detection allows more time to prepare to abandon ship, thereby increasing the crew's chances of survival.

In recent years, the inability to detect and plug leaks has caused the sinking of several fishing vessels. Such hazards were identified in the following occurrences:

Date	Occ. Number	Type of Accident	Vessel Name	GRT	Fatalities	Injuries	Total Loss
17/02/92	M92M4007	Flooding	"MISS HOLLY NO. 2"	86	0	0	N
15/11/93	M93W1097	Foundering	"MENZIES BAY"	22	0	0	Y
22/01/97	M97M0005	Flooding	"SCOTIA GOLD"	51	0	0	N
27/11/98	M98L0149	Foundering	"BRIER MIST"	46	5	0	Y

In addition, on 27 June 1990, off Labrador, the fishing vessel "NORTHERN OSPREY" sank because flooding of the engine-room was not detected in time (TSB report No. M90M4020). On 16 December 1990, the "NADINE", a 37 m fishing vessel, sank by the stern in the Gulf of St. Lawrence. Two crew members were rescued; the bodies of six victims were recovered; and two crew members were reported missing (TSB report No. M90L3034). The Board determined that the "NADINE" sank because the openings on the after deck and in the transverse bulkheads were not secured. The suddenness of the sinking contributed to the loss of lives. In its report on that occurrence, the Board recommended that the Department of Transport require the installation of water level detectors in all compartments below the waterline on *large* fishing vessels (recommendation M94-06, issued May 1994).

The "BRIER MIST" had no water level detector or alarm in the fish hold or the afterpeak. The absence of a water level detector and an audible and visible alarm on the bridge explains why the crew was slow in detecting the flooding. As the regulations do not require the installation of water level alarms in the various compartments of fishing vessels, the danger persists.

In its response to the coroner's Recommendation No. 2, TC has indicated that it agrees with the concept of fish hold high water level detectors on small fishing vessels, and that the Small Fishing Vessel Steering Committee will examine the subject. However, as 10 years have gone by since the sinking of the "NADINE" without the changes recommended in 1994 having been made, the Board is still very concerned about the lack of progress on the installation of water level detection and alarm systems in compartments below the waterline of closed-construction fishing vessels. The Board will continue to assess the safety action taken by TC in this area.

4.3.2 *Protection from Hypothermia and Drowning*

During most of the year in Canadian waters, protection against hypothermia is essential to survival. To face the climatic conditions prevailing in the estuary of the St. Lawrence River, personal life-saving equipment should both protect against the cold and provide flotation. Although lifejackets meet strict buoyancy standards and have the ability to turn an unconscious person onto his/her back in the water, they offer no protection against

the cold. The survival time of a person immersed in cold water while wearing a lifejacket is often measured in minutes whereas a person wearing an anti-exposure worksuit can survive for several hours.

The “BRIER MIST” carried only three personal flotation devices (PFDs) for the five seamen on board. One of the seamen found only had time to partly pull on his PFD. The other seaman recovered had time to grab a lifebuoy before abandoning the vessel. It is not known if the three missing seamen were able to find their lifejackets.

The four main factors contributing to deaths in the fishing industry in Canada are falling overboard, or foundering, capsizing and sinking of the vessel. Often when the vessel sinks, the crew is forced to abandon ship. In such circumstances, protection from hypothermia is a major factor in survival.

In January 1993, following the sinking of the scallop dragger “CAPE ASPY”, 10 survivors were found after spending three hours on a liferaft while another survivor was rescued from the icy sea about six hours after the sinking (TSB report No. M93M4004). These persons owe their lives to their immersion suits. Persons wearing such suits have been successfully rescued after 18 hours of immersion in cold water. The “BRIER MIST” was not required to carry this type of equipment.

In December 1998, the coroner concluded that the deaths of the five crew members of the “BRIER MIST” were attributable to drowning following hypothermia due to immersion in icy water. The coroner deemed it imperative that such life-saving equipment be available for all seamen on board fishing vessels operating in cold water. In its response to the coroner’s Recommendation No. 6, TC has explained why there have been delays in adopting such a measure even though the risk of accidents is greater on small vessels.

In 1993, the Board recommended that TC expedite its revision of the Small Fishing Vessel Safety Regulations which would require the carriage of anti-exposure worksuits or survival suits by fishermen (recommendation No. M92-07, issued March 1993). The response to that recommendation was that the Small Fishing Vessel Steering Committee would consider anti-exposure suits as an alternative to standard lifejackets when it would work on the revision of the Small Fishing Vessel Regulations.

Since more than eight years have gone by without the recommended changes being made, the Board is very concerned about the slow progress in this area and is also concerned that more than 10 fishermen lose their lives every year by drowning and hypothermia. The number of deaths by drowning is not decreasing despite the attempts by the CCG and TC to inform fishermen about the benefits of carrying worksuits that protect from cold and drowning

hazards. Such equipment is available on the market; however, the safety message does not appear to be reaching fishermen. The Board therefore believes that more energetic action is necessary.

It is noted that anti-exposure suits are required on large fishing vessels and that TCMS agrees that there is a need for each person to be equipped with an immersion suit on board vessels operating in waters where hypothermia can greatly reduce an individual's survival time.¹³ The Board believes that the need for an immersion suit is equal or greater on small fishing vessels than on other types of vessels, and that TC should review Recommendation M92-07 with a view to expediting action required to address this deficiency.

4.3.3 *Marine Emergency Duties (MED) Training*

None of the five crew members of the "BRIER MIST" was required to take any MED training.

The decision to abandon a small fishing vessel at sea is often taken very quickly, and sometimes in panic. It may be possible to don suits protecting from hypothermia or immersion suits more quickly in an emergency if the crew has practised donning such suits during ship abandonment drills. Drills also provide an opportunity to show the crew how to stow and don immersion suits and launch liferafts. It is easier to take whatever corrective measure is necessary before a real emergency occurs.

The Board has determined that the lack of training in survival techniques contributed to the loss of several lives. Following its investigation into the sinking of the Canadian fishing vessel "STRAITS PRIDE II" (TSB report No. M90N5017), the Board recommended that the Department of Transport ensure that personnel who regularly crew closed-construction fishing vessels receive formal training in life-saving equipment and survival techniques (recommendation M92-06, issued March 1993). TC advised that it had developed a draft amendment to the *Canada Shipping Act* along the lines of this recommendation.

Following the sinking of the "PACIFIC BANDIT" on 11 February 1995 (TSB report No. M95W0005), the Board recommended that the Department of Transport examine ways to encourage crews of small fishing vessels to train in the use of life-saving equipment (recommendation M96-15, issued December 1996). In 1998, TC set up a working group on fishing vessel safety. In the meantime, the lack of knowledge of life-saving and survival techniques continues to compromise the chances of survival of fishermen in an emergency.

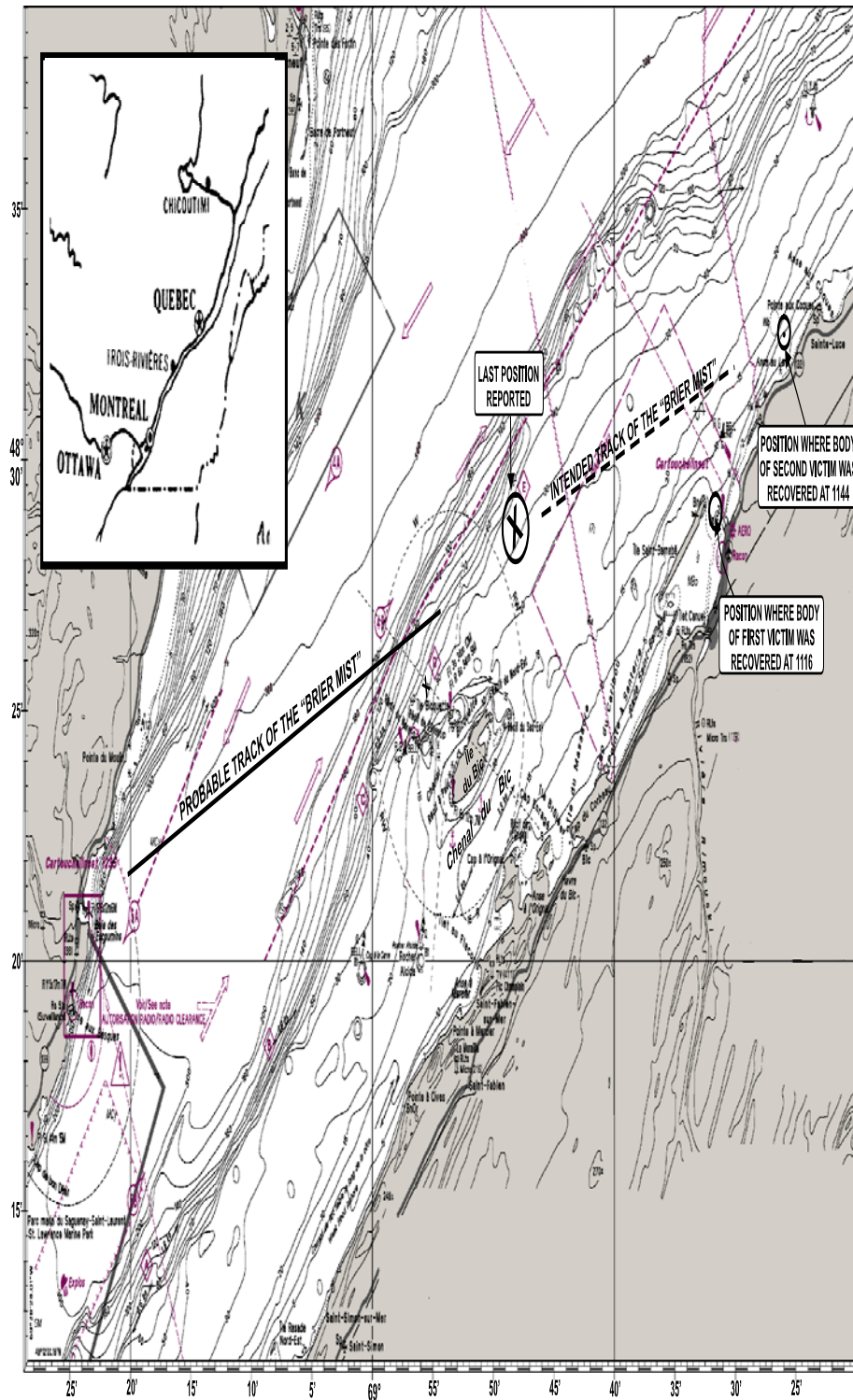
In its response to the coroner's Recommendation No. 1, TC has noted that every member of a fishing vessel's crew will have to successfully complete MED training with respect to basic safety (A-1); however, this is not to apply to fishermen until 30 July 2002 as there are problems

¹³ Response to Recommendation M00-02 (TSB report No. M98N0001)

associated with the availability of training. The Board notes that, in the *Crewing Regulations*, this important provision was originally to apply to fishermen on 30 July 2000 and is therefore concerned that there may be further delays in its implementation.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 06 December 2000.

Appendix A - Sketch of the Occurrence Area



Appendix B - Photographs







Appendix C - List of Reports

The following reports were prepared in connection with the investigation:

Engineering Report LP 16/99 - Analysis McMurdo Marine Lifebuoy Light

Macro-Analysis Report M99-43

These reports are available upon request from the Transportation Safety Board of Canada.

Appendix D - Glossary

A	aft
BHP	brake horsepower
C	Celsius
CCG	Canadian Coast Guard
CCGS	Canadian Coast Guard Ship
cm	centimetre
CSA	<i>Canada Shipping Act</i>
DSC	digital selective calling
EPIRB	emergency position indicating radio beacon
EST	eastern standard time
F	forward
GPS	global positioning system
GRT	gross registered ton
IMO	International Maritime Organization
km	kilometre
km ²	square kilometre
km/h	kilometre per hour
m	metre
m ³	cubic metre
M	nautical mile
MAPAQ	<i>ministère de l'Agriculture, des Pêches et de l'Alimentation du Québec</i>
MCTS	Marine Communications and Traffic Services
MED	marine emergency duties
mm	millimetre
MRSC	Marine Rescue Sub-Centre
MSA	Marine Safety Advisory
MTR	Marine Traffic Regulator
N	north
N.S.	Nova Scotia
PFD	personal flotation device
Que.	Quebec
RCC	Rescue Coordination Centre
SAR	search and rescue
SART	search and rescue transponder
SI	International System (of units)
SIC	ship inspection certificate
SSB	Ship Safety Bulletin
TC	Transport Canada
TCMS	Transport Canada Marine Safety
TSB	Transportation Safety Board of Canada

UTC	Coordinated Universal Time
VHF	very high frequency
VTS	Vessel Traffic Services
W	west
°	degree
'	minute
%	per cent