

MARINE OCCURRENCE REPORT

CAPSIZING AND SUBSEQUENT GROUNDING

OF THE FISHING VESSEL "LADY DEVINE"

FORWARD BAY, JOHNSTONE STRAIT,

BRITISH COLUMBIA

14 APRIL 1994

REPORT NUMBER M94W0026

Canada

MANDATE OF THE TSB

The Canadian Transportation Accident Investigation and Safety Board Act provides the legal framework governing the TSB's activities. Basically, the TSB has a mandate to advance safety in the marine, pipeline, rail, and aviation modes of transportation by:

- conducting independent investigations and, if necessary, public inquiries into transportation occurrences in order to make findings as to their causes and contributing factors;
- reporting publicly on its investigations and public inquiries and on the related findings;
- identifying safety deficiencies as evidenced by transportation occurrences;
- making recommendations designed to eliminate or reduce any such safety deficiencies; and
- conducting special studies and special investigations on transportation safety matters.

It is not the function of the Board to assign fault or determine civil or criminal liability. However, the Board must not refrain from fully reporting on the causes and contributing factors merely because fault or liability might be inferred from the Board's findings.

INDEPENDENCE

To enable the public to have confidence in the transportation accident investigation process, it is essential that the investigating agency be, and be seen to be, independent and free from any conflicts of interest when it investigates accidents, identifies safety deficiencies, and makes safety recommendations. Independence is a key feature of the TSB. The Board reports to Parliament through the President of the Queen's Privy Council for Canada and is separate from other government agencies and departments. Its independence enables it to be fully objective in arriving at its conclusions and recommendations.



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.

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Synopsis

The "LADY DEVINE", heavily laden with prawn traps, was struck on the port quarter by a large swell and capsized. The two crew members climbed up on the hull and waited for rescue, but the vessel drifted in a westerly direction and grounded in Forward Bay, British Columbia. The two crew members suffered from hypothermia and the deck-hand later drowned. The owner/operator was stranded on West Cracroft Island, British Columbia, for two days before the "LADY DEVINE" was sighted by a passing vessel and he was rescued.

The Board determined that the effective after freeboard and transverse stability of the "LADY DEVINE" were markedly reduced due to the number of prawn traps stowed on the afterdeck. The weather deteriorated later in the day and stabilizers were not deployed.

The stacked prawn traps and a nylon tarpaulin presented a large surface area to the strong wind and acted like a large sail retarding the vessel's return to the upright. The vessel shipped and retained water on the weather deck, downflooded, and capsized to starboard. Seawater entered the forward under-deck compartments through the open door at the after end of the wheel-house and through the fish hold when the unsecured fish hold hinged hatch cover became displaced.

Ce rapport est également disponible en français.

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1.0 Factual Information

1.1 Particulars of the Vessel

	"LADY DEVINE"
CFV Number	26533
Home Port	Nanaimo, B.C.
Type	Fishing vessel
Gross Tons	12.9
Length	10.97 m
	F: 1.07 m
Draught	A: 1.22 m
Built	1953
Propulsion	One 85 BHP diesel engine
	Mr. Vincent McGee
Owner	North Vancouver, B.C.

1.1.1 Description of the Vessel

The "LADY DEVINE" was a small fishing vessel of wooden construction with a wooden wheel-house situated forward of amidships. The vessel was built in 1953 as a double-ended troller. In 1977, the "LADY DEVINE" was rebuilt from amidships aft with a transom stern and lengthened 0.46 m. The insulated, fibreglass fish hold was abaft the wheel-house. There was a 2 m-high metal tubing cage around the stern and a small nylon tarpaulin suspended overhead. The vessel was fitted with aluminium stabilizer poles and stabilizers (paravanes).

1.1.2 Stabilizers

At the time of the capsizing, the paravanes were not deployed and the stabilizer poles were stowed in the upright position.

¹ See Glossary for all abbreviations, acronyms, and definitions.

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.

1.2 *History of the Voyage*

On 13 April 1994, at 0700, the "LADY DEVINE" departed Gibsons, B.C., for the fishing grounds at Knight Inlet, B.C., with the owner/operator and a deck-hand who was making his first trip on this vessel. Approximately 260 stackable prawn traps, weighing in total about 910 kg, were stowed on the afterdeck.

At 1500, 14 April 1994, after passing the lee side of Hardwicke Island in Sunderland Channel, B.C., the wind had noticeably increased from the south-east at 25 to 30 knots.

When the vessel was west of Fanny Island, B.C., seas were about 1 m high. After entering an area of tidal rips off Port Neville, B.C., the owner/operator became concerned for their safety because the seas were confused and conditions were rougher. The vessel had a long period of roll when loaded with traps and would hesitate before returning to the upright.

At about 1600, the owner/operator called his brother because they had made arrangements to pick him up in Port McNeill, B.C. As his brother was not available, the owner/operator talked to his brother's spouse and told her that the weather was poor and the seas were rough. He was not sure as to what he was going to do, but the plan was either to anchor at Port Neville to wait for conditions to moderate or to continue on to Broken Islands, B.C.

A short time after talking with his brother's spouse, the owner/operator sent the deck-hand to deploy the stabilizers, but, before he could do so, the "LADY DEVINE" was struck on the port quarter by a large wave and sheered to port. The vessel heeled to starboard, the bulwark was submerged, and seawater flooded the afterdeck, reducing the vessel's transverse stability and retarding her return to the upright.

The owner/operator, steering on manual, applied starboard helm and reduced engine speed but the vessel was struck by a second large wave. Before further action could be taken, a strong gust of wind acting on the stacked traps and on the nylon tarpaulin, which was hung over the afterdeck, caused the vessel to lay on her starboard beam ends.

The vessel began to downflood through the open door at the after end of the wheel-house and into the fish hold when the hinged hatch cover became displaced. The owner/operator helped the deck-hand to exit the wheel-house through the port window and sent two MAYDAY messages on very high frequency (VHF) radiotelephone (R/T) channel 16 as the vessel slowly capsized in approximate position 50° 28'00" N, 126° 03'30" W. Despite his attempts, he did not hear a response to his calls for help.

The water forced the owner/operator to leave the wheel-house. He scrambled out the port window and, with the assistance of the deck-hand, climbed up on the capsized hull.

The deck-hand said that he could not swim so the owner/operator tied a large polyfloat (scotsman) around his waist. There was no time to retrieve the lifejackets or emergency supplies.

³ All times are PDT (Coordinated Universal Time (UTC) minus seven hours) unless otherwise stated.

The vessel drifted in a westerly direction in Johnstone Strait. Three small boats passed by and two aircraft flew overhead; however, they did not see them. The survivors rapidly lost body heat and began to shiver uncontrollably. They lost feeling in their extremities and held on to each other to keep warm.

The survivors were suffering from hypothermia when the vessel drifted near the shore in Forward Bay. They feared that the vessel would drift away from the beach and decided that the best course of action would be for the owner/operator to swim to shore, then pull the vessel closer to the beach and help the deck-hand ashore.

The owner/operator began to swim toward shore but, when he looked back, he saw that the deck-hand was in the water. He returned to find him unconscious with his face in the water. He held his head up while swimming toward shore, and tried to revive him. At that point, the owner/operator could not confirm that the deck-hand was still alive.

The owner/operator, nearly exhausted, pushed the deck-hand up on a small ledge. As there was no room for him to climb up with the deck-hand, he swam to a nearby ledge and climbed out of the water where he passed out. When he regained consciousness, he looked for the deck-hand but was unable to locate him. Later in the evening, the "LADY DEVINE" grounded in Forward Bay.

The owner/operator was stranded on West Cracroft Island for two days before the "LADY DEVINE" was sighted by the "TWO ANNE". At about 1000, 16 April 1994, the "TWO ANNE" advised the Coast Guard Radio Station (CGRS) at Comox, B.C., of the situation. The information was passed to the Rescue Co-ordination Centre (RCC) at Victoria, B.C., and a search was immediately initiated.

The owner/operator was located about two miles west of the grounded vessel at 1249, 16 April. He was rescued by the Port Hardy lifeboat at 1255, and later transported by helicopter to the hospital where he was treated for hypothermia, dehydration, and minor injuries.

At 1638, 16 April, the deceased crew member was located near the west end of Cormorant Island, B.C. He was recovered at 1757, and transported to the hospital where an autopsy confirmed that his death was caused by drowning in salt water.

The "LADY DEVINE" was salvaged on 17 April 1994. However, on 19 April 1994, the vessel sank while under tow off Hanson Island, Johnstone Strait, in approximate position $50^{\circ}33'04''\text{N}$, $126^{\circ}42'77''\text{W}$, in a depth of 400 m.

1.3 Injuries to Persons

The owner/operator sustained minor injuries and suffered from hypothermia and the deck-hand drowned.

1.4 Cold Water Survival

Scientific studies of cooling rates on an average person holding still in ocean water of 10°C and wearing a standard lifejacket and light clothing show a predicted survival time of 2.5 to 3 hours (extra body fat can increase this time). In this instance, the seawater temperature in the immediate area was not recorded; however, the seawater temperature at Sisters Island Light Station was recorded as 9.3°C .

The deck-hand was described as being 1.75 m tall and weighing approximately 64 kg. He was reportedly in good health. He could not swim and was extremely chilled when he entered the water. When he was located, the polyfloat was still tied around his waist. He was not wearing a lifejacket or an approved personal flotation device (PFD).

1.5 Certification

1.5.1 Vessel

Being less than 15 gross registered tons (GRT), the "LADY DEVINE" was exempt from inspection by the Ship Safety Branch of the Canadian Coast Guard (CCG).

The vessel was inspected for insurance purposes at False Creek, B.C., in 1990. The survey revealed her to be in good condition and well maintained.

1.5.2 Personnel

The owner/operator and the deck-hand did not possess Certificates of Competency, nor were they required to by regulation.

The owner/operator had been involved in the fishing industry for 25 years and he had been operating small fishing vessels since 1976. The deck-hand was an experienced fisherman and he was making his first trip on the "LADY DEVINE".

1.6 Damage to the Vessel

An underwater inspection of the "LADY DEVINE" was conducted on 17 April 1994 at the grounding site. The survey revealed that several hull planks were sprung and one was badly sprung on the starboard side. This damage was most probably caused after the vessel grounded.

The vessel was salvaged on 17 April 1994; however, while under tow at 0040, 19 April, she sank off Hanson Island and there are no plans to attempt salvage.

1.7 Environmental Damage

There was no environmental damage as a result of this occurrence.

1.8 Weather and Tidal Information

1.8.1 Weather as Recorded by the Vessel

The owner/operator reportedly listened to the marine weather forecast before beginning the trip and was aware that a small craft warning was in effect for the area the vessel was to travel.

When the vessel left port on 13 April 1994, weather conditions were described as good with light wind, a slight sea, and good visibility.

At 1500, 14 April, the weather had deteriorated with the wind from the south-east at 25 to 30 knots with rough seas.

1.8.2 Environment Canada Recorded Weather

At 0545, 14 April 1994, the Pacific Weather Centre of Environment Canada issued a small craft warning for Johnstone Strait.

Winds were forecast to increase to south-easterly at 15 to 25 knots. Scattered showers were forecast with an outlook of moderate to strong south-east winds.

The winds encountered by the "LADY DEVINE" were consistent with those forecasted.

1.8.3 Nearest Recorded Weather

The Atmospheric Environment Service automated weather station at Helmcken Island, B.C., provided no weather information for the afternoon of 14 April 1994. The Chatham Point Light Station, located further south, reported an easterly wind of 12 knots. Pulteney Point Light Station, located to the north of the occurrence site, recorded easterly winds of 30 knots.

1.8.4 Tidal Information

The "LADY DEVINE" capsized about 1.5 miles south-east of the entrance to Port Neville which is entered between Ransom Point, B.C., in position 50° 29'N, 126° 05'W, and Neville Point, B.C. The vessel entered an area of steep confused seas and tidal rips. The seas that struck the vessel appeared to be larger than the others.

On 14 April 1994, the high water at Port Neville was predicted to be at 1710, with a height of 3.99 m above chart datum. Low water was predicted to be at 2224, with a height of 2.07 m above chart datum.

Tidal streams in the entrance to Port Neville attain three knots at times. The flood tide sets in an easterly direction.

1.9 Capsizing and Subsequent Grounding Position

The "LADY DEVINE" capsized in approximate position 50°28'00"N, 126°03'30"W. The vessel drifted west in Johnstone Strait and grounded in Forward Bay, West Cracroft Island, almost 14 miles from the capsizing location, in approximate position 50°30'48"N, 126°25'W.

1.10 Life-saving Equipment

The vessel was fitted with the requisite life-saving equipment pursuant to the Small Fishing Vessel Inspection Regulations.

1.11 Search and Rescue Resources

Upon receipt of the information from the CGRS in Comox, RCC Victoria initiated a Search and Rescue (SAR) mission. The CCGS "ARCTIC MIK", the CCGC "PORT HARDY" and the Port Hardy Fast Rescue Craft (FRC) "PORT HARDY 1" were tasked. In addition, aircraft Rescue 318 and Rescue 482, together with the Royal Canadian Mounted Police (RCMP) vessel "1G1", other fishing vessels, and pleasure craft, participated in the search.

1.12 Stability

Being less than 15 GRT and not engaged in fishing herring or capelin, the "LADY DEVINE" was not required to comply with CCG regulatory stability standards. The vessel had been in service since 1977, and it is not known if an inclining experiment or a roll period test was ever conducted.

The vessel's two fibreglass fuel tanks, situated in the stern, had a capacity of approximately 1,059 litres. The water tank under the forecabin floorboards had a capacity of 318 litres. The fuel tank for the galley stove, situated on the wheel-house roof, held approximately 170 litres. When the vessel capsized, all tanks were slack. No records show the quantities of liquids carried on board before the capsizing.

1.12.1 Prawn Traps

There were two types of prawn traps stowed on the afterdeck in 10 columns and stacked to a height of about 1.5 m. All were reportedly lashed down.

The afterdeck was about 2.9 m wide and 6.1 m long. The insulated, fibreglass fish hold, situated abaft the wheel-house, was fitted with a 1.2 m-long, 1.2 m-wide and 1 m-high insulated wooden hatch coaming, hinged at its forward end, providing access to the refrigerated hold.

The afterdeck was fitted with a 1.8 m-high metal tubing cage and a small nylon tarpaulin was hung overhead to provide shelter.

The larger traps, each with a dry weight of 2.95 kg, had a base measuring 77 cm, a top of 64 cm, and a depth of 31 cm.

The smaller traps, of heavier construction, each had a dry weight of 4.08 kg, a base measuring 73 cm, a top of 51.5 cm, and a depth of 29.5 cm. The traps carried on the afterdeck weighed in total about 910 kg.

1.12.2 *Rolling Motion*

The owner/operator reported that the vessel had a long period of roll, generally returning with some hesitation from large angles when heavily laden with prawn traps. Whenever the vessel was struck on the quarter by a large swell, she would deviate from her course, roll to the opposite side, and hesitate before returning to the upright. To counter this, he would apply helm and reduce engine speed. The vessel would then slowly return to the upright and to her original heading.

1.13 *Situational Awareness and Information Processing*

Situational awareness can be defined as all the knowledge that is accessible and can be integrated into a coherent picture, when required, to assess and cope with a situation.

To maintain situational awareness, a person scans for signals or cues which can be interpreted to reveal important information, such as location, speed, and the presence of hazards.

When operators are stressed by the difficulty of a situation, pressures for on-time performance, or anything else, there is a tendency for their attention to become even more narrowed so that even those cues which are present are missed, ignored, or discounted. Stress can also affect the perception of time.

1.14 *Factors Affecting Decision Making*

The work at sea takes place in a very specific, sometimes hostile, environment (e.g. vessel motions which vary in strength with meteorological conditions). Generally, variable and continuously changing factors result in complex decision-making processes that involve the safety of the vessel and crew.

These decisions are often made in the face of grave adversities and in a limited time frame. Some of the decision-making factors associated with impending dangers include:

- The (individual's) tendency to search for alternative interpretations of warning messages that will neutralize the threat conveyed (Ikeda, 1982).
- Any vagueness in warning allows for interpretation of the situation in a non-threatening fashion (Perry et al., 1981).
- The initial tendency to interpret new data in terms of the known and the familiar (Quaranteilli, 1980).

- The perceived risk by decision makers bears a stronger positive relationship to warning response (Perry and Greene, 1983).

2.0 *Analysis*

2.1 *Introduction*

The owner/operator was aware that the vessel was very tender when heavily laden with prawn traps. Historically, he had travelled, on occasion, with a larger number of traps on the afterdeck; however, during those times, the stabilizers were often deployed. In this instance, the stabilizers were not deployed because the weather was fine when the vessel left port on 13 April 1994. On 14 April 1994, the weather and sea conditions had deteriorated later in the day, but the decision to deploy the stabilizers was made only seconds before the vessel capsized. A small craft warning was in effect in the area.

2.2 *Stability*

A period of roll is the time, in seconds, for a vessel to roll from one side to the other and return to the original side. The period of roll may be used as a method to approximate a vessel's metacentric height (GM) and initial transverse stability. It is used primarily for vessels up to 24 m in registered length, when it is not practical to carry out an inclining experiment or, as in this case, when an inclining experiment is not required by regulation.

According to her rolling characteristics when heavily laden, the "LADY DEVINE" would appear to have been a tender ship with a small righting moment and reduced freeboard.

In this instance, the vessel did not have sufficient transverse stability to withstand the dynamic heeling effects of waves, wind, and water shipped and retained on deck.

The south-easterly wind opposing the easterly tidal flow created a steep confused sea. Some of the waves were larger than the others and, when the bulwark was submerged, the shipped seawater flooded the afterdeck, heeled the vessel to starboard, and prevented her from returning to the upright.

The side of the vessel, and her wheel-house, the stacked traps, and tarpaulin presented a large surface area to the wind and acted like a large sail.

This force, in conjunction with the shipped water which was retained on deck, effectively retarded and subsequently prevented her return to the upright, allowing seawater to downflood into the hull through the open door at the after end of the wheel-house and into the fish hold when the hinged hatch cover became displaced.

2.3 *Sea State*

Waves that are larger than the majority of those present are often encountered. These rogue waves occasionally cause structural damage and sometimes cause vessels to capsize. The sea and tidal conditions combined with the strong wind produced a steep and confused sea.

2.4 Situational Awareness and Information Processing

The weather, although fair upon departing Gibsons, B.C., on 13 April 1994, had deteriorated on the afternoon of 14 April. The owner/operator was aware of the changing conditions and, when the vessel was off Port Neville, a strong tide rip and a confused sea were encountered.

The owner/operator was aware of the dangers associated with the weather conditions, but he had not decided if he would continue or enter Port Neville and wait for the weather to moderate.

Because the vessel proceeded to sea in adverse weather conditions with watertight/weathertight openings not securely shut, there was an apparent lack of appreciation of the dangers associated with a possible ingress of seawater through those openings.

2.5 Crew Decision Making

Over the years, fishing has been transformed from an occupation based on traditional knowledge and skill to one based on management skills and entrepreneurial abilities. Fishing, in general, is a high-risk occupation and the traditional attitude of the fishermen is to accept the risk involved.

Thus, threats posed by the hostile environment are often downplayed in the initial stages and during the decision-making process, and are responded to only when danger arrives, in some cases, with tragic consequences.

Because fishing is physically demanding, the crew sets practices to facilitate operations. These practices, when continued, form habits, and the resultant changes in attitude and perception can inadvertently compromise safety. In this instance, weathertight/watertight accesses were left open at sea, permitting downflooding to occur and progress until the vessel capsized.

⁴ Canadian Coast Guard, Coast Guard Working Group on Fishing Vessel Safety, *A Coast Guard Study into Fishing Vessel Safety*, TP8694 E, 1987.

3.0 *Conclusions*

3.1 *Findings*

1. The vessel's effective after freeboard and transverse stability were markedly reduced due to the large number of prawn traps that were stowed on the afterdeck. This condition was exacerbated by the windage of the traps and tarpaulin, sea conditions, and slack tanks.
2. The door at the after end of the wheel-house and the fish hold hinged hatch cover were left open and unsecured, allowing the downflooding of the vessel which resulted in her capsizing.
3. The owner/operator was aware that a small craft warning was in effect for the area the vessel was to travel, but he chose to continue with the voyage.
4. The deck-hand was sent to deploy the stabilizers but the vessel capsized before he could deploy them.
5. There was insufficient time to retrieve the lifejackets or emergency supplies.

3.2 *Causes*

The effective after freeboard and transverse stability of the "LADY DEVINE" were markedly reduced due to the number of prawn traps stowed on the afterdeck. The weather deteriorated later in the day and stabilizers were not deployed.

The stacked prawn traps and a nylon tarpaulin presented a large surface area to the strong wind and acted like a large sail retarding the vessel's return to the upright. The vessel shipped and retained water on the weather deck, downflooded, and capsized to starboard. Seawater entered the forward under-deck compartments through the open door at the after end of the wheel-house and through the fish hold when the unsecured fish hold hinged hatch cover became displaced.

4.0 *Safety Action*

4.1 *Action Taken*

4.1.1 *Unsecured Openings*

Once again, a breach of watertight integrity due to unsecured openings has contributed to a fatal marine accident.

In view of the continuing occurrence record of vessels being lost due to unsecured openings, and subsequent to the sinking of the fishing vessels "NADINE" and "CAPE ASPY" for similar reasons, the Board recommended that Transport Canada 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 (M93-01). Furthermore, on a separate occasion, following the sinking of the fishing vessel "NORTHERN OSPREY", the Board recommended that Transport Canada promote awareness among the operators, officers and crews of fishing vessels of the serious consequences associated with leaving access or other watertight doors open at sea (M92-04).

As a result, the Canadian Coast Guard (CCG) issued a Ship Safety Bulletin (SSB) urging mariners and operators to keep watertight openings closed at all times except when it is absolutely necessary to open them to gain access to spaces (SSB No. 16/92). Transport Canada also re-issued previous SSB Nos. 1/83 and 4/87 on the same subject.

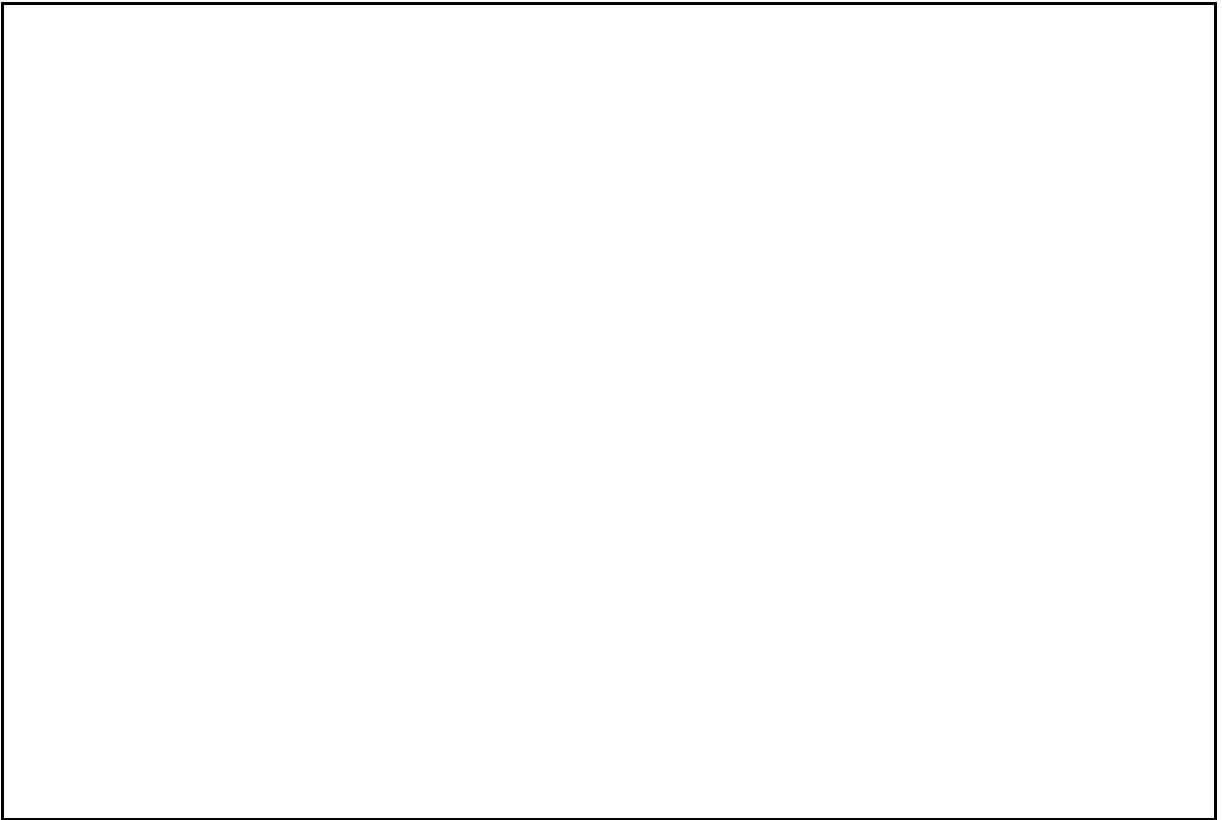
It is also understood that watertight integrity and its effects on vessel stability are being brought to the attention of the industry by the Examiners of Masters, Mates, and Engineers through intensified examination in these areas by the CCG.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board, consisting of Chairperson John W. Stants, and members Zita Brunet and Hugh MacNeil, authorized the release of this report on 30 August 1995.

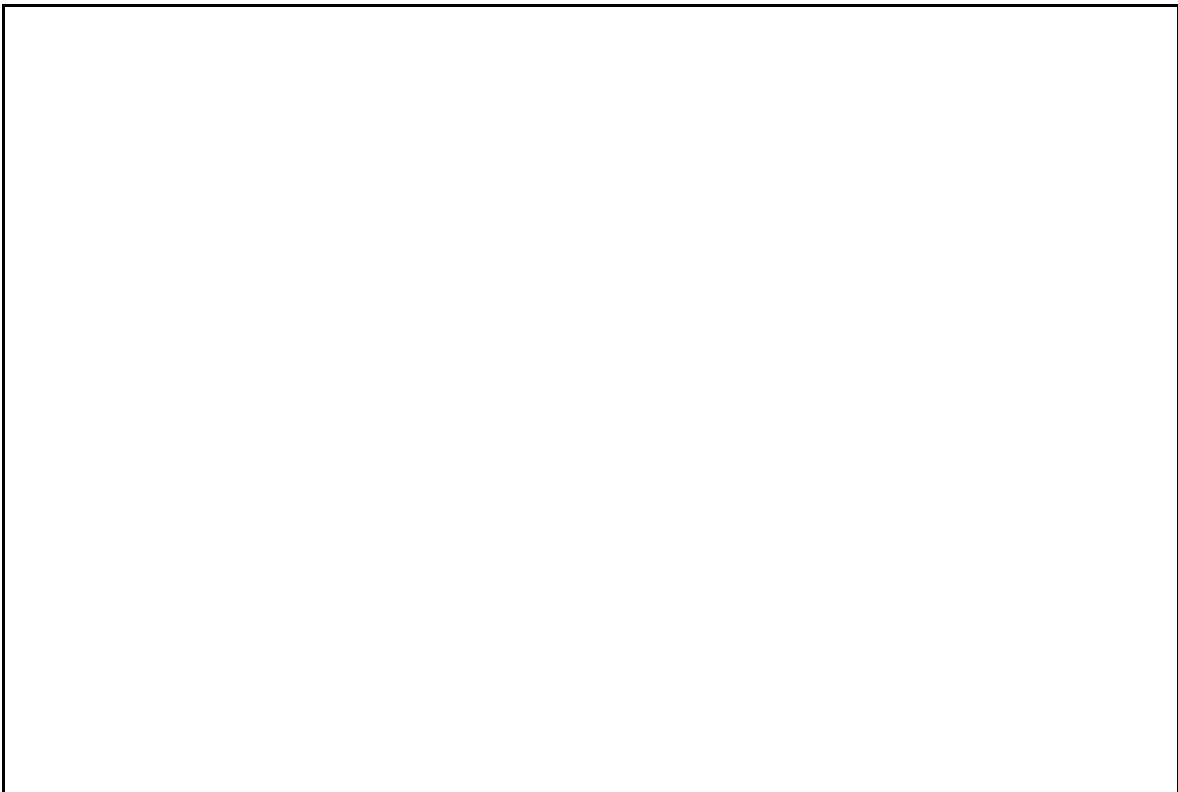
Appendix A - Photographs



"LADY DEVINE"







Appendix B - Glossary

A	aft
B.C.	British Columbia
BHP	brake horsepower
bulwark	vertical plating/planking along each side of the vessel above the weather deck
C	Celsius
CCG	Canadian Coast Guard
CCGC	Canadian Coast Guard Cutter
CCGS	Canadian Coast Guard Ship
CFV	Canadian Fishing Vessel
CGRS	Coast Guard Radio Station
cm	centimetre(s)
F	forward
FRC	Fast Rescue Craft
freeboard	the height from the waterline to the deck edge
GM	metacentric height
GRT	gross registered ton(s)
IMO	International Maritime Organization
kg	kilogram(s)
m	metre(s)
mm	millimetre(s)
N	north
PDT	Pacific daylight time
PDF	personal flotation device
RCC	Rescue Co-ordination Centre
RCMP	Royal Canadian Mounted Police
R/T	radiotelephone
SAR	Search and Rescue
SI	International System (of units)
SSB	Ship Safety Bulletin
TSB	Transportation Safety Board of Canada
UTC	Coordinated Universal Time
VHF	very high frequency
W	west
°	degree(s)
'	minute(s)
"	second(s)

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17803 - 106 A Avenue
Edmonton, Alberta
T5S 1V8
Phone (403) 495-3865
24 Hours (403) 495-3999
Facsimile (403) 495-2079

CALGARY, ALBERTA

Pipeline and Rail
Sam Livingstone Building
510 - 12th Avenue SW
Room 210, P.O. Box 222
Calgary, Alberta
T2R 0X5
Phone (403) 299-3911
24 Hours (403) 299-3912
Facsimile (403) 299-3913

GREATER VANCOUVER, BRITISH COLUMBIA

Marine, Pipeline, Rail and Air
4 - 3071 Number Five Road
Richmond, British Columbia
V6X 2T4
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*Services available in both official languages