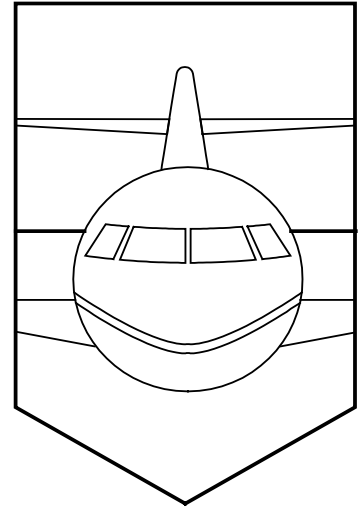
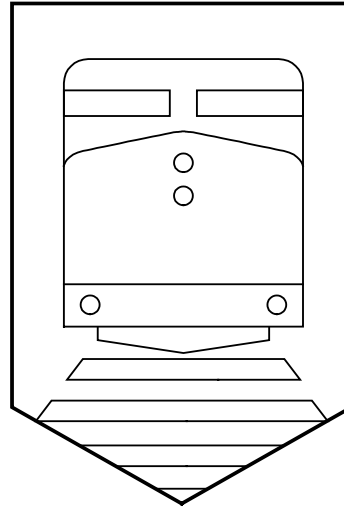
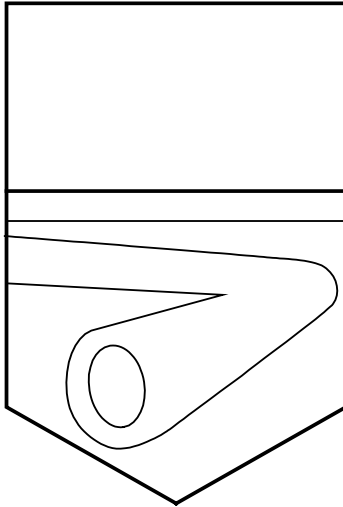
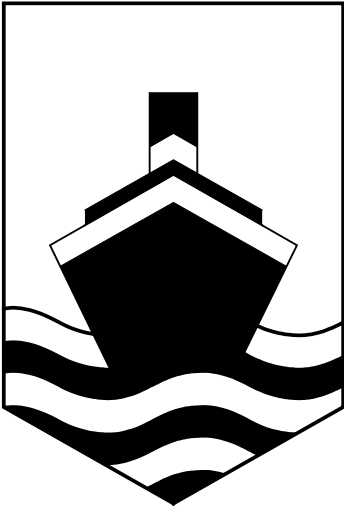




Transportation Safety Board
of Canada

Bureau de la sécurité des transports
du Canada



MARINE OCCURRENCE REPORT

CAPSIZING

FISHING VESSEL "STÉPHANE P II"

OFF GASCONS

CHALEUR BAY, QUEBEC

27 APRIL 1996

REPORT NUMBER M96L0037

Canada

MANDATE OF THE TSB

The *Canadian Transportation Accident Investigation and Safety Board Act* provides the legal framework governing the TSB's activities.

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.

INDEPENDENCE

To encourage public confidence in transportation accident investigation, the investigating agency must be, and be seen to be, objective, independent and free from any conflicts of interest. The key feature of the TSB is its independence. It 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. Its continuing independence rests on its competence, openness, and integrity, together with the fairness of its processes.

Visit the TSB site.

<http://bst-tsb.gc.ca/>

The occurrence reports published by the TSB since January 1995 are now available. New reports will be added as they are published.



Transportation Safety Board
of Canada

Bureau de la sécurité des transports
du Canada

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

Marine Occurrence Report

Capsizing

Fishing Vessel "STÉPHANE P II"

off Gascons

Chaleur Bay, Quebec

27 April 1996

Report Number M96L0037

Synopsis

On 27 April 1996, the "STÉPHANE P II", carrying lobster traps on deck and with three persons on board, departed the harbour of Gascons, Quebec, bound for the fishing grounds. Shortly after departure, the vessel encountered rough seas. The vessel was struck by a large wave and capsized suddenly. The two crew members lost their lives, but the third occupant, who was on the trip as a guest, escaped unharmed.

The Board determined that the small fishing vessel "STÉPHANE P II" capsized shortly after leaving the harbour of Gascons because of the adverse effect that the load of lobster traps stacked and secured on deck had on the stability of the vessel. The small margin of static and dynamic stability was lost when the vessel listed after being struck by a wave larger than the rest.

Ce rapport est également disponible en français.

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1.0 Factual Information

1.1 Particulars of the Vessel

	"STÉPHANE P II"
Small Vessel Licence Number	5D-2776
Port of Issuance	Gaspé, Quebec
Flag	Canada
Type	Small fishing vessel
Length	9.89 m
Built	1994
Propulsion	One PERKINS diesel engine, 160 kW
Owner	Stéphane Parisé Gascons, Quebec

1.1.1 Description of the Vessel

The "STÉPHANE P II" is a small closed-construction fishing vessel built of glass-reinforced plastic, intended to be used for fishing for groundfish, except cod. Based on the dimensions given on the small vessel licence, the vessel's gross tonnage is estimated at seven tons. The vessel has a wheel-house and crew accommodation forward, an engine compartment a third of the way back, and a fish hold and an after peak behind.

1.2 History of the Voyage

In this area, lobster fishing was scheduled to open on 28 April 1996. On the 27, the fishermen were therefore busy setting their traps in order to haul their first catches the next day. The weather was cloudy, and the wind was from the south-east at about three knots, but weather had been bad over the preceding days and the sea was still rough. The skipper/owner of the "STÉPHANE P II" loaded his vessel with lobster traps and waited for the weather conditions to improve before going to set his traps in the vicinity of Shigawake in Chaleur Bay, Quebec.

He asked some experienced fishermen about his chances of making the trip safely, and they pointed out to him that his deck load was perhaps stacked a little high for the sea conditions. After he had watched other vessels leave the harbour without any problem, however, the skipper/owner of the "STÉPHANE P II" cast off at about 1330, with a fisherman's helper and a guest on board.

When the vessel was about 350 m from the berth, she was struck by a large wave and capsized immediately. The "STÉPHANE P II" remained afloat, upside down, in approximate position 48° 10.91'N, 064° 51.45'W; the depth there is about 36 m. The guest was standing in the doorway of the wheel-house when the vessel capsized. Although the wheel-house was under water, he took off his boots, and after watching which way they went, he reasoned that the surface must be in the opposite direction and began swimming in that direction. He surfaced not far from the vessel and

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

² See Glossary for all abbreviations and acronyms.

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

managed to climb onto the upturned hull after numerous attempts.

The skipper of the "VIKING 5", which was leaving the harbour behind the "STÉPHANE P II", witnessed the accident and immediately called the Marine Communications and Traffic Services (MCTS) Centre at Rivière-au-Renard, Quebec, while heading for the scene, and he rescued the survivor. However, there was no sign of the other two occupants of the capsized vessel. Assistance was requested from other vessels and the survivor was taken to Gascons. An attempt was then made to tow the wreck to port in case one of the victims was trapped inside.

The body of the skipper was recovered on 29 April 1996 by divers of the Sûreté du Québec (SQ) emergency unit. The other crew member is still missing and he is presumed drowned.

1.3 *Injuries to Persons*

	Crew	Passengers	Others	Total
Fatal	1	-	-	1
Missing	1	-	-	1
Serious	-	-	-	-
Minor/None	-	-	1	1
Total	2	-	1	3

1.4 *Damage*

During the towing operation, the wheel-house of the "STÉPHANE P II" was torn off, the navigation equipment was lost, and the propulsion system was damaged by sea water.

1.5 *Certification*

1.5.1 *Vessel*

A small vessel licence had been issued to the "STÉPHANE P II" by the Department of Transport in April 1994. Because she was under 15 gross registered tons, the vessel did not need to be registered and was not required to have an inspection certificate.

1.5.2 *Personnel*

The skipper/owner did not hold a certificate, nor is any certificate required under the regulations. No one on board had any formal knowledge of vessel stability.

1.6 *Personnel History*

The skipper/owner had bought the vessel directly from the builder two years earlier and had been using her for commercial fishing ever since. He had approximately eight years' experience. The fisherman's helper had about three years' experience.

1.7 *Weather Information*

1.7.1 *Weather Forecasts*

The marine forecasts issued by the Maritimes Weather Centre of Environment Canada at 1130 Atlantic daylight time (ADT) on Saturday, 27 April 1996, predicted the following weather for Chaleur Bay:

Gale warning ended. Winds from the south between 20 and 25 knots decreasing to south 15 to 20 Sunday morning. Showers and fog patches ending overnight, poor visibility in showers and fog. Turning cooler Sunday.

1.7.2 Weather Encountered

According to witnesses, at the time of the accident, the wind was calm and the waves were about 0.6 m high.

1.8 Navigation Equipment

Reportedly, the "STÉPHANE P II" was equipped with a magnetic compass, a very high frequency (VHF) radiotelephone, a CB radio and a sonar fish finder. There may also have been a global positioning system (GPS) on board.

1.9 Radio Communications

There was no radio communication between the "STÉPHANE P II" and any radio station. The MCTS Centre at Rivière-au-Renard received an initial call from the "VIKING 5" at 1338 indicating that the "VIKING 5" was going to the aid of a capsized fishing vessel at Gascons.

1.10 Life-saving Equipment

Pursuant to the Small Fishing Vessel Inspection Regulations, a vessel such as the "STÉPHANE P II" must carry the following life-saving equipment:

- a) one approved lifejacket for each person on board; and
- b) one approved lifebuoy fitted with 27 m of line.

After the accident, the following equipment was found inside the wreck:

- a) two approved lifejackets still wrapped in plastic bags; and
- b) one approved 610 mm lifebuoy.

Other life-saving gear may have been lost during towing.

1.11 Search and Rescue

1.11.1 Mandate of the Marine Rescue Centre

The Marine Rescue Centre's mandate is to try to save human lives. Once all available information indicates that there is no more chance of survival, the case is referred to police forces which may decide to use divers to try to recover the bodies of the victims. The Canadian Coast Guard does not perform underwater searches.

1.11.2 Notification

At 1343 on 27 April 1996, the Marine Rescue Sub-Centre (MRSC) at Québec, Quebec, received a call from the MCTS Centre at Rivière-au-Renard advising that the fishing vessel "VIKING 5" had reported that the "STÉPHANE P II" had capsized off Gascons.

At 1350, MRSC Québec contacted the SQ at Pabos, Quebec, asking for a patrol car and an ambulance to be dispatched. At 1351, the MRSC notified the Rescue Co-ordination Centre (RCC) in Halifax, Nova Scotia, giving the details of the accident. The SQ was called back at 1357 to inquire about the possibility of sending divers. When the SQ replied that no divers could be sent, the MCTS Centre issued a call to all stations. No diver had been found by 1451 when the SQ at Pabos advised that fire-fighters from Chandler, Quebec, were on their way. They had two divers in their ranks, with basic equipment to perform reconnaissance dives.

1.11.3 Deployment of Resources

The "VIKING 5", which was leaving the harbour behind the "STÉPHANE P II", was on the scene within a few minutes. She was quickly joined by the "FREDDY" and other vessels. The divers of the Chandler fire department were on the scene at about 1540, followed by Search and Rescue (SAR) helicopter R-301 at 1625. The MRSC used two fishing vessels, two Canadian Marine Rescue Auxiliary (CMRA) vessels and a SAR helicopter to conduct the search. The hovercraft "WABANAKI" was also dispatched, but had to turn back because of bad weather.

1.12 Vessel Stability

1.12.1 Inclining Experiment

When the "STÉPHANE P II" was put back in the water to be placed on a trailer and taken to a storage area, the TSB took the opportunity to perform an inclining experiment. Over the next few days, the TSB measured the vessel in order to determine the lines of the hull, the size of the fish hold and compartments, and the position of the tanks, with a view to calculating the hydrostatic characteristics of the vessel. The TSB calculations took into account the fact that the wheel-house and its contents had been torn off.

The inclining experiment determined that the lightweight of the "STÉPHANE P II" was 5,417 kg. The vertical and longitudinal positions of the centre of gravity were 1.183 m and 1.812 m respectively from the reference axes.

1.12.2 Loading

Based on the survivor's observations and on the position of the lashings securing the lobster traps on the deck, a plan of the distribution and position of the traps was drawn up. According to information obtained from Fisheries and Oceans and from the owner's next of kin, and given the number of traps remaining on the wharf, the TSB established that the "STÉPHANE P II" was carrying 96 lobster traps, all secured on deck. They were attached together in groups of 8 with 6 fathoms of cable between them and at each end, with each group marked by a buoy attached with 12 fathoms of cable. The lobster traps were arranged on deck in 4 rows of 24 traps.

The traps were conventionally weighted, but early in the season, weight (a stone) is added until the traps (made of wood) become waterlogged. Thus, the traps had varying weights and centres of gravity. The TSB took sample traps, similar to the ones that were on board the "STÉPHANE P II", and calculated their weight. The traps weighed 36.8 kg on average and that weight is considered representative of the weight of the 96 traps loaded on board. The weight of the load, including the traps, the cables and the buoys, was estimated at 3,780 kg.

1.12.3 Stability Condition

From the inclining experiment, the lightship displacement of the "STÉPHANE P II" and the position of the centre of gravity were determined. The stability characteristics of the vessel with her fuel and hydraulic oil tanks full and 96 lobster traps stowed on deck were compared with the minimum stability criteria established by Transport Canada, as set out in STAB.4, "Stability Standards for Fishing Vessels," and the following results were obtained:

- a) The vessel's dynamic righting ability at an angle of between 0° and 30° was 14% lower than the normally required value.

- b) The vessel's dynamic righting ability at an angle of between 0° and 40° was 36% lower than the normally required value.
- c) The vessel's dynamic righting ability at an angle of between 30° and 40° was 66% lower than the normally required value.
- d) The righting lever (GZ), producing the vessel's moment of statical stability, was 57% lower than the normally required value at an angle of heel of 30° .

1.12.4 Normal Fresh Capelin Operation

To determine whether or not the stability characteristics of the "STÉPHANE P II" contributed to the occurrence, a comparative analysis was made between a deck load of lobster traps and a load of bulk whole fresh capelin. This analysis was carried out with the fish hold loaded to 90% capacity and the tanks filled to 25% capacity, except for the hydraulic oil tank which remains at the same level at all times. Furthermore, the weight of the net drum, which had been removed and placed on the wharf before the departure of the "STÉPHANE P II", was added. This analysis was conducted to assess the free surface effect. In this condition, which is one of the worst operating conditions, the static and dynamic stability characteristics of the vessel were from 25% to 47% higher than the normally required values as set out in STAB.4.

2.0 Analysis

2.1 Load Stacked and Secured on Deck

The skipper/owner of the "STÉPHANE P II" had a permit for 250 traps and, given the permissible load on board, he had to make at least three trips, carrying 83 traps per trip. As he was setting his traps in groups of 8, he could have made two trips with 80 traps and another with 88, taking weather conditions into account. It was determined that the "STÉPHANE P II" was carrying 96 lobster traps at the time of the accident. To improve the stability characteristics of the vessel, the skipper/owner could have stowed two groups of 8 traps in the hold. This method entailed certain difficulties, but it would have improved greatly the vessel's stability.

The fact that the traps that were stacked to a height of six feet were secured to the deck contributed to the capsizing. Had they not been secured, several of the traps probably would have fallen overboard when the vessel listed, thereby allowing her to right herself. Furthermore, stowing the traps one on top of the other raised the centre of gravity, thereby contributing to the capsizing. Other vessels in the area reported losing traps overboard the day of the occurrence, but they did not capsize.

Many skipper/owners of small fishing vessels have never been alerted to the dangers that some loads may present.

2.2 Decision to Tow the Wreck

When he called the MCTS Centre at Rivière-au-Renard after rescuing the survivor, the skipper of one of the first vessels to arrive on the scene asked if he should tow the capsized vessel to the wharf. The MCTS Centre told him that the MRSC wanted him to try to get closer to see if he could hear any sounds possibly coming from persons trapped inside the wheel-house, and, if possible, to try to tow the vessel. Apparently, the vessel was to be towed in order to bring her back into shallower water in case she sank as well as to facilitate inspection of the inside by divers.

It seems that the lashings used to secure the traps broke during the towing operation. The lobster traps then sank, and the skipper's body may have been dragged to the bottom at that time.

His body was later found tangled in the cables among the traps.

2.3 Chances of Survival

On leaving the harbour, the fisherman's helper and the guest were sitting forward of the wheel-house. Shortly thereafter, the skipper asked his helper to go check the traps at the stern because the vessel was beginning to roll heavily. The fisherman's helper and the guest proceeded to the stern. The guest stood in the doorway of the wheel-house while the helper checked the traps. The skipper then saw a large wave coming and warned his companions that it was a dangerous one. He began to turn the vessel to face into it, but he did not have time to complete the manoeuvre. When the vessel capsized, the skipper was in the wheel-house, the helper was on deck leaning against the traps and the guest held on to the doorway.

None of them was wearing a personal flotation device (PFD). After the vessel capsized, even if the occupants were still conscious, they had little chance of returning to the surface because of the water temperature (2°C) and disorientation.

When the body rotates under water and gravity references are lost, disorientation is inevitable, and it is difficult for the occupants of a capsized vessel to escape. Darkness would have increased disorientation.

In-rushing water has four major effects, all of which can lead to drowning. The first is panic, because the individual is exposed to potential drowning; the second is uncontrolled hyperventilation and reduction of the ability to hold one's breath; the third is being tossed about in a confined space like the wheel-house of the "STÉPHANE P II", which can lead to intense disorientation. The fourth effect, immersion in cold water, exacerbates the first two. If water temperature is below 10°C and the survivors are not wearing survival suits, a combination of factors can

lead to drowning: panic, hyperventilation, reduction of the ability to hold one's breath, and the possibility of cardiac arrest or arrhythmia.

According to a study done by the North Atlantic Treaty Organization (NATO) Advisory Group for Aerospace Research and Development (AGARD) entitled "The Human Factors Relating to Escape and Survival from Helicopters Ditching in Water", only those who have experienced disorientation in an underwater escape simulator have a good chance of understanding the problem and solving it. Even experienced professional divers are surprised by the profound sense of disorientation that they suffer the first time they try the simulator. The study revealed that, "in spite of their lengthy experience, 16 out of 24 divers testing escape hatch illumination became seriously disoriented and needed assistance."

⁴ Information taken from AGARDograph No. 305. The study was carried out by the NATO Aerospace Medicine Group.

3.0 Conclusions

3.1 Findings

1. The sea was rough because of the strong winds of the preceding days.
2. The centre of gravity was raised because the load was stacked and secured on deck.
3. The fish hold was empty, and that worsened the stability characteristics of the vessel.
4. No one on board was wearing either a lifejacket or a personal flotation device (PFD).
5. It is very likely that disorientation played a role in the loss of the two lives on board the "STÉPHANE P II".
6. No one on board had any formal knowledge of vessel stability.
7. With the fish hold loaded to 90% capacity, the static and dynamic stability characteristics of the "STÉPHANE P II" would be higher than the normally required values.
8. The "STÉPHANE P II" capsized because of the low margin of static and dynamic stability caused by stacking the traps on deck.

3.2 Causes

The small fishing vessel "STÉPHANE P II" capsized shortly after leaving the harbour of Gascons because of the adverse effect that the load of lobster traps stacked and secured on deck had on the stability of the vessel. The small margin of static and dynamic stability was lost when the vessel listed after being struck by a wave larger than the rest.

4.0 Safety Action

4.1 Safety Concern

4.1.1 Small Fishing Vessel Loading Practices

During its investigation of occurrences involving fishing vessels, the TSB has observed that many crews on fishing vessels do not fully appreciate that some of their day-to-day operating procedures may be creating unsafe conditions. Therefore, in its report on the investigation into the 1995 sinking of the "PACIFIC BANDIT" off Barkley Sound in British Columbia (TSB Report No. M95W0005), the Board recommended that:

The Department of Transport, in conjunction with other government departments, agencies, and organizations, immediately undertake a national safety promotion program for operators and crews of small fishing vessels to increase their awareness of the effects of unsafe operating practices on vessel stability; and

(M96-13, issued December 1996)

The Department of Transport conduct a study to identify the extent of unsafe loading and operating practices used by fishermen on small fishing vessels, with a view to developing guidelines for the safe operation of small fishing vessels.

(M96-14, issued December 1996)

In reply to these recommendations, Transport Canada (TC) indicated that it believes that the existing guidelines on the safe operation of small fishing vessels are adequate. TC further advised that in 1994, the Canadian Coast Guard (CCG) had sponsored an independent evaluation study of those *Non-Regulatory Marine Occurrence Prevention Programs (NRMOPP)* aimed at recreational vessels and commercial fishing vessels of less than 15 gross registered tons (grt). Phase I of the study, completed in 1995, recognized the relationship between education, awareness, positive safety attitudes and changed behaviours. TC now intends to proceed with Phase II of this study in order to determine and substantiate the relevance and effectiveness of existing safety promotion programs and their delivery.

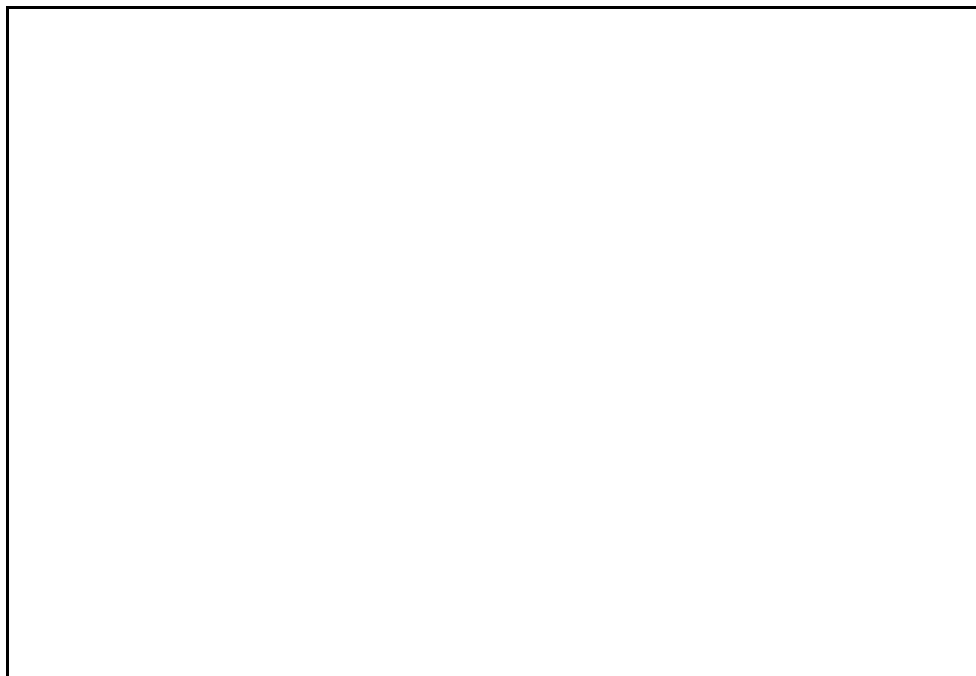
The Board believes, however, that its investigations have already shown that the "safety" message of some CCG programs is not getting through to those who are actually operating and crewing small vessels. As such, while the proposed Phase II of the study could better identify the weak areas and give rise to recommended corrective measures over the long term, the Board is concerned that, without specific action in the interim, unsafe loading and operating practices, such as those used on the "STÉPHANE P II", will continue to put fishing vessels and their crews at risk.

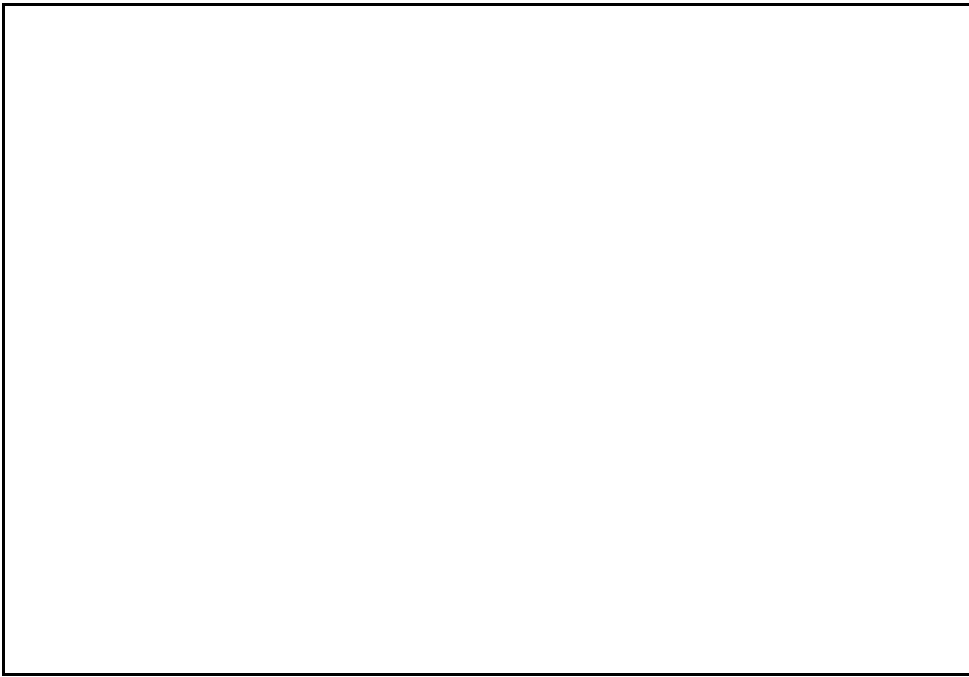
This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board, consisting of Chairperson Benoît Bouchard and members Maurice Harquail, Charles Simpson and W.A. Tadros, authorized the release of this report on 05 November 1997.

Appendix A - Sketch of the "STÉPHANE P II"

Appendix B - Sketch of the Occurrence Area

Appendix C - Photographs





Appendix D - Glossary

ADT	Atlantic daylight time
AGARD	Advisory Group for Aerospace Research and Development
C	Celsius
CB	citizen's band
CCG	Canadian Coast Guard
CMRA	Canadian Marine Rescue Auxiliary
EDT	Eastern daylight time
GPS	Global Positioning System
grt	gross registered ton
GZ	righting lever
IMO	International Maritime Organization
kg	kilogram
kW	kilowatt
m	metre
mm	millimetre
MCTS	Marine Communications and Traffic Services
MRSC	Marine Rescue Sub-Centre
N	north
NATO	North Atlantic Treaty Organization
NRMOPP	Non-Regulatory Marine Occurrence Prevention Programs
PF	personal flotation device
RCC	Rescue Co-ordination Centre
SAR	Search and Rescue
SI	International System (of units)
SQ	Sûreté du Québec
TC	Transport Canada
TSB	Transportation Safety Board of Canada
UTC	Coordinated Universal Time
VHF	very high frequency
W	west
°	degree
'	minute