

AVIATION OCCURRENCE REPORT

A97P0351

COLLISION WITH WATER

TERRY AIR

CESSNA 402C C-GKWV

MACKENZIE, BRITISH COLUMBIA 23 nm N

16 DECEMBER 1997

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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Summary

The Terry Air Cessna 402C, serial number 402C0515, had been chartered to transport passengers and equipment to the Bear Valley airstrip in northern British Columbia. The scheduled departure time of 0830 Pacific standard time (PST) was delayed because of inclement weather in Mackenzie; the aircraft eventually departed at 1210. The 40-minute flight to Bear Valley was reported to have been uneventful. After arriving in Bear Valley, the passengers and cargo were off-loaded, and about 500 pounds of cargo and two other passengers were loaded for the return flight to Mackenzie. The aircraft left Bear Valley at 1302. The pilot contacted Terry Air dispatch by radio at 1320 and reported that he was out of the Peace Arm, estimating Mackenzie at 1340. The dispatcher informed the pilot that the visibility at Mackenzie had dropped to two miles. At about 1330, the pilot transmitted, "Terry Air, KWV." The pilot's voice did not sound distressed, and the tone and content of the communication sounded like a normal initiation call. No further transmissions were heard from the pilot. At about 1350, Terry Air personnel began a communication search and emergency response. Search and Rescue and the Royal Canadian Mounted Police (RCMP) searched the area north of Mackenzie and found small pieces of floating wreckage near the west shore of Williston Lake. None of the occupants of the aircraft were found at this time. The bodies of the two passengers were later found and recovered.

Ce rapport est également disponible en français.

¹ All times are PST (Coordinated Universal Time (UTC) minus eight hours) unless otherwise stated.

Other Factual Information

When the pilot left Mackenzie, he followed Williston Lake northward for about 50 nautical miles (nm), and then turned east into the Peace Arm toward Bear Valley. The ceiling at the time was overcast at about 2 000 feet above ground level (agl), and there was slight turbulence at the entrance to the Peace Arm. The pilot then descended to remain below the cloud and continued in visual meteorological conditions (VMC). Passengers described the actions completed by the pilot; that information is consistent with his using the autopilot for the en route portion of the flight and his not making any radio calls after leaving Mackenzie.

For the return trip to Mackenzie, the pilot had loaded about 500 pounds of cargo in the forward cabin area, immediately aft of the pilot seats, and secured it laterally using cargo restraint straps; as well, about 100 pounds of freight was loaded into the nose locker. Witnesses reported that the pilot did not use the aircraft's wing lockers and that they remained closed during the stop-over at Bear Valley. The aircraft's weight at the time of the accident is estimated to have been about 6 200 pounds, with the centre of gravity at about 156 inches from the datum; both of these values are within the certificated limits.

The exact route for the return flight to Mackenzie is unknown; however, based on the pilot's radio report and the crash site location, his likely route was west from Bear Valley to Williston Lake, and then south to Mackenzie. The altitude for the return trip is unknown, but to remain in VMC, the pilot would have been limited by the overcast layer at about 2 000 feet agl, and by the localized weather conditions reported by several pilots who had flown through the area previously.

The aircraft wreckage was found near the centre of Williston Lake and the mouth of Six Mile Creek and was concentrated in an area of about 100 feet in diameter. The water depth at the crash site was about 160 feet, too deep for scuba divers. Several commercial dive teams completed underwater searches using remotely operated vehicles equipped with video recording systems. After several search efforts, two bodies were located and subsequently recovered, along with a large portion of the associated wreckage in the summer of 1998. This wreckage, as well as the video record taken during the underwater searches, were analysed by the TSB.

The aircraft sustained severe impact damage. The damage patterns on both sides of fuselage and nacelle sections appeared generally symmetrical. The wet fuel bay sections had been torn open. The right wing appeared to be attached to the fuselage, and the wing tip was detached and visible. The nose section of the aircraft was fragmented, and a large section of the right cabin wall was torn open and detached aft of the right wing. The air stair door appeared to be attached and closed. The left nacelle baggage compartment door and its latch were found in an open position before the wreckage was disturbed for recovery.

The forward end of the cabin floor, the left sidewall of the forward cabin, and the right horizontal stabilizer had been crushed in a symmetrical pattern at an angle of 45 to 60 degrees. These crush lines may indicate a steep nose-down attitude at impact, or may have been produced by hydraulic forces applied to the aircraft during a more level impact.

All damage to the primary wing structure was attributed to the impact forces. The empennage sustained severe impact damage, although the rudder and the vertical fin appeared to remain attached. The horizontal stabilizer was pivoted to the right and was nearly detached. The left horizontal stabilizer had sustained severe leading edge mechanical damage outboard of butt line 61.50, and a triangular-shaped section of the aerofoil was missing. The top surface of the stabilizer displayed two sets of wrinkles, one set being a mirror image of the

wrinkles visible on the top surface of the right horizontal stabilizer. The left elevator horn was undamaged and there was no evidence of flutter on the elevator control stops. A small piece of yellow, man-made material, similar to plastic, was lodged in the elevator skin adjacent to the left outboard elevator hinge. The horizontal stabilizer assembly, the left nacelle wing locker, and the recovered foreign substance were forwarded to the TSB Engineering Laboratory for further examination to determine if the damage to the horizontal stabilizer may have occurred before the water impact (LP 001/99).

All discontinuities noted in the flight control system were overload in nature and were attributed to the severe impact forces. Elevator and rudder trim tab actuator measurements were taken. The validity of these measurements as an indicator of the aircraft's pre-impact status is considered to be low because both trim systems are cable-operated and, therefore, subject to movement during a crash. Additionally, the rudder trim actuator was near its full travel position and its actuating cable had failed in overload.

The positions of the landing gear selector and the landing gear up-locks indicate that the landing gear was UP at the time of the accident. Additionally, the wing flap selector was positioned at the 15-degree setting; this selection is supported by the position of the flap actuator chain links and the actuator preselect switch lever, both of which indicated that the flaps were at an intermediate position at impact.

An examination of the left engine found no defect that would have resulted in a sudden or significant loss of power. There was no noticeable difference between the positions of the throttles, propeller controls, or condition levers; all were advanced to positions that were consistent with normal operation. The operation of the engines is supported by cockpit instrument indications captured at impact. The left airspeed indicator, the left turn and bank, the left direction indicator, the engine tachometer, the fuel flow gauge, and the right airspeed indicator minus the dial were forwarded to the TSB Engineering Laboratory for examination. From that examination, it was determined that:

- the heading captured on the direction indicator was 180 degrees;
- the left and right tachometers indicated 2 600 and 2 300 revolutions per minute (rpm), respectively;
- the fuel flow gauges revealed an estimated 160 to 170 pounds per hour; and
- an airspeed indication could not be recovered from the instrument.

The left crew seat had detached from the seat pedestal and was not recovered with the wreckage. However, an examination of the recovered sections of the pilot's station showed that the pilot's seat belt had been buckled, and that the floor section securing the left seat belt anchor had detached from the airframe due to overload; the seat belt would not have restrained the pilot, or held him in the wreckage after this failure occurred. There was no sign of fire on any of the examined components.

The flight dynamics of the aircraft before impact, the original impact point, and the flight attitude at impact were not determined. There were no known eyewitnesses to the crash. The aircraft did not carry flight data or cockpit voice recording devices; this equipment is not required by regulation. Additionally, because the crash occurred on water, there were no ground scars to capture data related to the original impact point and flight attitude. Finally, the high degree of hydraulic damage caused by the water impact tended to mask evidence that would normally be captured by the wreckage.

Terry Air was licensed to operate an air taxi service using a Cessna 402 and a Piper Seneca III aircraft; the company's main base is at Mackenzie. An air operator certificate, number 8360, issued by the Minister of Transport, was in effect at the time of the accident and authorized the company to carry passengers and freight under day, visual flight rules (VFR) or, when authorized by an air traffic control unit, special VFR conditions. Flight operations under instrument flight rules (IFR) or under the VFR over-the-top provisions were specifically prohibited according to the air operator certificate.

Terry Air flight operations were controlled by an operations manager. The operations manager did not hold a current aviation licence, and he had delegated some of his supervisory duties to the company chief pilot; it was the chief pilot who was involved in this accident. The chief pilot was responsible for the direction of safe flight operations and for the professional standards of the flight crews under his authority. At the time of the accident, the company employed one other pilot, and the flying duties were split between him and the chief pilot.

The aircraft was manufactured in 1981, was imported into Canada under an export certificate of airworthiness, issued on 26 April 1996, and was most recently maintained by Hill Aircraft Service Ltd. A review of the aircraft documents revealed that the aircraft was maintained in accordance with the Cessna 402 Progressive Care Program and in accordance with existing directives. The aircraft was last inspected on 06 November 1997, at about 16 612 hours' total airframe time, about 35 hours before the accident.

The aircraft was involved in a landing accident on 18 September 1997; it struck a pile of logs, damaging the left wing tip, the left de-ice boot, and the left aileron. Maintenance records indicate that these components were replaced. The left wing was inspected, and no corrosion or significant damage was found. After the repairs were completed, the chief pilot carried out a flight test and accepted the aircraft back into service. On 03 November 1997, Transport Canada maintenance inspectors reviewed the wing repair records and inspected the aircraft; they concluded that the repairs had been performed correctly and that the aircraft was airworthy. Since the repairs, the aircraft had accumulated about 60 flight hours; there is no indication of any unrectified defect or deferred maintenance action against the aircraft over the period leading up to the accident.

The accident pilot held a Canadian airline transport pilot licence, a current medical certificate, and an endorsement for the aircraft type. He had accumulated about 5 500 flight hours, much of which were VFR flying in northern Canada. He had worked for a regional air carrier in 1991 and 1992 and, at that time, had type-endorsements on the BA31 Jetstream and the de Havilland DHC-8. The pilot's instrument rating had lapsed, and he had failed his two most recent instrument flight tests with Transport Canada inspectors. An instrument flight rating was not required by regulations providing flight operations were conducted under the conditions of the air operator certificate.

Flights between Mackenzie and Bear Valley are conducted entirely within Class G airspace. In the Williston Lake area, flight service stations (FSS) at Prince George and Fort Nelson provide limited in-flight services to low-level aircraft on 126.7 megahertz (MHz). This communication capability does not cover the entire lake, nor does it extend into the Peace Arm. Pilots use 123.2 MHz as well as a VHF/FM radio system for communicating with the logging camps and for providing flight-following reports to their dispatchers.

On the day of the accident, the central interior of British Columbia was under the influence of a strong, south-westerly flow aloft; two weather systems which were embedded in this flow affected the Williston Lake area. The leading disturbance was a Pacific frontal system which traversed the central interior in the morning,

crossing southern Williston Lake at about 1000. A second, smaller system crossed the coast of British Columbia that same morning and the eastern edge of the associated cloud shield reached the Williston Lake area near noon. The trailing edge of this second system passed out of the Williston Lake area at about 1500.

The airmass was moist and stable in the lowest levels but fairly unstable further aloft. The Williston Lake area was generally covered with broken layers of stratus based at 3 000 to 6 000 feet above sea level and topped at 7 000 feet. There were also local embedded alto cumulus castellanus (ACC) clouds generating heavier snow showers which reduced the visibility to as low as ½ mile and formed local precipitation ceilings of 500 feet agl; tops of these clouds reached as high as 21 000 feet.

An analysis of the weather at the Mackenzie airport showed that precipitation from the second weather feature began at 1215. By 1300, the ceiling had dropped to 1 500 feet with a visibility of 3 statute miles (sm). Over the next hour and 45 minutes, the weather conditions deteriorated and remained below VMC. During that period, the Mackenzie automated weather observation site (AWOS) issued 15 special weather reports because of the rapidly changing weather conditions; the lowest ceiling was 200 feet, with 1⅙ sm visibility.

North of Mackenzie, in the vicinity of the accident site, the southern arm of Williston Lake narrows to form a channel. Air flowing northward through this constriction tends to be squeezed and forced gently upwards; this action tends to enhance the risk and intensity of precipitation in the area.

Two aircraft landed at Mackenzie between 1300 and 1315; both had flown through the area where the accident would later occur. The pilots reported that they had encountered significant degradation to the in-flight visibility because of moderate snow. Upon encountering the weather, both pilots had to descend to about 200 feet agl to maintain visual contact with the shoreline and the surface of the lake; neither reported any accumulation of ice on their aircraft. These adverse conditions extended from Scott Creek, at the north end of the Williston Lake narrows, through to Mackenzie. A number of scheduled flights from Mackenzie were subsequently cancelled because of the poor weather conditions. Conclusions of a meteorological analysis following the accident were that the conditions in the narrows at the time of the accident were likely worse than those described by these two pilot reports (pireps), and that the forward visibility in the area may have dropped to as low as ½ mile in heavy snow.

The Cessna 402 had been specifically chartered for this trip because of its higher load-carrying capability. Originally, a stop of 2½ hours had been planned at Bear Valley, with the return trip scheduled to arrive back in Mackenzie at about 1200. The normal seating arrangement incorporated two crew and seven passenger seats; for the accident flight, the first four passenger seats had been removed to accommodate the cargo.

Terry Air's company operations manual (OM) identified the pilot-in-command as responsible for the formulation, execution, and amendment of an operational flight plan, and for ensuring that the flight is conducted in accordance with all applicable regulations. The OM required pilots to obtain appropriate weather information for every flight. Each morning, the Terry Air dispatcher obtains preliminary weather information from an Environment Canada/

NAV CANADA internet site. On the morning of the accident, this information was obtained at 0856 and included terminal area forecasts and actual weather reports for Mackenzie, Fort Nelson, Prince George, and Fort St. John, all valid at 0800. Also, the dispatcher obtained a satellite image of the cloud cover that was over the area at 0730. The weather information did not contain an area forecast, a surface analysis, upper level winds, a significant weather chart, or available pilot reports for the area. Pilots with Terry Air were required to augment

preliminary information by obtaining a weather briefing from the FSS in Prince George before their flights and by contacting personnel at the outlying camps for the latest conditions at the destination airfields. TSB investigators reviewed the Prince George FSS briefing logs, the FSS audio recordings that cover radio frequency and telephone channels, the Terry Air company telephone records of all outgoing calls, as well as records of all incoming calls to the two "1-800" numbers listed in the Canada Flight Supplement. Investigators found no record of the pilot obtaining a formal weather briefing before either flight from Mackenzie or Bear Valley.

Terry Air is required to maintain a flight-following system to monitor a flight's progress and to notify appropriate company personnel and search and rescue authorities when a flight is overdue or missing; this function is normally performed by the dispatcher. Pilots aid in this function by reporting their movements using available communication facilities. On this flight, the pilot contacted the Prince George FSS on radio frequency 126.7 MHz before leaving Mackenzie for the outbound flight to Bear Valley. At that time, he advised the FSS of his departure from Mackenzie, his flight route, and that there was two inches of snow on the runway at Mackenzie. There is no record of any further radio calls from C-GKWV on 126.7 MHz. Using the FM radio, the pilot reported his departure from Mackenzie to the company dispatcher; this was the only transmission received from the pilot during the outbound leg to Bear Valley. On the return trip to Mackenzie, the pilot broadcast his departure time as 1302 on the FM radio; that report was not heard by the company dispatcher likely because of radio coverage limitations, but the Bear Valley camp informed the dispatcher of the aircraft's departure by telephone at 1305. The pilot contacted the dispatcher at 1320, after leaving the Peace Arm, and gave 1340 as an estimate for Mackenzie.

Canadian Aviation Regulations 703.27 and 703.29 provide a level of safety to VFR operations by legislating minimum obstacle clearance requirements, and by requiring pilots to avail themselves of current weather reports and forecasts before commencing a flight. In part, these regulations require that no person shall commence a VFR flight unless current weather reports and forecasts indicate that the weather conditions along the route to be flown, and at the destination aerodrome, will be such that the flight can be conducted in compliance with VFR. Additionally, except when conducting a take-off or landing, no person shall operate an aeroplane in day, VFR flight at less than 300 feet agl or at a horizontal distance of less than 300 feet from any obstacle.

Analysis

A complicated weather pattern was affecting the area; the essential elements of this weather were the risks of encountering reduced ceilings and visibility in the vicinity of a surface trough or in the area of embedded ACC/towering cumulus (TCU) clouds. With the exception of these localized risks, the flying area was generally overcast and suitable for VFR flight.

There was no indication that the pilot obtained a complete pre-flight weather briefing before either flight from Mackenzie or Bear Valley; without such a briefing, he would not have been aware of information contained in the area forecast, the surface analysis chart, the significant weather chart, or the pireps for the area; specifically, he would not have been aware of the risk of reduced visibility below VMC in the vicinity of embedded ACC/TCU clouds.

While the pilot was in Bear Valley, the weather in the Mackenzie region began to deteriorate to below VMC minimums. Although specific information about these deteriorating weather conditions had been discussed on the radio by two other pilots, the pilot of the accident aircraft would not likely have heard these transmissions because, at the time they were made, he was flying westward in the Peace Arm and was outside radio coverage. It is unlikely that the reported conditions would have improved significantly over the short period leading up to the accident; in fact, the general trend at Mackenzie was for a continued degradation of both the ceiling and the visibility, to the point that subsequent flights out of Mackenzie were cancelled.

When the pilot reported out of the Peace Arm at 1320, the company dispatcher informed him that the visibility at Mackenzie had dropped to two miles. Although informed of the deteriorating visibility, the pilot did not contact the Prince George FSS for a weather update; therefore, he would not have been aware of the new terminal forecast for Mackenzie effective at 1300. As well, he would not have known that the AWOS in Mackenzie was generating numerous special reports on the rapidly changing weather conditions, nor would he have been aware that the visibility in Mackenzie had dropped below VMC.

The Terry Air company OM specifically disallows operations under IFR or VFR over-the-top. The pilot, without an instrument rating, only had as permissible options, when encountering deteriorating weather, to turn back to his departure point or proceed to another suitable airport.

The crash site location reveals that the pilot entered the area of deteriorating weather and reduced visibility. It is therefore likely that he encountered similar conditions to those reported by the pilots who had flown through the narrows before him. In both those cases, the degraded weather had forced those pilots to descend to about 200 feet agl to maintain visual reference with the shoreline. The risks of conducting VFR flight under these conditions are known and are mitigated, to a degree, by the establishment of a minimum obstacle clearance altitude of 300 feet agl and by a minimum visibility requirement of 2 miles. Continuing a VFR flight at an altitude or visibility below these stated minimum values is considered to be unsafe and is not permitted by regulation.

The lack of radio calls on frequency 126.7 MHz, as noted on both the outbound and return legs of this trip, increased the risk to the flight by degrading the continuity of the flight-following. The lack of radio transmissions increased the risk of meeting opposing traffic in narrow areas of the lake and reduced the opportunity for other aircraft or FSS facilities to communicate pertinent information related to weather or flight safety.

A witness report of the pilot's radio call at about 1330 establishes that, in the time frame immediately preceding the accident, the radio transmitter was operational, was tuned to the Bevel Mountain FM frequency, and electrical power was available to run the radio system.

The precipitating cause of this accident is not known; however, because the pilot did not report any ongoing problem to the dispatcher or the FSS, it is likely that this accident occurred suddenly, and with little warning. Because the weather was known to be below VMC, the risk of inadvertently striking the terrain while in controlled flight was increased. However, it is also possible that some unknown mechanical malfunction may have occurred.

This aircraft had been involved in a previous accident. Its repair and return to service after that accident were checked and monitored by an approved maintenance organization, and by both the chief pilot and maintenance

manager of Terry Air. Additionally, the aircraft had passed an independent inspection conducted by two Transport Canada airworthiness inspectors. The aircraft had flown more than 60 hours after being accepted back into service following the wing repair and was reported to have had no documented unserviceabilities raised against it by either of the company pilots. For those reasons, the possibility of a causal link between the previous repair activity and the current accident is considered unlikely.

The likelihood of an in-flight break-up is considered to be remote; a major structural failure at altitude would normally cause aircraft wreckage to be scattered over a wide area; the debris trail associated with this accident was found within a small area which contained the major structural components of the aircraft.

There was no evidence of any fire damage on any of the examined pieces which included cockpit, engine and interior cabin components.

An evaluation of the recovered wreckage indicates that both aircraft power plants were likely operating at or above normal cruise power settings at the time of the crash. Regardless, pilots should normally be able to maintain control of an aircraft in the event of an engine failure, especially if operating under visual conditions as required by the operating certificate.

Crush angles on the recovered wreckage are inconclusive; they may indicate that the aircraft struck the water in a steep nose-down, slightly left-wing-low attitude, or they may have been caused by hydraulic action when the aircraft entered the water in a more level flight attitude.

The left horizontal stabilizer exhibited a mechanical damage pattern that appeared inconsistent with damage on adjacent portions of the aerofoil. Despite a detailed engineering examination of the involved components (LP 001/99), results were inconclusive as to whether this impact damage took place in flight, or at some time during the break-up sequence before the stabilizer contacted the water. There was no evidence of paint, bird, animal, or vegetation transfer in the vicinity of the damaged aerofoil. The yellow material found wedged in a fracture adjacent to the outboard trailing edge of the left horizontal stabilizer was not identified, nor was there sufficient physical evidence to conclude that it was part of the object responsible for the damage. Although the left baggage compartment was found with its door open and latch in the open position, it could not be conclusively determined that the compartment door was open before impact.

The extensive break-up and fragmentation of large sections of the airframe indicate that the aircraft sustained a rapid deceleration on impact. The deceleration would have produced high g-force levels, above the seat belt design criteria and near maximum human tolerance levels. The likelihood of survival in this case would be low because of the overstress and failure of the seat restraint systems. The presence and the method of securing the interior cargo would have further degraded the chance of survival for the occupants.

The following Engineering Branch reports were completed:

LP 094/98 Exhaust Stacks Analysis
LP 001/99 Wreckage Evaluation

Findings

1. The aircraft had been involved in a previous landing accident at Bear Valley on 18 September 1997; the likelihood of a link between the previous damage and the Williston Lake accident is considered to be remote.
2. There were no reported aircraft unserviceabilities before the flight, and aircraft maintenance records indicate that the aircraft was maintained in accordance with the applicable standards of airworthiness.
3. The aircraft's weight and balance were within the certificated limits.
4. In accordance with its air operations certificate, Terry Air is licensed as a day VFR operation only with operations under IFR or under VFR over-the-top specifically disallowed.
5. A complicated weather pattern was affecting the area; the essential elements of this weather were the risks of encountering reduced ceilings and visibility in the vicinity of a surface trough or in the area of embedded ACC/TCU clouds.
6. There is no evidence that the pilot obtained a complete weather briefing before either the flight from Mackenzie to Bear Valley, or the return.
7. There is no record to indicate that the pilot made any position reports on 126.7 MHz on the flight from Mackenzie or Bear Valley.

8. Over the period of this flight, the weather from Scott Creek, at the northern end of the Williston Lake narrows, through to Mackenzie dropped below VMC because of a localized disturbance related to embedded ACC/TCU clouds.
9. Although two other pilots had reported difficulty with the weather south of Scott Creek, the pilot of the accident aircraft would likely not have been aware of this because he was in the Peace Arm, beyond radio coverage.
10. Based on the crash location, it is apparent that the pilot continued southward and entered the area of reduced visibility.
11. The pilot was experienced at operating under VFR but had recently displayed some weaknesses in his instrument flight ability. His instrument rating had lapsed and he was not authorized to conduct instrument flight under the conditions of his licence.
12. Any attempt to continue the flight at low altitude in below VMC conditions would have increased the risks associated with the operation.
13. Recovered wreckage indicates a likelihood that both engines were operating at or above cruise power at the time of the crash.
14. Flight dynamics before impact are not known.
15. Crush angles on the recovered wreckage are inconclusive; they may indicate that the aircraft struck the water in a steep nose-down, slightly left-wing-low attitude, or they may have been caused by hydraulic action when the aircraft entered the water in a more level flight attitude.
16. The likelihood of an in-flight break-up is considered to be remote.
17. There was no sign of any fire damage to either engine or cabin components.
18. There is evidence to conclude that the leading edge tip of the left horizontal stabilizer was struck by an object before the stabilizer struck the water, but the nature of this object was not identified; likewise, it was inconclusive as to whether this impact took place in flight, or at some time during the break-up sequence before the stabilizer contacted the water.
19. The source of a small piece of yellow material found wedged in the fracture adjacent to the outboard trailing edge of the left horizontal stabilizer was not identified, nor was there sufficient physical evidence to conclude that it was part of the object responsible for the damage.
20. The accident was not survivable.

Causes and Contributing Factors

The cause of this accident is undetermined; however, it is probable that low-level, visual flight in deteriorating weather contributed to the accident.

Safety Action

Safety Action Taken

Elevated risks associated with air taxi operations have been recognized throughout the industry. In response, Transport Canada formed a task force which included representatives from Transport Canada system safety, commercial and business aviation and airworthiness branches, to study the safety of air taxi operations (SATOPS). The objective of the task force was to identify how the safety of air taxi aircraft can be improved and to recommend ways to reduce the number of accidents. In the *SATOPS Final Report Spring 1998*, a number of areas have been identified where improvements could be made to increase the safety of air taxi operations. The SATOPS recommendations have been divided into 13 general categories: Airworthiness, Client Pressures, Communication, Decision Making/Human Factors, Flight Training Units, Management, Navigation, Operating Pressures, Operating Problems, Statistics, Training, Transport Canada, and Weather. Transport Canada will produce a status report which will be published every six months to track the ongoing progress of the implementation plan and to advise the industry of the status of the recommendations.

Following this accident, Terry Air signed a memorandum of understanding with the Prince George FSS; the FSS will provide Terry Air with available weather information, excluding graphic products, on a scheduled basis.

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 28 July 1999.