

AMENDED REPORT

AVIATION INVESTIGATION REPORT

A00W0177

LOSS OF CONTROL—COLLISION WITH WATER

ROYAL CANADIAN MOUNTED POLICE

CESSNA 208 CARAVAN I C-GMPB

TESLIN LAKE, BRITISH COLUMBIA

14 AUGUST 2000

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.

Aviation Investigation Report

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Summary

A Cessna 208 Caravan I on amphibious floats, C-GMPB, serial number 20800082, was ferrying members of the Royal Canadian Mounted Police (RCMP) Emergency Response Team from Teslin, Yukon, to a site on the south end of Teslin Lake, British Columbia. At about 1645 Pacific daylight time, three team members, two dogs, and gear were unloaded on a gravel bar across from the mouth of the Jennings River. The aircraft departed for the Teslin airport at about 2355 with the pilot and one RCMP engineer on board. Shortly after take-off, the aircraft was seen to pitch up into a steep climb, stall, then descend at a steep angle into the water. The aircraft was destroyed, and the pilot and the passenger were fatally injured.

Ce rapport est également disponible en français.

Other Factual Information

The proposed four-day itinerary involved transporting several Royal Canadian Mounted Police (RCMP) Emergency Response Team (ERT) members and dogs from the Teslin, Yukon, airport to the south end of Teslin Lake, British Columbia, supporting them during a training session, and attending a memorial for a member killed on duty at that location.

The Caravan departed Prince Rupert, British Columbia, on August 14 at 1216 Pacific daylight time¹ on a visual flight rules flight plan for Dease Lake, British Columbia, with subsequent stops in Teslin and Whitehorse, Yukon. On board were the pilot, one ERT member, and a relief base maintenance engineer (the engineer), all RCMP members. At 1542 the Caravan arrived in Teslin, and the aircraft was configured to transport three ERT members, two dogs, and equipment. At 1622 the aircraft departed for the south end of Teslin Lake, 32 nautical miles away. The aircraft landed on the lake at 1645 and nosed into a gravel bar for deplaning. After unloading the passengers and their equipment, the aircraft was pushed off the gravel bar, and the pilot proceeded with the engine start at approximately 1705. The aircraft was still pointed toward the beach, and the pilot used a considerable amount of power to turn left to taxi out toward the proposed take-off area. In doing so, the aircraft became beached past the location on the gravel bar where the passengers had been dropped off.

RCMP procedure for beach operation of the Caravan is to nose the aircraft onto the beach then attach a rope to the back of the float and turn the aircraft so the heels of the floats are on the beach. This procedure expedites departure and prevents damage to the water rudders that could result from sailing the aircraft back onto the beach with wind or reverse power. It is not known why the pilot did not follow this procedure. Over the next six hours, the pilot tried to dislodge the aircraft and was in and out of the cold water with a small shovel and a paddle trying to dig out the gravel from under the back part of the floats. The pilot also used reverse thrust from the engine to try to move the aircraft. ERT members assisted as they set up their camp. One member called the Terrace, British Columbia, detachment on his satellite phone at about 1830, requesting assistance. The Teslin RCMP office then sent two members of its force, the engineer, and the two remaining ERT members in a boat that arrived at the camp at approximately 2300. With everyone helping, the aircraft was dislodged at about 2320. At 2335 the two Teslin members departed in the boat to return to Teslin.

There were discussions among the pilot, the engineer, and the other RCMP members about the advisability of flying back to Teslin at night. The pilot was offered shelter, hot food, and drink, but decided to depart for Teslin, with the engineer agreeing to accompany the pilot. At 2350, after the engineer had pumped the floats, the pilot started the aircraft and taxied down the lake for a short distance before returning to start the take-off run. The pilot took off downwind in the same northerly direction as the RCMP boat. When the members on the boat saw the approaching aircraft, they flashed their lights. The aircraft altered course and passed over the boat at about 100 feet, then entered a steep climb. At the top of the climb, it stalled and yawed to the left. The aircraft descended and struck the water in a near-vertical attitude, at approximately 2357, during the hours of darkness.

The aircraft struck the water about 200 metres from the RCMP boat, which responded immediately. They observed the aft fuselage and empennage descending below the surface, and the emergency liferaft deploying and inflating. Due to the nature of the impact forces, the accident was not survivable. The pilot was wearing his

¹ All times are Pacific daylight time (Coordinated Universal Time minus seven hours).

seat belt but not his shoulder harness, and the passenger was wearing his seat belt and his right shoulder harness. The emergency locator transmitter did not activate and was not recovered during the salvage operation.

The pilot had a valid airline transport pilot licence. He was certified but was not qualified for the night flight. The pilot's total night flying experience was about 188 hours, with his last recorded night flight of 0.9 hours on 13 January 2000 in a Pilatus PC-12. There was no record indicating the pilot received night training for operations on floats, nor did the pilot's logbook show any flight time at night on the Caravan. He had a total of 3768 flying hours, of which 282 hours were on type. The pilot had received RCMP training in pilot decision making, human factors, and crew resource management. He had been on duty for about 16 hours before the accident. The autopsy, toxicology, and medical records revealed no indication that the pilot's performance was degraded by physiological factors.

The aircraft was certified, equipped, and maintained in accordance with existing regulations and approved procedures. The weight and the centre of gravity were within the prescribed limits. No indication was found of any unserviceability or malfunction before impact. The aircraft was not equipped with a flight data recorder or cockpit voice recorder, nor was such equipment required in accordance with the *Canadian Aviation Regulations* (CARs). The aircraft was fully equipped with standard navigation equipment, including a global positioning system.

The terminal aerodrome forecast for Teslin was issued at 1253 on August 14, valid from 1300 to 1800. Wind was 220 degrees magnetic (°M) at 10 knots, visibility 6 statute miles (sm) in light rain, clouds 4000 feet above ground level (agl) broken and 8000 feet agl broken. Temporarily for the entire period, visibility 5 sm in light rain showers and mist, clouds 1500 feet agl scattered and 3000 feet agl overcast. The next forecast would be issued at 0745 the following morning.

The last aviation routine weather report (METAR) observation for Teslin was at 1800, as follows: wind 200°M at 8 knots; visibility 20 sm in light rain; a few clouds at 3600 feet agl, 8500 feet agl broken, 10 000 feet agl overcast; temperature 12°C; dew point 6°C; altimeter setting 29.84 inches of mercury. Remarks: stratocumulus 2 octas, altocumulus 4 octas, altostratus 2 octas, light rain intermittent.

The automatic weather reporting station (AUTO2) for Teslin recorded the following weather at 2300: station level pressure 1013.4 millibars, temperature 8°C, dew point 7°C, wind calm. At 0000 (midnight) the report was station level pressure 1013.6 millibars, temperature 8°C, dew point 7°C, and wind 360°M at 3 knots. At 0200 on August 15 the weather report was wind calm, visibility 5 sm in light rain, a few clouds at 1200 feet agl, overcast at 4000 feet agl, temperature 8°C, dew point 7°C, and altimeter setting 29.89 inches of mercury.

Members of the ERT reported the weather at the site as being overcast at about 2000 feet agl with intermittent light rain. The wind was from the south at about 5 to 10 miles per hour in dark night conditions, although the shoreline and mountain outlines were visible.

Sunset on August 14 for the accident site was 2141, and civil twilight ended at 2232. Civil twilight the next morning was at 0515.

The RCMP Air Services Branch (ASB) began an extensive reorganization in June 1999 that was still ongoing at the time of the occurrence. The office of the director of operations was in Ottawa, Ontario, at head office. Reporting to the director was the chief pilot, who had offices in Ottawa and in Montréal, Quebec, and the director of maintenance in Ottawa. The position of dedicated safety officer was eliminated in 1997, and the

position of dedicated training officer was eliminated in 1998. The responsibilities of the training and safety officer positions were added to the duties of other personnel.

ASB policy was developed by head office; however, a mechanism was in place to allow for the development and implementation of divisional and local policy. Each ASB detachment conducted its daily operation by self-authorization and self-dispatch. Flight operations relied considerably on the flight crew's initiative and professional self-discipline. For example, ASB had no national policy on canine sky cages; however, local detachments could implement such a policy. When an operational question of safety arose, the pilot had the final decision.

RCMP air operations fall into two categories as defined by the CARs: 604 operations—Private Operator Passenger Transportation (ex. Pilatus PC-12) and non-604 operations (ex. helicopter, Caravan). Transport Canada requirements are very different for the two types of operations: the 604 operations have more requirements and are subject to Transport Canada approval and audit. For the Caravan operations, the pilots abided by the CARs; there were no additional company rules, regulations, or current, concise standard operating procedures (SOPs). Regarding night operations, CAR 602.40 states that no person shall conduct a night landing or take off from an unlit aerodrome, except to save human life or to conduct a police operation in the service of a police authority.

The RCMP had no additional guidelines or SOPs for night operations, since night operations on floats or from unlit aerodromes are not recommended. RCMP pilots do not receive any training in night float operations.

Initial type training for the Caravan was conducted at Flight Safety in Orlando, Florida, followed by training by another RCMP pilot at the trainee's local detachment. Training at local detachments was provided by senior pilots who were not required to have an instructor's rating. Given the small size of many air sections, the senior pilot may have been the only other pilot at the detachment, as in this case. The training period continued until the senior pilot was satisfied with the incoming pilot's proficiency in all aspects of operating the aircraft, after which an evaluation and recommendation was submitted by the senior pilot to the chief pilot.

While there was no requirement for structured recurrent training on the Caravan, the RCMP's policy was to fund such training on aircraft such as the Caravan or larger aircraft. Non-mandatory training requests were funded when surplus training funds were available. It was mandatory for all pilots to have had training on pilot decision making / human factors, and pilots working operations other than single-pilot operations were required to have crew resource management training.

Pertinent safety information received by head office was disseminated to the fleet. However, ASB had no formalized safety management program to assist in the development and maintenance of national safety standards or to assist in the timely dissemination of information for the prevention of judgement-related accidents. The collection and dissemination of any educational, awareness, and safety literature was left to the discretion of the individual detachments. A national safety meeting had not been held in the two years preceding the accident.

The float plane operation in Prince Rupert was the only RCMP float plane in the fleet. Exchange of ideas on best practices for operations was not available in-house and was gathered from industry sources throughout North America.

The pilot reportedly was not supportive of the exercise, as he perceived that it was not a direct police action, and it would necessitate being away from home for several days. On arrival at Teslin, he found an extra person waiting that was not listed as a member of the exercise. He refused to transport the extra person, who was an RCMP member and a spouse of one of the dog handlers. The pilot was also reported to have been upset that the dog handlers had not brought sky cages for their dogs.

There was no indication that the pilot had eaten a meal since departing Prince Rupert at 1216 and during most of the time that the aircraft was stuck on the sandbar. He was observed to consume some cookies and soft drinks about two hours before departure.

Spatial disorientation can be defined as a pilot's failure to sense correctly—as a result of conflicting sensory information—the gravitational vertical and the position, motion, or attitude of the aircraft with respect to the earth's surface. Tests conducted with qualified instrument pilots have demonstrated that it can take up to 35 seconds to establish full control by instruments after the loss of visual reference to the earth's surface. Disorientation is more likely when surface references and the horizon are obscured, a situation that is common on over-water flights at night—especially in extremely sparsely populated areas or in low-visibility conditions. Fatigue and hypoglycemia can also alter physiological processes and increase susceptibility to disorientation.

Analysis

Sufficient information is not available to understand fully why the pilot decided to taxi from the location close to the beach or why, although recommended, he did not turn the aircraft to point away from the beach after landing or before launch. The information collected indicates that, although the pilot had experience turning the aircraft on floats, he apparently did not have any experience turning under these particular conditions. His use of considerable engine power close to the beach resulted in the aircraft beaching itself to such an extent that it could not be dislodged by the use of reverse power, nor with the combined efforts of the four persons at the site, even after digging material out from under the floats.

The pilot had the ability and the knowledge to recognize the dangers associated with take-offs from unlit locations; nonetheless, he elected to leave. The investigation revealed that it is probable that the pilot's motivation for attempting the take-off from the lake was to seek more comfortable overnight lodging instead of camping in the rain. This decision was likely the result of the unusually high number of stressors experienced by the pilot on that day, starting with the problems on arrival at the Teslin airport of an extra passenger and no sky cages for the dogs. Beaching the aircraft and trying unsuccessfully to free it compounded the stress. Additional stresses were created by the long delay, the physical fatigue from working in cold water with very little food intake for a long time, a long duty day, and the prospect of having to camp overnight because of darkness. The pilot's decision to take off was risky under the circumstances. Meeting the requirements of a regulation does not ensure that an operation is safe. Regulations simply define the limits, beyond which the regulator deems operations unacceptable. It is not uncommon for pilots to operate within the limits of the regulations but outside of their personal safety limits. In this instance, the pilot's judgement about his performance or personal safety limits was possibly impaired by stressors such as schedules, fatigue, and workload.

The aviation industry employs a number of methods to enhance pilot decision making and judgement. One such method is the development of SOPs. Among other benefits, SOPs can establish limits or acceptable tolerances of particular aspects of an operation. The industry has also recognized the benefits of a formalized safety management program to assist in the development and maintenance of company-wide standards and to assist in

the timely dissemination of information to enhance pilot awareness of relevant safety issues. The pilot was unable to utilize these added benefits to his decision-making skills because no current, concise SOPs and no formalized safety program were available.

With the elimination of the dedicated positions of safety and training officer, all national aspects of operation fall onto the ASB manager and the chief pilot. Isolated detachments and the decentralized nature of the ASB create a challenge in disseminating needed continuing training and safety information.

Given that the investigation did not identify any mechanical malfunction of the aircraft, it is most likely that the pilot experienced spatial disorientation. While the actions of the aircraft do not follow a standard pattern of disorientation, the conditions in which the pilot was flying (over water at night with overcast skies and rain showers; an unlit, sparsely populated mountainous area; aircraft landing lights the only illumination; and the glare of instrument lights reducing outside visibility) are elements that create a high risk for spatial disorientation.

The following TSB Engineering Laboratory Report was completed:

LP 119/00—Instruments and Avionics Examination

This report is available upon request from the Transportation Safety Board of Canada.

Findings as to Causes and Contributing Factors

1. The pilot's decision to depart from the unlit location was likely the result of the many psychological and physiological stressors encountered during the day.
2. The pilot most likely experienced spatial disorientation—precipitated by local geographic and environmental conditions—and lost control of the aircraft.

Findings as to Risk

1. Without a safety management program that routinely disseminates safety information, RCMP pilots may be inadequately sensitized to the limitations of decision making and judgement.
2. The RCMP had no current, concise standard operating procedures (SOPs) for its non-604 operations. Without useable SOPs, the pilots in some instances operate without clearly established limits and outside of acceptable tolerances.

Safety Action Taken

The RCMP has reinstated and is currently staffing dedicated positions for safety officers and training officers. This action will facilitate the provision of continuing training and safety information to RCMP pilots and promote good decision making and judgement.

The RCMP is currently developing concise and up-to-date standard operating procedures for non-604 operations.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 08 November 2001.