

AVIATION OCCURRENCE REPORT

COLLISION WITH WATER

CASTLE ROCK EXPLORATION CORP.
DE HAVILLAND DHC-2 BEAVER C-FFHF
PORTAGE LAKE, LABRADOR 3 KM NE
30 SEPTEMBER 1996

REPORT NUMBER A96A0175

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 pilot of C-FFHF, a float-equipped de Havilland DHC-2 Beaver, departed the company camp at Ugly Lake, Labrador, en route to Goose Bay. Prior to arriving at Goose Bay, the pilot contacted an overflying Air Labrador flight and advised them that he had landed on a pond and that he needed the SAR (search and rescue) time extended on his flight plan. The pilot also said that he would be departing the pond shortly, en route to Goose Bay. When C-FFHF did not arrive at the destination by the SAR time of 2030 Atlantic daylight saving time (ADT), a search was commenced.

Seven days later, an oil slick and a paddle with the company name on it were identified on a pond about 66 nautical miles (nm) north of Goose Bay. Divers located the aircraft wreckage in 120 feet of water. The aircraft was destroyed and the bodies of the pilot and passenger were located inside the wreckage.

Ce rapport est également disponible en français.

¹ All times are ADT (Coordinated Universal Time minus four hours) unless otherwise noted.

Other Factual Information

The pilot held a commercial pilot licence with an instrument rating endorsement and had about 894 hours total flight time. He had been based in Goose Bay since June and had flown C-FFHF about 234 hours during the 90 days prior to the accident.

The aircraft had recently been registered privately to Castle Rock Exploration Corporation and was used mainly for flights between the company base camp at Ugly Lake and Goose Bay. On 30 September, the pilot departed Goose Bay to deliver helicopter parts to Ugly Lake and return with one passenger, a company junior geologist. The weather conditions at Goose Bay deteriorated after C-FFHF departed. The aircraft arrived at Ugly Lake after a refuelling stop and then departed for the return visual flight rules (VFR) flight to Goose Bay.

During the flight south to Goose Bay, the pilot of C-FFHF was in communication with several aircraft. A pilot who was flying a single-engine Otter south to Goose Bay asked the pilot of C-FFHF, who was further south, for the en route actual weather. The pilot of C-FFHF replied that an Air Labrador flight en route to Goose Bay had encountered snow showers.

The Otter pilot advised TSB investigators that the visibility had deteriorated during his flight south to Goose Bay. He remarked that he entered a band of snow showers north of Goose Bay (an area that included the accident site), extending west to east across his intended route. The pilot had maintained visual reference with the ground by flying as low as 100 feet above ground level (agl) and continued south by following shorelines where possible. Rough water conditions due to strong winds were observed on the lakes overflowed en route. The pilot arrived at Goose Bay about 1735.

The pond where the accident took place was 1,000 feet above sea level (asl), about 3 kilometres (km) long and 1 km wide, with a small island near the centre. The terrain surrounding the shoreline rose gradually to 1,200 feet asl.

The aircraft wreckage, located by divers using a remotely operated video camera, was in 120 feet of water, and the bodies of the pilot and passenger were observed in the wreckage, in their seats with their seat-belts secured. The right wing was separated from the fuselage and the bow of each float was deflected up. There was substantial damage to the aircraft, although the empennage appeared intact and undamaged.

During the initial salvage operation, the aircraft's empennage separated from the fuselage. The pilot's body remained in the wreckage and was recovered. The passenger's body and passenger seat fell out of the wreckage during the salvage operation and were not found and recovered until 08 July 1997 during a search by the RCMP. It was determined that the seat attach points had failed during the impact. Autopsy results indicated that the pilot died from impact-force-related injuries; there was no evidence of drowning. The passenger also died as a result of impact injuries.

C-FFHF was not equipped with shoulder harnesses for the occupants. The lap belts installed on the aircraft met the minimum requirements of the Canadian Aviation Regulations. It has been proven that shoulder harnesses provide aircraft occupants with greater protection than lap belts alone.

Several weeks later, the aircraft wreckage was removed from the accident site and the aircraft journey log-book was recovered. It indicated that C-FFHF had departed Ugly Lake at 1427 and landed on a pond 70 miles north of Goose Bay at 1620. For the last flight leg, from the pond to Goose Bay, the aircraft take-off weight was recorded as 4,719 pounds, which included 300 pounds of fuel. There was no evidence that a cargo net was installed in the aircraft at the time of the accident, although cargo including empty propane tanks was carried onboard the aircraft.

The Goose Bay terminal forecast for the accident date was as follows:

0100-1100: scattered cloud at 4,000 feet, ceiling 6,000 feet broken, visibility greater than 6 miles.

1300-1500: overcast ceiling at 2,000 feet, visibility 4 miles in light rain showers.

1500-1800: overcast ceiling at 600 feet, visibility one mile in light rain and mist.

Records indicate that the aircraft was maintained in accordance with Transport Canada requirements and had about 13,200 hours total time since new. A 100-hour maintenance inspection was completed on 09 September 1996. During this inspection, an engine cylinder assembly was replaced; the aircraft had flown 62.5 hours since the inspection. There were no aircraft deficiencies entered in the journey log-book.

The aircraft flight manual (AFM) indicates that the aircraft take-off speed is 55 to 65 miles per hour (mph). When landing, a final approach speed of 65 to 68 mph should be maintained to touchdown. The aircraft stall speed is 45 mph at a gross weight of 5,100 pounds with power off and landing flaps selected.

The airframe, aircraft instruments, engine, propeller, and exhaust stacks were analyzed by the TSB. Visual examination of the wings, engine, and float strut/cross-member attachment points assessed the failure mode as overload from impact forces. The wings separated forward in relation to the fuselage, and the right front float-strut attachment point sustained considerably more damage than the other three float-strut attachment points. The observed wreckage damage was consistent with heavy contact with the water in a nose-down, right-bank attitude. The wing flaps were at about 28 degrees extension (take-off flap is about 39 degrees).

The vertical speed indicator (VSI) was indicating 2,000 fpm down, which is its maximum down indication. Indicated airspeed (IAS) was between 100 and 110 mph at impact; the baroscale on the altimeter was set at 29.73 inches of mercury (in. Hg.) and the engine manifold pressure (MAP) gauge was indicating in the range of 28 to 31.5 in. Hg. The remaining instruments did not provide any reliable information.

The engine teardown analysis did not reveal any internal failure or mechanical malfunction. The propeller teardown analysis identified that the propeller was at the low pitch blade setting when the aircraft struck the

water. Oil under pressure is supplied to the propeller by the propeller governor, and maintains the blades at low pitch when selected by the pilot. If the engine was not operating prior to impact, loss of oil pressure to the propeller would have resulted in the propeller counterweights rotating the blades to a higher pitch. When the aircraft is in cruise configuration, the propeller is normally set to a higher pitch.

A section of engine crushed exhaust stack was analyzed to identify a temperature range of the metal when it was crushed. The exhaust stack crush analysis was considered inconclusive because the aircraft had struck the water, effectively quenching the exhaust stack metal.

Analysis

The weather at Ugly Lake was suitable for VFR flight and the pilot made the decision to depart for Goose Bay. En route weather that included rain and snow showers with reduced visibility was reported by other pilots who were airborne about the same time as C-FFHF, and these conditions were also predicted in the terminal forecast for Goose Bay. If the pilot of C-FFHF had a mechanical problem with the aircraft, it is likely that he would have communicated this information to the overflying aircraft. Since there is no evidence that there was a mechanical problem with the aeroplane, it is likely that the pilot flew C-FFHF into deteriorating weather conditions as he approached Goose Bay from the north, and that he landed on the pond to wait for improving weather conditions.

The last radio transmission from the aircraft was at about 1725, when the pilot relayed his intention of departing the pond momentarily. Any extended delay in departure from the pond would have required the pilot and passenger to spend the night there due to inadequate daylight time remaining to complete the trip to Goose Bay. It is probable that the pilot, aware of the strong winds, rough water conditions, and impending darkness, departed the pond hoping that the visibility to the south was sufficient to complete the flight, rather than spend the night on the pond.

The 2,000 fpm (minimum) descent rate and the airspeed indication between 100 and 110 mph suggests that the aircraft was in a phase of flight other than take-off at the time of the accident. The MAP gauge indication was consistent with an engine operating within the cruise power setting range. The same indication would also be present if the engine was not operating, because the MAP gauge would then indicate field barometric pressure. However, the engine teardown analysis indicated that the engine was capable of producing power. Since the aircraft flaps were set to 28 degrees, with MAP between 28 and 31.5 in. Hg, and the propeller blade angle at low pitch, it is likely that the aircraft was configured for slow flight, because of the poor visibility.

Although it is difficult to determine if shoulder harnesses would have provided increased protection for the occupants in this occurrence, they still provide more protection than lap belts alone.

It is probable that the pilot was unable to maintain visual reference with the surface sometime after take-off from the pond. The aircraft struck the water either during the pilot's attempt to regain visual reference or because the pilot lost control of the aircraft in reduced visibility.

The following Engineering Branch reports were completed:

LP 153/96 - Instruments Examination;
LP 157/96 - Engine Disassembly Examination;
LP 158/96 - Propeller Examination; and
LP 170/96 - Exhaust Stack Temperature Analysis.

Findings

1. The pilot held a commercial licence with 894 hours total flight time.
2. There was no evidence to suggest that the pilot landed on a pond north of Goose Bay because of mechanical problems.
3. The weather in the area at approximately the time of the occurrence was reported as reduced visibility in snow showers with high winds.
4. Both the pilot and passenger were found in their seats with their seat-belts secured.
5. The body of the passenger and the passenger seat fell out of the wreckage during the salvage operation and were finally recovered on 8 July 1997.
6. Autopsy results determined that both the pilot and the passenger died from injuries sustained at impact.
7. Records indicate that the aircraft was maintained in accordance with existing regulations.
8. The aircraft struck the water in a nose-down, right-wing-low attitude with a rate of descent of at least 2,000 feet per minute, an airspeed of 100 to 110 knots, and a manifold pressure of 28 to 31.5 in. Hg.
9. The engine was capable of producing power, and there was no evidence of a mechanical malfunction.
10. The propeller was at the low-pitch blade setting when the aircraft struck the water.

Causes and Contributing Factors

It is probable that the pilot was unable to maintain visual reference with the surface sometime after take-off from the pond. The aircraft struck the water either during the pilot's attempt to regain visual reference or because the pilot lost control of the aircraft in reduced visibility.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board, consisting of Chairperson Benôt Bouchard, and members Maurice Harquail, Charles Simpson and W.A. Tadros, authorized the release of this report on 23 July, 1997.