

Transportation Safety Board  
of Canada



Bureau de la sécurité des transports  
du Canada

## AVIATION INVESTIGATION REPORT

A05P0262



### HELICOPTER ROLL-OVER – GLASSY WATER

**FAR WEST HELICOPTERS  
BELL HELICOPTER 206B C-GCQT  
DEVILS LAKE, BRITISH COLUMBIA  
26 OCTOBER 2005**

**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.

## Aviation Investigation Report

### Helicopter Roll-over – Glassy Water

Far West Helicopters  
Bell Helicopter 206B C-GCQT  
Devils Lake, British Columbia  
26 October 2005

Report Number A05P0262

### *Summary*

The Bell 206B helicopter (registration C-GCQT, serial number 492), equipped with fixed float landing gear, was carrying out lake water sampling operations for Environment Canada. It departed Chilliwack, British Columbia, with one pilot and two Environment Canada employees on board. Their mission involved landing on lakes north of the Vancouver lower mainland area to collect water samples. Following landings on eight different lakes, where the winds were light and variable, they attempted to land on Devils Lake, where the wind was calm. The water was quite glassy and was shaded from the sun by hills. The pilot made a shallow approach from the south to the middle of the lake, with reference to the shoreline 200 to 400 metres away and some small ripples on the water.

Before the pilot anticipated touching down, the helicopter struck the surface of the lake and flipped onto its back. It remained afloat supported by the floats, but the cabin was submerged. The passenger from the back seat and the pilot were able to exit the wreckage, but the passenger seated in the left front seat was unconscious. The passenger who had escaped the wreckage rescued the front-seat passenger but she died about six days later from injuries received in the accident. The helicopter sustained substantial damage. The accident occurred at about 1300 Pacific daylight time.

*Ce rapport est également disponible en français.*

## *Other Factual Information*

The helicopter had recently been overhauled. It was equipped with a normal complement of flight instruments, including an artificial horizon, directional gyro, pressure altimeter, and vertical speed indicator. It was not equipped with a radar altimeter. Inspection of the records and the wreckage revealed no anomalies, and the pilot reported that there were no problems with the helicopter.

The helicopter left Chilliwack at about 1100 Pacific daylight time with fuel for about two and a half hours of flying, and had flown in and out of lakes in the area for about two hours prior to the accident. The pilot was seated in the normal right front position for the Bell 206B. Dual controls were not installed and the left front seat was occupied by a passenger. In that position there was also about 40 pounds of data-gathering equipment. The other passenger was seated in the aft left seat. They were all wearing inflatable life vests. Next to the aft passenger there were water sample gathering equipment and samples that had already been collected.

In addition to the normal survival equipment, Far West Helicopters included a satellite telephone in a watertight case. After the three occupants were out of the wreckage, the phone was retrieved from the helicopter. The pilot called 911 and had the operator pass the appropriate information to Far West Helicopters.

Weight and balance calculations indicate that the helicopter left Chilliwack weighing close to its maximum take-off weight for fixed float operations and that its centre of gravity was about 1.5 inches aft and about 0.73 inches left of the main-rotor mast. At the time of the accident, the helicopter weighed about 200 pounds less than at take-off, and the centre of gravity was adjacent to the mast about 0.72 inches left—well within the centre of gravity limits.

Examination of the helicopter wreckage revealed that the upper deck, where the main transmission is attached, was torn and the transmission was dislodged from the airframe. The drive from the engine was disconnected. One of the helicopter's main-rotor blades broke on contact with the water and penetrated the cabin/cockpit area. The floats, which are inflatable, were still intact, and all of their compartments appeared to be at normal air pressure.

The pilot had extensive experience flying helicopters, including some on floats. He held a valid commercial helicopter licence, was trained as required, and was appropriately rested before the flight. He was wearing a flight helmet, which showed damage from the accident.

The passengers had flown in this type of helicopter many times before and had recently received underwater emergency escape training. Neither passenger was wearing a helmet.

## *Analysis*

Because there was no activity—wind or other—on Devils Lake, the water surface was flat. This condition caused the water to act as a mirror. This phenomenon is known as glassy water. When glassy water conditions exist, humans are not able to judge, with accuracy, the distance to the surface of the water by looking at it. In this occurrence, the pilot was trying to land on a surface an unknown distance below the aircraft. The helicopter was still travelling forward and down at

a rate that caused the floats to dig into the water on contact, and the helicopter flipped over, likely around the left front corner.

When the main-rotor blades struck the water at normal rpm (a tip speed of about 750 km/h), one blade broke and skipped on the surface of the water. As the helicopter continued to pitch forward and roll left, it rolled onto the broken blade. The blade penetrated the front of the helicopter, and wreckage debris struck the pilot and the front-seat passenger on their heads. The pilot was wearing a helmet, which protected him from serious head injuries. The front-seat passenger received critical head injuries.

Recent underwater emergency escape training gave the conscious passenger the knowledge and experience he needed to help him remain calm, escape safely, and rescue the unconscious passenger from the submerged wreckage.

### *Findings as to Causes and Contributing Factors*

1. Glassy water conditions impaired the pilot's ability to judge his height above the lake, and during the landing, the helicopter's floats contacted the water before the pilot expected them to, dug in, and the helicopter flipped over.
2. One of the helicopter's main-rotor blades broke on contact with the water and penetrated the front of the helicopter. Wreckage debris struck the pilot and the front-seat passenger on their heads.

### *Other Findings*

1. The pilot was wearing a helmet, which protected him from serious head injuries.
2. Recent underwater emergency escape training contributed to one passenger's ability to safely escape from the helicopter and rescue the other passenger from the submerged wreckage.
3. A satellite telephone was available; this contributed to prompt accident scene response.

*This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 14 February 2006.*

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