

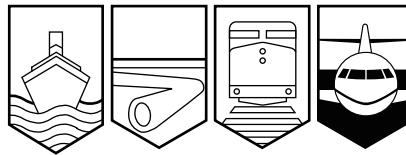
Transportation Safety Board
of Canada



Bureau de la sécurité des transports
du Canada

AVIATION INVESTIGATION REPORT

A05P0032



SETTLING WITH POWER – ROLL-OVER

TASMAN HELICOPTERS LTD.
BELL 212 (HELICOPTER) C-GEEC
SPEARHEAD GLACIER, BRITISH COLUMBIA
11 FEBRUARY 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

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Report Number A05P0032

Summary

The Bell 212 helicopter (registration C-GEEC, serial number 30931) was being used in heli-ski operations near Whistler, British Columbia. After operations on one glacier with two groups of skiers, the guides and the pilot agreed to move to the Spearhead Glacier. The skiers and guides were dropped off at the top of the glacier, and the pilot chose to pick up the skiers near the toe of the glacier.

The first group down the glacier comprised 11 skiers. During take-off from the toe of the glacier with this group, the helicopter began to settle as it turned downwind. The pilot turned it back toward the take-off area, but the helicopter continued to settle with full power applied. The helicopter struck the snow in a level attitude, turned over, and came to rest on its right side. The helicopter was substantially damaged. The main rotor chopped the tail off, the nose was crushed, and the battery was ejected. There was no fire. The passengers and pilot escaped with only minor injuries.

Ce rapport est également disponible en français.

Other Factual Information

The Spearhead Glacier is located to the east of the Blackcomb Peak near Whistler, and the accident was near the bottom of the glacier at about 6300 feet above sea level (50°02'30" N / 122°51'45" W). The glacier rests on the northwest side of the upper ridge flowing down about 80 per cent of a cirque.¹ The toe of the glacier had ablated and receded over recent years, and skiing to the usual pickup area was more difficult.

The pilot used the pickup area at the toe of the glacier to make it easier for the skiers to get to the helicopter and complete an extra run before lunch. The take-off was into wind facing up the glacier. The helicopter attained a positive rate of climb, and the pilot then turned the helicopter downwind. It began to descend and it was evident that the helicopter would not clear the lower ridge, so the pilot turned the helicopter toward a somewhat level area. As it contacted the snow, the helicopter bounced, struck a snow drift, dug in, stood on its nose, pirouetted, and came to rest on its right side and top corner. There was no loss of power at any time during the flight. The rotor and engine rpm stayed within their governed range and there were no caution lights or horns evident, even though the pilot pulled the collective up as far as possible.

The weather was clear with good visibility, and the prevailing winds were from the southeast at 25 to 30 knots, and gusting. There was good visual reference for ground proximity, even over the glacier. The glacier was on the lee side of the ridge and the winds were flowing over the glacier. A temperature inversion existed at the time.

Localized, shallow, glacier winds are katabatic winds, and under extreme cooling conditions, such as underlying ice cover, they can develop to hazardous proportions. As the ice provides relative cooling, a strong shallow wind will persist. In some locations, katabatic flow pulsates with cold air building up to some critical value before being released to rush downslope.

Actual weights of persons, equipment, lunches, etc. were used to calculate the gross take-off weight of the helicopter before its departure that morning. The weight was 10 250 pounds, which is about 92 per cent of the maximum allowable weight of 11 200 pounds. The performance charts showed that, on that day and at that weight, the Bell 212 should hover out-of-ground effect at a pressure altitude of 7500 feet. The location of the persons and equipment on board caused the centre of gravity to be well within the operating limits.

In the morning before the first flight, the passengers/skiers were given interactive training on emergencies and helicopter operations. The accident occurred about two and a half hours after the training. The passengers/skiers remembered the instructions, and the evacuation from the wrecked helicopter was carried out in a calm manner.

The pilot was licensed, trained, and certified as required by regulations. He had several years of experience flying the Bell 212 helicopter and in heli-ski operations with this type. The pilot had operated in and out of the Spearhead Glacier many times during his years of flying out of

¹ A cirque is a crater created by a glacier that forms a natural amphitheatre (like a bowl tilted to the diagonal).

Whistler. During those operations, however, he used a landing area located on the outside edge of the cirque. This location became more difficult to ski to as the glacier ablated over recent years.

The occurrence helicopter had been modified from the original type. Based on Airworthiness Directive CF 97-04, the helicopter was equipped with stainless steel elbow fittings for the engine fuel lines. Before 1990, Bell 212 helicopter engines were equipped with aluminium fittings. That year, a Bell 212 with aluminium lines was involved in a similar accident (TSB report A90P0121), but it caught fire when one of the fittings broke. Three lives were lost and many persons were seriously hurt from burns. In this accident, the stainless steel fittings remained intact even though the area was crushed. There was no fire.

The fact that the helicopter was equipped with stainless steel fuel line fittings and that passenger briefings were enhanced as a result of the findings of the 1990 heli-skiing accident investigation helped to minimize injuries from this occurrence.

On 13 January 2003, Transport Canada published Commercial and Business Aviation Advisory Circular (CBAAC) 0214 to inform air operators about guidelines for the conduct of heli-skiing in Canada.

Analysis

There were no reported problems with the helicopter's performance and there were no caution horns during the accident flight, which led the investigation and this analysis to focus on operational issues only.

It is quite likely that, during the day, as a temperature inversion existed, katabatic winds formed over the glacier and they were pulsing downhill. Given the gross weight of the helicopter at take-off, the close proximity to the glacier and the strong downflowing winds, the helicopter was not able to climb high enough to clear the surrounding terrain. When the pilot turned away from the lower ridge, the helicopter was settling with power in downflowing wind, and the pilot could not arrest its descent. When the helicopter settled onto the snow, still moving forward, it struck a snow drift, dug in, and rolled over.

Finding as to Causes and Contributing Factors

1. Given the helicopter's gross weight, its close proximity to the glacier, and the strong downflowing winds, the helicopter was not able to climb high enough to clear the surrounding terrain. When the pilot aborted the departure, the helicopter settled with power onto the snow, dug in, and rolled over.

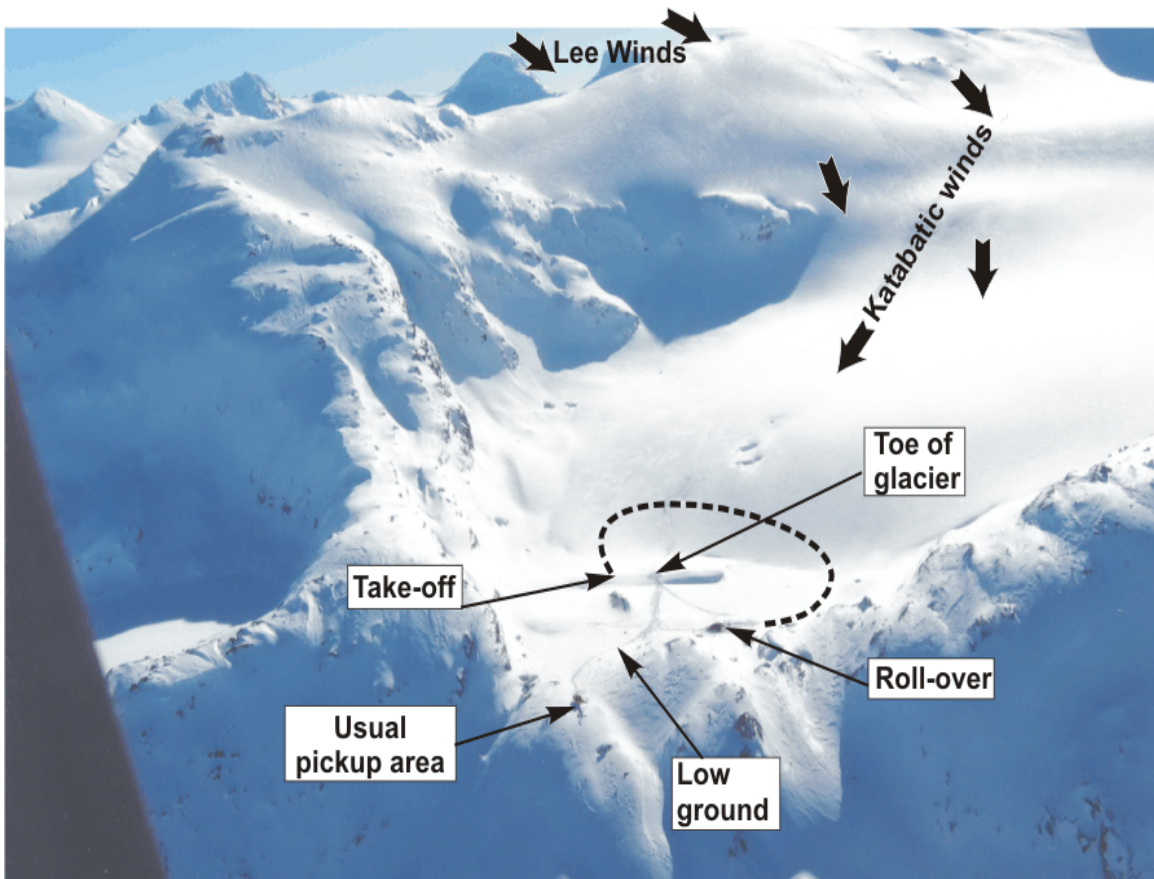
Other Finding

1. The fact that the helicopter was equipped with stainless steel fuel line fittings and that passenger briefings were enhanced helped to minimize injuries from this occurrence.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 21 April 2005.

Visit the Transportation Safety Board's Web site (www.tsb.gc.ca) for information about the Transportation Safety Board and its products and services. There you will also find links to other safety organizations and related sites.

Appendix A – Accident Flight Diagram



The photograph was taken soon after the accident. It shows the Spearhead Glacier and the conditions.