

AVIATION INVESTIGATION REPORT

A02W0057

LOSS OF CONTROL - ROTORCRAFT

BIGHORN HELICOPTERS INC.
EUROCOPTER AS350-D C-FBHX
BLAIRMORE, ALBERTA 12 NM N
26 MARCH 2002

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 Bighorn Helicopters Eurocopter AS350 D, C-FBHX, serial number 1428, and pilot were working for Alberta Environment near Blairmore, Alberta, providing support for weather station maintenance and snow pack analysis. An approach to a weather station site in mountainous terrain was made in strong, gusty winds. At about 50 to 100 feet above the mountainside landing site, an updraft and then a downdraft were encountered. The pilot aborted the landing and turned downhill but was unable to stop the sink rate as the helicopter settled into the trees and rolled onto its right side. The pilot and the front seat passenger received serious injuries, the rear passenger received minor injuries, and the helicopter was substantially damaged. The time of the accident was approximately 1115 mountain standard time.

Ce rapport est également disponible en français.

Other Factual Information

The helicopter was contracted by Alberta Environment to transport two technicians to service two weather stations in the Crowsnest Pass area. Accompanying the technicians were a reporter and a cameraman from a Lethbridge television station. The pilot departed the company home base at Cranbrook, British Columbia, at 0830 mountain standard time¹, and flew to Blairmore, Alberta, where he picked up four passengers. The flight departed Blairmore at about 0930 for the Allison Pass weather station.

After the tasks at Allison Pass were completed, the helicopter then flew to the South Racehorse Creek weather station. Elevation at the station site is about 6300 feet above sea level (asl). Following a reconnaissance flight to assess the wind and other conditions at the intended landing area on the east side of a mountain, the pilot decided to take two passengers into the site at a time. He dropped two passengers off at a cut block at the base of the mountain and flew the other two passengers back to the station. Because there was no flat place to land, the pilot “toed” the front of the helicopter skids onto the mountainside and kept the helicopter under power as the passengers disembarked, then departed down the mountain for the other two passengers.

On the second approach to the station site, there were variable winds and the helicopter’s airspeed indications were erratic. Just before landing, when at a height of 50 to 75 feet above the trees and slowing to hover speed, a gust lifted the helicopter. The pilot lowered the collective to maintain the descent, but the helicopter then suddenly began to descend at an excessive rate. The pilot aborted the approach and turned left down the slope away from the mountain. He reportedly did not raise the collective, but noticed that the main rotor rpm was indicating in the yellow arc (below normal operating range) on the tachometer. The low rotor warning horn sounded momentarily after the turn, but stopped when the pilot lowered the collective slightly. He then raised the collective to increase power for a climb and the engine accelerated, but the helicopter continued to descend. It settled into the trees and came to rest in deep snow, laying on its right side facing north. The television cameraman in the right rear seat recorded the accident sequence from after the turn until an impact dislodged the camera and it departed the helicopter. Total time of the recording was about five seconds.

The 1200 weather report for the Cranbrook Airport, 45 nautical miles (nm) west of the accident site, was as follows: wind 170° true at 13, gusting to 24 knots; visibility 25 statute miles (sm); a few clouds at 5000 feet and broken clouds at 6000 feet. The upper winds at 6000 feet were forecast to be from 220° at 21 knots with a temperature of 1°C.

The Pincher Creek Airport autoweather, 25 nm east, was reporting winds from 260° at 30 gusting to 44 knots, sky clear, and temperature of 5°C.

The Lethbridge Airport, 50 nm east, was reporting winds from 240° at 32 gusting to 42 knots, visibility of 30 sm, a few clouds at 12 000 feet, and broken cloud at 25 000 feet. The forecast upper winds at Lethbridge at 6000 feet were 42 knots, with a temperature of 1°C.

Mountain Wave activity was seen in satellite photos, and moderate lee wave turbulence was forecast for the region. Passengers described the turbulence as average given the wind conditions. Depending on

¹ All times are mountain standard time (Coordinated Universal Time minus seven hours) unless otherwise noted.

the slope and surrounding terrain, downdrafts from 21-knot winds could reach speeds of 2100 feet per minute (fpm) down, from 32-knot winds, speeds of 3250 fpm down, and from 42-knot winds, speeds of 4250 fpm down.

The engine, a Lycoming LTS-101-600A3, serial number LE43442CE, did not initially appear to respond when increased power was commanded. No unusual indications or sounds were noticed from the engine. The video tape recorded the sounds of the engine accelerating after the turn. The engine continued to run for a short time after the helicopter came to rest.

After the occurrence, the engine was shipped to the manufacturer and a full operational test was completed in the manufacturer's test cell, attended by a Federal Aviation Administration (FAA) inspector and the operator's representatives. The engine met all the specifications as to power output, acceleration, and throttle response. A check of the engine records did not reveal any history of problems with the fuel control unit, power turbine governor, or engine fuel pump. Main rotor head and blade examination revealed damage consistent with considerable power being produced when the rotor blades contacted trees.

The main rotor operating speed is 385 rpm, the yellow arc on the tachometer is between 320 and 370 rpm, and the low rotor warning horn is set to activate at a speed between 270 and 335 rpm.

The helicopter had no known deficiencies before the flight and was being operated within its load and centre of gravity limits. The calculated gross weight of the helicopter was 3640 pounds. For this weight, at 55 knots airspeed, at an ambient air temperature 1°C, and at an altitude of 6300 feet, the helicopter's maximum rate of climb was computed to be about 1500 fpm.

The pilot was certified and qualified for the flight in accordance with existing regulations. He had about 2460 hours total flight time, with about 2220 hours in helicopters, of which 170 hours were on type. He had completed a 15-hour mountain flying course, and had about 780 hours of mountain flying experience, of which about 100 hours were on type. His last single-engine pilot proficiency check (PPC) was on a Bell B206 on 27 April 2001.

Analysis

The two areas on which the investigation focussed were the atmospheric conditions at the site and a possible loss of power when the collective was raised after aborting the approach.

Winds at the site, as forecast and as reported from surrounding stations, were probably from the south or southwest at speeds of 20 to 40 knots. This resulted in subsidence, turbulence, and wind shears on the east (lee) side of the mountain. An updraft on final approach caused the pilot to lower the collective slightly, probably followed by a downdraft or wind shear which caused the helicopter to suddenly descend. From an altitude of approximately 50 to 100 feet above the trees, at a near-hover speed, there was little margin for the helicopter to recover. Maximum rate of climb of the helicopter at the altitude and load was about 1500 fpm, in downdrafts which could have exceeded 3000 fpm.

The engine was reported to have lost power, because the main rotor rpm decreased to between 270 and 335 rpm and the warning horn sounded when the collective was raised during the turn. A pilot's training and normal reaction would be to raise the collective when encountering a sudden downdraft at a near-hover airspeed, in close proximity to the terrain, especially if the collective had been lowered just prior to encountering the downdraft. An excessive increase of the collective during the abort could have over pitched the main rotor

blades, resulting in the loss of rotor rpm. The momentary activation, then silencing, of the low rotor warning horn would indicate that the main rotor speed drooped below the warning horn activation threshold rpm, then immediately accelerated to above that speed. Considerable engine power would have been required for the rotor rpm to accomplish this recovery with only a slight lowering of the collective. The engine acceleration sounds, main rotor blade damage, and continued operation after coming to rest would rule out engine failure. Further indications that a power loss was unlikely was the absence of any fault being found during the engine and component examination and testing.

Findings as to Causes and Contributing Factors

1. The pilot was attempting to land the helicopter in wind conditions which most likely exceeded the performance limitations of the helicopter.
2. The helicopter encountered strong downdrafts or wind shear on the second approach, which was not encountered on the first approach, and the pilot was unable to adequately control the helicopter.

This report concludes the TSB's investigation into this occurrence. Consequently, the Board authorized the release of this report on 14 May 2003.

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