Final Report

AIC 14 1008

PAPUA NEW GUINEA

ACCIDENT INVESTIGATION COMMISSION

SHORT SUMMARY REPORT

Heli Niugini Ltd

P2-HBS

Bell 206 L1

Loss of tail rotor effectiveness during landing

Mt. Kare, Enga Province

PAPUA NEW GUINEA

30 November 2014

About the AIC

The Accident Investigation Commission (AIC) is an independent statutory agency within Papua New Guinea (PNG). The AIC is governed by a Commission and is entirely separate from the judiciary, transport regulators, policy makers and service providers. The AIC's function is to improve safety and public confidence in the aviation mode of transport through excellence in: independent investigation of aviation accidents and other safety occurrences within the aviation system; safety data recording and analysis; and fostering safety awareness, knowledge and action.

The AIC is responsible for investigating accidents and other transport safety matters involving civil aviation, in PNG, as well as participating in overseas investigations involving PNG registered aircraft. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations.

The AIC performs its functions in accordance with the provisions of the PNG Civil Aviation Act 2000 (As Amended), Civil Aviation Rules 2004 (as amended), and the Commissions of Inquiry Act 1951 (as amended), and in accordance with Annex 13 to the Convention on International Civil Aviation.

The object of a safety investigation is to identify and reduce safety-related risk. AIC investigations determine and communicate the safety factors related to the transport safety matter being investigated.

It is not a function of the AIC to apportion blame or determine liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the AIC endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why it happened, in a fair and unbiased manner.

About this report

Decisions regarding whether to conduct an investigation, and the scope of an investigation, are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, a limited-scope, fact-gathering investigation was conducted in order to produce a short summary report, and allow for greater industry awareness of potential safety issues and possible safety actions.

Occurrence Details

On the morning of 30 November 2014, the pilot was tasked to pick up four passengers from Mt Hagen to take them to Mt Kare to conduct a survey of the Mt Kare exploration area. On arrival at Mt Hagen he noticed that instead of four passengers there were five passengers waiting for him.

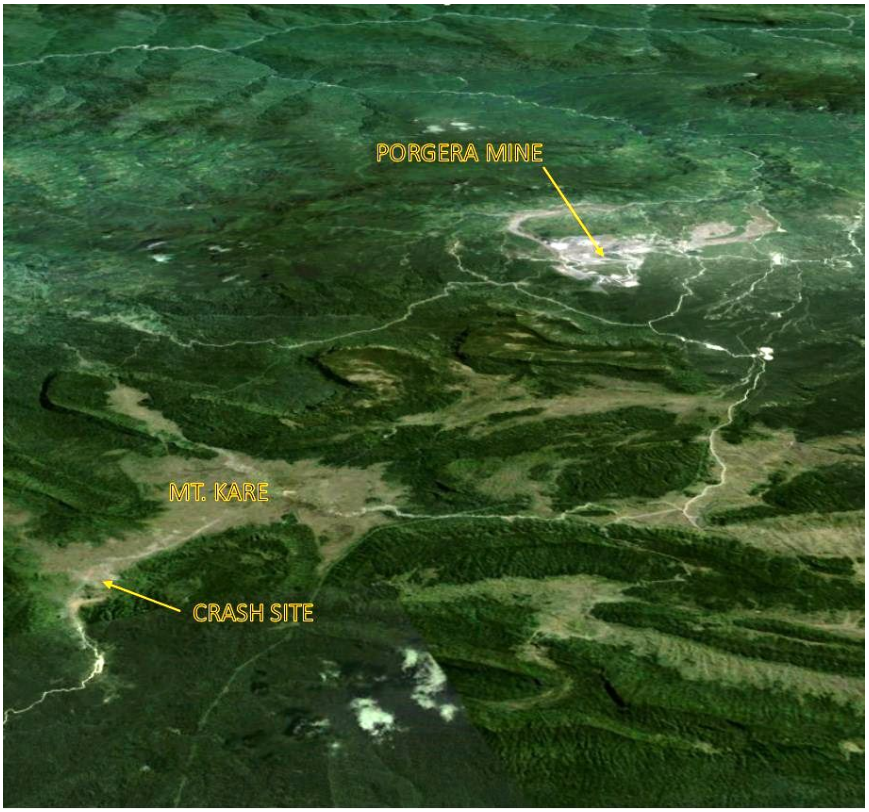


Figure 1: Accident site with reference to Mt Kare and Porgera

The pilot assessed the weights of the passengers and their baggage and wrote them on a blank sheet of paper. The pilots figures added up to a total all up weight for departure out of Mt Hagen of 2,208 kg. The AIC investigator reviewed the calculation and established that the correct weight was 1,967 kg, which was 85 kg above the maximum gross weight of 1,882 kg for the takeoff at Mt Hagen (elevation 5,367 ft).

Weight Calculations Mt Hagen to Mt Kare.

Empty Weight	1,158 kg
+ Pilot	100 kg
+ Passengers (5)	450 kg
+ Cargo	55 kg
Gross Weight (Zero Fuel)	1,763 kg
+ Fuel (450 lb)	204 kg
Take off Gross weight	**1,967 kg**
Maximum permissible take-off weight	1,882 kg
Weight -above MTOW ex Mt. Hagen	**85 kg**

A witnesses who observed the departure out of Mt Hagen stated that the helicopter appeared to have trouble taking off downwind at the high all up weight. One very experience helicopter pilot commented that he (the pilot flying HBS) is going to be in trouble when he gets to Mt Kare due to the observed performance of the helicopter as it departed from Mt Hagen.

On arrival, the pilot flew around the area to allow the passengers to see and assess the Mt Kare area from the air before establishing the helicopter for an approach to landing.

Weight Calculations on arrival Mt Kare.

Empty Weight	1,158 kg
+ Pilot	100 kg
+ Passengers (5)	450 kg
+ Cargo	55 kg
Gross Weight (Zero Fuel)	1,763 kg
+ Fuel (110 Ib)	50 kg
Weight on arrival Mt Kare	**1,813 kg**
Max weight HOGE[1] at Mt Kare	1,704 kg
Weight -above HOGE at Mt Kare	**109 kg**

Data extracted from the HOGE performance graphs of the aircraft flight manual at a pressure altitude of 9,000 ft and about 17ºC outside air temperature (OAT), the maximum gross weight for the prevailing atmospheric conditions was 1,704 kg. The calculated all up weight on arrival at Mt Kare, was 1,813 kg. This was 109 kg over the maximum allowable gross weight.

On approach to land with the weight 109 kg above the maximum permissible gross weight and high density altitude, power available was less than power required to maintain control at low airspeed close to the ground.

Figure 1: The approach path

[1] HOGE refers to hover out of ground effect.

Witnesses on the ground stated that 'the approach did not look like anything out of the ordinary; it was not steep, nor shallow'. Approximately 4 m from the pad, the helicopter started to make a slow 180° turn to the right while descending. The helicopter then rapidly rotated through another 360º and ended up approximately 150 m northwest of the helipad.

The helicopter entered a Loss of Tail Rotor Effectiveness (LTE) condition and the pilot lost control of the helicopter at a low height from which recovery was not possible. The helicopter impacted the ground at 04:06 UTC[2].

Figure 2: The flight path after Loss of Tail Rotor Effectiveness

Figure 3: Bent skids and severed tail boom as a result of heavy landing

[2] The 24-hour clock is used in this report to describe the local time of day, Local Mean Time (LMT), as particular events occurred. Local Mean Time was Coordinated Universal Time (UTC) + 10 hours.

AIC comment

The AIC determined that the pilot attempted to land the helicopter at high altitude at a weight 122 kg above the allowable HOGE weight at that altitude. Because the power available was less than power required to maintain control at low airspeed close to the ground the helicopter lost tail rotor effectiveness.

Loss of Tail Rotor Effectiveness (LTE)

To understand LTE, the pilot must first understand the function of the anti-torque system.

On Bell 206 helicopters the main rotor rotates counter clockwise as viewed from above. The torque produced by the main rotor causes the fuselage of the aircraft to rotate in the opposite direction (nose right). The anti-torque system provides thrust which counteracts this torque and provides directional control.

Tail rotor thrust is the result of the application of anti-torque pedal by the pilot. If the tail rotor generates more thrust than is required to counter the main rotor torque, the helicopter will yaw or turn to the left about the vertical axis. If less tail rotor thrust is generated, the helicopter will yaw or turn to the right. By varying the thrust generated by the tail rotor, the pilot controls the heading of the helicopter.

Gross Weight and Density Altitude

An increase in either of these factors will decrease the power margin between the maximum power available and the power required to hover. The pilot should conduct low-level, low-airspeed manoeuvres with minimum weight.

Safety Action

On 4 December 2014, the operator issued its preliminary company investigation report into the accident and noted the following with respect to weight and balance.

> Pilots are to utilize company W&B forms requiring them to fill in the boxes and determine aircraft suitability. It also requires pilots to use HOGE performance and not HIGE performance figures as the determining factor. The technique for landing is to arrive in Ground Effect (IGE) so that the extra margin enhances safety.

General details

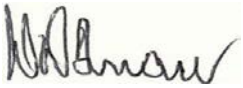
Date and time:	30 November 2014 04:06 UTC	
Occurrence category:	Accident	
Primary occurrence type:	Loss of tail rotor effectiveness	
Location:	Mt. Kare, Enga, Province, Papua New Guinea	
	Latitude: 06° 33' 29.7"S	Longitude: 142° 58' 53.6"S

Crew details

Nationality	United States of America
Licence type	Commercial Helicopter (PNG)
Licence number	P20641
Total hours	13,580 hours
Total hours on type	3,800 hours

Aircraft details

Aircraft manufacturer and model	Bell Helicopter B206 L1	
Registration	P2-HBS	
Serial number	45645	
Time in service	16,134.2 hours	
Engine		
Engine manufacturer and model	Rolls-Royce Corporation 250-C30	
Engine serial number	CAE-895013	
Persons on board	Crew: 1	Passengers: 5
Injuries	Crew: 1 Minor	Passengers: 5 Nil
Damage	Substantial damage to landing gear skids, main rotor blades and tail boom	
Type of operation	Charter	



David Inau

CEO

Accident Investigation Commission