



Operational Event

120 km south-west of Cooktown, Qld

22 July 2007

VH-ESB

Bell 412 Helicopter

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Released in accordance with section 25 of the *Transport Safety Investigation Act 2003*

Abstract

On 22 July 2007, the crew of a Bell 412 helicopter was conducting a night approach as part of a search for the source of transmissions from an emergency locator beacon. During the approach to a landing site, the pilot of the helicopter lost situational awareness and allowed the forward speed of the helicopter to decrease to zero. The helicopter developed a high rate of descent and, during an attempt to arrest the rate of descent, the helicopter was subjected to an over-torque condition. The Australian Transport Safety Bureau did not conduct an onsite investigation into the occurrence. However, the operator's internal investigation identified a number of safety issues. Following the investigation, the operator took safety actions to address the identified issues.

FACTUAL INFORMATION

The information presented below, including any analysis of that information, was prepared principally from information supplied to the Bureau.

History of the flight

On 22 July 2007, at 0253 EST¹, a Bell 412 helicopter, registered VH-ESB, was tasked to conduct a search for the source of transmissions from an emergency locator beacon located approximately 120 km to the south-west of Cooktown, Qld. The helicopter crew had conducted a briefing and departed Cairns, Qld. at 0339. On board the helicopter were a pilot, an aircrew officer and a rescue crewman.

As the helicopter approached the location of the distress beacon, the pilot descended the helicopter to approach a landing site using the helicopter 'Nitesun' searchlight, with the cockpit lighting dimmed. As the helicopter passed through 1,000 ft above ground level (AGL), the pilot asked the rescue crewman to report any ground detail in the area illuminated by the helicopter searchlight.

As the helicopter airspeed reduced to 42 kts, the pilot switched on the landing lights and noticed that this increased the haze effect from dust and smoke in the atmosphere. At about this time, the aircrew officer called 'zero airspeed'. The pilot reported that he was getting conflicting

1 The 24-hour clock is used in this report to describe the local time of day, Eastern Standard Time (EST), as particular events occurred. Eastern Standard Time was Coordinated Universal Time (UTC) + 10 hours.

information between visual cues and the information he was receiving from the flight instruments. At the time the pilot considered conducting a missed approach, the helicopter had developed a rapid rate of descent. The pilot made control inputs to arrest the rate of descent, however, the main-rotor low rpm and 'over-torque' caution lights illuminated on the cockpit instrument panel.

Once the pilot had arrested the helicopter's rate of descent, he noted that the radio altimeter indicated 200 ft AGL and the airspeed was fluctuating between 20 and 30 kts. He then continued the approach and landed normally at the chosen landing site. There were no injuries to any persons.

A post-flight inspection revealed that the mast torque signal conditioner 'dolls eye'² had popped, indicating that an over-torque condition had been encountered. A subsequent maintenance inspection revealed no obvious damage. However, the main rotor transmission, main rotor mast, main rotor driveshaft and the main rotor hub were removed for overhaul in accordance with the manufacturer's maintenance manual instructions, before the helicopter was flown again and returned to service.

Pilot information

The pilot held an Air Transport Pilot (Helicopter) Licence and had accrued 7,300 hours of aeronautical experience. The pilot had logged 1,380 hours on the Bell 412 type of helicopter, with 19.7 hours on the Bell 412 in the last month. He held a valid Class 1 medical certificate and had last undergone a night check flight in February 2007. His most recent night out-landing³ was on 5 July 2007.

2 The mast torque signal conditioner 'dolls eye' only indicates to the crew that there has been an over-torque, the upper limit of which is 112% torque. Once that indication has been triggered, maintenance action is required to be performed before the helicopter can be flown again.

3 An out-landing is defined as a landing in an area that is not normally used as a helicopter landing site, but has been assessed as being suitable for a landing area as determined by the type of operation being conducted.

Meteorological information

The pilot reported that the weather in the area of the reported beacon was clear sky, with a south-easterly wind at 15 kts. The area forecast indicated that the wind was from the south-east at up to 25 kts.

The moon had set some hours prior to the departure of the helicopter from Cairns. The visibility was reduced by smoke from bushfires in the vicinity of the beacon's location. The area forecast indicated that visibility could be reduced to as low as 2,000 m in areas of smoke.

The pilot reported that after landing he noticed that visibility at lower levels was reduced by trapped smoke and dust from vehicle activity. He also reported that the wind on the ground was calm below an inversion layer at approximately 500 ft AGL and the possibility of windshear at this point.

Helicopter information

At the time of the incident, the helicopter had recorded 9,567.8 hours in service and the maintenance release had no recorded defects.

Landing site and planning

The crew had local knowledge of the general area and a suitable landing site was chosen in a dry river bed. However, the crew were not familiar with the specific landing site.

The crew had completed a descent profile plan prior to conducting the approach. This plan provided a table of altitudes at specific Global Positioning System (GPS) distances from the landing site, and this was used to provide the pilot with an indication of the descent path being flown on the final approach.

The crew had conducted a briefing prior to commencing the approach; however a missed approach was not briefed.

Operator's investigation

The helicopter operator conducted a comprehensive investigation of the incident and provided a copy of the report to the ATSB. That report identified a number of safety issues related to this flight and other similar operations conducted by the company.

Those issues related to:

- Flight crews' compliance with the operators' Operations Manual, particularly in regard to night out-landings and reference to the operators' Safety Management System
- Flight crews compliance with the operators' task risk analyses in relation to night out-landings
- The conduct of adequate briefings prior to conducting approaches, the inclusion of stabilised approach criteria and missed approach requirements
- availability of criteria for conducting unaided night approaches
- management of the operators' Crew Resource Management training and refresher requirements
- standardisation of night operations training
- use and dimming of cockpit illumination during night approaches.

ANALYSIS

The incident was the result of the pilot losing situational awareness during a night approach in difficult visual conditions. The helicopter developed a high rate of descent, requiring the pilot to take recovery actions to prevent a collision with terrain. The pilot also reported that the possibility of windshear at the inversion layer transition may have affected the approach. The recovery actions resulted in the drive-train of the helicopter being subjected to an over-torque condition.

This incident highlights the hazardous nature of emergency medical and rescue service operations into unfamiliar terrain at night. The operator had introduced procedures to assess and mitigate the known risks. However, the operators' investigation identified safety issues with the implementation of those procedures.

FINDINGS

From the evidence available, the following findings are made with respect to the operational event involving VH-ESB on 22 July 2007 and

should not be read as apportioning blame or liability to any organisation or individual.

Operator's Investigation Findings

The helicopter operator's investigation into this incident made a number of findings that are summarised as follows:

- there was no standardised night out-landing approach briefing format
- the operator had conducted task risk analyses, which covered night out-landing operations, but these had not been implemented at operational base level
- aircrew employed by the operator had not completed Crew Resource Management (CRM) training in the previous 24 months, as prescribed by the operator's policy
- the operator did not have a standardised crew resource management training program
- there was significant haze and dust in the atmosphere which affected the visibility from the helicopter
- the crew had dimmed the cockpit lights to afford themselves better visibility; however, the operator did not have guidelines covering the dimming of cockpit lighting.

SAFETY ACTION

Operator Safety Action

The operator reported that the following safety actions have been taken following their internal investigation into this incident.

The applicable sections of the Company Operations Manual have been rewritten to more completely cover the necessary actions for conducting unaided night landing operations. This included: standard unaided night approach and landing briefings, inclusion of missed approach parameters and procedures and adjustment of cockpit lighting for night approaches.

The OM [Operations Manual] now contains the acceptable criteria for meteorological conditions for unaided night approaches.

All company aircrew, including rescue crewman and medical staff, have undergone CRM training, specifically tailored to company operations.

Specific missed approach parameters have been introduced to the aircrew officer and rescue crewman training manuals and checks of these requirements will be introduced to the checking program.

The company has recently been issued Civil Aviation Safety Authority approval for night vision equipment training and checking and this equipment will be progressively introduced across the organisation coincident with the introduction of a new helicopter type.

Task Risk Analyses (TRA) are now contained within the company Safety Management System manual. The operations manual has been amended to require use of the TRA prior to conducting unaided night landings.

The use of Google Earth to assist in mission planning has been introduced at those bases that have appropriate facilities.

SOURCES AND SUBMISSIONS

Under Part 4, Division 2 (Investigation Reports), Section 26 of the Transport Safety Investigation Act 2003, the Executive Director may provide a draft report, on a confidential basis, to any person whom the Executive Director considers appropriate. Section 26 (1) (a) of the Act allows a person receiving a draft report to make submissions to the Executive Director about the draft report.

A draft of this report was provided to the helicopter operator, the pilot in command and the Civil Aviation Safety Authority. Submissions were received from the helicopter operator and the pilot in command. The submissions were reviewed and, where considered appropriate, the text of the report was amended accordingly