Australian Government
Australian Transport Safety Bureau

ATSB TRANSPORT SAFETY INVESTIGATION REPORT
Aviation Occurrence Investigation – AO-2007-069
Preliminary

Collision with terrain
Pier 35, Melbourne, Vic.
29 December 2007
VH-MEB
Robinson Helicopter Company R44 Raven 1

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Port of Melbourne Corporation for Figure 1.

Abstract

At about 1905 Eastern Daylight-saving Time, on 29 December 2007, a Robinson Helicopter Company R44 Raven 1 (R44), registered VH-MEB was being operated under the charter category with two pilots on board. Following a passenger scenic flight, the helicopter departed Pier 35 helipad, located adjacent to the Yarra River, Melbourne, Vic. to return to the operator's base. Witnesses nearby reported that shortly following the takeoff, in a north-north-west direction, the helicopter banked left and turned to the south-west, passing a marina at a height of about 30-35 ft AMSL. Witnesses reported that the helicopter's forward airspeed decreased and that it 'rocked or wobbled in the air' then pitched nose up, rolled to the left, descended and impacted the water.

The handling pilot was able to exit the helicopter via the right side and was recovered by the crew of a boat. The other pilot did not exit the helicopter and was fatally injured. The body of the pilot was subsequently recovered from the wreckage by Victorian Police Search and Rescue Squad divers.

The investigation is continuing.

THE AUSTRALIAN TRANSPORT SAFETY BUREAU

The Australian Transport Safety Bureau (ATSB) is an operationally independent multi-modal bureau within the Australian Government Department of Infrastructure, Transport, Regional Development and Local Government. ATSB investigations are independent of regulatory, operator or other external organisations.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, relevant international agreements.

Purpose of safety investigations

The object of a safety investigation is to enhance safety. To reduce safety-related risk, ATSB investigations determine and communicate the safety factors related to the transport safety matter being investigated.

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

Developing safety action

Central to the ATSB's investigation of transport safety matters is the early identification of safety issues in the transport environment. The ATSB prefers to encourage the relevant organisation(s) to proactively initiate safety action rather than release formal recommendations. However, depending on the level of risk associated with a safety issue and the extent of corrective action undertaken by the relevant organisation, a recommendation may be issued either during or at the end of an investigation.

The ATSB has decided that when safety recommendations are issued, they will focus on clearly describing the safety issue of concern, rather than providing instructions or opinions on the method of corrective action. As with equivalent overseas organisations, the ATSB has no power to implement its recommendations. It is a matter for the body to which an ATSB recommendation is directed (for example the relevant regulator in consultation with industry) to assess the costs and benefits of any particular means of addressing a safety issue.

About ATSB investigation reports: How investigation reports are organised and definitions of terms used in ATSB reports, such as safety factor, contributing safety factor and safety issue, are provided on the ATSB web site www.atsb.gov.au.

FACTUAL INFORMATION

The information contained in this preliminary report is derived from initial investigation of the occurrence. Readers are cautioned that there is the possibility that new evidence may become available that alters the circumstances as depicted in the report.

History of the flight

At about 1905 Eastern Daylight Savings Time[1], on 29 December 2007, a Robinson Helicopter Company R44 Raven 1 (R44), registered VH-MEB, was being operated under the charter category with two pilots on board. The helicopter departed Pier 35 helipad located adjacent to the south-eastern bank of the Yarra River, Melbourne, Vic. to return to the operator's base following a passenger scenic flight. Witnesses located at a nearby marina reported that shortly after the helicopter's takeoff in a north-north-westerly direction, it banked left and turned to the south-west, passing the marina while at a height of about 30 to 35 ft Above Mean Sea Level (AMSL). The helicopter's forward airspeed decreased and it 'rocked or wobbled in the air' then pitched nose up, rolled to the left, descended and impacted the water.

The handling pilot exited the helicopter via the right side and was recovered by the crew of a nearby boat. The other pilot did not exit the helicopter and was fatally injured. The pilot was subsequently recovered from the wreckage by Victorian Police Search and Rescue Squad divers.

A Port of Melbourne Corporation closed circuit television (CCTV) security camera recorded the helicopter's flight and impact with the water. The video confirmed the witness reports and also revealed that, following the takeoff, the helicopter momentarily lost altitude and the main rotor RPM[2] appeared to slow prior to impact (Figure 1).

1 The 24-hour clock is used in this report to describe the local time of day, Eastern Daylight-saving Time, as particular events occurred. Eastern Daylight-saving Time was Coordinated Universal Time (UTC) + 11 hours.

2 Revolutions per minute.

Figure 1: CCTV footage of the helicopter taking off [3]

Recovery of the wreckage and examination

Late in the evening of 29 December 2007, the divers located the helicopter wreckage and secured it to the marina. On 30 December 2007 at about 1440, the wreckage was recovered from the river and secured for technical examination by the Australian Transport Safety Bureau (ATSB) (Figure 2).

3 The helicopter is circled in red.

Figure 2: Recovered helicopter wreckage

A preliminary examination of the wreckage indicated:

- a left side down, slightly forward impact
- impact damage to the cockpit upper and forward structure
- a missing section of the tail boom, including the tail rotor and tail rotor gearbox
- impact damage to both main rotor blades
- impact related damage to the main transmission and supporting frame work
- impact related damage to the tail rotor drive system
- the helicopter was configured with dual-controls[4].

On 1 January 2008, the police divers recovered a large section of main rotor blade, the tail rotor control tube and a missing section of tail boom, with the tail rotor gearbox and tail rotor attached (Figure 3). The tail rotor blades were intact, but bent towards the tail boom. Analysis of photographs taken by witnesses indicated that the separated section of the tail boom and tail rotor was attached when the helicopter was floating inverted in the water.

4 Provided with two sets of [usually interconnected] flight-control inceptors, usually for instructor and pupil.

Figure 3: Tail rotor gearbox and tail rotor

The helicopter's engine was removed, preserved and transported to an authorised engine overhaul facility. A test run of the engine was undertaken, under the supervision of the ATSB, in which the engine ran satisfactorily on the test rig and reached full power after replacement of the right engine magneto and harness assembly[5]. The right engine magneto was later tested at an authorised overhaul facility and found serviceable following the replacement of corrosion affected components.

Pilot information

The operator's chief pilot held a Civil Aviation Safety Authority (CASA) commercial pilot (helicopter) licence (CPL (H)) and occupied the left seat of the cockpit, with another CPL (H) pilot flying under supervision in the right seat[6]. The pilot under supervision reported that he was the handling pilot for the takeoff.

The handling pilot had received his CPL (H) on 31 August 2007 and had accumulated 137 total flying hours experience. He was appropriately licensed and endorsed on the R44 helicopter. The chief pilot had received his CPL (H) on 1 December 1989 and

5 The right engine magneto harness had incurred damage during the accident.

6 In the R44 helicopter the pilot in command normally flies from the right seat position.

accumulated about 776 total flying hours[7]. He was appropriately licensed and endorsed on the R44 helicopter. The chief pilot did not hold a helicopter instructor's rating.

The handling pilot stated that he had recently joined the company and was accumulating the 5 flying-hours pilot in command required by regulations in order to begin commercial operations conducting scenic flights. He had flown at the controls with the chief pilot in the helicopter on three occasions during that day. He reported that the understanding was that if an emergency should arise during the flight, the chief pilot would take over the controls of the helicopter.

The handling pilot reported that during the accident flight, the LOW MAIN ROTOR RPM audio horn and caution light activated, but that there were no other noticeable problems with the helicopter. He reported that following the audio horn activation, the chief pilot took control of the helicopter as briefed.

Helicopter information

The helicopter, serial number 1674, was manufactured in 2006 in the US and exported to Australia on 14 December 2006. On 8 February 2007, the CASA Australian Standard Certificate of Airworthiness for the helicopter was issued. Both the helicopter and engine had accumulated 476.8 hours total time in service (TTIS) at the time of the accident. The last inspection of the helicopter and engine was completed on 19 October 2007 at 395.2 hrs TTIS. The maintenance release for the helicopter was current and valid. Weight and balance, and centre of gravity calculations for the flight determined it to be within the helicopter manufacturer's limits.

Weather information

The handling pilot reported the winds to be from the west at about 15 to 20 kts. He told the investigation that he used the helipad wind sock and the flag from a container vessel moored on the opposite side of the river to determine the wind and that he assessed the wind was a crosswind from the left (for further information refer to Helipad information).

The nearest weather station to the helipad was located at the West Gate Bridge[8] about 1 km to the south-west of the helipad and monitored by VicRoads[9]. Records from that weather station, at the reported time of the accident, indicated:

- wind speed from 18 to a maximum of 25 kts
- wind direction from 215 to 230 degrees magnetic (south-southwest)
- ambient temperature 22 degrees.

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7 The chief pilot's logbook was updated on 21 December 2007. Calculations included hours from the helicopter maintenance release to derive the total flying hours.

8 The West Gate Bridge is over 2.5 km in length, with a main river span of 336 m. It has four traffic lanes plus a breakdown lane in each direction. It has a navigational clearance to low water of 53.7 m and its two towers stand 102 m high.

9 VicRoads is the registered business name of the Roads Corporation, a statutory Corporation within the Victorian Government infrastructure portfolio.

Helipad information

The Pier 35 helipad was privately owned and a fee was charged for usage. The owner reported that there was no video surveillance of the helipad. Users of the helipad were required to phone the manager to arrange landings/parking. The manager of the helipad reported that the chief pilot had not advised him of using the helipad on the day of the accident. Records indicated that the chief pilot had been charged for using the helipad once in November 2007. A review of a company trip record sheet dated from 16 December 2007 recovered from the wreckage, and the chief pilot's logbook indicated that the chief pilot had previously used the helipad on 30 November 2007 and on 16 and 18 December 2007[10].

The helipad was adjacent to a 15.5 m high boat storage building (to the west of the helipad). A wind sock, fitted to a 5 m tall pole, was located in the north-west corner of the helipad. The helipad was elevated approximately 2 to 2.5 m above the level of the river. To the east side was a 50 m Port of Melbourne Corporation control/surveillance tower and powerlines were located to the south.

The photograph below was taken just prior to the helicopter's takeoff by a crewmember on board a container ship, Josephine Maersk, that was entering the port. The control/surveillance tower is located to the left and out of view of the photograph. Note that the windsock is indicating little or nil wind (Figure 4).

Figure 4: VH-MEB on Pier 35 helipad and marina building

Helipad guidance

There are no Civil Aviation Regulations or standards covering helicopter landing sites. However, CASA provides guidance via Civil Aviation Advisory Publication (CAAP) 92-2 (1) –

10 Another company pilot had used the helipad on 26 and 27 December 2007.

Guidance for the establishment and use of helicopter landing sites (HLS). That CAAP stated:

> A wind direction indicator should be positioned on the HLS in an unobstructed area so that it is readily visible to helicopter pilots when approaching/departing the HLS.

In the absence of any Australian HLS regulations or standards, persons wishing to establish a HLS could also use information from the International Civil Aviation Organization (ICAO) International Standards and Recommended Practices Annex 14 – *Aerodromes Vol II Heliports (2nd edition – July 1995).* Chapter 5 of that publication stated, in relation to the location of HLS windsocks, that:

> A wind direction indicator shall be located so as to indicate the wind conditions over the final approach and the take-off area and in such a way so as to be free from the effects of airflow disturbances caused by nearby objects or rotor downwash. It shall be visible from a helicopter in flight, in a hover or on the movement area.

It also recommended that:

> Where a touchdown and lift off area may be subject to a disturbed flow, then additional wind direction indicators located close to the area should be provided to indicate the surface wind on the area.

Previous occurrence involving the operator

The operator was cross-leasing VH-MEB due to a previous bird strike occurrence involving its own R44 helicopter, registered VH-ZON, their original company helicopter. On 8 November 2007 at about 1230, VH-ZON, with only the chief pilot on board, struck a pelican. He successfully completed an emergency landing into a paddock on the side of the Yarra River near Patrick's Dock. The chief pilot was uninjured but the helicopter was substantially damaged.

Further examination

The investigation is continuing and will include, but is not limited to, the further examination of the:

- CCTV video footage
- pilot training and experience
- retained helicopter components
- helicopter operating requirements and restrictions
- design and authorisation of the helipad
- available wind indicators, existing wind conditions and wind related anomalies of the helipad.

SAFETY ACTION

Depending on the level of risk of the safety issue, the extent of corrective action taken by the relevant organisation, or the desirability of directing a broad safety message to the aviation industry, the Australian Transport Safety Bureau may issue safety recommendations or safety advisory notices as part of a report.

Safety issue

The following safety issue has been identified by the investigation to date:

> There was no readily available information, for pilots planning to use the helipad, on the pad's unique characteristics including constraints on operations and, in particular, the fact that the windsock may provide erroneous wind indications in some weather conditions. [*safety issue*]

The helipad operator was advised of the safety issue and provided the following response on 14 February 2008:

> You have invited Heli Air, the operator of the helipad, to respond to your concern that the unique characteristics of the helipad (the location of powerlines to the south and wind being affected by the surrounding structures) would not be identified by a pilot who was not familiar with the helipad.
>
> I don't agree that this concern is justifiable. While the helipad may have some unique characteristics, a properly trained helicopter pilot should be able to identify whether the helipad is safe to use and if so, how to use it. That is an assessment which any pilot must make of any landing site. Relevantly, I am not aware of any other accident through the use of this helipad since Heli Air became associated with the site through its acquisition of the current sub-lessee, SA Helicopters Ply Ltd, in 2003.
>
> I note that, on 8 February 2008, Heli Air decided not to allow the use of the helipad other than by Heli Air staff or contractors. This decision was made for commercial reasons relating to the lease of the land and the decision is not related to the accident on 29 December 2007 or to the ATSB investigation of the accident. Accordingly, there should be no on-going use of the helipad by pilots who are not familiar with it. This decision will be conveyed to former users of the helipad as and when they contact Heli Air to request to use the helipad in the future.

ATSB response

The Australian Transport Safety Bureau (ATSB) is concerned that the Pier 35 helipad does not comply with international standards and recommended practices and Civil Aviation Safety Authority guidance on helipads.

Despite the helipad operator's actions, there are no measures that will prevent the unauthorised use of the helipad as has happened in the past. Consequently, unauthorised pilots using the pad will be most likely unaware of the pad's unique characteristics including, constraints on operations. Also, the windsock may provide false or incorrect indications of the local wind in some conditions, due to the location of the windsock on the helipad.

ATSB SAFETY RECOMMENDATION AO-2007-069-NSA-001

The Australian Transport Safety Bureau recommends that Heli Air Pty Ltd takes action to address this safety issue.