



Australian Government

Australian Transport Safety Bureau

ATSB TRANSPORT SAFETY INVESTIGATION REPORT

Aviation Occurrence Report – AO-2007-046

Preliminary

Collision with Terrain

Doongan Station, WA

25 September 2007

Robinson Helicopter Company R22 Beta II, VH-HCN



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Published by: Australian Transport Safety Bureau
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ISBN and formal report title: see 'Document retrieval information' on page iii.

DOCUMENT RETRIEVAL INFORMATION

Report No.	Publication date	No. of pages	ISBN
AO-2007-046	21 November 2007	8	978-1-921165-50-4

Publication title

Collision with Terrain, Doongan Station, WA, 25 September 2007, Robinson Helicopter Company R22 Beta II, VH-HCN

Prepared by

Australian Transport Safety Bureau
PO Box 967, Civic Square ACT 2608 Australia
www.atsb.gov.au

Reference No.

Nov2007/DOTARS 50408

Acknowledgements

Figure 1: Airservices Australia

Abstract

On 25 September 2007, a Robinson Helicopter Company R22 Beta II helicopter was conducting a stock survey flight in the vicinity of Doongan Station, WA. On board the helicopter were the pilot and one passenger.

After about 5 to 10 minutes into the flight, the passenger notified the pilot that he detected a strong burning smell. The pilot landed in a clear area adjacent to a nearby road to inspect the helicopter, and elected to keep the helicopter engine running. Both the pilot and passenger visually inspected the helicopter, focussing on the two rubber drive belts that transfer power to the rotor system.

Following the inspection and discussion of the drive belt serviceability, the pilot elected to continue the flight to Doongan Station, while the passenger elected to walk along the road towards the station, until met by a vehicle which was to be sent back by the pilot for him.

After walking about 11 km along the road in the direction of the station, the passenger saw smoke and flames and, upon reaching the source of the smoke, discovered the wreckage of the helicopter adjacent to the road. The helicopter had been destroyed by impact forces and a post-impact fire. The pilot was fatally injured. The post-impact fire started a bushfire which continued for several days.

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 Transport and Regional Services. ATSB investigations are independent of regulatory, operator or other external bodies.

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.

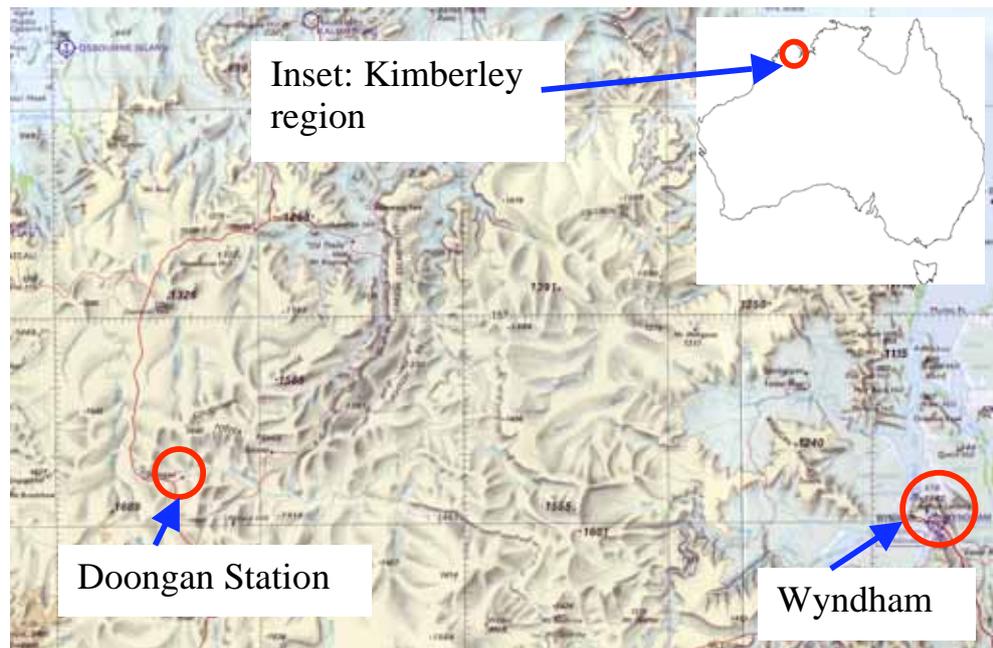
About ATSB investigation reports: How investigation reports are organised and definitions of terms used in ATSB reports, such as safety factor, contributing safety factor and safety issue, are provided on the ATSB web site www.atsb.gov.au.

FACTUAL INFORMATION

History of the flight

At about 0600 Western Standard Time¹ on 25 September 2007, a Robinson Helicopter Company R22 Beta II helicopter, registered VH-HCN, took off from Doongan Station in the Kimberley region of Western Australia (Figure 1), under the visual flight rules for a stock survey flight. On board the helicopter were the pilot and one passenger.

Figure 1: Area map



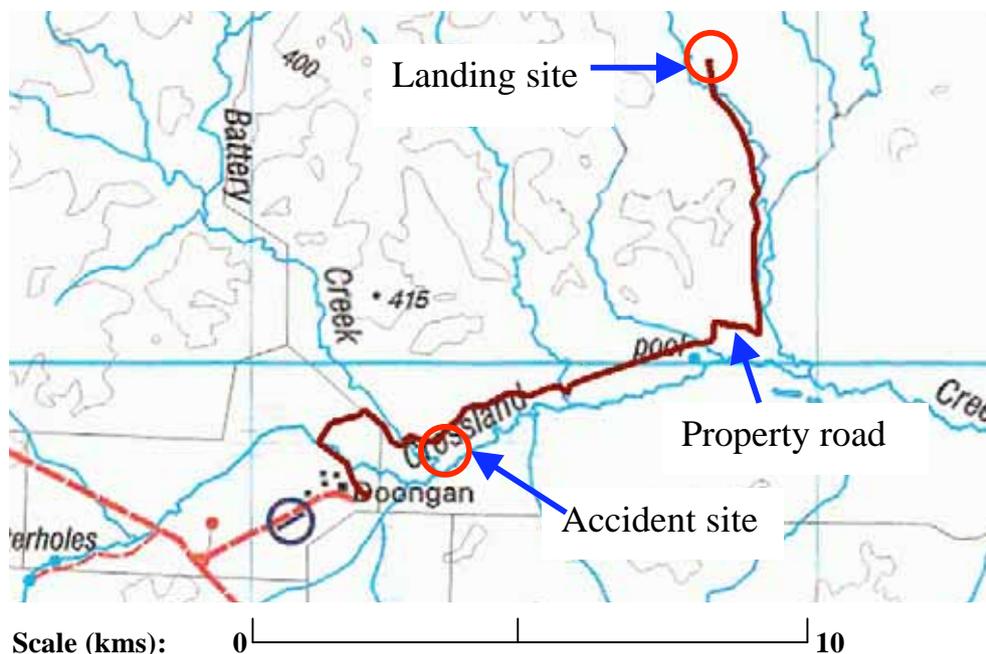
After about 5 to 10 minutes into the flight, the passenger notified the pilot that he detected a strong rubber-like burning smell. The pilot landed the helicopter in a clear area adjacent to a nearby road to conduct an inspection (Figure 2), and elected to keep the helicopter engine running. Both the pilot and passenger visually inspected the helicopter, focussing on the two rubber drive belts that transfer power from the engine to the helicopter rotor system.

Following the inspection and discussion of the drive belt serviceability, the pilot elected to continue the flight to Doongan Station, while the passenger elected to walk along the road towards the station, until met by a vehicle which was to be sent back by the pilot for him. The passenger watched the helicopter take off and climb to an estimated altitude of 600 to 1,000 ft above ground level for the return flight to the station. Visual contact was lost with the helicopter after several minutes due to

¹ The 24-hour clock is used in this report to describe the local time of day, Western Standard Time (WST), as particular events occurred. Western Standard Time is Coordinated Universal Time (UTC) + 8 hours.

the terrain. However, owing to the calm conditions, the passenger continued to hear the engine noise of the helicopter for some time.

Figure 2: Accident site location



Approximately 30 to 60 seconds after losing sight of the helicopter, the passenger reported hearing a change in engine noise, consistent with what he believed was a reduction in engine power. Subsequently, within 1 minute, the engine sound was heard to increase to the original level. The noise level then remained constant for about a further 30 to 60 seconds before stopping abruptly.

After walking about 11 km along the road in the direction of the station, the passenger saw smoke and flames and, upon reaching the source of the smoke, discovered the wreckage of the helicopter adjacent to the road. The helicopter had been destroyed by impact forces and a post-impact fire and the pilot was fatally injured. The post-impact fire started a bushfire which continued for several days.

Pilot information

The pilot held an Australian commercial pilot (helicopter) licence, issued in May 1997 by the Civil Aviation Safety Authority (CASA). He was appropriately endorsed to fly the R22 helicopter and held a valid CASA Class 1 Aviation Medical Certificate.

The pilot's aeronautical experience could not be accurately determined as his *Pilot's Flying Log Book* could not be located. However, records held by the helicopter operator indicated that the pilot's total flying experience was about 6,800 flying hours.

The pilot had flown the helicopter to Doongan Station 2 days before the accident and had been free from duty until the morning of the accident flight.

Helicopter information

The helicopter had undergone a 100-hourly maintenance inspection 4 days prior to the accident, which had included replacement of the helicopter drive belts. The pilot had refuelled the helicopter prior to departure on the accident flight from fuel drums positioned at Doongan Station. Weight and balance calculations conducted by the Australian Transport Safety Bureau (ATSB) indicated that the helicopter was being operated below its maximum allowable gross weight and within the centre of gravity limits at the time of the accident. Calculations using the helicopter manufacturer's performance data indicated that the helicopter was capable of hovering out of ground effect² in zero wind conditions.

Wreckage and impact information

The accident site was located in flat, lightly timbered, terrain about 4 km east of Doongan Station. The helicopter initially collided with trees before impacting the ground in a steep nose-down, left skid-low, attitude. The helicopter then came to rest a further 13 m on a bearing of about 240 degrees magnetic. One of the main rotor blades had fractured and separated from the helicopter and was located about 15 m from the wreckage. A severe post-impact fire consumed the majority of the helicopter and also ignited the surrounding vegetation (Figure 3). The resulting bushfire continued for several days and affected both the accident site and large areas of the surrounding environment.

Figure 3: Accident site



² Helicopters require less power to hover close to the ground due to a cushioning effect of the main rotor downwash striking the ground. Under these conditions the aircraft is operating 'in ground effect'. The United States Federal Aircraft Administration's *Rotorcraft Flying Handbook* states that this effect usually occurs at less than one rotor diameter above the surface (25 feet for an R22 helicopter), above which point the helicopter is operating 'out of ground effect'.

Four trees, close to the line of flight, showed evidence of contact from the helicopter, with corresponding impact marks on the main and tail rotor blades, and the lower vertical stabiliser. On-site examination of the wreckage accounted for all major parts of the helicopter.

Due to the severity of the post-impact fire destroying sections of the aluminium control tubing, it was not possible to verify the integrity of the entire flight control system. However, all steel components associated with the collective and cyclic flight controls were found intact and secure. Evidence of the rubber drive belts was found in the main wreckage. However, due to the degree of fire damage, it was not possible to establish the serviceability of the belts at the time of the accident.

A number of helicopter components were removed from the accident site for further technical examination, including the engine, the separated main rotor blade, both drive sheaves (pulleys) and other components.

Meteorological information

The Bureau of Meteorology forecast for the Kimberley region included fine conditions with some smoke haze, light south to south-westerly winds and temperatures ranging from 29 to 40 degrees Celsius. The passenger reported that, at the time of the accident, conditions were fine with no wind.

Further investigation

The investigation is continuing and will include:

- further technical examination of the helicopter engine, rotor drive system and other components
- operational issues
- a review of maintenance conducted on the helicopter.