



AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/8645	
Aircraft Registration	ZS-RDB	Date of Accident	03 May 2009		Time of Accident	0830Z
Type of Aircraft	Robinson R22 Beta II		Type of Operation	Private		
Pilot-in-command Licence Type	Commercial		Age	38	Licence Valid	Yes
Pilot-in-command Flying Experience	Total Flying Hours	8084.2		Hours on Type	388	
Last point of departure	Kwandwe game reserve in the Eastern Cape area.					
Next point of intended landing	Kariega game reserve near Kenton-on Sea in the Eastern Cape area.					
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)						
Kariega game reserve GPS Position: S33°34.113' E02 6°34.985' Elevation 1005 AMSL.						
Meteorological Information	Surface Wind, 10 Knots: Temperature, 18°C: Visibility, 10km: Scattered Clouds.					
Number of people on board	1 + 0	No. of people injured	0	No. of people killed	1	
Synopsis:						
<p>On 3 May 2009, the pilot being the sole occupant on board, the helicopter was en-route from Kwandwe game reserve, north of Grahamstown, to Kariega game reserve on a game capturing operation when the accident occurred. The helicopter collided with terrain in a bush at Kariega game reserve. Examination of the wreckage and engine strip revealed no deficiencies with the helicopter, engine failure or aircraft system failure. The on-site investigation (photographs) indicates that the main rotor was turning prior impact.</p> <p>The helicopter was destroyed by the impact and post-impact fire. The pilot was fatally injured in the accident.</p>						
Probable Cause:						
Undetermined.						
IARC Date				Release Date		

AIRCRAFT ACCIDENT REPORT

Name of Owner/Operator : D G Helicopters CC
Manufacturer : Robinson Helicopter Company
Model : R22 Beta II
Nationality : South African
Registration Marks : ZS-RDB
Place : Kariega Game Reserve (Eastern Cape area)
Date : 03 May 2009
Time : 0830Z

All times given in this report is Co-ordinated Universal Time (UTC) and will be denoted by (Z). South African Standard Time is UTC plus 2 hours.

Purpose of the Investigation:

In terms of Regulation 12.03.1 of the Civil Aviation Regulations (1997) this report was compiled in the interest of the promotion of aviation safety and the reduction of the risk of aviation accidents or incidents and not to establish legal liability.

Disclaimer:

This report is given without prejudice to the rights of the CAA, which are reserved.

1. FACTUAL INFORMATION:

1.1 History of Flight:

- 1.1.1 On the morning of 03 May 2009, the pilot being the sole occupant on board, the helicopter was en-route on a positioning flight under visual flight rules (VFR) from Kwandwe game reserve, north of Grahamstown during a game capturing operation when the accident occurred. The helicopter collided with terrain at Kariega game reserve in the Eastern Cape area.
- 1.1.2 Four game rangers who were inside a house at the game reserve at the time heard the sound of a helicopter flying and after a few minutes they heard a very loud noise nearby. They went outside to see what could have caused the noise, when they saw a dense smoke emanating from the bush.
- 1.1.3 They quickly rushed to the site and found that the helicopter was on fire. They attempted to render some assistance by extinguishing the fire, but the pilot was already fatally injured. The investigators could not establish how much fuel was on-board the helicopter prior to the accident flight.
- 1.1.4 Fine weather conditions prevailed in the area at the time of the accident. The game rangers informed the appropriate authorities and they were quickly on the scene to render some assistance and secure the area. According to the statement from a friend of the deceased pilot, a day before the accident after he had completed some work near Graaf Reinet, the deceased had pointed out to him some rubber dust developing on the housing surrounding the main rotor drive belts.

- 1.1.5 He again pointed out that on closer inspection it was evident that the drive belts were wearing a little on one side and polishing the pulley grooves on the same side. The deceased further mentioned that the engine was recently installed and the pulley system was slightly out of alignment and would need some adjustment on his return to KwaZulu-Natal as it posed no immediate threats.
- 1.1.6 The accident occurred during daylight conditions at the geographical position determined as South 33° 34.113' and East 026°34.98 5' at an elevation of 1005 AMSL.

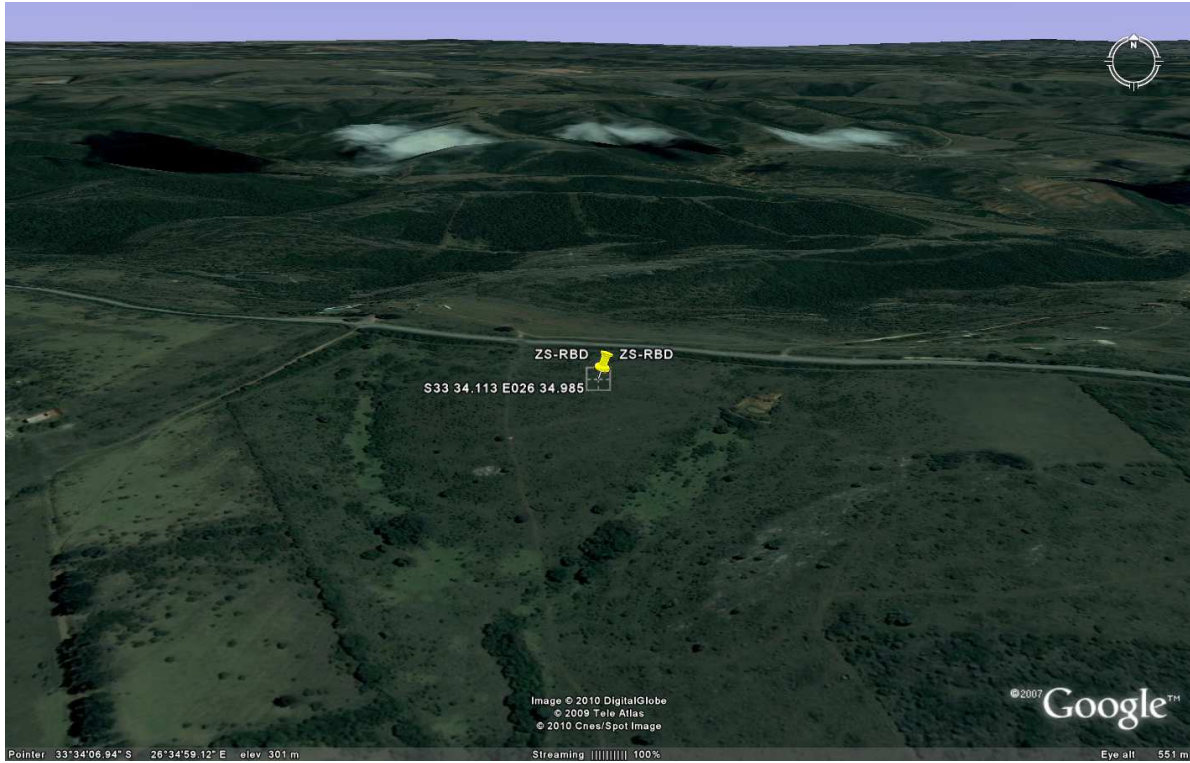


Figure 1: Terrain of the accident site.

1.2 Injuries to Persons:

Injuries	Pilot	Crew	Pass.	Other
Fatal	1	-	-	-
Serious	-	-	-	-
Minor	-	-	-	-
None	-	-	-	-

1.3 Damage to Aircraft:

- 1.3.1 The helicopter was destroyed during the impact sequence and by post-impact fire.



Figure 2: A view of the main wreckage.

1.4 Other Damage:

1.4.1 Fire damage was caused to the vegetation in the area of impact.

1.5 Personnel Information:

Nationality	South African	Gender	Male	Age	38
Licence number	*****	Licence type	Commercial		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Instructors Rating, Night Rating, Under sling, Winching and Culling Ratings.				
Medical Expiry Date	31 January 2010				
Restrictions	None				
Previous Accidents	None				

Flying Experience:

1.5.2 The pilot's log-book could not be found during the investigation. The flying hours below were obtained from the SACAA pilot's file, indicating his last pilot's licence renewal dated 06 January 2009. The total hours on type were also obtained from the logbook entry, which was on the pilot's file during his licence renewal.

Total Hours	8084.2
Total Past 90 Days	18.5
Total on Type Past 90 Days	18.5
Total on Type	388

1.6 Aircraft information:

Airframe:

Type	Robinson R22 Beta II	
Serial Number	2306	
Manufacturer	Robinson Helicopter Company	
Year of Manufacture	1992	
Total Airframe Hours (At time of Accident)	Not known	
Last MPI (Date & Hours)	23 April 2009	4035.0
Hours since Last MPI	Not known	
C of A (Issue Date)	30 April 2002	
C of A (Expiry Date)	29 April 2010	
C of R (Issue Date) (Present owner)	07 April 2006	
Operating Categories	Standard	

Note: The total airframe hours at the time of the accident and hours since the last MPI could not be established or traced by the investigators because the flight folio could not be found. The flight folio might have been destroyed by the post-impact fire. The total airframe hours were obtained from the aircraft's airframe log-book.

- 1.6.1 The Robinson R22 Beta II is a two-seater, single engine helicopter constructed primarily of metal and equipped with a spring and skid type landing gear. The primary structure of the fuselage is welded steel tubing and riveted aluminium.

Engine:

Type	Lycoming/O-320-B2C
Serial Number	L-16908-39A
Hours since New	2490.8
Hours since Overhaul	490.8

NB: These were the last hours recorded in the engine logbook on 23 April 2009.

- 1.6.2 The Robinson R22 Beta II is powered by one Lycoming four-cylinder, horizontally opposed, overhead 0-valve, and air-cooled, carburetted engine with a wet sump oil system.

1.7 Meteorological Information:

- 1.7.1 An official weather report was obtained from the South African Weather services (SAWS).

WEATHER CONDITIONS IN THE VICINITY OF THE ACCIDENT.

No official observations are available regarding the time and place of the accident. The most likely weather conditions at the place of the accident were as follows:

Temperature : 18°C
Dew point : 13°C

Surface Wind: 090°TN 10 Knots
Cloud covers: Scattered clouds at 1500 feet
Visibility : 10 km

2. This is a satellite image:
(09H00Z 03 May 2009)

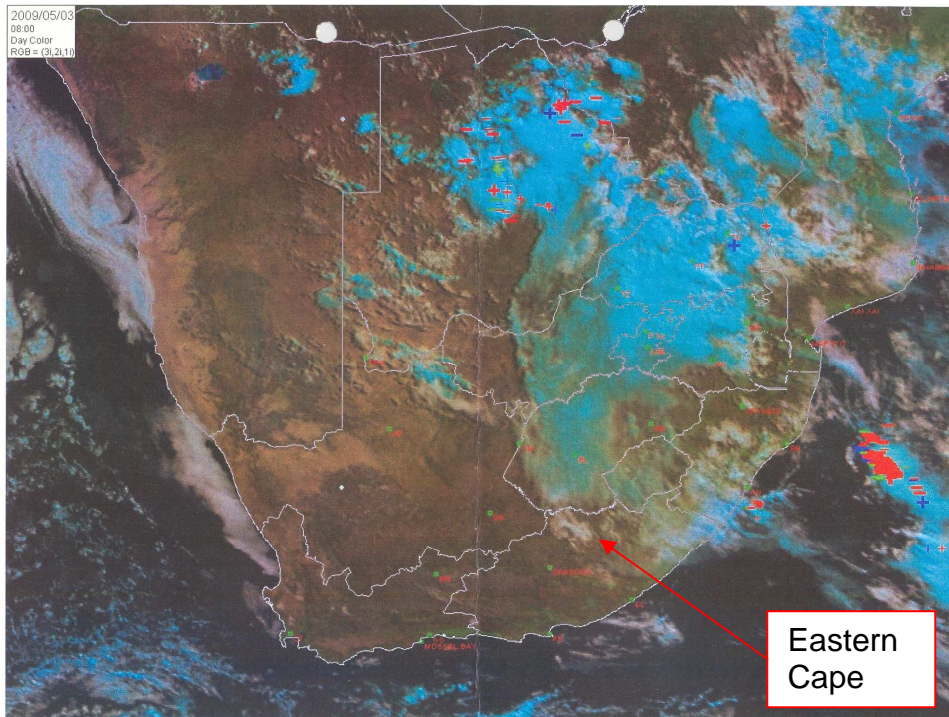


Figure 3: View of the satellite image in the Eastern Cape area.

1.8 Aids to Navigation:

- 1.8.1 The helicopter was fitted with standard navigation equipment for this helicopter type as approved at the time of certification. The pilot was in possession of a portable Garmin GPS (Global Positioning System) but no data could be retrieved from the unit because it was destroyed by the post-impact fire.

1.9 Communications:

- 1.9.2 There was no communication with Air Traffic Control Services (ATC) as the helicopter was operated outside of controlled airspace.

1.10 Aerodrome information:

- 1.10.1 The accident occurred outside the terminal control area (TMA) of any aerodrome, in a bush at GPS coordinates determined as South 33° 34.113' East 026°34.985' Elevation 1005 above ground level (AMSL).

1.11 Flight Recorders:

1.11.1 The helicopter was not fitted with a flight data recorder (FDR) or a cockpit voice recorder (CVR), neither was it required in terms of the South African Civil Aviation Regulations to be fitted to this type of helicopter.

1.12 Wreckage and Impact Information:

1.12.1 The accident occurred in a bush at Kariega game reserve. Components and structural pieces of the helicopter were scattered over an area of more than 16 metres in diameter, which was oriented on a southerly heading from the initial point of impact. The initial ground contact by the helicopter was shown by a ground scar caused by both skids. A few metres down the wreckage path from the initial point of impact were components from the skids. Other components from the cockpit/cabin area were situated on the right-hand side of the helicopter e.g. Perspex pieces from the shattered windscreen, the instrument panel and a headset.

1.12.2 The tail boom, including the tail rotor assembly, was still attached to the helicopter. The main wreckage was located at the last point of impact. The fuel tank ruptured and the helicopter caught fire. The fire also spread to the vegetation and to all other areas with fuel residue. The fuel tank was completely destroyed by the ground impact and post-impact fire.

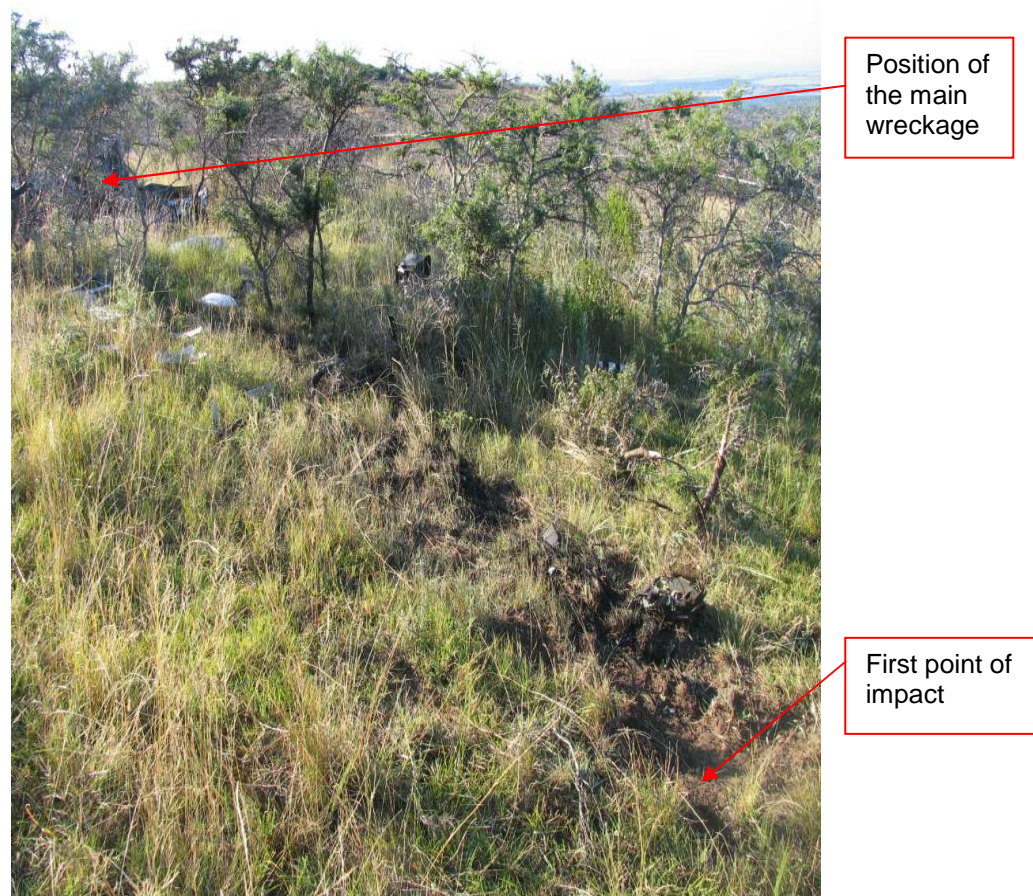


Figure 3: First point of impact and final position of the main wreckage.

1.12.3 The main rotor shaft was damaged during impact and was still attached to the main rotor head. The exterior of the aircraft was heavily scorched from the post-impact fire. The tail rotor drive shaft was heavily damaged from overload separation of the tail boom. The tail rotor gear box was still attached to the tail section. Both tail rotor blades were destroyed. The main rotor blades showed signs of the engine operating at very high power settings at the time of impact.

1.13 Medical and Pathological Information:

1.13.1 According to the medico-legal post-mortem report it was concluded that the pilot died from extensive heat fractures. The toxicology test results were not available at the time this report was compiled. Should the result have any bearing on the circumstances, it will be evaluated and the report might be revised accordingly.

1.14 Fire:

1.14.1 An intense fire started after impact and consumed most of the fuselage and the inboard area of the helicopter. Some of the engine components were melted and reduced to ashes.

1.14.2 It was calculated that there was sufficient fuel on board for further flight when the accident occurred. Considering the damage to the helicopter and both fuel tanks, it is likely that a fuel line might have ruptured during the ground impact.

1.14.3 The ignition source could not be established although there was enough impact disruption to the electrical system to have caused arcing at some point during the impact sequence.

1.15 Survival Aspects:

1.15.1 The accident was regarded to be a non-survivable accident due to the impact forces associated with it. It was not possible to determine if the pilot was wearing his seat and shoulder harness at the time of the accident due to the cockpit/cabin area being destroyed by post-impact fire.

1.16 Tests and Research:

1.16.1 During the on-scene investigation, no fuel was available from the helicopter for analysis. The fuel pump and associated lines were removed and were found to be damaged. Flight control integrity could not be established due to damage caused to the helicopter. The cockpit/cabin area was found to be destroyed and no pre-impact indications could be traced.

1.16.2 The main rotor head assembly was intact but extensively damaged by the impact forces. No disassembly of the hub was performed. The tail rotor assembly was inspected and it was found that severe damage had been caused to the tail rotor blades. Further verification of the operation of the gearbox and pitch change mechanism could not be done.

1.16.3 Engine tear down and inspection:

The engine was removed from the fuselage and was subjected to a tear-down inspection.

1.16.4 The engine, a Lycoming O-320-B2C, S/N L-16908-39A was removed from the wreckage and was subjected to a tear-down inspection at an approved engine overhaul facility in Port Alfred (Eastern Cape) where it was stripped and examined under the supervision of the SACAA. The detailed inspection included major engine components, fuel oil systems, filters and pumps, ignition system and exhaust.

The following observations were made:

- i. The oil sump was missing from the engine or destroyed during the accident sequence.
- ii. All the piston cylinders were found to be heat-damaged and seized.



Figure 4: Heat damage caused to cylinders and pistons.

- iii. The rear case was burned by fire. The rear case was removed. The camshaft and crankcase gear timing were found to be correctly timed.
- iv. It was noted that the centre, rear and conrod bearings were melted by the heat that the engine had experienced.
- v. Both magnetos and the carburettor were severely damaged to the extent that testing was not possible. Although these components sustained extensive damages due to impact and post-impact fire, no evidence could be found indicating that any of them could have contributed to the accident.

- vi. The investigation showed that the engine was running at a very high power setting. See the picture of a deformed cooling fan below.



Figure 5: View of a deformed cooling fan.

1.17 Organisational and Management Information:

1.17.1 This was a private flight.

1.17.2 The last Mandatory Periodical Inspection (MPI) that was carried out on the helicopter prior to the accident was certified on 23 April 2009 by an SACAA approved Aircraft Maintenance Organisation (AMO).

1.18 Additional Information:

1.18.1 None.

1.19 Useful or Effective Investigation Techniques:

1.19.1 None.

2. ANALYSIS:

2.1 The available information indicated that fine weather conditions prevailed in the area at the time of the accident. The prevailing weather conditions were therefore not considered to have had any bearing on the accident.

- 2.2 According to the logbooks, the aircraft was properly maintained and no documented evidence was found indicating a defect or possible malfunctioning of it prior to the flight that could have contributed or have caused the accident, with the last MPI being certified on the 23 April 2009.
- 2.3 The pilot held a valid pilot's licence as well as a valid aviation medical certificate, issued by an SACAA -accredited medical examiner.
- 2.4 The pilot had flown a total of 388 hours on the aircraft type and 8084.2 total flying hours. The helicopter crashed during a positioning flight to Kariega Park for a game capturing operation.
- 2.5 The statement from the deceased pilot's friend could not be overlooked, but since the main rotor drive belts had been consumed by fire, nothing could be inspected and analysed. The engine and some components were taken to an approved engine overhaul facility for an engine strip and examination under SACAA supervision. Examination of the wreckage and the engine strip revealed no deficiencies with the helicopter or engine failure or aircraft system failure. The investigation showed that the engine was running at a very high power setting prior to impact with the terrain. The on-site evidence, (photographs) indicates that the main rotor was turning prior impact.
- 2.6 The possibility that the pilot had encountered or suffered from a medical condition could not be established during the post-mortem procedure. However, it could not be ruled out. The possibility of fatigue, or the pilot falling asleep behind the controls could also not be eliminated as a possible or contributing factor to this accident.

CONCLUSION:

3.1 Findings:

- 3.1.1 The pilot was the holder of a valid commercial licence with a helicopter type licence endorsed in his logbook.
- 3.1.2 The pilot's medical certificate expired on 31 January 2010 with no restrictions.
- 3.1.3 The pilot was engaged in a private flight.
- 3.1.4 The helicopter was maintained in accordance with the approved maintenance schedule with the last MPI prior to the accident being certified on 23 April 2009.
- 3.1.5 The AMO that had certified the last inspection was accredited by the SACAA.
- 3.1.6 No records of any fuel uplift could be found because the helicopter's flight folio could not be obtained.
- 3.1.7 The helicopter was destroyed by the impact and the post-impact fire that erupted.
- 3.1.8 The Certificate of Airworthiness was valid until 29 April 2009.
- 3.1.9 The flight was conducted with good weather conditions prevailing.

3.2 Probable Cause/s:

3.1 Undetermined.

4. SAFETY RECOMMENDATIONS:

4.1 None.

5. APPENDICES:

5.1 There are no appendices to this report.

Report reviewed and amended by the Advisory Safety Panel on 16 March 2010
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