SOUTH AFRICAN CIVIL AVIATION AUTHORITY

Section/division **Accident and Incident Investigations Division** Form Number: CA 12-12a

AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/9362		
Aircraft Registration	**ZS-RUU**	**Date of Accident**	22 September 2014		**Time of Accident**	1000Z	
Type of Aircraft	Robinson R44 Raven II		**Type of Operation**		Commercial		
Pilot-in-command Licence Type		Commercial	**Age**	23	**Licence Valid**	Yes	
Pilot-in-command Flying Experience		Total Flying Hours	1146.0		Hours on Type	928.7	
Last point of departure	Pennygum Country Cottages, Underberg, KwaZulu-Natal province						
Next point of intended landing	Pennygum Country Cottages, Underberg, KwaZulu-Natal province						
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)							
In an open field in the Himeville area (GPS position S 29°51'54.8" E 029°38'40.9").							
Meteorological Information	Wind: 040°/04Kts., Visibility: 10000m. Temperature: 24°C. Dew point: 09°C. Cloud cover: Nil. Cloud base: Nil.						
Number of people on board	1+1	**No. of people injured**	0	**No. of people killed**	1+1		

Synopsis

On 22 September 2014, the pilot, accompanied by a passenger, was engaged in an alien vegetation survey in the Himeville area.

Contractors in that area saw the helicopter flying around. A few minutes later, they heard a loud bang and so they proceeded to the area where the noise had come from, in order to investigate. On their way there, they saw black smoke and heard an explosion. On arrival at the scene they found the wreckage of the helicopter where it collided with the ground.

Both occupants were fatally injured and the helicopter was destroyed during the accident sequence and post-impact fire.

It was found the tail boom was severed by the main rotor blades resulting in a collision with the ground.

Probable Cause

The helicopter's tail boom was severed/cut off by the main rotor blades during an evasive action to prevent a collision with electrical power lines. As a result, the helicopter collided with the ground.

ASP Date		Release Date	

AIRCRAFT ACCIDENT REPORT

Name of Owner	**:** E'Scape Airtours Charters and Transfers CC
Name of Operator	**:** E'Scape Airtours Charters and Transfers CC
Manufacturer	**:** Robinson Helicopter Company
Model	**:** R44 II
Nationality	**:** South Africa
Registration Marks	**:** ZS-RUU
Place	**:** Himeville, KwaZulu-Natal province
Date	**:** 22 September 2014
Time	**:** 1000Z

All times given in this report are 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 produced without prejudice to the rights of the CAA, which are reserved.

1. FACTUAL INFORMATION

1.1 History of Flight

1.1.1 A Robinson R44 helicopter, registration ZS-RUU, took off from Penningham Cottages near Underberg in KwaZulu-Natal on a commercial flight (survey flight) with the intention of landing back at Penningham Cottages. The commercial flight was being conducted under visual meteorological conditions (VMC) and during daylight conditions.

1.1.2 On the day when the accident flight took place, the pilot and his passenger intended

to fly to several pre-determined points to conduct a survey of alien vegetation in the area.

1.1.3 At approximately 0955Z, silviculturist contractors working in the Himeville area saw the helicopter operating in that area. A few minutes later they heard a loud bang and so they proceeded to the area where the noise had come from, in order to investigate. While on their way there, they saw black smoke and heard an explosion.

1.1.4 When they reached the source of the smoke, they could see the wreckage of a helicopter. Because of the intense heat of the fire, they could not render any assistance to the occupants of the helicopter.

1.1.5 They immediately called for medical assistance but by the time the assistance arrived, both occupants had succumbed to their injuries.

1.1.6 Impact with the ground was at a GPS position S 29°51’54.8” S029°38’40.9” at an elevation of 4461 feet above mean sea level (AMSL)

1.2 Injuries to Persons

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

1.3 Damage to Aircraft

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

Figure 1: View of the helicopter, destroyed by the post-impact fire.

1.4 Other Damage

1.4.1 The post-impact fire caused minor damage to the surrounding vegetation.

1.5 Personnel Information

Pilot

Nationality	South African	Gender	Male	Age	23
Licence Number	0272343286	Licence Type	Commercial		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Night Rating, Instructors Rating				
Medical Expiry Date	31 January 2015				
Restrictions	None				
Previous Accidents	None				

Flying Experience:

Total Hours	1146.6
Total Past 90 Days	88.9
Total on Type Past 90 Days	88.9
Total on Type	928.7

1.5.1 It should be noted that the number of flying hours indicated in the above table is not a correct indication of the pilot's total flying hours. The total amount of flying hours

on the day of the accident was not known.

1.6 Aircraft Information

Airframe:

Type	Robinson R44 Raven II	
Serial Number	10619	
Manufacturer	Robinson Helicopter Company	
Year of Manufacture	2005	
Total Airframe Hours (At time of Accident)	2367.8	
Last MPI (Date & Hours)	1 September 2014	2299.5
Hours since Last MPI	68.3	
C of A (Issue Date)	18 September 2012	
C of R (Issue Date) (Present owner)	13 May 2014	
Operating Categories	Standard Part 127	

Engine:

Type	Lycoming IO-540-AE1A5
Serial Number	L-29881-48A
Hours since New	2367.8
Hours since Overhaul	367.3

1.7 Meteorological Information

1.7.1 The meteorological information provided in the table below was obtained from the South African Weather Service (SAWS).

Wind direction	040°T	Wind speed	04KT	Visibility	10000m
Temperature	24°C	Cloud cover	Nil	Cloud base	Nil
Dew point	09°C				

1.8 Aids to Navigation

1.8.1 The helicopter was equipped with the standard navigational equipment indicated in the Minimum Equipment List approved by the regulator. There were no recorded defects to the navigational equipment prior to the flight.

1.9 Communications.

1.9.1 The helicopter was equipped with standard communication equipment as indicated in the Minimum Equipment List approved by the regulator. There were no recorded defects to the communication equipment prior to the flight.

1.9.2 It is not known if the pilot broadcasted his intentions while flying in the area.

1.10 Aerodrome Information

1.10.1 The accident happened outside the boundaries of an aerodrome.

1.11 Flight Recorders

1.11.1 The helicopter was not fitted with a cockpit voice recorder (CVR) or a flight data recorder (FDR). Neither of these was required, in terms of the regulations, to be fitted to this type of helicopter.

1.12 Wreckage and Impact Information

1.12.1 Damage to the helicopter

The direction of flight was 010° Magnetic while the wreckage of the fuselage after the accident was 160° Magnetic.

The cabin and fuselage of the helicopter were destroyed by the post-impact fire.

Although the engine was extensively damaged, it remained retained inside the engine mounting support. However, it was destroyed by the post-impact fire.

Figure 2: Damage caused to the fuselage and engine of the helicopter.

After the accident it was found that both main rotor blades had remained attached to the main rotor head. One of the main rotor blades was intact although impact damage was visible, while the other main rotor blade was severed halfway along the length of the blade.

Figure 3: Both main rotor blades remained attached to the main rotor head following the accident sequence.

During the accident sequence, both the main landing gear skids became separated from the fuselage of the helicopter but they were found in close proximity to the main wreckage.

The rear end of the tail boom section, containing the tail rotor system and horizontal stabilizer, was found approximately 100m from the main wreckage in the direction from where the helicopter was flying. Yellow paint marks were visible on the tail boom surface at the place where the tail boom was severed by the main rotor blades.

Figure 4: Severed tail boom section.

The fuel tank of the helicopter became separated from the fuselage during the accident sequence and it was found approximately 10m away from the fuselage. The fuel tank was torn open and no fuel remained in it.

Figure 5: The damaged fuel tank.

Several personal items were ejected upon impact and these were found in the area around the main wreckage.

An investigation conducted at the accident scene concluded that no part of the airframe structure or any control surface was missing.

1.12.2 Helicopter attitude during impact

The terrain where the helicopter impacted the ground has an upslope. Impact marks on the ground indicate that the helicopter was in a level attitude when it impacted the ground.

1.12.3 Helicopter configuration during impact

The tail rotor section of the tail boom was severed from the rest of the tail boom during impact.

1.13 Medical and Pathological Information

1.13.1 Post mortem examinations were performed on the deceased pilot and the passenger but the results of those examinations and toxicology tests were not yet available when this report was compiled. If any of those results indicate that

medical issues could have affected the performance of the pilot, then this finding will be regarded as new evidence and the investigation will be re-opened.

1.14 Fire

1.14.1 The cabin and most of the tail boom were destroyed by the post-impact fire.

1.15 Survival Aspects

1.15.1 The accident was not considered to be survivable because of the high kinetic forces associated with the accident and the post-impact fire.

1.16 Tests and Research

1.16.1 No new methods were applied.

1.17 Organizational and Management Information

1.17.1 The last mandatory periodic inspection (MPI) before the accident was certified on 1 September 2014 at 2299.5 airframe hours; this was done by a SACAA approved Aircraft Maintenance Organization (AMO) holding a valid AMO certificate.

1.17.2 The operator possessed a valid Air Operators Certificate (AOC 08823) for Part 127 operations. Aerial patrol, observation and survey were endorsed on the AOC and the helicopter ZS-RUU was also authorised for use under this AOC.

1.17.3 The survey was being done for the Agricultural Research Council (ARC). The helicopter had been hired by the ARC and the passenger was an ARC employee and as such, not a fare paying passenger.

1.18 Additional Information

1.18.1 The route being followed by the pilot before the accident was down a valley. There was some relatively high ground within that valley in the area of the accident site. Electrical high tension wires were spanning the valley. It was not possible to

establish the precise height of those wires where they spanned the valley in the vicinity of the high ground; however, they were known to be less than 500ft above ground level (AGL). The precise height at which the flight was conducted was also not known. However, it seems that at the height at which the pilot was flying moments before the accident, the electrical wires spanning the valley blended in with the surrounding mountains, and were therefore difficult for the pilot to see.

Figure 6: Position of the wreckage relative to the high tension wires that spanned across the valley.

1.18.2 Initial reports on the accident indicated that the helicopter collided with the high tension electrical wires that spanned across the valley. An investigation at the scene revealed there was indeed a set of high tension wires spanned across the valley close to the accident site, with one of the three cables lying on the ground.

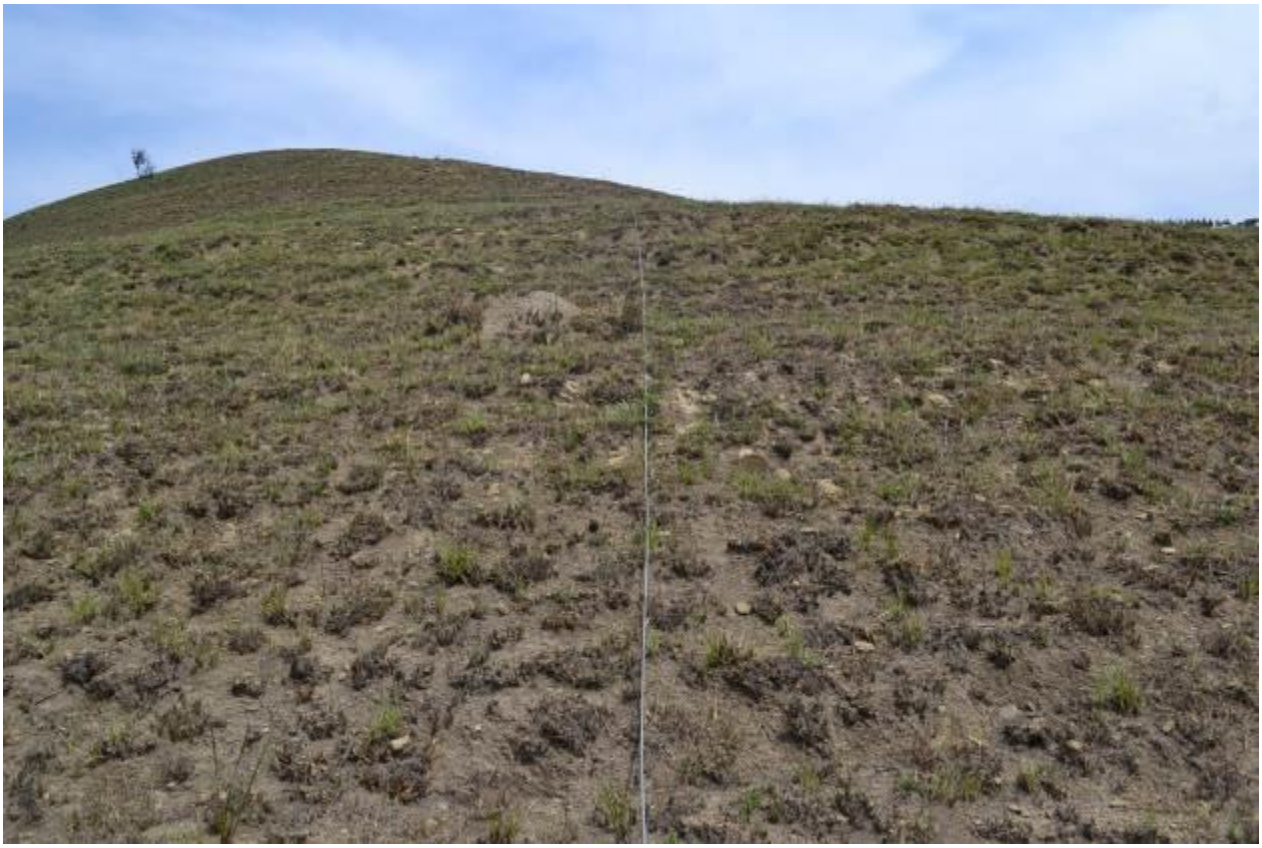

Figure 7: The high tension cable as it was found on the ground.

1.18.3 The cable was found to be lying on the ground in a straight line. An inspection of the cable could not reveal any marks or evidence of any collision by the helicopter with the cable. It became clear that the cable had been lying in that position for some time as vegetation has started to cover it.

1.18.4 ESCOM confirmed that the cable broke during a snowfall in the area during the previous winter and the cable was lying on the ground since tehen.

1.18.5 An on-site investigation of the wreckage could also not reveal evidence of any collision with any object before the helicopter impacted the ground.

1.18.6 Because of the fire damage caused to the engine by the post-impact fire, it was not possible to conduct a strip down inspection of the engine.

1.18.7 The wreckage came to rest approximately 110 meters past the high tension cable.

1.18.8 The operator's Manual of Operation for Surveying operations states the following:

"***The role of the helicopter for the SURVEYING OPERATIONS for E'scape AIRTOURS:***

(i) The helicopter is used to survey different areas that are not easily accessible by vehicles.

(ii) Points will be downloaded to a GPS and these points will be flown by the pilot in command (PIC).

(iii) The helicopter will operate from different air strips and from time to time from private lodges.

(iv) On no account will operations be conducted downwind at less than 500 feet AGL unless operationally necessary.

Function and duties of the pilot when conducting operations in surveying areas.

In addition to the function and duties of the pilot contained in Section 3 of this Chapter, the pilot has the following functions and duties when conducting operations.

(a) To plan an[d] co-ordinate the use of the helicopter during all operations.

(b) To operate the helicopter in such a way that:

(c) The safety of all persons involved and the helicopter is not compromised; and

(d) The engine and airframe limitations are not exceeded.

(e) To ensure that all personnel operating in close proximity of the helicopter are thoroughly briefed on all safety aspects.

(f) To ensure the safety of the helicopter at all times."

1.19 Useful or Effective Investigation Techniques

1.19.1 No new methods were applied.

2. ANALYSIS

2.1 Man

The pilot held a valid Commercial Pilot licence (Helicopter) at the time of the accident and had the aircraft type endorsed on it. The pilot possessed a valid

medical certificate with no restrictions imposed on it.

The pilot's total flying hours at the time of the accident was 1146.6 hours of which 928.7 hours were on the Robinson R44 helicopter.

It was not possible to establish the height of the helicopter at the time of the accident. It seems that the pilot only became aware of the electrical wires when he was already in close proximity to them. The pilot then either purposely, or acting in a state of fright upon seeing the electrical wires, pulled hard on the cyclic control in an effort to gain height to clear the top of the wires. During this action, the main rotor blades made contact with the helicopter's tail boom. No evidence could be found to indicate that the helicopter made any contact with the electrical wires.

2.2 Machine

Maintenance documents revealed that the last mandatory periodic inspection (MPI) on this aircraft took place at 2299.5 airframe hours on 1 September 2014; it was conducted by an approved aircraft maintenance organization (AMO) which possessed a valid AMO certificate.

An inspection of the helicopter wreckage at the scene of the accident revealed no evidence of any collision marks which might have been caused by a collision between the helicopter and the electrical wires.

2.3 Environment

At the time of the accident, the flight was taking place down a valley. There were some relatively high areas of ground within that valley. If the pilot was following the contour of the valley, then he might not have been able to see the electrical wires until he was in close proximity to them.

Weather conditions on the day were good with no wind gusts and good visibility.

3 CONCLUSION

3.1 Findings

3.1.1 The pilot was properly certified and he was qualified in terms of the regulations to perform this flight. He possessed a valid medical certificate.

3.1.2 The pilot was not immediately aware of the electrical wires that spanned across his flight path. He only saw those wires when he was in close proximity to them and at that point he made an evasive manoeuvre to prevent a collision with the wires: during the manoeuvre, the tail boom was severed from the rest of the helicopter which rendered the helicopter uncontrollable and as a result a collision with the ground followed.

3.1.3 The helicopter had a valid Certificate of Airworthiness and was recorded as being serviceable at the time of the accident.

3.1.4 Weather conditions had no influence on the accident.

3.2 Probable Cause/s

3.2.1 The helicopter's tail boom was severed/cut off by the main rotor blades during an evasive action to prevent a collision with electrical power lines. As a result, the helicopter collided with the ground.

4. SAFETY RECOMMENDATIONS

4.1 None

5. APPENDICES

5.1 None