SOUTH AFRICAN CIVIL AVIATION AUTHORITY

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

AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/8819		
Aircraft Registration	**ZS-CVW**	**Date of Accident**	13/08/2010		**Time of Accident**	0740Z	
Type of Aircraft	Robinson R44		**Type of Operation**		Private		
Pilot-in-command Licence Type	Private		**Age**	54	**Licence Valid**	Yes	
Pilot-in-command Flying Experience	Total Flying Hours		388.4		Hours on Type	376.2	
Last point of departure	South Africa - FAGM (QRA): Johannesburg/Rand						
Next point of intended landing	South Africa - FAEO : Ermelo						
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)							
25 km west of Ermelo (Mpumalanga) at GPS coordinates S 26º30'35" E 29º47'30"							
Meteorological Information	CAVOK. Temperature 10˚C. Cloud cover: Nil. Wind speed: 8kts. Wind Direction 250˚						
Number of people on board	1+2	**No. of people injured**	0		**No. of people killed**	3	

Synopsis

A pilot and two passengers took off in a Robinson R44 on a private flight from a private helipad in the west rand area of the Gauteng province. The pilot flew the helicopter to Rand Airport (FAGM) where he uplifted fuel for the onward journey, the final destination being the Piet Retief area in the Mpumalanga province.

The flight from Rand Airport (FAGM) was considered to be uneventful and the helicopter was then flown toward Ermelo in the Mpumalanga province, with the intention of refuelling in Ermelo for the onward journey to Piet Retief.

The helicopter was seen by witnesses to be flying at a low altitude, before it struck the electrical power cables that spanned the N17 highway. Witnesses reported that after the aircraft struck the power cables, debris from the aircraft began falling onto the road and smoke was seen emanating from the cabin area.

Control of the helicopter was lost and it collided with the ground.

The pilot and two passengers were fatally injured in the accident.

Probable Cause

The helicopter collided with electrical power cables, where after the pilot lost control and the helicopter impacted the ground

IARC Date		Release Date	

AIRCRAFT ACCIDENT REPORT

Name of Owner/Operator : Colmec Carriers cc
Manufacturer : Robinson Helicopter Company
Model : R44 II
Nationality : South African
Registration Marks : ZS-CVW
Place : 25 km west of Ermelo in the Mpumalanga Province
Date : 13 August 2010
Time : 0740Z

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:

1. FACTUAL INFORMATION

1.1 History of Flight

1.1.1 A pilot and two passengers took off in a Robinson R44 on a private flight from a private helipad in the west rand area of the Gauteng province. The pilot flew the helicopter to Rand Airport (FAGM) where he uplifted fuel for the onward journey; the final destination being the Piet Retief area in the Mpumalanga province.

1.1.2 The flight from Rand Airport (FAGM) was considered to be uneventful and the helicopter was then flown toward Ermelo in the Mpumalanga province with the intention of refuelling in Ermelo for the onward journey to Piet Retief.

1.1.3 The helicopter was seen by witnesses to be flying at a low altitude before it struck the electrical power cables that spanned the N17 highway. Witnesses reported that after the helicopter struck the electrical power cables, debris from the helicopter began falling onto the road and smoke was seen emanating from the cabin area.

1.1.4 The helicopter struck the barrier that was next to the road with the right skid. The helicopter then flipped over the side of the barrier and it went down an embankment. The rotor blades of the aircraft struck the ground, where after the aircraft burst into flames.

1.1.5 Construction workers who were busy working on the road attempted to render assistance to the occupants of the helicopter. The workers tried to extinguish the fire with a water pump used to fill the construction vehicles with water from the river.

The intensity of the post-impact fire prevented the construction workers from rendering further assistance to the occupants of the helicopter.

1.1.6 The pilot and both passengers succumbed to their injuries. The helicopter was destroyed in the accident sequence.

1.2 Injuries to Persons

Injuries	Pilot	Crew	Pass.	Other
Fatal	1	-	2	-
Serious	-	-	-	-
Minor	-	-	-	-
None	-	-	-	-

1.3 Damage to Aircraft

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

Figure 1 showing the accident site.

1.4 Other Damage

1.4.1 Other damage was caused to the electrical power cables which were severed when they were struck by the helicopter.

Figure 2 showing severed electrical power cables.

1.5 Personnel Information

Nationality	South African	Gender	Male	Age	54
Licence Number	xxxxxxxxxx	Licence Type	Private		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Flight Tests- Single engine piston				
Medical Expiry Date	31/07/2011				
Restrictions	Corrective lenses. Hypertension protocol.				
Previous Accidents	None				

Flying Experience :

Total Hours	388.4
Total Past 90 Days	2.4
Total on Type Past 90 Days	2.4
Total on Type	376.2

1.6 Aircraft Information

Airframe :

Type	R44 II	
Serial Number	11603	
Manufacturer	Robinson Helicopter Company	
Date of Manufacture	2007	
Total Airframe Hours (At time of Accident)	334.9	
Last MPI (Date & Hours)	09/07/2010	334.9
Hours since Last MPI	unknown	
C of A (Issue Date)	07/03/2007	
C of R (Issue Date) (Present owner)	06/03/2007	
Operating Categories	Standard part 127	

1.6.1. The total airframe hours and the hours since the last MPI at the time of the accident are unknown, as the aircraft and instruments were destroyed by the post-impact fire.

1.6.2 The information on the total airframe hours was taken from the aircraft logbook on the 9th of July 2010.

Engine :

Type	Lycoming-IO-540
Serial Number	L-31714-48A
Hours since New	334.9
Hours since Overhaul	TBO not Reached

1.7 Meteorological Information

1.7.1 The following meteorological report (ref: ZS-CVW-2010-08-13-031) was obtained from the South African Weather Service. As no official observations were available at the place of the accident, the most likely weather conditions at the place of the accident are indicated in the table below.

Wind direction	250˚	Wind speed	08kts	Visibility	Good
Temperature	10˚C	Cloud cover	Nil	Cloud base	Nil
Dew point	-01˚C				

1.8 Aids to Navigation

1.8.1 The helicopter was equipped with the standard navigation equipment and no defects were recorded before the flight.

1.9 Communications

1.9.1 The helicopter was equipped with the standard communication equipment and no defects were recorded before the flight.

1.10 Aerodrome Information

1.10.1 The accident did not occur at an aerodrome.

1.11 Flight Recorders

1.11.1 The helicopter was not fitted with a flight data recorder (FDR) or cockpit voice recorder (CVR), and neither was required by regulations to be fitted to this type of helicopter.

1.12 Wreckage and Impact Information

1.12.1 The accident occurred at a location away from an aerodrome at G.P.S coordinates S 26º30'35" E 29º47'30". During the onsite investigation process, the following was observed:

Electrical power Cables

1.12.2 The helicopter collided with electrical power cables with the windscreen at approximately the height of the instrument cluster. Pieces of the windshield and instrument cluster were found lying on the ground between the electrical masts.

Main rotor blades

1.12.2 The main rotor blades sustained impact damage and only partial fire damage. The damage to the main rotor blades was caused by impact with the ground. A large piece of one of the rotor blades was located approximately 10 metres away from the main wreckage.

Main wreckage

1.12.4 The aircraft was found lying on its left side and had evidence of impact damage and destruction by fire. The cockpit was totally destroyed by the post-impact fire that erupted.

The cyclic control of the aircraft showed signs of being scraped by the electrical cables.

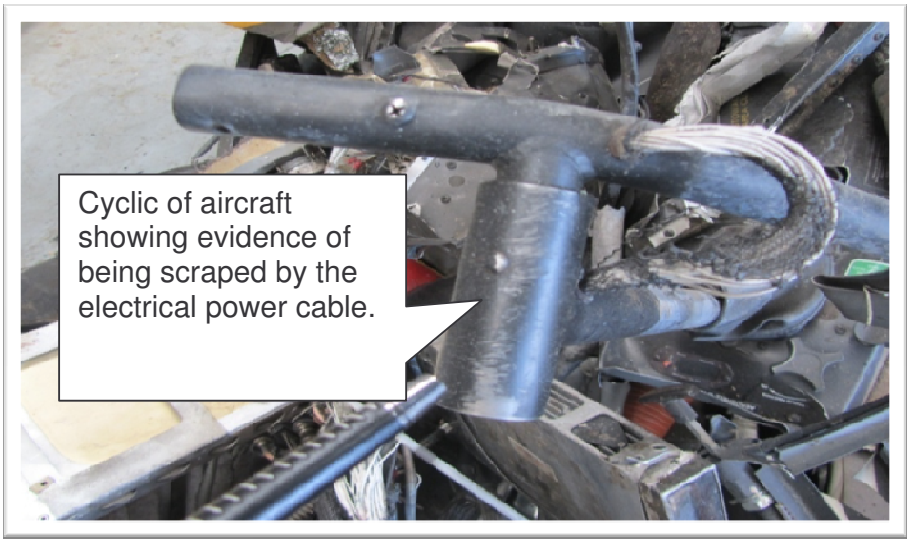

Figure 3 shows the impact marks on the cyclic of the helicopter.

Engine

1.12.5. There was substantial fire damage caused to the engine during the post-impact fire. All electrical wiring, rubber pipes and belts that formed part of the engine were also damaged in the post-impact fire. The engine was still in its original location on the aircraft.

Ground scars

1.12.6 The first ground impact scars were found approximately 280 metres from the point of impact with the electrical power cables. The impact scars were identified as that of the right skid which collided with the barrier located on the bridge. The main rotor struck the embankment and one rotor blade broke off. Approximately 20 m forward of the main rotor, the aircraft tail boom section collided with the ground. Approximately 20 m further the main fuselage struck the ground and came to rest on its left side.

Tail Rotor

1.12.7 The tail rotor was damaged in the accident sequence. The tail rotor showed signs of turning at high speed. The helicopter rolled over onto its left side before it came to a halt.

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

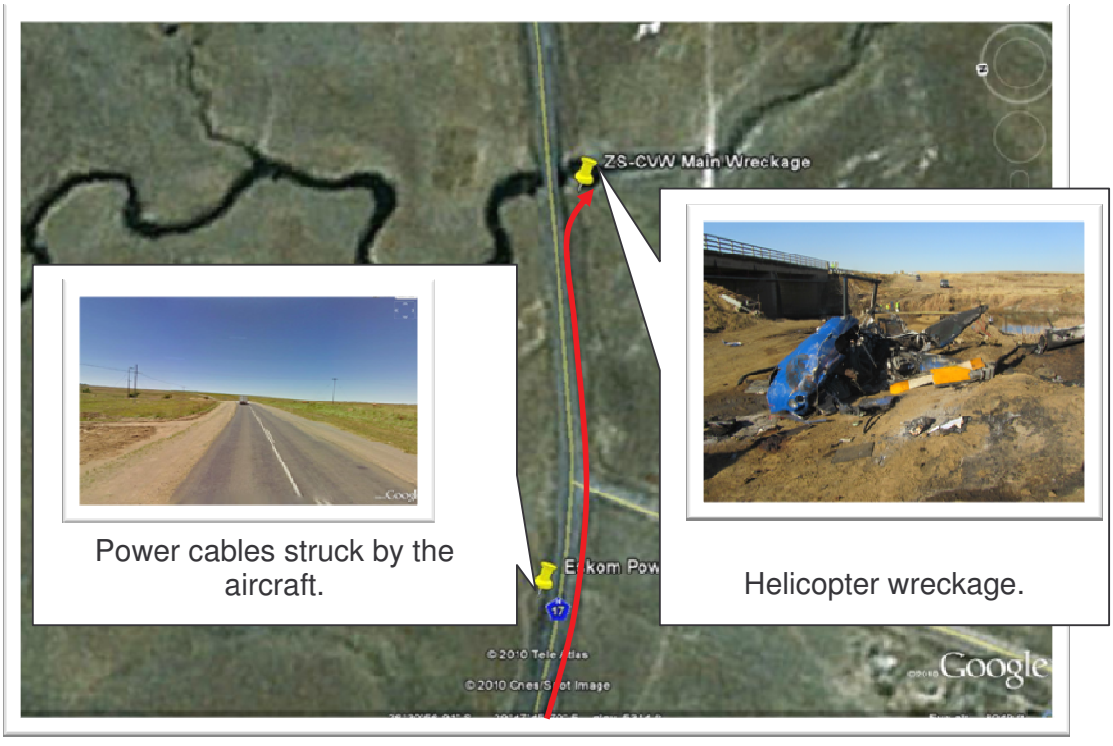

Figure 4 showing the accident sequence. The red arrow indicates the direction of the flight.

1.13 Medical and Pathological Information

1.13.1 The pathological reports state that the cause of death was skull and brain injury.

1.13.2 The pilot had numerous fractures of the metacarpals of the left hand. The pilot also had crushing and laceration marks involving the right superior aspect of the chest. This suggests that the electrical power cables struck the pilot on the hand and the chest.

1.13.3 There was no evidence to suggest that the pilot suffered any sudden illness or incapacity which might have affected his ability to control the aircraft prior to impact with the electrical power cables.

1.14 Fire

1.14.1 There was no report of a fire before the helicopter struck the electrical power cables.

1.14.2 Witnesses reported seeing smoke emanating from the helicopter cockpit after it struck the electrical power cables.

1.14.3 A construction worker who was sitting under the bridge saw the helicopter burst into flames as it struck the ground in front of him. The worker, who had the duty of filling the construction trucks with water from the adjacent stream, used the water pump and hose available to him in an attempt to put out the fire.

1.15 Survival Aspects

1.15.1 The accident was not survivable due to the high impact forces and the magnitude of the post-impact fire.

1.16 Tests and Research

1.16.1 None

1.17 Organisational and Management Information

1.17.1 The helicopter was privately operated by the owner.

1.17.2 The helicopter was maintained by an approved aircraft maintenance organisation (AMO). The AMO was in possession of a valid AMO certificate.

1.18 Additional Information

1.18.1 During the onsite investigation the height of the electrical masts was measured. The masts were found to be approximately 10.8 m in height and approximately 84 m apart. The three electrical power cables were spanned between pole number 115/108 and 115/109 that crossed perpendicular to the direction of the N17 road. The electrical power cables carried a voltage of 11 kv and were of the Davel Rural type.

1.18.2 The maintenance manual of the helicopter states that the height of the helicopter from the bottom of the skids to the top of the mast is approximately 3.27 m. The helicopter struck the electrical power cables at the height of the cyclic control which is approximately 1.40 m above the skids of the aircraft. The height of the electrical masts was approximately 10.8 m. The aircraft was thus flying at approximately 9.4 m AGL when it struck the electrical power cables.

1.18.3 The investigation found that the engine was turning at the time of the accident, as the helicopter made contact with the ground 280 meters past the electrical power cables. The engine was not removed for further investigation as the aircraft was flying at a relatively high forward speed, which would not have been possible if the engine had not operated normally.

1.18.4The SACAA Accident and Incident Investigation Division produced a report into the causes of wire strike accidents in South Africa up to 2008 (Ref 11/9/2009.). The report is attached as appendix A

1.19 Useful or Effective Investigation Techniques

1.19.1 None

2. ANALYSIS

2.1 Inspection of the aircraft's cyclic control revealed marks associated with the impact of a metal cable. Evidence of broken electrical power cables were found on the scene of the accident. The marks on the cyclic control of the helicopter were caused by the electrical power cable.

2.2 The investigation found that the engine was turning at the time of the accident, as the helicopter made contact with the ground 280 metres past the power lines, which indicated that the helicopter was flying at a relatively high forward speed, which would not have been possible, should the engine not have operated normally.

2.3The helicopter struck the electrical power cables with the cockpit area at approximately the height of the cyclic, which suggests that the aircraft was flying approximately 9.4 m above ground level (AGL) when it struck the electrical wires.

2.4 After the collision of the cockpit area with the electrical power cables, the electrical power cables struck the pilot on the hand and then the chest area. The force of the blow to the hand and chest of the pilot was of such a magnitude that it may have caused the pilot to become incapacitated.

2.5 The resulting impact forces caused the pilot to lose control of the aircraft, resulting in the aircraft colliding with the ground.

3. CONCLUSION

3.1 Findings

3.1.1 The pilot was licensed and held the appropriate rating for the helicopter.

3.1.2 The helicopter had a valid certificate of airworthiness.

3.1.3 There was no evidence of any defect or malfunction in the helicopter prior to the accident that could have contributed to the accident.

3.1.4 The helicopter was structurally intact prior to colliding with the electrical power cables in the accident sequence, as no aircraft debris was found prior to impact with the electrical power cables.

3.1.5 All control surfaces were accounted for, and all damage to the helicopter could be attributable to severe impact forces.

3.1.6 The helicopter was destroyed by impact forces and a post-impact fire.

3.1.7The pilot was flying at a low level, failed to observe the electrical power cables and collided with the electrical power cables.

3.1.8 The control of the helicopter was lost after it collided with the electrical power cables and impacted with the ground.

3.1.9 Based on the autopsy and medical reports, there was no evidence to indicate that the pilot's performance was degraded by physiological factors prior to impact with the electrical power cables.

3.1.10 The accident was not survivable, due to the magnitude of the impact forces with the electrical power cables, and the intensity of the post-impact fire.

3.2 Probable Cause/s

3.2.1The helicopter collided with electrical power cables, where after the pilot lost control and the helicopter impacted the ground.

4. SAFETY RECOMMENDATIONS

4.1 None.

5. APPENDICES

5.1 Appendix A

Report reviewed and amended by the Advisory Safety Panel 08 March 2011.

-END-

Appendix A

SACAA-AIID Report on wire strikes.

Data Analysis –
The data gathered shows that wire strike accidents are more prevalent in private operations, followed by agricultural operations, then training.

Some causes of wire strike accidents in private operations:

6.1 Wire strike accident reports revealed the following as some of the causes of wire strike accidents:

- *Non-adherence to specified minimum altitude (unlawful low flying)*
- *Some of the accidents occur when a pilot attempts to do an emergency landing in a field which may have high tension wires*
- *Failure to look out, due to distractions*
- *Poor visibility (clouds ,fog, sun)*

6.2 Why are there fewer accidents in aerial operations in comparison with private operations?

On consultation with various low flying operations, the following was uncovered:

- *Pilots share information regarding dangers*
- *Prevalent safety culture and no compromise on safety*
- *Multi-crew operations—extra pair of eyes often available*
- *Strict adherence to regulations*
- *Situational awareness.*

7. Recommendations

- *Adhere to prescribed minimum heights and refrain from illegal low flying*
- *Always be on the lookout*
- *Share information re. danger zones with fellow pilots*
- *Do proper planning, using up-to-date maps*
- *Ask people who are familiar with the area about any wires*
- *Always do an observation flight prior to low flying operations*
- *Be on the lookout for high tension wires in valleys.*

Source : SACAA Accident and Incident Investigation Division : causes of wire strike accidents in South Africa up to 2008 (Ref 11/9/2009.).

Compiled by:

Ahmed Motala Date: ……..……..

For: Director of Civil Aviation

Investigator-in-charge: …… Date: ……..

Co-Investigator: ……..…… Date: ……..……