

		CA18/2/3/8063				
		SOUTH AFRICAN CIVIL AVIATION AUTHORITY AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY				
Aircraft Registration	ZS-RXA	Date of Accident	17 January 2006	Time of Accident	0815Z	
Type of Aircraft	Robinson R22 Beta II		Type of Operation	Training		
Pilot-in-command Licence Type		Student Pilot	Age	41	Licence Valid	Yes
Pilot-in-command Flying Experience		Total Flying Hours	37.8	Hours on Type	37.8	
Last point of departure		Cape Town International Aerodrome (FACT)				
Next point of intended landing		Cape Town International Aerodrome (FACT)				
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)						
Crashed into the sea 800m off-shore near Cape Point (GPS position: South 34°20.465 East 018° 28.991)						
Meteorological Information		Surface wind; 230°/7kt, Temperature; 20°C, Cloud cover; Scattered at 1000 feet				
Number of people on board	1 + 0	No. of people injured	0	No. of people killed	1	
Synopsis						
<p>Prior to the flight, the student pilot was briefed by the chief flight instructor of the training school on the route he should take and the heights he should fly as well as the recommended reporting points. The route as discussed was drawn onto the student pilot's map by the flight instructor, which he took with him on the flight.</p> <p>A few minutes after he became airborne, a fellow student pilot of the same school, also flying a Robinson R22 (ZS-RUX) met up with him and they continued to fly in a loose formation past the V&A Waterfront around the Sea Point area over Clifton, Llandudno and then inland to Hout Bay. According to a statement by the flight instructor, the student pilot should have flown from Hout Bay to Muizenberg over land and back to FACT. However, both helicopters proceed to fly along the coast from Noordhoek around Cape Point with the aircraft ZS-RUX leading the two aircraft in a loose formation. As they passed Cape Point, approaching abeam Rooikrans, several members of a hiking party saw the helicopter (ZS-RXA), which was flying slightly behind the other helicopter, suddenly nose dive and crash in a nose-down attitude into the sea. The impact occurred approximately 800m offshore. They immediately notified the local fire station, which in turn informed Cape Town ATC (air traffic control).</p> <p>According to eyewitness accounts, fine weather conditions prevailed in the area at the time of the accident, with the wind reported to be light and variable.</p>						
Probable Cause						
<p>The pilot most probably suffered from a cardiovascular event in-flight, which resulted in incapacitation in the air, rendering the helicopter uncontrollable with water impact inevitable.</p>						
IARC Date		Release Date				



AIRCRAFT ACCIDENT REPORT

Name of Owner : Halocopter Partnership
Name of Operator : Starlite Aviation
Manufacturer : Robinson Helicopter Company
Model : R22 Beta II
Nationality : South African
Registration Marks : ZS-RXA
Place : Cape Point
Date : 17 January 2006
Time : 0815Z

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 interests 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 The student pilot commenced with flying training in October 2005, with his first training flight being on 20 October 2005. According to available information (Aviation Training Organisation, Flight Log) the pilot had performed thirty-nine (39) flights prior to the accident flight, with twelve of these flights being solo flights (meaning the student pilot was acting as pilot-in-command of a helicopter without any supervision).
- 1.1.2 On the morning of 17 January 2006, the student pilot was scheduled to perform a solo navigation flight. Following a detailed pre-take-off briefing by his flight instructor, the flight was duly authorised in the ATO (Aviation Training Organisation) authorisation book. The route the student pilot had to fly was accordingly marked on his map (scale; 1:500 000) by his flight instructor during the briefing, with the heights he should fly at

also entered onto the map. The intended route he was authorised to fly was referred to by the ATO as a 'half' peninsula flight, which was as follows:

Depart Cape Town International Aerodrome (FACT) to the Victoria Alfred Waterfront/Table Bay area, along the Atlantic seaboard to Hout Bay (at 2000' AGL) then just east of Chapman's Peak to Fishhoek, Muizenberg and back to FACT. (For illustration purposes, an extract from a 1:500 000 Cape Town map is inserted into this report on page 4).

- 1.1.3 Prior to take-off, the helicopter was refuelled with the tanks' quantity indicating $\frac{3}{4}$ each side, which allowed for an endurance of approximately 2 hours 15 minutes. The helicopter had already flown one hour for the morning and no defects or malfunctions were reported during the flight. The flight in question was therefore the second flight of the day with this helicopter. According to available information, fine weather conditions prevailed, with the wind reported to be light and variable prior to take-off.
- 1.1.4 Prior to take-off, another helicopter student pilot from the same school (already in possession of a valid aeroplane private pilot's licence) was also scheduled to perform a local private flight. The flight instructor asked him, if it would be possible to fly ahead of the student in ZS-RXA in a loose line astern formation and indicate to him via radio communication where he should make the required radio transmissions, as he had flown the route several times already in an aeroplane. The pilot agreed with the arrangement and the two helicopters (ZS-RUX and ZS-RXA) departed at approximately 0730Z, with some separation between them. The pilot that was flying ZS-RUX took the lead as discussed prior to take-off.
- 1.1.5 After a flight of approximately one hour, the pilot that flew ZS-RUX landed back at FACT, but there was no sign of the second helicopter. During an interview with the pilot, he stated that he never saw or had any radio response from the student pilot that was flying ZS-RXA for the entire duration of the flight, and was therefore not aware of any emergency or problem that he might have encountered during the flight.
- 1.1.6 At approximately 0826Z, the Cape Point Lighthouse keeper contacted the Fire and Rescue Station at FACT, which in turn transferred the call to ATC (Air Traffic Control). ATC was informed that a helicopter had crashed into the sea, several hundred metres offshore, abeam Rooikrans near Cape Point. Following the report, an EMS (Emergency Medical Services) helicopter was dispatched to the area in order to provide possible assistance to any survivors. Some minor debris was floating on the water, but no evidence of any survivors was observed.
- 1.1.7 According to several eyewitnesses' accounts (by a hiking party that was walking in the Cape Point Nature Reserve at the time) two helicopters were observed flying one

behind the other in a northerly direction, when the helicopter at the back suddenly descended and crashed into the sea. No strange noises, smoke or an explosion of any kind was heard or noticed. It just went straight down and crashed into the water. A member of the hiking party then notified the local Fire and Rescue Services of the accident via cell phone. They remained at the specific position for sometime, however, no one surfaced from where the accident had occurred. The helicopter that was flying in front of the one that had crashed continued with his flight, unaware of the fact that the helicopter behind him had just crashed.

1.1.8 The accident occurred during daylight conditions at a geographical position that was determined to be South 34°20.465 East 018° 28.991. The pilot that was on board the helicopter did not survive the accident.

1.1.9 The area/location where the accident occurred was not included in the intended routing as per the pre-take-off briefing/discussion between the student pilot (ZS-RXA) and the flight instructor.



Figure 1. An extract from the 1:500 000 Cape Town map, similar to what the pilot used at the time.

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 subsequent submersion.



Figure 2. A view of the wreckage being lifted from the sea onto the recovery vessel.



Figure 3. View of the wreckage after it was salvaged from the sea.

1.4 Other Damage:

- 1.4.1 Apart from minor environmental damage caused by the leakage of the fuel that was onboard the helicopter when it crashed, no other damage caused.

1.5 Personnel Information:

Nationality	South African	Gender	Male	Age	41
Licence Type	Student				
Licence valid	Yes	Type Endorsed	Yes		
Ratings	None				
Medical Expiry Date	31 October 2006				
Restrictions	Nil				
Previous Accident/s	Nil				

*NOTE: The pilot was subjected to an aviation medical examination on 11 October 2005, which included a Stress ECG (Electrocardiogram), lung function test, Lipogram and Chest X-ray. According to the medical report, the pilot had no history of heart diseases, high blood pressure, epilepsy, convulsions, diabetes, severe headaches, motion sickness, asthma, tropical disease, malignant tumour, cancer or mental illnesses. He was found to be of slender built; weighing 70kg and his height was 1.81m.

The doctor that performed the aviation medical examination, however, found that the applicant's cholesterol was higher than the acceptable norm and recommended that he consult with his GP (General

Practitioner), which he did. Lipitor was prescribed following the diagnoses.

According to an interview with the late pilot's wife, he had suffered from a medical condition one evening at home during the month of October 2005, when he fainted. She immediately rushed him to a nearby hospital (Emergency Unit) where they performed several tests on him, including an ECG. They could not positively diagnose why he had fainted, but indicated that he might have suffered a mild heart attack. He was admitted to hospital and was kept under observation for the night and was discharged the following day.

Flying Experience:

Total Hours	37.8
Total Past 90 Days	37.8
Total on Type Past 90 Days	37.8
Total on Type	37.8

1.6 Aircraft Information:

1.6.1 Airframe and Engine:

The Robinson R22 Beta II is a two-seat, single reciprocating engine helicopter equipped with a skid landing gear. It is certified for VFR (Visual Flight Rules) operations by day. It could be utilised for VFR night flights, pending that additional requirements are met as stipulated in POH (Pilot's Operating Handbook) as well as the authority/state of registration.



Figure 3. A view of the Robinson R22 Beta II (ZS-RXA) prior to the accident.

Type	Robinson R22 Beta II	
Serial Number	3862	
Manufacturer	Robinson Helicopter Company	
Year of Manufacture	2005	
Aircraft Certification Status	Type Certified (FAR 27 and FAR 21)	
Total Airframe Hours (At time of Accident)	323.8	
Last MPI (Hours & Date)	298.0	6 January 2006
Hours since Last MPI	25.8	
C of A (Issue Date)	20 June 2005	
C of A (Currency Fee Expiry Date)	19 June 2006	
C of R (Issue Date) (Present owner)	5 December 2005	
Operating Categories	Standard	

Engine:

Type	Lycoming O-360-J2A
Serial Number	L-40045-36A
Hours since New	323.8
Hours since Overhaul	T.B.O. not yet reached

1.6.2 Weight and Balance:

	Weight (lbs)	Arm (inches)	Moment (lbs x inches)
A/C Empty Weight	859.4	103.8	89 169.0
Pilot (70kg)	154.3	78.0	12 037.2
Baggage (5kg)	11.2	78.0	876.0
Fuel main tank (14.8 US/Gal)	88.8	108.6	9 643.7
Fuel aux tank (8.2 US/Gal)	49.0	103.8	5 086.2
Total take-off weight	1 162.7	100.4	116 812.1
- Fuel consumed	- 30.0	106.2	3 186.0
Estimated Weight (crash)	1 132.7	100.3	113 626.1

The maximum take-off weight for the aircraft according to the POH (Pilot's Operating Handbook, Section 2, Pg. 2-5) was 1370 lbs (622kg).

According to statements obtained from the flying school, the fuel state of the aircraft prior to take-off was approximately $\frac{3}{4}$ of a tank each side.

According to the hobbs meter reading that was recovered with the wreckage from the sea, the duration of the flight was approximately 0.8 of an hour (48 minutes) from take-

off until the time of the accident.

Fuel consumption was calculated at 6 US Gal/per hour, using a conversion factor of 6 lbs/US Gal. A small additional amount was added for starting and warm-up.

The aircraft was being operated within the weight limitation as stipulated in the POH at the time of the crash.

The aircraft was operated within the CG limitation as stipulated in the POH, Section 2.

1.7 Meteorological Information:

1.7.1 The weather information was obtained from an official weather report that was compiled by the South African Weather Services (SAWS).

A cold front was just to the west of Cape Point causing partly cloudy conditions in the area, with the most likely conditions at the place of the accident being as follows:

Wind direction	230°	Wind speed	7 knots	Visibility	>10km
Temperature	20°C	Cloud cover	Scattered	Cloud base	600-1000ft
Dew point	15°C				

*NOTE: Scattered cloud cover as per definition reflects the cloud cover to be 3 to 4 octas out of a possible maximum of 8 octas, which accounts to cloud cover of about 50%.

1.8 Aids to Navigation:

1.8.1 There were no reported failures with the navigational aids prior to the accident flight.

1.9 Communications:

1.9.1 There were no reported failures with the communication aids reported prior to the accident flight.

1.10 Aerodrome Information:

- 1.10.1 The helicopter took off from Cape Town International Aerodrome on a local navigation flight, with the intention of landing back at the point of the departure.
- 1.10.2 The helicopter crashed into the sea abeam Rooikrans near Cape Point at a geographical position that was determined to be as follows: South 34°20.465 East 018° 28.991.

1.11 Flight Recorders:

- 1.11.1 The helicopter was not equipped with a Flight Data Recorder (FDR) or a Cockpit Voice Recorder (CVR), nor was it required by regulation.

1.12 Wreckage and Impact Information:

- 1.12.1 The helicopter was observed to have crashed into the sea in a nose-down attitude. Following impact with the water, the wreckage sank to a depth of 27m to the bottom of the ocean. Although the canopy/cabin area was severely disrupted following the impact sequence, the wreckage remained fairly intact. Certain lightweight articles that were installed on the helicopter surfaced, and were found floating in the area where the helicopter went down. Rescue boats that surveyed the area located several floating objects from the sea surface.



Figure 6. A view of the wreckage on the seabed as taken by one of the divers.

1.13 Medical and Pathological Information:

1.13.1 The post mortem indicates that there were multiple blunt force injuries to the pilot, which were consistent with a fall from a height, and occurred while the deceased was alive. There were no findings suggestive of drowning.

Conclusion:

Histological examination of the heart section showed ischemic contraction bands, which are strongly indicative of myocardial ischemia, particularly given the age of the deceased. This pattern could indicate an acute incapacitating event in the air.

1.13.2 On 23 January 2006, a toxicological kit, which was sealed, was delivered for analysis to the Medico-Legal Forensic Chemistry Laboratory of the Department of Health in Salt River, Cape Town.

The following observations were made following the examination of stomach and contents, the liver, the kidneys and the bile.

- No drugs or any other toxic substances could be detected.

The blood sample was tested for alcohol and carbon monoxide and the results were as follows;

- No alcohol could be detected in the blood.
- The carbon monoxide content of the blood sample was 5% saturation of the total haemoglobin.

There was insufficient blood for a drug screen.

1.14 Fire:

1.14.1 There was no evidence of a pre- or post-impact fire.

1.15 Survival Aspects:

1.15.1 The accident was not regarded as a survivable accident due to the destruction of the cockpit/cabin area, which was associated with a substantial impact force. The Vertical Speed Indicator (VSI) gauge captured a rate of descent of 1 850 feet per minute.

1.16 Tests and Research:

1.16.1 With the post-mortem finding taken into consideration, the writer felt it appropriate to include as an annexure (Annexure A) to this report a study that was conducted by the U.S. Department of Transportation (Doc. DOT/FAA/AM-04/16). The document was published under the heading: In-Flight Medical Incapacitation and Impairment of U.S. Airline Pilots: 1993 to 1998. The study focuses on the five most 'common' causes why pilots experienced medical incapacitation and impairment events during flight, including cardiovascular events, which were applicable to the pilot in this accident.

1.16.2 Following recovery of the wreckage from the sea, it was transported via a recovery vessel to the Cape Town harbour from where it was again transported to a maintenance facility at Cape Town International Aerodrome. At the Aircraft Maintenance Organisation (AMO) the engine, a Lycoming O-360-J2A, Serial No. L-40045-36A was removed from the wreckage and was subjected to a teardown inspection.

No mechanical malfunction or any other defect was found that could have caused or contributed to the accident.

The two magnetos were removed from the engine during the teardown inspection and were subjected to a visual examination as well as a bench test by an approved Aircraft Electrical Service Centre with the following results:

L/H Magneto: TCM Type; S4LSC-200, Part No. 10-600614-1, Serial No. EO4KA032

- Main points should be 10°, were found to be 10°.
- Coil primary should be 0.2 to 0.6 ohms, was found to be 0.3 ohms.
- Coil secondary should be 12 000 to 16 000 ohms, was found to be 14 950 ohms.
- Capacitor destroyed by impact.
- Magneto was bench tested and functioned correctly.

R/H Magneto: TCM Type; S4LSC-204, Part No. 10-600644-201, Serial No. EO4JA234

- Main points should be 10°, were found to be 21°.
- Coil primary should be 0.2 to 0.6 ohms, was found to be 0.2 ohms.
- Coil secondary should be 12 000 to 16 000 ohms, was found to be 14 750 ohms.
- Capacitor destroyed by impact.
- The magneto top casing was found cracked.

*NOTE: The points on the right-hand magneto were 11° out. Inspection of the capacitor showed the angle and the indent where the capacitor made

contact with points, which also had a mark where the capacitor made contact. The condenser, which was found slightly bent, was not replaced or disturbed. Following the re-adjustment of the points back to the 10° required setting, the unit was subjected to a bench test, and tested satisfactorily.

1.17 Organisational and Management Information:

1.17.1 The ATO (Aviation Training Organisation) was in possession of a valid CAA Accreditation Certificate No. CAA/0202 at the time of the accident. The flight in question was duly authorised prior to take-off.

1.17.2 The last maintenance that was carried out on the helicopter prior to the accident was conducted by AMO (Aircraft Maintenance Organisation) No. 221. The AMO was in possession of a valid AMO Approval Certificate to perform the required maintenance.

1.18 Additional Information:

1.18.1 Wreckage Recovery/Layout:

The accident occurred at approximately 0815Z on 17 January 2006. The wreckage was located by the search team the following day and was recovered and loaded onto the recovery vessel (ZTUG) by late afternoon. An arrangement was made with the master of the vessel to have the wreckage properly rinsed with fresh water in order to try and minimise corrosion. The vessel was only allowed to enter Cape Town harbour the following morning (19 January 2006). The wreckage was collected and was transported to a maintenance facility at Cape Town International Aerodrome.

The engine was removed and the wreckage was repositioned to a hangar in order to conduct the wreckage layout inspection, which was concluded the following day. Even though the wreckage was found to be severely disrupted due to impact, it was possible to assess that all failures that were identified, were consistent with overload mode with the tail cone and tail rotor assembly still fairly intact.

The helicopter was equipped with a Garmin GPS XL150. The unit was removed from the instrument panel and was made available to an authorised avionics facility in order to establish if it was possible to recover any data from the unit. This was, however, not possible due to the fact that the unit had sustained a substantial amount of impact damage as well as corrosion.

The engine was subjected to a teardown inspection by an appropriately licensed aircraft maintenance engineer (AME) on Friday, 19 January 2006. No anomalies were found that could have presented an engine failure in-flight. (Reference: paragraph 1.16 of this report).

1.18.2 During the investigation into the accident, the two other helicopter training schools at Cape Town International Aerodrome were visited, being Base4 and Aeronautical Training Solutions (ATS) to enquire about the routes which they allow their students to fly when flying solo.

None of the two schools allow students to fly along the route in question at all, according to their respective chief flight instructors.

An additional concern is that a substantial amount of “hire and fly” and/or owner flights, as well as scenic flights, are being conducted along the route in question. Most of the operators flying along the route do operate with aircraft that are equipped with floatation gear as a minimum requirement and the flights are being conducted at a substantial height, with at least a commercial pilot’s or higher grade of licence in command.

The concern is that of private pilots (or for that matter “leisure pilots”) or in this case student pilots flying these routes. Although the student was briefed by the flight instructor on the route that he should have flown/followed, his instruction was not adhered to/disregarded. Another concern is, who should be accountable if orders and procedures are being disobeyed.

In the interests of aviation safety, it is recommended that the CAA implement the appropriate proactive action/s to prevent a recurrence of this nature.

CONCERN

It would appear that a very limited number of people in the aviation industry are aware of the classification of helicopters as stipulated in Part 91.09.2, 91.09.3 and again repeated in Part 127 of the Civil Aviation Regulations.

During the above-mentioned investigation, several pilots and flight instructors were questioned on the classification of the different helicopter classes and not one person was able to answer the writer correctly.

The flight authorisation book that was signed by the student as well as the instructor

prior to the flight indicate the exercise intended to be flown as exercise No. 35 (Practical flight test for licence or rating), which was incorrect. Flying training organisations should ensure that all entries that are being made in the Flight Authorisation Book are accurate and pertinent to the specific exercise/flight in question.

1.19 Useful or Effective Investigation Techniques:

1.19.1 The assistance of the South African Council of Geoscience (Marine Unit) was acquired by the search team (South African Police), which utilized several boats for this purpose. The geoscience team utilized special sonar equipment for the purpose of the underwater search. The wreckage was located the following day (18 January 2006) at approximately 1030Z. The wreckage was recovered after a team of Police divers attached floatation devices to the wreckage. Once afloat, a special recovery vessel (Smit Amandla, ZTUG) moved into position and the wreckage was recovered from the sea by means of a crane on board the vessel. Following the recovery, the vessel was granted permission the following day to enter the port of Cape Town where the wreckage was offloaded onto a truck that transported it to an allocated area at Cape Town International Aerodrome.

2. ANALYSIS

- 2.1 The flight was conducted with fine weather conditions prevailing, which was not considered to have had any bearing on the accident.
- 2.2 The helicopter was properly maintained and was subjected to a maintenance inspection eleven (11) days prior to the accident flight, with a total of 25.8 hours being flown during the period. This was the second flight of the day with this helicopter, as it had completed a one-hour flight earlier the morning. It was refuelled prior to the flight with both tanks indicating $\frac{3}{4}$ each, which allowed for an estimated endurance of 2 hours and 15 minutes. No documented evidence was found indicating a defect and/or possible malfunction with the helicopter prior to the flight that could have contributed or have caused the accident.
- 2.3 The intended flight was planned and a briefing followed between the student pilot and flight instructor prior to departure. The flight instructor drew the intended route as well as the required heights on the student pilot's map, whereafter the flight was duly authorised in the Flight Authorisation book as exercise 35. The exercise (35) that was allocated to the flight, appears to have been an error, as it pertains to a practical flight test, which was not the case in this flight. It would appear that the confusion on the planned routing came about when the flight instructor met up with a second student

pilot that was also scheduled to fly during the same period along the same route. He then requested the private pilot (ZS-RUX) if he would provide some guidance to the student pilot that was flying ZS-RXA, as he had flown the route before, seeing that he was the holder of a valid aeroplane private pilot's licence.

- 2.4 Once airborne, the pilot that was flying ZS-RUX flew as the lead helicopter and the second helicopter (ZS-RXA) followed and remained in that position for the entire flight. They deviated, however, from the recommended route as was discussed during the pre-take-off briefing between the student pilot flying ZS-RXA and the flight instructor. They proceeded around the Peninsula, including the Cape Point area, flying most of the time over the sea. According to the pilot that flew ZS-RUX the pilot in ZS-RXA never communicated with him during the entire duration of the flight. He therefore continued with the flight and at no time had the second helicopter in sight.
- 2.5 According to eyewitness accounts, the helicopter was observed flying behind the first one in a straight and level attitude and it then just nose-dived straight down and crashed into the sea. At no time that they could recall were there any abnormal noises, smoke or any other visible in-flight failure (such as some part separating from the helicopter in air). Following a search and recovery of the wreckage as well as the deceased, a wreckage examination was conducted that did not reveal any abnormalities that could have contributed to, or have caused the accident. It should be borne in mind that the wreckage was extensively deformed as a result of the impact.
- 2.6 A medico-legal post mortem was conducted by a forensic pathologist and it was documented that the lumen of the left anterior descending coronary artery was 25% occluded by atheroma. The lumen of the other available coronary arteries was found to be patent. Histological examination of the heart section showed ischemic contraction bands, which could be associated with (a) electrocution, (b) cardiac ischemia, (c) intense adrenergic stimulation of the heart, as seen in a case where a person has been resuscitated. The autopsy demonstrated no evidence of electrical burn marks anywhere on the body. No resuscitation was administered in this case. The possibility of an ischemic event having occurred could not be excluded. Histological examination of the heart section showed ischemic contraction bands, which are strongly indicative of myocardial ischemia, particularly given the age of the deceased. This pattern could indicate an acute incapacitating event in the air. It was further noted that the pilot did not perish as a result of drowning but due to multiple injuries sustained, most probably on impact with the water and the consequences thereof.
- 2.7 Looking briefly into the recent medical history of the pilot, it came about that he was admitted to the emergency unit of a nearby hospital by his wife, after hearing a loud screaming type noise one evening and then finding that her husband had fainted.

Several test were conducted on his arrival at the hospital, included an ECG (Electrocardiogram). Although it was very difficult for medical personnel to have diagnosed the cause to a single event, he was kept in hospital overnight for observation, and the possibility of a mild heart attack was not excluded. The pilot was also prescribed with the drug, Lipitor to control high cholesterol, following his aviation medical examination that was conducted on 11 October 2005.

- 2.8 The reference material attached to this report as Annexure A, pertains to a study that the U.S. Department of Transportation conducted on In-flight Medical Incapacitation, and Impairment of U.S. Airline Pilots: 1993 to 1998 revealed on pages 6 and 7 of such report that four pilots died as a result of their in-flight incapacitating events. All four deceased pilots were pronounced dead because of cardiac events, three of the four deaths resulted from myocardial infarctions (MIs) while one was the result of a cardiac dysrhythmia.
- 2.9 The flight appeared to be uneventful, with the pilot of ZS-RXA following the helicopter ZS-RUX ahead of him. Then suddenly without any distress or Mayday call, the helicopter diverted from level flight into a nosedive attitude, and impacted the water in such attitude. The situation/condition that let to this sudden change in the flight profile could most probably be associated with the pilot suffering from a sudden cardiovascular condition, which resulted in an incapacitating event. The pilot most probably as a result of the severe chest pain he encountered, heeled forward and in doing so pushed the cyclic control stick forward to full or near full deflection, which would explain the sudden nosedive attitude as was described by the eyewitnesses. The event was of such nature that recovery of the helicopter was not possible and ground/water impact inevitable.

3. CONCLUSION

a) Findings:

- (i) The pilot was the holder of a valid student pilot's licence (helicopter) and had the aircraft type endorsed on his logbook.
- (ii) The pilot was the holder of a valid aviation medical certificate, with his last medical examination being on 11 October 2005.
- (iii) During the medical examination on 11 October 2005, the pilot was subjected to a Stress ECG, with no abnormalities being noted.
- (iv) According to the Aviation Medical Report dated 11 October 2005, the pilot had no known medical history of heart diseases or high blood pressure, chest

discomfort or palpitations.

- (v) The pilot was found to have high cholesterol levels and was prescribed with the drug Lipitor, following his aviation medical examination on 11 October 2005.
- (vi) There were no reported defects recorded in the available documentation that indicated that the helicopter was not airworthy prior to the accident flight.
- (vii) The helicopter had $\frac{3}{4}$ of fuel in each tank prior to its departure from Cape Town International Aerodrome, which allowed for an endurance of 2 hours 15 minutes.
- (viii) The helicopter's weight and balance calculations indicate that it was operated well within its approved limitations.
- (ix) Weather conditions at the time were reported to be fine, and were not considered to have had a bearing on the accident.
- (x) The flight authorisation book that was signed by the student as well as the flight instructor prior to the flight, indicate the exercise to be flown as exercise No. 35 (practical flight test for licence or rating), which was an incorrect entry.
- (xi) Histological examination of the heart section showed ischemic contraction bands, which are strongly indicative of myocardial ischemia, particularly given the age of the deceased. This pattern could indicate an acute incapacitating event in the air.

b) Probable Cause/s:

- (i) The pilot most probably suffered from a cardiovascular event in-flight, which resulted in incapacitation in the air, rendering the helicopter uncontrollable with water impact inevitable.

4. SAFETY RECOMMENDATIONS

- 4.1 It is recommended that the SACAA – Flight Operations Department place a moratorium on Class 3 helicopters flying around the Cape Peninsula (over the sea) with immediate effect. The area/terrain does not allow for a safe forced landing to be performed unless the flight is conducted at a substantial altitude of at least 4 000 feet AGL and above, depending on distance off-shore.

- 4.2 The risk/hazard of flying over the sea with a Class 3 helicopter without floatation gear installed on the aircraft, should not be allowed and action should be taken with immediate effect (regulation covers this matter 127.08.2).
- 4.3 Student pilots should be prohibited from any off-shore flying activity while under training in a Class 3 helicopter, or any other helicopter for that matter, that are not accordingly equipped.
- 4.4 It is recommended that the SACAA, Safety Promotions Department in conjunction with the Aviation Medical Department, publish an article in the Safety Link and SACAA website, informing pilots and any potential pilots on the risks/hazards associated with flying and having an underlying medical condition that might result in an in-flight incapacitation and/or impairment event.
- 4.5 It is recommended to the Commissioner for Civil Aviation that a Medical Alert form be developed and introduced, similar to current CAHRS reporting forms, whereby fellow aviators (especially; Part 121, 127 and 135 operations) functioning in a multi-crew environment can report any suspicious medical condition/behaviour to the Authority via the confidential reporting system. Such a form should be accessible to all levels of aviation, in the interests of aviation safety.

5. APPENDICES

- 5.1 Annexure A (US Department of Transport, In-flight Medical Incapacitation and Impairment of U.S. Airline Pilots: 1993 to 1998)

-END-

Report reviewed and amended by Advisory Safety Panel

27 January 2009