AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/9461		
Aircraft registration	**ZS-WVV**	**Date of accident**	08 August 2015		**Time of accident**	±1135Z	
Type of aircraft	Challenger II (Aeroplane)		**Type of operation**		Part 94		
Pilot-in-command licence type	National Pilot	**Age**	66		**Licence valid**	Yes	
Pilot-in-command flying experience	Total flying hours	68.5			Hours on type	62.5	
Last point of departure	Morningstar aerodrome in Cape Town: Western Cape province						
Next point of intended landing	Morningstar aerodrome in Cape Town: Western Cape province						
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)							
Onto the field at Blouberg farm, Cape Town at GPS co-ordinates determined to be S33° 43.′ 49″ E018° 30.′ 13″ at an elevation of 338 feet AMSL.							
Meteorological information	Temperature: 17°C, Dew-point: 11°C, Wind direction: 160, Wind speed: 6 knots, Scattered clouds at 2 000ft AGL, Barometric pressure: Q1021hPa.						
Number of people on board	1 + 1	**No. of people injured**	0	**No. of people killed**	2		

Synopsis

On Saturday 08 August 2015, the pilot accompanied by the passenger was conducting a private flight from Morningstar aerodrome in Cape Town when the accident occurred. According to the pilot's colleague who flew with the pilot on ZS-WVV during the first flight that took place early in the morning, the aircraft had about three hour's fuel endurance remaining. Before this second flight, the pilot conducted a thorough pre-flight inspection and all appeared to be normal. The aircraft took off and headed towards Melkbosstrand area. The aircraft did not return as expected and the passenger's father got concerned and radioed the pilot. There was no response and he immediately called the pilot on his mobile phone. Again there was no answer. After two hours a search aircraft was deployed and the pilot spotted the wreckage of ZS-WVV on the farm Blouberg approximately 3 nautical miles "NM" west of the departure aerodrome. The aircraft was destroyed by impact and all occupants were fatally injured. The investigation concluded that the pilot in all likelihood suffered physical incapacitation in-flight due to a pre-existing cardiac condition causing him to lose control of the aircraft.

Probable cause

Incapacitation of pilot.

SRP date		Release date	

AIRCRAFT ACCIDENT REPORT

Name of Owner/operator : M E Rolfe
Manufacturer : Quad City Incorporated
Model : Challenger II
Nationality : South African
Registration Marks : ZS-WVV
Place : Blouberg farm
Date : 08 August 2015
Time : ±1135Z

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 (2011) 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 On Saturday 08 August 2015, a certified national pilot licence holder accompanied by the passenger was conducting what appeared to be a flip “short private flight” from Morningstar aerodrome in Cape Town, Western Cape province when the accident occurred. Visual meteorological conditions (VMC) prevailed in the area, and no flight plan was filed. According to the pilot’s colleague who flew with the pilot on ZS-WVV during the first flight that took place early in the morning, the aircraft had about three hour’s fuel endurance remaining. Before this second flight, the pilot conducted a thorough pre-flight inspection and all appeared to be normal. The aircraft took off and headed towards Melkbosstrand area.

1.1.2 ZS-WVV did not return when expected and the passenger's father got increasingly concerned. He radioed the pilot but without success. He then called the pilot on his mobile phone but there was no response. The aircraft went untraceable for approximately two hours and a decision to deploy a search aircraft was made. The search aircraft took off and headed westerly where after few minutes the wreckage of ZS-WVV was spotted on Blouberg farm grounds approximately 3 NM west of the departure "Morningstar" aerodrome. According to the search pilot, he made a low level pass at the site of the crash and there was no indication of a movement. He then got anxious and instantly radioed his fellow aviators at the club house who instantly drove to the site of the crash. The aircraft was destroyed by post impact and the occupants were fatally injured.

1.1.3 The accident happened during day light conditions next to the road leading to Melkbosstrand at GPS co-ordinates determined to be S33° 43.´ 49″ E018° 30.´ 13″ at an elevation of 338 feet AMSL. Attached below on Figure 1 is the Google Earth picture depicting the departure aerodrome and the accident site.

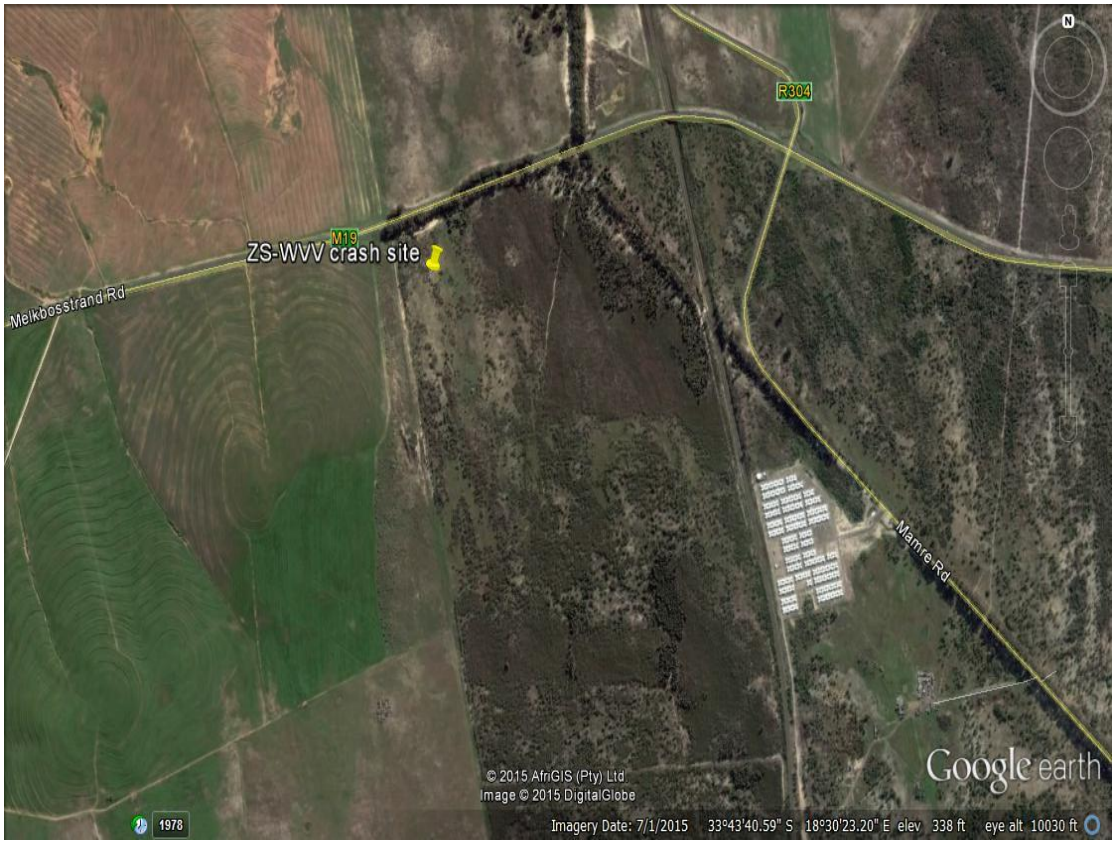

Figure 1: Google earth map depicting the accident site of ZS-WVV about 3 NM west of Morningstar aerodrome

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 aircraft was destroyed by impact during the accident sequence.

Figure 2: The wreckage as found at the accident site

1.4 Other damage:

1.4.1 None.

1.5 Personnel information:

Nationality	South African	Gender	Male	Age	66
Licence number	027 901 6893	Licence type	National pilot		
Licence valid	Yes	Type endorsed	Yes		
Ratings	None				
Medical expiry date	31 December 2017				
Restrictions	Pilot must wear suitable corrective lenses				
Previous accidents	Nil				

Flying experience:

Total hours	68.5
Total past 90-days	13.5
Total on type past 90-days	13.5
Total on type	62.5

*NOTE: The pilot was the holder of a National pilot licence with a single engine aircraft rating issued on 02 March 2015. His profile revealed no accident or incident history, enforcement actions, pilot certificate or rating failure, or retest history. On his application for the licence, he had a total of 49.2 of flying experience. He held a fourth class medical certificate with a restriction to wear suitable corrective lenses. This was issued on 11 January 2015.

1.6 Aircraft Information:

1.6.1 The Challenger II is a high wing, tricycle gear microlite with a frame structure built from aluminium alloy tubing fastened with bolts and rivets and covered with Dacron fabric. It is powered by a 50 horse power twin cylinder two stroke Rotax 503 engine that drives a wooden fixed pitch propeller. The engine is mounted in pusher configuration. The aircraft has the capacity to soar with its engine switched off.

Figure 3: The accident aircraft

Figure 4: The instrument panel of ZS-WVV aircraft

Airframe:

Type	Challenger II	
Serial number	CH2-1190-0580	
Manufacturer	Quad City Incorporated	
Year of manufacture	1996	
Maximum take-off weight	435 kg	
Total airframe hours (at time of accident)	600.31	
Last Annual Inspection (hours & date)	594.50	13 March 2015
Hours since last Inspection	5.81	
A T F (issue date)	06 November 2014	
A T F (expiry date)	23 October 2015	
C of R (issue date) (present owner)	12 February 2013	
Operating categories	Standard Part 94	

Engine:

Type	Rotax 503
Serial number	3952241
Hours since new	948.8
Hours since overhaul	2.8

Propeller:

Type	De Necker P prop
Serial numbers	54 x 37
Hours since new	948.8
Hours since overhaul	TBO not yet reached

1.6.2 Weight and balance:

Item	Weight (kg)
Aircraft empty weight	140
Pilot	98
Passenger	75
Fuel weight (43 litres)	30.1
Take-off weight	**343.1**

*NOTE: The maximum (certificated and recommended) take-off weight for the aircraft in question was not allowed to exceed 435 kg. The aircraft's total weight before departure was calculated to be 343.1, meaning that the aircraft was operated within its allowable flight envelope.

1.7 Meteorological information:

1.7.1 An official weather report was obtained from the South African Weather Services (SAWS). The weather data on the report was extracted from SAWS Automatic Weather Station located at Cape Town. The data below was for 08 August 2015 at 1130Z.

(i) Surface data:

Dry-bulb temperature: 17°C

Dew-point temperature: 11°C

Wind speed: 6 knots

Wind direction: 160

Weather phenomenon: NIL

Clouds amount and height: Scattered clouds at 2 000ft AGL

Barometric pressure: Q1021hPa

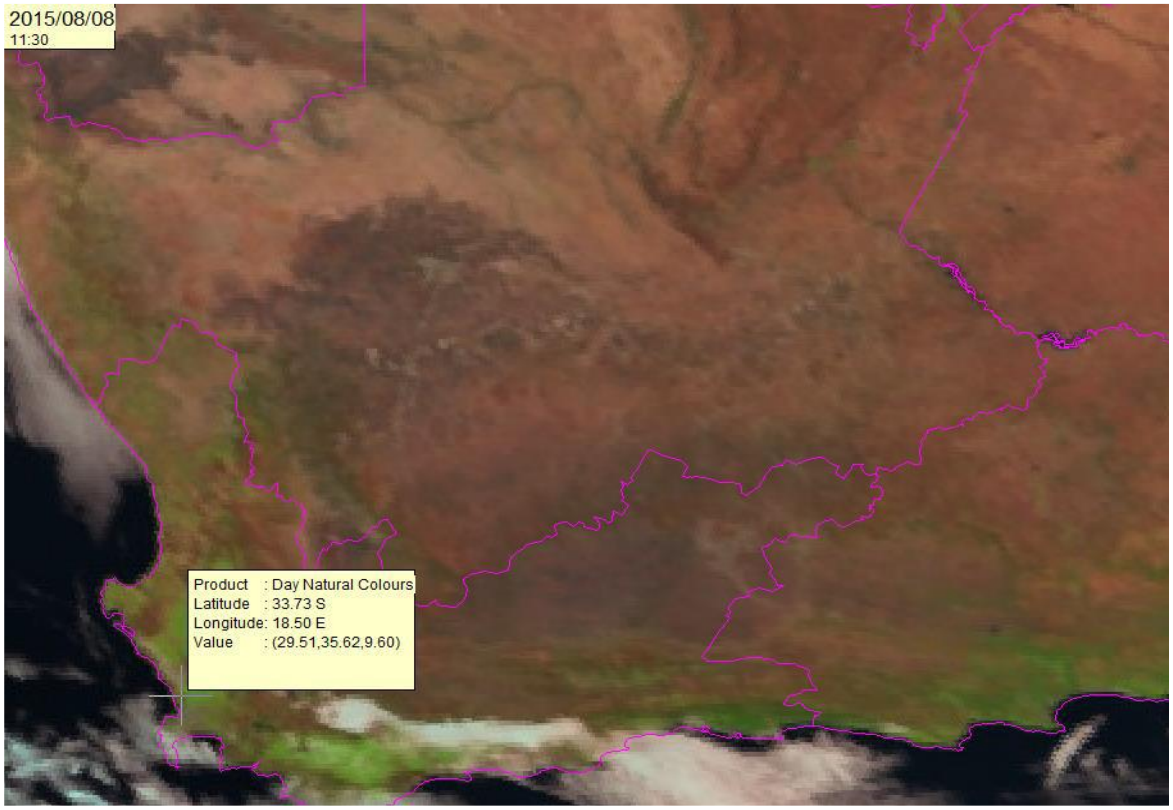

Figure 5: Satellite image of the area at the time as per the official weather report

1.8.1 Aids to navigation:

1.8.1 The aircraft was equipped with standard navigational equipment. No defects were reported prior to the accident.

1.9 Communication:

1.9.1 The communication equipment installed in the aircraft was found to comply with the approved equipment list.

1.10 Aerodrome information:

1.10.1 The accident occurred alongside the road leading to Melkbosstrand at GPS co-ordinates determined to be S33° 43.´ 49″ E018° 30.´ 13″ at an elevation of 338 feet AMSL. Below on figure 6 is the Google Earth map depicting Morningstar aerodrome and the accident site.

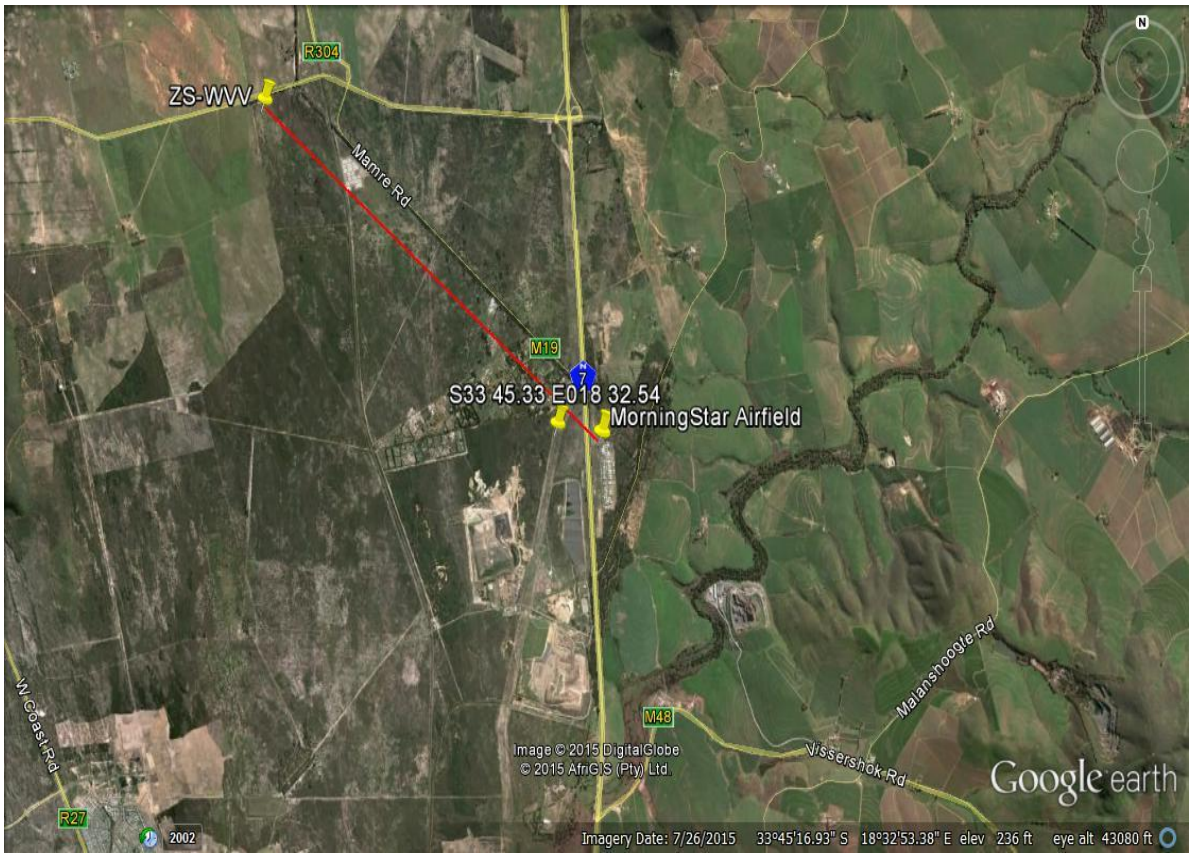

Figure 6: Google Earth map depicting the distance between the departure aerodrome and the accident site

1.11 Flight recorders:

1.11.1 The aircraft was not equipped with a flight data recorder (FDR) or a cockpit voice recorder (CVR), nor was it required by the regulations to be fitted to this type of aircraft.

1.12 Wreckage and impact information:

1.12.1 The aircraft broke into pieces after impact. The investigator in charge examined the entire wreckage and found it complete; no flight controls were missing. The aircraft had collided with the ground nose-low in a northerly direction. The cabin was destroyed on impact. The aircraft seat and safety harnesses had failed and the Perspex windshield had shattered during the accident sequence. The altimeter, the fuel gauge and the exhaust temperature gauge was damaged. The landing gear struts broken due to overload but the wheels were intact and were deflated during the on-site investigation. The wing support spars and the flaperon flight control system were destroyed. The horizontal and vertical stabilizers and the rudder remained attached. The engine had detached from the airframe during the accident sequence. Examination revealed that the drive belt was in place and the engine rotated freely by hand. The propeller was still attached to the engine. Attached below is a photo of the accident site.

Figure 7: The aircraft first point of impact and the final position of the wreckage

1.12.2 Power train continuity was confirmed. All the spark plugs displayed a light greyish colour associated with normal engine operation. Both carburettors bowls contained two stroke fuel that was free from contaminants. Inspection of the fuel pump revealed no evidence of pre-impact failure or malfunction. The fuel filter contained fuel; the unit was drained into a clean glass container and found to be of the correct grade and free of contamination. Both propeller blades tips had fractured; five pieces were recovered in the debris. The fuel in the filter was found to be uncontaminated. Attached below are pictures shot at the accident site.

Figure 8: The wreckage from another angle

(a) (b)

Figure 9: The instruments panel showing the fuel pump switch and the radio both in the "ON" position as well as the altimeter, fuel consumption gauge and the exhaust temperature gauge. None was of any use in the investigation

1.12.3 Severe damage to the propeller tips indicated that the engine was providing power at the time of impact. See the pictures below.

(a) (b)

Figure 10: The propeller was attached to the engine and displayed tip damage; indicating that the engine had been providing power at the moment of impact

1.13 Medical and pathological information:

1.13.1 The pilot was the holder of a valid aviation medical certificate that was issued by a CAA approved medical examiner. Based on a medico-legal post-mortem examination conducted by the Western Cape government's Directorate of Forensic Pathology Services both occupants died of multiple blunt injuries. The pilot's post-mortem examination/report concluded that the pilot had an advanced atherosclerotic coronary artery disease which according to the medical specialists would put him at a risk of major coronary event. The pilot's personal medical records showed that he consulted with the civil aviation recognised medical examiner (CAME) for the first time in September 2011 when he initially applied for a Class IV flight medical. He was declined a licence because he was diagnosed DM II (adult on-set diabetes mellitus type 2).

1.13.2 He was then referred to the treating doctor for control of diabetes and advised to come back with proof of control. On 11 January 2012, the pilot was found to be fit for a Class IV medical as he met the criteria, with restrictions to follow diabetes control and to wear suitable corrective lenses. Certificate number 179190 was issued on the same day. He returned for renewal of his licence on 19 December 2014 and his medical history reported that he had been to hospital after suffering an episode of dizziness. A brain scan report was attached stating that no pathology could be found explaining the cause of dizziness. On examination by the SA CAA-approved physician, the pilot had no indication of any pathology. His diabetes was

controlled and he was on secondary prevention treatment. The stress ECG was conducted and found to be normal.

1.13.3 The blood results were also within range of the pilot's age. Reports included with the medical report were sent to the SACAA medical division and certificate number 302009 was subsequently issued on 09 December 2014 declaring him fit until 31 December 2017.

1.13.4 The results of a neurologist report requested as part of the investigation in essence calls into question the declared medical fitness of the pilot

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 pilot and the passenger were properly restrained with the aircraft equipped safety harnesses. However due to the high kinetic forces on impact and destruction of the cabin the accident was considered non survivable. All the seats structures displayed evidence of deformation associated with impact. A team of aviators drove to the site of the accident immediately, but the occupants were found to have died on impact. The bodies were handed to the Western Cape Forensic Pathology Services and the Melkbosstrand police station opened an inquest investigation docket.

1.16 Tests and research:

1.16.1 Examination of the wreckage at the accident site showed no signs of anomalies. The aircraft logbook and maintenance records indicated that the aircraft had been certified and equipped in accordance with existing regulations and approved procedures. A review of the logbook entries revealed no reported deficiencies before the flight; and the aircraft was therefore deemed to have been airworthy.

1.17 Organizational and management information:

1.17.1 This was a private flight conducted according to CAR 2011; Part 94 and the pilot was the owner of the accident aircraft (ZS-WVV).

1.17.2 The aircraft maintenance organisation (AMO) that conducted the last annual maintenance inspection on the aircraft prior to the accident on 13 March 2015 was in possession of a valid AMO approval certificate Number 038.

1.18 Additional information:

1.18.1 None.

1.19 Useful or effective investigation techniques:

1.19.1 None.

2. ANALYSIS:

2.1 The pilot and the passenger were conducting a private flight when the accident occurred. Examination of the wreckage revealed no evidence of any structural failure, flight control malfunction or loss of power. The pilot was in position of a valid aviation medical certificate issued by a CAA approved medial officer with restrictions to follow diabetes protocol and wear suitable corrective lenses. The post-mortem analysis showed an advanced atherosclerotic arterial disease. The pilot's medical profile showed a pre-existing cardiac illness. The investigation concluded that the pilot in all likelihood suffered physical incapacitation in-flight due to a pre-existing cardiac illness causing him to lose control of the aircraft.

3. CONCLUSION:

3.1 Findings:

3.1.1 The pilot was the holder of a valid National Pilot Licence and had the aircraft type endorsed on his licence.

3.1.2 The pilot was the holder of a valid aviation medical certificate that was issued by a CAA approved medical examiner.

3.1.3 The post-mortem report revealed that both occupants died of multiple blunt force injuries.

3.1.4 The post-mortem report revealed that the pilot had an advanced atherosclerotic arterial disease.

3.1.5 The pilot had pre-existing health risk factors, making it possible that he may have suffered a cardiac event resulting in incapacitation and loss of control of the aircraft.

3.1.6 The aircraft had a valid authority to fly “ATF” certificate.

3.1.7 The aircraft was operated within its weight limitations at the time of the accident.

3.1.8 The engine was providing substantial power at the time of impact.

3.1.9 Good weather conditions prevailed in the area at the time of the accident.

3.1.10 The aircraft maintenance organisation that conducted the last annual inspection on the aircraft prior to the accident flight was in possession of a valid AMO approval certificate.

3.1.11 Due to the destruction of the cockpit/cabin area during the impact sequence this was considered a non-survivable accident.

3.2 Probable cause:

3.2.1 Incapacitation of pilot.

4. SAFETY RECOMMENDATIONS:

4.1 In light of the findings, it is therefore recommended that the Director of Civil Aviation through the relevant department ASO review the process of a combination of illness/medical protocols against the accepted medical standards for the issuance of an aviation license

5. APPENDICES:

5.1 Atherosclerosis disease definition: Concordia University.

Atherosclerosis is considered to be the leading cause of cardiovascular disease resulting in acute coronary syndromes. It is pathologically defined as the accumulation of large lipid-rich core, blood clots and calcification forming lesions called plaques. If the atherosclerotic plaque ruptures, it could potentially lead to

serious clinical events such as a heart attack and stroke. The pathology of atherosclerosis is well understood; however, there is limited information on the material properties of plaque rupture and its vulnerability. The main objective of this report is to perform a literature review of atherosclerosis. This review will mainly cover the underlying pathology of the disease and its vulnerability to plaque rupture, treatments in use, and an overview of the current investigative research in the progression of the disease. Atherosclerosis is considered to be the most common cardiovascular disease resulting in acute coronary syndromes. It is a disease affecting the medium to large size arteries such as the coronary, iliac and femoral arteries, and the largest artery in the human body, the aorta. Atherosclerosis is pathologically defined as the accumulation of large lipid-rich core, blood clots and calcification forming lesions called plaques. If the atherosclerotic plaque ruptures, a blood clot may form and block the blood flow to the heart leading to fatal clinical events. Individuals who have high blood pressure, high blood cholesterol level and diabetes are at a higher risk of developing atherosclerosis.