

## AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/8807	
<b>Aircraft Registration</b>	<b>ZS-RGN</b>	<b>Date of Accident</b>	21 July 2010		<b>Time of Accident</b>	1445Z
<b>Type of Aircraft</b>	Cessna 182		<b>Type of Operation</b>	Private		
<b>Pilot-in-command Licence Type</b>		Private	<b>Age</b>	67	<b>Licence Valid</b>	Yes
<b>Pilot-in-command Flying Experience</b>		Total Flying Hours	±420		Hours on Type	Unknown
<b>Last point of departure</b>		Nelspruit aerodrome (FANS) (Mpumalanga province).				
<b>Next point of intended landing</b>		Hoedspruit Civil aerodrome (Limpopo province).				
<b>Location of the accident site with reference to easily defined geographical points (GPS readings if possible)</b>						
At Bakenkop Mountain at GPS Co-ordinates determined as S24° 49. 00' E030° 55. 53' at +/- 4500 feet altitude above mean sea level (AMSL).						
<b>Meteorological Information</b>		Temperature 17°, Dew point 09°C, Surface wind 09 Knots, Broken to Overcast clouds.				
<b>Number of people on board</b>	1 + 1	<b>No. of people injured</b>	0	<b>No. of people killed</b>	2	
<b>Synopsis</b>						
<p>The pilot, accompanied by a passenger, departed from Hoedspruit Civil Aerodrome early in the morning on a business trip under Visual Flight Rules (VFR) and flew to Nelspruit aerodrome. The flight was uneventful and according to a witness who saw the aircraft before takeoff on the return flight to Hoedspruit, the pilot had performed a comprehensive pre-flight inspection, which included a thorough fuel drain check. The aircraft was then taxied to the refuelling pumps where aviation gasoline Avgas low lead (LL) 100 was uplifted. The aircraft was taxied to the runway holding point where power and pre-departure checks were carried out and the engine performed satisfactorily, including the idle checks. Take-off was normal; however the aircraft did not reach its destination and a Search and Rescue effort was initiated. The wreckage was located on the same day by two search helicopters, approximately 28 nautical miles south of Hoedspruit. The aircraft had collided with Bakenkop Mountain (5500 feet AMSL) at +/- 4500 feet altitude above mean sea level (AMSL). The aircraft was destroyed by the impact and both occupants suffered fatal injuries. During the investigation the pilot was found not to have been IFR-rated.</p>						
<b>Probable Cause</b>						
Controlled flight into terrain (CFIT).						
<b>IARC Date</b>				<b>Release Date</b>		

## AIRCRAFT ACCIDENT REPORT

**Name of Owner/Operator** : J. Diedericks  
**Manufacturer** : Cessna Aircraft Company  
**Model** : Cessna 182  
**Nationality** : South African  
**Registration Marks** : ZS-RGN  
**Place** : At Bakenkop Mountain (Limpopo).  
**Date** : 21 July 2010  
**Time** : 1445Z

*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 The pilot, accompanied by a passenger, departed from Civil Hoedspruit aerodrome early in the morning on a business trip under Visual Flight Rules (VFR) and flew to Nelspruit aerodrome. The flight was uneventful and according to a witness who saw the aircraft before takeoff later in the afternoon whilst preparing to return to Civil Hoedspruit, the pilot had performed a comprehensive pre-flight inspection, which included a thorough fuel drain check. A flight plan was not filed and aviation gasoline Avgas low lead (LL) 100 was uplifted. The aircraft was taxied to the runway holding point where power and pre-departure checks were carried out. According to the witness, the engine performed satisfactorily, including the idle checks.
- 1.1.2 Takeoff was normal and the available information (Air Traffic Control transcript) indicated that en route to Hoedspruit, the pilot had reported his position to Kruger Mpumalanga (FAKN) control tower and requested to climb to 5500 feet altitude above mean sea level (AMSL). The pilot was advised to climb to an altitude of 4500 feet (because of traffic), stay below and remain west of Legogot Mountain and the R40 national road and to report once in Legogot. Later in-flight, the pilot was given clearance to climb to 5500 feet altitude and to contact LASS. The aircraft was not heard from again. The pilot had flown this route very often and was familiar with it. LASS were informed about the aircraft and ZS-RGN was called on Code, Squawk 7470 several times, yet there was no response.

- 1.1.3 The ATC officer who was on duty at the time in the LASS, phoned the pilot's cellular phone several times and again there was no answer. The matter was reported to the appropriate authorities and a Search and Rescue effort was initiated. The radar data at Hoedspruit air force base showed ZS-RNG at 5500 feet altitude above mean sea level (AMSL), descending to 4500 feet altitude and disappearing from the primary surveillance radar. The wreckage was located on the same day by two search helicopters, approximately 28 nautical miles south of Hoedspruit at Bakenkop Mountain. The aircraft had collided with Bakenkop Mountain (5500 feet AMSL) at +/- 4500 feet altitude above mean sea level (AMSL). Poor weather conditions hampered the rescue effort and it was called off. The following day in the morning, a South African Air Force (SAAF) helicopter, with the SACAA aircraft accident investigators, the South African Police Services (SAPS) and Mountain Search and Rescue (MSR) team located the wreckage.
- 1.1.4 Both occupants had suffered fatal injuries and the aircraft was destroyed. The accident occurred at GPS co-ordinates determined as S24°49.00' E030° 55.53' at an elevation of 4500 feet above mean sea level (AMSL). See intended track on figure 1 below.



Figure 1: Likely track of the aircraft from Nelspruit and the accident site.

## 1.2 Injuries to Persons:

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

## 1.3 Damage to Aircraft:

- 1.3.1 On-site inspection by the SACAA investigators showed that the aircraft was destroyed following a heavy impact with the mountain. See figure 2 below.



**Figure 2:** A view of the wreckage after the accident (aerial photograph).

#### 1.4 Other Damage:

1.4.1 Damage was limited to the trees at the accident site.

#### 1.5 Personnel Information:

Nationality	South African	Gender	Male	Age	67
Licence Number	*****	Licence Type	Private		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	None				
Medical Expiry Date	28 February 2011				
Restrictions	Corrective lenses and hearing aid				
Previous Incidents	Yes (No relevance to this accident)				

Flying Experience:

Total Hours	±420
Total Past 90 Days	Unknown
Total on Type Past 90 Days	Unknown
Total on Type	Unknown

**Note:** The flying experience hours should not be regarded as a true reflection of the pilot's total hours, as his pilot logbook could not be found after the accident. These are the last hours recorded during his licence renewal at the SACAA.

## 1.6 Aircraft Information:

### Aircraft general description:

The Cessna 182 is a high-wing, single-engine aircraft, with seating capacity of up to six people. The aircraft may be flown from the left or right seat. However, the pilot flying usually occupies the left seat.

### Airframe:

Type	Cessna 182	
Serial Number	182-59828	
Manufacturer	Cessna Aircraft Company	
Date of Manufacture	1969	
Total Airframe Hours (At time of Accident)	3405.7	
Last MPI (Hours & Date)	3358.2	21 April 2010
Hours since Last MPI	47.5	
C of A (Issue Date)	20 December 2007	
C of A (Expiry Date)	20 May 2011	
C of R (Issue Date) (Present owner)	04 June 2010	
Operating Categories	Standard	
Recommended fuel used	Avgas LL 100	

**Note:** It was not possible to determine the actual aircraft hours at the time of the accident due to the destruction of the cockpit/cabin area. The hours entered in the table above were as recorded in the aircraft flight folio after the last flight to Nelspruit, on 21 July 2010, with the aircraft prior to the accident.

### Engine:

Type	Continental TCM 0470R25
Serial Number	828411-R
Hours since New	532.6
Hours since Overhaul	Not reached

### Propeller:

Type	McCaully 2A34C66-P
Serial Number	766370
Hours since New	369.4
Hours since Overhaul	Not reached

**Note:** The aircraft's propeller (S/N = 60206) was damaged after striking a pothole on the runway at 2984.8 total hours. The propeller mentioned in the table above was fitted on 18 May 2006.



## 1.7 Meteorological Information:

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

### WEATHER CONDITIONS IN THE VICINITY OF THE ACCIDENT:

The most likely surface conditions at the time of the incident in the vicinity of Hoedspruit are similar to those given below:

Time: 1500Z

Temperature: 17°C

Dew Point: 09°C

Surface Wind: 170° 09knots

Cloud cover: No cloud reported (automatic weather station) but the satellite image shows broken to overcast clouds, and the closest manned station (Kruger Int. Airport) reported the cloud base to have been at 2000 ft AGL.

Weather: There were no reported showers, but a possibility of showers in the vicinity as confirmed by the preceding Metar (1300Z) at Kruger Int. Airport.

Visibility: Not reported, but estimated to be greater than 10 km.

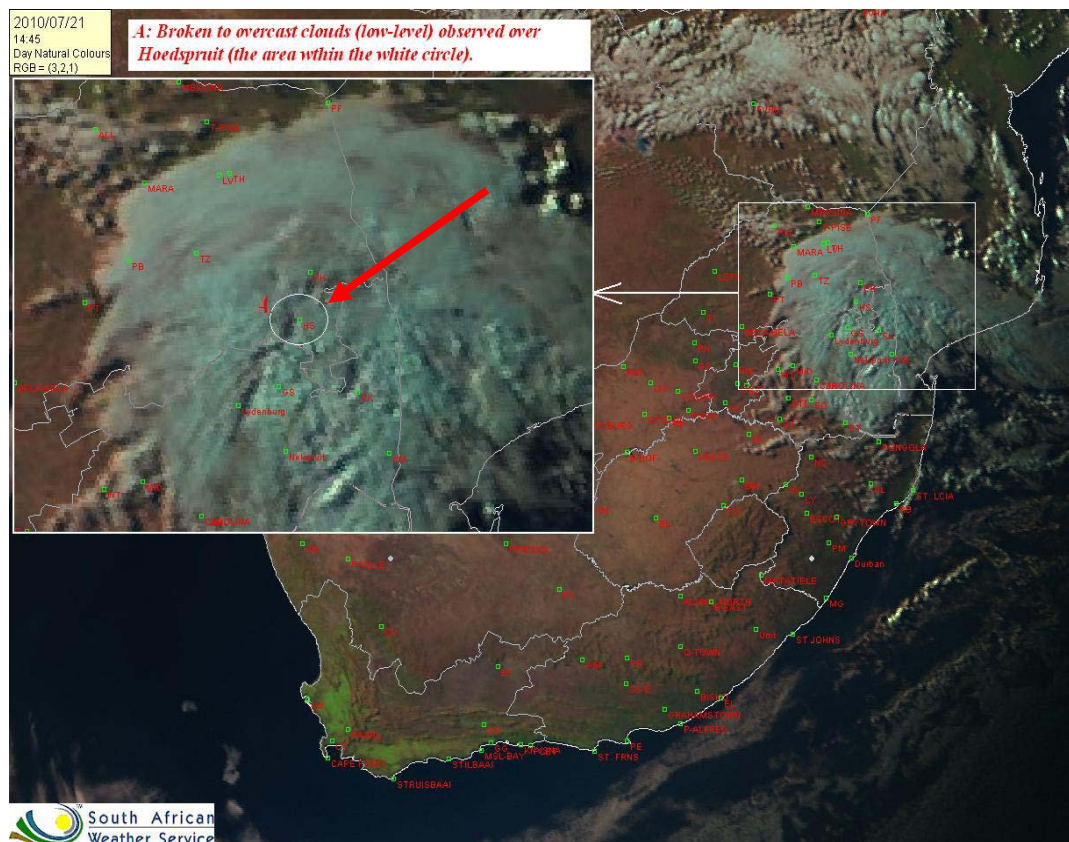


Figure 3: Satellite weather report at the time of the accident.

## **1.8 Aids to Navigation:**

1.8.1 The aircraft was equipped with the following navigational aids:

- ❖ Magnetic Compass.
- ❖ Transponder.
- ❖ Garmin GPS.
- ❖ ADF (Automatic Direction Finder).
- ❖ VOR (Variable Omni Range) finder.

1.8.2 No recorded or reported defects were experienced with the navigation equipment.

1.8.3 The aircraft transponder was inoperative.

## **1.9 Communications:**

1.9.1 The pilot had established radio contact with the Kruger Mpumalanga aerodrome control tower on the very high frequency (VHF) 119,0 Megahertz (MHz). The pilot was later given clearance to climb to an altitude of 5500 feet and was told to report to LASS. The aircraft was not heard from again and there was no indication that the pilot may have experienced an in-flight emergency.

## **1.10 Aerodrome Information:**

1.10.1 The accident did not occur at close proximity to an aerodrome.

1.10.2 The accident took place on the Bakenkop Mountain at the GPS position determined as South 24 ° 49.55' East 030 ° 55.53' at +/- 4500 feet altitude above mean sea level (AMSL).

## **1.11 Flight Recorders:**

1.11.1 The aircraft was not fitted with a Cockpit Voice Recorder (CVR) or a Flight Data Recorder (FDR) and neither was required by regulations to be fitted to this type of aircraft.

## **1.12 Wreckage and Impact Information:**

1.12.1 On-site examination of the wreckage revealed that the aircraft had broken apart on impact. The wreckage showed evidence of high speed on impact and there was no evidence of any airframe failure, flight control problems, electrical problems, power loss, or fire during the flight. The engine, the propeller, the tail section, both wings and the undercarriage were destroyed by the impact. There was evidence of fuel at the accident site and both fuel tanks had ruptured on impact. Due to the condition of the instruments it was not possible to determine the instrument readings and the position of all the switches at the time of impact. From examination of the wreckage, it was not possible to determine the position of the engine controls and fuel tank

selector. The cockpit was severely damaged on impact. See figure 4 below.



**Figure 4:** View of the wreckage on the mountain.

### **1.13 Medical and Pathological Information:**

- 1.13.1 A post-mortem examination was performed on the pilot as well as the passenger. The results of the post-mortem and the toxicology tests were not available at the time when this report was compiled. Should any of the results indicate that medical aspects may have affected the pilot's performance, this will be considered as new evidence and the investigation will be reopened.

### **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 considered to be non-survivable due to the magnitude of the deceleration forces and the collapse of the cockpit/cabin area. All the seats were destroyed and the condition of the seat belt attachment and the adjustment of the seat belts couldn't be analyzed. The aircraft was not fitted with an emergency locator transmitter and the aircraft transponder was inoperative, which further hampered the Search and Rescue effort. Both occupants were found to be fatally injured and were extracted from the wreckage by the Search and Rescue team. The accident site was not accessible by foot or by road and all the people who took part had to be hoisted from the helicopter to the accident site. The South African Air force (SAAF), the South African Police Services (SAPS) and the Mountain Search



and Rescue (MSR) teams must be commended for their assistance during this investigation. See figure 5 below.



**Figure 5:** View of the terrain, the wreckage and the rescue helicopter.

#### **1.16 Tests and Research:**

1.16.1 On-site investigation did not reveal any failure or malfunction of the aircraft prior to impact that might have reduced the aircraft's performance. The investigator in charge (IIC) did not find it necessary to conduct any tests or research on any part or component of the aircraft during the investigation. According to available aircraft documentation no reported defects were recorded since the last maintenance inspection had been certified.

#### **1.17 Organisational and Management Information:**

1.17.1 The aircraft was operated privately.

1.17.2 The last annual inspection that was carried out on the aircraft prior to the accident was certified at 3358.2 hours on 21 April 2010 by an approved Aircraft Maintenance Organisation (AMO). The person that certified the task held a valid approved person accreditation from the CAA as well as that of an aircraft maintenance engineer (AME).

## 1.18 Additional Information:

### 1.18.1 Controlled Flight into Terrain (CFIT)

CFIT occurs when an airworthy aircraft, under the control of a pilot, is flown into terrain (water or obstacles) with inadequate awareness on the part of the pilot of the impending disaster (FAA, 2000). A number of general aviation (GA) weather accidents have been associated with external or social pressures, such as the pilot's reluctance to appear "cowardly" or to disappoint passengers eager to make or continue a trip. There is almost always pressure to launch, and pressure to continue. Even the small investment in making the trip to the airport can create pressure to avoid "wasted" time.

One of the most effective safety tools at a pilot's disposal is waiting out bad weather. Bad weather (especially involving weather fronts) normally does not last long, and waiting just a day can often make the difference between a flight with high weather risk and a flight that you can make safely. Many times, weather is not forecast to be severe enough to cancel the trip, so pilots often choose to take off and evaluate the weather as they go. While it is not necessarily a bad idea to take off and take a look, staying safe requires staying alert to weather changes. GA pilots and their aircraft operate in (rather than above) most weather. At typical GA aircraft speeds, making a 200-mile trip can leave a two to three-hour weather information gap between the pre-flight briefing and the actual flight. In-flight updates are vital!

Because a single-piloted, small GA aircraft is vulnerable to the same CFIT risks as a crewed aircraft but with only one pilot to perform all of the flight and decision-making duties, that pilot must be better prepared to avoid a CFIT type accident. In some cases, a GA pilot may be more at risk to certain CFIT type accidents because the pilot does not have the company management or government oversight that a corporate or commercial operator may be exposed to. Without such oversight, such as detailed standard operating procedures and higher mandatory safety requirements, it is the responsibility of the single pilot to ensure he or she is well trained, qualified for the intended flight, meets all regulatory requirements for the flight, and has the self-discipline to follow industry recommended safety procedures that can minimize CFIT type accidents.

The Instrument Procedure Handbook (FAA-H-8261-1A), Chapter 4, states:

*"The basic causes of CFIT accidents involve poor flight crew situational awareness. One definition of situational awareness is an accurate perception by pilots of the factors and conditions currently affecting the safe operation of the aircraft and the crew. The causes of CFIT are the flight crews' lack of vertical position awareness or their lack of horizontal position awareness in relation to the ground, water, or an obstacle. More than two-thirds of all CFIT accidents are the result of an altitude error or lack of vertical situational awareness. CFIT accidents most often occur during reduced visibility associated with instrument meteorological conditions (IMC), darkness, or a combination of both."*

## 1.19 Useful or Effective Investigation Techniques:

### 1.19.1 None.

## **2. ANALYSIS:**

- 2.1 On-site examination of the wreckage indicated that the aircraft was serviceable at the time of the occurrence. There is no evidence that there was an in-flight emergency, or that the aircraft had problems before impact.
- 2.2 The analysis therefore focused on the weather conditions that existed along the planned route at the time of the accident, and the pilot's decision to continue the flight in mountainous terrain with deteriorating weather.
- 2.3 The aircraft was properly maintained in accordance with the manufacturer's approved procedures and no documented evidence was found indicating any defect or malfunction prior to the flight that could have contributed or caused the accident. The aircraft was equipped and certified for Instrument Flight Rules (IFR) and had flown a total of 47.5 hours since the last mandatory periodic inspection (MPI) was certified. The pilot held a valid private pilot's licence as well as a valid aviation medical certificate that had been issued by an SACAA accredited medical examiner. The pilot had flown a total of ±420 hours on the aircraft type and these hours do not include hours flown on the day of the accident. The accident flight was the pilot's second flight of the day. He had performed an uneventful flight earlier in the morning, flying from Civil Hoedspruit to Nelspruit.
- 2.4 Although conditions at the departure aerodrome were favourable for a Visual Flight Rules (VFR) flight, available weather forecasts and observations indicated that the weather conditions over the intended direct route for the return flight to Hoedspruit Civil that afternoon, were not favourable for VFR conditions. It could not be verified that the pilot had in fact obtained any weather forecast information prior to his decision to proceed with his flight or not. Subsequent reports by the search and rescue pilots were that low clouds prevailed over the route and in the mountainous area. As he was familiar with the region it may be that he relied on his knowledge of local weather conditions.
- 2.5 After being initially restricted to 4500ft by LASS, the aircraft was cleared to 5500ft. The evidence implies that the pilot encountered adverse weather in-flight and tried to maintain visual contact with the ground as radar data revealed that the aircraft descended to 4500 feet altitude again without contacting LASS. The pilot was not instrument rated and may have lost situational awareness as to his enroute location resulting in collision with the mountainous terrain.

## **3. CONCLUSION:**

### **3.1 Findings:**

- 3.1.1 The pilot was the holder of a private pilot's licence with the aircraft type licence endorsed in his logbook.
- 3.1.2 The pilot and the passenger were involved in a private flight under Visual Flight Rules (VFR) by day.
- 3.1.3 The pilot's medical certificate was valid with restrictions to put on corrective lenses and a hearing aid at the time of the accident.

3.1.4 The aircraft was equipped and certified for IFR.

3.1.5 The closest manned station (Kruger Int. Airport) reported the cloud base to have been at 2000 ft AGL, but reports by the Search and Rescue pilots were that low clouds prevailed over the route and in the mountainous area.

3.1.6 The aircraft collided with the mountain at high speed.

3.1.7 The accident is categorized as not survivable.

### **3.2 Probable Cause/s:**

3.2.1 Controlled flight into terrain (CFIT).

## **4. SAFETY RECOMMENDATIONS:**

4.1 None.

## **5. APPENDICES:**

5.1 Annexure A (Transcript of communication between ATC Kruger Mpumalanga air traffic control tower and ZS-RNG.)

Report reviewed and amended by the Advisory Safety Panel 19 October 2010.

-END-

**ANNEXURE A****Frequency: 119.0 MHz****Date: 21 July 2010**

Transcript for ZS-RGN

Source	Text of transmission (Frequency )
ZS-RNG	Kruger International RGN good day.
TOWER	RGN Kruger good day go ahead.
ZS-RGN	Er RGN Charlie one eight two (C182) routing from Nelspruit to Hoedspruit Civil we are currently coming up the N4, we are two on board and two hours endurance, requesting five thousand five hundred feet (5500 ft).
TOWER	RNG standby for higher, climb to four thousand five hundred feet (4500 ft) and the QNH 1029, keeping west of Legogot and the R40 report once up in Legogot.
ZS-RGN	Er maintain 4500 ft and below remain west of Legogot west of R40 RG.
TOWER	Squawk 7470 RGN
ZS-RGN	RGN
ZS-RGN	RGN now coming up your boundary outbound.
TOWER	RGN climb to 5500 ft contact Lowveld 119.0 good day Sir.
RGN	119.0 thank you bye bye.

\*No further communication with the pilot and ATC\*.