

<b>AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY</b>
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				Reference:	CA18/2/3/8930	
<b>Aircraft Registration</b>	ZS-KSZ	<b>Date of Accident</b>	28 May 2011		<b>Time of Accident</b>	0901Z
<b>Type of Aircraft</b>	Cessna R182		<b>Type of Operation</b>	Private (Air Race)		
<b>Pilot-in-command Licence Type</b>	Private	<b>Age</b>	68	<b>Licence Valid</b>	Yes	
<b>Pilot-in-command Flying Experience</b>	Total Flying Hours	1 924		Hours on Type	Unknown	
<b>Last point of departure</b>	Mafikeng Aerodrome, Mafikeng, Northwest Province					
<b>Next point of intended landing</b>	Mafikeng Aerodrome, Mafikeng, Northwest Province					
<b>Location of the accident site with reference to easily defined geographical points (GPS readings if possible)</b>						
At Blokkloof Farm, Koster, Northwest Province (GPS: S25°42.689 E026°50.348 at 4553 feet elevation)						
<b>Meteorological Information</b>	Temperature: 17°C; Dew point: -03°C; Wind: 360°08k nots; Cloud cover: None; Visibility: 10km					
<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>On 27 May 2011 the Pilot-in-Command and the Navigator (father and son respectively) participated in "The President's Trophy Air Race" at Mafikeng International Airport. On the first day of the event the crew of ZS-KSZ took off from Mafikeng International Airport and landed uneventfully back at Mafikeng International Airport.</p> <p>On Saturday 28 May 2011, the second day of the race, the crew took off from Mafikeng International Airport with the intention of completing the race and landing back at Mafikeng International Airport. During the second leg of the race ZS-KSZ impacted high tension wires and crashed into the side of a valley. The aircraft then burst into flames.</p> <p>Both occupants were fatally injured during the accident. The aircraft was destroyed by impact forces and a post-impact fire.</p>					
<b>Probable Cause</b>						
The aircraft collided with high tension wires, where after the pilot lost control and the aircraft impacted the ground.						
<u>Contributory Factor</u> Low flying.						

IARC Date		Release Date	
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## AIRCRAFT ACCIDENT REPORT

**Name of Owner/Operator** : Wally Brink Property Investments  
**Manufacturer** : Cessna Aircraft Company  
**Model** : R182  
**Nationality** : South African  
**Registration Marks** : ZS-KSZ  
**Place** : Koster, Northwest Province  
**Date** : 28 May 2011  
**Time** : 0901Z

*All times given in this report are Co-ordinated Universal Time (UTC) and will be denoted by (Z). South African Standard Time is UTC plus 2 hours.*

### Purpose of the Investigation :

*In terms of Regulation 12.03.1 of the Civil Aviation Regulations (1997) this report was compiled in the interest of the promotion of aviation safety and the reduction of the risk of aviation accidents or incidents and **not to establish legal liability.***

### Disclaimer:

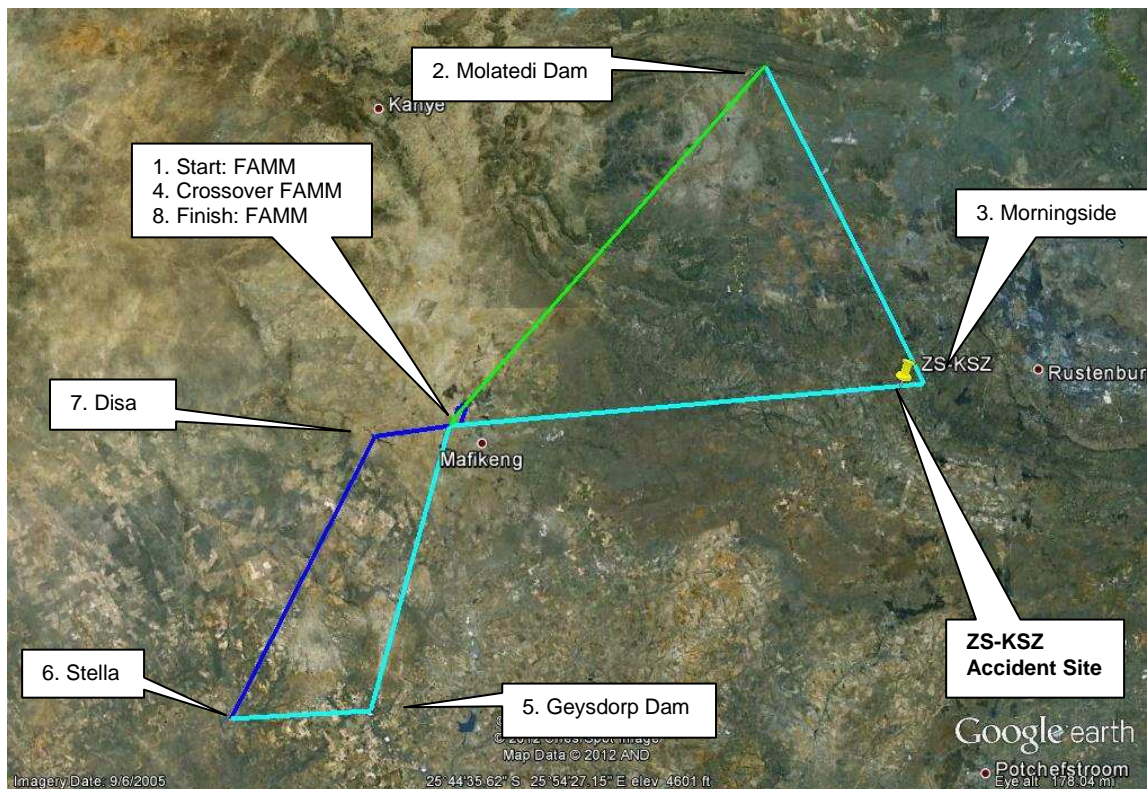
*This report is given without prejudice to the rights of the CAA, which are reserved.*

## 1. FACTUAL INFORMATION

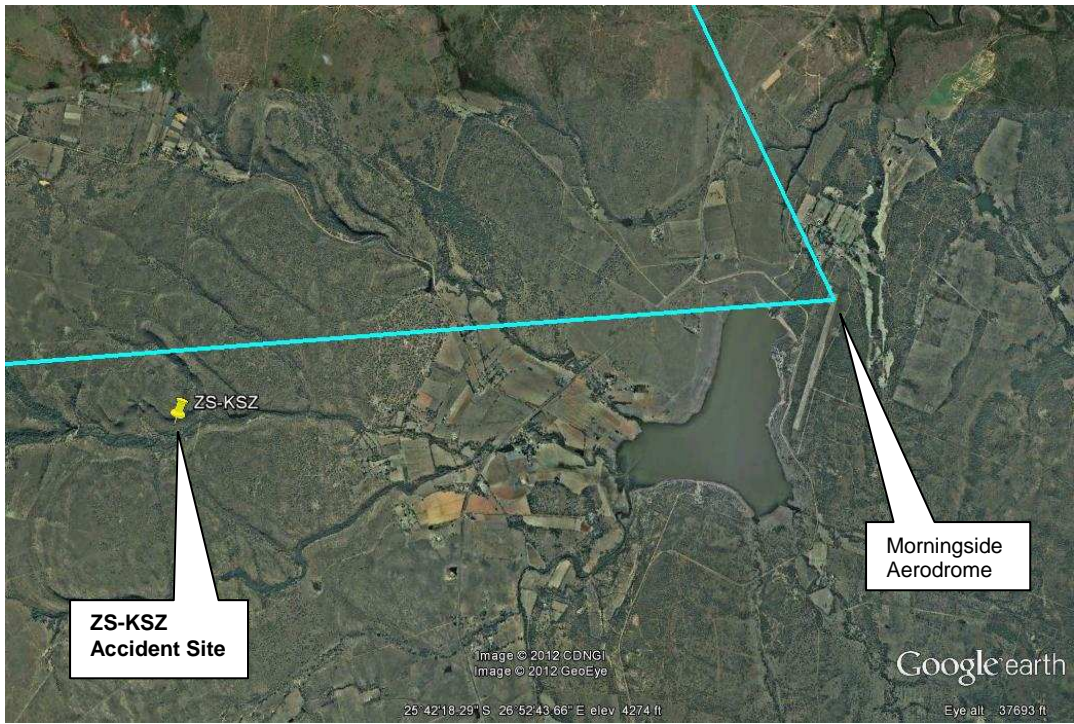
### 1.1 History of Flight

- 1.1 On 27 May 2011, the Pilot-in-Command and the Navigator, (father and son respectively) participated with ZS-KSZ, a Cessna R182, in "The 2011 President's Trophy Air Race" hosted by the Beauchamp-Proctor Flying Club at Mafikeng International Airport. The father and son were both pilots and both held ratings on the aircraft with the father the pilot-in-command and the son the navigator.
- 1.2 "The President's Trophy Air Race" is a two day event that is run annually at the end of May each year whilst attracting approximately 100 participants. The event is a handicap race for aircraft in Group 1 and in the Class C1 and/or to C1 g of the South African Power Flying Association (SAPFA) and the Federation Aeronautique Internationale (FAI) sporting code (aircraft powered by one or more piston-engine power plants and a maximum takeoff weight of less than 12 500 kg). Handicap races are developed to give each aircraft a chance of winning and also allow aircraft of different types to compete against each other.
- 1.3 Each day the competitors fly a course of approximately 320 nautical miles (nm) while they are required to have a minimum cruise speed of 100 knots and be able to cover the distance with proper legal fuel reserves remaining.
- 1.4 On Friday, 27 May 2011, the first day of the event, the crew of ZS-KSZ took off on an uneventful 341.5nm race from Mafikeng International Airport to Kuruman, Reivilo, Schweizer-Reneke, and then back to Mafikeng International Airport.

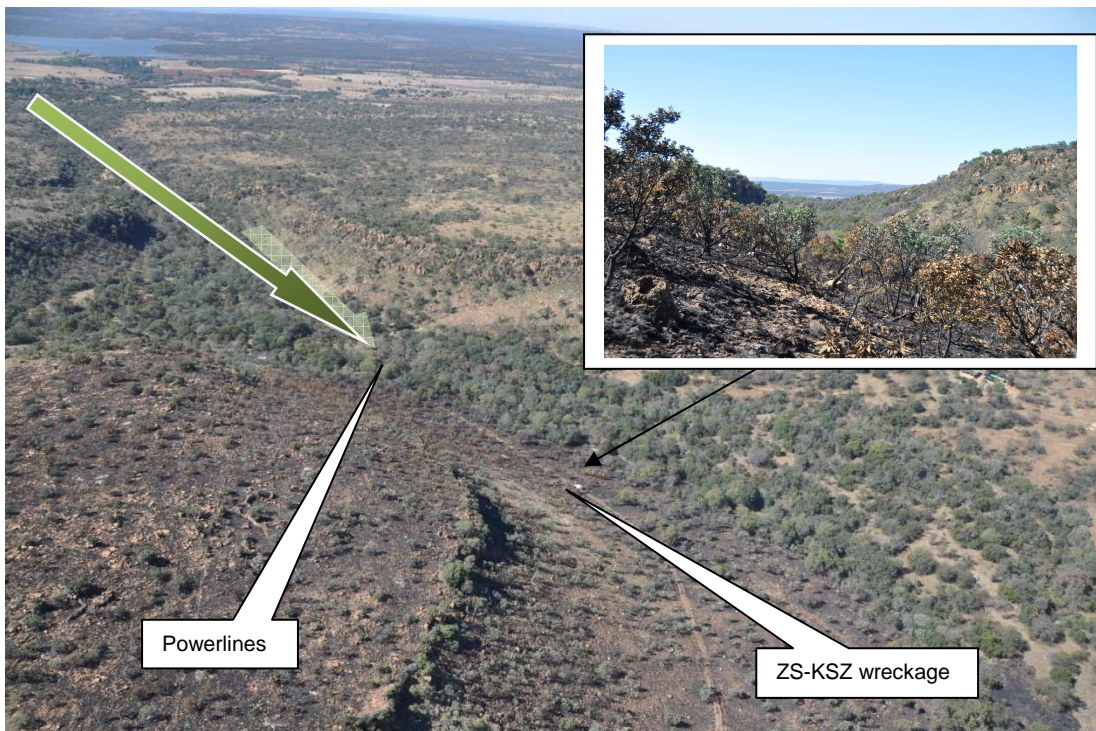
- 1.5 On 28 May 2011, the second day of the air race was scheduled for 333.9nm from Mafikeng International Airport to Molatedi Dam, Morningside, Mafikeng, Geysdorp Dam, Stella, Disa and then back to Mafikeng International Airport.
- 1.6 The crew of ZS-KSZ departed at approximately 0825Z from Runway 04 at Mafikeng International Airport and after approximately 74.5nm, ZS-KSZ turned right after passing Molatedi Dam and headed for Morningside Farms. ZS-KSZ was observed turning right at Morningside farms and continued on the next leg towards Mafikeng.
- 1.7 A pilot (witness) that was flying behind ZS-KSZ stated that after he arrived at the turning point behind ZS-KSZ at 0840:29Z he immediately climbed to 500 ft AGL to clear the mountains. The rules of the race instructed the participants to pass over the turning point between 200 and 500 ft AGL. The witness stated that on levelling out he saw ZS-KSZ flying at a low altitude in front of him, up the valley. He then saw ZS-KSZ suddenly pitching up violently until almost vertical and entering into a right-hand spiral dive. The aircraft crashed into the side of the valley and burst into flames.
- 1.8 According to another witness on the ground, he noticed ZS-KSZ flying low in the valley and impacting the high tension wires spanned across the valley. The aircraft then impacted the side of the valley where after it bounced during the impact sequence. He observed smoke coming from the wreckage and it then burst into flames. The aircraft wreckage was destroyed by the post impact fire.
- 1.9 The pilot (witness) that was flying behind ZS-KSZ made a radio call and informed the race marshals of the accident. A rescue helicopter from Mafikeng was dispatched to the scene. Both occupants were fatally injured during the accident sequence. The accident occurred at GPS coordinates S25°42.689 E026°50.348.



**Photo 1:** Google Earth photo of the race path.



**Photo 2:** Google Earth photo of the accident site and race path.



**Photo 3:** Estimated path of ZS-KSZ thru the valley. **Inset:** View of valley.

## 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 the impact forces and the post-impact fire.

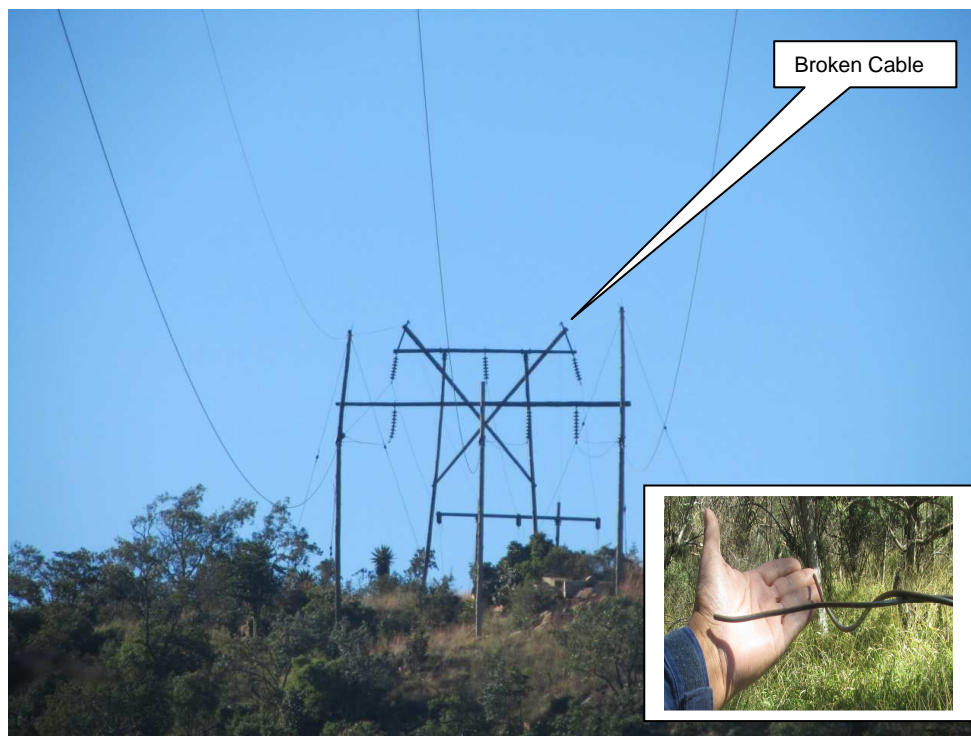


**Photo 4:** A view of the aircraft wreckage.

### 1.4 Other Damage

1.4.1 The veldt around the wreckage burnt.

1.4.2 The high tension wire (earth wire) sustained damage after the aircraft impacted it.



**Photo 5:** High tension wires and pylons. **Inset:** Broken earth wire.

## 1.5 Personnel Information

### 1.5.1 Pilot-in-Command

Nationality	South African	Gender	Male	Age	68
Licence Number	0270066327	Licence Type	Private Pilot		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Night Rating; Safety Pilot Rating				
Medical Expiry Date	30 April 2012				
Restrictions	Corrective Lenses				
Previous Accidents	Yes				

Previous Accidents: The pilot and three passengers were involved in an accident on 04 June 1978 in a Cessna 182, ZS-PWC. The accident report stated that the aircraft landed in soft ground resulting in a nose landing gear collapse with damage to the nose landing gear, wing and propeller. The occupants onboard sustained no injuries.

Flying Experience:

Total Hours	1 924
Total Past 90 Days	Unknown
Total on Type Past 90 Days	Unknown
Total on Type	Unknown

Note: The hours shown was obtained from family members. The pilot's logbook was not available and his exact flying hours at the time of the accident could therefore not be determined.

### 1.5.2 Navigator

Nationality	South African	Gender	Male	Age	40
Licence Number	0270418098	Licence Type	Private Pilot		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	None				
Medical Expiry Date	30 September 2011				
Restrictions	Corrective Lenses				
Previous Accidents	None				

Flying Experience:

Total Hours	1 294.6
Total Past 90 Days	Unknown
Total on Type Past 90 Days	Unknown
Total on Type	Unknown

Note: The hours shown was obtained from family members. The pilot's logbook was not available and his exact flying hours at the time of the accident could therefore not be determined.

## 1.6 Aircraft Information

### Aircraft Description

The Cessna 182 is a four-seater, single-engine, monoplane light aircraft. The fuselage is an all-metal (mostly aluminum alloy) semi-monocoque structure with braced high-wing. The tail unit is a cantilever all-metal structure with a swept fin and rudder. The aircraft is powered by a 235 hp (175 kW) Lycoming O-540-J3C5D piston engine.

### **Airframe:**

Type	Cessna R182	
Serial Number	R182-01723	
Manufacturer	Cessna Aircraft Company	
Date of Manufacture	1981	
Total Airframe Hours (At time of Accident)	1653.3	
Last MPI (Date & Hours)	1626.1	08 July 2010
Hours since Last MPI	27.2	
C of A (Issue Date)	17 July 1981	
C of R (Issue Date) (Present owner)	08 November 2007	
Operating Categories	Standard Part 91	

### **Engine :**

Type	Lycoming O-540-J315D
Serial Number	L-23019-40A
Hours since New	1653.3
Hours since Overhaul	TBO Not Yet Reached

### **Propeller :**

Type	McCaughey B2034C1218
Serial Number	810116
Hours since New	1653.3
Hours since Overhaul	225.0

Note: The hours of the airframe, engine and propeller was calculated since the aircraft hours was not known at the time of impact.

## 1.7 Meteorological Information

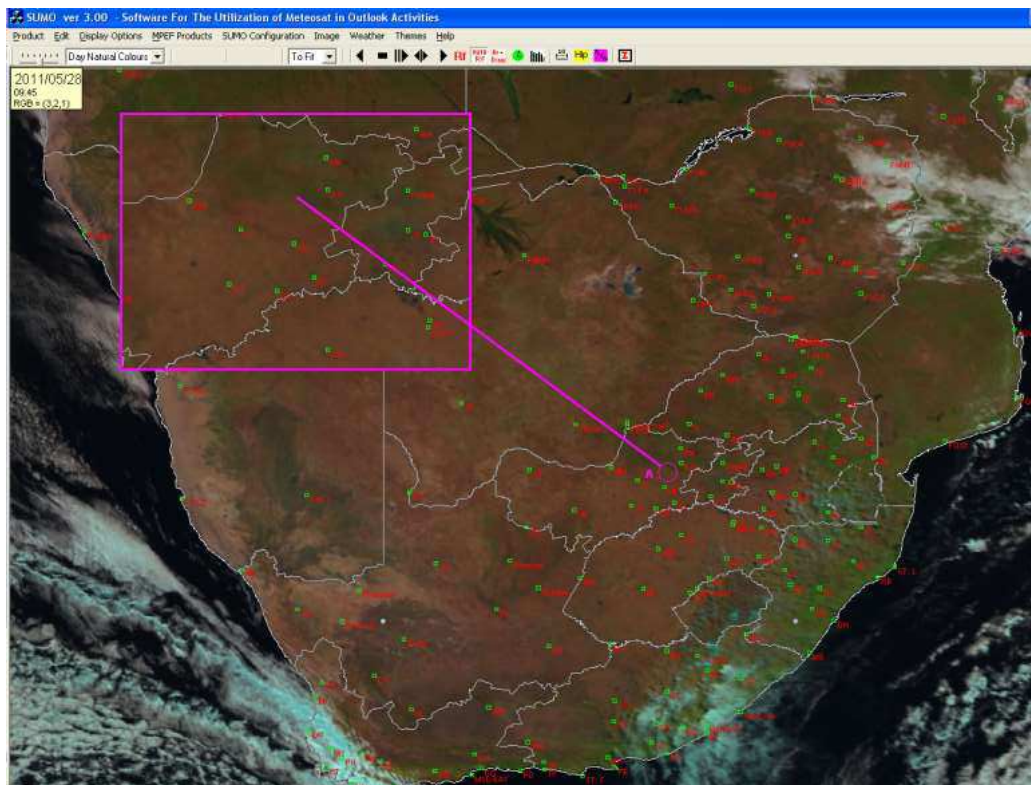
- 1.7.1 The following meteorological report was obtained from the South African Weather Service. As no official observations were available at the place of the accident, the most likely weather conditions at the place of the accident are indicated in the table below.

Wind direction	360°	Wind speed	08 kts	Visibility	10 km
Temperature	17°C	Cloud cover	None	Cloud base	None
Dew point	- 03°C				



## WEATHER SYSTEMS AT THE TIME OF ACCIDENT/INCIDENT

- SURFACE ANALYSIS (06:00Z 28th May 2011)  
*A surface high pressure system is dominating the whole central interior of the country leaving surface divergence over the area of incident/accident and as a result clear skies are observed.*
- UPPER AIR (00:00Z 28th May 2011)  
*The upper air analysis shows a weak ridge at 500hPa, positioned just to the west of the area of incident/accident leading to subsidence over the area. As a result the area of incident/accident is highly stable leaving the possibility for any developments close to zero.*
- SATELLITE IMAGE (09:45Z 28th May 2011)  
*The satellite image shows clear sky over the area of incident/accident (Photo 6).*
- WEATHER CONDITIONS IN THE VICINITY OF THE INCIDENT  
*METARs from the selected stations show light winds close to the ground and very dry conditions over the surrounding areas.*
- Station: FAMM Date: 2011-05-28  
*FAMM 280900Z 36008KT CAVOK 17/M03 Q1022 NOSIG=  
FAMM 281000Z 33006KT CAVOK 17/M03 Q1022 NOSIG=*



**Photo 6:** Satellite image of the weather.

## 1.8 Aids to Navigation

- 1.8.1 The aircraft was equipped with the standard navigation equipment as approved at the time of certification by the regulator. No defects were recorded or reported prior to or during the accident flight.

## **1.9 Communications**

1.9.1 The aircraft was equipped with the standard communication equipment as approved at the time of certification by the regulator. No defects were recorded or reported prior to or during the accident flight.

## **1.10 Aerodrome Information**

1.10.1 The accident did not occur at an aerodrome, but outside the boundaries of an aerodrome.

## **1.11 Flight Recorders**

1.11.1 The aircraft 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 aircraft.

1.11.2 A data logger was used by the pilot of ZS-KSZ for the duration of the air race. The data logger records the track, time and height the aircraft was flying. The data logger was however not recovered at the wreckage site.

## **1.12 Wreckage and Impact Information**

1.12.1 During the "President's Trophy Air Race" ZS-KSZ flew low through the valley and impacted high tension wires. The aircraft then pitched up, entered into a spiral dive and impacted the side of the valley. A post-impact fire ensued which then destroyed the aircraft wreckage.

1.12.2 Evidence at the wreckage site showed signs that the aircraft bounced after the initial impact. The aircraft then broke into two significant parts; the left wing and the rest of the airframe. The engine was mangled and destroyed by the impact forces and post-impact fire. The propeller exhibited damage indicative of the engine producing power at impact.

1.12.3 There was no evidence of airframe failure or system malfunction prior to the accident. All control surfaces were accounted for, and all damage to the aircraft was attributed to the severe impact forces and the post-impact fire that ensued.

1.12.4 During the impact sequence the high tension wire severed the vertical stabilizer approximately 140 cm from the top. It then severed the rudder and ripped it from the vertical stabilizer. The rudder was located below the broken high tension wire approximately 242 meters (794 feet) from the main wreckage.



**Photo 7:** The vertical stabilizer



**Photo 8:** The rudder

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

1.13.1 A post-mortem examination was performed on the pilot and the passenger. The post-mortem report of both occupants determined the cause of death to be fourth degree burns.

1.13.2 The results of the toxicology tests were not available at the time when the report was compiled. Should any of the results indicate that medical aspects may have affected the performance of the pilot, this will be considered as new evidence and the investigation re-opened.

### **1.14 Fire**

1.14.1 During the impact sequence the witness observed the aircraft bursting into flames on impact with the side of the valley. The aircraft was destroyed by a post-impact fire. Part of the vegetation around the wreckage was also destroyed by the fire.

### **1.15 Survival Aspects**

1.15.1 Although the occupants onboard the aircraft were secured with safety harnesses the accident was not survivable due to the magnitude of the deceleration forces, and the severity of the post-impact fire.

### **1.16 Tests and Research**

1.16.1 None.

## 1.17 Organizational and Management Information

- 1.17.1 The race is organized and controlled by the South African Power Flying Association (SAPFA) and is officially sanctioned by the Federation Aeronautique Internationale (FAI) as a World Class 1 event. The event was organized and executed in accordance with the valid sporting code of the FAI Rules and Regulations and the Supplementary Rules and regulations for the specific year's event.
- 1.17.2 All participants were briefed about the rules and regulations of the race. Also rules and regulation documents and maps were available to all participants.
- 1.17.3 The Aircraft Maintenance Organisation (AMO) that performed the last maintenance on the aircraft prior to the incident flight was in possession of a valid AMO Approval certificate.

## 1.18 Additional Information

- 1.18.1 The Civil Aviation Regulations regarding minimum heights:

Civil Aviation Regulations 91.06.32

(1) *Except when necessary for taking off or landing, or except with prior written approval of the Commissioner, no aircraft –*

*(a) shall be flown over built-up areas or over an open-air assembly of persons at a height less than 1 000 feet above the highest obstacle, within a radius of 2 000 feet from the aircraft;*

*(b) when flown elsewhere than specified in paragraph (a), shall be flown at a height less than 500 feet above the ground or water, unless the flight can be made without hazard or nuisance to persons or property on the ground or water; and*

- 1.18.2 The 2011 President's Trophy Air Race Rules

The following was from the 2011 President's Trophy Air Race Rules - Official Rules and Regulations:

14.4 *Heights and altitudes crossing checkpoints, turning points or finish lines will be detailed in briefings, but will **not be below 200 feet AGL and not above 500 feet AGL.***

14.7 *Once an aircraft has passed the designated point a sharp lookout must be kept before turning onto the new heading. Altitude must be changed gradually - NO PULL-UPS.*

14.8 *Notwithstanding 15.7, aircraft passing the finish line, shall, unless specifically given a procedural change during the briefing, continue on the same heading and at the same altitude for a distance of at least one (1) nautical mile before ANY change in heading or altitude will be allowed.*

15.6 *Penalties that may be applied will include either be time added to the competitor or, in the worst case, exclusion. The prescribed penalties are;*

15.6.1 Any activity flying that is determined by the designated Safety Officer to be dangerous and a risk to the competitor himself, other competitors or anyone else, will be excluded from the results

15.6.2 The Race Director, in conjunction with the time keepers will apply the following penalties.

15.6.2.4 Turning too high/low over a turning point:

**<100 feet - Exclusion**

600-1000 feet - 30 seconds

1001-2000feet -120seconds

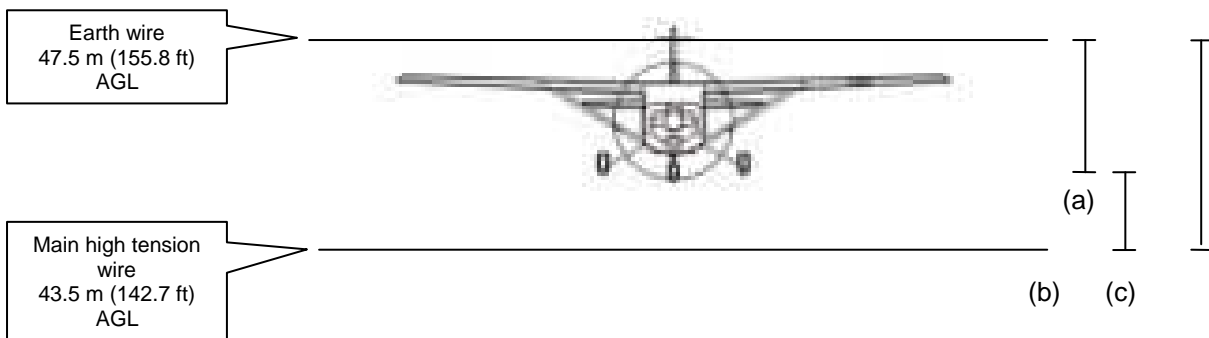
>2001 feet -360 seconds

Multiple infringements -Exclusion

15.7 A Competitor may be excluded for any unsporting or dangerous behavior, deliberate attempts to deceive or mislead officials, willful interference with other competitors, verbal abuse of any official or other competitor, falsification of documents, use of forbidden equipment, violations of airspace, or any infringements of the rules, regulations or supplementary regulations.

### 1.18.3 Height of high tension wires and aircraft

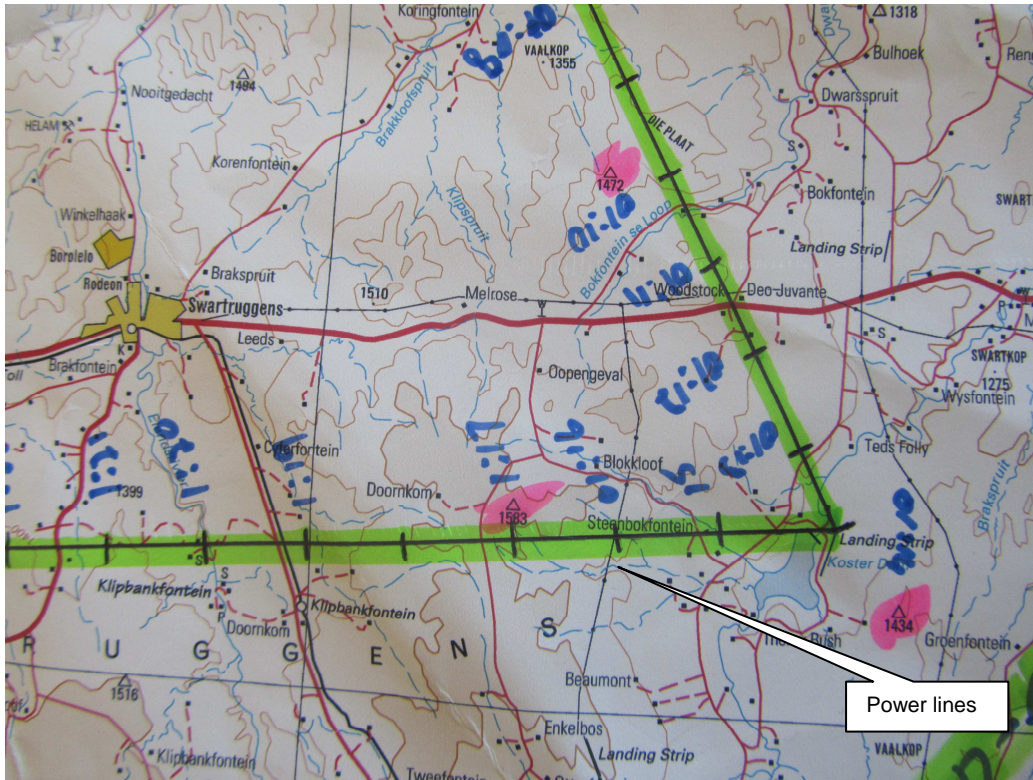
- a) The aircraft had collided with one of two earth wires that were 47.5 metres (155.8 feet) above the ground. The high tension wires consisted of three lower high tension wires and two upper earth high tension wires.
- b) The height of the high tension wires were measured from the ground:
  - Height of main high tension wires was 43.5 metres (142.7 feet) AGL
  - Height of earth high tension wire was 47.5 metres (155.8 feet) AGL
- c) As the height of ZS-KSG was 2.82 meters (9.3 feet) and the vertical stabilizer was found sliced approximately 140 cm from the top by the high tension wire. It then sliced into the rudder and ripped the rudder from the vertical stabilizer. It was calculated that the aircraft was at a height of 44.82 m AGL (147 feet) when it impacted the earth wire. See the sketch below:
- d) The trees adjacent to the cleared area underneath the high tension wires were approximately 5 m (16.4 feet) high. The clearance of the aircraft to the obstacles was then approximately 39.82 m (130.6 feet).



Distance

- (a) Earth wire to Aircraft landing gear – 2.68 m
- (b) Aircraft landing gear to Main high tension wire – 1.32 m
- (c) Earth wire and Main high tension wire – 4 m

Consequently the aircraft was at a height of 44.82 m (147 feet) AGL when it impacted the earth wire.



**Photo 9:** Portion of map which indicates the high tension wires

**1.19 Useful or Effective Investigation Techniques**

1.19.1 None considered necessary.

**2. ANALYSIS**

2.1 The Saturday, 28 May 2011, the Pilot-in-Command and Navigator (father and son team) participated on the second day of “The 2011 President's Trophy Air Race”, in a Cessna R182, registration ZS-KSZ. After take-off from Mafikeng International Airport and after the Morningside Farm turn, the accident aircraft was observed by a witness in another aircraft following ZS-KSZ, flying low up a valley and suddenly pitching up violently.

2.2 Another witness on the ground observed ZS-KSZ impacting high tension wires whilst flying low. The height of the high tension earth wire was 47.5 meters (155.8 feet) AGL. Witness marks on the vertical stabilizer indicated that the aircraft contacted the wires whilst flying at a height of approximately 44.82 meters (147 feet) AGL. Calculations established that the aircraft went in-between the upper earth wire and the lower high tension wires when the upper earth wire contacted the vertical stabilizer.

- 2.3 The rules of the event stated that crossing checkpoints, turning points or finish lines should not be flown below 200 feet AGL. The investigation is of the opinion that the crew of ZS-KSZ became fixated on the conquest and as a result failed to adhere to the minimum heights.
- 2.4 After the vertical stabilizer contacted the upper earth wire, the wire cut through it and into the rudder, ripping the rudder from the vertical stabilizer. The pulling force then pitch the nose of the aircraft upwards and the aircraft thereafter dropped to the right and went into a spiral dive. It then crashed into the side of the valley and burst into flames. The aircraft wreckage was destroyed by the post-impact fire and both occupants sustained fatal injuries.

### **3. CONCLUSION**

#### **3.1 Findings**

- 3.1.1 The aircraft had a valid Certificate of Airworthiness.
- 3.1.2 The maintenance records indicated that the aircraft was equipped and maintained in accordance with existing regulations and approved procedures.
- 3.1.4 There was no evidence of any defect or malfunction in the aircraft that could have contributed to the accident.
- 3.1.5 The aircraft was destroyed by impact forces and a post-impact fire.
- 3.1.6 The propeller exhibited damage indicative of the engine producing power at impact.
- 3.1.7 The pilot and navigator were properly licensed and held the appropriate rating for the aircraft.
- 3.1.8 The pilot was flying low and collided with the high tension wires.
- 3.1.9 The control of the aircraft was lost after it collided with the high tension wires.
- 3.1.10 The accident was not survivable due to the magnitude of the deceleration forces and the severity of the post-impact fire.

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

- 3.2.1 The aircraft collided with high tension wires, where after the pilot lost control and the aircraft impacted the ground.

#### **3.3 Contributory Factor**

- 3.3.1 Low flying.

**4. SAFETY RECOMMENDATIONS**

4.1 None considered necessary.

**5. APPENDICES**

5.1 None.

Compiled by:

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**For: Director of Civil Aviation**

Date: .....

Investigator-in-charge: .....

Date: .....

Co-Investigator: .....

Date: .....