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## AIR ACCIDENT INVESTIGATION

FACTUAL INCIDENT REPORT

5Y-BOP

31.07.2013

# CIVIL AIRCRAFT FACTUAL INCIDENT REPORT

CAV/INC/BOP/11

OPERATOR: SAFARILINK AVIATION LIMITED

OWNER: HDM AIR (PTY) LIMITED

AIRCRAFT: CESSNA 208B CARAVAN

REGISTRATION: 5Y-BOP

PLACE: MUSIARA AIRSTRIP - MASAI

MARA Co-ordinates 1°17'54.88"S 35° 3'53.08"

DATE: 08 SEPTEMBER 2011

TIME: 1405 hours

All times given in this report is Coordinated Universal Time (UTC)

East African Local Time is UTC plus 3 hours.

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## **ABBREVIATIONS**

<b>AAID</b>	-	Air Accident Investigation Department
<b>AIP</b>	-	Aeronautical Information Publication
<b>AMSL</b>	-	Above Mean Sea Level
<b>ATC</b>	-	Air Traffic Control
<b>ATPL</b>	-	Airline Transport Pilot License
<b>HKMZ</b>	-	ICAO Aerodrome Designation for Musiara Airstrip
<b>ICAO</b>	-	International Civil Aviation Organization
<b>KCAA</b>	-	Kenya Civil Aviation Authority
<b>POH</b>	-	Pilot Operating Handbook



## **SYNOPSIS**

The Air Accident Investigation Department was notified of an incident in Musiara Airstrip, Masai Mara, on the evening of 8 September 2011 by Safarilink Aviation Limited. An Investigation Team comprising officers from Air Accident Investigation Department (AAID) responded to the incident the following morning on 9 September 2011.

At 1405 hours on 8 September 2011, a Cessna 208B Caravan, of registration 5Y-BOP, operated by Safarilink Aviation Limited, collided with a Topi antelope on landing at runway 27 of Musiara Airstrip in Masai Mara. The aircraft was conducting a regular scheduled passenger flight from Nairobi to Masai Mara via Loldia and back to Nairobi. The aircraft was on its second last stop before returning to Nairobi.

There were 11 persons on board - 10 passengers and 1 crew member. There were no injuries reported as a result of the incident. The aircraft damage was concentrated on the propellers and the engine.





# **1. FACTUAL INFORMATION**

## **1.1. History of Flight**

The aircraft 5Y-BOP operated by Safarilink Aviation Limited departed Nairobi, Wilson Airport, on 08 September 2011 on a regular scheduled flight to Masai Mara via Loldia. The aircraft was scheduled to return to its Wilson Airport base the same day. The flight was divided into 5 sectors as follows: Wilson Airport – Loldia; Loldia – Mara Shikar; Mara Shikar – Musiara; Musiara – Kichwa Tembo; Kichwa Tembo – Wilson Airport.

The aircraft took off from Wilson Airport at 1200 hours and arrived in Loldia at 1256 hours. After a short ground time to drop and take passengers, the aircraft took off again at 1305 hours destined for Mara Shikar. It arrived forty minutes later and remained on ground for fifteen minutes before it took off for Musiara.

The flight to Musiara was uneventful and at 1400 hours prior to landing, the pilot reported that he inspected the airstrip for any hazards including animals before landing. The pilot also reported that vehicle drivers from Governor's Camp were on standby close to the threshold of runway 27 and were keeping off animals from getting closer to the runway. According to the pilot, the winds were favouring landing on runway 27, and he therefore approached and landed on the same runway. The aircraft landed safely at 1405 hours and as the pilot applied reverse thrust to decelerate, a Topi Antelope appeared ahead from the left side and was trying to cross to the right side of the runway. On noticing this, the pilot reported to have applied full brakes in an attempt to stop the aircraft and avoid possible collision with the animal. The animal was, however, hit by aircraft propeller on the rear side causing a stop to the propeller rotation. The aircraft came to a stop immediately thereafter. The pilot reported to have shut off the engine and secured the aircraft before evacuating the passengers. The aircraft was then towed to the parking area of the airstrip.

The propeller strike location was determined to be approximately 300 feet from the threshold of runway 27. Blood stains and animal remains were strewn over the propeller spinner and the underside of the left wing.

## 1.2. Injuries to persons

Injuries	Crew	Passengers	Others
Fatal	-	-	-
Serious	-	-	-
None	1	10	

## 1.3. Damage to Aircraft



The propeller blades were bent as a result of impact with the animal. The propeller hub was also damaged and back plate broken. The starter fan belt was dislodged as a result of the impact.

## 1.4. Other damage

None

## 1.5. Personnel Information

### The Captain

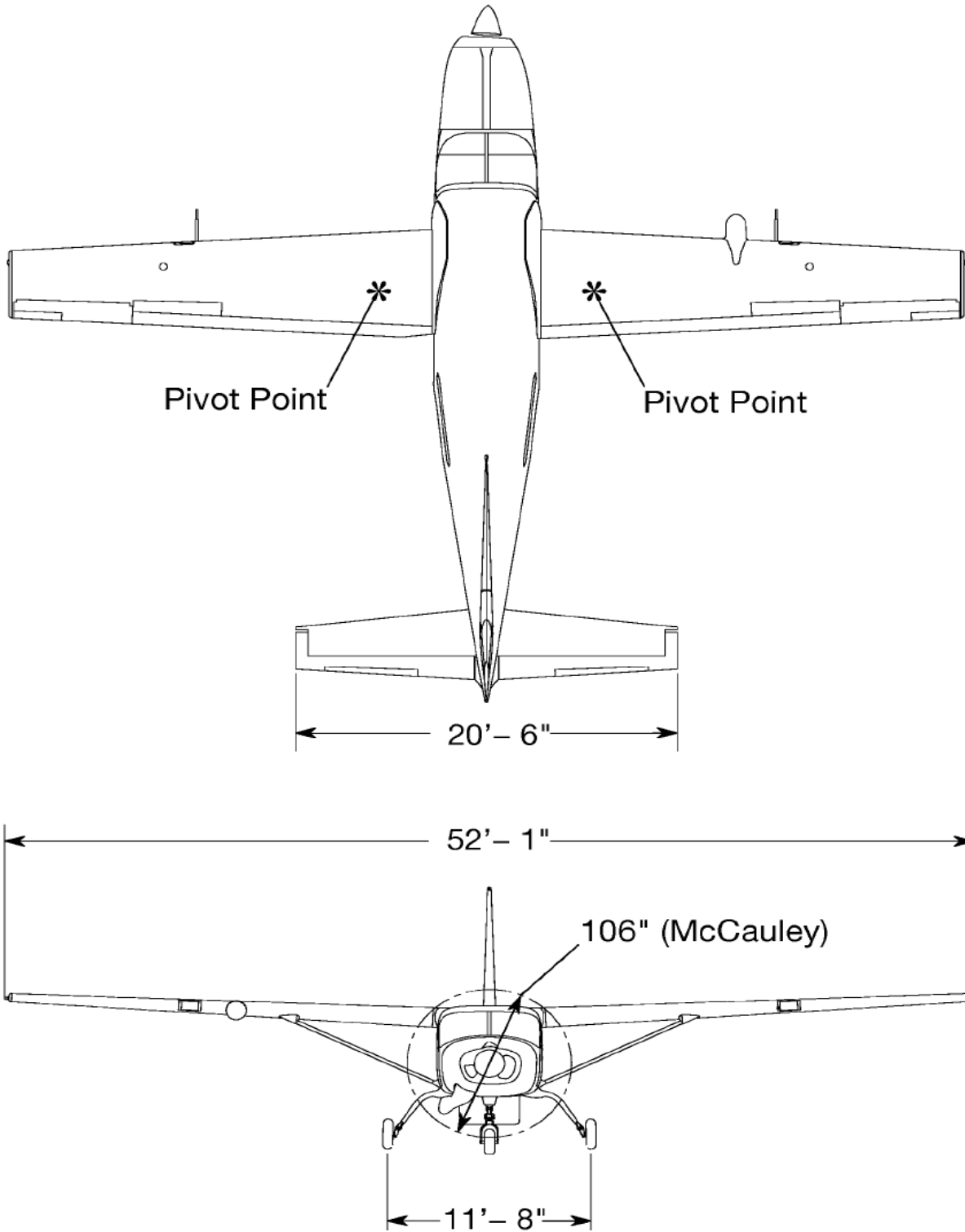
The captain, a Kenyan male aged 43 at the time of incident, held a valid Airline Transport Pilot License (ATPL No. YK-3033-AL issued on 4 July 2006 by Kenya Civil Aviation Authority. The ATPL had coverage for aeroplanes and was valid till 24 January 2012. The pilot also held a Multi-engine instrument rating. Records indicated that he had passed instrument rating renewal flight test on 17 June 2011.

The Captain also held a valid Flight Radio Telephony Operator's License № YK-3033-RL which was valid until 24 January 2013.

The Captain had a Cessna 208 type rating endorsed on his ATPL Group I.

Date of Birth/Age	14 February 1968
Sex	Male
Nationality	Kenyan
License No.	YK-3033-AL
Type of License	ATPL (Aeroplanes)
Validity of license	Valid till 24 January 2012
Ratings	Group I: Boeing 737; CRJ 100; ATR 42; Let 410 UVP-E9 & E20; Cessna 208; Group II: Boeing 767
Proficiency check	Instrument rating Renewal Flight Test on 17 June 2011.
Total hours	11,400
Hours on type	750
Duty Time	2 hours. Reported on duty at 1200 hours

## 1.6. Aircraft Information



**Cessna 208B Schematic Aerial and Front Views from the POH**

Manufacturer	Cessna Aircraft Company
Type	Cessna 208B
Year of Manufacture	2000
Aircraft Serial Number	0642
Number and type of engines	1 Pratt & Whitney PT6A-114A
Certificate of Registration	Kenyan registered since 11 July 2005
Certificate of Airworthiness	C of A renewed on 16 July 2011 and was valid until 15 July 2012.
Category	Commercial Air Transport (Passenger)

The aircraft was equipped with one Pratt and Whitney PT6A-114A turbo-propeller engine of serial № 17062. The aluminum-bladed McCauley propellers were constant-speed, full-feathering, reversible, and hydraulically-actuated of model № 3GFR34C703. The aircraft was being maintained at Phoenix Aviation Limited, a KCAA Approved Maintenance Organization. The aircraft Certificate of Release to Service was dated 06.09.2011. The aircraft condition at the time of incident was considered satisfactory and was not a factor in this investigation.

#### **1.6.1. Mass and Balance**

The aircraft mass and balance was not considered as a factor in this investigation.

#### **1.7. Meteorological Information**

According to the pilot, he had been informed of the wind conditions at Musiara Airstrip by a departing aircraft 5Y-HAA. According to this aircraft winds were favoring landing on runway 27. Visibility according to the pilot was better than 10KM with a very low cloud base. It was raining in patches.

According to the Airstrip Representative interviewed during the investigation, it was raining at the time of incident and they had sought cover at the parking area of the airstrip. He also indicated that it was getting dark at the time.

There is no weather station in the Masai Mara region and pilots flying to that destination would normally get weather forecast information from Wilson Airport

ATC prior to departure. Additional source of weather information is from other pilots flying in the area.

### **1.8. Aerodrome Information**

Musiara is an unmanned airstrip (ICAO designation HKMZ) located in Masai Mara approximately 200KM west of Nairobi at an elevation of 5174 feet AMSL. It is located at latitude 01° 17' 54.51" S and longitude 035° 03' 49.65" E. The airstrip runway 09/27 has dimensions of 1200×15 metres. The runway surface is dry bitumen and is restricted to light aircraft only.

The airstrip is not fenced and is located inside the Game Reserve. A variety of wild animals including antelopes, wildebeests, and bufaloes have unrestricted access to the airstrip.

### **1.9. Flight Recorders**

The aircraft was not equipped with either a Flight Data Recorder (FDR) or a Cockpit Voice Recorder (CVR) and neither was required.

### **1.10. Wreckage and Impact Information**

The aircraft structure remained intact after the incident except for the bending of propeller blades as a result of the animal strike. The propeller hub was damaged and the back plate broken. The starter fan belt was also dislodged.



### **1.11. Medical and Pathological Information**

No medical examination of the crew was conducted.

## **1.12. Fire**

There was no evidence of fire resulting from the incident

## **1.13. Survival Aspects**

Not applicable

## **1.14. Tests and Research**

None was conducted

## **1.15. Organizational and Management Information**

### **1.15.1. Safarilink Aviation Limited**

The company had been in existence for seven years as at the time of incident. It conducts scheduled passenger flights to various local tourist destinations including Masai Mara, Amboseli, Tsavo, Naivasha, Nanyuki, Lewa Downs, Samburu, Lamu, Kiwayu, Kilimanjaro, Shaba, Loisaba, Voi, and Diani.

According to the pilot, it was procedural for them to inspect the airstrip from the air for presence of animal hazards. This was done by conducting a go around procedure prior to landing. The pilot also indicated that the lodge was responsible for sending drivers to clear the runway. Drivers had been trained to clear the runways.

### **1.15.2. Governor's Camp**

Majority of passengers on the flight were visitors of Governor's Camp in Masai Mara. The Camp had organized their transport from the airstrip to the Camp by sending relevant vehicles.

According to the pilot and the Airstrip Representative, it was the responsibility of the drivers of Governor's camp to make sure that the Airstrip was clear of animals in preparation of aircraft landing. Pilots would normally call when visitors are expected at the camp for arrangements for picking the passengers are clearing the runway to be made. However, it was noted that some camps did not have radios for communication.

According to the Airstrip Representative, they arrived at the Airstrip from the Camp at 1300 hours to receive the guests arriving with 5Y-BOP. At this time the rains had not started but visibility was not very good. Two other aircraft had landed at the airstrip before 5Y-BOP. The Airstrip Representative indicated that

at about 1400 hours, it was raining and they had to stay inside the vehicles. They then saw animals on the runway and went back to chase them and clear the runway. Three people were assisting in clearing the runway.

### **1.15.3. Kenya Civil Aviation Authority**

According to the Aeronautical Information Publication (AIP) Amendment No 4 of December 2005 published by KCAA, Aerodromes in national Parks are made available for use by civil aircraft on the express condition that such use is entirely at the risk of the registered owner of the aircraft concerned and that the Government Authority of the National Parks will not be liable for loss or damage resulting from the use of the said aerodrome or their accessory facilities through among others obstruction by animals. The AIP was available to all operators. Ol Kejuado County Council was the Authority in charge of the Musiara Airstrip including the runway.

### **1.16. Additional Information**

None

### **1.17. Useful and Effective Investigative Techniques**

None

## **2. ANALYSIS**

The flight was being conducted into an unfenced airstrip inside the Masai Mara Game Reserve. Wild animals, therefore, had free access to the runway area and posed a safety hazard to aircraft landing in such airstrips. The Authority in charge of the Game Reserve including the airstrip was Ol Kejuado County Council. The operator, the Governor's Camp, and Ol Kejuado County Council were all aware of the hazard posed by wildlife incursion or obstruction of the runway. However, fencing of the airstrips had not been considered as an option of preventing wildlife incursion because it would interfere with the wildlife ecosystem.

The weather conditions at the time of incident were not favourable for landing at an airstrip with wildlife hazard. The pilot and the airstrip representative both stated that it was raining at the time of the incident. The airstrip representative also indicated that ground personnel responsible for clearing the runway had to take cover from the rain at the airstrip parking area. He also indicated that it was getting dark. The pilot, however, stated that visibility was better than 10 km. The investigation considers that, due to the rains and the poor visibility, the ground



personnel who were responsible for clearing the runway, did not fully ensure that the runway and its surroundings were free of wild animals. A Topi antelope, which was possibly asleep near the runway, was left unnoticed. As the aircraft made its final approach to land, the antelope was disturbed by the engine noise. As it tried to escape from danger, it collided with the aircraft which had just landed.

The operator and the camp management were aware of the danger posed by wildlife hazard to aircraft operation. Systems had been put in place to mitigate the risks associated with wildlife incursion. Pilots would normally do an aerial inspection of the runway to satisfy themselves that it was safe to land. They would do a go around procedure before landing. To complement the pilot aerial inspection, ground personnel from the hotel would normally be dispatched to clear the airstrip when aircraft landing is anticipated. The pilot indicated that the ground personnel were trained to clear the runways. The operator and the hotel would communicate in advance on the arrival time of aircraft to facilitate this arrangement. However, the operation of these defences under conditions of poor visibility and weather were not satisfactorily analyzed.

KCAA had indicated in the AIP that operation into airstrips in the National Parks was entirely at the risk of the operator or aircraft owner. In addition, the AIP had also indicated that the Authority responsible for the airstrips would not be liable for any loss or damage resulting from among other things, the obstruction by wild animals of the airstrips. The investigation noted that there were daily scheduled flights to Masai Mara from Nairobi and Mombasa. A number of other local operators fly this route. However, it was noted that there was lack of an adequate risk analysis mechanism by the operator on flights to the Masai Mara to identify and develop the best risk mitigating strategies to ensure safe flights.

The investigation also noted that there were no clear mechanisms developed by the operator to delegate the responsibility of clearing the airstrip of wild animals to the hotel. An informal arrangement was in place that drivers from the hotel are responsible for clearing the runway.

The operator strategies of mitigating the wildlife incursion risks were inadequate and did not address the issue of flights in conditions of poor visibility and bad weather when it would be difficult to satisfactorily clear the runway and the pilots may not have a clear aerial view of the airstrip. The operator did not have a reliable system of obtaining weather information in the Masai Mara.

### **3. CONCLUSIONS**

#### **Findings**

1. The Pilot held appropriate qualifications and experience as per KCAA regulations to fly the Cessna 208B aircraft.
2. The commercial flight was being conducted into an unfenced airstrip inside the Masai Mara Game Reserve with clear knowledge of the safety hazards posed by wildlife.
3. The airstrip had not been fenced because it would interfere with the wildlife natural environment and ecosystem.
4. Weather conditions and visibility were not favourable for landing at an airstrip with wildlife hazards at the time of incident.
5. The operator did not have a system of getting reliable weather information at the Masai Mara.
6. The operator was aware of the safety risks associated with operation into the airstrips and had developed some mitigating strategies which were not adequate.
7. KCAA had published in the AIP that aircraft operation into airstrips in the National Parks was entirely at the risk of the operator.
8. The operator had not established a comprehensive risk analysis system for flights into Masai Mara Airstrips.
9. The operator had not developed a clear mechanism delegating the responsibility of clearing the airstrip of wildlife to the hotels receiving guests through their flights.

### **4. SAFETY RECOMMENDATIONS**

1. KCAA should ensure that all airstrips handling commercial transport aeroplanes in the National Parks and Game Reserves are fenced as the best mitigating strategy against the risk of wildlife incursion.
2. KCAA should ensure that all operators flying to the National Parks and Game Reserves develop a comprehensive system of risk analysis in their SMS programs for conducting flights to unfenced airstrips in these areas.

3. The operator should develop a formal agreement delegating the responsibility of clearing the airstrip runways of wildlife to the hotels. Alternatively, the operator may have its own ground personnel responsible for clearing the runway.

## **APPENDICES**

**Appendix I – Masai Mara Map**

**Appendix II – Google Map of the incident location**

**Appendix III – The Topi Antelope**

**Appendix IV – Aircraft Photographs**

**Masai Mara Map**



**Incident Location on Musiara Airstrip**



**The Topi Antelope at Musiara Airstrip**



**Aircraft Photographs**











