SOUTH AFRICAN CIVIL AVIATION AUTHORITY

Section/division **Accident and Incident Investigations Division** Form Number: CA 12-57

LIMITED ACCIDENT INVESTIGATION REPORT

Reference Number	CA18/2/3/10113								
Classification	Accident	**Date**	8 February 2022		**Time**	0900Z			
Type of Operation	Aerial Survey (Part 135)								
Location									
Place of Departure	Kitty Hawk Aerodrome (FAKT)		Place of Intended Landing		Kitty Hawk Aerodrome (FAKT)				
Place of Accident	Farm near Matla Power Station								
GPS Co-ordinates	Latitude	S26º19'31.5"	Longitude	E029°07'01.6"	Elevation	1 606ft			
Aircraft Information									
Registration	ZS-SYW								
Make/Model	Cessna U206G (Serial Number: U206-06056)								
Damage to Aircraft	Substantial		Total Aircraft Hours		5 047.7 hobs				
Pilot-in-command									
Licence Valid	Yes	Gender	Female		Age	45			
Licence Type	Commercial Pilot Licence (Aeroplane)								
Total Hours on Type	966.1		Total Flying Hours		6 757.5				
People On-board	1+1	Injuries	0	Fatalities	0	Other (On Ground)	0		

What Happened

On the morning of 8 February 2022, a pilot accompanied by a camera operator on-board a Cessna aircraft with registration ZS-SYW took off on a survey flight from Kitty Hawk Aerodrome (FAKT) in Gauteng province to Matla Power Station in Mpumalanga province. The planned survey of power lines stretched from Matla Power Station to O.R. Tambo International Airport (FAOR) area. Visual meteorological conditions (VMC) by day prevailed at the time and the flight plan was filed with Johannesburg Briefing; reference number 992 was allocated, and the flight was issued central airspace management unit (CAMU) clearance numbers GN01021 and GN01022. The aerial survey flight was conducted under the provisions of Part 135 of the Civil Aviation Regulations (CAR) 2011 as amended. The pilot stated that after a meeting with the camera operator at the office located in Hatfield, Pretoria, they both travelled by road to FAKT where the aircraft was based. On arrival at FAKT, the pilot conducted a pre-flight inspection; no anomalies were found. The pilot then drew fuel samples from the aircraft and stored them in the hangar as per the standard operating procedures (SOP).

The previous day (7 February 2022), the pilot and the camera operator had surveyed part of the high-level power lines near Matla Power Station; and on 8 February 2022, they were to continue inspecting the remainder of the power lines that were closer to FAOR.

Prior to departure for the power lines survey on 8 February 2022, the pilot contacted CAMU and spoke to the radar controller to confirm their flight level 090 (FL090) in their airspace as the operation was very close to FAOR. According to the pilot, they took off from FAKT at 0544Z to Matla Power Station. The pilot stated that she had selected the left fuel tank containing 170 litres of Avgas fuel at the start of the flight. (*Each tank contained 170 litres of Avgas fuel*). The pair commenced with the higher survey flight (away from Matla Power Station), and after about an hour, lower clouds started forming below the altitude of the aircraft at 8000 feet (ft), making it difficult for the camera operator to take clear pictures; therefore, the pilot elected to conduct a low survey flight. Because they did not continue with the high-level survey (they had only flown for an hour), she had sufficient fuel to do a low-level survey flight, and thus, decided not to land for fuel uplift as per her fuel management plan. The pilot then switched the fuel selector from the left- to the right-side tank and continued with the flight for another hour. Thereafter, she alternated from the right- to the left-side tank at every 30 minutes.

During the power line survey which started in the Special Rules Area to the terminal manoeuvring area (TMA) near FAOR, the pilot contacted Johannesburg Information South on 119.5-Megahertz (MHz) frequency to request the survey altitude between FL065 to FL070. The pilot was then requested to report “operations” normal every 30 minutes.

The pilot continued to survey the power lines over Matla Power Station. At this point, she had the left fuel tank selected; she then used the “EasyCockpit” software tool to prepare information for Secunda as well as to check the route to Secunda Airport to refuel. At approximately 0850Z whilst on the second last power line surveyed in the area, and whilst flying over the power station, the pilot experienced a severe updraft from the heat expelled by the smokestacks, however, the aircraft was not negatively affected. The pilot stated that she was to call “ops normal” at 0900Z to inform Johannesburg Information South that she would be routing to Secunda Airport (FASC) for refuelling before returning to the survey area.

Whilst preparing for the next survey line, she stated that she changed the tank from the left- to the right-side which contained more fuel at the time so that she could route to Secunda. She turned out, selected the last line and flew back over Matla Power Station at an altitude of 7200ft (1800ft above ground level). The pilot stated that as she picked up the survey power line at the far side of the power station, the aircraft experienced a total loss of engine power. The pilot then carried out the emergency procedure for engine restart in-flight. When this failed, she elected to execute a forced landing on a private farm (field) which had overgrown grass that concealed holes on the

ground. The pilot and the camera operator were not injured during the forced landing, and the aircraft was substantially damaged.

Figure 1: The aircraft as it came to rest. (Source: Pilot)

During the interview with the investigator, the pilot commented that conducting a survey of power lines requires high concentration, and it was not possible for one to change tanks while surveying power lines as one was unable to maintain an exact altitude, speed and direction which was required when undertaking this task. The pilot further commented that once a line was completed, she would look out for other aircraft and obstacles, change tanks or operate the radio or the "EasyCockpit/GPS" on the Tablet, before turning to survey the next power line. This meant that changing tanks was not done exactly every 30 minutes as per fuel management plan. She stated that the fuel tank change would be done between 5 to 10 minutes earlier or later than the set time.

What was found

- Upon inspection of the aircraft on-site by the aircraft maintenance organisation (AMO), it was found that the left-side tank had 250 millilitres of fuel remaining and the right-side tank had approximately 50 litres of fuel, of which 7.5 litres was unusable. The AMO also tested the engine-driven fuel pump whilst on-site, and it was found to be serviceable. The fuel distribution point (the spider) was inspected and was found dry.

- Once the aircraft was recovered, it was taken to the AMO where the engine was removed and sent to an engine shop for inspection and testing. After the engine was dismantled and inspected, its parts were tested, and they were found to be serviceable. The fuel system was then put on a testbench to be tested separately, and it was found to be serviceable.

Figure 2: The engine whilst at the engine shop for inspection.

- The pilot had 6 757.5 total hours, 966.1 hours on type and 91.7 hours on surveying. The pilot had explained that the survey operation was intense. Moreover, she had not flown the power lines survey type of operation previously. The pilot also stated that she was not always able to follow the exact times for fuel tank changes because of (high) workload in the cockpit.

- According to the pilot, when the aircraft experienced a total loss of power, the aircraft was 5 nautical miles (nm) south-west of Kriel Airfield (FAKL) (Figure 3) and 1nm south-west of Matla Power Station (Figure 4).

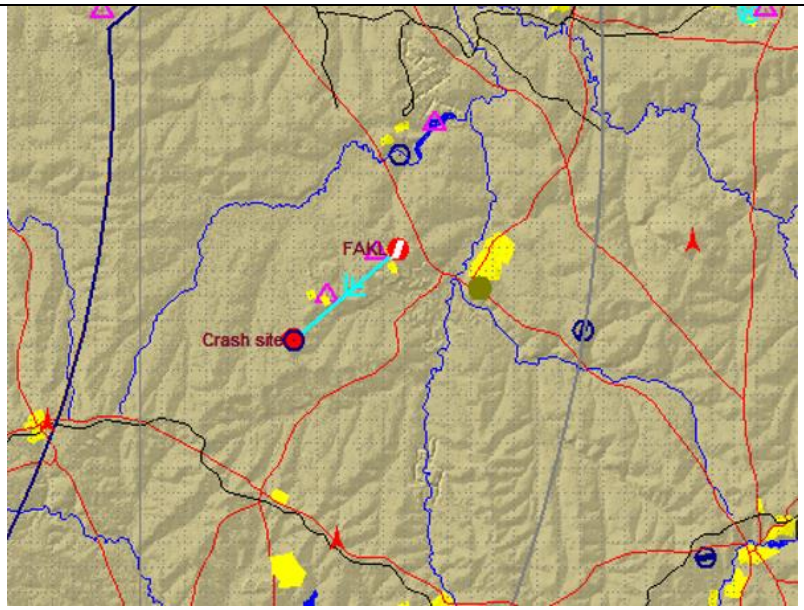

Figure 3: The position of the aircraft south-west of FAKL. (Source: Pilot)

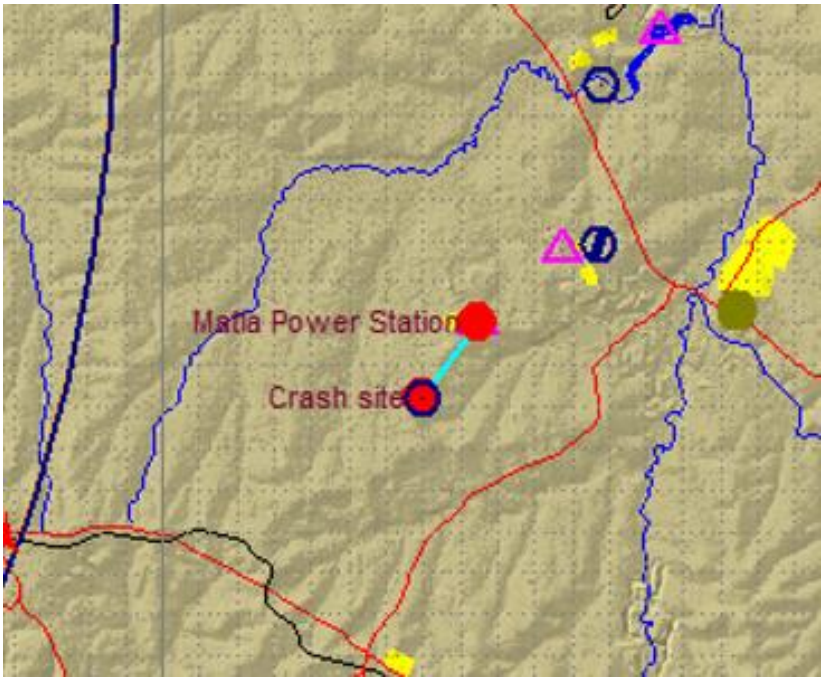

Figure 4: The position of the aircraft 1nm south-west of Matla power station. (Source: Pilot)

- The last maintenance inspection prior to the accident flight was carried out on 2 February 2022 at 5026.10 Hobbs hours. The aircraft was issued a Certificate of Release to Service (CoRS) on 2 February 2022 with an expiry date of 1 February 2023 or at 5126.10 Hobbs hours, whichever occurs first. The aircraft was flown 21.6 Hobbs hours after the last inspection.

- The flight was conducted under the provisions of Part 135 of the Civil Aviation Regulations (CAR) 2011 as amended. The operator was issued an Operating Certificate by SACAA on 31 March 2021 with an expiry date of 31 March 2022.

- During a power line survey, the pilot is required to fly a straight line without any variations on attitude or altitude. The pilot is also required to make the necessary radio calls and keep a vigilant look out for other aircraft as well. This translates to a high workload in the cockpit for one pilot to carry out during flight.

Probable cause:

The engine stopped in-flight as a result of fuel starvation, causing the pilot to execute a forced landing on an unprepared field (with overgrown grass concealing holes on the ground).

Contributing factor:

Fuel mismanagement.

Safety Actions

None.

Safety Recommendation

1. In the interest of safety, a recommendation to the DCA is to investigate the possibility to have operations such as the power line surveys to be a two-crew operation.

2. In the interest of safety, a recommendation to operators is to consider a two-crew operation for operations such as power line surveys which, in this case, resulted in an accident.

Purpose of the Investigation

In terms of Regulation 12.03.1 of the Civil Aviation Regulations (CAR) 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 apportion blame or liability****.*

About this Report

Decisions regarding whether to investigate, and the scope of an investigation are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, no investigation has been conducted, and the Accident and Incident Investigations Division (AIID) has relied on the information submitted by the affected person/s and organisation/s to compile this brief report. The report has been compiled using information supplied in the initial notification, as well as follow-up information to bring awareness of potential safety issues to the industry in respect of this occurrence, as well as possible safety action/s that the industry might want to consider in preventing a recurrence of a similar accident.

This report provides an opportunity to share safety message/s in the absence of an investigation.

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.

Disclaimer	
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This report is issued by:

Accident and Incident Investigations Division
South African Civil Aviation Authority
Republic of South Africa