AIRCRAFT ACCIDENT SHORT REPORT

CA18/3/2/1257: The aircraft was forced landed on a dirt road due to fuel mismanagement.

Date and time	**:**26 April 2019, 0700Z
Aircraft registration	**:**ZU-DLW
Aircraft manufacturer and model	**:**Beech Aircraft Corporation, Beech A35 (Veteran)
Last point of departure	**:**Wesselsbron Aerodrome (FAWS), Free State Province
Next point of intended landing	**:**Wesselsbron Aerodrome (FAWS), Free State Province
Location of accident site with reference to easily defined geographical points (GPS readings)	**:**GPS co-ordinates S28°0'59.20" E026°18'9.36"
Meteorological information	**:**Surface wind: 360° at 2kts, temperature: 14°C, dew point: 10°C, QNH: 1022, CAVOK
Type of operation	**:**Private (Part 94)
Persons on-board	**:**1 + 2
Injuries	**:**None
Damage to aircraft	**:**Substantial

All times given in this report are Coordinated 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 apportion blame or liability.***

Disclaimer:

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1. SYNOPSIS

1.1 On 26 April 2019, the pilot and two passengers on-board the aircraft took off on a private flight from Wesselsbron Aerodrome (FAWS) in the Free State province to a farm 10 nautical miles (nm) south of the aerodrome. The occupants were assessing the damage on the farm after a heavy rainfall a few days prior.

1.2 The pilot stated that 18 minutes into the flight and while overhead the farm, the engine suddenly stopped, however, there was no indication of malfunction on the instrument panel in the cockpit. The pilot attempted to re-start the engine by putting the auxiliary fuel pump on and changing the position of the fuel tanks selector from left to right, however, the engine did not respond. The pilot then scanned the area for a suitable place to perform a forced landing. She identified S91 dirt road as ideal for a forced landing as the road was straight. The aircraft touched down and rolled on the ground for a few metres before the left wheel got caught in a muddy hole, resulting in the aircraft veering off to the left of the road. The nose gear collapsed and the propeller struck the ground.

1.3 The aircraft was substantially damaged, however, the occupants were not injured.

1.4 The investigation revealed that the aircraft's engine stopped during cruise due to fuel starvation caused by the delay in changing fuel tanks selector from left to right.

2 FACTUAL INFORMATION

2.1 On 26 April 2019, a Beech A35 (veteran) aircraft with registration marking ZU-DLW, took off on Runway 01 in Wesselsbron Aerodrome (FAWS) on a private flight to a farm 10nm south of the aerodrome.

2.2 The pilot stated that 18 minutes into the flight and while overhead the farm, the engine suddenly stopped, however, there was no indication of malfunction on the instrument panel in the cockpit. The pilot attempted to re-start the engine by putting the auxiliary fuel pump on and changing the position of the fuel tanks selector from left to right, however, the engine did not respond. The pilot scanned the area for a suitable place to perform a forced landing. She identified S91 dirt road as ideal for a forced landing as the road was straight.

The first part of the landing was uneventful until the left undercarriage got caught in a muddy hole, resulting in the aircraft veering off to the left of the road. The nose undercarriage collapsed and the propeller struck the ground.

2.3 The accident occurred during daylight conditions at Global Positioning System (GPS) determined to be S28°0’59.20” E026°18’37.89” at an elevation of 4 212 feet (ft) above mean sea level (AMSL).

Figure 1: The aircraft as it came to rest with the blade lodged under the nose section.

2.4 Post-accident inspection revealed that one propeller blade was not damaged, but the other propeller blade was bent towards the hub and the nose gear collapsed. Figure 1 shows the blade that was lodged under the nose section while the other blade was not damaged.

Figure 2: The condition of propeller blades as they were recovered from the accident site.

2.5 The aircraft had flown 12.8 hours from its last annual inspection prior to the accident. On 6 June 2018, the spark plugs were inspected, the oil filter was inspected and cleaned, the oil cooler was removed and cleaned, the starter motor cable was replaced and the oil pressure transducer and the oil pressure gauge were replaced.

2.6 The aircraft uplifted 63 litres of aviation fuel (AVGAS) on 24 April 2019 and had a total of 190 litres on-board. The aircraft was flown 2.1 hours from the day it was refuelled until the time of accident. The aircraft maintenance engineer (AME) recovered approximately 80 litres (21.0 gallons) of fuel from the right tank and approximately 10 litres (2.6 gallons) from the left tank of the aircraft after the accident. The aircraft's fuel selector was selected to the right tank upon recovery of the aircraft.

2.6.1 The Beechcraft Bonanza's pilot operating handbook (POH):

Fuel standard system total capacity is 189L (50 US gal) and total usable 166L (44 US gal) which is 83L useable fuel per tank, therefore the unusable fuel is 22L (6 US gal). According to the cruise power setting table, the fuel flow should have been 50L/h (13.3 US gal/h).

2.7 The aircraft flew 2.1 hours since the last refueling and it had full tanks, the engine would consume 50L/h (13.3 US gal/h) thus in 2.1 hours it would have consumed 105L (28 US gal).

2.8 In-flight fuel management encompasses verification, utilization, monitoring, recording and reconciliation of the fuel loaded on the aircraft. At all stages of flight, the flight crew must be vigilant regarding their fuel state. Complacency could result in the late determination of a fuel consumption. In the worst case, poor in-flight fuel management can lead to fuel exhaustion and forced landing with the potential of the loss of aircraft and loss of life. www.skybrary.aero

Whenever you are changing tanks in flight, the electric fuel pump should be switched on just before switching tanks and left on for a short period of time afterwards, 30 seconds should be enough. This is done so that any air in the fuel line from the other tank is purged. Never run a tank dry before switching as this could introduce air into the fuel lines. Some engines have trouble restarting when air gets into the system. www.skybrary.aero. Note that the tanks were switched/changed after the engine had stopped.

2.9 Post-accident inspection of the aircraft was conducted by the AME who recovered the aircraft. The AME stated that he discovered that the left fuel tank vent system was blocked by what seemed like insect nest deposits. The AME then flushed the system with compressed air to clear it (Figure 3).

Pre-flight inspection of the Beechcraft Bonanza's POH states the following:
Left landing gear:

a. Wheel well door, tire and strut - Check
b. Fuel vent - Check
c. Fuel Sump – Drain
d. Fuel Selector Valve Sump – Drain, Cover, Secure

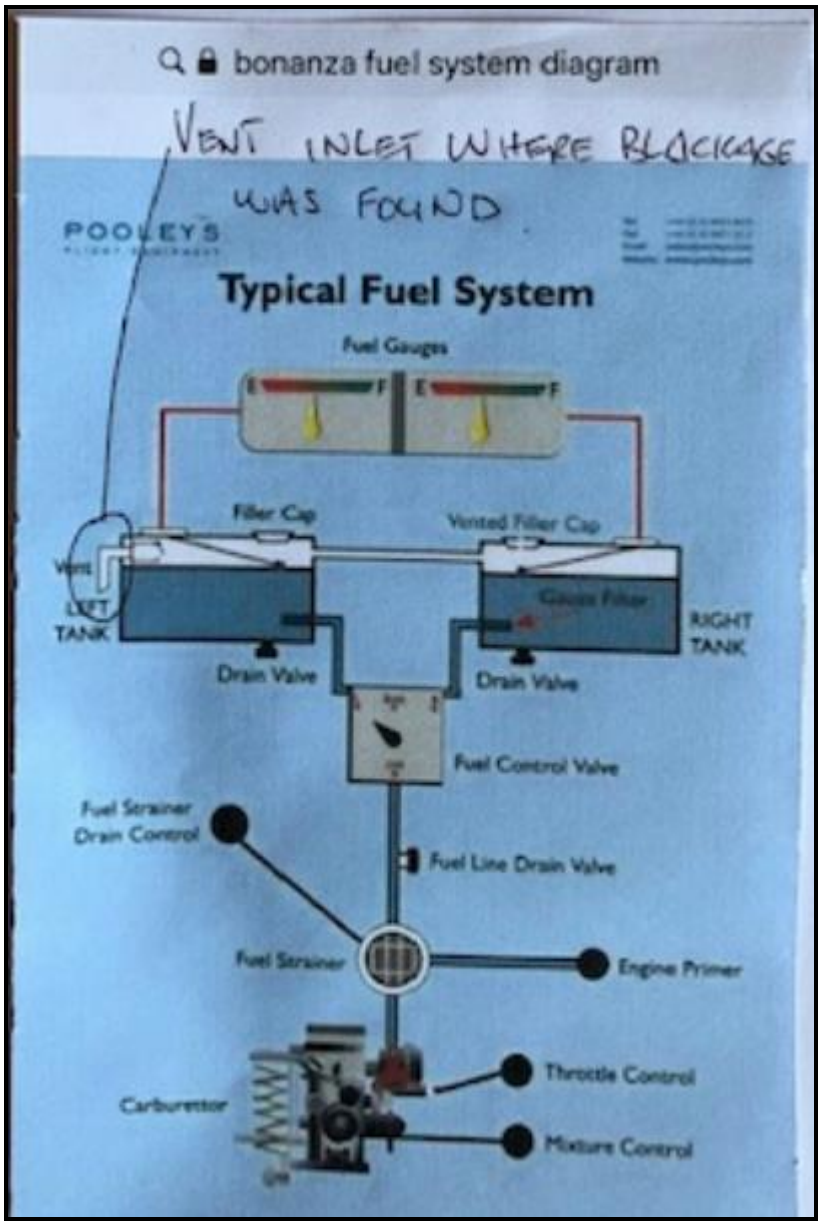

Figure 3: Schematic of the Beechcraft A35 fuel system.

3 Findings:

3.1 The pilot had been issued with a Commercial Pilot Licence (CPL) on 16 November 2018 with an expiry date of 30 November 2019. The pilot conducted her last commercial and instrument flight check on 16 November 2018. The pilot had 1902.0 total hours and 17.3 hours on type. The aircraft type was endorsed on her licence.

3.2 The pilot's aviation medical certificate had been issued without any restrictions on 15 June 2018 with an expiry date of 30 June 2019.

3.3 The last annual inspection was carried out on 6 November 2018 at 316.1 airframe hours.

3.4 The aircraft had a total of 328.9 airframe hours at the time of the accident and had flown 12.8 hours since its last inspection.

3.5 The aircraft had been issued with an authority to fly on 7 November 2018 with an expiry date of 5 November 2019.

3.6 The flight was conducted under visual flight rules (VFR) by day.

3.7 The weather at the time of the accident was: wind 360°2KT, temperature 14°C, dew point 10°C, query nautical height (QNH): 1022, ceiling and visibility OK (CAVOK).

3.8 Only one propeller blade was damaged during the accident sequence (when the propeller struck the ground), an indication that the engine was not functioning when the accident occurred.

3.9 The aircraft type POH also states that the aircraft's unusable fuel is 6 gallons and the AME recovered 2.6 gallons from the left fuel tank. By the time the pilot had attempted to change the fuel selector from left to right fuel tank, the fuel in the left tank was below the level of unusable fuel.

3.11 The investigation revealed that the aircraft's engine stopped during flight due to fuel starvation caused by the delay in changing fuel tanks selector from left to right.

4 PROBABLE CAUSE/CONTRIBUTING FACTOR

4.1 The aircraft's engine stopped during flight due to fuel starvation caused by the delay in changing fuel tanks selector from left to right.

4.2 Contributory Factors

4.2.1 Lack of monitoring

4.2.2 Poor flight planning

5 REFERENCES USED IN THE REPORT

5.1 Beechcraft Bonanza Pilot Operating Handbook

5.2 www.skybrary.aero

6 SAFETY RECOMMENDATION

6.1 None.