

Safety Investigation Report

Ref. AAIU-2014-8

Classification:	Accident
Level of investigation:	Standard
Date and hour:	17 May 2014 at 11:50 UTC
Aircraft:	Cessna 152. The aircraft was registered in Belgium and held a Certificate of Airworthiness and a valid Airworthiness Review Certificate (ARC)
Total flight time:	7674:27 FH
Type of engine:	One Lycoming O-235-N2C, s/n L-15050-15
Accident location:	Coal tip, E of EBZW airfield
Type of flight:	Cross-country
Phase:	Landing
Persons on board:	2 pilots.
Injuries:	None

Abstract

Upon reaching the destination airfield after a navigation flight, the engine of a Cessna 152 airplane coughed, and stopped working. The airplane was damaged as a result of the emergency landing.

The two pilots climbed out the airplane, uninjured

Cause

The cause of the accident is the engine failure due to fuel starvation.

Contributing factors:

The poor reliability of fuel gauges.

Recommendations:

None

Hazard identified during the investigation ¹:

- Emergency landing

Consequence ²:

Damage to the aircraft

¹ Hazard – Condition or object with the potential of causing injuries to personnel, damage to equipment or structures, loss of material, or reduction of ability to perform a prescribed function.

² Consequence – Potential outcome(s) of the hazard

Factual Information

History of the flight

The two pilots rented an aircraft for performing a navigation flight from EBZW to EBUL via Zeeland in the Netherlands, and back to EBZW after a stopover in EBUL. A flight plan was filed.

The navigation planning was performed a week before.

On the day of the flight, the pilot made the flight preparation, and fuelled the aircraft. The fuel tanks were filled, and consulting the POH, found the airplane had an autonomy of 4 hours of flight.

The flight to EBUL, including the detour in the Netherlands, lasted 2 hours. For the return flight from EBUL to EBZW, the two PPL pilots switched seats. The flight route was EBUL – Ninove – Ronquières – Longchamps – Waremme – Kleine Spouwen – Tongeren – EBZW. The airplane took off from EBUL at 12:22.

The pilot was in contact with Brussels info. The airplane flew at an altitude of 1200 – 1400 ft, with an indicated airspeed of 80 – 90kts, the engine was running at 2200-2300 rpm.

The wind direction changed somewhat during flight, with a strong headwind component; the pilot had to correct the drift.

Above Waremme, the pilot checked the fuel quantity indicators, LH tank indicated $\frac{1}{4}$ full; RH Tank between $\frac{1}{2}$ - $\frac{1}{4}$ full. Both pilots conferred and decided to continue towards EBZW as they were confident there was sufficient fuel available after 3 hours of flight.

The headwind increased and became turbulent. The PIC had some thoughts about deviating to EBST or EBLG for refuel. However, due to time constraint – the airplane was booked by other pilots – they decide to fly straight towards EBZW, without going via Kleine Spuwen-Tongeren, as previously foreseen.

The PIC left the Brussels info frequency; the airplane was 5NM SE of EBZW, and wanted to contact EBZW on the radio. The pilot recalled the fuel quantity indicators showed:

- LH Tank between 0 – $\frac{1}{4}$ full
- RH Tank $\frac{1}{4}$ full.

The airplane went into the landing pattern at 1200 ft. At that time, the engine starting coughing. Engine rpm was 2300 rpm, at an indicated airspeed of 95kts. The pilot tried unsuccessfully to revive the engine (pumping with the throttle). The airplane lost altitude, and the pilot realized he could not land on the runway. The engine stopped.

The pilot selected a zone for an emergency landing, and proceeded to the landing.

The landing was normal, but at the end of the landing roll, the nose wheel fell into a ditch, and broke off.

The two pilots climbed out the airplane, uninjured. A passer-by came to their rescue, and noticed an evident fuel odour.



Fig.1. the airplane



Fig.2 airplane NLG damage

Airfield information

The Zwartberg airfield (EBZW) is located 5km North of the city of Genk. It features a 799m long asphalt runway. Its orientation is 034°/214°.

The location is N51 00.9 E005 31.6

The pattern of the airfield is as depicted in Fig.3, and features limitations due to the proximity of a military zone to the North, and noise abatement rules.

Geography around the airfield

Genk is a former coal mining region, and there are coal mine spoil tips remaining from these times. The Waterschei coal tip is close to the flight pattern.



Fig.3: EBZW airfield pattern



Fig. 4 The EBZW airfield and surrounding coal tip

Pilot information

Pilot 1

Aged 67, PPL Licence, first issued (Belgian PPL) 12/11/1970, last issued 18/3/2014, valid until 30/4/2016

Rating SEP(land), Towing

Total FH: 1594 FH on airplane, 2160 FH on sailplanes

C152 experience: 70FH

Pilot 2

Aged 65, PPL Licence first issued 9/7/1985, last issued 27/6/2013, valid until 30/6/2015.

Rating SEP(land)

Total FH : 800FH

C152: 33FH

Meteorological information

Temperature: 20°C, Wind: 030° 10 knots, Visibility +10 km and QNH: 1029 hPa.

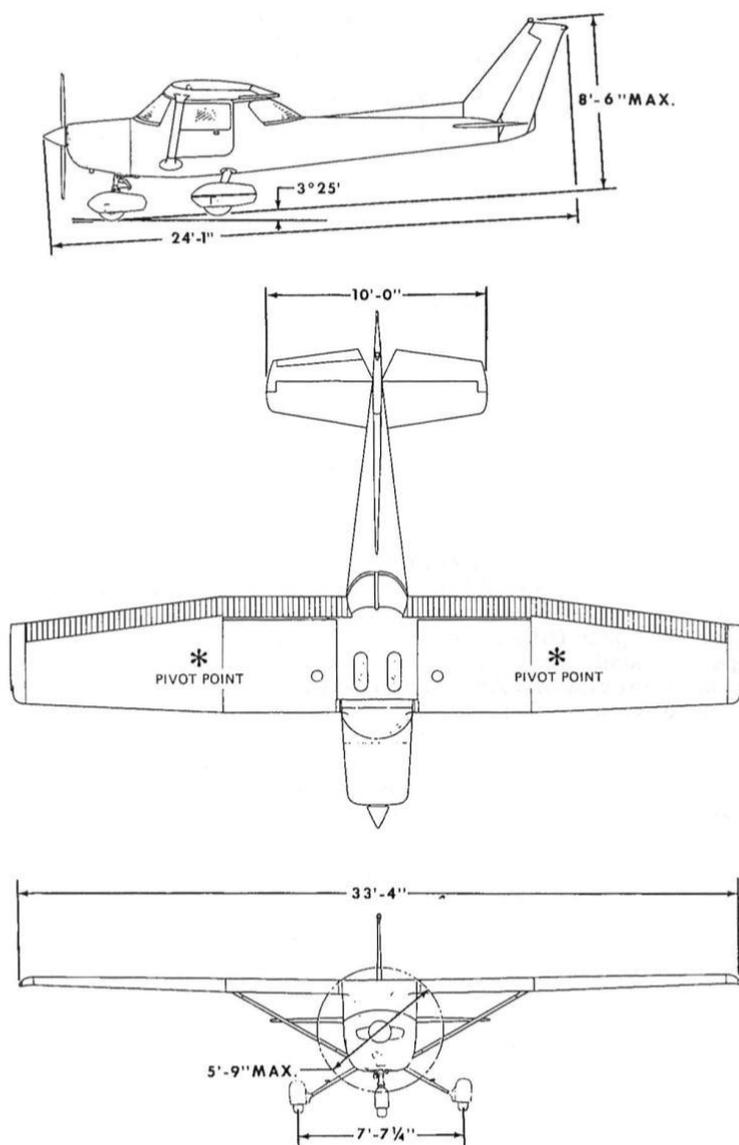
Damage

The Nose landing gear was damaged, and the fuselage structure bent.

Aircraft information:

General description.

The Cessna 152 is an all-metal high-wing two seat aircraft widely used as a trainer. It was introduced in 1978 as a successor of the popular 150. The airplane type was built in the Cessna factory in Wichita, Kansas, and also by Reims Aviation of France (with the designation F152/FA152). Production was ended in 1985. The F152 is approved by FAA under Type Certificate No. A13EU.



Characteristics:

Crew: 2
Length: 7,34 m
Height: 2,59 m
Wingspan: 10,16 m
Fuel: two tanks of 13 US gallons (49l) each – Avgas

Performance (from the 'Pilot's Operating Handbook'):

Maximum speed V_{NO} : 111 KIAS
Cruise speed V_C : 107 KIAS, 75% power at 8000'
Stall speed V_S : 40 KIAS
Cruising range: 350 nm, 75% power at 8000'
Service ceiling: 14,700 ft
Fuel consumption: 23 l/h (6,1 US gallon) at 75% power at 2000'

Airframe

Cessna Aircraft Company
Manufacturer: Reims Aviation
Type: Cessna F152
Serial number: 15281455
Built year: 1978
Total flight hours: 7674 :27 hours
Certificate of Registration issued on September 2000 by the BCAA
Certificate of Airworthiness: last issued on August 22, 2008
Airworthiness Review Certificate:, last issued on August 23, 2013, valid until August 24, 2014.

Engine.

Manufacturer: Lycoming
Type: O-235-N2C
Serial number: L-15050-15
Total flight hours: 4985 :59 hours
Total flight hours since O/H: 1478 :53 hours

Fuel system

The aircraft is equipped with 2 standard vented aluminium tanks of 13 US Gal each, one in each wing. The system is gravity fed and both tanks supply fuel to a common line with a fuel shutoff valve which has an 'ON/OFF' selection. When the valve is in the ON position, fuel flows through a fuel strainer to the carburettor. Each tank has 0,75 US Gal unusable fuel what makes that the total fuel volume available for all flight conditions is 24,5 US Gal (92,73l).

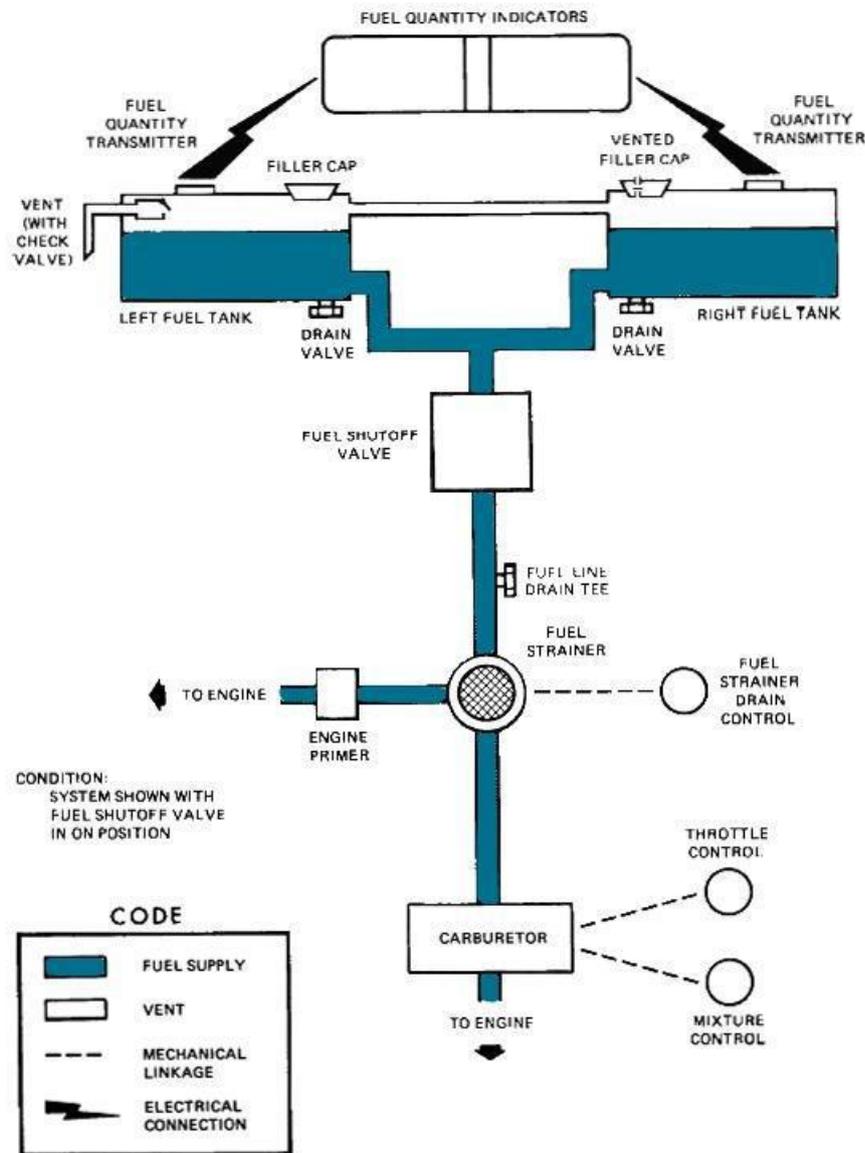


Figure 5: Fuel system

As there is no fuel pump, venting is essential to the system operation. This is accomplished by a crossover line connecting the right fuel tank with the left fuel tank. The left tank is vented via a vent tube protruding into the airstream. This tube is fitted with a check valve to prevent fuel spillage. The tank filler cap of the right tank is also vented.

As stated in the POH in section 2 on page 2-7, the tanks should be re-topped after each refuelling to assure maximum capacity due to the cross-feeding between the fuel tanks.

Fuelling

The pilots stated they filled the tanks fully. The airplane was re-fueled with 32.5l

After the event, only 7 liters of fuel were remaining in the wing tanks, and the fuel supply lines to the engine were empty.

Analysis

From the fuel quantity found remaining in the fuel tanks after the event, we can assume the engine stopped due to fuel starvation.

During flight preparation, the pilots assumed they filled the tanks, however, there was no dip stick check performed to ensure both tanks were indeed full, and no intermediate check prior to the return flight leg (from EBUL to EBZW). The fuel management in flight relied mostly on the fuel gages indication.

The emergency landing is a mere consequence of the engine failure, and the selected terrain for the landing looked flat from above, but featured obstacles, ditches, that caused the damages.

Conclusion

The accident was caused by fuel starvation.

Contributing factors:

The poor reliability of fuel gauges.

Recommendation.

None.

About this report

As per Annex 13 and EU regulation EU 996/2010, each safety investigation shall be concluded with a report in a form appropriate to the type and seriousness of the accident and serious incident. For this occurrence, a limited-scope, fact-gathering investigation and analysis was conducted in order to produce a short summary report.

It is not the purpose of the Air Accident Investigation Unit to apportion blame or liability. The sole objective of the investigation and the reports produced is the determination of the causes, and, where appropriate define recommendations in order to prevent future accidents and incidents.