



National Transportation Safety Board Aviation Accident Final Report

Location:	Colton, New York	Accident Number:	ERA17FA172
Date & Time:	May 3, 2017, 20:30 Local	Registration:	C-GQAM
Aircraft:	Piper PA31	Aircraft Damage:	Destroyed
Defining Event:	Miscellaneous/other	Injuries:	1 Fatal
Flight Conducted Under:	Non-U.S., commercial		

Analysis

The commercial pilot departed on a planned 1-hour cargo cross-country flight in the autopilot-equipped airplane. About 3 minutes after departure, the controller instructed the pilot to fly direct to the destination airport at 2,000 ft mean sea level (msl). The pilot acknowledged the clearance, and there were no further radio transmissions from the airplane. The airplane continued flying past the destination airport in straight-and-level flight at 2,100 ft msl, consistent with the airplane operating under autopilot control, until it was about 100 miles beyond the destination airport.

A witness near the accident site watched the airplane fly over at a low altitude, heard three "pops" come from the airplane, and then saw it bank to the left and begin to descend. The airplane continued in the descending left turn until he lost sight of it as it dropped below the horizon.

The airplane impacted trees in about a 45° left bank and a level pitch attitude and came to rest in a heavily wooded area. The airplane sustained extensive thermal damage from a postcrash fire; however, examination of the remaining portions of the airframe, flight controls, engines, and engine accessories revealed no evidence of preimpact failure or malfunction. The fuel selector valves were found on the outboard tanks, which was in accordance with the normal cruise procedures in the pilot's operating handbook. Calculations based on the airplane's flight records and the fuel consumption information in the engine manual indicated that, at departure, the outboard tanks of the airplane contained sufficient fuel for about 1 hour 10 minutes of flight. The airplane had been flying for about 1 hour 15 minutes when the accident occurred. Therefore, it is likely that the fuel in the outboard tanks was exhausted; without pilot action to switch fuel tanks, the engines lost power as a result of fuel starvation, and the airplane descended and impacted trees and terrain.

The overflight of the intended destination and the subsequent loss of engine power due to fuel starvation are indicative of pilot incapacitation. The pilot's autopsy identified no significant natural disease; however, the examination was limited by the severity of damage to the body. Further, there are a number of conditions, including cardiac arrhythmias, seizures, or other causes of loss of consciousness, that could incapacitate a pilot and leave no evidence at autopsy.

The pilot's toxicology results indicated that the pilot had used marijuana/tetrahydrocannabinol (THC) at some point before the accident. THC can impair judgment, but it does not cause incapacitation; therefore, the circumstances of this accident are not consistent with impairment from THC, and, the pilot's THC use likely did not contribute to this accident. The reason for the pilot's incapacitation could not be determined.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The pilot's incapacitation for unknown reasons, which resulted in an overflight of his destination, a subsequent loss of engine power due to fuel starvation, and collision with terrain.

Findings

Personnel issues	Other loss of consciousness - Pilot
Not determined	(general) - Unknown/Not determined

Factual Information

History of Flight

Enroute-cruise	Miscellaneous/other (Defining event)
Enroute-cruise	Fuel starvation
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On May 3, 2017, about 2030 eastern daylight time, a Piper PA-31, Canadian registration C-GQAM, impacted trees and terrain near Colton, New York. The Canadian commercial pilot was fatally injured, and the airplane was destroyed. The airplane was registered to and operated by Strait Air (2000) Ltd. as an air taxi flight under the provisions of Canadian Aviation Regulation 703. Visual meteorological conditions prevailed, and the flight was operated on a visual flight rules flight plan. The flight originated from Quebec/Jean Lesage International Airport (CYQB), Quebec, Quebec, Canada, at 1916, and was destined for Montreal Saint-Hubert Longueuil Airport (CYHU), Saint Hubert, Quebec, Canada.

According to the operator, the flight's estimated duration was 1 hour, and the airplane departed with 720 pounds (120 gallons) of fuel on board. According to CYQB Terminal Control air traffic control data, at 1919, the pilot was cleared to fly direct to CYHU at 2,000 ft mean sea level (msl). The pilot acknowledged the clearance, and there were no further radio transmissions from the pilot. The airplane continued flying a straight course, at 2,100 ft msl, overflew CYHU, and impacted terrain about 100 miles beyond the destination airport.

One witness heard the airplane flying over her house and reported that the engine sounded like it was "spitting and sputtering." The sound lasted for about 5 to 10 seconds and then stopped. Shortly thereafter, the witness heard "a loud bang." Another witness was inside his home when he heard a "low whining noise" that was followed by "a loud thud." A third witness reported that he heard the airplane flying low over his house and went outside to watch it. He watched the airplane head southwest at an "extremely low" altitude, and then he heard three "pops" coming from the airplane. A few seconds after that, the airplane banked to the left and began to "gradually lose altitude." The airplane continued in the descending left turn until he lost sight of it as it dropped below the horizon.

Pilot Information

Certificate:	Commercial; Foreign	Age:	35, Male
Airplane Rating(s):	Single-engine land; Multi-engine land	Seat Occupied:	Unknown
Other Aircraft Rating(s):	None	Restraint Used:	Unknown
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 1 With waivers/limitations	Last FAA Medical Exam:	May 17, 2016
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	
Flight Time:	5250 hours (Total, all aircraft), 1187 hours (Total, this make and model), 2 hours (Last 24 hours, all aircraft)		

According to Transport Canada records, the pilot held a commercial pilot certificate with ratings for airplane single-engine land, airplane multi-engine land, and instrument airplane. The pilot was issued a category 1 medical certificate on May 17, 2016. According to the operator, the pilot had about 5,250 total hours of flight experience and 1,187 hours in the accident airplane make and model.

According to the pilot's family, he would typically fly from Quebec City to Montreal every weekday evening, stay in Montreal and sleep until about 0330, go back to the airport, and fly back to Quebec City in the morning. He would usually take a nap during the day before the next evening flight.

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	Registration:	C-GQAM
Model/Series:	PA31 310	Aircraft Category:	Airplane
Year of Manufacture:	1979	Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	31-7912093
Landing Gear Type:	Retractable - Tricycle	Seats:	2
Date/Type of Last Inspection:	October 31, 2016 Annual	Certified Max Gross Wt.:	6840 lbs
Time Since Last Inspection:		Engines:	2 Reciprocating
Airframe Total Time:		Engine Manufacturer:	Lycoming
ELT:		Engine Model/Series:	TIO-540-A2C
Registered Owner:		Rated Power:	310 Horsepower
Operator:		Operating Certificate(s) Held:	None

According to Transport Canada records, the airplane was manufactured in 1979 and was registered to the operator in 2003. It was equipped with two 310-horsepower Lycoming TIO-540-A2C engines that drove two Hartzell constant-speed propellers. The airplane's most recent annual or 100-hour inspection was performed on October 31, 2016.

Right and left fuel flow warning lights illuminated to warn the pilot of an impending fuel flow interruption. The lights were activated by a sensing probe mounted near each inboard fuel tank outlet. No audible warning was associated with the illumination of the lights.

Section 4, "Normal Procedures" in the POH recommended that when the airplane is loaded to a rearward center of gravity, fuel from the outboard tanks be used first during cruise flight.

The airplane was equipped with a KFC 200 autopilot. According to the pilot operating handbook (POH), when the autopilot was disengaged, the autopilot light on the annunciator panel would flash at least four times and then remain off to indicate that the autopilot was disengaged. Also, a 2-second audible warning tone would sound when the autopilot disconnected.

According to the cruise checklist found in the POH, the following items should be completed:

Fuel Selectors – OUTBOARD OR INBOARD

Power – Set

Cowl Flaps – As required

Mixture – Leaned

According to the POH, the airplane was equipped with four flexible fuel cells, two in each wing. The outboard fuel cells had a capacity of 40 gallons each, and the inboard cells had a capacity of 56 gallons each, providing a total fuel capacity of 192 gallons, 187.3 gallons of which were usable. According to the POH, the inboard fuel tanks were to be used for taxi, takeoff, climb, and descent. The outboard tanks were only to be used in level flight while en route.

According to the engine manufacturer's operating manual, using the most conservative fuel consumption in economy cruise, the airplane consumed about 13.5 gallons per hour of fuel per engine. Assuming that the en route phases of flight were performed on the outboard fuel tanks, with the engines' power at economy cruise, the airplane would have an estimated 2.9 hours of fuel endurance in the outboard tanks with the tanks full.

Interpolation of performance charts revealed that, assuming the airplane typically flew at 2,000 ft msl en route, it would take about 3 minutes to climb and 3 minutes to descend, totaling 6 minutes, or 0.1 hour.

On May 2, 2017, the airplane flight records indicated that the airplane departed from CYQB for CYHU with full fuel tanks, which was 1,123 lbs of fuel, and accumulated 0.9 hours of flight time. On the morning of May 3, 2017, the records indicated that the airplane flew from CYHU for CYQB with a total flight time of 1.0 hours. Finally, the airplane departed on the accident flight and accumulated about 1.25 hours of flight time. There was no evidence the airplane had been refueled between these flights.

Date	Flight Time	Time Enroute (flight time minus 0.05 for climb & 0.05 for descent)	Gallons used in each outboard tank.	Gallons remaining in each outboard tank.
May 2 (CYQB>CYHU)	0.9 hours	0.8	10.8	29.2
May 3 (CYHU>CYQB)	1.0 hours	0.9	12.2	17
May 3 (CYQB>CYHU accident flight)	~1.25 hours	~1.2 (subtract only 0.05 since only the climb phase was completed)	~16.2 gallons	

Figure 1. Estimated Outboard Tank Fuel Consumption.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Dusk
Observation Facility, Elevation:	MSS, 214 ft msl	Distance from Accident Site:	24 Nautical Miles
Observation Time:	20:53 Local	Direction from Accident Site:	5°
Lowest Cloud Condition:	Clear	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	5 knots /	Turbulence Type Forecast/Actual:	/ None
Wind Direction:	220°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30.1 inches Hg	Temperature/Dew Point:	7°C / 1°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Quebec (CYQB)	Type of Flight Plan Filed:	VFR
Destination:	Saint Hubert (CYHU)	Type of Clearance:	VFR
Departure Time:	19:16 Local	Type of Airspace:	

The 2053 recorded weather observation at Massena International Airport ‐ Richards Field (MSS), Massena, New York, located about 24 nautical miles north of the accident location, included wind from 220° at 5 knots, visibility 10 miles, sky clear, temperature 7°C, dew point 1°C, and an altimeter setting of 30.10 inches of mercury.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:		Aircraft Fire:	On-ground
Ground Injuries:	N/A	Aircraft Explosion:	On-ground
Total Injuries:	1 Fatal	Latitude, Longitude:	44.531112,-74.891113(est)

Examination of the accident site revealed damage to trees consistent with a 45° left bank and level pitch attitude at impact. The airplane impacted terrain about 1,200 ft msl, and a postimpact fire ensued. A ground scar was located about 40 ft past the initial tree strike and about 100 ft before the main wreckage. The initial impact crater was about 2 ft deep. All components of the airplane were located in the vicinity of the main wreckage, and the debris field was about 240 ft long on about a 300° heading. There were several branches located along the debris path with 45° cuts in the wood.

Flight control continuity was confirmed from the cockpit to all the flight control surfaces. The cockpit and cabin were partially consumed by fire. Both wings were impact-separated, fragmented, and located along the debris path. The left wing tip light's lens cap was located in the initial impact crater, and the right wing tip light's lens cap was located in the vicinity of the first tree strike. All fuel tanks were breached, and the fuel selector valves were found in the outboard tank positions. The empennage remained attached to the fuselage and was partially consumed by fire. The vertical stabilizer and rudder remained attached to the empennage. The lower forward section of the vertical stabilizer was partially consumed by fire. The top approximate 2 ft of the rudder were impact-damaged. The left and right horizontal stabilizers and the left elevator were impact-damaged, and the outboard sections were separated and located along the debris path. The right elevator remained attached to the empennage and was impact-damaged and bent aft.

The left engine was examined, and crankshaft continuity was confirmed. Holes were drilled into the engine case to allow for examination of the internal components of the engine, and there was no evidence of heat distress or mechanical disconnects. The No. 2 top and bottom and the No. 6 bottom spark plugs were not located. The No. 5 top spark plug exhibited corrosion. All other spark plugs exhibited "worn out-normal" wear when compared to the Champion Check-a-plug Chart. The cylinders were examined with a borescope, and carbon deposits were noted on the tops of the pistons. The turbocharger was impact-separated from the engine. No scoring was noted on the housing; however, the compressor blades were bent opposite the direction of rotation. Both magnetos would not rotate by hand due to thermal damage. No anomalies were noted with the left engine that would have precluded normal operation before the accident.

The left propeller hub remained attached to the crankshaft flange. The three propeller blades of the left engine were impact-separated and located along the debris path. The blades were lettered A, B, and C, for descriptive purposes. Blade A was bent aft in a smooth arc, exhibited torsional twisting, leading edge gouging, and blade tip deformation and curling. Blade B was bent forward midspan, exhibited leading edge gouging, and torsional twisting. Blade C was bent and curled aft, exhibited trailing edge S-bending, torsional twisting, leading edge damage, and about 8 inches of the blade was torn from the tip.

The right engine was examined, and the crankshaft would not rotate when trying to move the propeller by hand. Holes were drilled in the top section of the case, and a borescope was used to examine the internal components of the engine. Crankshaft continuity was confirmed, and there were no anomalies noted inside the engine. The spark plugs exhibited normal wear when compared to the Champion Check-a-plug Chart. The cylinders were examined with a borescope, and carbon deposits were noted on the tops of the pistons. The Nos. 1, 2, and 4 cylinders were impact-damaged. No evidence of foreign object ingestion or detonation was noted in the engine. The valves were intact. The left and right magnetos of the right engine were consumed by postimpact fire. The turbocharger compressor housing exhibited rotational scoring. The turbocharger exhaust clamps were all secure. The turbocharger waste gate was impact-separated, and the butterfly could be operated by hand. No anomalies were noted with the right engine that would have precluded normal operation before the accident.

The right propeller remained attached to the crankshaft flange, and the blades remained attached to the propeller hub. They were lettered for descriptive purposes. All blades rotated in the hub socket. Blade A exhibited leading edge damage and was bent aft about 80°. Blade B exhibited trailing edge S-bending, torsional twisting, and leading edge damage. About 6 inches of the tip of blade B was separated and not located. Blade C was bent slightly, and no other damage was noted.

Medical and Pathological Information

The St. Lawrence County Coroner's Office, Canton, New York, performed the autopsy on the pilot. The autopsy report indicated that the pilot's cause of death was exsanguination (loss of a substantial proportion of blood). No significant natural disease was identified, but the examination was limited by the severity of damage to the body.

The FAA's Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed toxicological testing of the pilot. Fluid and tissue specimens from the pilot tested negative for carbon monoxide and ethanol. The testing identified 1.9 ng/ml of tetrahydrocannabinol (THC) and 19.6 ng/ml of 11-carboxytetrahydrocannabinol (THC-COOH) in cavity blood. THC and THC-COOH were also identified in liver and lung.

THC is the principal psychoactive constituent of marijuana. Marijuana is a psychoactive drug with therapeutic levels as low as 1 ng/ml. According to the National Highway Traffic Safety Administration's Drugs and Human Performance Fact Sheet on marijuana, "it is difficult to establish a relationship between a person's marijuana blood or plasma concentration and performance impairing effects. Concentrations of parent drug and metabolite are very dependent on pattern of use as well as dose. THC concentrations typically peak during the act of smoking, while peak [THC-COOH] concentrations occur approximately 9-23 minutes after the start of smoking. Concentrations of both analytes decline rapidly and are often < 5 ng/ml at 3 hours."

ADDITIONAL INFORMATION

Pilot's Work Schedule

According to the operator, the pilot's home base was CYQB. On Monday mornings, he drove from CYQB to CYHU, which was about a 2.5-hour drive. Monday to Friday, the pilot had the following schedule:

Begin at CYHU at 0300
Take off for CYQB at 0400
Arrive at CYQB at 0500

Begin at CYQB at 1800
Takeoff for CYHU at 1900
Arrive at CYHU at 2000

There was a crew rest area at the fixed based operator in CYQB, where the pilot would rest between the flights. On Friday evenings, the pilot drove from CYHU to CYQB and had the rest of the weekend off.

Administrative Information

Investigator In Charge (IIC):	Kemner, Heidi
Additional Participating Persons:	Todd Moses; FAA FSDO; Albany, NY Mike McClure; Piper Aircraft; Vero Beach, FL Mark Platt; Lycoming; Williamsport, PA Marc Belzile; Transportation Safety Board of Canada
Original Publish Date:	November 5, 2018
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=95104

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