Aviation Investigation Final Report

Location:	Wasilla, Alaska	**Accident Number:**	ANC17LA037
Date & Time:	July 15, 2017, 17:00 Local	**Registration:**	N401WC
Aircraft:	Cessna A185	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	1 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot reported that he departed on a 1.3-hour flight in his floatplane, and about 1 hour into the flight, fuel flow diminished and the engine “sputtered.” He noted that the left tank fuel quantity gauge indicated empty, and the right fuel tank indicated 1/2 full. He verified that the fuel selector was in the “both” position and increased the throttle. The fuel flow increased momentarily, and then the engine lost total power. The pilot performed a forced landing on grassy tidal mud flats, during which one of the floats hit a log and the airplane nosed over, which resulted in substantial damage to the wings, vertical stabilizer, and wing struts. A witness stated that there was no fuel leaking from the wreckage at the scene.

An examination of the airframe revealed that only 1.75 gallons of fuel remained in the left tank, which was below the unusable amount of 3 gallons; 8 gallons remained in the right tank. The pilot reported that he departed on the round-trip flight with 62 gallons. The digital fuel flow gauge indicated that 61.2 gallons had been used since refueling and 0.8 gallons of planned fuel remained. The fuel selector and auxiliary fuel pump were functionally tested with no anomalies noted. The vented fuel caps, tank vents, and drain system were intact. A fuel quality sample revealed no contaminants and the drained fuel was used for an engine test run. The engine started and ran at a low power setting with no anomalies observed.

According to the pilot, there was sufficient fuel onboard to complete the flight. The engine likely burned fuel primarily from the left tank, for reasons that could not be determined.

Had the pilot monitored the fuel quantity indicators or the digital fuel flow quantities during the flight, he would have known that one tank was supplying fuel at a faster rate than the other, that the left tank was approaching empty, and that more fuel than he planned was being consumed. After the loss of power, the pilot responded by "pumping the throttle;" however, manufacturer guidance stated that the pilot should select the fullest tank and turn on the

auxiliary fuel pump. Had the pilot followed the manufacturer's guidance, it is likely that engine power would have been restored.

Probable Cause and Findings

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

The pilot's failure to manage fuel quantity in flight, which resulted in a total loss of engine power due to fuel starvation. Contributing to the accident was the pilot's failure to follow manufacturer guidance for restoring engine power after emptying a fuel tank.

Findings

Personnel issues	Use of equip/system - Pilot
Aircraft	Fuel - Fluid management
Personnel issues	Incorrect action performance - Pilot

Factual Information

History of Flight

Enroute	Fuel starvation
Enroute-cruise	Loss of engine power (total) (Defining event)
Landing-landing roll	Collision with terr/obj (non-CFIT)
Landing-landing roll	Nose over/nose down

On July 15, 2017, about 1700 Alaska daylight time, a float-equipped Cessna A185F airplane, N401WC, was substantially damaged when it was involved in an accident near Wasilla, Alaska. The pilot was not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The pilot stated that, 4 days before the accident, he fueled the airplane's long range tanks to 62 total gallons before flying from Campbell Lake to Lake Louise, about a 1.3-hour flight. Before the return flight on the day of the accident, the fuel quantity indicators each read 3/4 full and the pilot visually verified, without a dipstick, the fuel level in each tank. He took fuel samples and noted no contamination.

About 1 hour into the flight, at an altitude of about 1,500 ft mean sea level (msl), the pilot looked at the engine analyzer and fuel flow gauge and noted a fuel flow of 13 gallons per hour (gph). Then the fuel flow decreased to 4 gph and the engine "sputtered." The pilot pushed the throttle lever to maximum and "pumped the throttle," trying to keep the engine running, and he maneuvered the airplane for an emergency landing. He verified that the fuel selector was in the "both" position and noted that the left fuel quantity gauge indicated empty and the right indicated about 1/2 full. The fuel flow temporarily increased to 15.6 gph and then the engine lost total power about 300 ft above ground level (agl). The pilot performed a forced landing in grassy tidal flats. During the landing, the left float contacted a log hidden in tall grass, and the airplane nosed over. The airplane came to rest inverted and the pilot safely egressed.

A Federal Aviation Administration aviation safety inspector who lived in the area of the accident site heard the airplane sputtering for about 45 seconds and watched the airplane descend toward the flats. He said that just before the airplane's floats touched down, he momentarily heard the engine power increase, which was followed by silence. He responded to the scene of the accident and noted that the airplane was inverted and no fuel was leaking from the airplane, which sustained substantial damage to the wings, left lift strut, and vertical stabilizer.

During a postaccident examination, electrical power was applied; the fuel quantity gauges indicated that the left fuel tank was empty and the right tank was 1/2 full. The digital fuel flow gauge indicated that 61.2 gallons had been used since the last time it was set and 0.8 gallon remained. Fuel samples exhibited qualities consistent with 100 low lead aviation fuel. About 8 gallons of fuel were drained from the right tank and 1.75 gallons from the left, which was less than the tank's unusable amount of 3 gallons. The fuel quantity indicators each indicated empty after draining the tanks. The four fuel tank caps were in

place and secure. The fuel tank vents were in place and clear of debris. No leaks were observed. The fuel selector valve and auxiliary fuel pump were functionally tested and operated normally. An engine test run was conducted with fuel that was drained from the tanks. The engine started successfully, and a magneto test was conducted at 900 rpm. The engine was not tested at high power due to propeller damage. Examination of the airframe and engine revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation.

The pilot stated that the fuel tanks were balanced before the flight and that he flew the airplane with the fuel selector in the "both" position. Based on the prevailing wind at the time of the accident, the flight would have experienced a quartering headwind, which would have decreased ground speed, increased the crosswind drag effect on the floats, and increased time and fuel required for the flight.

The Cessna A185F pilot operating handbook (POH) indicated that expected fuel flow at 2,500 ft msl at 25 inches manifold pressure and 2,500 rpm was 16 gph.

A Cessna Pilots Association Technote 003 indicated possible causes of fuel imbalance in Cessna single-engine airplanes while operated with the fuel selector in "both." The issues that were highlighted in the article were sloshing in the tank's interconnect vent line, fuel tank vent tube abnormalities, fuel tank cap venting, wing dihedral affects, fuel line restriction, and flight control rigging out of balance. A note on page 2-2 of the Cessna 185 POH indicated that:

Fuel may not be drained from full tanks evenly due to sloshing in the interconnect vent line, preventing absolutely equal vent pressure in each tank. However, as fuel is consumed, clearing the interconnect vent line and equalizing tank vent pressures, the fuel quantities should equalize in each tank, provided the wings are maintained exactly level.

Another note on page 2-4 indicated:

Take-off and land with the selector valve handle in the BOTH ON position to prevent inadvertent operation on an empty tank. However, when the selector is left in the BOTH ON position for extended flight, unequal fuel flow from each tank may occur if the wings are not maintained exactly level. Resulting wing heaviness can be alleviated gradually by turning the selector valve handle to the tank in the "heavy" wing.

The recommended cruise fuel management procedure for extended flight is to use the left and right tank alternately.

The POH indicated on page 2-5 that:

To ensure a prompt engine restart in flight after running a fuel tank dry, immediately switch to a tank containing fuel at the first indication of fuel pressure fluctuation and/or power loss. Then place the right half of the auxiliary fuel pump switch in the ON position momentarily with the throttle at least ½ open.

The pilot stated that, after the first sign of loss of power, he knew that the left tank was indicating empty. Once he turned and initiated an emergency landing, there was no time to perform the engine restart procedures.

Pilot Information

Certificate:	Private	**Age:**	54,Male
Airplane Rating(s):	Single-engine land; Single-engine sea	**Seat Occupied:**	Front
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	June 6, 2016
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	June 20, 2014
Flight Time:	(Estimated) 230 hours (Total, all aircraft), 158 hours (Total, this make and model), 230 hours (Pilot In Command, all aircraft), 5 hours (Last 90 days, all aircraft), 5 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N401WC
Model/Series:	A185 F	**Aircraft Category:**	Airplane
Year of Manufacture:	1973	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	18502235
Landing Gear Type:	Float	**Seats:**	4
Date/Type of Last Inspection:	July 27, 2016 Annual	**Certified Max Gross Wt.:**	3350 lbs
Time Since Last Inspection:	16 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	3864.5 Hrs at time of accident	**Engine Manufacturer:**	Continental
ELT:	C91 installed, not activated	**Engine Model/Series:**	IO-520-D
Registered Owner:	On file	**Rated Power:**	300 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	PABV,96 ft msl	**Distance from Accident Site:**	6 Nautical Miles
Observation Time:	00:56 Local	**Direction from Accident Site:**	144°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots /	**Turbulence Type Forecast/Actual:**	None /
Wind Direction:	270°	**Turbulence Severity Forecast/Actual:**	N/A /
Altimeter Setting:	29.95 inches Hg	**Temperature/Dew Point:**	18°C / 10°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	LAKE LOUISE, AK (13S)	**Type of Flight Plan Filed:**	None
Destination:	ANCHORAGE, AK (3C3)	**Type of Clearance:**	None
Departure Time:	16:00 Local	**Type of Airspace:**	Class G

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	61.4925,-149.62249(est)

Administrative Information

Investigator In Charge (IIC):	Price, Noreen
Additional Participating Persons:	Gregory Varner; Federal Aviation Administration; Wasilla, AK Nicole Charnon; Continental Motors, Inc.
Original Publish Date:	May 6, 2021
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=95588

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The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, "accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties … and are not conducted for the purpose of determining the rights or liabilities of any person" (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB's statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available here.