Aviation Investigation Final Report

Location:	Eagle River, Alaska	**Accident Number:**	ANC20LA043
Date & Time:	April 11, 2020, 20:25 Local	**Registration:**	N185RN
Aircraft:	Cessna A185E	**Aircraft Damage:**	Substantial
Defining Event:	Aerodynamic stall/spin	**Injuries:**	2 Serious, 2 Minor
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot-rated passenger reported that, during approach for landing, the engine lost total power. The pilot attempted to make an emergency landing; however, the airplane aerodynamically stalled short of the lake and impacted the ground.

Upon arrival, first responders reported minimal fuel leaking from the airplane and negligible evidence of a fuel spill. A postaccident examination of the airplane revealed no evidence of preexisting malfunctions or failures that would have precluded normal operation.

The passenger stated the pilot did not add fuel the day of the accident or check the fuel quantity visually before departing on the accident flight and that the pilot relied on the fuel totalizer to determine fuel onboard. Although the fuel totalizer indicated there was 7.7 gallons of fuel remaining at the time of the accident, the accuracy of the fuel totalizer requires accurate estimates of the fuel onboard the airplane to be reliable. The investigation could not determine the amount of fuel onboard prior to the accident flight. However, assuming the pilot had full fuel onboard when he last departed the airfield he commonly refueled at, fuel burn computations were consistent with the airplane consuming all usable fuel onboard at the time of the accident. It is likely the engine consumed fuel at a higher rate than the pilot planned for, and the engine lost all power due to fuel exhaustion.

Probable Cause and Findings

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

The pilot’s failure to ensure adequate fuel onboard prior to the planned flight, resulting in a total loss of engine power due to fuel exhaustion and an aerodynamic stall during the subsequent emergency landing. Contributing to the accident was the pilot’s reliance on an improperly programmed fuel totalizer.

Findings

Personnel issues	Fuel planning - Pilot
Aircraft	Angle of attack - Capability exceeded
Personnel issues	Aircraft control - Pilot

Factual Information

History of Flight

Approach	Loss of engine power (total)
Emergency descent	Aerodynamic stall/spin (Defining event)
Emergency descent	Loss of control in flight
Emergency descent	Collision with terr/obj (non-CFIT)

On April 11, 2020, about 2025 Alaska daylight time, a Cessna A185E, N185RN, was substantially damaged when it was involved in an accident near D&C Fire Lake Flying Club Seaplane Base (D72), Eagle River, Alaska. Of the four occupants onboard, the pilot and one passenger sustained serious injuries, and two passengers sustained minor injuries. The airplane was operated as a Title *14 Code of Federal Regulations (CFR)* Part 91 personal flight.

Due to the injuries sustained in the accident, the pilot had no recollection of the accident flight. The pilot-rated passenger, seated in the front right seat, reported they were returning home from the family's cabin and the pilot began the initial descent about 5 miles north of Fire Lake. He said that the pilot's intentions were to over fly the lake to inspect the landing area, followed by a left base turn, and a landing on the frozen lake to the north. He added that as they flew over the north side of the lake, on a southerly heading, the pilot began to maneuver the airplane for the approach to land and the engine suddenly lost all power, but the propeller continued to windmill. The pilot continued to fly the approach and set up to make an emergency landing. As he maneuvered the airplane to the left, he said, in part: "We are going down" which was immediately followed by the sound of the stall warning horn. The airplane subsequently struck a stand of trees and a powerline, and then pitched down violently and struck the ground in a nosed down attitude.

The pilot-rated passenger reported that immediately after regaining consciousness, moments after the accident, he realized that he had gasoline in his eyes and on his coat.

A witness on the ground reported that he observed the airplane fly over the northeast corner of the lake, and head south, at an altitude of about 600 ft. As the airplane passed overhead, he noted that the flaps were initially in the retracted position. He heard the power suddenly change from a mid-range cruise setting to an abrupt loss in power. He added that the propeller continued to windmill following the loss of engine power, and that once the airplane was about midway over the lake it banked to the southwest. He then recalled that the flaps had been extended and the airplane appeared to be in a forward sideslip momentarily. After briefly losing sight of the airplane, he witnessed it heading east toward the direction of the lake. A few seconds later he heard an airplane impact the trees and the ground.

The airplane came to rest in a residential yard in a near vertical position after impacting multiple trees and a powerline. The wings, fuselage, engine, and empennage were impact damaged. The landing gear

appeared to be extended in the ski down position. All parts of the airplane were located at the accident site.

Federal Aviation Administration (FAA) inspectors that responded to the accident site reported that the outboard left wing leading edge had impacted the ground and that the right wing had not impacted the ground. They observed no fuel on the ground, no odor of fuel was noted at the scene of the accident, and there was no evidence of a post-crash fire. The empennage was separated but remained connected to the fuselage by the flight control cables. The left and right flap appeared to be positioned in the down (extended) position. The fuel selector was found set to the middle (BOTH) position. There were no propeller ground strike marks, and the propeller was damaged.

The FAA inspectors further reported that where the right wing connects with the forward pillar that the fuel line was pulled from the fuel tank. They added that they removed the left inboard fuel tank cap and observed that the fuel tank membrane was completely dry. Then they removed the left outboard fuel tank cap and observed that the tank membrane showed the presence of fuel. They dipped the left tank and the dip stick went to the outboard aft corner of the tank, which was the lowest point in the fuel tank due to the position of the airplane. A moisture mark was noted about 1.5 to 2 inches up on the stick when it was removed. They did not pull the fuel tank caps on the right tanks due to the position of the airplane.

First responders reported minimal evidence of a fuel spill at the accident scene upon arrival. During the recovery of the airplane wreckage the following afternoon, no fuel was found in either wing. Residual fuel was found in the fuel strainer that contained minor sediment and no blockages were found in the engine fuel lines. Examination of the airplane revealed no evidence of preimpact malfunctions or anomalies.

The pilot rated passenger reported they sumped the fuel tanks prior to the flight and no water or contaminates were noted. He said he was unsure of the quantity of fuel onboard before the flight because “they do not dip the tanks or visually check fuel levels; they rely on the fuel totalizer for the fuel quantity.” He was unsure when the last time fuel was added, but said the pilot usually flew to Birchwood Airport (BCV), Alaska to refuel. He did not recall the fuel quantity just before the accident and did not know of any mechanical problems prior to the accident.

A Garmin GPSMap 495 portable global positioning system (GPS) was recovered and subsequently download and analyzed. The downloaded data revealed that the airplane was last flown to BCV, the pilot’s reported usual refueling airport, on March 28, then flown to the family’s cabin, and the airplane then returned to Fire Lake that same day. On April 4, the airplane was flown from Fire Lake to the family’s cabin and back to Fire Lake. On April 11, the day of the accident, the airplane was again flown from Fire Lake to the family’s cabin, and the accident occurred while returning to Fire Lake. A total of about 4.1 flight hours had elapsed since the airplane had been flown to BCV, or any other intermediate stops between Fire Lake or the family’s cabin.

A J.P. Instruments (JPI) Fuel Scan, model 450, was recovered and subsequently downloaded at the NTSB's Vehicle Recorders Laboratory. The following preset parameters were recovered from the device:

Twin/Single Engine: “Single”
Fuel Units: “Gallons”
Tanks Size: “68”
Fuel Remaining: “7.7”
Fuel Used: “0”

The J.P.I model 450 Fuel Scan system is dependent on user input to provide correct indications of fuel used and fuel remaining parameters.

The airplane was configured with an 84-gallon total fuel capacity (78 usable). Each wing can hold 42 gallons (39 usable) of fuel, with about 3 gallons unusable fuel remaining in each wing after fuel exhaustion.

The airplane was equipped with a Continental IO-550-D engine, Fluidyne 3600 hydraulic wheel-skis, and a belly-mounted cargo pod. An airplane performance study was performed by the NTSB’s vehicle performance group. The group found that detailed airplane performance data for the Cessna A185E on hydraulic wheel-skis, with the Continental IO-550-D engine, do not exist. However, limited fuel burn data was found.

Supplemental Type Certificate (STC) SA00344WI, which facilitates the installation of the Continental IO-550-D engine in the Cessna A185E, reflects the following limitations regarding fuel flow at full throttle (2,700 RPM) for the airframe/engine combination: 24.9 gallons per hour (GPH) sea level, 22.6 GPH 4,000 ft., 19.2 GPH 8,000 ft., 17.1 GPH 12,000 ft. However, the throttle, propeller, and mixture settings used on the flights leading up to and the accident flight are unknown. Assuming the airplane had maximum usable fuel when it departed BCV, 4.1 flight hours before the accident, the engine had an average fuel consumption rate of about 19 GPH.

Title 14 *CFR* Part 91.151(a) defines the minimum fuel requirements for flight under day VFR. It states that no person may begin a flight in an airplane under VFR conditions unless (considering wind and forecast weather conditions) there is enough fuel to fly to the first point of intended landing and, assuming normal cruising speed, to fly after that for at least 30 minutes. The intent of the fuel reserve is to accommodate the unexpected: an incorrect forecast for winds aloft enroute, an unexpected and longer routing from air traffic control, etc.

To arrive at the destination airport with a 30-minute VFR fuel reserve, the accident airplane would have needed to burn fuel at a rate of about 17 GPH if all usable fuel was available for 4.1 hours of flight time.

Pilot Information

Certificate:	Private	**Age:**	51,Male
Airplane Rating(s):	Single-engine land; Single-engine sea	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	June 14, 2018
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 1500 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N185RN
Model/Series:	A185E	**Aircraft Category:**	Airplane
Year of Manufacture:	1968	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	185-1417
Landing Gear Type:	Retractable - Tailwheel; Ski/wheel	**Seats:**	
Date/Type of Last Inspection:	June 17, 2019 Annual	**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	1966 Hrs as of last inspection	**Engine Manufacturer:**	Continental Motors
ELT:	C91A installed	**Engine Model/Series:**	IO-550-D (2)
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:	PANC,132 ft msl	**Distance from Accident Site:**	20 Nautical Miles
Observation Time:	19:53 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:		**Visibility**	10 miles
Lowest Ceiling:	Broken / 7000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	6 knots /	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:	50°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	30.33 inches Hg	**Temperature/Dew Point:**	3°C / -8°C
Precipitation and Obscuration:			
Departure Point:	Tyonek , AK	**Type of Flight Plan Filed:**	None
Destination:	Eagle River, AK	**Type of Clearance:**	None
Departure Time:	19:45 Local	**Type of Airspace:**	Class G

Airport Information

Airport:	D&C FIRE LAKE FLYING CLUB D72	**Runway Surface Type:**	Ice;Snow
Airport Elevation:	295 ft msl	**Runway Surface Condition:**	Ice;Snow
Runway Used:	N/S	**IFR Approach:**	None
Runway Length/Width:	3500 ft / 200 ft	**VFR Approach/Landing:**	Full stop

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Serious, 2 Minor	**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	2 Serious, 2 Minor	**Latitude, Longitude:**	61.351943,-149.54888(est)

Administrative Information

Investigator In Charge (IIC):	Swenson, Eric
Additional Participating Persons:	Mathew M Cary; FAA; Anchorage, AK Kurt Gibson; Continental Aerospace Technologies; Mobile, AL Casey Love; Textron Aviation; Wichita , KS
Original Publish Date:	March 11, 2022
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=101166

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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.