

National Transportation Safety Board
Office of Research and Engineering
Washington, D.C. 20594

Airplane Performance Study

Specialist Report Timothy Burtch

A. ACCIDENT

Location: Eagle River, Alaska
Date: April 11, 2020
Time: 2025 Alaska daylight time
Airplane: Cessna A185E, N185RN
NTSB Number: ANC20LA043

B. GROUP

No vehicle performance group was formed.

C. SUMMARY

On April 11, 2020, about 2025 Alaska daylight time (AKDT), a wheel/ski-equipped 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 under visual flight rules (VFR).

Times in the study are quoted in Alaska daylight time, AKDT. AKDT = Greenwich Mean Time (GMT) – 8 hr.

D. THE AIRPLANE

A picture of the accident airplane, a wheel/ski-equipped Cessna A185E, is shown in Figure 1 when it was configured with floats. The airplane was manufactured by Cessna in 1968 and is registered to a private owner. An exemplar wheel/ski-equipped Cessna A185E is shown in Figure 2.

E. WEATHER SUMMARY

The closest National Weather Service reporting location to the accident site is Ted Stevens Anchorage International (PANC) located approximately 17 nautical miles (NM) southwest of the accident site and at a similar elevation. The PANC METAR reported the following approximately 32 minutes before the accident.

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METAR PANC 120353Z 05006KT 10SM BKN070 BKN100 OVC120 03/M08 A3033

The automated surface weather observation at Ted Stevens Anchorage International airport on April 11 at 1953 AKDT is wind 050° at 6 knots (kt); 10 statute miles visibility; broken clouds at 7,000 feet (ft) above the ground (agl). broken clouds at 10,000 ft agl, overcast clouds at 12,000 ft agl; temperature 3° Celsius (C); dew point -8°C; altimeter 30.33" mercury.

F. PERFORMANCE STUDY

The airplane performance study is based solely on data recovered from a Garmin portable GPS unit that was installed on the airplane. The unit recorded date, time, altitude, ground speed, ground track, and position for five previous flights in addition to the accident flight. See Figure 3 and Table 1 below.

AIRLOG - DATE	START TIME	END TIME	DURATION	ROUTE	MAX ALTITUDE	MAX SPEED
75 - 3/28/2020	1815	1818	3 min	BCV fuel pit to takeoff*		
76 - 3/28/2020	1818	1856	38 min	BCV takeoff to Camp	4,074 ft	140 mph
77 - 3/28/2020	2012	2058	45 min	Camp to Fire Lake	4,127 ft	162 mph
78 - 4/04/2020	1633	1715	42 min	Fire Lake to Camp	2,218 ft	147 mph
79 - 4/04/2020	1840	1920	40 min	Camp to Fire Lake	2,170 ft	144 mph
80 - 4/11/2020	1341	1422	41 min	Fire Lake to Camp	4,356 ft	160 mph
81 - 4/11/2020	1945	2023	37 min	Camp to accident site	2,445 ft	142 mph

TOTAL TIME: 246 minutes = 4.1 hours (hr) since refueling

Table 1: Garmin GPS Airlog Summary

The GPS data were unremarkable and did not indicate any problems. The accident occurred shortly after the end of Airlog 81 as shown in Table 1 as N185RN was returning to Fire Lake from camp, about 75 miles away. Note: the logs start at Birchwood airport (BCV) where N185RN last filled up with fuel. BCV is located approximately 4 NM north of Fire Lake. See Figures 4 thru 7.

Detailed airplane performance for the Cessna A185E on skis with the Continental IO-550-D engine do not exist. However, limited fuel burn data were found¹. Supplemental Type Certificate (STC) SA00344WI 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 power, propeller, and mixture settings used on the flights leading up to and the accident flight are unknown.

¹ P Ponk Aviation purchased STC SA00344WI for the A185E and A185F airframes with the Continental IO-550-D engine from CS Industries and provided limited fuel burn data.

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In addition to the STC, the FAA Approved Flight Manual (AFM) supplement states in Section 4, Normal Procedures, and the notes in Section 5, Performance, that “Range and Endurance will be affected by slightly higher fuel consumption (with the IO-550-D engine).”

While power settings are not recorded by the Garmin portable GPS, the Airlog data show that N185RN climbed to altitudes between 2,170 ft and 4,356 ft and reached ground speeds between 140 and 162 mph² on the accident flight and five previous flights. (See Table 1.) However, the average ground speed for the six flights since refueling was approximately 111 mph, and, as a result, it is unlikely that N185RN flew at full power.

Cessna indicated that N185RN could carry a maximum of 78 gallons of usable fuel. Assuming the tanks were filled at BCV on 3/28/2020, N185RN had a maximum endurance of about 3.4 hr at full throttle: 78 gallons / 23 GPH = 3.4 hr.

G. SUMMARY AND CONCLUSIONS

Figure 8 is a picture of the wreckage. Assuming N185RN exhausted its fuel supply on the day of the accident³, the average fuel burn would have been approximately 19 GPH based on the maximum useable fuel and the total time from Table 1: 78 gallons/4.1 hr = 19 GPH. However, as stated previously, detailed airplane performance with the Continental IO-550-D engine do not exist.

The airplane owner’s manual with the smaller Continental IO-520-D engine lists full-fuel endurances between 4.7 hr and 9.1 hr and ranges between 695 miles and 845 miles at 2,500 ft. N185RN traveled approximately six, 75 mile, legs or 450 miles for a little more than 4 hr since refueling at BCV.

The manual also states that allowances for fuel reserve, headwinds, take-offs and climb, and variations in mixture leaning technique should be made and are in addition to those on the charts. Other indeterminate variables such as fuel metering characteristics, engine and propeller conditions, and turbulence of the atmosphere may account for variations of 10% or more in maximum range. Comparison of estimated and actual performance on several flights will provide the basis on which to determine these allowances.

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.

² N185RN was equipped with a cargo pack. The AFM states that “When a cargo pack is installed on the floatplane, no change in take-off, climb, or landing performance will be incurred. For cruise performance, subtract approximately five miles per hour from the cruise performance figures shown in the tables.”

³ The FAA inspector that documented the wreckage site observed no fuel on the ground, no odor of fuel, and no post-accident fire.

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Including the 30-minute VFR fuel reserve, N185RN would have needed to burn fuel at a rate of 78 gallons/4.6 hr = 17 GPH. Based on the STC data for the Cessna A185E on skis with the Continental IO-550-D listed above and a cargo pack, an average fuel burn of only 17 GPH is unlikely.

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H. FIGURES



Figure 1: Accident Airplane, N185RN, a Cessna A185E



Figure 2: Exemplary Wheel/Ski-Equipped Cessna A185E

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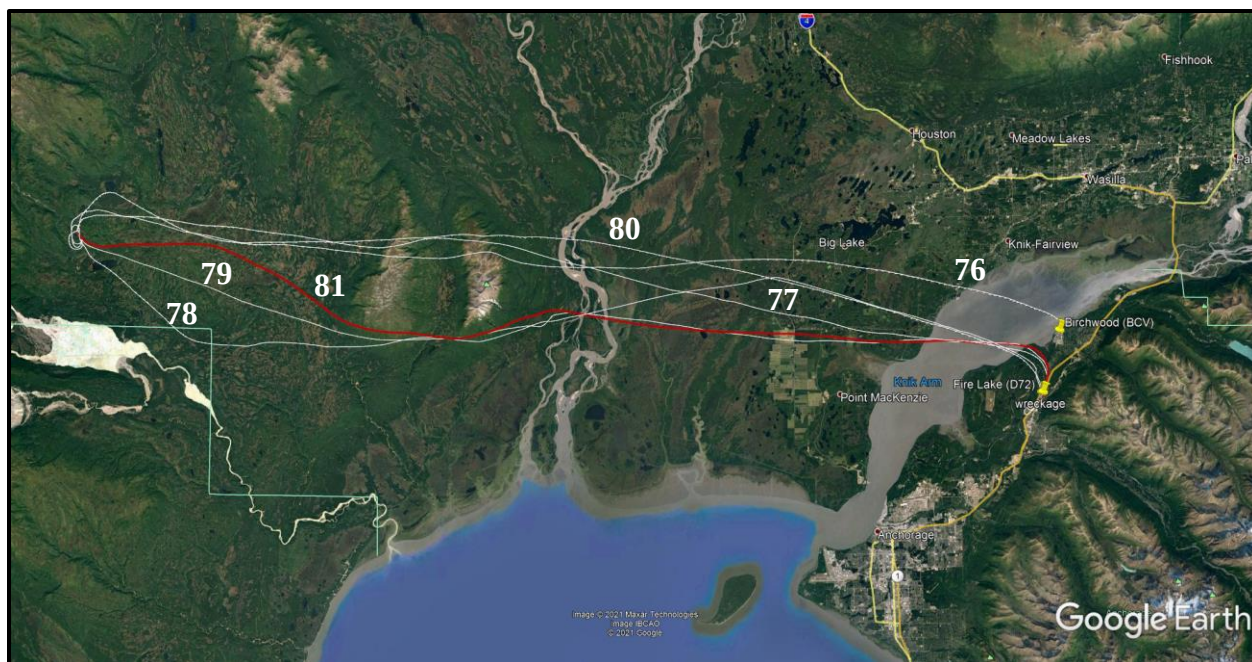


Figure 3: GPS Recorded Ground Tracks including Accident Flight, Airlog 81

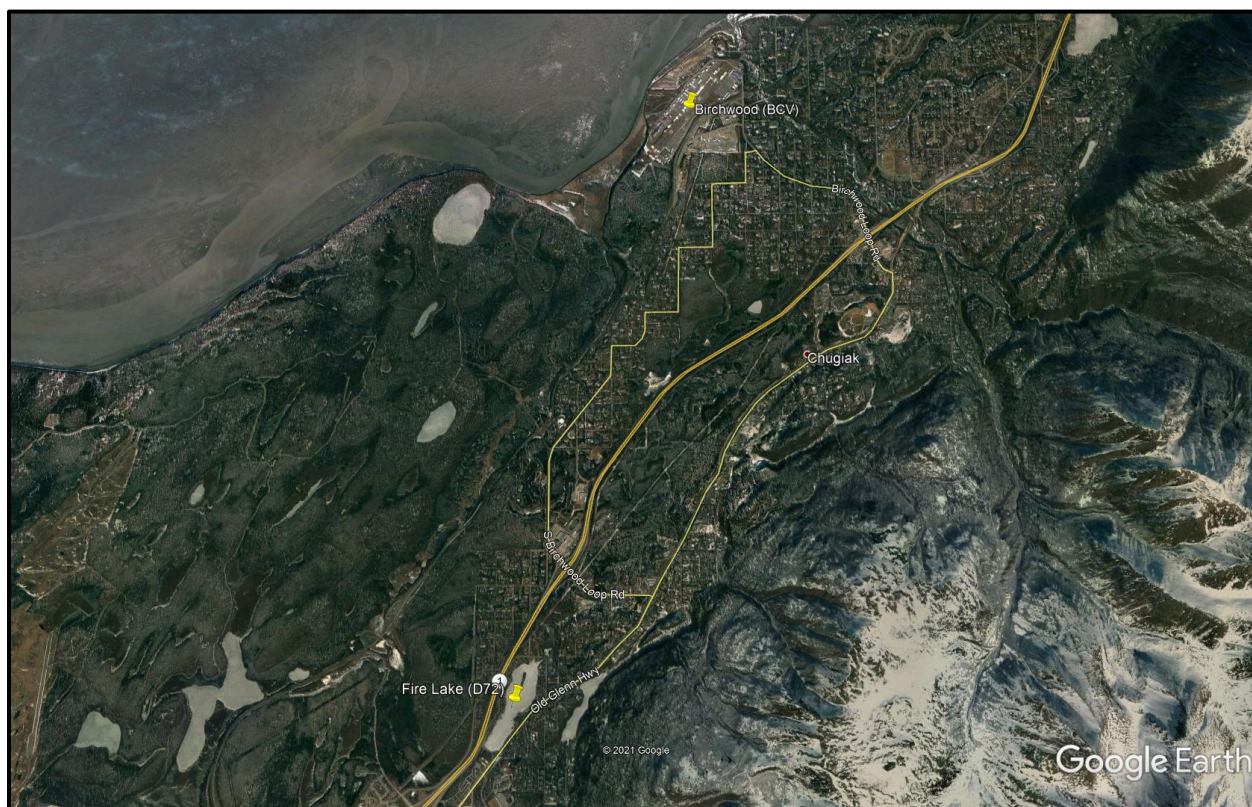


Figure 4: N185RN Re-fueled at Birchwood Airport Located 4 NM North of Fire Lake

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Figure 5: Camp and Ground Track from Final Take-off, Airlog 81

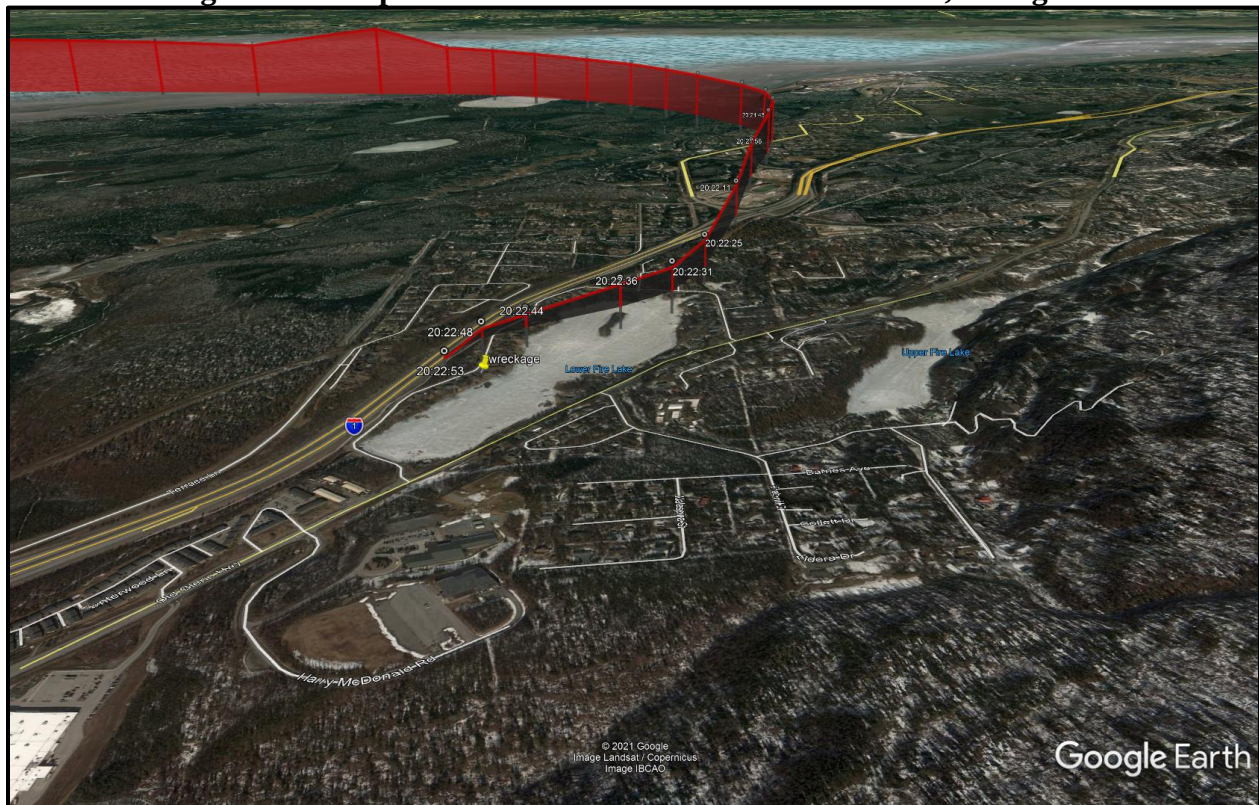


Figure 6: Recorded Airplane Position Approaching Lower Fire Lake, Airlog 81

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Figure 7: Accident Site on Lower Fire Lake



Figure 8: Wreckage