



National Transportation Safety Board Aviation Accident Final Report

Location:	Russian Mission, AK	Accident Number:	ANC18FA003
Date & Time:	10/16/2017, 1430 AKD	Registration:	N8347Z
Aircraft:	CESSNA 210	Aircraft Damage:	Destroyed
Defining Event:	VFR encounter with IMC	Injuries:	1 Fatal
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

The non-instrument-rated private pilot was conducting a VFR cross-country flight in an area of low clouds and fog layers. According to a pilot who departed about 10 minutes ahead of the accident pilot on the same flight route, widespread areas of low-level fog existed along the flight route. The interviewed pilot estimated that fog existed between 400 and 600 ft above ground level (agl). The interviewed pilot also stated that he flew his airplane at 1,500 ft agl, above the fog and with good visibility, but he did not know the altitude at which the accident pilot would be flying his airplane.

Examination of the airplane did not reveal any anomalies that would have precluded normal operation. Meteorological information indicated that the accident pilot would have encountered instrument meteorological conditions during the flight. Specifically, the area forecast that was valid at the time of the accident included an AIRMET for instrument conditions, a broken to overcast ceiling at 300 ft with cloud tops at 10,000 ft, and visibilities below 1 mile in mist. Also, images from the FAA's aviation weather camera facing the direction of the accident location indicated a low bank of clouds toward the accident site and along the intended flight route.

The pilot's relatively low flight experience, lack of an instrument rating and the lack of visual references due to fog and cloud layers created a situation conducive to the development of spatial disorientation. The airplane wreckage and impact information indicated that a loss of control occurred, which is consistent with the known effects of spatial disorientation.

Probable Cause and Findings

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

The pilot's decision to continue visual flight into instrument meteorological conditions, which resulted in spatial disorientation and a subsequent loss of control.

Findings

Aircraft	Performance/control parameters - Not attained/maintained (Cause)
Personnel issues	Decision making/judgment - Pilot (Cause) Incorrect action selection - Pilot (Cause) Spatial disorientation - Pilot (Cause)
Environmental issues	Below VFR minima - Decision related to condition (Cause)

Factual Information

History of Flight

Enroute	VFR encounter with IMC (Defining event) Loss of control in flight
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On October 16, 2017, about 1430 Alaska daylight time, a Cessna 210-5 airplane, N8347Z, impacted the Yukon River about 10 miles southwest of Russian Mission, Alaska. The private pilot sustained fatal injuries, and the airplane was destroyed. The airplane was registered to and operated by the pilot under the provisions of Title 14 *Code of Federal Regulations* Part 91. Instrument meteorological conditions prevailed at the accident site. No flight plan had been filed for the visual flight rules (VFR) flight, and no record of the pilot receiving a preflight weather briefing could be found. The flight originated about 1415 from Kako Airport, Kako, Alaska, with a destination of Bethel Airport (PABE), Bethel, Alaska.

Visual meteorological conditions were reported at the time of departure. According to a pilot of an airplane that departed about 10 minutes ahead of the accident airplane on the same route of flight and also destined for Bethel, widespread areas of low-level fog (between 400 and 600 ft above ground level [agl]) existed along the route. This pilot stated, during a postaccident interview, that he conversed with the accident pilot (after he departed from Kako) about the fog layers. No further radio communications occurred between the pilots. The interviewed pilot indicated that he tried to contact the accident pilot about 15 minutes after their conversation but received no response. After arriving at PABE and loading passengers, the interviewed pilot departed for a return flight to Kako. During that flight, he searched for the accident pilot's airplane but could not locate the airplane. After landing at Kako, the interviewed pilot notified the Federal Aviation Administration (FAA) Flight Service Station about the overdue airplane, and the FAA issued an alert notice (ALNOT) at 1748. On October 17, the accident airplane was located submerged in the Yukon River about 10 miles southwest of Russian Mission.

The interviewed pilot stated that he flew his airplane at 1,500 ft agl above the fog and with 20-mile visibility. The pilot also stated that, at that altitude, he could see fog laying on the ground, on hills, and over the Yukon River. He did not know the altitude of the accident airplane but indicated that, in the area of the accident site, the fog was thick with no holes visible.

Pilot Information

Certificate:	Private	Age:	31, Male
Airplane Rating(s):	Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Unknown
Instrument Rating(s):	None	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 3 Without Waivers/Limitations	Last FAA Medical Exam:	02/01/2014
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:	35 hours (Total, all aircraft)		

The pilot, age 31, held a private pilot certificate with an airplane single-engine land rating. The pilot did not have an instrument rating. His most recent third-class medical certificate was issued on February 1, 2014, without waivers or limitations. At the time of the pilot's application for his medical certificate, he reported 35 hours of total flight experience. A relative of the pilot estimated that he had accumulated about 160 hours of total flight experience.

Aircraft and Owner/Operator Information

Aircraft Make:	CESSNA	Registration:	N8347Z
Model/Series:	210 5	Aircraft Category:	Airplane
Year of Manufacture:	1963	Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	205-0347
Landing Gear Type:	Tricycle	Seats:	
Date/Type of Last Inspection:	09/08/2017, Annual	Certified Max Gross Wt.:	
Time Since Last Inspection:		Engines:	1 Reciprocating
Airframe Total Time:	5533.7 Hours as of last inspection	Engine Manufacturer:	Continental Motors
ELT:	Installed, not activated	Engine Model/Series:	O-470
Registered Owner:	On file	Rated Power:	265 hp
Operator:	On file	Operating Certificate(s) Held:	None

The airplane was manufactured in 1963 and was equipped with a Continental Motors IO-470 series engine. The airplane's last annual inspection was completed on September 8, 2017. At that time, the airplane had accumulated 5,533.7 total hours, and the tachometer displayed 1,649.2 hours.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	PARS, 51 ft msl	Distance from Accident Site:	9 Nautical Miles
Observation Time:	2213 UTC	Direction from Accident Site:	24°
Lowest Cloud Condition:	Scattered / 300 ft agl	Visibility	10 Miles
Lowest Ceiling:	Broken / 3600 ft agl	Visibility (RVR):	
Wind Speed/Gusts:	3 knots /	Turbulence Type Forecast/Actual:	/ Unknown
Wind Direction:	140°	Turbulence Severity Forecast/Actual:	/ Unknown
Altimeter Setting:	29.68 inches Hg	Temperature/Dew Point:	3° C / 2° C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	RUSSIAN MISSION, AK (9AK2)	Type of Flight Plan Filed:	None
Destination:	BETHEL, AK (BET)	Type of Clearance:	None
Departure Time:	1415 AKD	Type of Airspace:	Class G

The National Transportation Safety Board (NTSB) performed a detailed weather study for this accident. Russian Mission Airport, located about 9 nautical miles (nm) north-northeast of the accident site, was the closest airport with official weather observations. At 1413 (about 17 minutes before the accident), a METAR reported the following information: wind from 140° at 3 knots; visibility 10 statute miles; scattered clouds at 300 ft agl, scattered clouds at 2,600 ft agl, and broken ceiling at 3,600 ft agl; temperature 37°F; dew point 36°F; and altimeter setting 29.68 inches of mercury. At 1446 (about 16 minutes after the accident), a METAR reported the following information: wind from 170° at 4 knots; visibility 10 statute miles with light rain; scattered clouds at 1,000 ft agl, broken ceiling at 2,300 ft agl, and overcast skies at 3,400 ft; temperature 37°F; dew point 34°F; and altimeter setting 29.68 inches of mercury. In addition, the 1446 METAR reported that the rain began at the airport at 1432.

Marshall Don Hunter Sr. Airport, Marshall, Alaska, the next closest airport with official weather observations, was located 21 nm northwest of the accident site. At 1356 (34 minutes before the accident), a METAR reported wind from 250° at 4 knots, visibility 10 statute miles, broken ceiling at 2,700 ft agl and overcast skies at 3,500 ft agl, temperature 37°F, dew point 35°F, and altimeter setting 29.67 inches of mercury.

Only one pilot report (PIREP) was available for the 3 hours surrounding the accident at an altitude below 18,000 ft and within 200 nm of the accident site. The PIREP was reported over Aniak, Alaska (about 50 nm southeast of the accident site), at 1512. The pilot of a Cessna 208 reported an overcast ceiling at 700 ft with cloud tops at 4,000 ft.

The area forecast issued at 1206, which was valid at the time of the accident, forecasted an AIRMET for instrument conditions, broken to overcast ceiling at 300 ft with cloud tops at 10,000 ft, and visibilities below 1 mile in mist with improving conditions forecast into the afternoon and evening hours.

The closest National Weather Service Weather Surveillance Radar-1988, Doppler (WSR-88D) was near PABE, located 52 miles south-southwest of the accident site. The radar detected reflectivity targets and associated rain showers above the accident site at 1422 and 1432. The area of rain showers was moving from southwest to northeast and had moved over and past the accident site between 1402 and 1442. No lightning strikes were at or near the accident site at the accident time.

The FAA's aviation weather cameras in Russian Mission showed the weather conditions surrounding the time of the accident. Images from the south- and southwest-facing cameras depicted rain shower conditions with the rain showers moving across the area with low ceiling and visibility conditions within the rain showers beyond the visibility reference point. The south-facing camera also indicated a low bank of clouds toward the Yukon River, the accident site, and along the intended flight route.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Fatal	Latitude, Longitude:	61.640000, -161.445556

The airplane was located about 10 miles southwest of Russian Mission, submerged about 15 ft in the Yukon River. The main wreckage was recovered and moved ashore. A portion of the forward fuselage, the engine, and the wings were located but could not be recovered. The location of these parts items has been confirmed using SONAR equipment and will be examined if they are eventually recovered at a later date.

The horizontal and vertical stabilizers remained attached to the empennage. The vertical stabilizer and left horizontal stabilizer were relatively free of impact damage. About 3 ft of the outboard portion of the right horizontal stabilizer and elevator was displaced about 45° up and was absent any leading-edge nicks or gouges.

The aft fuselage separated from the forward fuselage at the upper production joint near the forward end of the rear windows. The rivets from the upper production joint on the left side were pulled through the joint, which was consistent with the left wing rotating forward during impact. The rivets from the upper production joint on the right side did not pull but were popped out, which was consistent with the right wing rotating aft during impact.

The front left (pilot) seat was located about 5 miles downstream from the main wreckage location. The seat did not show any evidence of compression damage. The front right (copilot) seat was located about 10 miles downstream from the main wreckage location. Compression damage appeared on the bottom of the seat on the right side. More compression was found on the forward right side of the seat than on the rear right side. The left side of the seat showed relatively little crushing damage.

Medical And Pathological Information

The State of Alaska Medical Examiner's Office, Anchorage, Alaska, conducted an autopsy of the pilot. His cause of death was multiple blunt force injuries.

The FAA's Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed toxicology testing on specimens from the pilot, which were negative for drugs, ethanol, and carbon monoxide.

Tests And Research

The airplane was equipped with a J.P. Instruments (JPI) Engine Data Monitor (EDM) model 730, installed under STC SA00432SE and STC SA2586NM. The EDM model 730 is a panel-mounted LCD display that can monitor and record up to 24 parameters related to engine operations, including cylinder head temperature for each cylinder, exhaust gas temperature for each cylinder, fuel flow, fuel pressure, RPM, manifold pressure, and oil pressure and temperature.

The EDM was removed from the accident airplane and sent to the NTSB's Vehicle Recorders Laboratory in Washington, DC, for download. The data began recording at 1418:42 and were recorded in 6-second intervals. At 1420:30 and 1421:30, the engine parameters appeared consistent with the engine run-up. The manifold pressure, rpm, and other engine parameters appeared consistent with the takeoff roll at 1421:40.

For about the next 9.5 minutes, until the data recording ended at 1431:06, all engine parameters appeared nominal. Specifically, the final set of recorded data indicated that the cylinder head temperatures ranged from 290° to 365° F, exhaust gas temperatures ranged from 1,404° to 1,503° F, fuel flow was 13.1 gallons per hour, rpm was 2,415, manifold pressure was 23.4 inches of mercury, oil pressure was 39 psi, and oil temperature was 123° F. The EDM specialist's factual report is in the public docket for this accident.

The attitude indicator was also removed from the airplane and was examined by the NTSB Materials Laboratory in Washington, DC. The indicator's glass face was intact with slight scratching damage. No significant deformation damage was found on the outside of the case.

After disassembly, the gimbals were found to move freely. Further disassembly to the gyro revealed wetness and corrosion, but the rotor spun freely on the shaft within its housing. No scoring or deep gouge marks were observed in either the rotor or gyro housing surfaces.

Additional Information

An FAA safety brochure, titled "Spatial Disorientation Visual Illusions," included the following information:

The flight attitude of an airplane is generally determined by the pilot's visual reference to the natural horizon. When the natural horizon is obscured, attitude can sometimes be maintained by visual reference to the surface below. If neither horizon nor surface visual references exist, the airplane's attitude can only be determined by artificial means such as an attitude indicator or other flight instruments. Surface references or the natural horizon may at times become obscured by smoke, fog, smog, haze, dust, ice particles, or other phenomena, although visibility may be above VFR minimums. This is especially true at airports located adjacent to large bodies of water or sparsely populated areas, where few, if any, surface references are available. Lack of horizon or surface reference is common on over-water flights, at night, or in low visibility conditions.

To prevent spatial disorientation, the brochure recommended relying on flight instruments when flying in reduced visibility conditions and not attempting visual flight when there is a possibility of being trapped in deteriorating conditions.

Preventing Similar Accidents

Reduced Visual References Require Vigilance

About two-thirds of general aviation accidents that occur in reduced visibility weather conditions are fatal. The accidents can involve pilot spatial disorientation or controlled flight into terrain.

Preflight weather briefings are critical to safe flight. In-flight weather information can also help pilots make decisions, as can in-cockpit weather equipment that supplements official information. In-cockpit equipment requires an understanding of the features and limitations.

We often see pilots who decide to turn back after they have already encountered weather, at which point, it is too late. Pilots shouldn't allow a situation to become dangerous before deciding to act. Additionally, air traffic controllers are there to help; be honest with them about your situation and ask for help.

Even when flying at night, visual weather conditions can also be challenging. Remote areas with limited ground lighting provide limited visual reference cues for pilots, which can be disorienting or render rising terrain visually imperceptible. Topographic references can help

pilots become more familiar with the terrain. The use of instruments, if pilots are proficient, can also help pilots navigate these challenging areas.

See http://www.nts.gov/safety/safety-alerts/documents/SA_020.pdf for additional resources.

The NTSB presents this information to prevent recurrence of similar accidents. Note that this should not be considered guidance from the regulator, nor does this supersede existing FAA Regulations (FARs).

Administrative Information

Investigator In Charge (IIC):	David S Williams	Report Date:	11/05/2018
Additional Participating Persons:	Doug Lowery; FAA; Bethel, AK Mike Council; Continental Motors; Mobile, AL		
Publish Date:	11/05/2018		
Note:	The NTSB traveled to the scene of this accident.		
Investigation Docket:	http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=96204		

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).