



## National Transportation Safety Board Aviation Accident Factual Report

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<b>Location:</b>	Ellendale, MN	<b>Accident Number:</b>	CEN17LA101
<b>Date &amp; Time:</b>	02/02/2017, 1955 CST	<b>Registration:</b>	N9149V
<b>Aircraft:</b>	MOONEY M20C	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Miscellaneous/other	<b>Injuries:</b>	1 Serious
<b>Flight Conducted Under:</b>	Part 91: General Aviation - Business		

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On February 2, 2017, about 1955 central standard time, N9149V, a Mooney M20C, collided with a field in Ellendale, Minnesota, after the pilot became incapacitated during the flight. The pilot was seriously injured and the airplane was substantially damaged. The airplane was registered to and operated by the pilot under the provisions of 14 *Code of Federal Regulations* Part 91 as a business flight. Visual meteorological conditions prevailed and an instrument flight rules flight plan was filed. The flight originated from the Duluth International Airport (DLH), Duluth, Minnesota, at 1808, with an intended destination of the Winona Municipal Airport (ONA), Winona, Minnesota.

Earlier on the day of the accident the pilot flew the airplane from ONA to Thunder Bay (CYQT), Ontario (CYQT). The weather was cold so he had the airplane heater on for the entire trip. The pilot stated he had a slight headache during the last 10 to 15 minutes of the 2 hour 30-minute flight. After landing, while in the fixed base operator, the headache remained and he felt "butterflies" in his stomach which he likened to a feeling of anxiety. The pilot attributed his headache to not having any caffeine in the morning and having possibly picked up an illness from a family member and he attributed the anxiety to his concern about following proper customs procedures.

The pilot stated the headache continued during the morning until he drank coffee which seemed to help. The pilot had the airplane preheated and departed CYQT about 1600 for the 1 hour 20-minute flight to DLH. The pilot reported he did not have a headache during the flight, but the headache returned after he landed at DLH. The pilot expedited his time on the ground at DLH because he was concerned about getting the engine started in the cold weather. He stated he started the airplane and sat in it while he filed his flight plan and "took my time getting the cockpit organized for the flight." The pilot received his IFR clearance to fly as filed to ONA at 6,000 ft above mean sea level (msl) and to expect a clearance to 9,000 ft msl, 10 minutes after takeoff. The pilot read back the clearance and requested to taxi.

The pilot still had a headache and experienced another episode of "butterflies" while taxiing to the runway. He stated the symptoms were more intense than they were in the morning. He stated the symptoms subsided by time he reached the runway, and he felt "good" but became

"hyper focused." He performed an engine runup and performed the takeoff checklist 3 or 4 times and repeatedly checked the avionics and instruments, which was not his normal routine. The airport tower controller asked him if he was ready to takeoff, which he stated "snapped" him out of repeating the takeoff checklist. Air traffic control (ATC) recordings show the pilot was in the airplane with it running for at least 12 minutes prior to taking off.

The pilot stated he remembers being cleared to a heading of 240° and setting the autopilot heading bug prior to taking off. While climbing out, he experienced another case of the "butterflies". He stated he began the turn and activated the autopilot during the turn. The last thing he remembers is being cleared to 6,000 ft msl on a heading of 240°. ATC transcripts recordings show the pilot communicated with ATC for the first four minutes of the flight. About three minutes after takeoff, the DLH tower controller instructed the pilot to contact departure control. The pilot acknowledged the instruction and attempted to check in with departure control while still on the tower control frequency. The controller informed the pilot that he was still on the tower frequency. At 1812:18, the pilot once again attempted to contact departure control without having changed the frequency. This was the last communication from the pilot.

Both the DLH controller and controllers in the Minneapolis Air Route Traffic Center made numerous attempts to contact the pilot, including having other pilots attempt to make radio contact. Radar data showed the airplane flew a ground track of 190 to 200 degrees at altitudes that exceeded 12,000 ft msl. The last radar contact was at 1952:47 at an altitude of 2,300 ft msl about 1 mile north-northeast of the accident site, which was about 80 miles west of ONA.

The pilot remained unresponsive until after the airplane impacted a field in a relatively level attitude. The pilot recalled waking up and thinking that he fell asleep for a few minutes. He stated he keyed the microphone to let air traffic control know that he was alright and noticed that the windscreen was "clear." He reached his hand out the hole in the windscreen which is when he realized that he was no longer flying. He stated he was very confused and had loud ringing in his ears at this point. The pilot freed his legs from the wreckage and he exited the airplane. He stated he was very weak and had difficulty with his balance and ability to walk. The pilot eventually made his way to a house about 500 ft from the accident site. It is unknown how long the pilot was unconscious after the impact. However, the last radar contact was at 1955 and the 911 call from the house was placed at 2107.

A postaccident examination of the airplane revealed that both the left and right fuel tanks were empty. The cabin heat control was full out (on) and the cabin vent control was full in (off). The exhaust muffler contained several cracks, one of which contained soot/exhaust deposits on the fractured surfaces. The inside of the exhaust shroud contained sooting as did the scat tubing leading from the muffler. The pilot reported he had the heater "full-on" during all three of the flights on the day of the accident and he did not have a CO detector in the airplane.

A review of maintenance records showed a new exhaust system was installed on the airplane on January 25, 2007, at a tachometer time of 2,343 hours. The last annual inspection was conducted February 2, 2016, at a tachometer time of 2998.0 hours. The tachometer time at the time of the accident was 3,081 hours.

The pilot provided his postaccident medical records for the National Transportation Safety Board (NTSB). The NTSB Chief Medical Officer reviewed the records and reported the pilot was treated for injuries sustained during the accident and for frostbite. At 0018, on the morning following the accident, the pilot's blood was drawn for tests which included carbon monoxide (CO) levels. At that time, the CO level was 13.8%.

Carbon monoxide is an odorless, tasteless, colorless, nonirritating gas formed by hydrocarbon combustion. CO binds to hemoglobin with much greater affinity than oxygen, forming carboxyhemoglobin; elevated levels result in impaired oxygen transport and utilization. Nonsmokers may normally have up to 3% carboxyhemoglobin in their blood; heavy smokers may have levels of 10 to 15%. The pilot was a nonsmoker.

The degree of carboxyhemoglobinemia is primarily related to the relative amounts of CO and oxygen in the environment and the duration of exposure. Once exposure to the CO decreases or ends, oxygen molecules batter the receptor and slowly knock the CO off so it can be exhaled. This process is more efficient when there are more oxygen molecules in the blood. The half-life (the time it takes to get rid of 1/2 the CO) of CO with a patient breathing ambient air at sea level (21% oxygen) is about 4 – 5 hours; once the person is breathing high flow oxygen, the half-life of CO drops to about 90 minutes. Given the half-life of 4 – 5 hours while breathing ambient air, the pilot's CO level at the time of the accident was at least 28% and most likely significantly higher because oxygen was administered in varying amounts during the first few hours of his postaccident medical care.

## Pilot Information

<b>Certificate:</b>	Flight Instructor; Commercial	<b>Age:</b>	39, Male
<b>Airplane Rating(s):</b>	Single-engine Land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	3-point
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	Airplane Single-engine	<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 3 Without Waivers/Limitations	<b>Last FAA Medical Exam:</b>	08/30/2016
<b>Occupational Pilot:</b>	No	<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	2108 hours (Total, all aircraft), 680 hours (Total, this make and model), 2138 hours (Pilot In Command, all aircraft), 20 hours (Last 90 days, all aircraft), 11 hours (Last 30 days, all aircraft), 4 hours (Last 24 hours, all aircraft)		

## Aircraft and Owner/Operator Information

Aircraft Make:	MOONEY	Registration:	N9149V
Model/Series:	M20C	Aircraft Category:	Airplane
Year of Manufacture:	1969	Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	690026
Landing Gear Type:	Retractable - Tricycle	Seats:	4
Date/Type of Last Inspection:	02/02/2016, Annual	Certified Max Gross Wt.:	2575 lbs
Time Since Last Inspection:	83 Hours	Engines:	1 Reciprocating
Airframe Total Time:	3081 Hours at time of accident	Engine Manufacturer:	LYCOMING
ELT:	Installed, not activated	Engine Model/Series:	O&VO-360 SER
Registered Owner:	On file	Rated Power:	0 hp
Operator:	On file	Operating Certificate(s) Held:	None

## Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Night
Observation Facility, Elevation:	KAEL, 1261 ft msl	Distance from Accident Site:	15 Nautical Miles
Observation Time:	1955 CST	Direction from Accident Site:	184°
Lowest Cloud Condition:	Clear	Visibility	10 Miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	6 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	300°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30.38 inches Hg	Temperature/Dew Point:	-10°C / -16°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Duluth, MN (DLH)	Type of Flight Plan Filed:	IFR
Destination:	Winona, MN (ONA)	Type of Clearance:	IFR
Departure Time:	1808 CST	Type of Airspace:	Class D; Class E; Class G

## Wreckage and Impact Information

Crew Injuries:	1 Serious	Aircraft Damage:	Substantial
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Serious	Latitude, Longitude:	43.898056, -93.348611

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Pamela S Sullivan
<b>Additional Participating Persons:</b>	Dave Nelsen; FAA; Minneapolis, MN John Butler; Lycoming; Williamsport, PA
<b>Note:</b>	The NTSB did not travel to the scene of this accident.
<b>Investigation Docket:</b>	<a href="http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=94693">http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=94693</a>