Aviation Investigation Final Report

Location:	Alexandria, Minnesota	**Accident Number:**	CEN18FA297
Date & Time:	July 28, 2018, 19:20 Local	**Registration:**	N85506
Aircraft:	Aeronca 7AC	**Aircraft Damage:**	Substantial
Defining Event:	Low altitude operation/event	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The private pilot was conducting a personal flight in the airplane. Multiple witnesses reported seeing the airplane flying at a low altitude and track data recovered from the pilot's mobile phone revealed that he had flown the airplane at an altitude that was less than 50 ft above the ground for most of the flight over and near a lake. One of the witnesses reported that the pilot would often overfly his house at a low altitude. The airplane subsequently collided with power lines over a road and impacted terrain.

Postaccident examination of the airplane and engine revealed no evidence of preimpact mechanical malfunctions or failures that would have precluded normal operation. The accident occurred during daylight hours and in visual meteorological conditions that included a clear sky and a 10-mile surface visibility. The position of the sun relative to the airplane's final flightpath would not have hindered the pilot's ability to see and avoid the power lines. Thus, the airplane struck the power lines because of the pilot's intentional low-altitude flight.

Postmortem toxicology testing identified 0.029 gm/dl and 0.053 gm/dl of ethanol in the pilot's blood and vitreous specimens, respectively. The reported levels were consistent with recent ingestion of alcohol by the pilot. Even at low levels, ethanol can affect judgment and decision-making as well as impair the psychomotor functioning necessary for safe flight. However, in this case, the pilot had a habit of flying in a reckless manner at low altitudes. As a result, the investigation was unable to determine if the effects of the likely ingested alcohol contributed to the accident.

Probable Cause and Findings

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

The pilot's intentional low-altitude flight, which resulted in an impact with power lines.

Findings

Personnel issues	Decision making/judgment - Pilot
Personnel issues	Monitoring environment - Pilot
Aircraft	Altitude - Not attained/maintained
Environmental issues	Wire - Effect on equipment
Personnel issues	Alcohol - Pilot

Factual Information

History of Flight

Maneuvering-low-alt flying	Low altitude operation/event (Defining event)
Maneuvering-low-alt flying	Collision with terr/obj (non-CFIT)

On July 28, 2018, at 1920 central daylight time, an Aeronca 7AC airplane, N85506, was substantially damaged when it was involved in an accident near Alexandria, Minnesota. The private pilot was fatally injured. The airplane was operated as a Title 14 Code of Federal Regulations (CFR) Part 91 personal flight.

According to track data recovered from the pilot's mobile telephone, the flight departed from Chandler Field Airport (AXN), Alexandria, Minnesota, at 1915, and flew north and climbed to a maximum altitude of 1,870 ft mean sea level (msl) (about 478 ft above the ground) before it entered a left descending turn. At 1917:20, the airplane flew over the north shore of a lake on a southwest course, at an altitude of 1,722 ft mean sea level (about 330 ft above the ground), and at a groundspeed of 80 knots. At 1918:00, the airplane continued on a southwest course over the lake at an altitude of 1,372 ft msl (about 12 ft above the surface) and a groundspeed of 74 knots. At 1919:40, the airplane made a left turn. The airplane was still about 12 ft above the lake while flying parallel to the shoreline on a south-southeast course. The airplane then made a left turn. At 1919:20, the airplane flew over the southwest shoreline while on a west-northwest course; the airplane's altitude remained at 1,372 ft msl, and its groundspeed increased to 78 knots. The airplane continued to the west-northwest and then turned north. At 1920:07, the airplane was heading north while at an altitude of 1,415 ft msl (about 13 ft above the ground) and at a groundspeed of 73 knots. The airplane's groundspeed decelerated to zero shortly afterward.

The airplane wreckage was located near the airplane's last recorded position in an area with multiple power lines that had been struck and a fractured power line pole.

Multiple witnesses saw and/or heard the airplane before the accident. Two witnesses reported that the airplane had approached their cabin (on the north shore of the lake) from the northeast and overflew the cabin at treetop level, which they estimated to be about 50 ft above the ground. One of these witnesses stated that the airplane had "barely cleared the trees" when it overflew his cabin. The witnesses reported that the airplane then descended below treetop level while flying south over the lake. The witnesses stated that they observed the airplane complete at least two low passes over a house located at the southwest side of the lake.

Another witness, who was a friend of the pilot, owned the house on the southwest side of the lake that was referenced by the two witnesses. This witness was inside his house when he heard an airplane overfly the house. The witness reported that the pilot would often overfly his house at a low altitude. The witness stated that the engine sounded normal when the airplane overflew his house. The accident site was located about 1 mile north-northwest of his house.

Three additional witnesses, located about ¼ mile northeast of the accident site, reported seeing the airplane approach their position at a low altitude. The witnesses reported that the airplane was flying toward the northwest when it descended behind a small ridge and collided with power lines. Two of these witnesses reported that they couldn't hear the engine as the airplane approached their position, but they noted that music was playing in the background at the time. The witnesses reported that the music should not have precluded them from hearing engine sounds because they were able to hear a "thud" when the airplane impacted the ground.

Pilot Information

Certificate:	Private	**Age:**	64,Male
Airplane Rating(s):	Single-engine land; Single-engine sea	**Seat Occupied:**	Front
Other Aircraft Rating(s):	None	**Restraint Used:**	Lap only
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	October 28, 2016
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 500 hours (Total, all aircraft)		

The pilot's logbook was not recovered, so the pilot's recent flight experience and his number of hours flying the accident airplane make and model could not be determined.

Aircraft and Owner/Operator Information

Aircraft Make:	Aeronca	**Registration:**	N85506
Model/Series:	7AC	**Aircraft Category:**	Airplane
Year of Manufacture:	1946	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	7AC-4246
Landing Gear Type:	Tailwheel	**Seats:**	2
Date/Type of Last Inspection:	June 28, 2018 Annual	**Certified Max Gross Wt.:**	1300 lbs
Time Since Last Inspection:	12 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	5991.72 Hrs at time of accident	**Engine Manufacturer:**	Continental
ELT:	C91 installed, not activated	**Engine Model/Series:**	C90-8F
Registered Owner:		**Rated Power:**	90 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

The maintenance records showed no unresolved airworthiness issues.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	AXN,1425 ft msl	**Distance from Accident Site:**	3 Nautical Miles
Observation Time:	18:53 Local	**Direction from Accident Site:**	113°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots /	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:	350°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	30.12 inches Hg	**Temperature/Dew Point:**	26°C / 12°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Alexandria, MN (AXN)	**Type of Flight Plan Filed:**	None
Destination:	Alexandria, MN (AXN)	**Type of Clearance:**	None
Departure Time:	19:15 Local	**Type of Airspace:**	Class E

At the time of the accident, the sun was about 14.85° above the horizon to the west-northwest (281.92°). Sunset was at 2056 on the day of the accident.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	45.882499,-95.449722

The main wreckage was located in a grass drainage ditch northwest of the airplane's last recorded position. Multiple power lines and a power pole had been struck and were lying across a road on a northwest heading. The main wreckage consisted of the entire airplane, which was found inverted in the drainage ditch facing south. There was no evidence of fire.

Flight control cable continuity was established from each flight control surface to its respective cockpit control. Both main landing gear oleo-struts and the propeller exhibited damage consistent with an in-flight wire impact. There was no evidence of a wire strike on either wing or the empennage.

The forward seat throttle was positioned about three-quarters of full travel. The primer control was pushed in and secured. The magneto switch was in the BOTH position. The carburetor heat control and the cabin heat control were in the OFF position. The airplane's only circuit breaker was not tripped.

The fuel shutoff valve was in the ON position. The fuel caps were remained secured on all fuel tanks. Fuel was observed in the main/header tank and both auxiliary wing tanks. Collected fuel samples had a color (blue) and a smell consistent with 100 low-lead aviation fuel and did not exhibit any evidence of water or particulate contamination. The fuel selectors for the auxiliary wing tanks were in the OFF position. A functional test of the fuel shutoff valve revealed no anomalies and confirmed that fuel flow was from the main/header tank. The fuselage-mounted gascolator had shattered during impact, and fuel was observed flowing from the fuel supply line.

The engine remained attached to the firewall. The propeller remained attached to the propeller flange. One propeller blade was bent aft about midspan and exhibited chordwise scratching and leading edge gouging that were consistent with an in-flight wire strike. The other propeller blade exhibited a slight aft bend, a single leading edge gouge, and minor chordwise scratching near the blade tip. Internal engine and valve train continuity were confirmed by rotating the propeller. Compression and suction were noted on all cylinders along with crankshaft rotation, and acceptable cylinder pressures were measured using a differential pressure gauge. The induction manifold and intake pipes exhibited signatures of normal operation with no excessive fuel staining observed.

The upper spark plugs were removed and were found to exhibit features consistent with normal engine operation. A borescope inspection of each cylinder revealed no anomalies with the cylinders, pistons, valves, valve seats, or lower spark plugs. The right magneto remained attached to its installation point and provided spark on all posts while the crankshaft was rotated. The left magneto remained attached to the engine, but the impulse coupling did not function as the crankshaft was rotated. The left magneto was removed and provided a spark on all posts when manually rotated. Right magneto-to-engine timing was confirmed to be at the top center on the No. 1 cylinder.

A teardown of the engine revealed no internal component failures. Adequate lubrication oil was observed throughout the engine, and no evidence indicated oil starvation or excessive heat. No metal material was observed after a magnet was passed through the engine sump. The oil filter tube pickup and oil filter screen were free of metallic material. Throttle control cable continuity was confirmed from the cockpit to the carburetor throttle arm. The carburetor mixture arm was safety-wired in the full rich position. The carburetor bowl did not contain evidence of water or particulate contamination. Disassembly of the carburetor revealed no anomalies with the single-piece venturi, metal floats, or needle valve.

Postaccident examination of the airframe and engine revealed no anomalies that would have precluded normal operation during the flight.

Medical and Pathological Information

The Midwest Medical Examiner's Office, Ramsey, Minnesota, performed an autopsy of the pilot. His cause of death was blunt-force injuries. Toxicology testing performed at the FAA Forensic Sciences Laboratory identified 0.029 gm/dl of ethanol in the pilot's blood specimens, 0.053 gm/dl of ethanol in the pilot's vitreous specimens, and naproxen in the pilot's urine specimens.

Ethanol is the intoxicant commonly found in beer, wine, and liquor. Ethanol acts as a central nervous system depressant. After ingestion at low doses, ethanol impairs judgment, psychomotor functioning, and vigilance; at higher doses, ethanol can cause coma and death. The effects of ethanol on aviators are generally well understood; it significantly impairs pilots' performance, even at very low levels. Because ingested alcohol is distributed throughout the body, levels from different postmortem tissues are usually similar. Ethanol may also be produced in body tissues by postmortem microbial activity, but intact vitreous is relatively protected from the effects of microbial activity. Because of the characteristics of the wall of eye globe, ethanol may be slow to collect in vitreous, and levels may drop more slowly than blood levels after alcohol ingestion has stopped.

FAA regulation (14 CFR 91.17) prohibits any person from acting or attempting to act as a crewmember of a civil aircraft while having 0.040 gm/dl or more ethanol in the blood.

Naproxen, often marketed with the brand name Aleve, is a mild anti-inflammatory drug available over the counter. It is not considered impairing.

Administrative Information

Investigator In Charge (IIC):	Fox, Andrew
Additional Participating Persons:	Scott F Carlson; Federal Aviation Administration - Minneapolis FSDO; Minneapolis, MN Todd G Roth; Federal Aviation Administration - Minneapolis FSDO; Minneapolis, MN
Original Publish Date:	April 20, 2020
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=97909