



AVIATION



HIGHWAY



MARINE



RAILROAD



PIPELINE

# Aviation Investigation Final Report

<b>Location:</b>	Eufaula, Oklahoma	<b>Accident Number:</b>	CEN15FA171
<b>Date &amp; Time:</b>	March 12, 2015, 23:15 Local	<b>Registration:</b>	N919EM
<b>Aircraft:</b>	Eurocopter AS 350 B2	<b>Aircraft Damage:</b>	Destroyed
<b>Defining Event:</b>	Loss of visual reference	<b>Injuries:</b>	1 Fatal, 2 Serious
<b>Flight Conducted Under:</b>	Part 135: Air taxi & commuter - Non-scheduled - Air Medical (Unspecified)		

## Analysis

The commercial pilot was conducting a positioning flight back to the base after conducting an emergency medical services flight during which a patient was transported to a hospital. According to one of the two medical crewmembers onboard the flight, the crew checked the weather before the flight, and the report showed ceilings at 8,500 ft. and 6 miles visibility at their intended destination and ceilings at 10,000 ft. at the departure location. During the flight to transport the patient, the pilot stated that the clouds above their cruise altitude were lower than he expected. The pilot descended the helicopter and landed it at the hospital helipad without incident. While on the ground, the pilot checked the weather conditions again, and they were the same. After the pilot conferred with the medical crew per their risk management procedures, they decided to return to their base as planned.

During the accident flight, the helicopter was southbound at a cruise altitude of about 1,500 ft. mean sea level (msl) in an area with a terrain elevation of about 700 to 900 ft. msl, and dark night visual meteorological conditions existed. According to the medical crewmembers, about midway to their destination, the helicopter entered instrument meteorological conditions (IMC). After a brief discussion, during which one of the crewmembers told the pilot to go "up," the pilot stated he was going to divert to another airport because he saw lights, and he then began a left turn.

Although both crewmembers reported seeing trees and one of them told the pilot to "pull up," shortly after, the helicopter impacted trees and terrain atop a wooded hill at an elevation of about 840 ft. msl, which resulted in the separation of the tailboom and portions of the fuselage; the main wreckage came to rest on its right side.

A meteorological reporting station located about 20 miles north-northwest of the accident location reported a broken ceiling at 2,400 ft. above ground level (agl) and 10 statute miles visibility at the time of the accident. Another meteorological reporting station located about 28 miles south of the accident location reported cloud bases between 900 and 2,100 ft. agl at the time of the accident. An examination of the helicopter revealed no preimpact anomalies that would have precluded normal operation. It is likely that the pilot experienced spatial disorientation during a turn after inadvertently entering IMC,

which resulted in the helicopter descending into trees atop high terrain.

Zolpidem, which is a prescription hypnotic medication used to treat insomnia and may impair mental and/or physical ability required to perform potentially hazardous tasks such as driving or operating heavy machinery, was detected in the pilot's blood and liver. Given it was not detected in the central blood, it could not be determined whether or to what extent it might have impaired the pilot .

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The flight's inadvertent encounter with night instrument meteorological conditions, which resulted in the pilot turning the helicopter and subsequently descending into trees and terrain due to spatial disorientation.

Findings	
Personnel issues	Spatial disorientation - Pilot
Environmental issues	Clouds - Effect on operation
Environmental issues	Mountainous/hilly terrain - Contributed to outcome
Aircraft	Altitude - Not attained/maintained

## Factual Information

### History of Flight

<b>Enroute-cruise</b>	VFR encounter with IMC
<b>Enroute-cruise</b>	Loss of visual reference (Defining event)
<b>Enroute-change of cruise level</b>	Controlled flight into terr/obj (CFIT)
<b>Post-impact</b>	Part(s) separation from AC
<b>Post-impact</b>	Roll over
<b>Post-impact</b>	Cabin safety event

On March 12, 2015, about 2315 central daylight time, a Eurocopter AS350 B2 helicopter, N919EM, impacted trees and terrain while maneuvering near Eufaula, Oklahoma. The commercial pilot was fatally injured, and the two medical crewmembers sustained serious injuries. The helicopter was destroyed. The helicopter was registered to and operated by Eagle Med, LLC, Wichita, Kansas, as Eagle Med 35, a 14 Code of Federal Regulations Part 135 emergency medical services (EMS) positioning flight. Dark night visual meteorological conditions prevailed at the time of the accident, and a company visual flight rules flight plan had been filed. The helicopter departed from St. Francis Hospital Heliport (4OK3), Tulsa, Oklahoma, about 2248 and was destined for McAlester Regional Airport (MLC), McAlester, Oklahoma.

According to the two medical crewmembers, one of whom was an emergency medical technician (EMT) and one of whom was a flight nurse, the crew checked the weather before the previous flight to transfer a patient to 4OK3, and the report showed ceilings at 8,500 ft and 6 miles visibility at MLC and ceilings at 10,000 ft. at 4OK3. During the flight to transport the patient, the pilot stated that the clouds above their cruise altitude were lower than he expected. The pilot descended the helicopter and then landed it at 4OK3 without incident. While on the ground at 4OK3, the pilot checked the weather conditions again, and they were the same. The pilot conferred with the medical crew per their risk management procedures, and they decided to return to MLC as planned. The helicopter took off and headed southbound at a cruise altitude of about 1,500 ft. mean sea level (msl) in an area with a terrain elevation of about 700 to 900 ft. msl.

The EMT, seated in the far left back seat, stated that they were about halfway to MLC when they suddenly entered instrument meteorological conditions (IMC). He recalled the pilot saying that this was "not good." He told the pilot to climb to 3,500 ft., but he did not think the pilot initiated a climb. He also told the pilot that he could see lights on the horizon. The pilot asked him to "tell him about those lights." He told the pilot, "They are to the left" and gestured a left turn with his hands. The EMT said that he then saw a strobe flash and trees and said, "pull up," but the helicopter crashed.

The flight nurse, seated in the far right back seat, stated that as they departed the Tulsa area, she began monitoring their route on the chart. She added that they were practicing a procedure regarding inadvertently encountering IMC when the EMT said, "We're in a cloud." The pilot responded, "What do

I do now?" and the EMT answered, "go up." The pilot then said that he was proceeding to Okmulgee, Oklahoma, because he could see lights to the left. He then said, "I'm turning left." When he started the turn, the EMT began yelling "pull up." The pilot then said, "What's that noise?" The EMT responded, "that's your 500" (altitude warning). The flight nurse said she started seeing trees and then did not see or hear anything after that.

The helicopter had an EMS Sky Connect GPS transmitter that sent 39 messages to the company containing location information and device power status. The last three messages showed the helicopter as it approached the accident site. The third-from-the-last message showed the helicopter on a 173° heading at 414 ft. and a ground speed of 118 knots. The next-to-last message showed the helicopter on a 146° heading at 397 ft. and a ground speed of 110 knots. The last message showed the helicopter on a 172° heading at 380 ft. and a ground speed of 119 knots.

### Pilot Information

<b>Certificate:</b>	Commercial	<b>Age:</b>	41, Male
<b>Airplane Rating(s):</b>	Single-engine land	<b>Seat Occupied:</b>	Right
<b>Other Aircraft Rating(s):</b>	Helicopter	<b>Restraint Used:</b>	3-point
<b>Instrument Rating(s):</b>	Airplane; Helicopter	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 2 Without waivers/limitations	<b>Last FAA Medical Exam:</b>	August 23, 2014
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	February 24, 2014
<b>Flight Time:</b>	2385 hours (Total, all aircraft), 135 hours (Total, this make and model), 2085 hours (Pilot In Command, all aircraft), 21 hours (Last 90 days, all aircraft), 8 hours (Last 30 days, all aircraft)		

The pilot held a commercial pilot certificate with single-engine land airplane, helicopter, and instrument ratings. On August 23, 2014, he was issued a second-class medical certificate with no limitations.

Company records showed that the pilot had flown 2,384.7 total hours and 7.6 hours in the 30 days before the accident. The records also showed that the pilot successfully completed a flight review in the accident make and model helicopter on February 24, 2014.

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Eurocopter	<b>Registration:</b>	N919EM
<b>Model/Series:</b>	AS 350 B2	<b>Aircraft Category:</b>	Helicopter
<b>Year of Manufacture:</b>	2006	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	4113
<b>Landing Gear Type:</b>	High skid; Skid	<b>Seats:</b>	3
<b>Date/Type of Last Inspection:</b>	March 9, 2015 100 hour	<b>Certified Max Gross Wt.:</b>	4960 lbs
<b>Time Since Last Inspection:</b>	91 Hrs	<b>Engines:</b>	1 Turbo shaft
<b>Airframe Total Time:</b>	1942.5 Hrs at time of accident	<b>Engine Manufacturer:</b>	Turbomeca
<b>ELT:</b>	C126 installed, activated, aided in locating accident	<b>Engine Model/Series:</b>	Arriel 1D1
<b>Registered Owner:</b>	EAGLEMED LLC	<b>Rated Power:</b>	712 Horsepower
<b>Operator:</b>	EAGLEMED LLC	<b>Operating Certificate(s) Held:</b>	On-demand air taxi (135)
<b>Operator Does Business As:</b>	EAGLEMED LLC	<b>Operator Designator Code:</b>	7EMA

The four-place, single-engine helicopter, serial number 4113, was configured for EMS transport. It was equipped with a single 143-gallon fuel tank and was powered by a 712-horsepower Turbomeca Arriel 1D1 turboshaft engine, serial number 19080.

A review of the company's maintenance records revealed that the helicopter was maintained under a company aircraft inspection program and had undergone a 100-hour inspection on March 9, 2015, at total airframe time of 1,935.2 hours. The Hobbs meter was recovered at the accident site, and it read 1,941.5 hours.

The Federal Aviation Administration (FAA) conducted a ramp inspection of the Eagle Med facility on March 11, 2015, that revealed discrepancies with the night vision goggle (NVG) lighting system and the radio altimeter indicator. The NVG system and radio altimeter were deferred until a 100-hour inspection could be completed on the NVG system and a filter could be replaced on the radio altimeter indicator. Until that was completed, helicopter night vision goggle operations were not permitted.

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Unknown	<b>Condition of Light:</b>	Night/dark
<b>Observation Facility, Elevation:</b>	KOKM, 720 ft msl	<b>Distance from Accident Site:</b>	19 Nautical Miles
<b>Observation Time:</b>	23:15 Local	<b>Direction from Accident Site:</b>	338°
<b>Lowest Cloud Condition:</b>	2400 ft AGL	<b>Visibility</b>	10 miles
<b>Lowest Ceiling:</b>	Broken / 2400 ft AGL	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	3 knots /	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>	20°	<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>	30.12 inches Hg	<b>Temperature/Dew Point:</b>	12°C / 11°C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	TULSA, OK (4OK3)	<b>Type of Flight Plan Filed:</b>	Company VFR
<b>Destination:</b>	MC ALESTER, OK (MLC )	<b>Type of Clearance:</b>	None
<b>Departure Time:</b>	22:48 Local	<b>Type of Airspace:</b>	Class G

A meteorological reporting station was located at Okmulgee Regional Airport, Okmulgee, Oklahoma, about 20 miles north-northwest of the accident location at an elevation of about 720 ft. A 2315 automated weather report indicated wind from 020° at 3 knots, visibility of 10 statute miles or greater, ceiling broken at 2,400 ft. above ground level (agl), broken cloud layer base at 3,000 ft. agl, temperature 12° C, dew point temperature 11° C, and an altimeter setting of 30.13 inches of mercury. From 2015 to 2315, the reported cloud layer was generally at or above 5,000 ft. agl; however, at 2255 (20 minutes before the accident), the reported cloud layer was scattered at 1,100 ft. agl.

A meteorological reporting station was located at MLC about 28 miles south of the accident location at an elevation of 770 ft. At 2053, MLC reported overcast clouds with bases at 9,000 ft. agl. Beginning at 2153 and continuing through the accident time, MLC automated reports indicated that the lowest cloud bases were between 900 and 2,100 ft. agl.

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 Fatal, 2 Serious	<b>Aircraft Damage:</b>	Destroyed
<b>Passenger Injuries:</b>		<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	1 Fatal, 2 Serious	<b>Latitude, Longitude:</b>	35.366664,-95.800003(est)

The accident site was located atop a wooded hill on an embankment next to a creek about 9 miles west of Eufaula at an elevation of 840 ft. msl. The helicopter came to rest on its right side and was oriented on an easterly heading. (See figure 1 for a photograph showing the accident site and main wreckage.)





Figure 1. A photograph showing the accident site and main wreckage.

The initial impact point was a tree about 190 ft. west of the main wreckage. Several trees in the immediate vicinity of the helicopter were broken and showed marks that corresponded with impact marks on the helicopter's fuselage and rotor blades. The wreckage debris path was on a bearing of 093° from the initial tree impact.

The main wreckage consisted of the cabin, fuselage, fuel tank, engine, transmission, main rotor system,

and left skid. The cockpit area, including the instrument panel, windscreens, right side pilot seat, medical litter, and chin windows, was broken downward, separated, and fragmented. The horizontal situation indicator was found with the heading stopped at 093°, the course selector needle was found set to 175°, and the heading bug was found set to 240°. The right cockpit and cabin doors were broken out, twisted, and fragmented. The left cabin and cockpit doors were also broken out. The left cabin door rested on the left skid, and the left cockpit door was behind the helicopter fuselage. The left skid was undamaged. The aft portion of the fuselage was broken upward and twisted about 45° to the right.

The transmission and engine were broken downward and aft but remained intact. The main rotor system mast and head remained attached to the transmission. The three blades remained attached at the head but were displaced aft. The outboard leading edges of all three blades showed gouges and fractures. One blade was bent downward 30° about 5 ft. outboard of the rotor head. The outboard portion of the blade was broken aft about 4 ft. from the bend. The other two blades were broken aft about 5 ft. outboard of the rotor head.

The fuel tank remained intact. During wreckage recovery, about 60 gallons of clean, uncontaminated fuel were removed from the tank.

Adjacent to the right side of the helicopter fuselage, in and along the creek and on the opposite side of the creek, were broken pieces of the right skid, flight publications, medical equipment, pieces of the cabin interior, the right cockpit door, and parts of the right cockpit door frame. The pilot seat was located along the creek aft of the helicopter fuselage. The pilot seat was intact and the restraints were connected. It was separated from the floor track.

The tailboom was separated about 2 ft. aft of the fuselage, was resting upright on the ground about 55 ft. aft of the main wreckage, and was oriented west-northwest, opposite the main wreckage. The top and bottom vertical stabilizers were broken aft. The left horizontal stabilizer was intact but showed upward bends at the inboard trailing edge and aft tip. The right horizontal stabilizer was bent and broken upward and twisted aft. A 6-ft-long piece of broken tree trunk was located beneath the left horizontal stabilizer and along the left side of the tailboom. The tail rotor hub and blades were attached and located beneath the tail rotor gear box. One tail rotor blade was broken near the hub but remained attached. Both blades showed chordwise scratches, and the leading edges and ends of the blades showed bends and gouges. The tail rotor drive shaft was separated torsionally at the connection to the tail rotor gear box and fractured torsionally about 30 inches outboard of the gear box. The drive shaft was also separated about 4 ft. forward of where the tailboom was separated from the fuselage.

Pedal and cyclic control to the main and tail rotor systems was established. The helicopter and all the separated components were recovered for further examination. The examination of the engine, transmission, flight controls, and other systems revealed no preimpact anomalies.

Three personal electronic devices were recovered from the wreckage and sent to the National Transportation Safety Board's Vehicle Performance Laboratory for examination and data extraction; no data pertinent to the accident were extracted. For more information, see the report, "Multiple Electronic Devices," in the public docket for this accident.



## Medical and Pathological Information

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The Board of Medical Investigations, Office of the Chief Medical Examiner, Eastern Division, Tulsa, Oklahoma, conducted an autopsy of the pilot. The pilot's death was attributed to "multiple blunt impact injuries."

The Federal Aviation Administration's Bioaeronautical Sciences Research Laboratory conducted toxicology testing on the pilot's specimens. The tests detected zolpidem in the pilot's blood and liver. Zolpidem is a prescription hypnotic medication used to treat insomnia and may impair mental and/or physical ability required to perform potentially hazardous tasks such as driving or operating heavy machinery.

## Survival Aspects

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After impact, the surviving medical crewmembers egressed the helicopter wreckage, and the EMT immediately called company dispatch to report the accident and their location. Several agencies then used the position report from the crew, data from the on-board GPS, and signals from the 406-MHz emergency locator transmitter to locate the wreckage. Emergency responders hiked in dark night conditions through remote rugged terrain and arrived at the crew's location several hours later.

## Additional Information

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Per company information, in 2012, Eagle Med entered into the FAA's Safety Management System and established a risk management program. Risk mitigation procedures the company follows includes Crew Resource Management and their "EagleMed Three to Go – One to Say No" policy where it takes the consensus of all three crew members to agree to take a mission, but it only takes one crew member to say no to reject a flight.

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Latson, Thomas
<b>Additional Participating Persons:</b>	Matthew Rigsby; FAA AVP-100; Washington, DC Todd Evans; FAA Oklahoma City FSDO; Oklahoma City, OK Dave Doerner; FAA Oklahoma City FSDO; Oklahoma City, OK Ricki Thorpe; Transportation Safety Institute; Oklahoma City, OK Seth Buttner; Airbus Helicopters, Inc; Grand Prairie, TX Manny Figlia; Airbus Helicopters, Inc; Grand Prairie, TX Brian Larimore; Turbomeca USA; Grand Prairie, TX Lance Hofmann; Eagle Med, LLC; Wichita, KS Vincent Ecalle; Bureau d'Enquêtes et d'Analyses; Le Bourget, France
<b>Original Publish Date:</b>	May 23, 2017
<b>Last Revision Date:</b>	
<b>Investigation Class:</b>	<a href="#">Class</a>
<b>Note:</b>	The NTSB traveled to the scene of this accident.
<b>Investigation Docket:</b>	<a href="https://data.nts.gov/Docket?ProjectID=90866">https://data.nts.gov/Docket?ProjectID=90866</a>

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

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](#).