



AVIATION



HIGHWAY



MARINE



RAILROAD



PIPELINE

# Aviation Investigation Final Report

<b>Location:</b>	Talihina, Oklahoma	<b>Accident Number:</b>	CEN13FA344
<b>Date &amp; Time:</b>	June 11, 2013, 18:30 Local	<b>Registration:</b>	N935EM
<b>Aircraft:</b>	Eurocopter AS350B2	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Loss of control in flight	<b>Injuries:</b>	1 Fatal, 1 Serious, 2 Minor
<b>Flight Conducted Under:</b>	Part 135: Air taxi & commuter - Non-scheduled - Air Medical (Medical emergency)		

## Analysis

The emergency medical service helicopter had been parked for more than an hour on a paved road next to a hospital. Immediately before takeoff during the predeparture safety briefing, the pilot discussed with the medical crew the 20-ft-tall metal lamp post to the helicopter's immediate left front. However, the pilot did not mention the 40-ft-tall metal lamp post that was 175 ft ahead of the helicopter and on the left side of the roadway. During takeoff, while traveling forward and following the center of the 25-ft-wide paved road, the helicopter's rotating main rotor blades impacted the 40-ft-tall lamp post about 24 ft above its base. The pilot was unable to maintain control of the helicopter, and the helicopter impacted the ground and came to rest on its right side about 230 ft from the takeoff point. The pilot reported that during the takeoff and before impact, he never saw the 40-ft-tall lamp post.

## Probable Cause and Findings

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

The helicopter pilot's failure to see and avoid the 40-ft-tall lamp post during takeoff. Contributing to the accident was the pilot's inadequate preflight evaluation of the obstructions in the takeoff path.

## Findings

<b>Personnel issues</b>	Identification/recognition - Pilot
<b>Environmental issues</b>	Pole - Awareness of condition
<b>Personnel issues</b>	(general) - Pilot

# Factual Information

## History of Flight

<b>Takeoff</b>	Collision with terr/obj (non-CFIT)
<b>Takeoff</b>	Loss of control in flight (Defining event)
<b>Uncontrolled descent</b>	Part(s) separation from AC
<b>Post-impact</b>	Fire/smoke (post-impact)

## HISTORY OF FLIGHT

On June 11, 2013, at 1830 central daylight time, N935EM, a Eurocopter AS350B2 helicopter, operating as EagleMed 35, was substantially damaged after impacting terrain during takeoff at Choctaw Indian Hospital Heliport (OK35), Talihina, Oklahoma. The medical patient was fatally injured, the flight nurse was seriously injured, and the pilot and flight paramedic sustained minor injuries. The helicopter was registered to JPMorgan Chase Bank N.A., Columbus, Ohio, and was operated by EagleMed, LLC, Wichita, Kansas. Day visual meteorological conditions (VMC) prevailed at the time of the accident and a company visual flight rules (VFR) flight plan had been filed for the 14 Code of Federal Regulations Part 135 helicopter emergency medical service (HEMS) flight. The helicopter was destined for St. Francis Hospital Heliport (4OK3), Tulsa, Oklahoma.

When EagleMed 35 arrived at OK35 another helicopter, Life Flight 4, had just landed and was occupying the single space helipad surface. EagleMed 35 landed and shut down on the asphalt surface of a road adjacent to the helipad, and about 103 feet northwest from the helipad. Life Flight 4 departed at 1728 and EagleMed 35 remained parked on the road for the next hour.

The patient was loaded onto a stretcher on the left side of the cabin and the medical crewmembers were seated in their forward facing seats behind the pilot and behind the stretcher patient. According to the pilot, he began a normal takeoff from a hover, and he intended to follow the center of the road in a westbound direction. During takeoff the left side of the rotating main rotor blades (MRB) impacted a metal light pole on the left side of the road about 175 feet west from the takeoff position. Control of the helicopter was lost and the helicopter came to rest on its right side about 230 feet from the takeoff position. A small postimpact fire ensued. The fire was finally extinguished by several persons using handheld fire extinguishers. Police officers on-duty at the helipad and numerous other first responders from the hospital immediately came to the scene and aided in the recovery efforts of the patient and the flight nurse. The engine, which had continued to run, was shut down with assistance from the first responders.

The pilot reported that during the time he was parked on the road he had three times conducted a walk around inspection of the helicopter. During his pre-departure safety briefing with the medical crew the pilot had discussed the 20 foot tall lamp post to their immediate left front, but he was not then aware of the 40 foot tall light pole. The pilot reported that during the take-off and before impact he never saw the 40 foot tall light pole.

## PERSONNEL INFORMATION

The pilot, age 32, held a Federal Aviation Administration (FAA) commercial pilot certificate with ratings for rotorcraft - helicopter, and instrument helicopter. The pilot also held an unrestricted FAA second-class medical certificate, issued on August 14, 2012, and an FAA flight instructor certificate with a rating in only rotorcraft – helicopter. The flight instructor certificate had expired on July 31, 2007.

A review of the operator's records, statements from the pilot, and FAA aeromedical certification records, showed that the pilot had an estimated total pilot experience in helicopters of about 3,560 hours, with a total of about 88 hours in AS-350 helicopters. He was working a 12 hour daytime schedule that began about 0700 and he had flown two previous flights that day for a total of 1.9 hours.

A review of the operator's pilot training records showed that the pilot completed the operator's FAA approved training program and his initial pilot competency check on August 9, 2012. He was then assigned as a pilot-in-command for AS-350 helicopters. On April 27, 2013, the pilot completed night vision goggle (NVG) ground and flight training, and a satisfactory NVG competency flight check.

## AIRCRAFT INFORMATION

The single-engine helicopter, N935EM, serial number 7427, was manufactured in 2012. It was powered by a 712-shaft horsepower Turbomeca Arriel 1D1 engine, serial number 19487. Review of the maintenance documents revealed that the last inspection was a continuous airworthiness inspection that occurred on May 21, 2013 at a total airframe time and total engine time of 470.0 hours. According to company maintenance records, and the cockpit mounted Hobbs meter reading, at the time of the accident, the helicopter had accrued an additional 52.5 hours for a total of 552.5 airframe hours and engine hours.

The helicopter was equipped with an Appareo Vision 1000 recorder which was originally installed on August, 21, 2012. It was mounted on the cockpit ceiling and was designed to record a cockpit video image and included provisions for recording 2-tracks of audio and an internal GPS receiver designed to record the GPS flight track.

Manufacturer's records noted that the Appareo unit was returned for repair on March 4, 2013, with the following note: "Replaced broken P1 connector". (power connector) "Backup kernel corrupt. Reflashed kernel". The manufacturer's records indicated that the unit was functioning after being repaired.

A review of the operator's weight and balance calculations and the pilot's weight showed that the helicopter had begun the take-off from OK35 at an estimated weight of about 4,840 pounds. FAA data shows the helicopter's maximum allowable operating weight is 4,961 pounds.

## METEOROLOGICAL INFORMATION

The closest official weather reporting station was at Robert S. Kerr Airport (KRKR), Poteau, Oklahoma, located 28 miles northeast from the accident location. At 1835 the Automated Surface Observation System at KRKR, reported wind from 180 degrees at 10 knots, visibility 10 miles, clear skies, temperature minus 33 degrees Celsius (C), dew point 23 degrees C, with an altimeter setting of 29.93 inches of Mercury.

Photographs of the accident scene taken immediately after impact showed smoke from the postimpact fire was being blown to the west by wind from the east.

Data from the National Oceanic and Atmospheric Administration showed that, at the accident location, at 1830, the altitude of the sun was about 23 degrees above the horizon and the azimuth of the sun was about 283 degrees. Apparent sunset occurred at 2036.

## AIRPORT INFORMATION

FAA records indicated that the OK35 heliport had a field elevation of 890 feet msl. There were no published radio frequencies for airport communications. The heliport had a single concrete helipad that measured 50 feet by 48 feet. There was surface mounted perimeter lighting around the helipad, a lighted windsock was located about 100 feet east of the helipad, and all lamp posts within 200 feet from the helipad had red obstruction lights.

The concrete helipad was located about 125 feet northeast from the emergency room entrance on the north side of the Choctaw Indian Hospital. About 50 feet north of the helipad was a 25 foot wide paved road which was oriented east-west. A metal lamp post about 20 feet tall was positioned on the south side of the paved road about 125 feet to the northeast from the helipad. Another lamp post about 20 feet tall was positioned about 125 feet to the northwest from the helipad. Other lamp posts on metal posts further to the west from the helipad were on the south side of the paved road and were about 40 feet tall.

There was a line of trees about 40 feet tall along the north edge of the paved road. A large open flat grassy area was located on the north side of the line of trees. The closest edge of the grassy area was about 300 feet northwest from the emergency room entrance.

## VIDEO RECORDER

An impact damaged Appareo Vision 1000 recorder, its separated SD memory card, wiring harness, and other components were recovered from the wreckage and examined at the NTSB Recorders Laboratory. The initial examination showed the Appareo device had sustained minor damage to the unit's P1 port and to the memory card door. Data was downloaded which showed a total of 26 files had been recorded during the period from December 19, 2012, through December 21, 2012. An additional 4 undated files, without any flight data, were recovered which were determined to be from the manufacturer's facility or from power-up events at the NTSB Recorders Laboratory.

The last recording of flight data or video and flight data was on December 20, 2012, when the helicopter was on the ground at the McAlester Regional Hospital.

The accident flight was not recorded on the Appareo device. At the time of the accident the operator did not have a flight data monitoring (FDM) or safety management system (SMS) program that would routinely monitor the Appareo Vision 1000 recordings.

## WRECKAGE AND IMPACT INFORMATION

The aircraft wreckage debris was located on the paved road adjacent to the hospital. The fuselage came to rest on its side, about 80 degrees to the right, and was oriented on a heading of about 330 degrees. Most wreckage debris remained within about 50 feet from the main wreckage.

A metal post of a 40 foot tall lamp post had been impact separated about 24 feet above the mounting flange. The damaged bottom half of the metal post was resting on the ground and remained partially attached to its mounting flange. The top portion of the separated metal post and the lamp fixture had completely separated and were located on the north side of the paved road.

The transmission and attached main rotor system was partially separated from the transmission deck but remained attached by cables and mounts. All of the transmission support arms were broken. The 'Starflex' remained in the center of the rotor hub with two of the star arms broken mid-span; one arm was separated from its thrust bearing. All three MRBs showed damage on their leading edges from about mid-span out to the tips. There were "broom-straw" separations, delaminating skins, and splaying signatures from the impacts. The impact scars on the MRBs. corresponded to the impact damage on the separated 40 foot tall light pole.

The pilot's seat and the medical crewmember's seats remained attached and their 4-point lap belt and shoulder harness systems remained intact. The medical stretcher base remained attached to the floor mountings, and the removable medical stretcher remained attached to the base unit. The patient restraint straps remained intact. The pilot's seat did not indicate any stroke attenuation. The upper portion of the main cabin structure was opened up by impact forces. The rear cabin bulkhead and the rear of the cabin ceiling were deformed and pushed forward. The door posts were impact separated from the roof and cabin ceiling. The windscreen and all Plexiglas windows were broken.

The instrument panel remained mostly intact.

The belly structure and landing gear skids did not show significant impact damage. The tail boom was separated at the aft bulkhead, and remained partially connected by electrical wires and control cables. The separated tail boom showed impact damage, but remained intact. The tail-rotor gear box remained securely attached, and the tail-rotor and drive shaft rotated freely when the blades were moved through by hand. The left horizontal stabilizer was bent down mid-span from the impact.

Control continuity was confirmed from the pilot's cyclic and collective input controls to the top of the transmission deck where the push-pull rods connect to the rotor system, and from the pilot's anti-torque pedals to the aft bulkhead to tail boom junction of the flex cable. The collective lever was found full up. The fuel flow control lever was positioned nearest to the flight gate. The emergency fuel shut off was observed in the off position; however the flex rod at the valve was broken. The fuel tank remained intact and was secure within the fuselage. Prior to wreckage recovery, about 50 gallons of fuel was removed by Hazmat personnel. The fuel was examined and no evidence of fuel contamination was noted.

There was thermal damage near the engine exhaust where the postimpact fire had been extinguished by emergency responders; however there did not appear to be significant thermal damage to the fuselage structure.

The engine as found was still attached to the helicopter by the front mount. The rear mount was separated during the impact sequence. All fuel, oil, and air lines were still connected and properly safety wired. The throttle and anticipator cables were still connected and pinned to the fuel control unit. The axial compressor showed signs of foreign object damage (FOD) and two of the compressor blades had the leading edge tips bent forward. The engine nose cone showed rotational scarring. The gas generator could not be rotated by hand. The free turbine blades were shed and the containment shield was bent in

an oblong shape. There were small escape punctures in the exhaust pipe and a few of the liberated free turbine blades were found on the ground directly behind the exhaust pipe where the engine came to rest.

The engine was removed from the wreckage and placed on a pallet for a partial disassembly examination. The engine Module 5 reduction gearbox was removed for inspection of the input pinion torque alignment marks. The marks were found to be misaligned approximately 2 millimeters in the tightening direction which is consistent with engine power being delivered to the drive train during the main rotor blade impact sequence.

The postaccident examination of the airframe and engine revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation.

## MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the passenger by the Office of the Chief Medical Examiner, Eastern Division; Tulsa, Oklahoma.

Following the accident, the pilot and flight paramedic were tested for evidence of 11 drugs and alcohol in accordance with the operator's FAA approved Drug and Alcohol Testing Program. The tests were negative.

The seriously injured Flight Nurse had been transported to a hospital in another city and was not tested.

## TESTS AND RESEARCH

The wreckage was again examined after the initial data download from the Appareo Vision 1000 device. The two-wire wiring harness was found separated at the Appareo unit connection in the ceiling of the aircraft. Initial examination at the accident scene showed the unit had remained attached to the cabin overhead, and the wiring remained attached to the aircraft near the windshield center post. At the separated end of the wiring nearest to the Appareo unit, one of the electrical wire leads was separated at the end of the wire insulation, and the other lead had remained attached to its gold colored connection pin. However, both pins were separated from the black plastic wiring plug which was not found in the wreckage.

The GPS antenna wire connection to the Appareo unit was found unplugged from the unit at the cabin overhead. The antenna wiring from the Appareo unit connection was traced down the center post and to the top of the right side instrument panel, glare shield. It was noted that the antenna RF connector was also found unplugged and laying loose near the connection. A small amount of brushing/burnishing marks was observed on the top of an instrument case neared to where the antenna connection was found lying. Little to no impact damage was noted to that part of the glare shield.

Positive electrical continuity was confirmed for the electrical circuit from the cockpit circuit breaker to the separated wire and pin at other end of the wiring harness that would attach to the Appareo Vision 1000 unit.

The wiring harness and circuit breaker associated with the Appareo Vision 1000 installation was removed from the wreckage and examined at the NTSB Recorders Laboratory. The wiring harness was checked for continuity and circuit breaker was tested for proper operation. The wiring harness showed

continuity when checked with a multi-meter. The circuit breaker was also found to be operating normally when checked with a multi-meter and a power supply.

## ORGANIZATIONAL AND MANAGEMENT INFORMATION

EagleMed, LLC, holds an FAA air carrier certificate number 7EMA575M, and is authorized to conduct on-demand common carriage, including HEMS operations in Eurocopter AS-350-B2; AS-350-B3; and AS-355-N helicopters. They also hold authorization to conduct air ambulance operations – airplane in Beech BE-200 and BE-90 series turboprop airplanes. Their principal base of operations is in Wichita, Kansas, and they describe themselves as a leading community-based provider of air ambulance programs across the central United States. They operate 16 different community-based locations, utilizing a fleet of over 28 helicopters and turboprop airplanes.

## ADDITIONAL INFORMATION

The operator reported that they have begun routinely monitoring the Appareo Vision 1000 system recordings as part of their SMS program. The operator also submitted a recommendation on how this accident could have been prevented and noted that the pilot "could have used a different departure path, or followed company procedure to identify and climb above the highest obstacle before transitioning to forward flight".

Interviews with two other, more experienced HEMS pilots, showed that they thought that the preferred and accepted procedure for most pilots when operating from other than an established airport with clear and open arrival and departure paths was to, whenever possible, make a vertical HOGUE liftoff until clear of all obstacles and then proceed forward into translational lift. They said that almost without exception this is the standard procedure for HEMS helicopter operations at an accident scene.

### Pilot Information

<b>Certificate:</b>	Commercial; Flight instructor	<b>Age:</b>	32
<b>Airplane Rating(s):</b>	None	<b>Seat Occupied:</b>	Right
<b>Other Aircraft Rating(s):</b>	Helicopter	<b>Restraint Used:</b>	4-point
<b>Instrument Rating(s):</b>	Helicopter	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	Helicopter	<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 2 Without waivers/limitations	<b>Last FAA Medical Exam:</b>	August 14, 2012
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	April 27, 2013
<b>Flight Time:</b>	(Estimated) 3560 hours (Total, all aircraft), 88 hours (Total, this make and model)		



## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Eurocopter	<b>Registration:</b>	N935EM
<b>Model/Series:</b>	AS350B2	<b>Aircraft Category:</b>	Helicopter
<b>Year of Manufacture:</b>	2012	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	7427
<b>Landing Gear Type:</b>	High skid; Skid	<b>Seats:</b>	
<b>Date/Type of Last Inspection:</b>	April 21, 2013 Continuous airworthiness	<b>Certified Max Gross Wt.:</b>	4961 lbs
<b>Time Since Last Inspection:</b>	52 Hrs	<b>Engines:</b>	1 Turbo shaft
<b>Airframe Total Time:</b>	522 Hrs at time of accident	<b>Engine Manufacturer:</b>	TURBOMECA
<b>ELT:</b>	C126 installed, not activated	<b>Engine Model/Series:</b>	ARRIEL 1D1
<b>Registered Owner:</b>	JPMORGAN CHASE BANK NA	<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

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	KRKR, 451 ft msl	<b>Distance from Accident Site:</b>	28 Nautical Miles
<b>Observation Time:</b>	18:35 Local	<b>Direction from Accident Site:</b>	55°
<b>Lowest Cloud Condition:</b>	Clear	<b>Visibility</b>	10 miles
<b>Lowest Ceiling:</b>	None	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	10 knots /	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>	180°	<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>	29.93 inches Hg	<b>Temperature/Dew Point:</b>	33°C / 23°C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	Talihina, OK (OK35)	<b>Type of Flight Plan Filed:</b>	Company VFR
<b>Destination:</b>	Tulsa, OK (4OK3)	<b>Type of Clearance:</b>	None
<b>Departure Time:</b>	18:30 Local	<b>Type of Airspace:</b>	Class G

## Airport Information

<b>Airport:</b>	Choctaw Indian Hosp Helipad OK35	<b>Runway Surface Type:</b>	Concrete
<b>Airport Elevation:</b>	890 ft msl	<b>Runway Surface Condition:</b>	Dry
<b>Runway Used:</b>	H1	<b>IFR Approach:</b>	None
<b>Runway Length/Width:</b>	50 ft / 48 ft	<b>VFR Approach/Landing:</b>	None

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 Serious, 2 Minor	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>	1 Fatal	<b>Aircraft Fire:</b>	On-ground
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	1 Fatal, 1 Serious, 2 Minor	<b>Latitude, Longitude:</b>	34.756668,-95.084167(est)

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Latson, Thomas
<b>Additional Participating Persons:</b>	Jerry Heuertz; FAA Oklahoma City FSDO; Oklahoma City, OK Matthew Rigsby; FAA Aircraft Certification Service Rotorcraft; Fort Worth, TX Seth D Buttner; American Eurocopter Corporation; Grand Prairie, TX Bryan Larimore; Turbomeca USA; Grand Prairie, TX Lance Hofmann; EagleMed LLC; Wichita, KS Guillaume Adam; Bureau d'Enquêtes et d'Analyses (BEA); Le Bourget
<b>Original Publish Date:</b>	September 23, 2015
<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=87176">https://data.nts.gov/Docket?ProjectID=87176</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](#).