Aviation Investigation Final Report

Location:	Enterprise, Alabama	**Accident Number:**	ERA16FA140
Date & Time:	March 26, 2016, 00:18 Local	**Registration:**	N911GF
Aircraft:	Eurocopter AS 350 B2	**Aircraft Damage:**	Substantial
Defining Event:	VFR encounter with IMC	**Injuries:**	4 Fatal
Flight Conducted Under:	Part 135: Air taxi & commuter - Non-scheduled - Air Medical (Medical emergency)		

Analysis

After picking up a patient at a motor vehicle accident (MVA) site, the airline transport pilot of the helicopter air ambulance flight, which was operating under visual flight rules (VFR), departed in dark night instrument meteorological conditions (IMC) to transport the patient to a hospital; a flight nurse and paramedic were also on board. Witness statements, video, and photographs indicated that reduced visibility in fog and mist as well as very-light-to-light precipitation existed at the MVA site, and the nearest weather station, 4 miles away, was reporting a 300-ft ceiling and 3 miles visibility. Radar data indicated that, after takeoff, the helicopter entered a left turn and climbed to 1,000 ft above mean sea level (msl). The rate of turn then began to increase, and, after reaching a peak altitude of 1,100 ft msl, the helicopter began a rapid descent that continued to ground impact. According to the radar data, the flight lasted about 1 minute. A search was initiated when the pilot did not check in with the communications center as required, and the wreckage was located the next morning about 1/2 mile from the departure location. Examination of the accident site and wreckage revealed that the helicopter struck trees and terrain and was highly fragmented. Examination of the wreckage did not reveal evidence of any preimpact malfunctions or failures that would have precluded normal operation of the helicopter.

Although the helicopter was not certificated for flight in IMC, it had sufficient instrumentation to operate in the event of an inadvertent encounter with IMC and was equipped with a helicopter terrain avoidance warning system, a night vision imaging system which included night vision goggles (NVGs), and an autopilot. The pilot had about 265 hours experience operating in IMC and had been trained in inadvertent IMC loss of control recovery, but he was not instrument current. Further, he had not been trained or qualified by the operator to fly in IMC. He was likely using NVGs during the flight as one of the first responders who helped load the patient into the helicopter saw the pilot wearing them. Based on the weather conditions, the flight path of the helicopter, and the lack of preimpact failures or anomalies, it is likely that the pilot experienced spatial disorientation after entering IMC and subsequently lost control of the helicopter.

To accomplish operational control of its flights, the operator used an operational control center (OCC) that was staffed 24 hours a day by operational control coordinators. According to the operator, the pilot had the final authority and responsibility for decisions relating to safety of flight, and the operational control coordinators were responsible for confirming whether a flight or series of flights could be initiated, conducted, or terminated safely, in accordance with the authorizations, limitations, and procedures in their operations manual, and the applicable regulations. In the case of the accident flight, the operator's required VFR weather minimums were a 1,000-ft ceiling with a flight visibility of 3 miles.

The operational control coordinators' role was accomplished by inputting flight data into software programs that would perform automated database queries for pilot currency and aircraft maintenance information and would provide weather information based upon route of flight. Both OCC personnel and pilots had the authority to terminate a flight at any time if required conditions were not met. There were two personnel on duty before and during the time of the accident at the operator's OCC, a trainee operational control coordinator and a senior operational control coordinator. About 1 hour before the helicopter accident, the OCC received notification of the request for the helicopter to respond to the MVA, and the coordinators used a software program called "OCC Helper" to query weather information. Although the coordinates for the location of the MVA provided to the OCC were correct, the format of the coordinates was not the correct format for OCC Helper. Therefore, the OCC Helper software only recognized the MVA site as being near the helicopter's base, which was reporting visual meteorological conditions, and did not show the IMC being reported at weather stations closer to the MVA site. The trainee reported that latitude and longitude format was a common problem with OCC Helper and, at times, required OCC personnel to reformat the latitude and longitude coordinates to get the coordinates to work in OCC Helper. On the night of the accident, the incorrectly formatted latitude and longitude for the MVA site were not corrected in OCC Helper until after the helicopter had departed its base en route to the MVA site. Given the IMC weather conditions being reported, which were below the required VFR weather minimums for the flight, the OCC coordinators should have provided the pilot with additional weather information after they had correctly input the coordinates of the MVA site into the OCC Helper software; however, they did not do so. The lack of monitoring of the flight by the OCC through direct human interaction due to overreliance on mission support software and other automated aids, and the incorrectly interpreted latitude and longitude information by both the software and the operational control coordinators resulted in a loss of operational control. Although the software formatting issues were known, there was no standard operating procedure to mitigate the problem.

The pilot had access to internet-based weather information at the helicopter's base, but it is unknown what weather information the pilot reviewed before beginning the flight to the MVA. However, text messages between the pilot and a friend and between the flight nurse on the accident flight and the same friend indicated that the pilot was aware of the possibility of encountering IMC before he departed the base for the MVA site. Further, after landing at the MVA, the pilot would have been aware that the weather conditions at the site were below the company's VFR weather minimums. Given the weather conditions at the MVA site, the pilot should have canceled the flight or, at a minimum, contacted the OCC to obtain updated weather information and guidance. However, the pilot's fixation on completing the mission probably motivated him to depart on the accident flight in IMC, even though significantly less risky alternatives existed, such as canceling the flight and transporting the patient by ground ambulance.

Probable Cause and Findings

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

The pilot's decision to perform visual flight rules flight into night instrument meteorological conditions, which resulted in loss of control due to spatial disorientation. Contributing to the accident was the pilot's self-induced pressure to complete the mission despite the weather conditions and the operator's inadequate oversight of the flight by its operational control center.

Findings

Personnel issues	Decision making/judgment - Pilot
Personnel issues	Spatial disorientation - Pilot
Personnel issues	Aircraft control - Pilot
Aircraft	(general) - Not attained/maintained
Environmental issues	Dark - Effect on operation
Environmental issues	Low ceiling - Effect on operation
Environmental issues	Low visibility - Effect on operation
Environmental issues	Clouds - Effect on operation
Environmental issues	Obscuration - Effect on operation
Environmental issues	Drizzle/mist - Effect on operation
Environmental issues	Fog - Effect on operation
Environmental issues	Below VFR minima - Effect on operation
Organizational issues	Oversight of operation - Operator
Personnel issues	Motivation/respond to pressure - Pilot

Factual Information

History of Flight

Prior to flight	Preflight or dispatch event
Takeoff	VFR encounter with IMC (Defining event)
Enroute-climb to cruise	Loss of control in flight
Uncontrolled descent	Collision with terr/obj (non-CFIT)

HISTORY OF FLIGHT

On March 26, 2016, about 0018 central daylight time, a Eurocopter AS350 B2, N911GF, impacted trees and terrain near Enterprise, Alabama. The airline transport pilot, flight nurse, flight paramedic, and patient being transported were fatally injured. The helicopter, which was registered to Haynes Life Flight LLC and operated by Metro Aviation, Inc., was substantially damaged. The flight was operated under the provisions of Title 14 *Code of Federal Regulations* (*CFR*) Part 135 as a helicopter air ambulance flight. Night instrument meteorological conditions (IMC) prevailed for the flight, which operated on a company visual flight rules (VFR) flight plan. The flight departed from a farm field near Goodman, Alabama, about 0017, and was destined for Baptist Medical Center Heliport (AL11), Montgomery, Alabama.

According to the Coffee County Sheriff's Office, on March 25, 2016, about 2309, sheriff's deputies and the Enterprise Rescue Squad were dispatched to a motor vehicle accident (MVA) near Goodman, Alabama. A sheriff's deputy contacted Haynes Ambulance Communication Center (HCC) by cellular phone when he learned that the motor vehicle was overturned and that an unconscious victim was inside.

According to communications records, HCC received the call from the deputy at 2319:10. The pilot of the helicopter, was notified at 2320:38. The helicopter, which was known as "Life Flight 2" and was based at the Troy Regional Medical Center, Troy, Alabama, departed Troy at 2326:57 and arrived at the landing zone (LZ) in a farm field adjacent to the MVA site at 2353:15.

Witnesses stated that, after touchdown, the pilot remained in the helicopter with the engine running. The flight paramedic and flight nurse exited the helicopter and entered the Enterprise Rescue Squad ambulance to help prepare the patient for transport.

Once the patient was ready for transport, the flight nurse, flight paramedic, and several other emergency responders rolled the gurney about 70 yards through a grassy area to the helicopter and loaded the patient on-board. One of the first responders later reported that he noticed that the pilot had something over his eyes "like sunglasses, but it was square looking." Once the patient had been loaded, the flight nurse and flight paramedic also boarded, and, at 0016:45, the helicopter lifted off and turned north toward AL11.

Review of radar data provided by the United States Army from the approach control radar site at Cairns Army Airfield (OZR), Fort Rucker, Alabama, located about 13 nautical miles east of the accident site, indicated that, the helicopter was first identified on radar after takeoff at 0017:35. The helicopter was in a shallow left turn and climbing to 1,000 ft above mean sea level. At 0018:04, the rate of turn began to increase and continued to increase over the next 4 seconds when the helicopter reached a peak altitude of 1,100 ft. The helicopter remained at this altitude and continued the left turn until 0018:28 when the helicopter began a rapid descent. Five seconds later, radar indicated that helicopter had descended through 600 ft. Moments later, the helicopter descended below the floor of the radar coverage area, and radar contact was lost. According to the radar data, the flight lasted about 1 minute.

According to HCC, the helicopter's on-board Skyconnect satellite tracking system updated every 3 minutes, and the pilot was supposed to contact them every 15 minutes. However, after the helicopter lifted off, HCC did not receive the pilot's normal 15-minute check-in, and, when they checked the satellite tracking system, it showed that it had not updated and that the helicopter was still at the LZ. HCC then began to notify authorities that they believed that the helicopter was down somewhere. About 0700, after an extensive search, search parties began to smell what they believed was jet fuel and eventually located the wreckage in a swampy, heavily wooded area.

PERSONNEL INFORMATION

According to Federal Aviation Administration (FAA), Metro Aviation, and pilot records, the pilot held an airline transport pilot certificate with a helicopter rating and type ratings for the Agusta Westland AB-139 and AW-139. He also held a flight instructor certificate with ratings for helicopter and instrument helicopter.

The pilot was hired as a flight instructor in June 2009 by Helicopters of America. He then became their lead flight instructor and worked for them until September 2009 when the company ceased operation. He was then hired by Cloud 9 Helicopters, where he became senior flight instructor.

On April 14, 2011, he was hired by Petroleum Helicopters International (PHI). When hired by PHI, he had accrued 2,448 total hours of helicopter flight experience and had flown the R22, R44, H269, AS355, MD500, MD600, and A109.

At PHI, he flew the AW139 as both a first officer (co-pilot) and a captain (pilot) in both visual flight rules (VFR) and instrument flight rules (IFR) operations. During his tenure at PHI, he accrued an additional 1,889.63 flight hours supporting oil and gas contracts until he left their employment on November 16, 2015.

At the time of the accident, the pilot had been employed by Metro Aviation for about 6 months and had accumulated 90 hours of flight experience in the accident helicopter make and model since he was hired. His total flight experience was 5,301 hours of which 5,265 hours were as pilot in command, 474 hours were at night, and 265 hours were in actual instrument conditions. His flight experience during the 90 days before the accident was 47 hours, including 20 hours in the 30 days before the accident.

Review of Metro Aviation/PHI training records indicated that he had received training in human factors and decision-making, night operations, night vision goggles (NVGs), and inadvertent entry into IMC. He did not meet currency requirements for flight in IMC at the time of the accident.

AIRCRAFT INFORMATION

The helicopter was manufactured in 1998. It was equipped with a three-blade main rotor system and a two-blade tail rotor system and was powered by a Turbomeca Arriel 1D1 engine rated at 641 shaft horsepower. The helicopter was equipped with skid-type landing gear, a night vision imaging system (NVIS), which consisted of NVGs and NVG-compatible lighting, a helicopter terrain avoidance warning system (HTAWS), and an autopilot. The helicopter was not certificated for flight in IMC.

According to Metro Aviation, the helicopter was maintained under an FAA-approved aircraft inspection program. The helicopter's most recent inspection was completed on February 12, 2016. At the time of the accident, the helicopter had accrued 8,923.2 total hours of operation.

METEOROLOGICAL INFORMATION

Videos, Photographs, and Witness Information

Witness statements indicated that fog, mist, and reduced visibility existed at the MVA site at the time of the helicopter's arrival. Witness statements, photographs, and videos also indicated that these conditions were still present when the helicopter lifted off about 23 minutes later.

Review of witness videos and photographs of the accident flight revealed that, during the takeoff sequence, very light to light precipitation was falling in the field surrounding the helicopter. The precipitation was also visible in the helicopter's landing light beams directed forward from the helicopter.

According to one witness, there was slight drizzle around the time of the takeoff, and, although there was no ground fog, there may have been fog above the trees. Another witness stated that there was a heavy mist, and the ceiling was "very low, maybe 100 foot." This witness also stated he could see the tops of the trees, and, by shining his flashlight up, he could easily tell that the fog started about two to three times as high as the nearest tree. Another witness stated that, at the time of the helicopter's departure, the fog was mixed with rain and was "kind of pretty thick." This witness also mentioned that the helicopter flew over the road, which was not far from the LZ, and the witness lost visual contact with the helicopter due to the fog.

Surface Analysis Chart

The National Weather Service (NWS) Surface Analysis Chart for 0100 depicted a stationary front that stretched from the northeastern Gulf of Mexico north-northeastward into southeastern Alabama and northeastward into western South Carolina. A low-pressure center was located in eastern Alabama. The station models around the accident site depicted air temperatures in the low to mid 60's degrees Fahrenheit (°F), with temperature-dew point spreads of 1°F or less, a southeast to east wind below 10 knots, cloudy skies, and fog. Areas near frontal boundaries with low temperature-dewpoint spreads at the surface are typically locations conducive to the formation of low clouds and fog, and, if enough moisture is available, precipitation can also be present.

Surface Observations

Enterprise Municipal Airport (EDN), located 4 miles east-northeast of the accident site, was the closest official weather station to the accident site and had an Automated Weather Observing System (AWOS). EDN weather at 0015 was reported as wind from 120° at 4 knots, 3 miles visibility, drizzle, an overcast ceiling at 300 ft above ground level (agl), temperature of 17°C, dew point temperature of 17°C, and an altimeter setting of 29.97 inches of mercury. EDN weather at 0035 was reported as wind from 120° at 4 knots, 3 miles visibility, drizzle, an overcast ceiling at 300 ft agl, temperature of 17°C, dew point temperature of 17°C, and an altimeter setting of 29.97 inches of mercury.

Observations from other stations near the accident site also indicated low instrument flight rules (LIFR) conditions due to ceilings below 500 ft agl at the accident time.

Satellite Data

Visible and infrared images obtained from the Geostationary Operational Environmental Satellite number 13 indicated abundant cloud cover over the accident site at the time of the accident. The cloud tops near the accident site were moving from southwest to northeast. Based on the brightness temperatures above the accident site and the vertical temperature profile, the cloud-top heights over the accident site were about 16,000 ft at 0115.

Radar Imagery Information

The closest NWS Weather Surveillance Radar-1988, Doppler (WSR-88D) was located 28 nautical miles east-northeast of the accident site at an elevation of 434 ft, at Fort Rucker, Alabama. The WSR-88D base reflectivity images indicated very light precipitation between AL11 and the automobile accident site before 2320 on March 25. The very light to light precipitation continued to form, increase in area coverage, and move over the automobile accident site while the helicopter was en route and while the helicopter was on the ground loading the patient. The accident flight likely took off in drizzle or light rain conditions, and these precipitation conditions persisted through the accident time.

Airmen's Meteorological Information

Airmen's Meteorological Information (AIRMET) Sierra for IFR conditions due to mist was issued at 2145 on March 25 and was valid at the accident time. There was another AIRMET Sierra for IFR conditions due to mist and precipitation that was also valid just east of the accident site for portions of Georgia and northwestern Florida. These AIRMETs were valid at the time flight notification at 2321 on March 25 all the way through the accident flight time.

Terminal Aerodrome Forecast (TAFs)

OZR and Dothan Regional Airport (DHN), Dothan, Alabama, located XX miles and XX miles from the accident site, respectively, both had TAFs that forecast IFR or LIFR conditions at the accident time, and both OZR and DHN TAFs were issued well before the time the pilot was notified of the mission.
National Weather Service Discussion

The National Weather Service Office in Tallahassee, Florida, issued an Area Forecast Discussion (AFD) at 1929 on March 25 for the area surrounding the accident site. The aviation section of the AFD mentioned that IFR conditions would be present at all airports overnight with improving conditions by the daytime on March 26.

Astronomical Data

Moonrise occurred at 2103 on March 25. The phase of the moon was waning gibbous with 91% of the moon's visible disk illuminated. .

For further details concerning meteorological information, refer to the Meteorology Report in the public docket for this accident investigation.

WRECKAGE AND IMPACT INFORMATION

Accident Site Examination

Examination of the accident site revealed that the helicopter had struck trees about 1/2 mile north of the motor vehicle accident site. A debris path ran from south to north at a downward angle of about 45° through the trees and led to the helicopter.

Airframe and Rotor System Examination

The wreckage was heavily fragmented with only the aft fuselage being easily recognizable. The fuel tank was broken open, and the smell of jet fuel was present. The engine and transmission were separated from their mounts. The main wreckage was resting at the base of a large tree, and other 80-ft- to 100-ft-tall trees along the debris path exhibited impact damage and evidence of blade strikes. Examination of the main rotor blades (MRBs) indicated that the main rotor was under power during the accident sequence, and the blue and red MRBs were broken in mutual locations.

The tail boom displayed a right horizontal bend mid-span; the right horizontal stabilizer and the tail rotor remained attached to the tail boom. Control continuity and rotation were confirmed from the tailrotor to the aft bulkhead. The left horizontal stabilizer was separated from its mounting location. The tail rotor pedals were separated from their mounting locations. Tail rotor pedal control continuity through the tail rotor flex ball cable was confirmed.

Continuity was confirmed through the transmission, and all three main rotor actuators (left roll, right roll, and pitch) and the tail rotor actuator were identified along with their associated hardware. No abnormalities with hydraulic servo integrity were noted, and all push-pull tubes and mixing unit actuators were broken and exhibited signatures consistent with overload signatures.

Main Rotor Actuators Examination

The left roll actuator remained attached to the stationary star by its rod-end bearing, and the other two main rotor actuators were detached and torn from the stationary star and rod-end bearings. The right roll actuator adaptor casing showed an approximately 2.5-inch break from the threaded attachment fitting to the stationary star. All main rotor actuator servo input rods remained attached to the rotor mast casing and could be moved by hand in and out of each adaptor casing. All three servo input rods showed evidence of bending. All three main rotor accumulators were intact with the right roll and left roll accumulators showing slight dents on their outer surfaces. Pressure from each of the main rotor accumulators was released via its Schrader valve. At least 120 psi of pressure was released from each accumulator, indicating the accumulators were normally charged.

Tail Rotor Actuator Examination

The tail rotor actuator unit was still attached to the airframe, the servo accumulator, and the load compensator. The hydraulic input and return lines exhibited evidence of hydraulic fluid being present. The tail rotor accumulator was intact and released 50 psi of pressure via its Schrader valve, indicating the accumulator was normally charged.

Attitude Indicator and Directional Gyro Examination

The attitude indicator was disassembled and examined. The gyro showed rotational scoring on the inner and outer housings consistent with rotation at the time of impact. The directional gyro was also disassembled and examined. The gyro showed scoring on the inner and outer housings consistent with rotation at the time of impact.

Fuel Filters Examination

The helicopter was fitted with a standard engine fuel filter attached to the fuel control unit and an aftermarket airframe fuel filtering system. Both fuel filter housing units were clean and free of debris. Both filters also appeared to be clean and unobstructed.

Engine Examination

The engine displayed external impact damage. The free turbine blades remained intact. The fuel control unit (FCU) was separated from the accessory gearbox; both FCU shafts were present and intact; the FCU remained attached by the fuel and air lines. The P2 line was still attached to both the intermediate case and the FCU.

The axial compressor had foreign object damage on all 13 blades and curling opposite the direction of rotation was observed on several blades. Both the Module 1 and the Module 5 magnetic plugs were clean. Both electric chip detectors (main and TU208 rear bearing) were clean. Module 5 was removed, and the input pinion slippage mark was found displaced in the over-torqued direction about 2 to 2.5 millimeters, a measurement consistent with engine power being produced at the time of main rotor strike.

The freewheel shaft was checked, and proper operation confirmed. Continuity to the N2 drive of the FCU was confirmed. The gas generator could not be turned by hand, and the free turbine could not be turned by hand.

The oil, air, and fuel lines were found connected to engine and properly secured. The electrical connection cannon plugs were still connected to the engine deck; the harnesses had been broken during the impact sequence. The rear engine mount was still connected to the linking tube, but both rubber mounts were separated from the engine deck. The front support was broken at the connection to the aircraft liaison tube.

The transmission shaft was found inside the liaison tube but neither side flector groups, nor bolts were connected to it. The flector group on the engine side was still connected to the flanged adapter, and on the freewheel shaft. The 3 bolts from the main gearbox input, to the transmission shaft had been broken, and the holes were found elongated opposite the direction of rotation consistent with power being produced at the time of main rotor strike.

MEDICAL AND PATHOLOGICAL INFORMATION

The Alabama Department of Forensic Sciences, Montgomery, Alabama, performed postmortem examinations on all three crew members and the patient. The cause of death for all four occupants was listed as multiple blunt force injuries.

The FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed toxicological testing of the pilot. The specimens from the pilot were negative for all tested drugs. Testing for ethanol, carbon monoxide and cyanide was not performed.

ORGANIZATIONAL INFORMATION

Metro Aviation

Metro Aviation was incorporated in 1982 as a helicopter charter, flight training, and maintenance operation. They entered the air medical service business in November 1983. At the time of the accident, Metro Aviation operated more than 130 aircraft out of 98 bases for more than 30 programs in 18 states across the country. Metro Aviation's operations division provided pilots and maintenance technicians for the aircraft in their various programs.

Haynes Ambulance

Haynes Ambulance was started in 1969 in Wetumpka, Alabama. In 1977, Haynes Ambulance of Alabama, Inc., was established in Montgomery Alabama. Haynes Life Flight LLC began operations in June 2014. At the time of the accident, Haynes Ambulance/Life Flight's operations covered three counties in Central Alabama (Elmore, Montgomery, and Pike) as well as Maxwell Air Force Base. Additionally, they had a variety of mutual aid agreements with various surrounding cities, counties, municipal, and private agencies.

Haynes Ambulance/Life Flight covered an area of about 1,420 square miles from 9 strategically located stations throughout their service area. About 180 full-time and part-time emergency medical technicians (EMT) and paramedics cared for emergency and convalescent patients, serving a population of over 500,000 citizens with over 35 ground ambulances and 2 helicopters.

ADDITIONAL INFORMATION

Aeronautical Decision-making

According to FAA Advisory Circular AC 60-22, Aeronautical Decision Making, "pilots, particularly those with considerable experience, as a rule always try to complete a flight as planned, please passengers, meet schedules, and generally demonstrate that they have 'the right stuff'." One of the common behavioral traps identified was "Get-There-Itis." According to the AC, "common among pilots, [get-there-itis] clouds the vision and impairs judgment by causing a fixation on the original goal or destination combined with a total disregard for any alternative course of action." Get-There-Itis is also known as hurry syndrome, plan continuation, or goal fixation.

Metro Aviation Operations Manual

According to Metro Aviation's Operations Manual, the pilot-in-command of an aircraft had the final authority and responsibility for decisions relating to safety of flight and was required to select the most conservative course of action if a conflict arose concerning a Metro Aviation policy, procedure, or regulation. Operational control coordinators and operational control supervisors were responsible for confirming whether a flight or series of flights could be initiated, conducted, or terminated safely, in accordance with the authorizations, limitations, and procedures in the Metro Aviation Operations Manual and the applicable regulations. They were also "authorized to terminate a flight for any reason that may be contrary to [Federal aviation regulations] FARs or policy."

Weather minimums were also published in the operations manual for all VFR operations. Review of the weather minimums indicated that:

- When flying at night using an approved NVIS or HTAWS in non-mountainous, local flying areas, an 800-ft ceiling with a flight visibility of 3 statute miles was required.

- When flying at night using an approved NVIS or HTAWS in non-mountainous, non-local, flying areas, a 1,000-ft ceiling with a flight visibility of 3 statute miles was required.

Guidance for use of NVIS stated, "at no time shall NVGs be utilized to continue flight into weather below the minimums."

Guidance for inadvertent IMC or loss of visual surface reference stated:

"Inadvertent IMC does not only mean situations where an aircraft enters clouds, but also entering areas of reduced visibility, darkness with no ground lighting, and/or lowering ceiling resulting in the loss of visual ground reference. Pilots are expected to avoid inadvertent IMC and the loss of visual surface reference by maintaining situational awareness of weather changes and environmental conditions.

Pilots should be prepared for the possibility of inadvertent IMC or loss of visual surface reference. All company aircraft will carry current instrument approach charts and low altitude enroute maps for the area where the aircraft is assigned or expected to be flown. These charts and maps are to be used in the event that the aircraft enters into "inadvertent IMC" or "loss of visual reference". …

A minimum safe altitude [MSA] chart for each base local area will be carried on each base aircraft for quick reference by the pilot. ….

Minimum safe altitudes outside the local area will be 1000 feet above the maximum elevation figure as depicted on the VFR Sectional Chart for the aircraft location or the minimum off route obstruction clearance altitude as depicted on IFR Low En route chart. Inadvertent IMC is an emergency situation which requires maximum pilot attention. Good crew resource management is essential to safely deal with the emergency and make a successful recovery. Pilots will brief their medical crew members on their roles and responsibilities in the event of an inadvertent IMC prior to flight in marginal VFR conditions or en route if marginal VFR conditions are encountered."

The Operations Manual further advised that:

"In case of inadvertent IMC or Loss of visual surface reference the following procedure will be followed:

A. Maintain positive control of the aircraft with reference to instruments

1) Attitude – Level
2) Heading – Turn only to avoid known obstacles
3) Power – Adjust to climb power
4) Airspeed – Adjust to climb airspeed
5) Make turns no greater than standard rate

B. Climb to the minimum safe altitude (MSA) to clear all obstacles in the area.

C. Communicate

1) Declare an emergency to ATC
a. Squawk 7700
b. Report:
i. last known position,
ii. heading, altitude,
iii. fuel remaining, and
iv. souls on board

2) State nature of emergency (inadvertent IMC), intentions, and request for assistance
a. Weather: Determine if VFR conditions can be reached with ATC assistance.
b. Obstacles: Remain at or above a minimum safe altitude.
c. ATC can provide frequencies, vectors, courses, and altitude for airways and approaches.
d. If no assistance is available in the aircraft, use ATC for as much help as you need.
e. Complete the approach procedure to a landing or entering VMC conditions.
f. Maintain VMC and land."

Metro Aviation's Operational Control Center

According to Metro Aviation's Operations Manual, operational control is a two-tier system. The first tier involves the placement of an airworthy aircraft listed in the company's operations specifications and a current and qualified crew.

The second tier is determining whether a flight or series of flights can be initiated, conducted, or terminated safely and in accordance with all policies, procedures, general operations manual and regulations.

To accomplish operational control, Metro Aviation's Operational Control Center (OCC) was staffed 24 hours a day by operational control coordinators. The OCC continually monitored flight operations, weather trends, aircraft status, and any change that could affect the ability of the pilot to initiate, conduct, or terminate a flight or series of flights in accordance with the Metro Aviation Operations Manual, Operations Specifications, or Metro Operations Memos.

At the time of the accident, the OCC used two software systems to comply with Operations Specification A008-Operational Control (14 *CFR* 135.77- Responsibility for Operational Control and 14 *CFR* 135.79 Flight Locating Requirements). The first software system was the Metro Aviation Secure Website (MASW), acted as a central collection and processing point for operational information. Users logged into the system with a unique username and password and interacted within the system in accordance with the permissions granted by the company administrator. The MASW was routinely relied upon by Metro Aviation pilots, operational control coordinators, mechanics, aircraft records employees, pilot records employees, and partner communication centers/communication specialists.

The second software system was the OCC Helper (OH), which was developed by Metro Aviation to perform key compliance tasks and to monitor company flight operations. The primary logic of this application was focused on routine queries of company databases (pilot records, aircraft status reports, etc.), as well as outside resources such as NWS reports and forecasts. Operational control center coordinators were the only Metro Aviation employees trained and allowed access to OH.

Determination of pilot qualifications and aircraft status at the various bases was accomplished by the OCC using Operational Control Form 1 (OCF-1).

Metro Aviation required that, before commencing any flight operation, and after a pilot had logged-in for his/her assigned duty period and completed the pre-flight inspection of the aircraft assigned, the pilot was to complete the OCF-1 electronically using the MASW. Upon receiving the OCF-1 at the OCC, the OH software would query the Metro Aviation Pilot Records Database and display a summary view of the pilot's aircraft qualifications, currency, and medical certificate status. Additionally, the OH software would query the Metro Aviation Aircraft Records Database and provide a summary view of the aircraft's maintenance status. After reviewing these records and determining that they were appropriate, the operational control coordinator would electronically attest that the OCF-1 had been reviewed.

The OCF-1 was an editable form that pilots would routinely update throughout their assigned duty periods to report changes in weather, static risk, or aircraft maintenance status. Once the pilot completed an edit, the OCC would be prompted to perform an updated review of the form.

Flight locating requirements were addressed by the OCC using Operational Control Form 2 (OCF-2). The OCF-2 was the primary oversight for a specific Part 135 flight or series of flights. To achieve this oversight, Metro Aviation partnered with multiple communication centers throughout the country. Each communication center was associated with a specific Metro Aviation client's program. Some programs were just one base and one aircraft; others were several bases and several aircraft all associated with the same Metro Aviation client.

Communication center employees were not Metro Aviation employees; however, all the communication center employees were trained by Metro Aviation. This training was recognized in the approved Metro Aviation Training Manual and was conducted both initially and then annually for currency requirements.

The communications center's primary role in Metro Aviation flight operations was communicating flight requests to the Metro Aviation pilots and the Metro Aviation OCC. In the example of a car accident response, the first responder on scene (ambulance, fire dept., etc.) would make the initial request for the aircraft to the communication center, who would then notify the Metro Aviation pilot. The Metro Aviation pilot would then analyze the request in accordance with the Metro Aviation Operations

Manual, Metro Aviation Training Program, Operations Specifications, and Federal Aviation Regulations and either accept or decline the flight. Whether accepted or declined by the pilot, the communication center would submit the OCF-2 to the OCC.

The OCF-2 was an electronic form accessed through the MASW. Once a communication center submitted the OCF-2 for a flight and the pilot accepted, an "OCC Number" would be issued to the communications center electronically as confirmation that the OCF-2 was received. The OCC's processing of the OCF-2 information was accomplished using the OH software. The OH software would query the OCF-2 for multiple data points including:

- Aircraft registration
- Metro Base Name and Metro Aviation Client Program Name
- Pilot name
- Date the OCF-2 was submitted by the communication center
- Time the flight is initiated
- Route of flight
- Estimated time enroute (ETE)

With this information, the software would once again access pilot training records and aircraft records to verify the pilot's qualifications, currency, medical certificate status, and the aircraft's airworthiness status. ETE information was analyzed by OH in relation to the pilot's reported start time of the assigned duty period to ensure the planned termination of the flight would not exceed the maximum allowed 14 hours of duty time. The estimated termination time of a flight was also monitored, and an alert would be displayed within the OCC if the flight had not ended within that time (aircraft overdue response).

The final data point analyzed by OH was the route of flight. The OH application recognized all FAA airport/heliport identifiers, Metro base identifiers, hospital identifiers, and 30 formats of GPS coordinates. Using this information, OH would query the NWS internet sites to obtain reported and forecast weather conditions along the route of flight indicated on the OCF-2. OH would display this information in a textual release summary. The operational control coordinator was responsible for reviewing the release summary. If the weather conditions were found to be out of compliance with the Operations Manual and Operations Specification requirements, the operational control coordinator would contact the pilot directly or by relay through the appropriate communication center.

Once a flight became airborne, the OCC would monitor the progress of the flight through a central display known as the Outerlink Console. This display would translate the various manufacturers' satellite tracking transponders and depict the aircraft's movement over a satellite view of the terrain. The Outerlink Console did not display weather information.

The OCF-2 was an editable form and was routinely accessed by either a communication center or the Metro Aviation OCC to update the route of flight, ETE, or to close the OCF-2 with "Time Terminated" information.

Occurrences in the OCC During and Around the Time of the Accident Flight

There were two Metro Aviation personnel on duty before and during the time of the accident at the OCC, a trainee operational control coordinator and a senior operational control coordinator. The trainee coordinator stated that when the accident flight request came into the OCC, the weather was reviewed using information from FAA-approved resources and through their Schneider Electric weather source.

The trainee coordinator stated that, on the night of the accident, he and the senior coordinator were using OH, which he referred to as the "old system" that he was not that familiar with. The trainee coordinator mentioned OH could crash while one was looking at it and flights could be airborne 15 minutes before a person was aware of it. In addition, the trainee coordinator mentioned that the coordinates for the location of the motor vehicle accident were correct, but that the format was not correct in OH. The trainee coordinator stated that the latitude and longitude format was a common problem with OH and that Metro Aviation OCC personnel had to reformat the latitude and longitude coordinates at times to get the coordinates to work in OH. The trainee coordinator mentioned that HCC would not have known of any formatting issues with Metro's OH software.

The trainee coordinator stated that he and the senior coordinator checked the weather the night of the accident, but nothing drew their attention to the weather.

Before the accident, it was common practice for communication centers, such as HCC, to fill out only the first segment or first few segments of the total flight route on the OCF-2 forms when sending that information into the OCC for review. When all the segments of flight were known, it was common practice to go back and complete or adjust the OCF-2 form in the official OCC Release Summary. This adjustment of the flight route occurred for the accident flight with the initial flight notification on the OCF-2 form from the HCC being at 2321 on March 25 and a current flight tracking record change done by the HCC at 2359 on March 25.

Review of the flight release revealed that the requested route of flight was Troy, Alabama, to the incorrectly-formatted latitude and longitude coordinates; it did not include the flight from the MVA site to the hospital. Since OH did not recognize the coordinates, the only weather information provided was for Troy Municipal Airport (TOI), about 5 miles from the helicopter's base. The TOI METAR about 42 minutes before the flight departed reported 10 miles visibility and a cloud ceiling of 6,500 ft. Although the TOI Terminal Aerodrome Forecast indicated that conditions would be deteriorating, the flight was predicted to return to base before that occurred. The route of flight was updated during the time the helicopter was on the ground at the MVA and would have provided further information about the conditions along the route, the OCC made no attempt to provide the updated weather information to the pilot. The trainee reviewed the release summary for the accident flight; the senior operational control coordinator provided no oversight of the review.

Following the accident, HCC noted that the format for the coordinates provided to Metro Aviation OCC for the accident flight was the same format that the HCC had been providing to the Metro Aviation OCC for the previous 2 years. Metro Aviation OCC did not have a procedure to ensure correct formatting of these coordinates.

Pilot Weather Briefing

The pilot's assessment of weather conditions at the start of his/her assigned duty period was communicated on the OCF-1 in a generalized color code. Green indicated no significant weather concerns; yellow indicated that commencing a flight may not be possible; and red indicated weather conditions prohibited flight operations. Metro Aviation provided internet-based, NWS-approved weather information to each of its bases of operation. This information would have been readily available to the accident pilot at the time of the flight request.

The accident pilot did not receive an official weather briefing from Lockheed Martin Flight Service (LMFS) or from Direct User Access Terminal Service (DUATS) and was not required to do so. The pilot did check the weather before the flight to the automobile accident scene, but it is unknown what weather information the pilot reviewed. The pilot completed an OCF-1 at the start of his shift around 1928 on March 25. At that time, the pilot assessed the weather conditions as "yellow." If the pilot had reviewed weather conditions after the 2321 notification time, the surface observations, TAFs, and AIRMET Sierra would have all indicated LIFR to IFR conditions near the MVA. There was no record of the accident pilot receiving or retrieving any additional weather information before the accident flight, or before and during the flight to the MVA.

Pilot and Flight Nurse Text Message Summaries

According to a nurse who was a friend of both the pilot and the flight nurse, they would text with each other routinely. Review of their text messages on the night of the accident indicated that the pilot was aware of the weather conditions before the flights. The following are excerpts from the text messages obtained from the nurse by the NTSB:

Text messages between the flight nurse and the friend:

- At 2328, the flight nurse advised her friend, "Got a flight." Her friend responded, "Have fun at that [motor vehicle accident] MVA."

- At 2336, the flight nurse advised her friend, "Lots of fog!!!" Her friend then responded, "You're in good hands."

- At 2337, the flight nurse responded to her friend and stated, "I know. But even he is like…Umm its pretty thick. Hahahaha." She then added, "He said we are good. 5 mins out."

- At 2340, the friend stated, "Sweet. Keep me posted."

- At 2343, the flight nurse advised that they were, "1.8 miles out." (This was the last text message sent by the flight nurse before the accident occurred.)

Text messages between the pilot and the friend:

- At 2354, the pilot advised the friend, "Shhhh this was more than work…Actually had to pull out some piloting skills."

- At 2356, the friend messaged the pilot stating, "That's what you got those mad piloting skills for my dear…to use them lol…was it bad?"

- At 2358, the pilot responded back to the friend advising that he would have to let the flight nurse tell her "but put it this way the other guys would have turned around."

- At 0000, the friend advised him, "She text me that there was lots of fog but that's all she said. I just responded to her she was in good hands…" The friend then asked, "Where did y'all go."

- At 0001, the pilot answered stating, "We are in enterprise..I'm sittin here still spinning watin..Gonna have to take to south it's the only place where weather is flyable."

- At 0002, the friend asked him, "How long will it take you to get to south?"

- At 0003, the pilot advised her, "Maybe 25-30 min." The friend then asked, "Is it gonna be one of those flights where you have to use those mad piloting skills again?

- At 0004, the pilot responded stating, "Yea to take off after that should be good."

- At 0005, the friend asked the pilot, "They still getting the patient loaded." He then responded, "Yea they still in the ambulance."

- At 0006, the friend stated, "At least they have the best pilot taking them there." The pilot responded that, "I wouldn't say all that…" (This was the last text message sent by the pilot before the accident occurred).

Get-There-Itis

According to FAA Advisory Circular AC 60-22, Aeronautical Decision Making, "pilots, particularly those with considerable experience, as a rule always try to complete a flight as planned, please passengers, meet schedules, and generally demonstrate that they have 'the right stuff.'."

One of the common behavioral traps identified was "Get-There-Itis." According to the AC, "common among pilots, [get-there-itis] clouds the vision and impairs judgment by causing a fixation on the original goal or destination combined with a total disregard for any alternative course of action."

Get-There-Itis is also known as hurry syndrome, plan continuation, or goal fixation.

Spatial Disorientation

The FAA Pilot's Handbook of Aeronautical Knowledge (FAA-H-8083-25B) contained guidance which stated that "under normal flight conditions, when there is a visual reference to the horizon and ground, the sensory system in the inner ear helps to identify the pitch, roll, and yaw movements of the airplane. When visual contact with the horizon is lost, the vestibular system becomes unreliable. Without visual references outside the airplane, there are many situations where combinations of normal motions and forces can create convincing illusions that are difficult to overcome." The Handbook also advised, "unless a pilot has many hours of training in instrument flight, flight in reduced visibility or at night when the horizon is not visible should be avoided."

According to the FAA Airplane Flying Handbook (FAA-H-8083-3), "night flying is very different from day flying and demands more attention of the pilot. The most noticeable difference is the limited availability of outside visual references. Therefore, flight instruments should be used to a greater degree.… Generally, at night it is difficult to see clouds and restrictions to visibility, particularly on dark nights or under overcast. The pilot flying under VFR must exercise caution to avoid flying into clouds or a layer of fog." The handbook described some hazards associated with flying in airplanes under VFR when visual references, such as the ground or horizon, are obscured stating that "the vestibular sense (motion sensing by the inner ear) in particular tends to confuse the pilot. Because of inertia, the sensory areas of the inner ear cannot detect slight changes in the attitude of the airplane, nor can they accurately sense attitude changes that occur at a uniform rate over a period of time. On the other hand, false sensations are often generated; leading the pilot to believe the attitude of the airplane has changed when in fact, it has not. These false sensations result in the pilot experiencing spatial disorientation."

Pilot Information

Certificate:	Airline transport; Flight instructor	**Age:**	29,Male
Airplane Rating(s):	None	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	Unknown
Instrument Rating(s):	Helicopter	**Second Pilot Present:**	No
Instructor Rating(s):	Helicopter; Instrument helicopter	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	July 9, 2015
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	October 28, 2015
Flight Time:	(Estimated) 5424 hours (Total, all aircraft), 90 hours (Total, this make and model), 5388 hours (Pilot In Command, all aircraft), 47 hours (Last 90 days, all aircraft), 20 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Other flight crew Information

Certificate:	None	**Age:**	38,Female
Airplane Rating(s):	None	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:		**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 0 hours (Total, all aircraft), 0 hours (Total, this make and model)		

Other flight crew Information

Certificate:	None	**Age:**	34,Male
Airplane Rating(s):	None	**Seat Occupied:**	Center
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:		**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 0 hours (Total, all aircraft), 0 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	Eurocopter	**Registration:**	N911GF
Model/Series:	AS 350 B2	**Aircraft Category:**	Helicopter
Year of Manufacture:	1998	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	3119
Landing Gear Type:	Skid	**Seats:**	4
Date/Type of Last Inspection:	February 12, 2016 AAIP	**Certified Max Gross Wt.:**	4961 lbs
Time Since Last Inspection:		**Engines:**	1 Turbo shaft
Airframe Total Time:	8923.2 Hrs at time of accident	**Engine Manufacturer:**	Turbomeca
ELT:	C91A installed, activated, did not aid in locating accident	**Engine Model/Series:**	Arriel/1D1
Registered Owner:	HAYNES LIFE FLIGHT LLC	**Rated Power:**	641 Horsepower
Operator:	Metro Aviation Inc.	**Operating Certificate(s) Held:**	On-demand air taxi (135)
Operator Does Business As:		**Operator Designator Code:**	HDNA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Night
Observation Facility, Elevation:	EDN,360 ft msl	**Distance from Accident Site:**	4 Nautical Miles
Observation Time:	00:15 Local	**Direction from Accident Site:**	90°
Lowest Cloud Condition:	Unknown	**Visibility**	3 miles
Lowest Ceiling:	Overcast / 300 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots / None	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	120°	**Turbulence Severity Forecast/Actual:**	/ N/A
Altimeter Setting:	29.96 inches Hg	**Temperature/Dew Point:**	17°C / 17°C
Precipitation and Obscuration:	N/A - None - Fog		
Departure Point:	Goodman, AL (None)	**Type of Flight Plan Filed:**	Company VFR
Destination:	Montgomery, AL (AL11)	**Type of Clearance:**	None
Departure Time:	00:17 Local	**Type of Airspace:**	Class G

Airport Information

Airport:	Farm Field None	**Runway Surface Type:**	Grass/turf
Airport Elevation:	283 ft msl	**Runway Surface Condition:**	Rough;Vegetation;Wet
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	3 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	4 Fatal	**Latitude, Longitude:**	31.279443,-85.971107

Administrative Information

Investigator In Charge (IIC):	Gunther, Todd
Additional Participating Persons:	Patrick A Hempen; FAA / AVP-100; Washington, DC Thierry Hespel; BEA; Le Bourget Ed Stockhausen ; Metro Aviation Inc.; Shreveport, LA Kirk Barrett; Haynes Life Flight LLC.; Montgomery, AL Seth D Buttner; Airbus Helicopters Inc.; Grand Prairie, TX Bryan Larimore; Turbomeca USA; Grand Prairie, TX
Original Publish Date:	May 24, 2018
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=92894