



# National Transportation Safety Board Aviation Accident Final Report

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<b>Location:</b>	Georgetown, South Carolina	<b>Accident Number:</b>	ERA09FA537
<b>Date &amp; Time:</b>	September 25, 2009, 23:31 Local	<b>Registration:</b>	N417AE
<b>Aircraft:</b>	Eurocopter AS-350	<b>Aircraft Damage:</b>	Destroyed
<b>Defining Event:</b>	VFR encounter with IMC	<b>Injuries:</b>	3 Fatal
<b>Flight Conducted Under:</b>	Part 91: General aviation - Other work use		

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## Analysis

After conducting an interfacility patient transfer, the pilot refueled and then requested flight-following services from air traffic control, departing in visual meteorological conditions (VMC) for the return flight to his base. During the return flight, the pilot encountered instrument meteorological conditions (IMC). A review of Sky Connect data for the accident flight revealed that the helicopter was cruising at varying altitudes and never reached a steady state cruise altitude for any significant period of time. The majority of the flight was flown at altitudes below 1,000 feet with the greater part of the last 8-minute segment of the flight being operated below 800 feet. (The lowest altitude recorded during the last cruise segment of flight was 627 feet.) Witnesses who observed the helicopter before the accident described it as flying about 1,000 feet above ground level (agl), with its searchlight turning on and off, in moderate to heavy rain. A subsequent loss of control occurred, and the helicopter impacted terrain about 1.92 nautical miles (nm) southwest of Georgetown County Airport (GGE).

Postaccident examination of the main wreckage revealed no evidence of any preimpact failures or malfunctions of the engine, drive train, main rotor, tail rotor, or structure of the helicopter. Additionally, there was no indication of an in-flight fire.

During the first legs of his flight, the pilot experienced and observed VMC conditions along his route. However, postaccident witness reports and in-flight statements from the accident pilot indicated that the weather in the area had deteriorated since his southbound flight 2 hours prior. According to Omniflight's Savannah, Georgia, base manager, who was also a pilot operating in the area on the night of the accident, the weather that night was deteriorating but was forecast to remain well above minimums for his flight from Savannah to Greenville, South Carolina, and then to the Medical University of South Carolina (MUSC) in Charleston. However, while he was refueling at the Greenville airport, the pilot of the accident helicopter contacted him by radio and advised him to double check the weather before returning to

MUSC. The accident pilot stated that “bad thunderstorms” were in the GGE area and that he did not know if he would be able to return to his base that night. The Savannah base manager then advised the accident pilot that he could stay at the Charleston base that night. However, the accident pilot decided to return to his base at Conway-Horry County Airport (HYW), Conway, South Carolina.

Review of radar data and weather observations provided by the National Oceanic and Atmospheric Administration revealed that, after departing, the helicopter entered an area of convective activity and precipitation. The University Corporation for Atmospheric Research regional radar mosaic chart for 2333 also depicted a large area of echoes north of the frontal boundary, with several defined thunderstorms and rain showers extended over South Carolina and over the accident helicopter’s flight route. Additionally, correlation of the radar data to the location of the accident site revealed that several defined cells surrounded the site at the time of the accident.

The terminal aerodrome forecast (TAF) for Myrtle Beach International Airport, Myrtle Beach, South Carolina, which was located 29 nm northeast of the accident site, was issued about 1928 and indicated expected marginal visual flight rules conditions through 0100 on September 26. From 2000 through 2130, variable winds to 15 knots with visibility of 4 miles in thunderstorms, moderate rain, and a broken ceiling of 3,500 feet agl in cumulonimbus clouds were expected. From 2130 to 0100, the wind was expected to be from 040 degrees at 12 knots with a visibility of 6 miles in light rain showers and mist and a broken ceiling at 2,000 feet agl. About 2207, the National Weather Service issued an amended TAF that expected instrument flight rules (IFR) conditions to prevail during the period with a broken ceiling at 700 feet agl and light drizzle and mist after midnight.

The pilot had previously flown helicopters in IMC but was not current in instrument ratings at the time of the accident. The accident helicopter was not certificated for flight in IMC but had sufficient instrumentation to operate in the event of an inadvertent encounter with IMC. On the pilot’s last Part 135 airman competency/proficiency check, which occurred on December 12, 2008, he satisfactorily demonstrated inadvertent IMC loss of control recovery.

Although the pilot encountered an area of deteriorating weather and IMC, this did not have to occur as the pilot did not have to enter the weather and could have returned to Charleston Air Force Base/International Airport or landed at an alternate location. The pilot, however, chose to enter the area of weather, despite the availability of safer options. Based on the pilot’s statement to the Savannah-based pilot regarding bad thunderstorms in the area, he was aware of the weather and still chose to fly into it. In addition, the pilot’s inability to maintain a steady state cruise altitude during the flight and the declining altitude throughout the flight likely reflected his attempt to stay below the cloud level. These cues should have indicated to the pilot

that it was not safe to continue flight into IMC. This decision-making error played an important causal role in this accident.

In the absence of evidence indicating a mechanical malfunction, severe turbulence, or some other factor that would explain the accident pilot's apparent loss of control of the helicopter, spatial disorientation is a likely explanation, as it has contributed to many accidents involving loss of control. In many cases, loss of control follows a pilot's inappropriate control inputs resulting from confusion about the aircraft's attitude. Two major situational risk factors for spatial disorientation were present in this accident, including high workload and transitions between VMC and IMC that require shifting visual attention between external visual references and cockpit flight instruments. Attempts to continue visual flight into IMC are even more problematic for helicopter pilots than for pilots of fixed-wing aircraft because helicopters are inherently less stable and require near-continuous control inputs from the pilot. Helicopters, like the accident helicopter, that are not equipped for IFR flight and do not have control stabilization or an autopilot impose high perceptual and motor demands on the pilot. This can make it very challenging for pilots to maintain stable flight by referring to flight instruments alone. When the accident pilot attempted to continue visual flight into IMC, he would have been subjected to a high workload to maintain control of the helicopter. The extent of the weather and the duration of the flight also suggest that the pilot's encounter with IMC was prolonged. This would have further complicated the pilot's workload and increased the potential for spatial disorientation resulting from hazardous illusions, thereby increasing the potential for inappropriate control input responses.

According to Omniflight's 135 Operations Manual, the pilot-in-command was responsible for obtaining weather information before beginning a series of flights. During interviews with National Transportation Safety Board (NTSB) investigators, Omniflight pilots indicated that, at the beginning of each shift, they would obtain weather information from a base computer and would advise the Omniflight Operational Control Center (OCC) of weather conditions in the operating area throughout the period of their flight. Before any launch, the OCC must approve the flight. If the OCC knew of adverse weather, it would contact the pilot to evaluate the weather. Based on launch approval and actual weather conditions encountered and reported by the pilot, the weather at takeoff and along the flight route was VMC. About 2242, an MUSC communications center specialist spoke with an Omniflight OCC operations coordinator and indicated that the helicopter would be returning to HYW as soon as the patient transfer was complete. The operations coordinator then advised the MUSC specialist that if the pilot called before takeoff, they would review the weather with him for his return flight. However, the pilot never called the OCC, and the OCC did not contact the pilot. While the OCC was not required to contact the pilot and review the weather, if the OCC had contacted the pilot before takeoff, the OCC could have advised the pilot about the adverse weather, given him the updated TAF information issued about 2207 with IMC, and noted the potential risks involved with the flight. On February 7, 2006, the NTSB issued Safety Recommendation A-06-14, which asked the Federal Aviation Administration (FAA) to "require emergency medical services operators to use formalized dispatch and flight-following procedures that include up-to-date weather information and assistance in flight risk assessment decisions." On February 18, 2010, based

on the FAA’s pending notice of proposed rulemaking concerning helicopter operations and pending timely issuance of a final rule mandating formalized dispatch and flight-following procedures that include up-to-date weather information and assistance in flight risk assessment decisions, the NTSB classified this recommendation “Open—Acceptable Response.”

The accident helicopter was not equipped with an autopilot. On September 24, 2009, the NTSB issued Safety Recommendation A-09-96, which asked the FAA to “require helicopters that are used in emergency medical services transportation to be equipped with autopilots and that the pilots be trained to use the autopilot if a second pilot is not available.” On December 23, 2009, the FAA stated that it would conduct a study of the feasibility and safety consequences of requiring a second pilot or operable autopilot. On October 7, 2010, pending the NTSB’s review of the results of this study, Safety Recommendation A-09-96 was classified “Open—Acceptable Response.”

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot’s decision to continue the visual flight rules flight into an area of instrument meteorological conditions, which resulted in the pilot’s spatial disorientation and a loss of control of the helicopter. Contributing to the accident was the inadequate oversight of the flight by Omniflight’s Operational Control Center.

### Findings

Environmental issues	Low ceiling - Effect on personnel
Environmental issues	Low visibility - Effect on personnel
Personnel issues	Decision making/judgment - Pilot
Personnel issues	Use of policy/procedure - Pilot
Organizational issues	Oversight of operation - Operator
Personnel issues	Spatial disorientation - Pilot

## Factual Information

### HISTORY OF FLIGHT

On September 25, 2009, about 2331 eastern daylight time, a Eurocopter AS350 B2, N417AE, lost control and impacted terrain near Georgetown County Airport (GGE), Georgetown, South Carolina. The certificated commercial pilot, flight nurse, and flight paramedic were fatally injured; the helicopter was substantially damaged. The helicopter was registered to GE Business Financial Services Incorporated and operated by Omniflight Helicopters Incorporated, doing business as Carolina Life Care, under the provisions of 14 Code of Federal Regulations (CFR) Part 91 as a helicopter emergency medical services (HEMS) positioning flight. Night instrument meteorological conditions (IMC) prevailed for the flight, which operated on a company visual flight rules (VFR) flight plan. The flight originated from Charleston Air Force Base/International Airport (CHS), Charleston, South Carolina, about 2302 and was destined for Conway-Horry County Airport (HYW), Conway, South Carolina.

According to Omniflight, the helicopter departed from its base at HYW about 2023 and was destined for Georgetown Memorial Hospital to conduct an interfacility patient transfer to the Medical University of South Carolina (MUSC), Charleston, South Carolina, which is located about 90 nautical miles (nm) southwest of HYW.

According to a Cessna pilot flying in the area before the time of the accident, a small but intense weather cell had been stationary near GGE since about 1640 and forced him to abort his landing approach and divert to CHS. He returned to GGE sometime after 2000 for another landing attempt, during which he heard the accident pilot on the UNICOM frequency state his current position over the GGE airport. The accident pilot then provided the Cessna pilot with a pilot report on the weather conditions in the area. He advised that the ceilings were at 1,500 feet above mean sea level (msl). The Cessna pilot then noticed the helicopter's spotlight near a paper plant and the helicopter passing below him as he descended through 2,800 feet msl. Moments later, while on approach to GGE, the Cessna pilot descended through approximately 900 feet msl and experienced a windshear event during which his descent rate exceeded 1,200 feet per minute for a few seconds.

After passing GGE, the helicopter landed at Georgetown Memorial Hospital about 2041, picked up the patient, and departed for MUSC about 2107. About 2135, the helicopter landed at MUSC and dropped off the patient. The helicopter departed MUSC about 2225 for CHS and landed there about 2232. After refueling, about 2302, the pilot advised MUSC flight control that he was about to depart CHS for HYW and that he had 2 hours and 45 minutes of fuel on board. He indicated that he would be flying at 1,500 feet msl and estimated his arrival at HYW about 2347.

According to the Federal Aviation Administration (FAA), about 2305, the helicopter departed CHS and flew eastbound for the VFR flight. The pilot requested and received flight-following services to Mount Pleasant Regional Airport-Faison Field (LRO), Mount Pleasant, South Carolina. About 2309, the pilot reported LRO in sight, and air traffic control (ATC) flight following services were terminated. The accident helicopter then turned to the northeast and

flew past LRO towards HYW.

About 2316, the pilot advised MUSC's flight control communications specialist that the flight was at 1,000 feet msl, indicated 110 knots, and estimated that the flight should arrive at HYW in 29 minutes. No further communications from the pilot were received.

About 15 minutes later, when the accident helicopter did not provide a periodic in flight update, the MUSC communications specialist initiated efforts to contact the helicopter. With no radio response, the MUSC specialist activated the emergency action plan (EAP). The specialist contacted the Omniflight Operational Control Center (OCC) and requested the crew's cellular telephone numbers. The Omniflight OCC coordinator on duty began a parallel telephone search about 2343 using the company satellite telephone with no response.

About 0012 the next day, the last known position of the helicopter was plotted, and about 0015, the MUSC communications specialist called the Charleston County Sheriff's Office. The United States Coast Guard was notified about 0016, and ATC and the Air Force Rescue Coordination Center were notified about 0017.

When MUSC contacted the FAA Southern Region Operations Center, Atlanta, Georgia, to request the issuance of an alert notice, CHS tower reviewed the radar data and observed that the helicopter had continued past LRO. The radar data also showed that a line of weather existed 20 to 30 miles north of LRO, which ran east to west across the accident helicopter's flightpath. About 0122, after determining the last recorded radar position, CHS tower forwarded the radar data to the Georgetown County Sheriff's Office and the Jacksonville Air Route Traffic Control Center.

The helicopter was subsequently located about 0206 by Georgetown County sheriff's deputies about 2 miles southwest of GGE.

#### PERSONNEL INFORMATION

The pilot, age 45, held a commercial pilot certificate with ratings for airplane single-engine and multiengine land, rotorcraft helicopter, instrument airplane, and instrument helicopter. The pilot was Omniflight's HYW base manager. According to company records, before working for Omniflight in 2005, the pilot had accrued a total of 3,736 flight hours as a naval aviator in the United States Marine Corps.

The pilot had experience flying helicopters in IMC and had been instrument current at one time. Omniflight's operations with the AS350 B2, however, were conducted under VFR; therefore, he was not required to be current in instrument ratings. He was only required to be current and qualified to act as pilot-in-command (PIC) under VFR day and night flight operations in accordance with 14 CFR 135.293(a) and (b) and 135.299. On December 12, 2008, during the pilot's last Part 135 airman competency/proficiency check, he satisfactorily demonstrated inadvertent IMC recovery. His latest FAA second-class medical certificate was issued on July 21, 2009, with no restrictions or limitations. He reported a total of 4,600 flight hours on that date.

From September 22 through September 24, the pilot worked the day shift from 0800 to 2000. On the day of the accident (September 25), he switched to the night shift (scheduled from 2000 to 0800 the next morning). The pilot's wife indicated that, in the days before going on duty, the pilot was eating and sleeping without any problems.

## AIRCRAFT INFORMATION

The accident helicopter was a Eurocopter AS350 B2 model that was manufactured in 2000. It was equipped with a three-blade main rotor system and a two-blade tail rotor system and was powered by a 732 shaft horsepower Turbomeca Arriel 1D1 turboshaft engine. The accident helicopter, which was configured for HEMS operations and equipped with a Sky Connect flight tracking system, was equipped to carry up to four occupants (one pilot, one patient, and two attendants), in addition to medical equipment.

The helicopter was not approved by the FAA for operations in IMC but was equipped with sufficient instrumentation (airspeed indicator, attitude indicator, altimeter, turn and back, directional gyro, and vertical speed indicator) to operate in IMC if the helicopter inadvertently entered such conditions. It was not equipped with on-board weather radar, a night vision imaging system, an autopilot, or a helicopter terrain awareness and warning system.

A review of maintenance records revealed that the most recent 500-hour inspection was completed on September 17, 2009, at which time the helicopter had accrued 2,967.3 total hours of operation.

## METEOROLOGICAL INFORMATION

According to Omniflight's 135 Operations Manual, the PIC was responsible for obtaining weather information before beginning a series of flights. During interviews with National Transportation Safety Board investigators, Omniflight pilots indicated that, at the beginning of each shift, they would obtain weather information from a base computer and would advise the OCC of weather conditions in the operating area throughout the period of their flight. Pilots would also call the OCC before initiating a series of flights, and if the OCC knew of adverse weather, it would contact the pilot to evaluate the weather.

Weather data that the accident pilot obtained before the accident flight was not recovered. Based on launch approval given by the OCC and actual weather conditions encountered and reported by the pilot, the weather at takeoff and along the flight route was visual meteorological conditions (VMC). About 2242, an MUSC communications center specialist spoke with an Omniflight OCC operations coordinator and indicated that the helicopter would be returning to HYW as soon as the patient transfer was complete. The operations coordinator then advised the MUSC specialist that if the pilot called before takeoff, they would review the weather with him for his return flight. However, the pilot never called the OCC, and the OCC did not contact the pilot.

According to Omniflight's Savannah, Georgia, base manager, who was also a pilot operating in South Carolina on the night of the accident, the weather that night was deteriorating but was forecast to remain well above minimums for his flight from Savannah to Greenville, South

Carolina, and then to MUSC. After he dropped off the medical crew at the hospital in Greenville, he flew to the Greenville airport to refuel. The base manager indicated that, while he was refueling, the pilot of the accident helicopter contacted him by radio and advised him to double check the weather before returning to MUSC. The accident pilot stated that "bad thunderstorms" were in the GGE area and that he did not know if he would be able to return to his base at HYW that night. The Savannah base manager stated that he then advised the accident pilot that he could stay at the CHS base that night.

The Savannah-based pilot indicated that when he checked the weather for his return flight to MUSC, "it looked like it would likely be ok." He then flew back to the hospital in Greenville and contacted the OCC for a weather update while waiting for the crew and patient. However, a few minutes after departure from the hospital, the weather was worse than forecasted and was deteriorating. He then decided that the risk was unacceptable and flew back to the hospital in Greenville. When the Savannah-based pilot contacted the dispatch center and indicated that he would be returning to the hospital in Greenville, the pilot of the accident helicopter asked him over the radio what kind of weather he encountered, and the Savannah-based pilot responded that the ceiling and visibility were dropping fast in the Greenville area, which is about 230 miles west of the accident helicopter's operating area.

#### Weather Observations

Review of weather observations taken at CHS before the helicopter departed for the return trip indicated that lightning was observed to the distant northeast and that a thunderstorm was observed in the same area. A weather observation taken at CHS about 9 minutes before the accident helicopter's departure indicated VMC conditions with recorded wind as 020 degrees at 11 knots, visibility 10 miles, scattered clouds at 2,000 feet, broken clouds at 6,000 feet, broken clouds at 8,000 feet, temperature 26 degrees C, dew point 23 degrees C, and an altimeter setting of 30.09 inches of mercury. About 20 minutes after the accident helicopter departed to the east, light rain moved onto the field from the north.

Weather reports for the area surrounding the accident site were not available, as the automated weather observation station at GGE had been out of service for about 6 weeks. However, witnesses who observed the helicopter just before the accident described it as flying approximately 1,000 feet above ground level (agl) with its searchlight turning on and off, paralleling U.S. Route 17 northbound in the direction of GGE, in moderate to heavy rain.

#### Terminal Aerodrome Forecasts

The terminal aerodrome forecast (TAF) for Myrtle Beach International Airport (MYR), Myrtle Beach, South Carolina, which was located 29 nm northeast of the accident site, was issued about 1928 and indicated expected marginal VFR (MVFR) conditions through 0100 on September 26. From 2000 through 2130, variable winds to 15 knots with visibility of 4 miles in thunderstorms, moderate rain, and a broken ceiling of 3,500 feet agl in cumulonimbus clouds were expected. From 2130 to 0100, the wind was expected to be from 040 degrees at 12 knots with a visibility of 6 miles in light rain showers and mist and a broken ceiling at 2,000 feet agl. After 0100, instrument flight rules (IFR) conditions were expected to prevail due to drizzle, mist, and low ceilings.



About 2207, the National Weather Service issued an amended TAF that expected IFR conditions to prevail during the period with a broken ceiling at 700 feet agl and light drizzle and mist after midnight.

### Station Models and Weather Depiction Charts

Station models depicted a frontal boundary over Charleston about 2300, with surface wind flow from the north at approximately 10 knots in the vicinity of the accident site. The station model from MYR also indicated overcast clouds with a 2-degree temperature/dewpoint spread that indicated that precipitation, clouds, and/or fog was present.

Weather depiction charts about 2100 and 2400 also depicted MVFR to IFR conditions north of the frontal boundary, which ran perpendicular to the accident helicopter's flightpath. The charts indicated that VFR conditions were depicted about 2100 for the route between CHS and MYR. About 2400, the chart depicted MVFR to IFR conditions over the route, with IFR conditions over MYR and over a large portion of central and northern South Carolina, which indicated deteriorating weather conditions.

### Radar Data

Review of radar data and weather observations provided by the National Oceanic and Atmospheric Administration revealed that, after passing LRO, the helicopter entered an area of convective activity and precipitation. The University Corporation for Atmospheric Research regional radar mosaic chart for 2333 also depicted a large area of echoes north of the frontal boundary, with several defined thunderstorms and rain showers extended over South Carolina and over the flight route. Additionally, correlation of the radar data to the location of the accident site revealed that several defined cells surrounded the site at the time of the accident.

### Astronomical Data

According to the United States Naval Observatory, at the time of the accident, the moon was at an elevation of 3.6 degrees above the horizon at an azimuth of 235 degrees, with 50 percent of the moon's visible disc illuminated. Review of satellite imagery revealed, however, that the moon would not have been visible during the accident flight.

### FLIGHT RECORDERS

The helicopter was not equipped with a flight data recorder; however, its Sky Connect tracking system transmitted position, speed, and altitude information. A review of Sky Connect data for the accident flight revealed that the helicopter was cruising at varying altitudes and never reached a steady state cruise altitude for any significant period of time. A peak global positioning system altitude of 1,558 feet was recorded for approximately 1 minute, and the majority of the flight was flown at altitudes below 1,000 feet with the greater part of the last 8-minute segment of the flight being operated below 800 feet. The lowest altitude recorded during the last cruise segment of flight was 627 feet.

## WRECKAGE AND IMPACT INFORMATION

Radar and Sky Connect tracking data for the flight indicated the last target was located about 1.92 nm southwest of GGE, which coincided with the approximate location of the wreckage.

Examination of the accident site and wreckage revealed that the helicopter struck a tree before impacting terrain and coming to rest inverted in sawdust and loose soil on a magnetic heading of 156 degrees. The debris path was approximately 22 feet long and 39 feet wide, and a 3-foot deep crater existed beneath the main wreckage. A postcrash fire consumed the majority of the helicopter, and the trees surrounding the main wreckage were scorched to an approximate height of 30 feet.

All of the major components of the helicopter were located at the accident site. Examination of the main wreckage revealed no evidence of any preimpact failures or malfunctions of the engine, drive train, main rotor, tail rotor, or structure of the helicopter. Additionally, there was no indication of an in-flight fire.

The helicopter fuselage displayed heavy crush and compression damage. The starflex hub displayed no evidence of preimpact damage, and the main rotor mast remained attached to the main rotor hub and main gearbox. All three pitch-links displayed varying degrees of damage but remained attached at their attachment fittings.

All three main rotor blades displayed differing degrees of impact damage. The yellow blade was found with its outboard end buried in the soil about 2 feet below ground level, the blue blade was bent back on itself at a 45-degree angle at approximately the mid-span position, and the red blade was located underneath the wreckage. Examination of the tail rotor, which was found still attached to the tail rotor gearbox, revealed that the tail rotor's impact fingers (strike indicators) were bent in. The tailrotor blades, spar, blade cuffs, and pitch change links exhibited no significant impact damage.

Examination of the main rotor control system, which was made up of control linkages between the cyclic control stick, collective pitch lever, and main rotor swashplate, revealed impact damage and multiple fractures of the torque tubes and push-pull tubes. The breaks in the system were consistent with overload.

Examination of the tail rotor control system, which consisted of the tail rotor control pedals, rocker arm, control rods, bellcranks, and input rod, also revealed impact damage and multiple fractures of the components, which were consistent with overload.

Examination of the surviving flight instruments revealed that the attitude indicator's instrument face was missing. Internal examination of the attitude indicator revealed the presence of rotational scoring. The turn and slip indicator's needle was fused in the left-turn position. The horizontal situation indicator (HSI) bug was found in the 198-degree position, and the HSI was indicating 120 degrees. The radar altimeter's bug was set at 200 feet. Examination of the surviving engine instruments revealed that the T4 indicator (exhaust gas temperature) was indicating approximately 600 degrees C, and the torque indicator was indicating approximately 45 percent.

Examination of the engine revealed that it was damaged from impact forces and the postcrash fire. Both front and rear engine mounts had separated at the airframe connection. Evidence of rotation was observed at both the axial compressor and power turbine blades. The axial compressor exhibited damage from ingestion of foreign objects, and all blades were eroded. The power turbine blades were intact, and blade tip rub was observed on the casing. Both the engine starter and fuel control unit (FCU) had separated from the accessory gearbox. Both FCU drive shafts and the FCU fuel pipe connections were intact. The FCU fuel flow lever and anticipator lever were broken consistent with overload and exhibited fire damage. The fuel flow indicator pointer was at 61 degrees. The anticipator pointer and scale exhibited fire damage and were unreadable.

The engine to aircraft transmission shaft was torsionally separated on both ends at the base of each flange. The flex couplings were attached to the transmission and the engine, respectively. Rotational scoring was observed on the flange that connects to the engine drive shaft. The engine drive shaft nut and lock also exhibited rotational scoring.

#### MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot at MUSC's Department of Pathology and Laboratory Medicine. The autopsy report noted the cause of death as thermal injuries. Toxicological testing of the pilot was conducted at the FAA Bioaeronautical Sciences Research Laboratory (CAMI), Oklahoma City, Oklahoma. The CAMI toxicology report indicated negative results for carbon monoxide, cyanide, basic, acidic, and neutral drugs.

#### ADDITIONAL INFORMATION

##### Overdue Aircraft Notification

Operational control and flight following of the accident flight was accomplished through Omniflight's OCC, its regional communications center, and the MUSC communications center.

The OCC, which was located at Omniflight's headquarters in Addison, Texas, monitored the weather, flight plans, and airworthiness conditions of each aircraft and was also required to approve flights and issue flight releases.

Omniflight also operated two regional communications centers in the United States: one in Kennesaw, Georgia, and another in Mesa, Arizona. Both centers were staffed with Omniflight air medical services communications specialists 24 hours a day. These communications centers directed and facilitated all missions and served as the first point of contact when air medical services were requested. Each center had real-time aircraft tracking and satellite communications through Sky Connect and an air medical computer-aided dispatch system. This system allowed for faster processing of air medical service needs and continuous management of the flight and transport process.

The MUSC communications center provided flight following for Omniflight and other HEMS operators to fulfill the requirements of 14 CFR Part 135. A review of documentation provided

by MUSC revealed that it had a policy manual that addressed helicopter dispatching, flight following, and postaccident actions. Additionally, Omniflight provided the communications center with an EAP containing missing/overdue aircraft procedures.

## History of Flight

<b>Enroute</b>	VFR encounter with IMC (Defining event)
<b>Enroute-cruise</b>	Loss of control in flight
<b>Uncontrolled descent</b>	Collision with terr/obj (non-CFIT)

## Pilot Information

<b>Certificate:</b>	Commercial	<b>Age:</b>	45, Male
<b>Airplane Rating(s):</b>	Single-engine land; Multi-engine land	<b>Seat Occupied:</b>	Right
<b>Other Aircraft Rating(s):</b>	Helicopter	<b>Restraint Used:</b>	
<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 21, 2009
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	December 12, 2008
<b>Flight Time:</b>	4600 hours (Total, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Eurocopter	<b>Registration:</b>	N417AE
<b>Model/Series:</b>	AS-350 B2	<b>Aircraft Category:</b>	Helicopter
<b>Year of Manufacture:</b>		<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	9032
<b>Landing Gear Type:</b>	N/A; Skid	<b>Seats:</b>	3
<b>Date/Type of Last Inspection:</b>	September 17, 2009 Continuous airworthiness	<b>Certified Max Gross Wt.:</b>	4961 lbs
<b>Time Since Last Inspection:</b>	7 Hrs	<b>Engines:</b>	1 Turbo shaft
<b>Airframe Total Time:</b>	2967 Hrs as of last inspection	<b>Engine Manufacturer:</b>	Turbomeca
<b>ELT:</b>	Installed	<b>Engine Model/Series:</b>	Arriel 1D1
<b>Registered Owner:</b>		<b>Rated Power:</b>	732 Horsepower
<b>Operator:</b>		<b>Operating Certificate(s) Held:</b>	On-demand air taxi (135)
<b>Operator Does Business As:</b>	Carolina Life Care	<b>Operator Designator Code:</b>	RMXA

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Instrument (IMC)	<b>Condition of Light:</b>	Night/dark
<b>Observation Facility, Elevation:</b>	MYR,25 ft msl	<b>Distance from Accident Site:</b>	29 Nautical Miles
<b>Observation Time:</b>	22:52 Local	<b>Direction from Accident Site:</b>	45°
<b>Lowest Cloud Condition:</b>	Few / 500 ft AGL	<b>Visibility</b>	10 miles
<b>Lowest Ceiling:</b>	Broken / 1600 ft AGL	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	7 knots /	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>	10°	<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>	30.14 inches Hg	<b>Temperature/Dew Point:</b>	23° C / 22° C
<b>Precipitation and Obscuration:</b>	N/A - None - Unknown precipitation		
<b>Departure Point:</b>	Charleston, SC (CHS )	<b>Type of Flight Plan Filed:</b>	Company VFR
<b>Destination:</b>	Conway, SC (HYW )	<b>Type of Clearance:</b>	None
<b>Departure Time:</b>	23:02 Local	<b>Type of Airspace:</b>	

## Airport Information

<b>Airport:</b>	Georgetown County Airport GGE	<b>Runway Surface Type:</b>	
<b>Airport Elevation:</b>	39 ft msl	<b>Runway Surface Condition:</b>	
<b>Runway Used:</b>		<b>IFR Approach:</b>	None
<b>Runway Length/Width:</b>		<b>VFR Approach/Landing:</b>	None

## Wreckage and Impact Information

<b>Crew Injuries:</b>	3 Fatal	<b>Aircraft Damage:</b>	Destroyed
<b>Passenger Injuries:</b>		<b>Aircraft Fire:</b>	On-ground
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	3 Fatal	<b>Latitude, Longitude:</b>	33.288612,-79.342224(est)

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Gunther, Todd
<b>Additional Participating Persons:</b>	Floyd A James; FAA/AVP-100; Washington, DC Lindsay B Cunningham; American Eurocopter LLC.; Grand Prairie, TX Archie Whitten; Turbomeca USA; Grand Prairie, TX Jonathon H Primm; Omniflight Helicopters Inc.; Addison, TX Xavier M De Gastines; BEA; Le Bourget, France
<b>Original Publish Date:</b>	January 19, 2012
<b>Note:</b>	The NTSB traveled to the scene of this accident.
<b>Investigation Docket:</b>	<a href="https://data.nts.gov/Docket?ProjectID=74807">https://data.nts.gov/Docket?ProjectID=74807</a>

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).