National Transportation Safety Board
Aviation Accident Final Report

Location:	Brownsville, Tennessee	**Accident Number:**	ERA10MA188
Date & Time:	March 25, 2010, 06:00 Local	**Registration:**	N855HW
Aircraft:	Eurocopter AS-350-B3	**Aircraft Damage:**	Substantial
Defining Event:	Windshear or thunderstorm	**Injuries:**	3 Fatal
Flight Conducted Under:	Part 91: General aviation - Positioning		

Analysis

The accident pilot was preparing to return to the helicopter's home base at night after dropping off a patient at a hospital helipad near the end of his 12-hour duty period. The oncoming pilot, who was scheduled for the next duty period, arrived at the helicopter's home base and saw that the helicopter was gone. He was concerned about the weather and called a flight-following center, locating the helicopter on the hospital helipad. The accident pilot then called the oncoming pilot via cellular telephone and asked about the weather. He stated that he was still on the helipad waiting for the flight nurses to return and that he "wanted to get the helicopter out." The oncoming pilot further indicated in postaccident interviews that when he suggested that the accident pilot park the helicopter on the helipad, the accident pilot said that another helicopter already occupied the lower elevation pad, which the oncoming pilot took to mean that the accident pilot did not want to leave the helicopter on the hospital's elevated pad. The two pilots then discussed an approaching weather system. The oncoming pilot reported that the accident pilot told him that he believed he had about 18 minutes to beat the storm and return to home base, so he was going to leave the flight nurses behind and bring the helicopter back.

The oncoming pilot stated that he later called the flight nurses, only to learn that they were on board the helicopter. Rechecking visibility, the oncoming pilot then communicated with one of the nurses on board and told her that she "had the weather beat," and she responded that they were about 30 seconds from arrival. Three witnesses near the accident site stated that they saw lightning and heard thunder at the time of the accident. One witness stated that it was very windy at the time, and another stated that heavy rain bands were passing through the area. After the oncoming pilot heard a loud clap of thunder and saw lightning, he tried to call the crew, but there was no response. The helicopter crashed in an open wheat field about 2.5 miles east of the home base.

Examination of the 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.

An examination of meteorological data revealed that the helicopter likely encountered the leading edge of a line of thunderstorms, moving at 61 knots groundspeed. A portion of this line of thunderstorms

included localized instrument meteorological conditions, heavy rain, lightning, and wind gusts up to 20 knots. The near-surface region immediately ahead of this advancing line, known as the "gust front," is an area prone to extreme low-level wind shear that often occurs in clear air. Based on these conditions, the helicopter likely encountered severe turbulence from which there was no possibility of recovery, particularly at low level. No evidence existed of a lightning strike at the time of the accident.

Although the pilot encountered an area of deteriorating weather, this did not have to occur as the pilot could have chosen to stay at the hospital helipad. The pilot, however, decided to enter the area of weather, despite the availability of a safer option. Based on the pilot's statement to the oncoming pilot about the need to "beat the storm" and his intention to leave the flight nurses behind and bring the helicopter back (even though the nurses made it back on board), he was aware of the storm and still chose to fly into it. The pilot made a risky decision to attempt to outrun the storm in night conditions, which would enable him to return the helicopter to its home base and end his shift there, rather than choosing a safer alternative of parking the helicopter in a secure area and exploring alternate transportation arrangements or waiting for the storm to pass and returning to base after sunrise when conditions improved. This decision making error played an important causal role in this accident.
At the time of the accident, the pilot was nearing the end of his 12-hour duty shift, during which he had flown previous missions and may have had limited opportunities to rest. Further, he had been on duty overnight, and the accident occurred at an early hour that can be associated with degraded alertness. The pilot's length of time awake, his night shift, and the early hour of the accident provide risk factors for fatigue that could have significantly degraded his decision making. However, without complete evidence regarding his sleep and rest activities, the National Transportation Safety Board was unable to determine whether or to what degree fatigue contributed to the pilot's faulty decision to attempt to outrun the storm.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's decision to attempt the flight into approaching adverse weather, resulting in an encounter with a thunderstorm with localized instrument meteorological conditions, heavy rain, and severe turbulence that led to a loss of control.

Findings

Environmental issues	Thunderstorm - Contributed to outcome
Personnel issues	Decision making/judgment - Pilot
Personnel issues	Weather planning - Pilot

Factual Information

History of Flight

Enroute	Windshear or thunderstorm (Defining event)
Enroute	VFR encounter with IMC
Enroute	Loss of control in flight
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On March 25, 2010, about 0600 central daylight time (CDT), a Eurocopter AS350 B3, N855HW, impacted terrain near Brownsville, Tennessee. The certificated commercial pilot and two flight nurses were fatally injured; the helicopter was substantially damaged. The helicopter was registered to and operated by Memphis Medical Center Air Ambulance Service, doing business as Hospital Wing, under the provisions of 14 Code of Federal Regulations Part 91 as a positioning flight. Night visual meteorological conditions prevailed for the flight, which operated on a visual flight rules flight plan. The flight originated from Jackson-Madison County General Hospital Heliport (TN05), Jackson, Tennessee, about 0551 and was en route to Haywood County EMS Heliport (99TN), Brownsville, Tennessee.

According to satellite tracking and witness interviews, the helicopter initially departed its home base (99TN) about 0426 and arrived in Parsons, Tennessee, about 0450 to pick up a patient. The helicopter departed Parsons about 0517 and arrived at TN05 to drop off the patient about 0534. The helicopter subsequently departed TN05 about 0551, and the last satellite contact occurred near the accident site about 0600. Satellite-recorded data indicated that the helicopter flew about 1,000 feet above mean sea level (msl) during the last flight segment until the last contact, when the helicopter's altitude indicated 752 feet msl (about 350 feet above ground level [agl]) and 105 miles per hour (mph).

According to an oncoming shift pilot who started his duty about 0530, it was dark, cloudy, and lightly raining when he arrived at 99TN. When he entered the hangar, he noticed that the helicopter was gone. He was concerned about the weather and called MedCom, a flight following center, to locate the helicopter, which was then on the pad at TN05. After hanging up with MedCom, the accident pilot called the oncoming pilot via cellular telephone and asked about the weather. The oncoming pilot indicated in a postaccident interview that the accident pilot stated that he "wanted to get the helicopter out." The oncoming pilot asked, "Can you park it?" The oncoming pilot stated that the accident pilot then responded that another helicopter already occupied the lower elevation pad, which the oncoming pilot took to mean that the accident pilot did not want to leave the helicopter on the hospital's elevated pad.

The two pilots further discussed the weather, and the oncoming pilot noted, from a computer-based radar depiction, that a front was coming from the Memphis area about 65 miles southwest at an estimated speed of about 25 mph. At the time, the radar was depicting "red" over Memphis and "yellow" extending about 10 miles out.

The oncoming pilot reported that the accident pilot told him that he believed he had about 18 minutes to beat the storm and return to home base. He told the oncoming pilot to call the two flight nurses, who were not yet on board the helicopter, to advise them that he was going to take off and that they would be

picked up later by car. The oncoming pilot stated that he tried to call one of the flight nurses, but she had left her phone back at the base. When he called the other nurse and told her the plan, she stated that they had already made it back to the helicopter and were 7 minutes out from the base.

The oncoming pilot reported in a postaccident interview that he raised the door of the hangar and then went back to look at the weather radar again, noting that the thunderstorm line had "just barely touched the southwest corner of [the] county," which was about 18 miles from base. He went outside, could not see the helicopter, and called the flight nurse again. When she answered, she asked about the weather. The oncoming pilot saw the blinking light on a radio tower to the east, about 6 miles away, "so visibility was good." He told the nurse that she "had the weather beat." The nurse then stated that they were 30 seconds out.

At the time of the conversation, the oncoming pilot observed that it was raining lightly but that the wind had picked up, perhaps to about 20 knots. Then, just after hanging up, he heard an "immediate" loud clap of thunder and saw lightning that made him jump. He looked out, saw no helicopter, and tried to call the nurse without success. He then called MedCom and ran up the hill to contact the ambulance service located there. As he did so, it was raining harder than before, but it was not a soaking rain.

The helicopter was located in a field about 1,500 feet southwest of the last airborne target recorded by satellite about 0600. The accident location was about 2.5 miles east of the helicopter's home base.

Pilot Information

Certificate:	Commercial	**Age:**	58,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	Airplane; Helicopter	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane single-engine; Helicopter; Instrument airplane; Instrument helicopter	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	March 4, 2009
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	August 26, 2009
Flight Time:	4193 hours (Total, all aircraft), 919 hours (Total, this make and model)		

The pilot, age 58, held a commercial pilot certificate, with airplane single-engine and multiengine land, rotorcraft helicopter, instrument airplane, and instrument helicopter ratings. According to company records, the pilot was initially hired by Hospital Wing on May 10, 2005. At that time, he indicated that he had about 2,200 hours of helicopter flight time, and since then, he had accrued about 415 additional hours.

The pilot's latest Part 135 airman competency/proficiency check was completed on August 26, 2009, and his latest instrument competency check was completed on February 14, 2010. The pilot's initial and only night vision goggles (NVG) training was completed on July 27, 2009. His latest Federal Aviation

Administration (FAA) second class medical certificate was issued on March 15, 2009, with the restriction that he possess glasses for near and intermediate vision. He reported a total of 4,008 flight hours on that date.

The pilot was off duty on March 18, 19, and 22. On March 20, he recorded an 8-hour duty day with no flying time. On March 21, he recorded 2.9 flight hours, all during the day. On March 23, he recorded 0.9 flight hours, including 0.2 hours during the day, 0.2 hours at night (without NVG), and 0.5 hours at night (with NVG). On March 24 (the evening before the accident), he recorded 0.4 hours at night. The pilot's wife reported that she called him at work about 2130 on March 24. She stated that he seemed normal during the conversation and did not complain of any fatigue or tiredness. She was not at home when he went to work that day, but she did report that he "always slept well." She indicated that when he worked night shifts, he would sleep for most of the day.

Aircraft and Owner/Operator Information

Aircraft Make:	Eurocopter	**Registration:**	N855HW
Model/Series:	AS-350-B3	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	4624
Landing Gear Type:	High skid	**Seats:**	
Date/Type of Last Inspection:	March 1, 2010 Annual	**Certified Max Gross Wt.:**	5225 lbs
Time Since Last Inspection:	48 Hrs	**Engines:**	1 Turbo shaft
Airframe Total Time:	248 Hrs at time of accident	**Engine Manufacturer:**	Turbomeca
ELT:	Installed, not activated	**Engine Model/Series:**	Arriel 2B1
Registered Owner:		**Rated Power:**	747 Horsepower
Operator:		**Operating Certificate(s) Held:**	On-demand air taxi (135)
Operator Does Business As:	HOSPITAL WING	**Operator Designator Code:**	

The accident helicopter was a Eurocopter AS350 B3 model that was manufactured in 2008. It was equipped with a three blade main rotor system and a two blade tail rotor system and was powered by a 747-shaft horsepower Turbomeca Arriel 2B1 engine.

According to aircraft records, American Eurocopter delivered the helicopter to Hospital Wing in May 2009. At the time of delivery, the helicopter was equipped with high-skid landing gear, NVG and NVG-compatible lighting, a vehicle engine multifunction display (VEMD), an autopilot, and an enhanced ground proximity warning system (EGPWS). Hospital Wing subsequently sent the helicopter to Metro Aviation, Shreveport, Louisiana, for aftermarket installations, including a medical interior. The helicopter was configured with the pilot seat in the right front position, the medical litter extending from the left front to the left aft cabin bulkhead, and medical crew seat backs against the aft cabin bulkhead.

A review of maintenance records revealed that the most recent 200 hour and annual inspections were accomplished on March 1, 2010, at 199.6 hours total time since new (TTSN). At the time of the

accident, the helicopter had accrued approximately 248 hours TTSN, and no outstanding discrepancies were listed in the maintenance records.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Night
Observation Facility, Elevation:	MKL,434 ft msl	**Distance from Accident Site:**	17 Nautical Miles
Observation Time:	05:53 Local	**Direction from Accident Site:**	90°
Lowest Cloud Condition:	Few / 2000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Broken / 2700 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	5 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	160°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.77 inches Hg	**Temperature/Dew Point:**	16°C / 12°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Jackson, TN (TN05)	**Type of Flight Plan Filed:**	Company VFR
Destination:	Brownsville, TN (99TN)	**Type of Clearance:**	None
Departure Time:	05:51 Local	**Type of Airspace:**	

Weather recorded about 0553 at McKeller-Sipes Regional Airport (MKL), Jackson, Tennessee, about 17 miles east of the accident site, included winds from 160 degrees true at 5 knots, visibility greater than 10 miles, a few clouds at 2,000 feet, a broken cloud layer at 2,700 feet, an overcast cloud layer at 3,700 feet, temperature 16 degrees C, dew point 12 degrees C, an altimeter setting of 29.77 inches of mercury, and distant lightning to the southwest.

About 0609 (about 9 minutes after the accident), MKL reported winds from 220 degrees at 15 knots with gusts to 19 knots, visibility 9 miles, thunderstorms in the vicinity, broken ceiling at 1,800 feet agl, overcast cloud base at 2,700 feet agl, temperature 15 degrees C, dew point 12 degrees C, and an altimeter setting of 29.84 inches of mercury. Remarks noted distant lightning in the south and west octants and a thunderstorm that began about 0603.

Radar images indicated that, about the time of the accident, a mesoscale convective system (MCS), or line of thunderstorms, was moving through the area, southwest to northeast, at a groundspeed of about 61 knots. A portion of the 50+ dBZ radar reflectivity pattern of this MCS was characterized by a "bow echo," which included localized instrument meteorological conditions (IMC), heavy rain, lightning, and wind gusts up to 20 knots. The near-surface region immediately ahead of an advancing MCS, known as the gust front, is an area prone to extreme low-level wind shear that often occurs in clear air.

Infrared satellite imagery indicated extensive cloud cover over far-western Tennessee during the time of the accident, with cloud tops at 30,000 feet and greater.

A report of cloud-to-ground lightning strikes from the National Lightning Detection Network indicated that, within a 15-mile radius of the accident site between 0400 and 0605, one strike occurred at 0602:08. An additional report was obtained from the WeatherBug Total Lightning Network (WTLN). From 0545

to 0615, WTLN detected 6 cloud-to-ground strikes and 12 intercloud strikes; however, none occurred within 90 seconds of the accident time.

Three witnesses near the accident site stated that they saw lightning and heard thunder at the time of the accident. One witness stated that it was very windy at the time, and another stated that heavy rain bands were passing through the area.

Wreckage and Impact Information

Crew Injuries:	3 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	Unknown
Total Injuries:	3 Fatal	**Latitude, Longitude:**	35.607223,-89.194999(est)

The wreckage was located in an open wheat field of new growth, about 080 degrees magnetic and 2.5 miles from 99TN, in the vicinity of 35 degrees 36.44 minutes north latitude, 089 degrees 11.70 minutes west longitude. The main debris field was about 250 feet long and 150 feet wide, oriented toward 180 degrees magnetic. The global positioning system (GPS)-measured elevation was 386 feet msl. All of the major components of the helicopter were accounted for at the accident site.

Initial ground scars contained main rotor blade fragments and parts of the left landing gear skid, along with helicopter belly pieces. The scars were oriented consistent with the helicopter impacting the ground in near nose-level, 33-degree left bank attitude.

The main wreckage, consisting of the cabin and cockpit areas, came to rest about 112 feet south of the initial ground scars and was mostly destroyed by a postimpact fire. The radar altimeter indicated 75 feet, and the altitude bug was set at 200 feet. The Kollsman setting on the altimeter was at 29.78.

Examination of the 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.

All three main rotor blades (yellow, blue, and red) remained attached to the hub and exhibited impact damage, with two of the blades exhibiting composite broomstrawing. A detailed examination of the main rotor blade bonding braids did not reveal damage consistent with a lightning strike. The outboard tip of the red main rotor blade, measuring about 18 inches in length, was found about 300 feet northwest of the initial impact crater; its tip weight chamber was also separated and found buried in the initial impact crater.

The tail boom was separated about 3 feet aft of the fuselage attach point and was mostly intact. The flex coupling that connected the forward tail rotor drive shaft to the engine exhibited evidence of torsional separation. Tail rotor strike indicators were partially bent, and flapping damage was observed on the tail

rotor blades, along with damage to the right side of the tail boom, consistent with rotating tail rotor blade contact.

Flight control tubes and hardware from the cockpit to the rotor head exhibited fracture surfaces consistent with overload.

After recovery from the accident site, a partial disassembly of the engine was performed. The engine exhibited evidence of power at impact, including foreign object damage to eight of the axial compressor blades and blade tip curling of two of the blades. The engine power shaft also exhibited torsional damage. Examination of visible internal bearings showed no evidence of damage associated with a lightning strike.

A wheeled, above-ground irrigation system, about 600 feet in length and 0.25 mile east of the accident site, was examined for evidence of lightning strikes, with none found.

Medical and Pathological Information

An autopsy was performed on the pilot at the Shelby County Medical Examiner's Office, Memphis, Tennessee. The autopsy report noted the cause of death as multiple blunt force injuries.

Toxicological testing on pilot specimens was conducted by the FAA Bioaeronautical Sciences Research Laboratory (CAMI), Oklahoma City, Oklahoma. The CAMI toxicology report indicated negative results for ethanol, cyanide, carbon monoxide, and drugs.

Tests and Research

Enhanced Ground Proximity Warning System

The helicopter was equipped with a Honeywell EGPWS. An examination of the remains of the EGPWS computer was conducted at the Honeywell Aerospace facilities, Redmond, Washington, on July 6, 2010. The unit exhibited severe thermal damage to the internal printed circuit boards. The chips, which contained nonvolatile memory (NVM), were missing from the circuit boards due to impact and thermal damage. No data was recovered from the EGPWS unit.

Vehicle and Management Display

The helicopter was equipped with a Thales VEMD. The unit was sent to the National Transportation Safety Board (NTSB) Vehicle Recorder Division, Washington, DC, for examination and download of data.

The VEMD, a multifunction screen installed on the instrument panel that managed essential and nonessential vehicle and engine data, stored flight reports, failure reports, and over-limit reports in NVM. Although the front face of the unit received impact damage, there was no visible damage to the

circuit card assemblies or memory chips. NVM data was recovered and decoded with the assistance of Eurocopter and the Bureau d'Enquêtes et d'Analyses of France. Examination of the data revealed no recorded faults associated with the accident flight.

Digital Electronic Control Unit

The helicopter was equipped with a Thales/Sextant Digital Electronic Control Unit (DECU). The unit was sent to the NTSB Vehicle Recorder Division, Washington, DC, for examination and download of data.

The DECU was a dual-channel, electronic control unit that controlled and monitored engine operation. Due to extensive heat damage to the memory chips, no data could be recovered from the unit.

Multifunction Display

The helicopter was equipped with an Avidyne Multifunction Display (MFD). The unit was sent to the NTSB Vehicle Recorder Division, Washington, DC, for examination and download of data.

The Avidyne FlightMax EX500 was a multifunction "moving map" display that could be configured to depict the helicopter's current position, flight plan, airports, navigational aids, terrain, other traffic, and weather information. The pilot could select one of several pages to view, including several types of maps with or without weather information, navigational charts, trip data, and airport diagrams. The unit was configured to receive satellite broadcast "XM WX Satellite Weather" information, which includes, among other products, Next Generation Radar (NEXRAD) Doppler weather radar data and lighting strike data.

The unit did not record flight data or GPS location information; however, it did record the time the unit was powered on and a time-stamped list of weather products received by the unit. The contents of the weather products were not stored in the unit's NVM, but XM maintained these products in its archives, which were available to investigators. The service provider collects NEXRAD radar data from multiple radar antennas and compiles a single "mosaic" dataset that covers the entire continental United States. This mosaic (and its time of creation) is sent to the XM subscribers at about 5-minute intervals.

The NEXRAD weather product delivered by the service provider is not a "real time" indication of current conditions; latency is involved in the collection, processing, and delivery of the NEXRAD radar data to the EX500 MFD. The Pilot's Guide for the EX500 MFD includes the following caution to customers: "When using Datalink weather, monitor the data age so you are aware of the time elapsed since the last weather update."

The EX500 has an "NXR" indication on the display that shows the age (in minutes) of currently displayed NEXRAD data. This is actually the age of the radar data "mosaic" product produced by the service provider, not the time elapsed since the actual weather conditions. According to the service provider, the radar data mosaic is created every 5 minutes using the latest available NEXRAD data. Any NEXRAD data that is over 15 minutes old is excluded from the mosaic. As a result, an age indication of "NXR 5min" on the EX500 MFD means that any given data in the mosaic are at least 5 minutes old but could be up to 20 minutes old.

For the purposes of this report, "overall latency" of NEXRAD weather information refers to the estimated time lapse from when the precipitation conditions were detected by radar until the data were available on the EX500 MFD. By comparing the NEXRAD data archive from the XM WX Satellite Weather provider to the data obtained from the National Weather Service (NWS), an estimate of the overall latency on the day and location of the accident was calculated. Based on information provided by XM WX Satellite Weather Service, a NEXRAD mosaic was created at 05:55:00 CDT, which was available on the EX500 display during the accident flight at 05:56:20, or about 4 minutes before the accident. This was the only NEXRAD data received during the accident flight. At that time, the NEXRAD age indicator should have indicated "NXR 1min" (1 minute old). Comparing this to archived NWS data, the overall latency was calculated to be about 5 minutes and 21 seconds.

An examination of the NEXRAD presentation that would have been available to the pilot at 05:56:20 shows that the leading edge of the weather system, indicated in green to be light rain, had just crossed 99TN. An area of moderate rain (displayed in yellow) was located about 7 miles southwest of 99TN, moving northeast. During the flight before the accident flight, the EX500 received three updates, the last occurring at 5:31:28 CDT. The overall latency in this case was calculated to be about 8 minutes and 19 seconds.

Organizational and Management Information

Hospital Wing began operations on July 1, 1986. At the time of the accident, Hospital Wing operated five AS350 B3 helicopters with 16 pilots, serving three bases (Brownsville, Tennessee; Memphis, Tennessee; and Oxford, Mississippi). Hospital Wing used a formal safety program with a designated safety officer who reported directly to the Director of Operations. The duties, responsibilities, and qualifications of the safety officer were documented in the Hospital Wing Operations Manual.

Hospital Wing's Director of Operations, who also held the positions of Program Director and Chief Operating Officer, actively participated in the NTSB's public hearing on helicopter emergency medical services in February 2009. As part of the Small Operator Group, he provided input on the implementation of several safety enhancements, including NVG, satellite tracking, helicopter terrain awareness and warning systems, EGPWS, GPS, downlink weather data, radar altimeter, and autopilot.

At the time of the accident, Hospital Wing employed a full-time training officer. Since the accident, Hospital Wing purchased an AS350 B3 FAA-approved flight simulator. According to the Director of Operations, all instrument requirements can be completed in the simulator, and each pilot receives at least 8 hours of IMC training each year.

Risk Assessment

Hospital Wing had a formal risk assessment program at the time of the accident. According to Hospital Wing, a risk assessment form was completed about 1725 on March 24, 2010, at the beginning of the pilot's duty shift. Included with the risk assessment was a crew briefing checklist that included crew names, weather minimums, local weather observations and forecasts, and in-flight communication

procedures.

The risk assessment form evaluated static risks (such as low pilot experience and inoperative aircraft equipment) and dynamic risks (such as poor weather and lack of night lighting). Each category was given numerical values, which were added to determine a total static and dynamic risk value. Higher risk values indicated increased risk. Points were also subtracted in certain situations (such as high pilot experience and NVG usage). A value greater than 14 resulted in a "no go" situation.

The total static and dynamic risk calculated by the pilot before the accident was "3," which included 2 points subtracted for high pilot experience (greater than 500 hours in type of aircraft) and NVG use.

Preventing Similar Accidents

In-Cockpit NEXRAD Mosaic Imagery

Weather radar "mosaic" imagery created from Next Generation Radar (NEXRAD) data is available to pilots in the cockpit via the flight information service-broadcast (FIS-B) and private satellite weather service providers. A mosaic image presents radar data from multiple radar ground sites on a single image on the cockpit display. When a mosaic image is updated, it may not contain new information from each ground site. The age indicator associated with the mosaic image on the cockpit display **does not** show the age of the actual weather conditions as detected by the NEXRAD network. Instead, the age indicator displays the age of the mosaic image created by the service provider. Weather conditions depicted on the mosaic image will **ALWAYS be older than the age indicated on the display**. Due to latencies inherent in processes used to detect and deliver the NEXRAD data from the ground site to the service provider, as well as the time intervals used for the mosaic-creation process set by the service provider, NEXRAD data can age significantly by the time the mosaic image is created.

Although such situations are not believed to be typical, in extreme latency and mosaic-creation scenarios, the actual age of the oldest NEXRAD data in the mosaic can **EXCEED** the age indication in the cockpit by **15 to 20 minutes**. Even small time differences between the age indicator and actual conditions can be important for safety of flight, especially when considering fast-moving weather hazards, quickly developing weather scenarios, and/or fast-moving aircraft. The general issue of latency with in-cockpit NEXRAD is discussed in pilots' guides, in industry literature, and on service providers' websites. However, the NTSB has not found that such guidance contains details about the potential time difference between the age indicator and actual conditions.

Remember that the in-cockpit NEXRAD display depicts where the weather **WAS**, not where it **IS**. The age indicator does not show the age of the actual weather conditions but rather the age of the mosaic image. The common perception of a "5-minute latency" with radar data is not always correct. You should consider the potential delay, which may be up to 15 to 20 minutes, when using in-cockpit NEXRAD capabilities, as the movement and/or intensification of weather could adversely affect safety of flight.

Having in-cockpit weather capabilities does not circumvent the need for a complete weather briefing **before** takeoff. Further, pilots should use all appropriate sources of weather information to make in-flight decisions.

See http://www.ntsb.gov/safety/safety-alerts/documents/SA_017.pdf for additional resources.

The NTSB presents this information to prevent recurrence of similar accidents. Note that this should not be considered guidance from the regulator, nor does this supersede existing FAA Regulations (FARs).

Administrative Information

Investigator In Charge (IIC):	Hicks, Ralph
Additional Participating Persons:	Eric West; FAA/AVP-100; Washington, DC Lindsay Cunningham; American Eurocopter; Grand Prairie, TX Archie Whitten; Turbomeca USA; Grand Prairie, TX Allen Burnett; Hospital Wing; Memphis, TN
Original Publish Date:	January 19, 2012
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=75577