



National Transportation Safety Board Aviation Accident Final Report

Location:	Pyote, Texas	Accident Number:	FTW04FA097
Date & Time:	March 21, 2004, 02:16 Local	Registration:	N502MT
Aircraft:	Bell 407	Aircraft Damage:	Destroyed
Defining Event:		Injuries:	4 Fatal, 1 Serious
Flight Conducted Under:	Part 135: Air taxi & commuter - Non-scheduled - Air Medical (Medical emergency)		

Analysis

While maneuvering during dark night conditions, an emergency medical services helicopter impacted the terrain near Pyote, Texas, after encountering a gust front that produced localized blowing dust and moderate to severe turbulence. The pilot did not obtain any formal preflight weather briefing before departure or en route. No flight dispatch services were used for the flight. No evidence was found to indicate that the pilot obtained any preflight weather briefing before departure or en route. Radar data depicted the helicopter traveling in a north-northeasterly direct route toward the destination after departing from a hospital. Approximately 34 minutes after departure, the helicopter executed a right turn to the east. About that time, the pilot contacted the company dispatch and began a position report, stating, "...hold on a [minute] dispatch, [approximately 14 seconds later] look at, gimme something to look at." There were no further communications from the helicopter. Radar data indicated that the helicopter continued in a right turn back to the north. Examination of the accident site revealed the helicopter impacted the terrain on a southerly heading in the opposite direction of the destination, consistent with the helicopter turning around again. Examination of the helicopter revealed no evidence of an in-flight control or system malfunction before the initial impact. According to documents provided by the operator, the pilot had accumulated a total of 86 flight hours as pilot-in-command of the accident helicopter make and model and a total of 4,209 rotorcraft flight hours. Reported weather conditions at the time of the accident and near the accident site included strong winds, moderate to severe turbulence, and unstable atmosphere that supported thunderstorm activity.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's inadvertent encounter with adverse weather, which resulted in the pilot failing to maintain terrain clearance. Contributing factors were the dark night conditions, the pilot's inadequate preflight preparation and planning, and the pressure to complete the mission

induced by the pilot as a result of the nature of the EMS mission.

Findings

Occurrence #1: IN FLIGHT ENCOUNTER WITH WEATHER

Phase of Operation: CRUISE - NORMAL

Findings

1. (F) LIGHT CONDITION - DARK NIGHT
2. (F) PREFLIGHT PLANNING/PREPARATION - INADEQUATE - PILOT IN COMMAND
3. (C) FLIGHT INTO ADVERSE WEATHER - INADVERTENT - PILOT IN COMMAND
4. (F) PRESSURE INDUCED BY CONDITIONS/EVENTS - PILOT IN COMMAND
5. (F) WEATHER CONDITION - GUSTS
6. (F) WEATHER CONDITION - SAND/DUST STORM
7. (F) WEATHER CONDITION - TURBULENCE, CONVECTION INDUCED

Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER

Phase of Operation: MANEUVERING - TURN TO REVERSE DIRECTION

Findings

8. (C) CLEARANCE - NOT MAINTAINED - PILOT IN COMMAND

Factual Information

HISTORY OF FLIGHT

On March 21, 2004, approximately 0216 central standard time, a Bell 407 air ambulance helicopter, N502MT, was destroyed when it impacted terrain while maneuvering in reduced visibility conditions near Pyote, Texas. The instrument-rated commercial pilot, a flight paramedic, an infant patient, and a passenger sustained fatal injuries, and a flight nurse sustained serious injuries. The single-engine helicopter was owned and operated by Med-Trans Corporation (MTC), of Bismarck, North Dakota, and doing business as CareStar, Odessa, Texas. Night instrument meteorological conditions (IMC) prevailed throughout the area for the Title 14 Code of Regulations Part 135 on-demand air ambulance flight for which a company visual flight rules (VFR) flight plan was filed. The flight originated from the Big Bend Regional Medical Center, near Alpine, Texas, approximately 0139 to transfer the patient to the University Medical Center (UMC), near Lubbock, Texas.

According to MTC personnel, the pilot reported for duty approximately 2000, March 20, 2004, at the base hangar at the Odessa-Schlemeyer Field (ODO), near Odessa, Texas, and was relieving the base chief pilot. Approximately 2200, the base chief pilot informed the accident pilot via a telephone call that there was weather in the area and to be careful on any possible flights. He advised the accident pilot to move the helicopter into the hangar due to weather, and that there was a pending pediatric flight.

At 2330, the medical staff requested, through dispatch personnel that an infant patient be transferred from Alpine to Lubbock. At 2342, the MTC pilot departed the base hangar and arrived at the Medical Center Hospital (MCH) in Odessa to pick up the flight nurse and paramedic for the flight to Alpine. A review of the MCH dispatch log revealed that at 2346, the following transmission from dispatch was recorded, "[CareStar], Adv yellow weather status, pilot checked weather, will take run." At 2352, the flight departed MCH en route to the Big Bend Regional Medical Center, and arrived at 0044 (March 21, 2005).

Approximately 0135, the patient and passenger boarded the helicopter. At 0139, the flight departed Big Bend Regional Medical Center en route to Lubbock (Lubbock is approximately 220 miles north-northeast of Alpine). A review of the radar data depicted the helicopter heading in a north-northeasterly direction after departure from Alpine. At 0155, the pilot contacted the MCH dispatch and gave the following position report, "[N] 30.51.50, [W] 103.23.56, ETA 1 hr. 28 min, 740 [pounds of] fuel."

At 0213, approximately 1 mile south of the accident site, the helicopter executed a turn to the north, and then a turn back to the northeast. At 0215, the radar data depicted the helicopter turned to the east and then turned 270 degrees back to the north. Approximately the same time the helicopter executed the turn to the east, the pilot contacted the MCH dispatch and began a position report, when he stated, "...hold on a [minute] dispatch, [approximately 14 seconds later] look at, gimmie something to look at." There were no further communications from the helicopter. The last radar position of the helicopter was recorded at 0216:13, at 31 degrees 24 minutes 08 seconds north latitude and 103 degrees 07 minutes 31 seconds west

longitude, at an altitude of 5,900 feet msl, approximately 1,200 feet north of the accident site.

At 0323, the MCH dispatch facility notified the Texas Department of Public Safety (DPS) of a possible missing helicopter. Due to weather in the Odessa area, the DPS helicopter could not initiate a search until approximately 0600. At 0619, DPS helicopter rescue personnel located the helicopter wreckage approximately 6 miles south of Pyote. The geographical coordinates of the helicopter wreckage were north latitude 31 degrees 23.944 minutes by west longitude 103 degrees 07.554 minutes at an elevation of approximately 2,480 feet msl. (It should be noted that the communications transcripts and radar data times are off by up to 4 minutes at some points, and the time noted in this report is from the radar data.)

Several attempts to obtain a statement from the flight nurse were unsuccessful.

PERSONNEL INFORMATION

The pilot held a commercial helicopter certificate issued on February 18, 1999, with an instrument helicopter rating, which was issued October 4, 1999. The pilot held a certified flight instructor certificate with rotorcraft and instrument rotorcraft ratings. In addition, the pilot held an airline transport pilot certificate with a rating for multi-engine land airplanes. The pilot was issued a second-class medical certificate on March 3, 2004, with the limitation, "Holder shall possess glasses that correct for the near vision."

According to the Pilot/Operator Aircraft Accident Report (NTSB Form 6120.1/2), the operator reported the pilot accumulated 17,307 total flight hours, and 4,209 hours total rotorcraft flight time. The pilot accumulated 1,747 hours of night flight time, 130 hours of actual instrument flight time, and 87 hours of simulated instrument time; however, it was unknown how many night and instrument hours were in rotorcraft operations. According to the pilot's resume, as of October 1, 2003, the pilot had accumulated 13,032 total hours in aerial application flight operations, of which 1,200 hours were in rotorcraft. The pilot's logbook was not provided to investigators during the investigation.

The operator provided the pilot's duty time records to the National Transportation Safety Board Investigator-In-Charge (NTSB IIC). As of March 19, 2004, the pilot accumulated 86 flight hours as pilot-in-command in the Bell 407. The pilot accumulated 60.6, 39.2, and 25.4 flight hours in the last 90, 60, and 30 days, respectively. According to the operator's "Record of Flight Training," the pilot accumulated 4.4 flight hours of new hire training, which covered, "Normal and Emergency Procedure Training, Night Flight [and] Approaches." The 4.4 hours of new hire training consisted of 3 hours of day flight, 0.2 hours of simulated instrument conditions (under a view limiting hood), and 1.2 hours of night flight.

On November 11, 2003, the pilot satisfactorily completed his Federal Aviation Regulations Part 135 Airman Competency/Proficiency Check in the Bell 407 helicopter. According to the remarks, the pilot successfully completed the "Initial new hire" check ride.

According to the company's "Pilot Interview" form, question 14 asked, "How many times have you been Inadvertent IMC? How did you react? How do you avoid Inadvertent IMC?" The pilot answered the first question, "No" and did not answer the last two questions.

COMPANY INFORMATION

Med-Trans Corporation was issued an operating certificate by the Federal Aviation Administration (FAA) in 1995, to conduct on-demand air taxi operations under the provisions of Title 14 CFR Part 135. At the time of the accident, MTC had air ambulance operations in the states of Tennessee, Kentucky, South Carolina, Texas, Arizona, California, South Dakota, North Dakota, and Nebraska. The corporate headquarters was located in Bismarck, the Director of Maintenance was located in Bismarck, the Director of Operations was located in Tucson, Arizona, and the Chief Pilot was located in Johnson City, Tennessee. The Part 135 operating certificate was managed by the FAA Flight Standards District Office in Scottsdale, Arizona. The FAA approved company operation specifications did not allow flights to be conducted in IMC.

AIRCRAFT INFORMATION

The red and white accident helicopter (serial number 53549) was configured for the transport of medical patients with two seats in the cockpit, one rear-facing seat aft of the pilot's seat, two forward-facing seats, and one medical bed. The helicopter was powered by one 650-horsepower Rolls Royce Corporation turbo-shaft engine (serial number CAE 847594) and equipped with a four bladed main rotor system, and a two bladed tail rotor. The helicopter was equipped for Instrument Flight Rules operations.

The helicopter was maintained in accordance with an Approved Airworthiness Inspection Program on a continuous basis. At the time of the accident, the airframe and engine accumulated a total of 500.8 flight hours. The 100-hour airframe inspection and 150-hour engine inspection was completed on February 28, 2004, at a total time of 452.4 hours. The last inspection conducted on the accident helicopter was a 50-hour inspection, which was completed on March 18, 2004, at a total time of 497.2 hours.

METEOROLOGICAL INFORMATION

The National Weather Service (NWS) Storm Prediction Center (SPC) issued a Convective Outlook at 1900 on March 20, 2004, for expected thunderstorm activity across the country. A slight risk of severe thunderstorms was expected from southwest Texas to northern Mississippi, which included the accident site area. Surrounding the slight risk area was a larger area of general thunderstorm activity, which also encompassed the accident site. The SPC outlook indicated that several multi-cellular to marginal super cell type thunderstorm clusters had formed over west central Arkansas, and in the area of Abilene, Texas, westward to near Midland, Texas, in the vicinity of pre-frontal wind shifts. The advisory warned that many short-lived thunderstorms would be the rule along the frontal system during the evening with the potential for large hail and gusty winds. The advisory also warned that the most intense thunderstorms that developed near the frontal boundaries had the potential to briefly become a super cell.

The NWS Aviation Weather Center issued a Convective SIGMET (Significant Meteorological Information) 25C at 0154, which was valid until 0355, for portions of western Texas. The

advisory was issued for an area of thunderstorms moving from 040 degrees at 30 knots, with cloud tops to 41,000 feet. The accident site was located approximately 15 miles southwest of the boundary area for the advisory. The convective outlook, valid from 0355 to 0755, warned that the area could expect continued thunderstorm development that met convective SIGMET criteria. The accident site was within this outlook region.

The Geostationary Operations Environmental Satellite number 12 image for 0132 displayed two large convective systems on either side of the direct route between Alpine and Lubbock (which ran south to north). The accident site was located on the southwestern side of the eastern system. The image for 0215 also displayed the accident site between two large convective systems. A comparison between the 0132 and 0215 images revealed the cloud system to the west had moved to the west-southwest with the cloud tops lowering, and the system to the east had pushed southward and had developed a defined leading edge band of cumulonimbus clouds.

The NWS Radar Summary Chart for 0217 depicted an area of echoes associated with thunderstorms and rain showers stretching across southwest to eastern Texas and Louisiana. The area of echoes began in the vicinity of the accident site and turned into a solid line of thunderstorms associated with intense to extreme intensity echoes to the east of the accident site, with another area of very light intensity echoes to the west.

The NWS Surface Analysis Chart for 0300 depicted the primary surface features within the hour of the accident. The chart depicted a stationary front extending east-to-west central Texas into northern Mexico in the immediate vicinity of the accident site. A squall line or instability band was depicted south of the stationary front across Texas, east of the accident site. The station models in the vicinity of the accident site indicated temperatures ranging from the low 70's (degrees Fahrenheit) south of the front to the upper 50's north of the front, and west of the accident site. Dew point temperatures were in the mid to upper 60's south of the front and decreased rapidly to the west of the accident site to the mid 50's. Cloud cover varied from overcast skies along the front to clear west of the accident site.

The closest upper air or rawinsonde observation was from the NWS Midland Regional Forecast Office, Midland, Texas, located approximately 62 miles northeast of the accident site and was issued at 1800, on March 20th. The sounding provided a maximum probable gust from thunderstorms of 57 knots, and a microburst maximum gust potential of 67 knots.

The area forecast for southwestern Texas, which was issued at 1234 on March 20, 2004, and was valid until 0200, was for clear skies or scattered cirrus clouds. From 1800, on March 20, 2004, the forecast called for scattered-to-broken clouds at 5,000 feet agl with widely scattered thunderstorms and light rain, with cumulonimbus cloud tops to 35,000 feet. The outlook, from 0200 to 0800 on March 21, 2004, was for VFR conditions with thunderstorms and moderate rain.

The closest terminal aerodrome forecast (TAF) to the accident site was for Winkler County Airport, Wink, Texas, located approximately 29 miles north of the accident site at an elevation of 2,820 feet. The TAFs are valid for a 5-mile radius of the airport center point. Temporarily from 2300 to 0200, the forecast called for a visibility of 1/2 mile in thunderstorms and heavy

rain, and an overcast ceiling at 1,000 feet in cumulonimbus clouds.

At 0027, the ODO (original departure point) automated surface observing system (ASOS), located approximately 50 miles north-northeast of the accident site, reported the wind from 050 degrees at 16 knots, visibility 10 statute miles, broken cloud layers at 2,000, 2,400, and 11,000 feet agl, temperature 17 degrees Celsius, dew point 13 degrees Celsius, and an altimeter setting of 30.40 inches of mercury.

The closest weather reporting location to the accident site was from Pecos Municipal Airport (KPEQ), Pecos, Texas, located approximately 19 miles west of the accident site at an elevation of 2,613 feet msl. The airport had an Automated Weather Observing System (AWOS), which reported the weather conditions every 20 minutes.

At 0125, PEQ AWOS reported the wind from 120 degrees at 6 knots, visibility 10 statute miles, sky clear below 12,000 feet, temperature 20 degrees Celsius, dew point 15 degrees Celsius, and an altimeter setting of 30.32 inches of mercury.

At 0225, PEQ AWOS reported the wind from 010 degrees at 3 knots, visibility 10 statute miles, sky clear below 12,000 feet, temperature 19 degrees Celsius, dew point 15 degrees Celsius, and an altimeter setting of 30.30 inches of mercury.

There was no report of the pilot obtaining any formal preflight weather briefing (from a flight service station, DUATS or WSI weather program) prior to departure or en route.

According to the U.S. Naval Observatory astronomical data for Pyote, Texas, the moonset was at 1903 on March 20, 2004. The phase of the moon was a waxing crescent with 1 percent of the moon's visible disk illuminated.

A family traveling in a recreational vehicle from El Paso, Texas, northeastward on Interstate 20 reported the weather conditions they encountered while en route in the vicinity of the accident. They reported they could see a defined thunderstorm in the distance from the time they left El Paso. Approximately 0030, when they were approximately 15 miles west of Pecos, they encountered what they called a "strong storm front" that almost blew them off the road. They indicated that there was no precipitation, only extremely high winds and dust. They continued in the storm at a slower speed to approximately Monahans, Texas, which was located approximately 15 miles northeast of the accident site. They described the storm as being "vicious" and almost took them off the road, and they could barely control their vehicle through the storm.

The local authorities also reported strong thunderstorms throughout the area around the time of the accident.

The FAA Advisory Circular 00-24B "Thunderstorms" identifies the hazards associated with thunderstorms. Section C of that advisory deals with turbulence associated with thunderstorms and identifies a gust front. The advisory states that potentially hazardous turbulence is present in all thunderstorms, and a severe thunderstorm can destroy an aircraft. Strongest turbulence within the cloud occurs with shear between updrafts and downdrafts.

Outside the cloud, shear turbulence has been encountered several thousand feet above and 20 miles laterally from a severe storm. A low level turbulent area is the shear zone associated with the gust front. Often, a roll cloud forms on the leading edge of the thunderstorm and marks the top of the eddies in the shear zone and signifies an extremely turbulent zone. Gust fronts often move far ahead (up to 15 miles) of associated precipitation. The gust front causes a rapid and sometimes drastic change in surface wind ahead of an approaching storm.

FAA Advisory Circular 00-50A "Low Level Windshear" explains in greater detail the hazards associated with gust fronts. The hazards associated with the turbulence region of the gust front are identified from the leading edge or nose, which would be marked by a sudden wind shift and increase in wind speed and potentially moderate to severe turbulence up to 1,000 to 3,000 feet agl. Multiple surges of cold dense air would also be possible. Behind the head of the gust front, another area of turbulence is typically found near the wake and can cause wave formation with the density discontinuities between warm and cold air masses with again moderate to severe turbulence.

On November 22, 2004, the NTSB IIC, another NTSB investigator, and a representative from the FAA interviewed MTC's Director of Operations and Chief Pilot. During the interview, the MTC personnel described the company procedure regarding MTC's classification of the weather conditions. Company procedure for flight dispatcher's states the following, "Red, Yellow, and Green Weather System:

Red - Weather conditions will not allow for mission acceptance. Below minimums.

Yellow - Weather conditions may not allow for flights to certain locations. Weather conditions at the base are above minimums, however, parts of our service are not. ([Flight Dispatcher] must check with the pilot on a case-by-case basis prior to acceptance of a flight.)

Green - Weather conditions allow for the acceptance of any mission within our service area."

WRECKAGE AND IMPACT INFORMATION

On March 22 and 23, 2004, the accident site and helicopter wreckage were examined by the NTSB IIC, a representative from the FAA Rotorcraft Directorate, representatives from the airframe and engine manufacturers, and representatives from MTC.

The debris field and ground scars at the accident site were oriented along a 170 to 180-degree magnetic heading. The wreckage distribution was approximately 450 feet in length, and all components of the helicopter were located in the debris area. The initial impact area contained three ground scars consistent with the left and right landing gear skids and the belly of the fuselage. The helicopter landing light and miscellaneous belly structure were found in the initial impact area. The scars associated with the landing gear were approximately the same length and began at the same point. Approximately 20 feet beyond the initial impact point, three ground scars that were perpendicular to the energy path were observed. Adjacent to the perpendicular slash marks were separated sections of the main rotor blade tips. A section of the fuselage belly structure was located approximately 60 feet beyond the initial impact area. The main wreckage came to rest approximately 285 feet forward of the initial impact point.

The main wreckage consisted of the fuselage, transmission, main rotor hub and blade assembly, and tail boom. Between the initial impact and the main wreckage were helicopter components which included anti-torque pedals, doors, instrument panel, tail skid, and landing gear cross tubes, skid tubes, and steps. The engine, tail rotor gearbox (with tail rotor blade assembly attached), and fuel bladders came to rest approximately 60 feet beyond the main wreckage.

The cockpit and cabin were destroyed with crushing and component separation. Portions of the seats and medical equipment were scattered in the debris path.

The radar altimeter was found in the OFF position, the altimeter indicated approximately 2,380 feet msl, and the airspeed indicator read 0 knots. The HOBBS meter indicated 500.8 hours. The collective was located with the main wreckage. The twist-grip throttle was found in the IDLE position. The fuel boost and transfer pump switches were in the OFF position. The cyclic and flight control tubes were fragmented and destroyed. Flight control continuity from the cyclic, collective, and anti-torque pedals was precluded by impact damage.

The tail boom remained partially attached to the main fuselage structure. The left and right auxiliary fins of the horizontal stabilizer were separated. The outer 14 inches of the right horizontal stabilizer was separated and displayed a witness mark consistent with a main rotor blade strike. The vertical fin was separated from the tail boom and displayed upward crush damage to the lower end. The tail skid was separated and located near the initial impact area. The tail rotor gearbox was separated from the tail boom; however, it remained attached to the separated tail boom structure. The inboard section of both tail rotor blades remained attached to the tail rotor hub. The tail rotor yoke assembly remained attached to the tail rotor gearbox output shaft. The outboard sections of the tail rotor blades were separated and the fiberglass structure was shredded. Continuity was established from the tail rotor pitch change mechanism to the tail rotor crosshead and pitch link. The number 4 tail rotor drive shaft was separated and located in the debris path. The drive shaft displayed rotational scoring signatures and the attached rivets were sheared. The other tail rotor drive shafts remained attached to the tail boom mounting structure.

The main transmission remained partially attached to the fuselage structure. The main transmission input gear shaft was not free to rotate. The K-Flex drive shaft was separated at the freewheeling unit attach point. The K-Flex flex frames were fractured and the drive shaft displayed rotational scoring signatures. The upper and lower transmission chip detectors were removed and no evidence of metal debris was noted. Two of the main rotor pitch links were bent and fractured, and two remained attached to the swash plate and main rotor pitch horns. All four main rotor blades remained attached to the main rotor blade grips. The blades displayed leading edge gouging, scratching and core separation. Separated sections of the main rotor blades were located in the debris path.

The engine's N1 drive train rotated freely when manually rotated; however, the engine's N2 drive was not free to rotate. The compressor impeller displayed several blades bent in the opposite direction of rotation, and the impeller shroud displayed 360-degree rub signatures. The freewheeling unit to oil cooler blower short shaft, which was mounted to the engine accessory gearbox rear power output shaft, was found sheared and displayed rotational

scoring. The starter generator was separated from its mounting structure, and the fan blades displayed rotational signatures. The engine electronic control unit (ECU) (serial number JG2ALK0748, part number 23072790) was removed from the airframe structure and retained for additional examination and information extraction. The engine was also retained for further examination.

PATHOLOGICAL INFORMATION

The Texas Tech University Health Sciences Center, Division of Forensic Pathology, Lubbock, Texas, performed an autopsy on the pilot on March 22, 2004. Specimens for toxicological tests were taken from the pilot by the medical examiner. According to the autopsy, the cause of death for the pilot was multiple blunt force injuries.

The FAA's Civil Aeromedical Institute's Forensic and Accident Research Center examined the specimen's taken by the medical examiner. The toxicology test revealed 3.832 (ug/ml, ug,g) of acetaminophen was detected in the blood. The toxicological tests were negative for carbon monoxide, cyanide and alcohol.

FIRE

There was no post-impact fire.

SURVIVAL ASPECTS

According to a nurse at Big Bend Regional Medical Center, the helicopter occupants were in the following seat locations prior to departure to UMC: the pilot was seated in the right front seat, the flight paramedic was seated in the left aft forward-facing seat, the flight nurse, who was also the sole survivor, was seated in the right aft forward-facing seat, and the infant patient and passenger were seated in the right aft-facing seat directly behind the pilot.

TEST AND RESEARCH

The engine was examined and disassembled on May 13, 2004, at the facilities of Rolls Royce Corporation, under the supervision of the NTSB IIC and representatives of Rolls Royce. Examination of the engine revealed foreign object debris in the compressor section and several compressor blades were bent in the opposite direction of rotation. Rub signatures were noted on the impeller shroud at the six and twelve o'clock positions. The engine N2 drive train was free to rotate when separated from the exhaust collector. The engine N1 and N2 shafting was intact and not damaged. Debris, consistent with earthen terrain, was noted in the number 3 and 4 stage turbine wheels and in the outer combustion case, combustion liner, and turbine area. No anomalies were noted that would have precluded engine operation.

The ECU data was downloaded by Rolls Royce. According to Rolls Royce, the ECU recorder contained a total of 13 records. The data revealed that prior to record 9, no faults were recorded, and the engine was steady state in the auto mode, Gas Generator speed was over 100 percent through record 10, and torque was high. No prior faults up to the accident time (last run) were recorded. The ECU recorder captured a torque rate fault that occurred between

record 8 and 9, and aircraft power was lost after record 13. The Incident Recorder (IR) was triggered by an NP (power turbine RPM) and NR (main rotor RPM) exceedance that occurred after record 10.

The IR operates by monitoring a particular set of engine control conditions, at the same rate as the engine as the engine control software, for conditions that are determined to be abnormal or a fault. The IR maintains a 12 second memory buffer as pre-incident data. If a fault is detected, the incident data set is written to the system non-volatile memory space as "snapshot" data. The IR then proceeds to write the 10 data sets of pre-incident data, and the next 40 data sets to non-volatile memory. Non-volatile data storage is given to the "snapshot" data, so that additional faults detected will be saved before completing the storing of pre or post-incident data.

ADDITIONAL INFORMATION

The NTSB IIC conducted a review of MTC's "Helicopter Operations Training Manual", Revision 02, dated January 29, 2000. Chapter 18, Transition Flight Training BH 407, 206L-1/L-3, Section 18.10 stated the following in reference to Cross Country Flight training, "During the course of this flight the instructor will have the trainee demonstrate the ability to navigate and control the aircraft with reference to instruments only and recover from unusual attitudes by reference to instrument only." According to the manual, in reference to inadvertent IMC encounter, the pilot receives ground training to the following recovery procedure: A. Attitude, T. Torque, A. Airspeed, H. Heading.

The helicopter wreckage was released to the owner's representative.

Pilot Information

Certificate:	Airline transport; Commercial; Flight instructor	Age:	46, 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; Instrument airplane	Toxicology Performed:	Yes
Medical Certification:	Class 2 Valid Medical--w/ waivers/lim	Last FAA Medical Exam:	March 20, 2003
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	November 11, 2003
Flight Time:	17307 hours (Total, all aircraft), 66 hours (Total, this make and model), 66 hours (Last 90 days, all aircraft), 26 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Bell	Registration:	N502MT
Model/Series:	407	Aircraft Category:	Helicopter
Year of Manufacture:		Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	53549
Landing Gear Type:	Skid	Seats:	5
Date/Type of Last Inspection:	February 28, 2004 AAIP	Certified Max Gross Wt.:	5000 lbs
Time Since Last Inspection:	48.4 Hrs	Engines:	1 Turbo shaft
Airframe Total Time:	452.4 Hrs as of last inspection	Engine Manufacturer:	Rolls-Royce
ELT:	Installed, activated, aided in locating accident	Engine Model/Series:	250-C47B
Registered Owner:		Rated Power:	650 Horsepower
Operator:		Operating Certificate(s) Held:	On-demand air taxi (135)
Operator Does Business As:	CareStar	Operator Designator Code:	M3XA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	Condition of Light:	Night/dark
Observation Facility, Elevation:	PEQ,2613 ft msl	Distance from Accident Site:	19 Nautical Miles
Observation Time:	02:25 Local	Direction from Accident Site:	270°
Lowest Cloud Condition:	Clear	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	3 knots / 0 knots	Turbulence Type Forecast/Actual:	/
Wind Direction:	10°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30.32 inches Hg	Temperature/Dew Point:	19° C / 15° C
Precipitation and Obscuration:	N/A - Blowing - Widespread dust		
Departure Point:	Alpine, TX	Type of Flight Plan Filed:	Company VFR
Destination:	Lubbock, TX	Type of Clearance:	None
Departure Time:	01:39 Local	Type of Airspace:	Class G

Wreckage and Impact Information

Crew Injuries:	2 Fatal, 1 Serious	Aircraft Damage:	Destroyed
Passenger Injuries:	2 Fatal	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	4 Fatal, 1 Serious	Latitude, Longitude:	31.398889, -103.125556

Administrative Information

Investigator In Charge (IIC):	Sauer, Aaron
Additional Participating Persons:	Steven E Miller; Federal Aviation Administration - FSDO; Lubbock, TX Matthew J Rigsby; Federal Aviation Administration - ASW 112; Fort Worth, TX Harold R Barrentine; Bell Helicopter Textron; Fort Worth, TX Robert E Ketchum; Rolls-Royce Corporation; Indianapolis, IN Russ Braddock; Med-Trans Corporation; Bismarck, ND Bert Levesque; Med-Trans Corporation; Bismarck, ND
Original Publish Date:	January 26, 2006
Note:	
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=58927

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](#).