National Transportation Safety Board
Aviation Accident Final Report

Location:	DALHART, Texas	**Accident Number:**	FTW00FA091
Date & Time:	March 10, 2000, 06:05 Local	**Registration:**	N335T
Aircraft:	Eurocopter BO105S-CBS-5	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	4 Fatal
Flight Conducted Under:	Part 135: Air taxi & commuter - Non-scheduled - Air Medical (Medical emergency)		

Analysis

During dark night conditions, the helicopter was en route from its hospital base to another hospital to pick up a medical patient for transport back to the base hospital, when the pilot landed the helicopter 15 miles south of the destination hospital due to fog. The patient was transported via ambulance to the helicopter. After the patient was transferred to the helicopter, witnesses reported that the helicopter departed, with its lights on, and headed toward the south at an altitude between 10 and 75 feet agl. They reported the visibility as poor, about 1/4 mile, a very low ceiling, and extremely dense fog. One witness stated that it appeared as if the helicopter was 'trying to stay close to the ground and not get up into the heavy fog.' Examination of the accident site revealed that the helicopter impacted in a near 45 degree nose low attitude and the wreckage encompassed an area measuring 262 feet by 75 feet. A weather study revealed that the accident site was in area of low ceilings and fog, which was expanding to the south and west. According to documents provided by the operator, the pilot had accumulated a total of 44 simulated instrument flight hours and 1 hour of actual instrument flight experience. Examination of the helicopter revealed no evidence of an in-flight control or system malfunction, and examination of the engines revealed evidence of operation at the time of impact.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's failure to maintain control of the helicopter as a result of his continued flight into known adverse weather conditions. Factors were the dark night light condition, fog, low ceiling, and the pilot's lack of total instrument flight time.

Findings

Occurrence #1: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: MANEUVERING

Findings
1. (C) FLIGHT INTO KNOWN ADVERSE WEATHER - PERFORMED - PILOT IN COMMAND
2. (F) WEATHER CONDITION - LOW CEILING
3. (F) WEATHER CONDITION - FOG
4. (F) LIGHT CONDITION - DARK NIGHT
5. (F) LACK OF TOTAL INSTRUMENT TIME - PILOT IN COMMAND
6. (C) AIRCRAFT CONTROL - NOT MAINTAINED - PILOT IN COMMAND

Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Findings
7. TERRAIN CONDITION - OPEN FIELD

Factual Information

HISTORY OF FLIGHT

On March 10, 2000, at 0605 central standard time, an Mbb, BO105S-CBS-5 helicopter, N335T, was destroyed when it impacted terrain while maneuvering near Dalhart, Texas. The helicopter was registered to General Electric Capital Corporation, of Englewood, Colorado, and operated by Temsco Helicopters, Inc., Ketchikan, Alaska, under contract to Northwest Texas Healthcare System Hospital (Northwest Texas Hospital), of Amarillo, Texas. The instrument rated commercial pilot, two medical crew members, and the medical patient sustained fatal injuries. Dark night instrument meteorological conditions prevailed and a company flight plan was filed for the 14 Code of Federal Regulations Part 135 air medical transport flight. The flight originated from a farm field 15 miles south of Boise City, Oklahoma, at 0600 and was destined for the Northwest Texas Hospital.

According to dispatch personnel at the Northwest Texas Hospital, the helicopter departed Northwest Texas Hospital at 0355 and was destined for a hospital in Boise City. The purpose of the flight was to transfer a patient from the hospital in Boise City to the Northwest Texas Hospital. At 0506, the pilot reported that he landed the helicopter approximately 15 miles south of the Boise City hospital along the east side of Highway 385 due to fog. He stated that he would wait for the patient to be transported to his location and then return to the Northwest Texas Hospital.

At 0557, the emergency medical technician (EMT), who was aboard the ambulance, transferred the patient to the helicopter. The EMT stated that he observed the helicopter depart to the south with all the lights on, paralleling Highway 385 approximately 30-50 feet agl. The EMT added that the visibility on the ground was 1/4 mile with a "very low ceiling," and "it seemed like [the helicopter] was trying to stay close to the ground and not get up into the heavy fog."

According to the ambulance driver, he watched the helicopter liftoff and fly southbound over the road at an altitude of 50-75 feet agl. He stated that he followed the helicopter as it paralleled the road for approximately 1.5 minutes, and it was flying in "extremely dense fog." He then turned northbound and the helicopter disappeared from his view. He added that he also observed ice forming on the ambulance's mirrors and antennas.

The Boise City Sheriff stated that he and his wife were driving north on Highway 385 and they observed the helicopter lift off of the ground with its lights on. He reported that the helicopter flew south paralleling the east side of Highway 385, approximately 10-20 feet above the ground. The Sheriff added that there was patchy fog in the area and approximately 1/4-inch of ice had formed on his vehicle's antenna while driving in the area.

There were no witnesses to the accident.

PERSONNEL INFORMATION

The FAA issued the pilot a commercial certificate on December 22, 1992. According to records

provided by Temsco Helicopters Inc., the pilot was initially qualified in the BO-105 on January 29, 1998. A pilot qualification form, which was provided by Temsco Helicopters Inc., dated December 16, 1999, revealed that the pilot had accumulated a total of 3,585 flight hours, of which 3,500 hours were in helicopters, and 90 hours were in the BO-105. Additionally, the form revealed that the pilot had accumulated 44 hours of simulated instrument time and 1 hour of actual instrument time. The pilot successfully completed his most recent recurrent ground and flight training on January 6, 1999. According to the grade sheet for the flight portion of the recurrent training (FAA Form 8410-3), the pilot received a satisfactory rating for flight by reference to instruments. According to the Pilot/Operator Aircraft Accident Report (NTSB FORM 6120.1/2), which was completed by Temsco Helicopters Inc., the pilot had accumulated a total of 3,630 flight hours of which 3,580 were in rotorcraft, and 107 hours were in the BO-105. Additionally, the pilot held a second class medical certificate dated February 1, 2000.

The two medical crewmembers, a paramedic and a flight nurse, were based at the Northwest Texas Hospital.

AIRCRAFT INFORMATION

The 1994-model helicopter was powered by two 420-horsepower Allison 250-C20B turboshaft engines. The helicopter was equipped with a four-bladed main rotor system and a two-bladed tail rotor. The helicopter underwent its most recent annual inspection on January 16, 2000, and as of March 8, 2000, had accumulated a total of 565.2 hours. The engines underwent their most recent 100-hour inspections on January 16, 2000, at which time the left engine had accumulated a total of 360.7 hours, and the right engine had accumulated a total of 497.4 hours. Additionally, the helicopter was equipped for IFR operations.

METEOROLOGICAL INFORMATION

The area forecast for Oklahoma and Northwestern Texas was issued on March 10, 2000, at 0445, and was valid on March 10, 2000, until 1700. The forecast for Oklahoma (panhandle and western third) was broken to scattered clouds at 3,000 feet agl and broken clouds at 12,000 feet agl. Light rain showers and isolated thunderstorms were also forecast. The forecast for Northwestern Texas (panhandle) was for broken clouds at 12,000 feet agl, isolated rain showers, and isolated thunderstorms. There were no AIRMETs, SIGMETs, or Convective SIGMETs in effect for the time and area of the accident.

At 0551, the weather observation facility at Dalhart, Texas, (located 28 miles south of the accident site) reported scattered clouds at 10,000 feet, a broken ceiling at 20,000 feet, visibility 15 miles, wind from 350 degrees at 6 knots, temperature 36 degrees Fahrenheit, dew point 32 degrees Fahrenheit, and an altimeter setting of 29.97 inches of mercury.

At 0650, Dalhart reported scattered clouds at 15,000 feet, visibility 15 miles, wind from 330 degrees at 8 knots, temperature 32 degrees Fahrenheit, dewpoint 30 degrees Fahrenheit, and an altimeter setting of 29.98 inches of Mercury.

At 0750, Dalhart reported a ceiling of 200 feet broken and 15,000 feet overcast, visibility 1 mile

in mist, wind from 360 degrees at 10 knots, temperature 32 degrees Fahrenheit, dewpoint 29 degrees Fahrenheit, altimeter 29.97 inches of mercury, and the remarks sections reported visibility higher to the south-southwest.

At 0750, Dalhart also issued a corrected report which stated that there was a broken ceiling at 100 feet and overcast cloud layer at 15,000 feet, visibility .25 miles in freezing fog and mist, wind from 360 degrees at 10 knots, temperature 32 degrees Fahrenheit, dewpoint 29 degrees Fahrenheit, altimeter setting 29.99 inches of Mercury, and the remarks section reported visibility higher to the south-southwest.

According to Geostationary Operational Environmental Satellite (GOES) 8 data, between 0545 and 0645 radiative temperatures increased in value and area, near the accident location. GOES images revealed that the temperature changed between +2 and +10 degrees Celcius. Values between +2 and +5 degrees Celcius indicate the presence of liquid stratiform clouds and fog.

According to the U.S. Naval Observatory, sunrise occurred at 0707.

WRECKAGE AND IMPACT INFORMATION

The accident site was located on the west side of Highway 385, approximately 0.8 mile southwest of the departure site. The location of the wreckage was recorded by a GPS receiver at north 036 degrees 28.37 minutes latitude and west 102 degrees 32.50 minutes longitude. The entire accident site, including ground impressions and aircraft components, encompassed an area measuring 262 feet by 75 feet. The ground at the accident site was charred and sooted. The energy path was oriented along a measured magnetic heading of 240 degrees. Ground impressions at the initial impact point were consistent with both skids and slash marks from the main rotor blades. A portion of the left skid's shoe and a main rotor blade tip weight were found embedded in the initial impact crater. The left skid shoe was embedded along a 45-degree angle relative with the ground. The main wreckage was located 240 feet southwest of the initial impact point and included the main rotor assembly, transmission, and engines. The main wreckage was consumed by fire. Between the initial impact point and the main wreckage were helicopter components, including flight control tubes, doors, cockpit instruments, and the separated tailboom and tail rotor assembly. The final helicopter component along the distribution path was a section of the tail rotor drive shaft. The cabin area and cockpit were destroyed by impact forces and fire.

Both turbine engines, the transmission, and the main rotor system remained attached to the airframe. They were damaged by impact forces and were sooted and charred. The hydraulic module was observed in the system 1 position and a fluid resembling hydraulic fluid was observed emanating from the unit.

Two of the four main rotor blades separated at the blade root. One blade's pitch change rod remained attached to the swash plate, and the blade was fragmented from its mid-point outboard to the blade tip. The second blade's pitch change rod separated at mid-span and the entire blade was fragmented and charred. The third main rotor blade's pitch change link remained attached to the swashplate, and the blade separated aft of the counterweight. The

last main rotor blade's pitch change rod remained attached to the swashplate, and the blade remained secured to the main rotor head, although it was fragmented and charred.

A tailboom section that measured 12 feet, 4 inches, in length was separated just aft of the main fuselage. The tailboom was also separated aft of the stabilizer, which included the tail rotor assembly. The 90-degree gear box and tail rotor blades remained intact. Both tail rotor blades exhibited delamination at their trailing edges. The tailrotor drive shaft exhibited bending deformation, consistent with rotation at the time of impact. Furthermore, the Thomas (flex) couplings on the tail rotor drive shaft were fanned, also a feature consistent with rotation at the time of impact. The tail rotor blades were manually turned and rotated freely though the 90-degree gear box. The pitch change link operated when operated by hand.

Flight control continuity from the cyclic and collective controls to the main rotor head was precluded by impact damage and fire. The pilot's cyclic control exhibited a 90-degree bend to the left at its mid-point. Flight control continuity from the tail rotor pedals aft to the point where the tailboom separated was also precluded by impact damage. Continuity was established through the separated sections of tailboom.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot by the Lubbock County Medical Examiner's Office, Lubbock, Texas. Toxicological testing on the pilot performed by the FAA's Civil Aeromedical Institute, Oklahoma City, Oklahoma, was negative for carbon monoxide, cyanide, and drugs. The testing revealed 24 (mg/dl, mg/hg) ethanol detected in blood and no ethanol was detected in the brain or muscle. According to the toxicological report, the ethanol detected was a result of postmortem ethanol formation and not from ingestion.

TESTS AND RESEARCH

The engines were examined by the NTSB Investigator-In-Charge (IIC) and a representative of Rolls-Royce Allison, at Dallas Airmotive, Dallas, Texas. The air pressure lines for the left engine, serial number CAE 836707, and right engine, serial number CAE 836676, were pneumatically tested and no leaks were noted.

The left engine was disassembled. The upper and lower chip detectors were clean and free of contamination. The fuel filter was clean and residual fuel was noted in the fuel pump. The oil filter was clean and free from contamination. The fuel nozzle was clean and functionally tested within manufacturer's specifications. The N1 inner shaft (compressor to gas producer) rotated freely and smoothly. The N2 outer shaft (Turbine to PTO and transmission) rotated freely and smoothly. Rotational damage was noted between the N1 and N2 shafts. The first three stages of axial flow compressor blades exhibited gouge marks. Foreign object damage (FOD) was observed through the sixth stage axial compressor blades and through the centrifugal flow blades. The centrifugal impeller shroud exhibited witness marks consistent with rotational scoring. The blade tips from the centrifugal impeller exhibited rub marks. The turbine blade tips were cracked at mid-span outboard from the tip inward approximately 1/2 the length of the blade. Rotational damage was observed between the third stage turbine wheel and third stage nozzle, and between the fourth stage turbine wheel and fourth stage nozzle.

The right engine was disassembled. The upper and lower chip detectors were clean and free of contamination. The fuel filter was clean and residual fuel was observed in the fuel pump. The oil filter was clean and free from contamination. The fuel nozzle was clean and functionally tested within manufacturer's specifications. The N1 inner shaft did not rotate freely. The N2 shaft rotated freely and smoothly. All six stages of axial flow compressor blades exhibited rub marks on 2-3 blades per stage. A piece of molten aluminum was found on the axial flow blades. FOD was observed throughout the sixth stage axial flow and centrifugal flow blades. The centrifugal impeller shroud exhibited rub marks consistent with rotational scoring. The rear section of the centrifugal impeller and the diffuser exhibited witness marks consistent with rotational scoring. Each of the four stages of turbine wheel and nozzle assemblies exhibited rotational scoring.

The environmental control unit (ECU) was examined by the NTSB IIC, and a representative of American Eurocopter, at the American Eurcopter Facility in Grand Prarie, Texas. The unit was disassembled and the bearings rotated freely when turned by hand. The blade tips of the fan section were shiny and worn. The fan section's shroud exhibited rotational scoring along a section that measured 1.5 inches in length. The turbine blade tips were shiny and worn. Additionally, the turbine housing exhibited evidence of rotational scoring.

ADDITIONAL INFORMATION

According to the Temsco Helicopters Inc., Air Ambulance Helicopter Operational Procedures Manual, the following weather minimums apply for the dispatch of night VFR cross country flights: one thousand foot ceiling and visibility 3 miles or greater. There are no criteria outlined in the manual for flights in instrument meteorological conditions.

The helicopter was released to the owner's representative on December 27, 2000.

Pilot Information

Certificate:	Commercial	**Age:**	31,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	Helicopter	**Second Pilot Present:**	No
Instructor Rating(s):	Helicopter	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	February 1, 2000
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	3630 hours (Total, all aircraft), 107 hours (Total, this make and model), 3550 hours (Pilot In Command, all aircraft), 77 hours (Last 90 days, all aircraft), 17 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Eurocopter	**Registration:**	N335T
Model/Series:	BO105S-CBS-5 BO105S-CBS	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	S898
Landing Gear Type:	Skid	**Seats:**	5
Date/Type of Last Inspection:	January 16, 2000 Annual	**Certified Max Gross Wt.:**	5512 lbs
Time Since Last Inspection:	50 Hrs	**Engines:**	2 Turbo shaft
Airframe Total Time:	570 Hrs	**Engine Manufacturer:**	Allison
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	250-C20B
Registered Owner:		**Rated Power:**	420 Horsepower
Operator:		**Operating Certificate(s) Held:**	On-demand air taxi (135)
Operator Does Business As:	NORTHWEST TEXAS HOSPITAL	**Operator Designator Code:**	HXSA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Night/dark
Observation Facility, Elevation:		**Distance from Accident Site:**	
Observation Time:		**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	0.25 miles
Lowest Ceiling:	Broken / 100 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	0°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:		**Temperature/Dew Point:**	
Precipitation and Obscuration:	N/A - None - Fog		
Departure Point:		**Type of Flight Plan Filed:**	Company VFR
Destination:	AMARILLO , TX (NONE)	**Type of Clearance:**	
Departure Time:	06:00 Local	**Type of Airspace:**	Class G

Airport Information

Airport:		**Runway Surface Type:**	
Airport Elevation:		**Runway Surface Condition:**	
Runway Used:	0	**IFR Approach:**	
Runway Length/Width:		**VFR Approach/Landing:**	

Wreckage and Impact Information

Crew Injuries:	3 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	4 Fatal	**Latitude, Longitude:**	36.060668,-102.509307(est)

Administrative Information

Investigator In Charge (IIC):	Lupino, Nicole
Additional Participating Persons:	JACK SWENSEN; LUBBOCK , TX
Original Publish Date:	April 19, 2001
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=48771

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.