National Transportation Safety Board
Aviation Accident Final Report

Location:	Alpine, Texas	**Accident Number:**	CEN10MA367
Date & Time:	July 4, 2010, 00:15 Local	**Registration:**	N31AS
Aircraft:	Cessna 421B	**Aircraft Damage:**	Substantial
Defining Event:	Controlled flight into terr/obj (CFIT)	**Injuries:**	5 Fatal
Flight Conducted Under:	Part 135: Air taxi & commuter - Non-scheduled - Air Medical (Medical emergency)		

Analysis

The airplane impacted terrain shortly after takeoff. The wreckage distribution was consistent with a high airspeed, low angle-of-attack impact. Examination of the ground scars and wreckage indicated that the landing gear was down, the flaps were down, and the engines were operating at a high power setting at the time of impact. An examination of the airframe, engines, and related systems revealed no mechanical malfunctions or failures. According to the owner's manual for the airplane, the flaps should have been retracted and the landing gear should have been brought up as soon as a climb profile was established. Based upon the location of the wreckage, the direction of the impact, and the location of the airport, it is likely that the airplane crashed within one or two minutes after takeoff. The extended landing gear and flaps degraded the climb performance of the airplane.

The pilot held an airline transport pilot certificate and had recent night flight experience. Toxicological results were positive for azacyclonol and ibuprofen but were not at levels that would have affected his performance. According to family members, the pilot normally slept from 2230 or 2300 to 0700; the accident occurred at 0015. Although the investigation was unable to determine how long the pilot had been awake before the accident or his sleep schedule in the three days prior to the accident, it is possible that the pilot was fatigued, as the accident occurred at a time when the pilot was normally asleep. The company did not have, and was not required to have guidance or a policy addressing fatigue management.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The degraded performance of the airplane due to the pilot not properly setting the flaps and

retracting the landing gear after takeoff. Contributing to the accident was the pilot's fatigue.

Findings

Personnel issues	Use of equip/system - Pilot
Personnel issues	(general) - Pilot

Factual Information

HISTORY OF FLIGHT

On July 4, 2010, approximately 0015 central daylight time, a Cessna 421B, twin-engine airplane, N31AS, operated by O'Hara Flying Service, and doing business as Air Ambulance Stat, was substantially damaged when it impacted terrain 1.3 miles nautical miles (nm) northeast of Alpine-Casparis Municipal Airport (KE38), Alpine, Texas. A post crash fire ensued. Dark night visual meteorological conditions prevailed at the time of the accident. The emergency medical services flight was being operated on an instrument flight rules flight plan under the provisions of 14 Code of Federal Regulations (CFR) Part 135. The airline transport pilot, two flight nurses, a patient, and a passenger were fatally injured. The cross-country flight was originating at the time of the accident and was en route to Odessa-Schlemeyer Field Airport (KODO), Odessa, Texas.

The Alpine Police Department took witness statements from four individuals. The National Transportation Safety Board (NTSB) Investigator in Charge (IIC) interviewed three witnesses. Two witnesses were located to the north and two witnesses were located to the south of the impact location. According to these witnesses, the airplane was flying low to the ground from west to east, as if it had just departed KE38. The witnesses added that the airplane lights were on and noted that nothing appeared to be abnormal other than the low altitude. One witness remarked that the airplane appeared to descend and then observed a fireball shortly thereafter. All witnesses interviewed remarked that it was very dark, with overcast skies at the time of the accident.

According to O'Hara Flying Service, their initiate, release, and control (IRC) officer had received a call about 2300 from the Big Bend Regional Medical Center, requesting the transfer of one patient to Odessa, Texas. The IRC officer notified the pilot and medical flight crew shortly thereafter and the flight was accepted and dispatched. The pilot contacted the Federal Aviation Administration (FAA) Flight Service Station (FSS) at 2332 to file a flight plan and obtain a weather briefing for the route of flight.

Radar and flight track information was not available for the accident flight.

PERSONNEL INFORMATION

The pilot, age 59, held an airline transport pilot certificate with an airplane multiengine land rating and a commercial pilot certificate with an airplane single engine land rating. In addition, the pilot held a flight instructor certificate with airplane single engine and instrument privileges. He was issued a second-class airman medical certificate on October 12, 2009. The certificate contained the limitation "must have available glasses for near vision." The pilot reported that he was not taking any medications.

At the time of medical certificate application, dated October 6, 2009, the pilot reported 1,750 hours total time and zero hours within the previous six months. At the time of airman certificate application, dated November 9, 2009, the pilot reported 1,612 hours total time, 1,281

hours as pilot-in-command (PIC), 250 hours night PIC, 40 hours night second-in-command (SIC), and 306 hours of instrument experience. On the pilot's application for employment, he reported 1,630 hours total time; 860 hours multiengine time, and 180 hours at night. On the pilot experience form filed with O'Hara Flying Service, the pilot reported 1,350 hours of PIC time, 145 hours in a Cessna 421, and 180 hours of night experience.

The pilot's family provided the NTSB IIC the last 19 page sets of the pilot's flight log. These pages represented the dates of December 1, 2000, through June 15, 2010. A review of the logbook indicated that the pilot had logged a total flight time of 1,676 hours; 1,365.6 hours PIC, 173.1 hours in a Cessna 421 (10 hours of which were in a simulator), and 185.9 hours at night.

O'Hara Flying Service hired the pilot in June of 2010. According to the company records, the pilot also received his initial training in June of 2010. His airman competency/proficiency check for 14 CFR 135.293 (Initial and recurrent pilot testing), 135.297 (Pilot in command: Instrument proficiency check), and 135.299 (Pilot in command: Line checks: routes and airports) were completed with a satisfactory rating in all tested areas on June 6, 2010. The pilot received area familiarization training at several airports including KE38. O'Hara Flying Service based the accident pilot at KE38, but he was to be transferred to Pecos, Texas, once that base opened.

According to the company's flight tracking form, the pilot had logged no less than 15 hours in the company airplanes (1 hour was conducted under 14 CFR 135, with 9.2 hours at night, and 5.7 hours in the accident airplane). Prior to the accident, the last logged flight time was June 30, 2010, for 2.7 hours, all of which was at night. The pilot had not logged any flight or duty time from 0300 on July 1, 2010, until he accepted the accident flight.

During the interview with the director of operations and check airman, the pilot's training, experience, and flight ability were discussed. The director of operations stated that the training went well. He elaborated that there were no problems noted with the pilot's flying skills and night flying did not seem to be an issue.

AIRCRAFT INFORMATION

The accident airplane, a Cessna 421B (serial number 421B0473), was manufactured in 1973. It was registered with the FAA on a standard airworthiness certificate for normal operations. Two Teledyne Continental Motors GTSIO-520-H engines, each rated at 375 horsepower at 3,400 rpm, powered the airplane. Each engine was equipped with a three-blade, McCauley propeller. According to Cessna Aircraft Company, the airplane was originally sold with eight seats; according to O'Hara Flying Service, the airplane had been equipped for medical flight operations and had four occupant seats and a medical litter for the patient.

The airplane was registered to O'Hara Flying Service II LP, operated under the business name of Air Ambulance Stat, and was maintained under an annual/100 hour inspection program. A review of the maintenance records indicated that an annual/100 hour inspection had been completed on March 23, 2010, at an airframe total time of 2,302.8 hours. The maintenance entries were being kept in a three-ring notebook with loose pre-print pages labeled "Mechanical Irregularities Log." The last annual inspection was completed on March 23, 2010,

at a Hobbs time of 2,302.8 hours.

The airplane was not equipped, nor was it required to be equipped with a terrain awareness warning system.

METEOROLOGICAL INFORMATION

The closest official weather observation station was located at KE38, 1.3 nm southwest of the accident site. The elevation of the weather observation station was 4,515 feet mean sea level (msl). The routine aviation weather report (METAR) for KE38, issued at 0005, reported, winds 210 degrees at 5 knots, visibility 10 miles, sky condition scattered clouds at 7,000 feet, temperature 21 degrees Celsius (C), dew point 20 degrees C, and altimeter 30.05 inches of Mercury.

According to the United States Naval Observatory, Astronomical Applications Department Sun and Moon Data, the sunset was recorded at 2101 and the end of civil twilight was recorded at 2128 on July 3, 2010. The moon rose at 0040, and set at 1321 on July 3, 2010. The moon rose again at 0109 on the day of the accident. The moon was waning gibbous with 59 percent of the moon's visible disk illuminated.

AIRPORT INFORMATION

Alpine-Casparis Municipal Airport, was a public, non-towered airport (located 2 miles northwest of Alpine, Texas, at 30 degrees, 23 minutes, 3.2 seconds north latitude and 103 degrees, 41 minutes, 00.9 seconds west longitude, at a surveyed elevation of 4,515 feet msl. The airport had two open runways at the time of the accident, runway 1/19 (6,003 feet by 75 feet, asphalt) and runway 5/23 (5,018 feet by 60 feet, asphalt), both of which were reported to be in good condition.

WRECKAGE AND IMPACT INFORMATION

The accident site was located to the east of the airport in rolling hills and open terrain. The accident site was at an elevation of 4,400 feet msl and the airplane impacted on a magnetic heading of approximately 075 degrees.

The main wreckage consisted of the left and right wings, the empennage, fuselage, and the left and right engine assemblies.

On the initial wreckage path, ground scars were consistent with the landing gear being extended; several parallel-running ground scars ran in the direction of the airplane's heading. As many as four parallel scars were present, and not all the scars were present all the time. The distance between the two outboard scars was estimated to be about 30 feet. The two inside scars appeared to be between 10-15 feet apart. Shortly after the initial impact point and inside the right ground scar, perpendicular ground gashes were observed in the ground. About 20 ground scars, were noted, with 14 to 48 inches between strikes. The cuts were consistent with the right-side engine's propeller, impacting the terrain. Further along the wreckage path and among the parallel scars, small pieces of the airplane were found; a piece of the landing wheel

rim, landing gear door, strobe and navigational light assembly, and pieces of the right fuel tank. Vegetation blight consistent with a rupture of the right tank and fuel spray pattern in the direction of travel was also noted.

Continuing along the wreckage path, the ground scars disappeared with the ground scars reappearing again further down the path. At the reappearance of the ground scar, was several pieces of (red) glass from the beacon, which would have been located on the top of the airplane's vertical stabilizer. To the right of this scar, was another ground signature consistent with the left wing's fuel tank impacting the ground, followed by a fuel fire burst pattern to where the airplane came to rest. In addition, located in this section of the fire pattern were about seven propeller cuts, consistent with the left engine's propeller contacting the ground.

The airplane came to rest in the inverted position. A post-crash fire consumed a majority of the left wing, cabin/cockpit area.

The flaps were found in the extended position; the airplane's right main landing gear was torn from the airframe and was located past the main wreckage, the left main gear, was located in the wreckage and partly consumed by the fire. The nose gear assembly (minus the tire) was attached to its respective airframe unit. The post-crash fire destroyed both the landing gear box and flap motor/gear boxes.

Flight control continuity was established from each of the flight control surfaces to the control column. The elevator trim actuator was measured at 1.7 inches, corresponding to 6 degrees tab up (airplane nose down). The rudder was measured at 1.8 inches; corresponding to a 7.5-left tab (nose right) setting. The aileron trim setting corresponded to an off-scale reading.

Each propeller separated from their respective engine at the crankshaft flange. Additionally, each three-bladed propeller was located away from the main wreckage. The right propeller was located an estimated 60-feet left of the main wreckage. The left propeller was located about 10 feet in front of the wreckage. Both propellers exhibited similar damage signatures. The 3-bladed propellers were twisted, curled, and showed leading edge gouges.

MEDICAL AND PATHOLOGICAL INFORMATION

The autopsy was performed, on the pilot, at the Permian Basin Forensic Center on July 9, 2010, as authorized by the Justice of the Peace, Precinct 1, Brewster County, Texas. The autopsy concluded that the cause of death was trauma and multiple blunt force injuries.

The FAA's Civil Aerospace Medical Institute, Oklahoma City, Oklahoma, performed toxicological tests on specimens that were collected during the autopsy (CAMI Reference #2010001897001). Tests for carbon monoxide and cyanide were not performed. Tests of the urine revealed azacyclonol and ibuprofen, and tests of the liver revealed azacyclonol. Azacyclonol is a metabolize of antihistamines and ibuprofen is a pain reliever.

TESTS AND RESEARCH

Both engines were transported to the engine manufacturer's test facility in Mobile, Alabama.

The engines were examined under the auspices of NTSB investigators, an inspector from the FAA, investigators from Cessna Aircraft, and Teledyne Continental Motors, and a representative O'Hara Flying Service. The examination did not reveal pre-impact anomalies with the engines that would have precluded normal operation.

ORGANIZATIONAL AND MANAGEMENT INFORMATION

The FAA issued a 14 CFR Part 135 certificate to O'Hara Flying Service in 1991 to conduct on demand emergency medical service transports. At the time of the accident, O'Hara Flying Service conducted air ambulance operations in the state of Texas with three bases: Alpine, Odessa, and Amarillo. The corporate headquarters, including training, the director of operations, vice president of operations, and chief pilot were located in Amarillo, Texas.

The director of operations also served as the president of the company, the director of training, was responsible for conducting all company training, and was the check airman for the Part 135 checkrides at O'Hara Flying Service.

The company operated six airplanes, and employed seven pilots at the time of the accident. Four of these pilots were exclusively for air ambulance operations. Prior to employment, each pilot was required to have a minimum of 1,500 hours total time, 200 hours multiengine experience. There were no stated minimum requirements for night or instrument experience.

At the time of the accident, O'Hara Flying Service was regularly audited for safety and compliance by the State of Texas. They did not hold memberships for any "for profit" emergency medical services auditing or accreditation programs.

ADDITIONAL INFORMATION

Pre Flight Risk Assessment

O'Hara Flying Service did not have a formal risk assessment program or worksheet at the time of the accident, nor were they required to. The company did not have a safety reporting system for its employees. Following the accident, O'Hara Flying Service added a risk assessment form that was to be completed and discussed before flight acceptance.

Initiate, Release, and Control

The company used an initiate, release, and control (IRC) method for dispatching and monitoring the flight's progress. Generally, the IRC officer would receive a phone call from the hospital requesting transport and asking whether an airplane and flight crew were available. The IRC would be knowledgeable of crew status and availability and would call the pilot. During the first conversation with the pilot it was established if the flight could be taken. The pilot then checked weather, Notices to Airman (NOTAMS), and aircraft status while the IRC conducted a simultaneous identical check. If the pilot called back to state that the flight was okay to accept, then the flight was accepted. The paramedics were dispatched to the hospital to pick up the patient, and the pilot started preparing for the flight. If the pilot stated that the flight could not be taken, the IRC called the hospital back and turned down the flight. There

was no record kept of which flights were turned down or for what reason.

For flight monitoring purposes, prior to take-off, the pilot would call the IRC and state that the flight was about to depart. This allowed the IRC to be aware of the flight status so that on short flights, they could call the paramedics at the arrival airport and prepare them for the incoming flight. Once the flight had arrived at the destination airport, the pilot would call the IRC again and report that they were on the ground.

In addition to telephone calls from the pilot, the IRC was able to monitor the flight through the Flight Aware service. The Flight Aware service would electronically message the IRC when the flight plan had been opened or closed. The Flight Aware service also allowed the IRC to monitor the progress of the flight.

The hospital generally provided the pick-up location and destination when they request a transport. The patient status and information was not shared with the pilot, just the paramedics. The pilot would receive the patient's weight for the airplane's weight and balance calculations. The process took approximately 15 minutes to confirm that a crew was available and the conditions were safe for a flight. It took the paramedics 30 to 40 minutes to prepare the patient for transport and an additional 10 to 15 minutes to drive to the airport.

The flight acceptance or decision-making process was a mutual discussion between the pilot and the IRC; however, the ultimate responsibility remained with the pilot to turn down a flight.

Flights with patients were conducted under 14 CFR Part 135 while flights without patients, such as flights en route to pick up a patient or returning from delivering a patient were operated under 14 CFR Part 91.

Weight and Balance

O'Hara Flying Service used a computer program to assist in calculating their weight and balance for every flight. After the calculation had been completed, the pilot submitted a copy to the company's database.

The weight and balance calculation submitted by the pilot for the accident flight accounted for the pilot, the two flight paramedics, and a patient. The calculated gross weight for the accident flight was 6,925 pounds with a center of gravity (CG) of 156.58 inches. The addition of another passenger would have changed the take-off weight to approximately 7,100 lbs (with a corresponding minor change to the CG). The manifest listed the maximum take-off weight as 7,450.

If airplane capacity allowed, family members could accompany the flight. The pilot and flight medics retained authority for making this determination. The passenger would always sit in the front right seat. Generally, a second call would include the request to take the extra passenger. It was estimated that approximately 25 percent of the flights had an extra passenger.

Pilot Fatigue and Fatigue Management

According to the pilot's family, he was working a 1000 to 2200 shift at O'Hara Flying Service but was expected to be available for flights 24 hours a day, seven days a week. The family reported that the pilot usually slept 7 hours a day normally waking around 0700 and going to bed between 2230 and 2330. Family members were not around during the days prior to the accident to note the pilots sleeping habits in Alpine. The pilot did speak with his fiancé around 0850 the morning of the accident and again around 2230 the night of the accident, reporting that he was preparing to go to bed. It is not know if the pilot napped during the day. The family reported that the pilot was a heavy sleeper and had not been diagnosed with sleep problems.

O'Hara Flying Service did not provide any formal training or guidance to their pilots to address the potential for fatigue or how to manage fatigue, nor were they required to. Fatigue was mentioned briefly during their training.

Cessna Owner's Manual

Item 7 in the Before Takeoff checklist, Section I - Operating Checklist, of the Cessna Owner's Manual, stated that the wing flaps should be up prior to takeoff. In addition, the performance charts for normal takeoff and single engine takeoff also provide performance data with the wing flaps up. Section II - Description and Operating Details - After Takeoff, guides the pilot to retract the landing gear as soon as a climb configuration has been established.

The landing gear is electrically operated and retractable. The landing gear is operated by pulling out the switch knob and moving it to the desired position; up, off, or down.

FAA AIM

FAA Aeronautical Information Manual (AIM) chapter 5-1-2, "Follow IFR Procedures Even When Operating VFR," states the following: "When flying VFR at night, in addition to the altitude appropriate for the direction of flight, pilots should maintain an altitude which is at or above the minimum en route altitude as shown on the charts. This is especially true in mountainous terrain, where there is usually very little ground reference. Do not depend on your eyes alone to avoid rising unlighted terrain." Additionally, with respect to VFR night operations in mountainous terrain, chapter 7-5-6 of the AIM states, in part: "Continuous visual contact with the surface and obstructions is a major concern and flight operations under an overcast or in the vicinity of clouds should be approached with extreme caution."

The FAA Airplane Flying Handbook, FAA-H-8083-3, chapter 10, states the following about night flying: "Distance may be deceptive at night due to limited lighting conditions. A lack of intervening references on the ground and the inability of the pilot to compare the size and location of different ground objects cause this. This also applies to the estimation of altitude and speed. Consequently, more dependence must be placed on flight instruments, particularly the altimeter and the airspeed indicator."

FAA Oversight

FAA inspectors from the Lubbock Flight Standards District Office managed the O'Hara Flying Service Part 135 certificate. A new principle operations (POI) inspector started on the

certificate just prior to the accident. The former POI stated that this change took place to try and even the workload amongst the inspectors in the office.

The former POI had spent two years managing the Part 135 certificate with O'Hara Flying Service. During this time, he stated that he was able to accomplish all of his required tasks as outlined by his work plan provided by headquarters in Washington, DC. His only interaction was with the director of operations and on occasion, the chief pilot. He had only flown with the director of operations and had not observed the checkrides for the chief pilot or any of the line pilots. He had only attended training on one occasion during his two years as the POI. This training lasted 30 minutes and the operator truncated the training due to another obligation. During the out briefing with the incoming POI, his only concern was with the training of the company.

History of Flight

Initial climb	Controlled flight into terr/obj (CFIT) (Defining event)

Pilot Information

Certificate:	Airline transport; Commercial	**Age:**	59,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane single-engine; Instrument airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	October 12, 2009
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	June 10, 2010
Flight Time:	1650 hours (Total, all aircraft), 160 hours (Total, this make and model), 1375 hours (Pilot In Command, all aircraft), 50 hours (Last 90 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N31AS
Model/Series:	421B	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	421B0473
Landing Gear Type:	Retractable - Tricycle	**Seats:**	5
Date/Type of Last Inspection:	March 23, 2010 Annual	**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	2 Reciprocating
Airframe Total Time:	2302.8 Hrs as of last inspection	**Engine Manufacturer:**	CONT MOTOR
ELT:	Installed, not activated	**Engine Model/Series:**	GTSIO-520-H
Registered Owner:		**Rated Power:**	375 Horsepower
Operator:		**Operating Certificate(s) Held:**	None
Operator Does Business As:	Air Ambulance Stat	**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Night/dark
Observation Facility, Elevation:	E38,4515 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	00:05 Local	**Direction from Accident Site:**	45°
Lowest Cloud Condition:	Scattered / 7000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	5 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	210°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.04 inches Hg	**Temperature/Dew Point:**	21°C / 20°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Alpine, TX (KE38)	**Type of Flight Plan Filed:**	IFR
Destination:	Odessa, TX (KODO)	**Type of Clearance:**	None
Departure Time:	00:15 Local	**Type of Airspace:**	

Airport Information

Airport:	Alpine-Casparis Municipal KE38	**Runway Surface Type:**	
Airport Elevation:	4515 ft msl	**Runway Surface Condition:**	
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	3 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	2 Fatal	**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	5 Fatal	**Latitude, Longitude:**	30.400833,-103.665832

Administrative Information

Investigator In Charge (IIC):	Rodi, Jennifer
Additional Participating Persons:	Floyd A James; FAA AVP-100; Washington, DC Tom Moody; Cessna Aircraft Company; Wichita, KS Andrew Hall; Cessna Aircraft; Wichita, KS Jason Lukasik; Teledyne Continental Motors; Mobile, AL Denny O'Hara; OHara Flying Service; Amarillo, TX Clay Dixon; OHara Flying Service; Amarillo, TX
Original Publish Date:	November 17, 2011
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=76517