



AVIATION



HIGHWAY



MARINE



RAILROAD



PIPELINE

Aviation Investigation Final Report

| | | | |
|--------------------------------|---|-------------------------|------------|
| Location: | Silt, Colorado | Accident Number: | CEN14FA122 |
| Date & Time: | January 27, 2014, 11:18 Local | Registration: | N207DS |
| Aircraft: | Bell 206L 3 | Aircraft Damage: | Destroyed |
| Defining Event: | Low altitude operation/event | Injuries: | 3 Fatal |
| Flight Conducted Under: | Part 135: Air taxi & commuter - Non-scheduled | | |

Analysis

The purpose of the flight was to perform low-level aerial surveillance of power transmission lines using an external gimbal-mounted infrared camera to detect problems with the patrolled power lines. While patrolling above a power line that passed through a valley, the helicopter struck another power line that crossed perpendicular to the helicopter's flightpath and was at a higher elevation than the patrolled power line and ran from poles mounted atop higher terrain. The struck power line was not marked with high-visibility balls nor was it required to be. The sun was directly in front of the helicopter and 30 degrees above the horizon at the time of the accident, which likely made it difficult for the pilot to see the crossing wire. Postaccident examination of the helicopter did not reveal any preimpact anomalies. Given that this was a low-level surveillance flight of power transmission lines, the pilot should have familiarized himself with the power lines he was going to patrol and any other wires or obstructions in the area before the flight. It is likely that he did not adequately plan for the flight and that, if he had, he might have been aware of the power line and been able to avoid it.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The pilot's inadequate preflight planning for a low-level aerial surveillance flight of power transmission lines, which led to his being unaware of the crossing power line while flying toward the sun and his subsequent failure to maintain sufficient clearance from the wire.

Findings

| | |
|-----------------------------|------------------------------------|
| Aircraft | Altitude - Not attained/maintained |
| Personnel issues | Flight planning/navigation - Pilot |
| Personnel issues | Monitoring environment - Pilot |
| Environmental issues | Wire - Awareness of condition |
| Personnel issues | Identification/recognition - Pilot |
| Environmental issues | Glare - Effect on personnel |

Factual Information

History of Flight

| | |
|-----------------------------------|---|
| Maneuvering-low-alt flying | Collision with terr/obj (non-CFIT) |
| Maneuvering-low-alt flying | Low altitude operation/event (Defining event) |

HISTORY OF FLIGHT

On January 27, 2014, about 1118 mountain standard time, a Bell model 206L-3 helicopter, N207DS, was destroyed when it impacted a wire and terrain near Silt, Colorado. The pilot and two passengers were fatally injured. The aircraft was registered to and operated by Delta Bravo Sierra Inc. under the provisions of 14 Code of Federal Regulations Part 135 as an on-demand air taxi flight. The helicopter was performing aerial surveillance of power transmission lines when the accident occurred. Visual meteorological conditions prevailed for the flight, which was not on a flight plan. The local flight originated from the Garfield County Regional Airport (RIL), Rifle, Colorado, about 1045.

The operator was contracted by Holy Cross Energy, a local power utility, to perform aerial surveillance of power transmission wires using an infrared camera to detect potential problem areas on the wires. The occupants of the helicopter consisted of the pilot, an employee of Holy Cross Energy, and an employee of HOT/SHOT Infrared Inspections, Inc. It was reported that the helicopter had completed one surveillance flight earlier in the day and landed at RIL where it was refueled before departing on the accident flight. The accident occurred about 3 miles east of RIL. The power lines that were being patrolled by the helicopter at the time of the accident ran through a valley in a predominately north-south direction. Another set of power lines owned by Xcel Energy ran in a predominately east-west direction and crossed above the Holy Cross Energy power lines. Two parallel static wires ran from the top of each Xcel Energy tower to the next tower. The Excel Energy towers were located atop higher terrain, and the Holy Cross Energy power lines ran through the valley between the Xcel Energy towers. The helicopter struck the south static wire of the Xcel Energy power lines and subsequently impacted the ground. A witness reported seeing the helicopter heading south just prior to the accident. The Xcel Energy power lines were estimated to be about 170 feet above the floor of the valley where the accident occurred.

According to a representative of HOT/SHOT Infrared Inspections, Inc., the contract with Holy Cross Energy required video recording of the entire flight. During examination of the wreckage, two recording devices were found and retained for further examination. One of the recording devices had a secure digital (SD) memory card installed. The SD card slot of the other recording device was empty. A second SD card was not located during the wreckage examination.

PERSONNEL INFORMATION

The pilot held a pilot certificate with a commercial pilot rating for helicopters and private pilot ratings for airplane single engine land and instrument airplane. He also held a second class medical certificate issued on April 18, 2013. The pilot reported a total of 8010 total flight hours at the time of his most recent medical examination.

AIRCRAFT INFORMATION

The helicopter was a Bell model 206L-3 helicopter, serial number 51546, manufactured in 1991. The helicopter had a single main rotor with a tail mounted anti-torque rotor. The helicopter was configured to carry six occupants, including the flight crew. The helicopter was powered by a single Rolls-Royce (Allison) Model 250-C30S engine, serial number CAE890513S, rated to produce 435 maximum shaft horsepower.

A review of the maintenance records indicated that the helicopter had accumulated 5,129.7 hours total time as of the date of the last inspection on January 23, 2014. The engine had accumulated 12,463.6 hours total time as of the same date. The records showed that the engine had been installed on the helicopter on September 22, 2010.

METEOROLOGICAL INFORMATION

Weather conditions recorded by the RIL Automated Surface Observing System (ASOS), located about 3 miles west of the accident site, at 1053, were: wind calm, visibility 10 statute miles, scattered clouds at 11,000 feet agl, temperature -2 degrees Celsius, dew point -9 degrees Celsius, and altimeter 30.02 inches of mercury.

FLIGHT RECORDERS

The helicopter was equipped with an external gimbal mounted infrared camera (IR). Additionally, two digital video recorders were located within the wreckage along with a GeoStamp+ device. The GeoStamp+ was used to overlay video footage from the IR camera with information such as GPS location and time. The two DVR's each had a slot for insertion of a secure digital (SD) memory card. One of the DVR's contained a SD card and the other did not. The DVR's, SD card, and Geostamp+ device, were retained for further examination. Examination of the components revealed that the only recordable media present was the SD card, which contained three files. Two of the files were not pertinent to the accident flight. The third file contained video footage of the accident flight along with audio from the radio communications and the helicopter's intercom system.

The recording of the accident flight began when the helicopter was already airborne. Voices of the helicopter's occupants could be heard throughout the flight. For the majority of the flight, the helicopter followed a series of power lines through various terrain. Throughout the flight, casual and professional conversation was audible between the two passengers.

At 11:15:20 (hh:mm:ss), the crew members discussed turning right to follow a perpendicular set of power lines and return later to capture a previous data point. The helicopter turned right and the crewmembers carried out casual conversation for the remainder of the flight.

At 11:16:21, a pair of deer came into the view of the IR camera. During this time, one of the occupants remarked "See the deer?" and another occupant responded "where?". A follow-up remark was heard: "See the white things on the screen", followed ultimately by an acknowledgement.

At 11:16:29, intersecting power lines came into view of the IR camera. Immediately after the power lines passed, the video began to shale, with expletives heard in the background. The camera shaking intensified and discordant audio was audible until the recording ended at 11:16:36.

WRECKAGE AND IMPACT INFORMATION

The helicopter's wreckage was located in a valley between hills. There was scattered snow cover on the

terrain. There were two sets of crossing power lines in the area of the accident site. One set of power lines ran predominately north-south on single wooden poles. The second set of power lines ran predominately east-west and were suspended on dual support pole structures. There were two static lines at the top of each pole and the power transmission lines ran below the static lines. The east-west power lines were higher than the set that ran north-south. It was reported that the south static line of the east-west running lines was severed. The helicopter was reported to have been conducting power line patrol operations on the lower north-south running set of power lines.

The helicopter came to rest on its left side facing west. The main fuselage structure exhibited crushing in an upward/right direction that was consistent with an impact on the left bottom of the fuselage. The tail boom was separated from the fuselage. The tail boom was broken into two pieces. The forward portion of the tail boom to include the horizontal stabilizer was located about 150 feet from the main wreckage. The aft portion of the tail boom including the tail rotor gearbox and tail rotor was located near the main wreckage. The landing gear skid tubes were separated from the cross tubes. The left skid tube was broken approximately where the forward cross tube attached. The cross tubes were broken loose from their mounts to the fuselage with the forward cross tube completely separated. The rear cross tube remained within the fuselage penetration for the tube, but was not attached. Both main rotor blades were separated from their roots. The root section of each blade remained attached to the blade grips which remained attached to the hub. The hub remained attached to the mast which was still connected to the main rotor gearbox. Various aircraft components were found around the area of the accident site.

The wreckage of the helicopter was moved to an indoor facility for further examination. Examination of the helicopter's control system was conducted. The collective controls were predominately intact from the collective stick to the point of attachment at the hydraulic actuator on top of the fuselage. The anti-torque pedals on the right side were separated from the pushrod. The pushrod system was intact to the bellcrank at the bottom of the vertical pushrod tunnel. The vertical pushrod within the vertical pushrod tunnel was separated from the rod end at the bottom. The pushrod system through the tunnel at the top of the fuselage was not examined due to crush damage that prevented exposure of the area. The pushrod that ran from the bellcrank just aft of the rear cabin bulkhead was still attached to a portion of the bellcrank. The bellcrank arm was broken. The aft end of this pushrod was still attached to the next bellcrank at the bottom. The upper part of the bellcrank was still attached to the pushrod that ran through the tailboom but the pushrod was broken into several pieces. One break coincided with the forward separation point of the tailboom. The pieces of the pushrod were matched and a section of the pushrod was found to be missing during the wreckage review. The missing portion was approximately 2 feet in length and is presumed to have remained at the wreckage site, possibly obscured by snow. The aft rod end of the pushrod was fractured. The threaded portion remained in the pushrod while the spherical rod end portion remained attached to the bellcrank on the tail rotor gearbox. The tail rotor gearbox was separated from the tail boom. The tail rotor would turn when rotating the input shaft of the tail rotor gearbox. Actuation of the bellcrank confirmed actuation of the pitch angle of the tail rotor blades. The cyclic system was examined and the yoke that connects the right and left cyclic sticks to the mixer at the bottom of the vertical pushrod tunnel was fractured into 3 pieces. The yoke remained attached to the mixer and the right cyclic. The fractures were in the arm of the yoke connecting the left cyclic. The two vertical cyclic pushrods within the broom closet remained attached at both the mixer and the connection above the fuselage near the hydraulic actuator. All of the various control linkages on top of the fuselage remained attached and intact up to the swash plate. The ears where the pitch change links to the main rotor blades attached had broken loose from the rotating portion of the swash plate. The upper portion of one pitch change link pushrod remained attached to the bellcrank on the blade grip. The lower portion of

this link along with the broken ear from the swash plate was found on top of the fuselage. The upper rod end and pushrod barrel for the other pitch change link remained attached to the bellcrank on the blade grip. The remainder of this pitch change pushrod was not found.

No anomalies were found with respect to the flight control system that could be attributed to a pre-impact condition.

The tail rotor driveshaft components were located and laid out on the shop floor. All of the bearing mounts had been separated from the tailboom with the exception of the most aft hanger bearing. Five sections of the tail rotor driveshaft were recovered. One section was not located during the exam and is presumed to have remained at the accident site.

Examination of the rotor mast revealed a spiral scrape through the paint that started just above the swash plate and progressed upward toward the blade hub. The lower fixed portion of the swash plate assembly was fractured. The main rotor blades rotated when rotation of the input coupling was performed.

No anomalies were found with respect to the drive system components that could be attributed to a pre-impact condition.

The engine was removed from the helicopter for further examination. Both the compressor and power turbine could be rotated by hand with no binding or scraping detected. The compressor and turbine blades that were visible showed no abnormalities. The N2 drive train was free and continuous from the 4th stage power turbine wheel to the N2 tachometer generator gearbox. The N1 drive train was continuous from the compressor to the N1 tachometer generator gearbox. The power turbine governor sustained impact damage. The upper and lower chip detectors were clean when removed. No fuel was found in the inlet line on the fuel control. The fuel line between the check valve and the fuel nozzle contained a small amount of fuel.

No anomalies were found with respect to the engine or its systems that could be attributed to a pre-impact condition.

The forward fuselage, upper and lower wire strike cutters, and the center spine of the windshield showed no evidence of a wire impact.

The tail rotor driveshaft cover had marks consistent with a main rotor blade impact.

MEDICAL AND PATHOLOGICAL INFORMATION

A postmortem autopsy of the pilot was performed by Rocky Mountain Forensic Services, PLLC. The autopsy report indicated the cause of death as multiple injuries consistent with the reported circumstances.

Toxicology testing was performed by the FAA Civil Aerospace Medical Institute. Testing results were negative for all substances in the screening profile.

ADDITIONAL INFORMATION

The power lines that were struck were not marked with high-visibility marking balls. Federal regulations establish standards for determining obstructions to air navigation. 14 CFR 77.23 states, in part:

- (a) An existing object, including a mobile object, is, and a future object would be, an obstruction to air navigation if it is of greater height than any of the following heights or surfaces:
- (1) A height of 500 feet above ground level at the site of the object.
 - (2) A height that is 200 feet above ground level or above the established airport elevation, whichever is higher, within 3 nautical miles of the established reference point of an airport, excluding heliports, with its longest runway more than 3,200 feet in actual length, and that height increases in the proportion of 100 feet for each additional nautical mile of distance from the airport up to a maximum of 500 feet.

The accident occurred about 3.2 nautical miles from RIL, which had a runway measuring 7,000 feet in length. The airport elevation was 5,537 feet, and the elevation at the accident site was about 5,525 feet. The wires that were struck were about 170 feet above the accident site elevation.

At the time of the accident the sun was about 30 degrees above the horizon at an azimuth of 162 degrees. The flight path of the helicopter at the time of the accident was about 165 degrees, placing the sun directly in front of the helicopter.

Pilot Information

| | | | |
|----------------------------------|-------------------------------------|--|----------------|
| Certificate: | Commercial | Age: | 63 |
| Airplane Rating(s): | Single-engine land | Seat Occupied: | Right |
| Other Aircraft Rating(s): | Helicopter | Restraint Used: | 4-point |
| Instrument Rating(s): | Airplane | Second Pilot Present: | No |
| Instructor Rating(s): | None | Toxicology Performed: | Yes |
| Medical Certification: | Class 2 Without waivers/limitations | Last FAA Medical Exam: | April 18, 2013 |
| Occupational Pilot: | Yes | Last Flight Review or Equivalent: | |
| Flight Time: | 8010 hours (Total, all aircraft) | | |

Aircraft and Owner/Operator Information

| | | | |
|--------------------------------------|----------------------------------|---------------------------------------|--------------------------|
| Aircraft Make: | Bell | Registration: | N207DS |
| Model/Series: | 206L 3 L3 | Aircraft Category: | Helicopter |
| Year of Manufacture: | 1991 | Amateur Built: | |
| Airworthiness Certificate: | Normal | Serial Number: | 51546 |
| Landing Gear Type: | N/A; Skid | Seats: | 6 |
| Date/Type of Last Inspection: | January 23, 2014 100 hour | Certified Max Gross Wt.: | 4251 lbs |
| Time Since Last Inspection: | | Engines: | 1 Turbo shaft |
| Airframe Total Time: | 5129.7 Hrs as of last inspection | Engine Manufacturer: | ALLISON |
| ELT: | C91A installed | Engine Model/Series: | 250-C30 SER |
| Registered Owner: | DELTA BRAVO SIERRA INC | Rated Power: | 650 Horsepower |
| Operator: | DELTA BRAVO SIERRA INC | Operating Certificate(s) Held: | On-demand air taxi (135) |

Meteorological Information and Flight Plan

| | | | |
|---|--------------------------|---|------------------|
| Conditions at Accident Site: | Visual (VMC) | Condition of Light: | Day |
| Observation Facility, Elevation: | RIL, 5537 ft msl | Distance from Accident Site: | 3 Nautical Miles |
| Observation Time: | 17:53 Local | Direction from Accident Site: | 275° |
| Lowest Cloud Condition: | Scattered / 11000 ft AGL | Visibility | 10 miles |
| Lowest Ceiling: | None | Visibility (RVR): | |
| Wind Speed/Gusts: | / | Turbulence Type Forecast/Actual: | / |
| Wind Direction: | | Turbulence Severity Forecast/Actual: | / |
| Altimeter Setting: | 30.02 inches Hg | Temperature/Dew Point: | -2°C / -9°C |
| Precipitation and Obscuration: | | | |
| Departure Point: | Rifle, CO (RIL) | Type of Flight Plan Filed: | None |
| Destination: | Rifle, CO (RIL) | Type of Clearance: | None |
| Departure Time: | 10:45 Local | Type of Airspace: | |

Wreckage and Impact Information

| | | | |
|----------------------------|---------|-----------------------------|-----------------------|
| Crew Injuries: | 1 Fatal | Aircraft Damage: | Destroyed |
| Passenger Injuries: | 2 Fatal | Aircraft Fire: | None |
| Ground Injuries: | N/A | Aircraft Explosion: | None |
| Total Injuries: | 3 Fatal | Latitude, Longitude: | 39.521389,-107.660835 |

Administrative Information

Investigator In Charge (IIC): Brannen, John

Additional Participating Persons: Matthew Green; FAA - Salt Lake City FSDO; Salt Lake City, UT
Casey Lehman; Rolls Royce; Indianapolis, IN
Mark Stuntzner; Bell Helicopters; Fort Worth, TX

Original Publish Date: September 8, 2015

Last Revision Date:

Investigation Class: [Class](#)

Note:

Investigation Docket: <https://data.nts.gov/Docket?ProjectID=88720>

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).