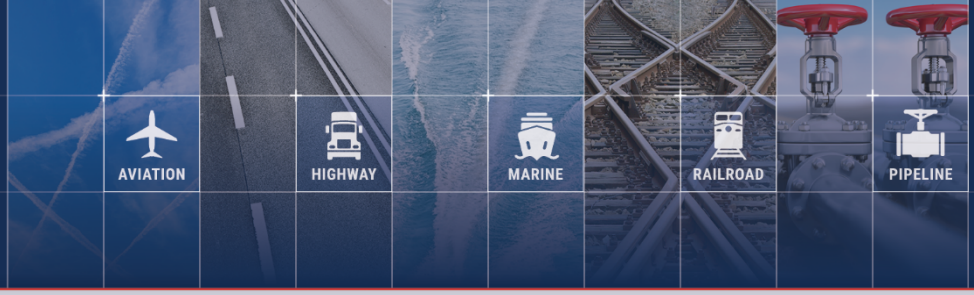

Aviation Investigation Final Report

Location:	Weaverville, California	**Accident Number:**	WPR11FA239
Date & Time:	May 27, 2011, 14:15 Local	**Registration:**	N222DW
Aircraft:	Brantly B-2B	**Aircraft Damage:**	Substantial
Defining Event:	Inflight upset	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The student pilot's solo flight endorsement prohibited flight in gusty wind conditions such as those existing at the time of departure along his route of flight and at his planned destination. Additionally, his route of flight would have been over mountainous terrain, which would have further exacerbated the conditions and resulted in updrafts, downdrafts, and turbulence at his flight altitude. A witness, who was located close to the accident site, reported unusually strong wind for the area at the time of the accident. The pilot did not request a weather briefing prior to the flight.

The wreckage distribution was consistent with a level impact with trees in the direction of flight. No indications of an in-flight breakup, bird strike, or fire were present, and damage to the main rotor system was consistent with it operating at a high level of rotational energy. The throttle was noted in the closed position, consistent with an autorotation event; however, it is possible the pilot may have closed the throttle just prior to, or during, the impact sequence.

The student pilot had received about 120 hours of helicopter flight training over the 3 1/2-year period prior to the accident. (The pilot's flight logbook had been defaced, thus an accurate assessment of his total flight experience was not possible.) During that time, he had used the services of about nine flight instructors, with only the last instructor endorsing him for solo flight about 2 weeks before the accident. The accident flight was most likely his second solo flight in the accident helicopter. Acquaintances and previous instructors recounted that the pilot often exhibited poor decision-making traits, was headstrong, stubborn, and overconfident.

Although the pilot performed maintenance and unapproved modifications to the helicopter, the modifications did not appear to have been causal to the accident, and a postaccident examination did not reveal any anomalies with the airframe or engine that would have precluded normal operation.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The student pilot's decision to fly in windy conditions that exceeded his capabilities, which resulted in his subsequent loss of helicopter control. Contributing to the accident was his lack of flight experience in the accident helicopter.

Findings

Aircraft	Directional control - Not attained/maintained
Personnel issues	Aircraft control - Student/instructed pilot
Personnel issues	Decision making/judgment - Student/instructed pilot
Personnel issues	Total experience - Student/instructed pilot
Environmental issues	Terrain induced turbulence - Ability to respond/compensate

Factual Information

History of Flight

Enroute-cruise	Other weather encounter
Enroute-cruise	Inflight upset (Defining event)
Enroute-cruise	Collision with terr/obj (non-CFIT)

HISTORY OF FLIGHT

On May 27, 2011, about 1415 Pacific daylight time, a Brantly B-2B, N222DW, collided with wooded terrain near Weaverville, California. The pilot was operating the helicopter under the provisions of Title 14 Code of Federal Regulations (CFR) Part 91 as a solo instructional flight. The student pilot was fatally injured, and the helicopter sustained substantial damage. The local flight departed Hayfork Airport (F62), Hayfork, California, about 1330, with a planned destination of Lonnie Pool Field/Weaverville Airport (O54), Weaverville, California. Visual meteorological conditions prevailed, and no flight plan had been filed.

A friend of the pilot arrived at Hayfork Airport about 1320. He noticed that the pilot had just begun to start the helicopter. He called the pilot on the radio and asked his destination, how much fuel he had onboard, and if he would like a photo taken. The pilot responded that he had 22 gallons of fuel, was going to Weaverville, and that he would like a photograph. He then lifted the helicopter into a hover, and the friend took a photograph. The helicopter then departed to the east.

The friend became concerned after the helicopter did not return later in the afternoon. He reported the missing helicopter to the local sheriff's department, and an Alert Notice (ALNOT) was issued about 1600. The helicopter was not equipped with an emergency locator transmitter (ELT). Search and rescue teams utilized the pilot's cell phone signal to perform network-based location analysis, and the helicopter was subsequently located about 1600 on the following day.

A witness located within her residence about 4 miles southwest of Weaverville reported unusually strong and gusty winds beginning about midday. She stated that the winds were so strong that she became concerned the noise from her wind chimes may wake up her husband who was resting. She reported that at a time between 1400 and 1430 she heard a loud metallic crunching sound, and assumed a tin roof had collapsed somewhere in the valley. She did not hear any accompanying sounds that she could associate with an engine or helicopter. Her residence was located within a valley, about 900 feet northeast of the accident site.

The helicopter was located within heavily wooded terrain, on the 45-degree sloping southwest face of a gulch, about 3.5 miles southwest of Weaverville Airport. The main wreckage came to

rest at an elevation of 2,450 feet mean sea level (msl). The area within a 5-mile radius consisted of intersecting crests, ridgelines, and valleys with elevations ranging between 1,800 and 4,400 feet. The immediate area was densely populated with waste-high poison oak, and pine trees ranging between 100 and 120 feet in height. A clearing was located about 200 feet east of the main wreckage.

PERSONNEL INFORMATION

A review of Federal Aviation Administration (FAA) airman records revealed that the 50-year-old pilot held a combined student pilot and third-class aviation medical certificate issued August 25, 2009. It had no limitations or waivers. The pilot indicated a total flight time in all aircraft of 49.1 hours at the time of the application. The pilot's first combination student pilot and medical certificate was issued September 27, 2007.

The pilot did not hold an Airframe and Powerplant mechanic certificate. He also owned, and was receiving training in, a Piper PA28-140 fixed wing airplane.

The pilot's flight logbook was provided to the NTSB investigator-in-charge by his flight instructor (CFI). A review of the logbook revealed that a series of pages had been removed. His first helicopter training flight occurred on August 6, 2007. The last entry indicating total flight times was dated February 15, 2010, and included 77.1 hours of total flight experience, all of which was dual instruction in helicopters. Fourteen more flights followed this entry, the last of which was dated March 27, 2010; however, the corresponding page indicating flight times was missing. The CFI estimated that about 30 hours of flight time was missing from the logbook.

On March 8, 2011, the pilot reported to the FAA that he was involved in an altercation with his prior fixed-wing CFI, and as a result, the logbook entries were removed and destroyed. The pilot stated that the destroyed entries included between 30 and 40 hours of solo fixed-wing and helicopter flight experience.

The majority of the pilot's flight experience was attained in the Robinson R22, R44, and Schweizer 269/300 series helicopters. The CFI stated that he provided about 5 hours of flight training in the accident helicopter. He issued an initial solo cross-country endorsement on May 14, 2011, and another endorsement allowing the pilot to practice solo takeoffs and landings at Hayfork, Benton Field, and Weaverville airports. The endorsement provided for a limitation that the flights must be performed in winds of less than 12 knots, with no gusts, a visibility of 3 miles or greater, and ceilings of 3,000 feet agl or higher. The CFI reported that he was not aware that the pilot was planning on performing the flight.

The CFI had no prior flight experience in the Brantly B-2B helicopter. As such, he flew about 10 hours in the accident helicopter in order to gain familiarity with its handling characteristics prior to providing flight training. The CFI stated that the helicopter's performance was marginal compared to his experience with other helicopters, and that during training it was not able to maintain a hover out of ground effect above 6,000 feet.

The CFI stated that although the pilot met the minimum flight requirements for solo flight, he was often headstrong, stubborn, easily distracted, and found it hard to concentrate. He would often branch off into conversations at inappropriate moments during flight training. He further stated that he often exhibited poor preflight and cross-country planning. An acquaintance of the pilot, who also held a pilot's license, recounted similar personality traits, stating that he purchased the airplane because his helicopter training was not progressing as planned.

The pilot's logbook indicated that he had received flight training from nine CFI's over the 3 1/2-year period that he was receiving flight training. One of the more recent CFI's reported that he was stubborn, failed to grasp the concept of flying helicopters, and displayed unusually little learning progression. Another CFI stated that he was overconfident of his abilities. With the exception of the final CFI, no other instructors endorsed the pilot for solo helicopter flight.

AIRCRAFT INFORMATION

The helicopter was issued its original airworthiness certificate in 1962, and was equipped with a Lycoming fuel injected IVO-360-A1A engine, serial number L-205-58. A review of the maintenance logbooks revealed that the helicopter had undergone an annual inspection on December 14, 2010, at a total airframe time, indicated by the Hobbs hour-meter, of 698.9 flight hours. The Hobbs hour-meter indicated 711.2 hours at the accident site. According to the logbooks, the engine had accrued 1,597.8 hours total flight time at the annual inspection, with 420.2 hours since the last overhaul, which occurred in 1984.

METEOROLOGICAL INFORMATION

The closest aviation weather observation station to the accident site and departure airport was located at Weaverville Airport. The elevation of the weather observation station was 2,350 feet msl. An aviation routine weather report (METAR) was recorded at 1415 PDT. It reported: winds from 250 degrees at 7 knots gusting to 22 knots; visibility 10 miles; few clouds at 5,500 feet, 6,500 feet broken; temperature 14 degrees C; dew point 2 degrees C.

A METAR issued at 1335 reported similar ceilings and visibilities with winds from 260 degrees at 6 knots, gusting to 16.

The area of the accident site was surrounded by numerous unofficial weather observation stations. These stations were located at elevations ranging from between 2,550 feet msl to approximately 3,300 feet msl. Wind data from these stations surrounding the time of the accident indicated directions were variable but generally identified from the west-southwest at magnitudes of between 5 to 10 knots, with gust measurements of up to 17 knots.

According to the FAA Aeronautical Information Manual, abrupt changes in wind direction and velocity can occur in areas of mountainous terrain. Additionally, severe updrafts, downdrafts, and turbulence can be expected, especially in high wind conditions. As such, the manual

recommends that pilots do not fly near or above abrupt changes in terrain.

According to a representative from Lockheed Martin Flight Service, the pilot did not request any weather services. Additionally, there was no record of the pilot obtaining a weather briefing from any Direct User Access Terminal (DUAT) provider.

WRECKAGE AND IMPACT INFORMATION

The main helicopter structure came to rest in a nose-down attitude at the base of a 120-foot-tall tree. A tree located about 20 feet southwest had been topped at the 60-foot-level. A second 120-foot-tall tree, located about 20 feet west of the main wreckage sustained fresh damage, and had been stripped of bark and limbs on its southern surface between the 60- and 100-foot level. No other tree damage was noted. The debris path, consisting of clear plastic fragments and shards of main rotor blade material, continued about 30 feet beyond the main wreckage on a north heading. All major sections of the helicopter, with the exception of the yellow and red main rotor blade tips, were located within the immediate vicinity of the accident site.

The outboard 3-foot-long sections of the yellow and red main rotor blades were located 150 and 300 feet consecutively, north of the main wreckage.

MEDICAL AND PATHOLOGICAL INFORMATION

A postmortem examination was conducted by Forensic Medical Group, Inc., Fairfield, California, under the auspices of the Yolo County Sheriff-Coroner. The cause of death was reported as the effect of blunt force head, neck, and thoracic injuries.

Toxicological tests on specimens from the pilot were performed by the FAA Civil Aeromedical Medical Institute. Analysis revealed no findings for carbon monoxide, or cyanide. The results were negative for all screened drug substances and ingested alcohol. Refer to the toxicology report included in the public docket for specific test parameters and results.

TESTS AND RESEARCH

Airframe

The forward fuselage was crushed and fragmented from the nose cone through to the foot pedals, and had become buried in soft soil. The cabin area had sustained accordion crush damage through to the firewall, exposing the seats and flight controls. The engine compartment sustained minimal damage. The tailcone remained partially attached at the forward seam, just beyond the engine, and came to rest facing north. The entire tailcone area remained largely intact with minimal damage. The combination oil pressure, fuel quantity, and engine temperature gauge exhibited bending damage to its face. The fuel needle indicated 14 gallons of fuel, with the temperature needle indicating 82 degrees C. The oil temperature needle had separated from its spindle. The engine/rotor speed indicator sustained crush

damage to its face and glass plate. The rotor speed needle indicated 190 rpm, with the engine speed needle indicating 0 rpm.

The helicopter skins and canopy fragments were free of rotor blade scrape marks or paint transfers, and no indications of in-flight fire or bird strike were present.

Control and drive train continuity was confirmed, with multiple disconnects noted throughout the systems. The failure signatures were of the bending type, with granular surface features consistent with impact damage. Both blades of the tail rotor remained attached to the hub, and exhibited wrinkling to their trailing edges.

The main rotor hub remained attached to the transmission, and came to rest within the dirt underneath the fuselage.

The main transmission gearbox was canted about 15 degrees forward of the engine crankshaft at the clutch assembly. The gearbox appeared free of external damage.

The fuel gascolator, located below the pilot's seat, appeared 2/3rds full with light blue fuel consistent in color with aviation gasoline. The fuel sector valve was in the on position. About 2 ounces of fuel was drained from line connecting the fuel servo to the electrical fuel pump.

About 1 gallon of fuel was drained from the fuel tank at the accident site, and an undetermined larger quantity of fuel remained within the tank. The position of the wreckage prevented an accurate assessment of the total remaining quantity.

The low fuel light was removed from the instrument panel and examined. The filament was intact and no stretching was noted.

The throttle control was continuous from the control grip through to the fuel servo arm. The throttle grip was found in the full clockwise position when viewed from the front of the helicopter, with the corresponding throttle butterfly valve noted in the closed position. Rotation of the grip resulted in smooth and free movement of the valve.

The mixture control was noted 1 inch aft of the full rich position, and the cable appeared impinged within the cabin structure. The cable remained connected to the mixture control arm at the fuel servo.

The engine had sustained minimal damage, and remained attached to its mounts within the engine compartment. Removal of the rocker covers revealed all internal surfaces to be wet with oil, with no indications of heat discoloration. Translucent, brown-colored oil was drained from the crankcase. The top spark plugs were removed; no mechanical damage was noted and the fine-wire electrodes exhibited light grey deposits, with wear signatures corresponding to normal operation when compared with the Champion Aviation Check-A-Plug AV-27 Chart.

No anomalies were noted with the airframe or engine that would have precluded normal operation. Refer to the examination report located in the public docket for further details.

Airframe Modifications

The fuel servo venturi and inlet plenum were coated with a layer of brown grease. The servo, fuel flow divider, and fuel injection nozzles were subsequently removed for testing at the facilities of Precision Airmotive. No anomalies were noted during testing that would have precluded normal operation, and the units performed nominally. The servo was subsequently disassembled, and brown grease appeared to have traversed into the inner suction slots of the venturi.

The CFI reported that the pilot regularly performed unapproved maintenance and modification to the helicopter. Modifications included the replacement of the collective friction lock actuator with a screwdriver, and the installation of an automotive air filter system in an effort to increase engine performance. The CFI reported that he refused to perform flight training in the helicopter while the automotive filter system was installed, and as such, it was removed. It was assumed that the grease located within the venturi was applied during the modification of the air induction system.

Engine Monitor

The helicopter was equipped with an Insight GEM 602 Engine Monitor. The unit was removed, and sent to the NTSB Office of Research and Engineering for data extraction. Examination revealed that the unit did not have the capability to store engine parameters.

Student pilot Information

Certificate:	None	**Age:**	50,Male
Airplane Rating(s):	None	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 Without waivers/limitations	**Last FAA Medical Exam:**	August 25, 2009
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	May 14, 2011
Flight Time:	(Estimated) 110 hours (Total, all aircraft), 7 hours (Total, this make and model), 15 hours (Pilot In Command, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Brantly	**Registration:**	N222DW
Model/Series:	B-2B	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	181
Landing Gear Type:	Skid	**Seats:**	2
Date/Type of Last Inspection:	December 14, 2010 Annual	**Certified Max Gross Wt.:**	1670 lbs
Time Since Last Inspection:	12 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	699 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	Not installed	**Engine Model/Series:**	IVO-360-A1A
Registered Owner:	On file	**Rated Power:**	180 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	O54,2350 ft msl	**Distance from Accident Site:**	3 Nautical Miles
Observation Time:	14:15 Local	**Direction from Accident Site:**	20°
Lowest Cloud Condition:	Few / 5500 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Broken / 6500 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots / 22 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	250°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:		**Temperature/Dew Point:**	14°C / 2°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Hayfork, CA (F62)	**Type of Flight Plan Filed:**	None
Destination:	Weaverville, CA (O54)	**Type of Clearance:**	None
Departure Time:	13:30 Local	**Type of Airspace:**	

Airport Information

Airport:	Weaverville O54	**Runway Surface Type:**	
Airport Elevation:	2350 ft msl	**Runway Surface Condition:**	
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	40.70111,-122.953887

Administrative Information

Investigator In Charge (IIC):	Simpson, Eliott
Additional Participating Persons:	William Bell; Federal Aviation Administration FSDO; Sacramento, CA
Original Publish Date:	April 20, 2012
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=79241