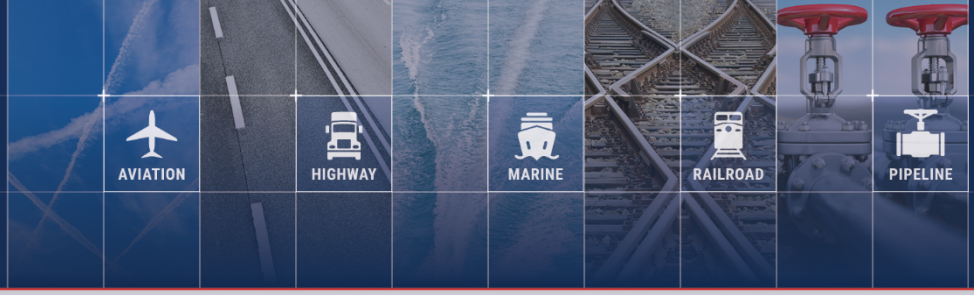

Aviation Investigation Factual Report

Location:	Missoula, Montana	**Accident Number:**	WPR14LA159
Date & Time:	April 4, 2014, 15:48 Local	**Registration:**	N43MA
Aircraft:	Bell 206B III	**Aircraft Damage:**	Substantial
Defining Event:	Roll over	**Injuries:**	2 Minor
Flight Conducted Under:	Part 91: General aviation - Other work use		

On April 4, 2014, about 1548 mountain daylight time, a Bell 206B III helicopter, N43MA, was substantially damaged during a liftoff attempt at Missoula International Airport (MSO), Missoula, Montana. Both pilots on board received minor injuries. The helicopter was operated by Minuteman Aviation Incorporated (MAI), and the evaluation flight was conducted under the provisions of Title 14 Code of Federal Regulations Part 91. Visual meteorological conditions prevailed, and no Federal Aviation Administration (FAA) flight plan was filed for the flight.

According to the pilot under evaluation, the purpose of the flight was regarding her possible employment by the operator as a Bell 206 pilot. On the day of the accident, after a flight with another MAI pilot, she landed and remained in the right seat with the engine running, while the other pilot exited and the MAI chief pilot (CP) took the left seat. She then flew the helicopter to, and landed on, a field adjacent to the airport. That field was referred to by MAI personnel as the "practice area." The landing surface was dry, level, and consisted of mixed dirt and clumps of grass, which the evaluee described as a "normal dry livestock field." The approach and landing were into the wind, on a heading variously described as either west or approximately parallel to MSO runway 29. After a brief discussion in which it was agreed that the CP would demonstrate the next maneuver that he wanted to see, the CP attempted a liftoff.

According to the CP, the right skid felt like it was "stuck" to the ground. Despite his efforts to correct the situation, the CP was unable to successfully set the helicopter fully back down. The helicopter rolled over onto its right side, and sustained substantial damage to the fuselage, tail boom, and main rotor. The CP shut the helicopter down, and both occupants exited the aircraft. The CP did not report any pre-rollover mechanical deficiencies or failures of the helicopter, and a post-accident examination of the helicopter by FAA inspectors did not detect any such deficiencies or failures.

Check pilot Information

Certificate:	Commercial	**Age:**	54
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	February 18, 2014
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	March 30, 2014
Flight Time:	19000 hours (Total, all aircraft), 1500 hours (Total, this make and model), 18850 hours (Pilot In Command, all aircraft), 50 hours (Last 90 days, all aircraft), 45 hours (Last 30 days, all aircraft), 5 hours (Last 24 hours, all aircraft)		

Pilot Information

Certificate:	Commercial	**Age:**	29
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	3-point
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	July 6, 2013
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	September 9, 2013
Flight Time:	1202 hours (Total, all aircraft), 5 hours (Total, this make and model), 1112 hours (Pilot In Command, all aircraft), 40 hours (Last 90 days, all aircraft), 5 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Chief Pilot

The CP held a commercial pilot certificate with multiple ratings, including helicopter. He reported a total flight experience of about 19,000 hours, including about 5,310 hours in helicopters, and about 1,500 hours in the accident helicopter make and model. His most recent flight review was completed in March 2014, and his most recent FAA second-class medical certificate was issued in February 2014.

Pilot Under Evaluation

The pilot under evaluation held a commercial pilot certificate with airplane single-engine land and helicopter ratings. She reported a total flight experience of about 1,200 hours, including about 1,080 hours in helicopters, and about 5 hours in the accident helicopter make and model. Her most recent flight review was completed in September 2013, and her most recent FAA first-class medical certificate was issued in July 2013.

Aircraft and Owner/Operator Information

Aircraft Make:	Bell	**Registration:**	N43MA
Model/Series:	206B III	**Aircraft Category:**	Helicopter
Year of Manufacture:	1991	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	4156
Landing Gear Type:	N/A; Skid	**Seats:**	
Date/Type of Last Inspection:	January 27, 2014 Annual	**Certified Max Gross Wt.:**	3201 lbs
Time Since Last Inspection:		**Engines:**	1 Turbo shaft
Airframe Total Time:	7484 Hrs at time of accident	**Engine Manufacturer:**	ALLISON
ELT:	Installed, not activated	**Engine Model/Series:**	250-C20 SER
Registered Owner:	MINUTEMAN AVIATION INC	**Rated Power:**	420 Horsepower
Operator:	MINUTEMAN AVIATION INC	**Operating Certificate(s) Held:**	Rotorcraft external load (133), On-demand air taxi (135), Agricultural aircraft (137)

Federal Aviation Administration (FAA) information indicated that the helicopter was configured with a single main rotor system and a tail rotor near the aft end of the tail boom. The helicopter was manufactured in 1991, and was equipped with an Allison (Rolls-Royce) 250-C20 series turboshaft engine. MAI information indicated that the helicopter had accumulated a total time in service of approximately 7,484 hours. Its most recent annual inspection was completed on January 27, 2014.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	MSO,3206 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	15:53 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Few / 6500 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	11 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	320°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.8 inches Hg	**Temperature/Dew Point:**	11°C / -2°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Missoula, MT (KMSO)	**Type of Flight Plan Filed:**	None
Destination:	Missoula, MT (KMSO)	**Type of Clearance:**	None
Departure Time:	15:48 Local	**Type of Airspace:**	Unknown

The airport was equipped with two separate wind sensor systems. One sensor system displayed wind speed and magnetic direction information in the air traffic control tower (ATCT), and that display was the data source for wind information issued to pilots by the controllers during their normal radio communications. The wind speed and direction information itself was not recorded; the only records of those values were any communications of the values in the controllers' transmissions. This method can introduce some temporal uncertainty (typically less than a minute, but possibly a few minutes) into the data. The ATCT wind sensor was located about 3,600 feet east of the accident location.

According to information provided by personnel from the company that operated the ATCT, the wind speed and direction values that were issued during the 24-minute period during which the helicopter was operating were always from 290 degrees, and varied between 10 and 18 knots. In the few minutes surrounding the accident period, maximum gusts up to 22 knots were reported.

The second wind sensor was part of the automated surface observation system (ASOS), and was the data source for the METARs and ATIS (automated terminal information service); that data is recorded at 1-minute intervals, and permanently archived. ASOS wind direction values are in degrees true; the magnetic variation must be accounted for in order to directly compare the ASOS and ATCT values. The ASOS wind sensor was located about 2,500 feet north-northeast of the accident location.

Review of the ASOS 1-minute data indicated that in the 5 minutes either side of the reported time of the accident, the wind direction varied between about 267 and 298 degrees magnetic, at speeds between 10 and 17 knots, with gusts up to 20 knots.

The MSO 1553 automated weather observation included winds from 320 degrees at 11 knots, visibility 10 miles, few clouds at 6,500 feet, temperature 11 degrees C, dew point minus 2 degrees C, and an altimeter setting of 29.81 inches of mercury.

The accident report form filed by the CP indicated that the wind was from 250 degrees at 13 knots, with gusts to 20 knots.

Airport Information

Airport:	Missoula International KMSO	**Runway Surface Type:**	Dirt;Grass/turf
Airport Elevation:	3206 ft msl	**Runway Surface Condition:**	Dry;Vegetation
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	None

MSO was equipped with two paved runways and a non-federal ATCT. Airport elevation was approximately 3,206 feet above mean sea level. Magnetic variation was 17 degrees east.

Wreckage and Impact Information

Crew Injuries:	2 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Minor	**Latitude, Longitude:**	46.916389,-114.090553(est)

The practice area being used by the pilots was 3,000 feet south-southeast of the intersection of runways 7/25 and 11/29, just outside the airport perimeter fence. According to the pilots, the helicopter came to rest on its right side, oriented on an approximate heading of 270 degrees magnetic. The pilots reported that that direction was the same direction that the helicopter was facing at the beginning of the attempted liftoff. The helicopter sustained substantial damage to the fuselage and tail boom. The main rotor blade assembly was fracture-separated from the mast, the cabin was deformed, the tailboom was bent, and several cockpit/cabin windows were broken.

Immediately after they exited the helicopter, the two pilots attempted to determine what had apparently caused the right skid to become stuck to the ground, but a fuel leak and a small fire caused them to move away from the helicopter. The investigation did not obtain any information to either substantiate or refute the CP's assertion that the right skid became stuck to the ground.

Additional Information

Dynamic Rollover

The FAA Rotorcraft Flying Handbook (H-8083-21) stated that a single-rotor helicopter "is susceptible to a lateral rolling tendency, called dynamic rollover, when lifting off the surface," and that if the helicopter's critical rollover angle "is exceeded, the helicopter rolls on its side regardless of the cyclic corrections made." The Handbook also noted that two "critical conditions" for dynamic rollover were "right side skid down" and "crosswinds from the left." The directionality of those parameters is primarily a function of the direction of rotation of the main rotor blades; the stated directionality is applicable to the accident helicopter.

Administrative Information

Investigator In Charge (IIC):	Huhn, Michael
Additional Participating Persons:	John Rasmussen; FAA FSDO; Helena, MT
Report Date:	October 21, 2015
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=89021