Aviation Investigation Final Report

Location:	Delano, California	**Accident Number:**	WPR13FA080
Date & Time:	January 2, 2013, 06:15 Local	**Registration:**	N828AC
Aircraft:	Bell 206	**Aircraft Damage:**	Destroyed
Defining Event:	Loss of visual reference	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Other work use		

Analysis

The accident helicopter was returning to the airport. Dark night visual meteorological conditions prevailed at the time with increasing fog. The pilot of a second helicopter, who was flying nearby and was in contact with the accident pilot, stated that, before the accident, he saw the accident helicopter make a right turn; he then asked the pilot if she was lost. The accident pilot responded that she thought she was. The second pilot told her to turn left toward the airport. Shortly after, the second pilot observed a fire on the ground and attempted to contact the accident pilot but received no reply. The accident helicopter crashed about 10 miles southeast of the destination airport. Postaccident documentation of the accident site revealed signatures indicative of a steep right turn while impacting vegetation and terrain. Examinations of the helicopter and engine revealed no evidence of preimpact mechanical malfunctions or failures that would have precluded normal operation. The dark night conditions, sparsely lit terrain, and accumulating fog reduced the visual cues available for the pilot to maintain orientation, and, under those conditions, the helicopter's external spotlights, which were on during the accident flight, could have further reduced or provided misleading visual cues. These conditions were conducive to the development of spatial disorientation.

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 helicopter control due to spatial disorientation while maneuvering in low visibility, dark night conditions.

Findings

Personnel issues	Monitoring environment - Pilot
Personnel issues	Spatial disorientation - Pilot
Environmental issues	Low visibility - Contributed to outcome
Environmental issues	Dark - Contributed to outcome

Factual Information

History of Flight

Enroute	Course deviation
Maneuvering-low-alt flying	Loss of visual reference (Defining event)
Maneuvering	Collision with terr/obj (non-CFIT)

On January 2, 2013, about 0615 Pacific standard time (PST), a Bell 206 helicopter, N828AC, was destroyed when it impacted terrain in a vineyard while maneuvering about 10 miles southeast of the Delano Municipal Airport (DLO), Delano, California. The helicopter was registered to Maricopa Helicopter, LLC, Fresno, California, and operated by San Joaquin Helicopters under provisions of Title 14 Code of Federal Regulations Part 91. The commercial pilot, the sole occupant of the helicopter was fatally injured. Dark night visual meteorological conditions prevailed and no flight plan was filed. The local flight originated from DLO about 0420 to perform frost protection.

The National Transportation Safety Board (NTSB) investigator-in-charge (IIC) interviewed the pilot of a second helicopter, which was following the accident helicopter on the return flight to DLO. The pilot stated that they were both returning to DLO due to accumulating fog over the field they were working. The pilot stated that during the return flight, he saw the accident helicopter ahead of his position make a right turn and asked the accident pilot if she were lost. The accident pilot responded that she thought she was. The second pilot then gave her directions to turn left in the direction of DLO. The second pilot stated that he diverted his attention to reestablish visual contact with distant lights to his left, and subsequently observed an orange glow within the fog layer ahead of his position. He also stated that on the return flight the accident helicopter's working spotlights were on prior to the accident.

Pilot Information

Certificate:	Commercial	**Age:**	62
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	March 31, 2012
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	1581 hours (Total, all aircraft), 189.1 hours (Total, this make and model), 1255 hours (Pilot In Command, all aircraft), 49.2 hours (Last 90 days, all aircraft), 14 hours (Last 30 days, all aircraft), 4.5 hours (Last 24 hours, all aircraft)		

The pilot, age 62, held a commercial pilot certificate with an airplane single-engine land, multi-engine

land, instrument airplane, and rotorcraft-helicopter ratings. A second-class airman medical certificate was issued in March of 2012, with no limitations stated. The pilot reported on her most recent Federal Aviation Administration (FAA) airmen medical certificate application that she had accumulated 1300 total flight hours, and 250 hours in the previous 6 months. According to the pilot's logbook she had flown a total of 212.6 hours in the last 6 months; 100.5 in fixed wing aircraft and 21.1 in helicopters.

According to the helicopter flight log, the pilot had flown the accident helicopter 2 days prior to the accident. The first flight was for training and currency, and was .6 hours in length. The second flight was for frost control work and was 4.5 hours in length. No other flight time was found with this operator in the previous 6 months.

Aircraft and Owner/Operator Information

Aircraft Make:	Bell	**Registration:**	N828AC
Model/Series:	206 B3	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	1519
Landing Gear Type:	Skid	**Seats:**	5
Date/Type of Last Inspection:	September 12, 2012 Annual	**Certified Max Gross Wt.:**	
Time Since Last Inspection:	20 Hrs	**Engines:**	1 Turbo shaft
Airframe Total Time:	5179 Hrs as of last inspection	**Engine Manufacturer:**	ROLLS-ROYC
ELT:	Installed, not activated	**Engine Model/Series:**	250-C20B
Registered Owner:	MARICOPA HELICOPTER LLC	**Rated Power:**	420 Horsepower
Operator:	San Joaquin Helicopters	**Operating Certificate(s) Held:**	Agricultural aircraft (137)

The helicopter was a Bell 206B3, serial number 1519. A review of the helicopter's logbooks revealed that it had a total airframe time of 5,179 hours at the most recent annual inspection, dated September 12, 2012. It was powered by an Allison Model 250-C20B, 420-hp engine. At the most recent 100-hour annual inspection, the engine had accumulated 9,236.1 total hours since new, and a total of 1,101 cycles.

The day prior to the accident, San Joaquin Helicopter's company documents recorded that the helicopter had a total time of 5,199 hours and 1,131 total cycles. The engine total time was 9,255 hours.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Night
Observation Facility, Elevation:	PTV,443 ft msl	**Distance from Accident Site:**	19 Nautical Miles
Observation Time:	06:15 Local	**Direction from Accident Site:**	15°
Lowest Cloud Condition:	Thin Overcast / 100 ft AGL	**Visibility**	0.25 miles
Lowest Ceiling:	Overcast / 100 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	5 knots /	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	140°	**Turbulence Severity Forecast/Actual:**	/ N/A
Altimeter Setting:	30.23 inches Hg	**Temperature/Dew Point:**	0°C / -1°C
Precipitation and Obscuration:	N/A - None - Fog		
Departure Point:	Delano, CA (DLO)	**Type of Flight Plan Filed:**	None
Destination:	Delano, CA (DLO)	**Type of Clearance:**	None
Departure Time:	04:20 Local	**Type of Airspace:**	

At 0615, the automated surface weather observation located 19 miles northeast of the Porterville Municipal Airport, Porterville, California, reported wind 140 degrees at 5 knots, 1/4 mile visibility, overcast clouds at 100 feet, temperature at 0 degrees Celsius (C), dew point minus 1 degree C, and an altimeter setting at 30.24 inches of mercury.

Airport Information

Airport:	Delano Municipal Airport DLO	**Runway Surface Type:**	
Airport Elevation:	316 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:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	35.726943,-119.162498

The wreckage debris was located about 10 miles southeast of DLO, enclosed in an area of about 30 feet

wide and about 500 feet in length. The direction of the energy path was oriented on a magnetic heading of about 040 degrees from the first identified point of contact (FIPC) to the main wreckage. Postimpact fire was observed throughout the debris path, as well as through the surrounding crops. The FIPC was the branch of a grapevine, followed by a large trough of disturbed dirt about 10 feet in length and about 10 inches in depth. About 15 feet further and in line with the FIPC, the main rotor, including the main rotor head hub assembly, blade grips and large sections of both blades had sustained impact damage. The tailboom was about 65 feet from the FIPC. The tailboom was damaged by postimpact fire damage and was buckled and separated from the fuselage at the fuselage attachment area. The tail rotor and gear box remained attached to the tailboom. The fuselage and engine were found about 75 feet from the FIPC. The fuselage was mostly consumed by postimpact fire. A leading edge section of the red marked main rotor blade was found approximately 480 feet from the FIPC with a magnetic heading of about 355 degrees.

The postaccident examination of the airframe and flight control system components revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation. Examination of the engine revealed impact damage to compressor blade leading edges and inlet guide vanes, metal spatter and debris throughout the gas path. These signatures are supportive of engine operation during the impact sequence. For further information see the Rolls-Royce Engine Investigation Report in the public docket.

Communications

The two helicopters and the operator, San Joaquin Helicopters, which was located at DLO, were in communication with each other through a common traffic advisory frequency.

Medical and Pathological Information

On January 4, 2013, an autopsy was performed on the pilot by the Kern County Coroner Division, Bakersfield, California. The cause of death was listed as "blunt injuries."

Forensic toxicology was performed on specimens from the pilot by the FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma. The toxicology report stated no ethanol was detected in the muscle or the brain, and Trimethoprim was detected in the muscle and liver.

Additional Information

The FAA Helicopter Flying Handbook, FAA-H-8083-21A, Chapter 13, states the following about night VFR (visual flight rules) operations: "The night flying environment and the techniques used when flying at night depend on outside conditions. Flying on a bright, clear, moonlit evening when the visibility is good and the wind is calm is not much different from flying during the day. However, if flying on an overcast night over a sparsely populated area, with few or no outside lights on the ground, the situation is quite different. Visibility is restricted, so be more alert in steering clear of obstructions and low clouds. Options are also limited in the event of an emergency, as it is more difficult to find a place to land and determine wind direction and speed. At night, rely more heavily on the aircraft systems, such as lights, flight instruments, and navigation equipment."

FAA Advisory Circular (AC) 60-4A "Pilot's Spatial Disorientation," reads in part, "Surface references and the natural horizon may at times become obscured, although visibility may be above visual flight rule minimums. Lack of natural horizon or surface reference is common on over-water flights, at night, and especially at night in extremely sparsely populated areas or in low visibility conditions. A sloping cloud formation, an obscured horizon, a dark scene spread with ground lights and stars, and certain geometric patterns of ground lights can provide inaccurate visual information for aligning the aircraft correctly with the actual horizon. The disoriented pilot may place the aircraft in a dangerous attitude."

Administrative Information

Investigator In Charge (IIC):	Swick, Andrew
Additional Participating Persons:	John G Jensen; FAA-FSDO; Fresno, CA Bill Sarles; Bell Helicopter; Fort Worth, TX David W Riser; Rolls Royce; Indianapolis, IN Casey Lehman; Rolls-Royce; Indianapolis, IN
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