Aviation Investigation Final Report

Location:	Macedonia, Iowa	**Accident Number:**	CEN14LA487
Date & Time:	September 6, 2014, 12:07 Local	**Registration:**	N699TQ
Aircraft:	ROBINSON HELICOPTER COMPANY R44 II	**Aircraft Damage:**	Substantial
Defining Event:	Low altitude operation/event	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 137: Agricultural		

Analysis

The pilot was conducting agricultural spray operations in a helicopter. He had sprayed three fields earlier in the day and was en route to the next field when the accident occurred. Witnesses reported observing the helicopter heading north and then colliding with a suspended static line. The helicopter subsequently pitched up, descended, and impacted terrain. Larger transmission lines were located above the smaller static lines. A witness who was about 1/4 mile from the accident site stated that he could see the larger transmission lines but that he did not see the smaller static lines until the helicopter struck one of them. He also stated that it did not appear that the pilot took any evasive action to avoid the line. A postaccident examination of the helicopter did not reveal any anomalies 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 pilot's inadequate visual lookout, which resulted in a collision with a static line.

Findings

Aircraft	Altitude - Not attained/maintained
Personnel issues	Monitoring environment - Pilot
Personnel issues	Identification/recognition - Pilot
Environmental issues	Wire - Awareness of condition

Factual Information

History of Flight

Maneuvering-low-alt flying	Low altitude operation/event (Defining event)
Maneuvering	Controlled flight into terr/obj (CFIT)

On September 6, 2014, at 1207 central daylight time, a Robinson R44 II helicopter, N699TQ, impacted a suspended static line near Macedonia, Iowa. The pilot was fatally injured and the helicopter was destroyed. The helicopter was registered to Mills County Choppers, Inc. and operated by Johnson Helicopter Services under the provisions of 14 Code of Federal Regulations Part 137 as an aerial application flight. Day visual meteorological conditions prevailed at the time of the accident and no flight plan was filed. The local flight originated at an unknown time.

A witness, who was about ½ mile from the accident site, reported he heard the helicopter prior to seeing it. He added that the helicopter was flying north, continued into the suspended lines, pitched up and then descended toward the ground. He observed fuel leaking from the helicopter at the accident site.

Another witness, who was about ¼ mile away, stated that the helicopter was flying north at a height above the larger transmission lines and it did not appear that the pilot made any evasive action to avoid the lines. From his location he could not see the smaller static line until the helicopter contacted it. He then observed the static line stretch to the north with the helicopter until it broke and the helicopter impacted the ground. There were no sparks or fire observed during the impact. He did not hear any unusual sounds from the helicopter's engine until the wire strike, and then it sounded like a "lawn mower going over a rock."

Power line maintenance employees stated that at the time of the accident the larger transmission lines were not energized. The smaller line that was struck by the helicopter was referred to as a static line and did not transmit electrical current. It was composed of seven strands of high strength steel and measured 3/8 inch thick. The tower structures that suspended the lines were 111 feet tall and were 1,650 feet apart. The estimated distance between the higher static lines and the lower transmission lines was 25 feet.

According to the pilot's spraying partner, they intended to spray from 1100 to 1800. The partner, the accident pilot, and the operator all sat together and completed paperwork for about two hours in preparation for the spaying they intended to accomplish that day. He stated that the field sprayed by the pilot prior to the accident was the fourth field of the day. Prior to that spray flight, he loaded the helicopter with 30 gallons of applicant and filled it with fuel. He stated that everything was going well that day and the pilot did not mention any issues with the helicopter. He drove about 17 miles (30 minutes) to meet the pilot at the next location; the helicopter had already crashed when he arrived. He had worked with the pilot for 3 years and stated it was strange that there was no radio communication during the drive to the next location.

A GPS receiver was recovered from the accident site and was sent to the National Transportation Safety Board (NTSB) Vehicle Recorder Laboratory for download.

Pilot Information

Certificate:	Commercial; Flight instructor	**Age:**	26
Airplane Rating(s):	None	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	3-point
Instrument Rating(s):	Helicopter	**Second Pilot Present:**	No
Instructor Rating(s):	Helicopter; Instrument helicopter	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	February 27, 2014
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	May 5, 2013
Flight Time:	(Estimated) 1522 hours (Total, all aircraft), 1084 hours (Total, this make and model), 1522 hours (Pilot In Command, all aircraft), 109 hours (Last 90 days, all aircraft), 20 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

The pilot, age 26, held a commercial pilot certificate with ratings for rotorcraft-helicopter and instrument helicopter. He also held a flight instructor certificate for the same. On February 27, 2014, the pilot was issued a first class Federal Aviation Administration (FAA) medical certificate with no limitations. On the application for the medical certificate, he reported his flight experience as 1,500 total flight hours and 100 hours in the preceding six months.

According to the operator, the pilot's flight experience included over 1,522 total rotorcraft flight hours and over 1,084 hours in the accident helicopter make and model. The pilot had accumulated over 109 hours in the preceding 90 days and over 20 hours in the preceding 30 days, all of which were in the accident helicopter make and model.

Aircraft and Owner/Operator Information

Aircraft Make:	ROBINSON HELICOPTER COMPANY	**Registration:**	N699TQ
Model/Series:	R44 II	**Aircraft Category:**	Helicopter
Year of Manufacture:	2004	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	10385
Landing Gear Type:	N/A; Skid	**Seats:**	
Date/Type of Last Inspection:	August 25, 2014 100 hour	**Certified Max Gross Wt.:**	2500 lbs
Time Since Last Inspection:	2 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	1183.4 Hrs as of last inspection	**Engine Manufacturer:**	LYCOMING
ELT:	C126 installed, activated, aided in locating accident	**Engine Model/Series:**	IO-540 AE1A5
Registered Owner:	MILLS COUNTY CHOPPERS INC	**Rated Power:**	205 Horsepower
Operator:	Johnson Helicopter Services	**Operating Certificate(s) Held:**	Agricultural aircraft (137)

The aircraft was a Robinson R44 II single engine light helicopter with a skid landing gear. It was manufactured in 2004. The helicopter had a semi-rigid two-bladed main rotor system and a two-bladed tail rotor which were driven by a 205-horsepower Lycoming IO-540 reciprocating engine. The engine had accumulated 308 total hours and 2 hours since the last inspection. On August 25, 2014, a 100-hour inspection was completed at an airframe total time of 1,183 hours. The helicopter was outfitted for agricultural spray operations.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KCBF,1253 ft msl	**Distance from Accident Site:**	11 Nautical Miles
Observation Time:	12:15 Local	**Direction from Accident Site:**	295°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	80°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.29 inches Hg	**Temperature/Dew Point:**	19°C / 10°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	RED OAK, IA (RDK)	**Type of Flight Plan Filed:**	Unknown
Destination:	RED OAK, IA (RDK)	**Type of Clearance:**	Unknown
Departure Time:		**Type of Airspace:**	Class G

At 1215, the automated weather observation at the Council Bluffs Municipal Airport (CBF), located 11 miles west-northwest of the accident site reported: wind from 080° at 4 knots; visibility 10 miles; sky condition clear; temperature 66° F; dew point 50° F; and barometric pressure 30.30 inches of mercury.

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:**	41.182498,-95.535552(est)

The responding FAA inspector examined the wreckage, which was located at GPS coordinates 41° 10' 57.2" N / 95° 32' 07.3" W, and at an elevation of 1,202 ft mean sea level (MSL). The accident area consisted of a group of multiple cultivated agricultural fields in one mile squares. The fields were terraced and had descending slopes from west to east. Several power lines ran east to west and intersected the intended spray field and the field that contained the wreckage. The power lines were mounted on 111-ft tall metal towers and consisted of three larger transmission lines beneath two static lines. The lines slightly drooped down between each tower. Due to the slight droop, the actual height of the static line prior to the accident was unknown. The northern static line was found broken and lying on the ground; the other lines appeared intact. The broken static line exhibited signatures consistent with tension overload. The distance from the lines to the accident site was 240 ft on a north heading.

The main wreckage consisted of the helicopter fuselage, tail boom and tail rotor system. The main rotor

system was separated from the helicopter and came to rest about 75 feet north of the main wreckage. The main rotor blades were damaged, but generally straight. One main rotor blade contained a distinct cut near the blade hub. The cut began on the leading edge and extended inboard toward the blade hub.

The FAA inspector also examined the helicopter wreckage after it was removed from the field and relocated to the owner's farm. The helicopter showed evidence of multiple structural failures, which was consistent with impact with a wire and terrain. The passenger area was damaged and significantly compressed. The engine compartment was also damaged and compressed. The tail boom remained attached, but was bent toward the nose of the helicopter to facilitate the wreckage transport. Flight control continuity could not be confirmed due to the extensive damage. The application storage tank was broken open. The instrument panel showed impact damage, but remained intact. The Kollsman window in the altimeter read 29.94.

Medical and Pathological Information

The pilot initially survived the accident and was hospitalized; however, on September 11, 2014, the pilot died as a result of the injuries sustained in the accident. On September 13, 2014, an autopsy was performed at the Douglas County Morgue, Omaha, Nebraska. The cause of death was attributed to multiple blunt force injuries to the chest and abdomen.

On October 29, 2014, the FAA Civil Aerospace Medical Institute completed a final forensic toxicology fatal accident report on the specimens from the pilot; the toxicology was negative.

Additional Information

DynaNav DynaFlight AirAg-E

The helicopter was equipped with a DynaNav DynaFlight AirAg-E, which was a GPS based guidance and mapping system that aided in the application of seeds, fertilizers, and chemicals to a treatment area. Data was recorded and stored on a compact flash drive inside the device and could be transferred via the USB port. The data was sampled at 10 times per second but not stored at that rate. The storage rate was determined by an algorithm based on the dynamics of the helicopter.

Upon arrival at the NTSB Vehicle Recorder Laboratory, an exterior examination revealed that the unit had sustained moderate impact damage from the accident. The compact flash card read out normally and the data was extracted. The read out resulted in a file which was converted to a Google Earth file using manufacturer's software.

The data extracted included 23 sessions from June 7, 2013, through September 6, 2014. The accident

flight was recorded starting 17:03:12 universal coordinated time (UTC) and ending 17:07:19 UTC on September 6, 2014.

The data showed the helicopter moving northeast at the beginning of the flight, then moving further to the west as the last data point was captured. During the flight, crops were sprayed in certain areas and then the pilot proceeded to the north. The data revealed that the helicopter was flying between 1,142 ft and 1,342 ft MSL during the operation. Due to buffering, the data recording may have ended before the accident event.

The final recorded points showed the helicopter headed north and in a slight descent from the last recorded point at 1,255 ft MSL; about 88 ft above the ground.

The GPS report and tabular data can be found in the docket associated with this accident report.

Administrative Information

Investigator In Charge (IIC):	Lindberg, Joshua
Additional Participating Persons:	Jeffrey Rock; Federal Aviation Administration; Des Moines, IA
Original Publish Date:	September 24, 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=90041