Aviation Investigation Final Report

Location:	Cosby, Tennessee	**Accident Number:**	ERA22FA096
Date & Time:	December 29, 2021, 14:25 Local	**Registration:**	N544SC
Aircraft:	ROBINSON HELICOPTER COMPANY R44 II	**Aircraft Damage:**	Substantial
Defining Event:	VFR encounter with IMC	**Injuries:**	1 Fatal, 1 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot was preparing for a cross-country flight in the newly-leased, non-instrument flight rules (IFR) equipped helicopter. Per the lease agreement, he flew in the local traffic pattern to assess the helicopter without incident. The weather reportedly deteriorated during the day, changing from marginal visual flight rules (VFR) conditions to IFR conditions. Local personnel warned him of the hazards of flying through the Smoky Mountains in such conditions; however, the pilot responded, “those are hills” and he had 14 years of mountain flying experience. The pilot subsequently took off with his passenger toward mountainous terrain.

On-board video captured most of the flight and all of the accident sequence, revealing that the pilot proceeded to the east, flying along valleys and roads, as the mountains ahead were obscured in low ceilings. The flight continued as the visibility eventually deteriorated to “zero” and the helicopter entered instrument meteorological conditions. The were no attempts to reverse course to get to better weather. The pilot eventually lost control of the helicopter and crashed into a tree line in a steep descent. The helicopter was substantially damaged, the pilot was seriously injured, and his passenger was fatally injured. The pilot would later report to law enforcement personnel that he remembered losing engine oil pressure and the main rotor began to make a loud noise, so he performed an autorotation; however, with the cloud cover, he could not see.

Postaccident examination of the airframe and engine revealed no evidence of a malfunction or anomaly that would have precluded normal operation. There was no evidence of a loss of engine oil or oil pressure. The on-board video did not support the pilot’s claims of an inflight loss of oil pressure or a main rotor malfunction, nor did it indicate that an autorotation was performed.

Probable Cause and Findings

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

The pilot's intentional, continued flight into instrument meteorological conditions in a helicopter that was not certified for instrument conditions, which resulted in a loss of helicopter control and a collision with trees and terrain.

Findings

Aircraft	Pitch control - Not attained/maintained
Aircraft	Lateral/bank control - Not attained/maintained
Personnel issues	Decision making/judgment - Pilot
Environmental issues	Obscuration - Contributed to outcome

Factual Information

History of Flight

Enroute	VFR encounter with IMC (Defining event)
Enroute	Loss of control in flight
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On December 29, 2021, at 1425 eastern standard time, a Robinson Helicopter Company R-44 II, N544SC, was substantially damaged when it was involved in an accident near Cosby, Tennessee. The commercial pilot received serious injuries and the passenger was fatally injured. The helicopter was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

According to personnel at Gatlinburg-Pigeon Forge Airport (GKT), Sevierville, Tennessee, the pilot and passenger traveled from Utah to pick up the helicopter after leasing it from the owner. They arrived at the service center where the helicopter had been stored about 0830 on the day of the accident. The pilot reviewed the lease agreement and conducted a local flight around the GKT airport traffic pattern to assess the helicopter per the lease agreement.

According to personnel at the service center, “the weather throughout the day was changing from marginal VFR conditions to IFR conditions.” The pilot had conversations with the service center employees about leaving the area but was cautioned by all of them he spoke with about the dangers of flying in the Smoky Mountains in marginal weather. One person showed him a book in their training room filled with controlled flight into terrain (CFIT) accidents that occurred in the area. The pilot’s response was “those are hills,” and informed him he had 14 years of experience of mountain flying. Additionally, a local helicopter air ambulance pilot who worked on the airport met the pilot and asked about his intentions. The pilot stated he planned on departing towards Asheville and was going to follow Interstate 40 (I-40) through the gorge to Raleigh, North Carolina, where he would visit relatives before heading back west. The other helicopter pilot told him that the mountains east of GKT were 6,000 ft and “there was no way he would make it there.” He also stated there were powerlines above the I-40 gorge.

About 1413, the pilot and passenger departed GKT eastbound. Federal Aviation Administration radar data showed the helicopter flying through the valleys in an easterly/southeasterly direction at altitudes between 1,200 ft and 1,750 ft. The data was not continuous along the route.

A GoPro video camera was mounted inside the cockpit and was recording during the flight. The camera and its memory card were forwarded to the National Transportation Safety Board Vehicle Recorders Laboratory for examination and analysis.

Automatic dependent surveillance-broadcast (ADS-B) data for the flight began about ½ nm east of the departure end of runway 10, at 1413:20. The video began at 1414:54, when the helicopter was already in flight. When the video began, there was rising terrain ahead of the helicopter, portions of which contained mountain top obscuration. The cloud layer appeared broken at the helicopter's current position, with thickening ahead of the helicopter and up along the horizon.

As the helicopter approached an area of low visibility and rising terrain, the helicopter continued in a gradual ascent. At 1424:34, the visibility started to greatly decrease. The helicopter's groundspeed (and indicated airspeed) at first showed a decreasing trend. By 1424:48, the manifold pressure was reduced and the groundspeed and indicated airspeed decreased and reached a minimum of less than 20 knots.

As the indicated airspeed reached a minimum, manifold pressure increased, the helicopter pitched forward, and airspeed increased slightly. Visible landmarks under the helicopter suggested it again had a forward component of speed. As the helicopter continued to fly forward, visibility decreased even further, eventually to "zero" at 1425:07. About the time this occurred, the manifold pressure went through the red arc range to a maximum of about 27 inHg (beyond the red arc range). The helicopter then pitched forward and airspeed rapidly increased to about 85 knots. During this time, the manifold pressure indicated steadily above the red arc (above 27 inHg). The helicopter then appeared to yaw rapidly to the right, the airspeed suddenly displayed "zero" knots, and the altitude decreased. The low rotor rpm warning light and aural warning alerted.

The helicopter emerged from the cloud layer, first in a right roll and right yaw condition that quickly reversed to a left roll and left yaw condition. The helicopter then descended rapidly into a tree line, impacting the tops of the trees in a left yaw and level roll condition. As the helicopter descended into the tree line, the main rotor blades struck tree branches and tree trunks. Reflections in the windshield suggested the low rotor rpm light (yellow), and the low engine oil pressure light (red) illuminated during impact. The helicopter came to rest amongst the trees at ground level.

There was no evidence in the recording that suggested that there were preimpact mechanical malfunctions or failures that would have precluded normal operation prior to the helicopter entering an extremely low visibility condition.

Local law enforcement personnel interviewed the pilot after the accident. He stated that he did recall the accident. He further stated that he remembered losing oil pressure and the main rotor began to make a loud noise, so he performed an autorotation; however, with the cloud cover, he could not see.

Passenger Information

Certificate:		**Age:**	35,Female
Airplane Rating(s):		**Seat Occupied:**	Left
Other Aircraft Rating(s):		**Restraint Used:**	3-point
Instrument Rating(s):		**Second Pilot Present:**	No
Instructor Rating(s):		**Toxicology Performed:**	
Medical Certification:		**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:			

Pilot Information

Certificate:	Commercial	**Age:**	34,Male
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):	None	**Toxicology Performed:**	
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	December 7, 2021
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	November 29, 2021
Flight Time:	2235 hours (Total, all aircraft)		

The pilot's total flight experience was obtained from his latest Federal Aviation Administration first-class medical certificate application, dated 12/7/2021. A pilot logbook was found in the wreckage; however, it was water-damaged and partially illegible and a total flight time could not be determined.

Aircraft and Owner/Operator Information

Aircraft Make:	ROBINSON HELICOPTER COMPANY	**Registration:**	N544SC
Model/Series:	R44 II	**Aircraft Category:**	Helicopter
Year of Manufacture:	2005	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	10884
Landing Gear Type:	Skid	**Seats:**	4
Date/Type of Last Inspection:	December 28, 2021 Annual	**Certified Max Gross Wt.:**	2500 lbs
Time Since Last Inspection:	0.5 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	4707 Hrs at time of accident	**Engine Manufacturer:**	LYCOMING
ELT:	Installed, not activated	**Engine Model/Series:**	IO-540 SER
Registered Owner:	NOVEMBER ALPHA LLC	**Rated Power:**	300 Horsepower
Operator:	Lyfted LLC	**Operating Certificate(s) Held:**	None

The helicopter was not certificated for flight in instrument meteorological conditions.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	GKT,833 ft msl	**Distance from Accident Site:**	15 Nautical Miles
Observation Time:	14:15 Local	**Direction from Accident Site:**	292°
Lowest Cloud Condition:	Scattered / 1800 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Broken / 3400 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:		**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	29.86 inches Hg	**Temperature/Dew Point:**	17°C / 16°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Gatlinburg, TN (GKT)	**Type of Flight Plan Filed:**	None
Destination:	Raleigh , NC (RDU)	**Type of Clearance:**	None
Departure Time:	14:13 Local	**Type of Airspace:**	Class G

Airport Information

Airport:	GATLINBURG-PIGEON FORGE GKT	**Runway Surface Type:**	
Airport Elevation:	1013 ft msl	**Runway Surface Condition:**	
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing;None

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal, 1 Serious	**Latitude, Longitude:**	35.773248,-83.279198(est)

The helicopter came to rest on a heading of 210°, on steep, wooded terrain. There was no fire. The cabin impacted the ground and was crushed forward with the tail boom raised behind the cabin. The tail rotor was separated and resting on the right side of the wreckage. Examination of the wreckage revealed all airframe, main rotor, tail rotor, and powerplant components were accounted for at the scene. The main and auxiliary fuel tanks remained attached to the fuselage. The auxiliary fuel tank was examined and appeared to be full. Fuel was collected from both tanks with no contamination noted. Flight control continuity was confirmed from all flight control surfaces to the flight controls in the cockpit.

The engine was examined and remained attached to the airframe with minor impact damage. The engine compartment was free of oil or fuel residue; there was no evidence of a loss of engine oil in flight.

Both main rotor blades remained attached to the main rotor hub, and one blade was bent, but complete. The other blade was bent and impact-separated into three pieces. The majority of the blade was attached to the main rotor hub, with 3 ft of the tip separated in two sections: about 2.5 ft of blade material and the weighted tip. Both sections were located near the main wreckage to the north.

After recovery of the wreckage to a salvage storage facility, the engine was examined in greater detail. The engine mount and structural tubing aft of the firewall were impact damaged. The engine-driven fuel pump overboard drain line fitting was impact-separated from the pump. The fuel strainer was impact damaged. The fuel strainer screen was absent of debris.

The fuselage was suspended from a lift. The upper spark plugs were removed and the engine crankshaft was rotated by turning the cooling fan. Continuity of the crankshaft to the rear gears and to the valvetrain was confirmed. The interiors of the cylinders were viewed using a lighted borescope and no damage to the pistons or valves was noted.

The fuel strainer was bypassed using locally-sourced hoses and fittings. An external fuel source was plumbed to the aircraft fuel system and serviced with aviation gasoline. An external battery was connected to the aircraft starter and to the airframe electric fuel pump. When the electric fuel pump was energized, fuel leaked around the fuel injector servo throttle shaft and the attempt to run the engine was abandoned. Closer examination of the throttle shaft revealed that it was bent consistent with contact with the aircraft firewall during the accident sequence.

All of the spark plugs and the rocker covers were removed. The aircraft engine oil pressure gauge was energized using an external battery and the engine crankshaft was rotated by energizing the engine starter motor. The oil pressure gage indicated about 60 PSI.

The fuel injector servo remained attached to the engine and was impact damaged. The servo was removed and partially disassembled. The rubber diaphragms were observed intact. The servo fuel inlet screen was unobstructed. The fuel flow divider remained attached to the engine. No damage was noted and it was not removed. The two-piece fuel injector nozzles were unobstructed. The engine-driven fuel pump remained attached to the engine. No damage was noted and it was not removed.

Both magnetos remained attached to the engine and no damage was noted. Both were removed and each produced spark from all ignition towers when rotated by hand. The spark plug electrodes exhibited gray coloration and normal wear condition when compared to a Champion Check-A-Plug chart. The electrodes of the Nos. 2 top, 6 top, 2 bottom, 4 bottom and 6 bottom spark plugs were oil soaked.

The engine oil dipstick indicated about 5 quarts of oil in the engine oil sump. No oil was observed on the exterior of the engine. The oil suction screen was absent of debris. The oil filter media was absent of metallic debris.

Examination of the airframe and engine revealed no malfunctions or anomalies that would have precluded normal operation.

Administrative Information

Investigator In Charge (IIC):	Hicks, Ralph
Additional Participating Persons:	Neal Thorne; FAA FSDO; Nashville Thom Webster; Robinson Helicopter; Torrance, CA Mike Childers; Lycoming; Westport, PA
Original Publish Date:	November 7, 2023
Last Revision Date:	
Investigation Class:	Class 3
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=104453

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