Aviation Investigation Final Report

Location:	Corona, California	**Accident Number:**	WPR13FA054
Date & Time:	November 25, 2012, 23:08 Local	**Registration:**	N4204A
Aircraft:	ROBINSON HELICOPTER COMPANY R44 II	**Aircraft Damage:**	Substantial
Defining Event:	Ground collision	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot had positioned the helicopter facing toward a fuel island and had added about 40 gallons of fuel. A review of a security video showed that the helicopter cabin was partially under a circular metal canopy that covered the island. After fueling and while still under the canopy, the helicopter lifted off, and the pilot immediately made a right turn. After turning nearly 180 degrees, the helicopter pitched forward, and the tail and main rotor blades rose and contacted the metal canopy. The helicopter then began to flail while turning and subsequently came to rest after turning 180 degrees back to its original direction. Several seconds later, a fire and explosion occurred. A postaccident examination of the airframe and engine revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation.

An review of the autopsy report revealed that the pilot's death was caused by thermal-related injuries and that he most likely would have survived the accident if no fire had occurred. The helicopter manufacturer issued several service bulletins advising owners to retrofit R44 all-aluminum fuel tanks with bladder-type tanks to improve the R44 fuel system's resistance to a postaccident fuel leak and the potential for a subsequent fire. The helicopter had not been retrofitted with these modifications. The NTSB has issued Safety Recommendation A-14-1 to the Federal Aviation Administration to require the retrofit.

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 clearance between the helicopter's main rotor blades and the metal canopy of a fuel island.

Findings

Personnel issues	Incorrect action performance - Pilot
Environmental issues	Airport structure - Awareness of condition
Personnel issues	(general) - Pilot
Aircraft	Fuel storage - Design

Factual Information

History of Flight

Taxi-into takeoff position	Ground collision (Defining event)

On November 25, 2012, at 2308 Pacific standard time, a Robinson R44 II, N4204A, collided with a fueling structure at Corona Municipal Airport, Corona, California. The pilot/owner was operating the helicopter under the provisions of 14 *Code of Federal Regulations* (CFR) Part 91. The commercial pilot sustained fatal injuries; the helicopter sustained substantial damage from impact forces and post-crash fire. The cross-country personal flight was departing Corona for Fullerton, California. Instrument meteorological conditions prevailed, and no flight plan had been filed.

A friend stated that he picked the pilot up at French Valley Airport in Temecula, California, about 1630, and they had attended an event in Temecula. He dropped the pilot back off at the airport about 2200.

Witnesses at Corona reported to first responders that they heard the helicopter, and then a bang followed by an explosion. They went outside and observed the helicopter on fire.

Fueling records indicated that the pilot added 40.6 gallons of 100LL about 15 minutes before the accident.

A review of a security video showed that the helicopter was facing towards a fuel island, and the cabin was partially under a circular metal canopy that covered the island. The helicopter lifted off, and made an immediate pedal turn nose right. Nearing 180 degrees of turn, the helicopter pitched forward; the tail and main rotor blades came up, and contacted the metal canopy. The helicopter then began to flail while turning, and came to rest, after it turned 180 degrees right, back in the original direction. Several seconds later, a fire began that was followed a few seconds later by an explosion.

Pilot Information

Certificate:	Commercial	**Age:**	61
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	Unknown
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane single-engine	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 Without waivers/limitations	**Last FAA Medical Exam:**	October 23, 2012
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	1500 hours (Total, all aircraft)		

A review of Federal Aviation Administration (FAA) airman records revealed that the 61-year-old pilot held a commercial pilot certificate with ratings for airplane single-engine land, rotorcraft-helicopter, and instrument airplane. The pilot held a certified flight instructor (CFI) certificate with a rating for airplane single-engine land.

The pilot possessed a third-class medical certificate issued on October 23, 2012; it had no limitations or waivers.

No personal flight records were located for the pilot. The NTSB investigator-in-charge (IIC) obtained the aeronautical experience listed in this report from a review of FAA records on file in the Airman and Medical Records Center located in Oklahoma City. The pilot reported on his medical application that he had a total time of 1,500 hours with 50 hours logged in the previous 6 months.

Aircraft and Owner/Operator Information

Aircraft Make:	ROBINSON HELICOPTER COMPANY	**Registration:**	N4204A
Model/Series:	R44 II	**Aircraft Category:**	Helicopter
Year of Manufacture:	2009	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	12634
Landing Gear Type:	Skid	**Seats:**	4
Date/Type of Last Inspection:	February 2, 2012 Annual	**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	133 Hrs as of last inspection	**Engine Manufacturer:**	LYCOMING
ELT:	Not installed	**Engine Model/Series:**	IO-540-AE1A5
Registered Owner:	LAW OFFICES OF JAMES C BECHLER PC	**Rated Power:**	260 Horsepower
Operator:	LAW OFFICES OF JAMES C BECHLER PC	**Operating Certificate(s) Held:**	None

The helicopter was a Robinson R44-II, serial number 12634. A review of the maintenance logbooks revealed that it had a total airframe time of 133.4 hours at the last annual inspection on February 2, 2012.

The engine was a Lycoming IO-540-AE1A5, serial number L33351-48E. Total time recorded on the engine at the last annual inspection was 133.4 hours.

Examination of the maintenance records revealed no unresolved maintenance discrepancies against the helicopter prior to departure.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Night/dark
Observation Facility, Elevation:	KAJO,533 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	22:56 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:		**Visibility**	2 miles
Lowest Ceiling:	Overcast / 300 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.97 inches Hg	**Temperature/Dew Point:**	12°C
Precipitation and Obscuration:	N/A - None - Mist		
Departure Point:	Corona, CA (AJO)	**Type of Flight Plan Filed:**	None
Destination:	Fullerton, CA (FUL)	**Type of Clearance:**	None
Departure Time:	23:08 Local	**Type of Airspace:**	

An aviation routine weather report (METAR) for Corona (KAJO, elevation 533 feet) was issued at 2256 PDT. It stated: wind calm; visibility 2 1/2 miles mist; sky 300 feet overcast; temperature 12/54 degrees Celsius/Fahrenheit; altimeter 29.98 inches of mercury.

Airport Information

Airport:	Corona AJO	**Runway Surface Type:**	
Airport Elevation:	533 ft msl	**Runway Surface Condition:**	Dry
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:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	On-ground
Total Injuries:	1 Fatal	**Latitude, Longitude:**	33.897777,-117.6025(est)

Investigators examined the wreckage at the accident scene on November 26, 2012. Detailed site examination notes are in the public docket.

The helicopter came to rest partially under the metal canopy of the fuel island, which had a gash in it with torn metal sheets hanging down. The height of the top of the mast of the R44 was 129 inches (10.75 feet); the rotor radius was 198 inches (16.5 feet). The canopy was 14 feet above the ground.

The helicopter sustained severe fire damage from the mid tail boom forward. Fire consumed most of the cabin area.

The main rotor blades sustained impact and thermal damage. One main rotor blade spar separated; investigators located it in a hangar several hundred feet from the main wreckage.

The main rotor gearbox separated from the airframe with deformation and separation in the frame tubes. Fracture surfaces were jagged and angular.

The tail rotor driveshaft had disconnected aft of the intermediate flex plate, and exhibited damage that was associated with severe thermal damage to the tail cone.

The tail rotor blades sustained minor impact damage. There was rotational scoring at the tip of both tail rotor blades. There was a semi-circular ground scar with red paint transfer that arched counter-clockwise toward the tail section.

Medical and Pathological Information

The Riverside County Coroner completed an autopsy. They ruled that diffuse thermal injury and inhalation of products of combustion were the causes of death.

The FAA Forensic Toxicology Research Team, Oklahoma City, Oklahoma, performed toxicological testing of specimens of the pilot.

Analysis of the specimens contained no findings for carbon monoxide, cyanide, volatiles, and tested drugs.

Tests and Research

Investigators from the NTSB, FAA, Robinson Helicopter Company, and Lycoming examined the wreckage at Aircraft Recovery Service, Littlerock, California, on November 27, 2012. Detailed examination notes are in the public docket.

Airframe

Investigators examined the elements of the surviving warning light bulbs on the annunciator panel. All of the surviving elements were tight except for the "clutch" light, which was stretched.

The main rotor gearbox chip detector was clean, and the gearbox rotated freely by hand.

Rotational scuff marks were on the upper sheave; there was rotational scoring on the cooling fan wheel.

The sprag clutch operated properly.

Flight controls

All rod ends were accounted for, and all separations appeared to be thermal damage; investigators noted no indication of preimpact failure of the flight control system.

Fuel System

The main tank remained attached to the fuselage with the upper half consumed by fire.

The auxiliary fuel tank separated from the fuselage, and was partially consumed by fire.

Fire consumed the gascolator housing; the gascolator cup and screen were recovered, and both were charred.

The fuel valve was in the "ON" position. Fire partially consumed the manual and auxiliary fuel pumps.

Engine

A borescope inspection revealed no mechanical deformation to the valves, cylinder walls, or internal cylinder head.

Investigators manually rotated the crankshaft with the cooling fan, and obtained thumb compression on all cylinders in firing order.

Investigators identified no mechanical anomalies with the airframe or engine during the wreckage examination.

Additional Information

Fuel Tanks

Robinson Helicopters are equipped with either one or two metal all-aluminum main and auxiliary fuel

tanks, which are installed above the engine firewall and on each side of the main rotor gearbox. In numerous instances, the fuel tanks have been breached during accidents, leaked fuel, and a post-crash fire occurred. In a number of cases, occupants have survived the initial accident, only to sustain serious or fatal injuries in the post-crash fire.

On December 20, 2010, RHC issued R44 Service Bulletin SB-78 recommending the installation of fuel bladders. Robinson R44 SB-67 and SB-68 address other fuel system crashworthiness components (fuel hose supports and flexible fuel lines) designed to minimize the possibility of a post-crash fire in the R44 series. Although not required, the design changes detailed in this service bulletin demonstrated compliance to a portion of the fuel system crashworthiness regulations in Title 14 CFR Part 27.952.

On September 28, 2012, RHC issued revision B to SB78. The revision directed an accelerated compliance date of April 30, 2013.

All R44 helicopters overhauled at the factory as of July 21, 2009, had the bladder kit installed automatically.

All new R44 Raven I models produced beginning with serial number 2066 (manufactured in October 2009) were equipped with the bladder tanks.

All new R44 Raven II models produced beginning with serial number 12891 (manufactured in August 2009) were equipped with the bladder tanks.

Due to several similar low-energy accidents with fatalities resulting from a post-crash fire, the Australian Civil Aviation Safety Authority (CASA) issued airworthiness directive AD/R44/23 on April 29, 2013, requiring installation of the bladders on all R44 helicopters by April 30, 2013.

Administrative Information

Investigator In Charge (IIC):	Plagens, Howard
Additional Participating Persons:	Ron Gonzales; FAA FSDO; Riverside, CA Thom Webster; Robinson Helicopoter Company; Torrance, CA Mark Platt; Lycoming; Williamsport, PA
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