



AVIATION



HIGHWAY



MARINE



RAILROAD



PIPELINE

# Aviation Investigation Final Report

<b>Location:</b>	Detroit, Oregon	<b>Accident Number:</b>	WPR13FA411
<b>Date &amp; Time:</b>	September 16, 2013, 15:35 Local	<b>Registration:</b>	N204UH
<b>Aircraft:</b>	Bell UH 1B	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Part(s) separation from AC	<b>Injuries:</b>	1 Fatal
<b>Flight Conducted Under:</b>	Part 133: Rotorcraft ext. load		

## Analysis

Witnesses reported that, when the helicopter was just above the trees during an external load logging operation, they either observed or heard the load of logs release early and impact the ground hard. Witnesses then observed the helicopter's tailboom separate from the fuselage and descend through the trees. The fuselage impacted the ground inverted, and the tailboom came to rest about 140 ft away. A mechanic reported that the pilot had indicated before the flight that the helicopter felt like it "shuffled" during translational lift; however, the mechanic suspected that the transmission mounts were starting to wear and would need to be changed at a later date.

Postaccident examination of the airframe and engine revealed control continuity throughout the airframe except for a portion of the tail rotor drive shaft that extended from the transmission, which was not found. The tailboom had separated from the aft fuselage at the tailboom attachment points. The lower two tailboom attachment fittings exhibited features consistent with overstress failure and did not show indications of fatigue and/or other failure modes. The upper two tailboom attachment fittings both contained fatigue cracks throughout almost the entire fracture surface.

The pilot purchased the helicopter about 3 years before the accident; that same year, the helicopter was issued a new airworthiness certificate. According to the Federal Aviation Administration, the previous owner had relinquished the helicopter's airworthiness certificate to avoid punitive action for poor maintenance of the helicopter. Maintenance records located within the helicopter did not contain sufficient information to determine when the most recent maintenance was performed; however, the documents did reveal that several component inspections were not completed within the manufacturer's recommended time. It is likely that long-term, inadequate maintenance of the helicopter contributed to the failure and separation of the tailboom.

## Probable Cause and Findings

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

The fatigue failure of the upper two tailboom attachment points, which resulted in the tailboom separating from the fuselage during logging operations. Contributing to the accident was poor maintenance throughout the helicopter's operational life.

**Findings**

<b>Aircraft</b>	Fuselage attach fittings sys - Fatigue/wear/corrosion
<b>Aircraft</b>	Rotorcraft tail boom - Fatigue/wear/corrosion
<b>Aircraft</b>	Rotorcraft tail boom - Not serviced/maintained
<b>Aircraft</b>	(general) - Not serviced/maintained

## Factual Information

### History of Flight

<b>Maneuvering-low-alt flying</b>	Part(s) separation from AC (Defining event)
<b>Maneuvering-low-alt flying</b>	Collision with terr/obj (non-CFIT)

On September 16, 2013, about 1535 Pacific daylight time, a Garlick UH-1B, N204UH, experienced a tailboom separation while logging in heavily wooded terrain about 3 miles east of Detroit, Oregon. The pilot, who was the sole occupant on board, was fatally injured. The helicopter sustained substantial damage to the tailboom, main rotor system, and fuselage. The helicopter was registered to Gitmo Holdings LLC, Stevensville, Montana, and operated by R&R Conner under the provisions of 14 Code of Federal Regulations Part 133 as an external load logging flight. Visual meteorological conditions prevailed for the flight, and no flight plan had been filed. The flight originated at about 1500.

Witnesses reported that when the helicopter was just above the trees, they either observed or heard the load of logs release early and impact the ground hard. After looking up, they observed the helicopter's fuselage separate from the tailboom; both descending through the trees. The fuselage impacted the ground inverted and the tailboom came to rest about 140 feet away.

A maintenance worker reported that shortly before the flight, the pilot had landed and shut down the helicopter for about a 45 minute lunch break. The pilot looked over the helicopter and said he was very happy with it; he said it was running really well.

### Pilot Information

<b>Certificate:</b>	Commercial	<b>Age:</b>	53
<b>Airplane Rating(s):</b>	Single-engine land; Multi-engine land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	Helicopter	<b>Restraint Used:</b>	Unknown
<b>Instrument Rating(s):</b>	Airplane; Helicopter	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 2 With waivers/limitations	<b>Last FAA Medical Exam:</b>	February 12, 2013
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	May 19, 2013
<b>Flight Time:</b>	(Estimated) 19000 hours (Total, all aircraft), 14000 hours (Total, this make and model)		

The pilot, age 53, held a commercial pilot certificate in helicopter, airplane single-, and multi-engine land, issued on April 27, 2010. The pilot also held an instrument rating in both helicopter and airplane. The pilot held a second-class medical certificate issued on February 12, 2013, with the limitations that he is not valid for any class after, and he must wear corrective lenses. According to the pilot's US Forest Service Helicopter Pilot Qualifications and Approval Records dated July 17, 2013, he reported having

19,000 total helicopter hours, 14,000 of which were in the accident helicopter make and model.

### Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Bell	<b>Registration:</b>	N204UH
<b>Model/Series:</b>	UH 1B	<b>Aircraft Category:</b>	Helicopter
<b>Year of Manufacture:</b>	1962	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Restricted (Special)	<b>Serial Number:</b>	62-2034
<b>Landing Gear Type:</b>	N/A; Skid	<b>Seats:</b>	1
<b>Date/Type of Last Inspection:</b>	Unknown	<b>Certified Max Gross Wt.:</b>	
<b>Time Since Last Inspection:</b>		<b>Engines:</b>	1 Turbo shaft
<b>Airframe Total Time:</b>	at time of accident	<b>Engine Manufacturer:</b>	LYCOMING
<b>ELT:</b>	Not installed	<b>Engine Model/Series:</b>	T5313B
<b>Registered Owner:</b>	GITMO HOLDINGS LLC	<b>Rated Power:</b>	1500 Horsepower
<b>Operator:</b>	R&R CONNER	<b>Operating Certificate(s) Held:</b>	Rotorcraft external load (133)

The Garlick helicopter, serial number 62-2034, was manufactured by Bell Helicopter as serial number 554 in 1962. It was powered by a T53-L13BA engine. The maintenance logbook records were found within the helicopter. The records did not contain dates or aircraft total time, therefore, the most recent maintenance was unable to be determined. The documents did reveal that several component inspections were not completed within the manufacturer's recommended time. During the postaccident examination, the hobbs meter was located and read 6,061.3 hours.

According to the Federal Aviation Administration (FAA), the previous owner relinquished the aircraft's airworthiness certificate to avoid punitive action by the FAA, who had been trying to revoke the airworthiness certificate due to the owner's poor maintenance of the aircraft. In 2010, a new airworthiness certificate was issued for the helicopter to the accident pilot.

A different mechanic reported that the helicopter had recently sat unused for about one month between jobs. The helicopter was put back in service the day before the accident occurred. The mechanic mentioned that the pilot had previously indicated the helicopter felt like it "shuffled" during translational lift; however, the mechanic suspected the transmission mounts were starting to wear and would need to be changed at a later date.

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	SLE,214 ft msl	<b>Distance from Accident Site:</b>	38 Nautical Miles
<b>Observation Time:</b>	15:56 Local	<b>Direction from Accident Site:</b>	287°
<b>Lowest Cloud Condition:</b>	4900 ft AGL	<b>Visibility</b>	10 miles
<b>Lowest Ceiling:</b>	Overcast / 5500 ft AGL	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	3 knots /	<b>Turbulence Type Forecast/Actual:</b>	/ None
<b>Wind Direction:</b>	130°	<b>Turbulence Severity Forecast/Actual:</b>	/ N/A
<b>Altimeter Setting:</b>	29.94 inches Hg	<b>Temperature/Dew Point:</b>	21°C / 13°C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	Detroit, OR	<b>Type of Flight Plan Filed:</b>	None
<b>Destination:</b>	Detroit, OR	<b>Type of Clearance:</b>	None
<b>Departure Time:</b>	<b>Type of Airspace:</b>		

The nearest weather reporting station was about 38 miles to the northwest at McNary Field Airport in Salem, Oregon at an elevation of 214 feet. At 1556, the weather was reported as wind from 130 degrees as 3 knots, visibility 10 statute miles, broken clouds at 4,900 and overcast clouds at 5,500 feet above ground level (agl), temperature 21 degrees C, dewpoint 13 degrees C, and an altimeter setting of 29.94 inches of mercury. In the remarks section it stated that rain started at 1537 hours and ended at 1552 hours.

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 Fatal	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>		<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	1 Fatal	<b>Latitude, Longitude:</b>	44.705833,-122.110832(est)

On scene examination by a FAA Inspector revealed that the helicopter came to rest on the opposite side of a northwest/southeast orientated dirt road from the log landing site. The terrain was hilly, heavily wooded, and remote. The trees around the accident site sustained limited damage; one tree was topped and others sustained vertical scrapes down the trunks.

The wreckage debris path extended almost parallel to the dirt road; the helicopter came to rest in four major pieces the fuselage/transmission, engine, main rotor blades, and tailboom. The fuselage and transmission were found upside down at the southeastern most point of the wreckage path. The engine was found in the same general vicinity as the fuselage. The main rotor head and blades were separated

from the main rotor shaft, and were located about 120 feet northwest of the main fuselage. One of the main rotor blades was embedded into the ground and extended the second blade into the air at about a 45 degree angle. The tailboom was separated from the fuselage and was located 140 feet northwest of the main rotor blades. The tail rotor gearbox, assembly, and tail rotor blades were still attached to the vertical fin. One tail rotor blade remained mostly undamaged; the second tail rotor blade sustained a 45 degree bend away from the vertical fin.

## **Medical and Pathological Information**

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An autopsy was performed on the pilot on September 17, 2013 by the Office of the State Medical Examiner, Clackamas, Oregon. The pilot's cause of death was blunt force head trauma.

The FAA Civil Aerospace Medical Institute performed forensic toxicology on specimens from the pilot with negative results for carbon monoxide and ethanol. Rosuvastatin, which is used to treat high cholesterol and related conditions, was detected in the blood and liver.

## **Tests and Research**

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A post accident examination of the airframe and engine occurred in Dallas, Oregon on January 29, 2014.

### **Airframe**

The cabin sustained significant damage. The windscreen, chin bubble, instrument panel, and roof were all found separated from the structure. The aft fuselage was mostly intact with the transmission still attached. The tailboom had separated from the aft fuselage at its attachment points; the skin along the sides of the tailboom had a "wave" like appearance. The tailboom attachment points were removed from the airframe for further examination.

Control continuity was established throughout the airframe with the exception of a segment of the tail rotor drive shaft that extended from the transmission, which was not located.

The main rotor shaft was fracture separated just below the main rotor head. The fracture surface was indicative of overload. At the fracture point, the main rotor shaft was oblong with impact damage on two opposing sides. Damage was also noted on the main rotor blade hub, indicative of a mast bump event.

### **Engine**

The engine was found separated from the helicopter. The exhaust and airframe inlet were removed. Organic debris was noted in the engine inlet, and metal spray was found on the second stage power turbine nozzle vanes. Tear and batter damage was noted to the first stage axial compressor blades and the inlet guide vanes. Rotation of the power turbine produced corresponding rotation to the engine

output shaft and overspeed governor drive gearbox; the engine rotated smoothly. The chip detector was examined and no debris was noted.

## **Additional Information**

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The tailboom attachment points were removed from the airframe and sent to the National Transportation Safety Board Laboratory for further examination.

The material research engineer reported that the fracture surfaces of the top right and left attachment point fittings exhibited relatively flat morphologies, with no indications of local material deformation or out of plane fracture. Conversely, the two bottom fittings exhibited darker and rough tortuous fracture surfaces, consistent with overstress failure.

### **Right Top Fitting**

Both mating surfaces of the right top fitting were examined and crack arrest marks, indicative of progressive crack growth, was evident over almost the entire fracture surface. The direction of these arrest marks indicated the cracks initiated near and emanated from a rivet hole within the fitting. The larger crack grew through almost the entire fitting cross section; the smaller crack progressed toward the opposite direction.

The fitting aft fracture surface was further analyzed and the fracture surface exhibited striations, which are consistent with fatigue failure. The area around the rivet hole possessed two fatigue crack initiate sites. The larger crack initiate site was on the outside surface of the fitting, and the smaller crack initiate site occurred at a corner adjacent to the rivet holes.

### **Left Top Fitting**

The aft fracture surface was relatively flat, orientated approximately perpendicular to the length of the fitting. After cleaning the fracture surface, crack arrest marks were observed over most of the fracture surface. The fracture surface consisted of two progressive cracks that initiated on the concave surface and grew in both directions, with fatigue striations throughout. The cracks grew through approximately 75% of the fitting cross-section, the remaining 15% succumbed to overstress.

### **Bottom Fittings**

The fracture surfaces of the bottom fittings exhibited features consistent with overstress failure. The fracture surfaces displayed a dull luster and tortuous surface appearance. Neither of the bottom fittings exhibited indications of fatigue and/or other failure modes.

## Administrative Information

**Investigator In Charge (IIC):** Link, Samantha

**Additional Participating Persons:** Marty G Conroy; Federal Aviation Administration; Portland, OR  
David Studtmann; Honeywell Aerospace; Phoenix, AZ  
Joan Gregoire; Bell Helicopter; Fort Worth, TX

**Original Publish Date:** May 13, 2015

**Last Revision Date:**

**Investigation Class:** [Class](#)

**Note:**

**Investigation Docket:** <https://data.nts.gov/Docket?ProjectID=88058>

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