National Transportation Safety Board

Washington, DC 20594

Response to Petition for Reconsideration

Date: March 14, 2016

Mr. Kenneth Dale Johnson
PO Box 12648
Jackson, Wyoming 83002

In accordance with 49 *Code of Federal Regulations* (*CFR*) 845.41, the National Transportation Safety Board (NTSB) has reviewed the January 7, 2015, petition for reconsideration and modification of the probable cause for the aircraft accident involving a Bell Helicopter model 407, N407HL, on February 15, 2012, near Moran Junction, Wyoming (WPR12GA106).[1] On the basis of this review, the NTSB hereby denies the petition in its entirety.

On February 15, 2012, about 1301 mountain standard time, a Bell Helicopter model 407, N407HL, was substantially damaged when it impacted trees and terrain in the Bridger Teton National Forest near Moran Junction, Wyoming, during a search and rescue (SAR) mission. The commercial pilot and one SAR crewmember received serious injuries, and the other SAR crewmember died. The public use flight was operated by the Teton County Sheriff's Office. Visual meteorological conditions prevailed, and no Federal Aviation Administration flight plan was filed.

The findings and probable cause of the accident, which were adopted on October 20, 2014, were as follows:

Occurrences

Enroute – Loss of control in flight

Maneuvering – hover – Loss of control in flight

[1] On December 24, 2015, the NTSB published in the *Federal Register* (*FR*) regulatory amendments to 49 *CFR* Part 845 (80 *FR* 80284). The amended final rule became effective on January 25, 2016, and the provision addressing petitions for reconsideration is now located in section 845.32. For the purposes of our review of this petition for reconsideration, we applied the requirements set forth in section 845.41.

Findings

1. Aircraft – Aircraft oper/perf/capability – Performance/control parameters – Yaw control – Not attained/maintained (Cause)
2. Personnel issues – Action/decision – Action – Incorrect action performance – Pilot (Cause)

Probable Cause

The pilot's failure to maintain yaw control while hovering at high density altitude, which resulted in a loss of tail rotor effectiveness [LTE].

The petitioner is the pilot of the accident helicopter. He states that he is "deeply concerned that not all areas of concerns where [*sic*] considered in this investigation." Specifically, the petitioner claims that three potential scenarios could have occurred to explain the loss of control on the day of the accident. First, he questions whether the helicopter experienced "a hard over that could have been caused by air entering the tail rotor hydrolic [*sic*] servo." Second, he questions whether a tail rotor blade had delaminated in flight, leading to the loss of control. He indicates that he examined postaccident photographs of the helicopter and noticed that "one of the tail rotor blades was pretty much undamaged while the other was delaminated with small rippling on the leading edge of the blade."

Third, the petitioner questions whether the "tail rotor limiting system," or the airspeed actuated pedal stop system, had malfunctioned. He indicates that the system could have inadvertently reduced the tail rotor pitch at a hover, "causing the loss of control and inconsistency in the left turn then right spin of the aircraft." The petitioner states that he discussed this issue with an inspector pilot, who told him about several other incidents regarding Bell Helicopter model 407s that experienced "unexplainable loss of control of the tail rotor." According to the petitioner, the tail rotor blade could flex and contact the helicopter's tailboom if the tail rotor pedals were deflected fully at high airspeed, leading to the collapse of the tailboom. He indicates that, to resolve this issue, Bell Helicopter added a "tail rotor limiting system that at approximately 50 knots would take about 40 percent of the authority away and then give that authority back as you decreased airspeed below 50 knots." The petitioner claims that "given this information, its [*sic*] makes a lot of sense to me that if the limiting system had malfunctioned, it surely could have been the cause of my accident."

After review of the original case material and the rationale that the petitioner has provided in his letter, we conclude that the petitioner's three scenarios are not persuasive. Regarding the first scenario that the petitioner offered, the petitioner himself indicates that he "discounted the servo as I am sure I would have noticed a full tail rotor pedal deflection." We concur with the petitioner's assessment of the first scenario. As the petitioner states, he did not notice a full tail rotor pedal deflection, which would have occurred with a hardover. In addition, as noted in the factual report regarding this accident, the tail rotor hydraulic servo was tested after the accident, and no anomalies were noted. Thus, we do not believe that the first scenario that the petitioner presented is a possibility in the accident.

Regarding the second scenario that the petitioner offered, an NTSB investigator reexamined postaccident photographs of the helicopter's tail rotor blades and determined that the damage is more consistent with impact rather than with delamination.[2] On one of the accident helicopter's tail rotor blades, evidence exists of impact to the leading edge and damage to the afterbody located near the leading edge impact damage.[3] The investigation ruled out a tail rotor tree strike, which suggests that the leading edge damage occurred during ground impact. Because the most severe afterbody damage is found immediately aft of the most severe impact damage to the leading edge and spar, the afterbody damage is likely from the same ground impact damage. Additionally, if delamination of the blade developed to become severe enough to cause a loss of directional control, the flight crew would likely feel an abnormal vibration before the right yaw. In the petitioner's postaccident statements to investigators, he did not report the presence of abnormal vibrations at any time during the accident flight. Further, on the second tail rotor blade, damage to the blade afterbody is observed near the tip. A photograph of the helicopter at the accident site shows this blade adjacent to a tailboom cowling and broken branches caused by the helicopter's descent into trees. These damage signatures suggest that the damage observed on the tail rotor blade afterbody was likely caused by ground impact. Thus, we do not concur with the second scenario that the petitioner presented.

Regarding the third scenario that the petitioner presented, the airspeed actuated pedal stop system on the Bell Helicopter 407 will physically limit left pedal travel when the pedal restrictor control unit (PRCU) determines airspeed is greater than 55 +/- 5 kts indicated airspeed (KIAS). When the airspeed falls below 50 +/- 5 KIAS, the PRCU will retract the left pedal stop. According to Bell Helicopter, pushing through an engaged left pedal stop is possible, although it would be very difficult. When the PRCU is engaged, a green "engage" message will illuminate on the pedal stop switch. If the PRCU detects a malfunction of the system, an amber "pedal stop" light illuminates on the caution/warning panel. The pilot can pull a mechanical release cable to manually disengage an engaged left pedal stop. The mechanical release is a red knob underneath the collective control stick; the pilot has to let go of the collective with the left hand to reach down to pull the mechanical release cable.

In the petitioner's postaccident statements to investigators, he did not indicate that he noticed caution lights or any reduction in left pedal travel during the accident sequence.[4] The petitioner did not provide any new evidence in his petition that he noticed such warnings, which would have indicated that the airspeed actuated pedal stop system was engaged. Further, we note that the helicopter's airspeed during the accident sequence was likely under 50 KIAS because the pilot recalled that the abnormal yaws began shortly after the helicopter was hovering; thus, the airspeed actuated pedal stop system likely would not have been engaged.

We note that LTE is a tail rotor performance margin issue. While the Bell Helicopter model 407 has a tail rotor system that is improved from some Bell Helicopter model 206s, LTE is still possible in the Bell Helicopter model 407. The required tail rotor thrust at a given time can vary depending on performance factors such as high gross weight, low airspeed, unfavorable

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[2] The postaccident photographs of the helicopter's tail rotor blades are located in the Airframe and Engine Examination Report, which is in the public docket for this accident (NTSB case number WPR12GA106) at www.ntsb.gov.

[3] The blade afterbody is the structure aft of the blade spar.

[4] The petitioner's postaccident statements to investigators are in the public docket for this accident (NTSB case number WPR12GA106) at www.ntsb.gov.

winds (both direction and magnitude), and available power to the rotors. The NTSB was unable to conduct a performance study for this accident because of the lack of adequate weather data for the area and no recorded performance data for the helicopter at the time of the accident. Without a performance study for this accident, no data exists regarding how close the tail rotor was to its performance margin given the estimated conditions before the spin and whether an airspeed actuated pedal stop system malfunction would have even had an impact on the accident sequence; for instance, if more left pedal is required than available with full left pedal travel, it does not matter if the airspeed actuated pedal stop system malfunctioned because the helicopter still would have spun right.

In addition, while the accident report notes approximate wind at 4 kts about the time of the accident, the pilot noted in his February 17, 2012, statement to investigators that he felt that the "initial yaw was a result of a tailwind." This accident occurred in a mountainous area, which typically has an increased risk of shifting and unpredictable winds. The uncommanded left yaw that the pilot encountered before the right spin could have been a sign of unpredictable, shifting winds. Thus, without evidence of preimpact delamination or a malfunctioning tail rotor hydraulic servo or airspeed actuated pedal stop system, we continue to believe that LTE is the most likely scenario in this accident.

After review of the evidence, the petition for reconsideration and modification of the NTSB's probable cause in connection with the aircraft accident involving a Bell Helicopter model 407, N407HL, on February 15, 2012, near Moran Junction, Wyoming (WPR12GA106), is denied.

Chairman HART, Vice Chairman DINH-ZARR, and Members SUMWALT and WEENER concurred in the disposition of this petition for reconsideration.

Enclosures:

1. Factual Report
2. Brief of Accident

National Transportation Safety Board FACTUAL REPORT AVIATION	NTSB ID: WPR12GA106	Aircraft Registration Number: N407HL
	Occurrence Date: 02/15/2012	Most Critical Injury: Fatal
	Occurrence Type: Accident	Investigated By: NTSB

Location/Time

Nearest City/Place	State	Zip Code	Local Time	Time Zone	
Moran Junction	WY	83013	1301	MST	

Airport Proximity: Off Airport/Airstrip	Distance From Landing Facility:

Aircraft Information Summary

Aircraft Manufacturer	Model/Series	Type of Aircraft
BELL	407	Helicopter

Revenue Sightseeing Flight: No Air Medical Transport Flight: No

Narrative

Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:

*** Note: : NTSB investigators either traveled in support of this investigation or conducted a significant amount of investigative work without any travel, and used data obtained from various sources to prepare this public aircraft accident report. ***

HISTORY OF FLIGHT

On February 15, 2012, about 1301 mountain standard time, a Bell Helicopter model 407, N407HL, was substantially damaged when it impacted trees and terrain in the Bridger Teton National Forest near Moran Junction, Wyoming, during a search and rescue (SAR) mission. The commercial pilot and one SAR crewmember received serious injuries, and the other SAR crewmember received fatal injuries. The public-use flight was operated by the Teton County Sheriff's Office (TCSO). Visual meteorological conditions prevailed, and no Federal Aviation Administration (FAA) flight plan was filed for the flight.

The mission was in response to a reported snowmobile injury accident, in order to transport medical personnel to that scene. Initial attempts to locate that victim, based on trail network and geographic coordinate information, were unsuccessful. The helicopter began a search, and the crew observed two snowmobilers signaling to them in a meadow. The helicopter landed in the meadow, and a SAR member exited and spoke with the snowmobilers. They were from the victim's party, and they agreed to lead the helicopter on their snowmobiles to the accident site. The SAR member re-boarded the helicopter, the helicopter lifted off to follow the snowmobilers, flying about 100 to 200 feet above the trees. Since the helicopter was faster than the snowmobiles, the pilot stopped two or three times in a hover to allow the snowmobiles to catch up. On either the second or third hover, the pilot experienced a slight left yaw, which he believed he corrected. The helicopter then started "spinning rapidly" and descended into the trees. The pilot and the surviving SAR member both believed that the spin direction was nose left, but they were not certain.

The SAR member in the rear seat remained conscious throughout the event, and extricated himself, despite an injured leg. He assisted the other SAR member and the pilot out of the helicopter after they became verbally responsive. The pilot carried a radio to the top of a nearby ridge and requested assistance. Reports varied as to when the first ground personnel who were originally responding to the snowmobile accident arrived at the helicopter, but the first TCSO personnel reached the helicopter about 1622.

PERSONNEL INFORMATION

Federal Aviation Administration (FAA) information indicated that the pilot held multiple certificates and ratings, including a commercial pilot certificate with a rotorcraft-helicopter rating. The pilot reported a total flight experience of about 22,250 hours, including about 4,500 hours in the accident helicopter make and model. His most recent FAA second-class medical certificate was issued in May 2011.

National Transportation Safety Board
FACTUAL REPORT
AVIATION

NTSB ID: WPR12GA106
Occurrence Date: 02/15/2012
Occurrence Type: Accident

Narrative (Continued)

He was the chief pilot for Hillsboro Aviation, Hillsboro, Oregon.

AIRCRAFT INFORMATION

According to FAA information, the helicopter was manufactured in 2008 and was equipped with a Rolls Royce 250-C47 series turboshaft engine. The helicopter was registered to Hillsboro Aviation, leased to TCSO, and operated by Hillsboro flight personnel.

At the time of the accident, the helicopter had accumulated a total time in service of 828.6 hours. The operator cited the maximum allowable gross weight of the helicopter as 5,250 pounds, which agreed with the FAA type certificate value when the helicopter was equipped with kit 407-706-020.

METEOROLOGICAL INFORMATION

The 1251 automated weather observation for the departure location, Jackson Hole Airport (JAC), Jackson, Wyoming, located about 25 miles southwest of the accident site, included winds from 090 degrees at 4 knots, visibility 10 miles, few clouds at 4,500 feet, temperature -6 degrees C, dew point -9 degrees C, and an altimeter setting of 29.96 inches of mercury.

Additional relevant meteorological information obtained from a variety of sources, indicated that the entire region, including the accident locale, was dominated by a high pressure region. This resulted in visual meteorological conditions (VMC) conditions, with no or high ceilings, and generally easterly winds of 10 knots or less. The density altitude was calculated to be between 8,500 and 9,300 feet.

WRECKAGE AND IMPACT INFORMATION

Site Information

The accident site was in a partially forested area, with coordinates of 43.726 degrees N, 110.217 degrees W. Site elevation was approximately 9,550 feet above mean sea level (msl). The ground in the immediate vicinity of the wreckage was relatively flat but sloped, the terrain in the general locale of the accident site was uneven, and the overall region was mountainous wilderness. The entire region was snow-covered, and the ground in the immediate vicinity of the wreckage was under deep snow.

Wreckage Overview

The helicopter came to rest on its right side in a stand of evergreen trees approximately 80 -100 feet high. One of those trees bore a diagonal cut, which separated its top, about 50 feet above the ground. The tree had a diameter of approximately 1 foot at that location.

Review of on-scene photographs revealed the following information. The fuselage (cockpit and cabin) was essentially intact, with minimal intrusions into, or compromises of, the occupiable volume. All cabin doors remained attached and operable, but damaged. Of the ten cabin transparencies, only the one for the aft left door was intact.

All four main rotor blades (MRB) were fracture-separated from the rotor mast/hub. The tail boom was fracture-separated into several sections, but damage precluded determination of the spin direction. The empennage, which consisted of the aft vertical fin, tail rotor gearbox, and tail rotor, was fracture-separated from the tail boom. The two tail rotor blades remained attached to the tail rotor hub, which remained attached to the gearbox. The engine remained intact and attached to the airframe. There was no fire.

Wreckage Examination

The wreckage was recovered from the accident site by helicopter on February 24, 2012. Some minor sectioning and/or disassembly of the wreckage was necessary for recovery purposes. The wreckage was examined by investigators and manufacturers' representatives about 1 week after that.

Narrative (Continued)

Several components or component elements were determined not to have been recovered with the wreckage. These included most afterbody portions of the MRBs, a short tip section of one MRB, and an approximate 30-inch segment of the tail boom (just forward of the tail rotor assembly).

Inspection of the engine exterior did not reveal any obvious signs of damage from impact forces or internal engine failure. The engine mounting structure was intact and properly secured, and no evidence of oil or fuel leaks was observed in the engine bay or surrounding area. The N1 and N2 rotor systems rotated smoothly and quietly by hand, and N1 and N2 gear train continuity was confirmed. There was no impact damage, metal splatter or evidence of rubbing around the power turbine air shrouds. Inspection of the inlet plenum chamber did not reveal any evidence of foreign material or missing hardware. Inspection of the compressor inlet revealed no visible damage or signs of foreign object ingestion. Drive continuity from the engine to the main rotor and tail rotor drive was verified.

The Engine Control Unit (ECU) was visually undamaged. Extraction of the ECU Incident Recorder (IR) data revealed a total of 15 data-points, recorded at 1.2 second intervals. In addition to IR data, eight additional "Snapshot" data lines were recorded in a separate file. Snapshot data is recorded immediately following an engine exceedance. All snapshot data lines were recorded within the final 3 seconds of the accident flight. Examination of ECU IR data recorded during the accident sequence revealed the engine responding normally to control inputs.

Physical examination of the available wreckage did not reveal evidence of any pre-impact deficiencies or failures that would have prevented normal operation and continued flight.

ADDITIONAL INFORMATION

GPS and Flight Information

Two handheld/portable GPS devices were onboard and operational for the entire flight, including the accident. Both were Garmin devices; one was a GPSMap296, and the other was an Aera 500. Both devices were sent to the NTSB Recorders laboratory for data download. Data from the accident flight was successfully recovered from both devices, and the flight tracks from the two devices were congruent.

The departure from Jackson, Wyoming, occurred about 1225. The en route portion of the flight to the search area ended about 1241. The en route groundspeed was about 115 knots, with altitudes ranging from about 8,976 feet MSL to 9,823 feet MSL. Upon entering the search area, the helicopter proceeded southeasterly for about 2 minutes. It then tracked southwesterly, made a 360-degree turn and then proceeded north-northwest until about 1249.

Based on crewmember testimony and geographic information, the northwest-most excursion corresponded to the point in the flight where the crew hovered to read a trail sign in order to obtain orientation/location information. After reading the trail sign, they then headed southeast again. That southeast leg extended about 2.2 miles farther southeast than the prior legs.

About 1254, the helicopter landed and a crewmember exited to speak with uninjured snowmobilers associated with the individual to be rescued. During that ground discussion it was agreed that the snowmobilers would lead the helicopter to the snowmobile victim.

The last segment of the flight, including the accident, occurred between 1300:24 and 1301:53. The groundspeed decreased from about 25 knots to less than 15 knots while at an altitude of about 9,680 feet MSL. The helicopter impacted trees and the ground about 1301:53.

Damaged Tree

The possibility that the TR struck a small tree during the crew's hovering maneuver to read the trail sign was prompted by the finding of a small tree near that sign whose top was observed to be damaged.

Narrative (Continued)

GPS track data confirmed that the helicopter had transited and loitered near the tree and trail sign. The GPS data did not indicate that the helicopter hovered in the immediate vicinity of the tree. The tree was a few hundred feet away from the sign, and the sign was oriented so that when reading the sign, the sign would be positioned between the reader and the tree. The upper 3-4 feet of the tree was sectioned from the tree by recovery personnel and returned with the helicopter wreckage, and was examined concurrent with the helicopter examination. The broken branch was about 3/4 inch in diameter, and the branch material was soft and flexible. No other branches from the recovered sample were observed to be broken or missing. The aggregate evidence was consistent with the branch not being struck or broken by the helicopter or the TR.

Commercial Tracking Services Company

Guardian Mobility was a private company based in Canada, which provided a variety of aviation services. At the time of the accident, the TCSO and the accident helicopter were equipped for and utilizing the company's "Automatic Flight Following" (AFF) tracking service.

Use of AFF services requires that the aircraft be physically equipped with a GPS-based tracking device, and that the aircraft operator have an active contract with company for the AFF services. Conceptually, the tracking device uploads the current aircraft position, altitude and average speed via satellite every 2 minutes, that information is processed by company software, and then operators can access and monitor that company-provided real-time tracking information via the internet.

According to a TCSO dispatch supervisor, they used the AFF system as a tool to track their aviation resources. Access to the system is installed on a server within the TCSO and available to all dispatchers in the TCSO Communications Center. The tracking system itself is passive with regard to incident or accident notification. The TCSO personnel first have to access and/or log onto the system on their computers, and then they must actively monitor the system display, which depicts certain aircraft parameters.

According to the manager of the Teton Interagency Dispatch Center, AFF does not provide alerts to dispatchers. Aircraft are depicted on the screen in blue if they are active, and in red if they have lost communication. Communication loss could be due to several factors, including operation in a location with poor or no satellite communication, or an incident/accident. The flight follower/dispatcher would not receive an alert, they would have to notice that the aircraft symbol on the screen turned red. Both of the TSCO dispatchers who were monitoring the flight reported that the AFF system did not change the color of the helicopter screen symbol until well after they knew about the accident, despite their repeated queries of the system; the AFF system was not instrumental in alerting the dispatchers to the loss of the helicopter. Subsequent to the accident, for unspecified reasons, the AFF system was upgraded to a newer version with improved functionality.

Directional Control Actuator (DCA) Test and Examination

The Directional Control Actuator (DCA), which was the hydro-mechanical unit used to control the TR, was removed and sent to Bell Helicopter for testing and examination. The DCA passed the functional checks and no evidence of any anomalies which would have prevented normal operation was detected.

Hover Performance Information

An Allowable Payload chart was found in the helicopter, in a binder identified as a Teton County SAR (TCSAR) medical protocols document. According to TCSAR personnel the chart was developed by the pilot, and was never used by the TCSAR personnel. TCSAR was uncertain as to why the chart was in that binder.

The chart contained two tables, one for "HIGE" (hover in ground effect), and one for "HOGE" (hover out of ground effect). The tables presented the maximum allowable payload (in pounds) as a function of pressure altitude (PA) and ambient temperature. Comparison of the chart with helicopter manufacturer's performance data validated the accuracy of the chart.

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	Occurrence Date: 02/15/2012	
	Occurrence Type: Accident	

Narrative (Continued)

Calculations using the available information indicated that the departure weight was approximately 4,165 to 4,300 lbs, and the weight at the time of the accident was between 3,965 and 4,100 lbs.

Comparison of known meteorological conditions and the estimated flight weight with the chart performance data indicated that the helicopter was within its hover performance envelope at the time of the accident.

Loss of Tail Rotor Effectiveness (LTE)

FAA Advisory Circular (AC) 90-95, Unanticipated Right Yaw In Helicopters, addressed the topic of loss of tail rotor effectiveness (LTE). The AC stated that LTE has been determined to be a contributing factor in a number of helicopter accidents.

The AC continued with the following text:

LTE is a critical, low-speed aerodynamic flight characteristic which can result in an uncommanded rapid yaw rate which does not subside of its own accord and, if not corrected, can result in the loss of aircraft control. LTE is not related to a maintenance malfunction and may occur in single-main-rotor helicopters at airspeeds less than 30 knots. LTE is not necessarily the result of a control margin deficiency.

Flight operations at low altitude and low airspeed in which the pilot is distracted from the dynamic conditions affecting control of the helicopter are particularly susceptible to the LTE phenomena.

On U.S. manufactured single rotor helicopters [such as the accident helicopter], the main rotor rotates counterclockwise as viewed from above. The torque produced by the main rotor causes the fuselage of the aircraft to rotate in the opposite direction (nose right). The anti-torque system provides thrust which counteracts this torque and provides directional control while hovering

Any maneuver which requires the pilot to operate in a high-power, low-airspeed environment with a left crosswind or tailwind creates an environment where unanticipated right yaw may occur. There is greater susceptibility for LTE in right turns. This is especially true during flight at low airspeed since the pilot may not be able to stop rotation. The helicopter will attempt to yaw to the right. Correct and timely pilot response to an uncommanded right yaw is critical. The yaw is usually correctable if additional left pedal is applied immediately. If the response is incorrect or slow, the yaw rate may rapidly increase to a point where recovery is not possible

The AC also noted that certain factors affect susceptibility to LTE. Relevant to this accident are gross weight, density altitude, and low airspeed. An increase in weight or density altitude will decrease the power margin between the maximum power available and the power required to hover. The pilot should conduct low-level, low-airspeed maneuvers with minimum weight. At airspeeds below translational lift, the tail rotor is required to produce nearly 100 percent of the directional control. If the required amount of tail rotor thrust is not available for any reason, the aircraft will yaw to the right.
Updated on Oct 20 2014 11:24AM

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB ID: WPR12GA106

Occurrence Date: 02/15/2012

Occurrence Type: Accident

Landing Facility/Approach Information

Airport Name	Airport ID:	Airport Elevation	Runway Used	Runway Length	Runway Width
N/A		Ft. MSL	N/A		

Runway Surface Type:

Runway Surface Condition:

Approach/Arrival Flown: NONE

VFR Approach/Landing: None

Aircraft Information

Aircraft Manufacturer	Model/Series	Serial Number
BELL	407	53869

Airworthiness Certificate(s): Normal

Landing Gear Type: Skid

Amateur Built Acft?	Number of Seats:	Certified Max Gross Wt.	Number of Engines:
No	7	5250 LBS	1

Engine Type:	Engine Manufacturer:	Model/Series:	Rated Power:
Turbo Shaft	Rolls-Royce	250-C47	650 HP

- Aircraft Inspection Information

Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Airframe Total Time
AAIP	12/2011	28 Hours	829 Hours

- Emergency Locator Transmitter (ELT) Information

ELT Installed?/Type	ELT Operated?	ELT Aided in Locating Accident Site?
Yes / C126		

Owner/Operator Information

Registered Aircraft Owner	Street Address		
Hillsboro Aviation	City: Hillsboro Oregon	State: OR	Zip Code: 97124

Operator of Aircraft	Street Address		
Teton County Sheriffs Office	City: Jackson	State: WY	Zip Code:

Operator Does Business As:

Operator Designator Code:

- Type of U.S. Certificate(s) Held: None

Air Carrier Operating Certificate(s):

Operating Certificate:

Operator Certificate:

Regulation Flight Conducted Under: Public Use

Type of Flight Operation Conducted: Public Aircraft - Local

National Transportation Safety Board

FACTUAL REPORT
AVIATION

NTSB ID: WPR12GA106

Occurrence Date: 02/15/2012

Occurrence Type: Accident

First Pilot Information

Name	City	State	Date of Birth	Age
On File	On File	On File	On File	62

Sex: | Seat Occupied: Right | Occupational Pilot? Yes | Certificate Number: On File

Certificate(s): Commercial; Private

Airplane Rating(s): Single-engine Land

Rotorcraft/Glider/LTA: Helicopter

Instrument Rating(s): Helicopter

Instructor Rating(s): None

Current Biennial Flight Review?

Medical Cert.: Class 2 | Medical Cert. Status: With Waivers/Limitations | Date of Last Medical Exam: 05/2011

- Flight Time Matrix	All A/C	This Make and Model	Airplane Single Engine	Airplane Mult-Engine	Night	Instrument Actual	Instrument Simulated	Rotorcraft	Glider	Lighter Than Air
Total Time	22500	4500								
Pilot In Command(PIC)										
Instructor										
Instruction Received										
Last 90 Days	35	35								
Last 30 Days										
Last 24 Hours										

Seatbelt Used? Yes | Shoulder Harness Used? | Toxicology Performed? Yes | Second Pilot? No

Flight Plan/Itinerary

Type of Flight Plan Filed: Unknown

Departure Point	State	Airport Identifier	Departure Time	Time Zone
Jackson	WY		1225	MST

Destination	State	Airport Identifier
Local Flight	WY	

Type of Clearance: None

Type of Airspace:

Weather Information

Pilot's Source of Wx Information:

Unknown

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB ID: WPR12GA106

Occurrence Date: 02/15/2012

Occurrence Type: Accident

Weather Information

WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
JAC	1251	MDT	7000 Ft. MSL	25 NM	45 Deg. Mag.

Sky/Lowest Cloud Condition: Few 4500 Ft. AGL

Condition of Light: Day

Lowest Ceiling: None Ft. AGL

Visibility: 10 SM

Altimeter: 29.96 "Hg

Temperature: -6 °C

Dew Point: -9 °C

Weather Conditions at Accident Site: Visual Conditions

Wind Direction: 90

Wind Speed: 4

Wind Gusts:

Visibility (RVR): Ft.

Visibility (RVV) SM

Precip and/or Obscuration:

No Obscuration; No Precipitation

Accident Information

Aircraft Damage: Substantial

Aircraft Fire: None

Aircraft Explosion None

- Injury Summary Matrix	Fatal	Serious	Minor	None	TOTAL
First Pilot		1			1
Second Pilot					
Student Pilot					
Flight Instructor					
Check Pilot					
Flight Engineer					
Cabin Attendants					
Other Crew					
Passengers	1	1			2
- TOTAL ABOARD -	1	2			3
Other Ground					
- GRAND TOTAL -	1	2			3

National Transportation Safety Board FACTUAL REPORT AVIATION	NTSB ID: WPR12GA106	
	Occurrence Date: 02/15/2012	
	Occurrence Type: Accident	

Administrative Information

Investigator-In-Charge (IIC)

Michael C. Huhn

Additional Persons Participating in This Accident/Incident Investigation:

Tom Weisner
FAA FSDO
Denver, CO

Jon Michael
Rolls Royce
Indianapolis, IN

Bill Sarles
Bell Helicopter
Ft Worth, TX

National Transportation Safety Board
Washington, DC 20594

Brief of Accident

Adopted 11/20/2014

WPR12GA106
File No. 33260 | 02/15/2012 | Moran Junction ,WY | Aircraft Reg No. N407HL | Time (Local): 13:01 MST

Make/Model:	Bell/407
Engine Make/Model:	Rolls-Royce / 250-C47
Aircraft Damage:	Substantial
Number of Engines:	1
Operating Certificate(s):	None
Type of Flight Operation:	Public Aircraft - Local
Reg. Flight Conducted Under:	Public Use

	Fatal	Serious	Minor/None
Crew	0	1	0
Pass	1	1	0

Last Depart. Point:	Jackson, WY
Destination:	Local Flight, WY
Airport Proximity:	Off Airport/Airstrip

Condition of Light:	Day
Weather Info Src:	Weather Observation Facility
Basic Weather:	Visual Conditions
Lowest Ceiling:	None
Visibility:	10.00 SM
Wind Dir/Speed:	090 / 004 kts
Temperature (°C):	-6
Precip/Obscuration:	No Obscuration; No Precipitation

Pilot-in-Command Age: 62

Certificate(s)/Rating(s)
Commercial; Private; Single-engine Land; Helicopter

Instrument Ratings
Helicopter

Flight Time (Hours)

Total All Aircraft:	22500
Last 90 Days:	35
Total Make/Model:	4500
Total Instrument Time:	UnK/Nr

*** Note: : NTSB investigators either traveled in support of this investigation or conducted a significant amount of investigative work without any travel, and used data obtained from various sources to prepare this public aircraft accident report. ***

WPR12GA106
File No. 33260 | 02/15/2012 | Moran Junction ,WY | Aircraft Reg No. N407HL | Time (Local): 13:01 MST

The single-main-rotor helicopter was dispatched on a search and rescue (SAR) mission in response to a snowmobile accident in remote, mountainous terrain. The helicopter was on lease to the local sheriff's office, and was being flown by the chief pilot of the company that owned it. Two SAR personnel were passengers. After an initial but fruitless search to locate the snowmobile victim, the helicopter located members of the snowmobile party. After a landing and brief discussion with the snowmobilers, they agreed to lead the helicopter to the accident site on their snowmobiles. The helicopter lifted off to follow the snowmobilers, flying about 100 to 200 feet above the trees. Because the helicopter was faster than the snowmobiles, the pilot stopped several times in a hover to allow the snowmobiles to catch up. During one hover, the pilot experienced a slight left yaw, which he believed he corrected. The helicopter then began to spin rapidly and descended into the trees. The sheriff's office dispatchers used a commercial flight following system to track the helicopter, but system difficulties prevented them from detecting the accident via that system. The injured pilot climbed a nearby hill, and notified the dispatchers of the accident via radio. The recovered wreckage was examined, and no evidence of any preimpact deficiencies or failures that would have prevented normal operation and continued flight was discovered. Data recovered from the engine control unit indicated that the engine operated normally until the accident, when parameter exceedances and torque spikes, consistent with main rotor blade strikes, were recorded. The directional control actuator (DCA), which was the hydro-mechanical unit used to control the tail rotor, was removed and sent to the helicopter manufacturer for testing and examination. The DCA passed the functional checks, and no evidence of any anomalies that would have prevented normal operation was detected. A damaged tree near a trail sign in the search area suggested the possibility that the tail rotor might have struck the tree and been damaged just before the accident. However, examination of the damage to the tree and the tail rotor did not support that hypothesis. Single-main-rotor helicopters are susceptible to a phenomenon known as "loss of tail rotor effectiveness" (LTE), which can occur at low airspeeds, and is a function of relative wind direction. The loss of control occurred in a hover, but the relative wind direction could not be determined. LTE is more likely at high density altitude and/or gross weight. The accident occurred at a density altitude of about 9,000 feet, and at a weight about 800 pounds below the maximum certificated operating weight. In the accident helicopter, LTE would result in a nose-right spin direction. Both the pilot and surviving passenger recalled that the spin direction was nose left, which is contrary to LTE. However, neither was certain of the spin direction, and a ground witness reported that the spin direction was nose right, consistent with LTE. Examination of the wreckage did not provide conclusive evidence as to the direction of the spin, but did indicate that both the main and tail rotor were rotating under power at the time of impact. Based on the witness observation and the uncertainty of the helicopter occupants about the direction of spin, the high density altitude, and the lack of indications of a tail rotor mechanical failure, it is likely that the loss of control was due to LTE.

Updated at Oct 20 2014 11:24AM

WPR12GA106
File No. 33260 | 02/15/2012 | Moran Junction ,WY | Aircraft Reg No. N407HL | Time (Local): 13:01 MST

OCCURRENCES

Enroute - Loss of control in flight
Maneuvering-hover - Loss of control in flight

FINDINGS

Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Yaw control-Not attained/maintained - C
Personnel issues-Action/decision-Action-Incorrect action performance-Pilot - C

Findings Legend: (C) = Cause, (F) = Factor

The National Transportation Safety Board determines the probable cause(s) of this accident as follows:
The pilot's failure to maintain yaw control while hovering at high density altitude, which resulted in a loss of tail rotor effectiveness.