
		NTSB ID: DEN05TA113		Aircraft Registration Number: N530TJ	
		Occurrence Date: 07/19/2005		Most Critical Injury: Minor	
		Occurrence Type: Accident		Investigated By: NTSB	
Location/Time					
Nearest City/Place Loveland	State CO	Zip Code 80538	Local Time 1515	Time Zone MDT	
Airport Proximity: Off Airport/Airstrip		Distance From Landing Facility:			
Aircraft Information Summary					
Aircraft Manufacturer Hughes		Model/Series 369FF		Type of Aircraft Helicopter	
Revenue Sightseeing Flight: No			Air Medical Transport Flight: No		
Narrative					
<p>Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:</p> <p>*** Note: NTSB investigators may not have traveled in support of this investigation and used data provided by various sources to prepare this public aircraft accident report. ***</p> <p>On July 19, 2005, approximately 1515 mountain daylight time, a Hughes 369FF single-engine helicopter, N530TJ, was destroyed when it impacted trees and terrain following a loss of control while hovering approximately 20 miles west of Loveland, Colorado. The commercial pilot, who was the sole occupant, sustained minor injuries. The helicopter was operated by the United States Department of Agriculture (USDA) Forest Service Rocky Mountain Region (Region 2) for public use firefighting missions, and registered to Utility Aviation Inc., Fort Collins, Colorado. Visual meteorological conditions prevailed, and a flight plan was not filed. The flight originated from a staging area west of Loveland at 1504.</p> <p>According to the pilot's statement, the helicopter was being used to support firefighting operations in the area and was attempting to deliver supplies via external load. The helicopter was equipped with a 100-foot long line and a 20-foot choker, the external load weighed 615 pounds, and the helicopter weighed a total of 3,000 pounds.</p> <p>Prior to the approach, the pilot over flew the intended landing location and was informed that the winds were from the west approximately 7 knots. The pilot performed a hover check approximately 1/2 mile east of the intended landing zone (LZ) over a valley. The pilot moved the helicopter west to the LZ at a speed just above effective translational lift and came to a hover with the load approximately 30-40 feet over the landing spot. The pilot checked the engine and operating instruments and all systems indicated normal. "No unusual noises or vibrations."</p> <p>The pilot began looking down and outside the helicopter when he felt a yaw to the right. The pilot noticed that he was "depressing the left [pedal] more as I pushed on the left to stop a right turn." The helicopter then made an "uncommanded turn to the right and began spinning right." The helicopter made two to three rotations to the right; the pilot jettisoned the cargo portion of the long line and lowered the collective. "As the aircraft stabilized in a glide, [pilot] attempted to regain control of the descent by adding power/pitch to the main rotor. When [pilot] did this, the aircraft immediately started spinning again, two quick rotations." The pilot lowered the collective and began a glide into the trees. Subsequently, the helicopter impacted trees and terrain and came to rest on its left side. The accident site was located at an elevation of 7,700 feet on a 10-20 degree slope.</p> <p>According to a witness, who was assisting near the LZ, the surface winds were light at the time; however, it had been a "pretty windy day." As the helicopter approached the LZ, "everything was normal when he did a 180-degree turn. The load was fairly stable below him and the ship did a quick 180. Paused briefly, did another (180), completed to the 360, and then kept slowly spinning...The flight pattern started getting a little more erratic, as far as the load of his, the sling was kind of penduluming...swinging." The witness then observed the helicopter release the external load. The witness lost sight of the helicopter behind a tree and heard the impact.</p>					
FACTUAL REPORT - AVIATION					
					Page 1

 <p>National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION</p>	NTSB ID: DEN05TA113
	Occurrence Date: 07/19/2005
	Occurrence Type: Accident

## Narrative (Continued)

The witness responded to the accident site and the engine was still running. Shortly after that, "the engine cut."

According to the United States Forest Service (USFS), at the time of the accident, the temperature was 32 degrees Celsius and a calculated density altitude of 11,465 feet.

During a telephone interview conducted by the NTSB IIC, the pilot reported he had accumulated 1,600 total rotorcraft hours, and 65 hours in the accident helicopter. The pilot had accumulated approximately 150 total hours in external load operations, with approximately 8 total hours in the accident helicopter. In addition, the pilot had approximately 10 years experience in single-engine air tankers.

The helicopter was examined at the accident site by the Federal Aviation Administration and the USFS. The helicopter was recovered and transported to a facility in Greeley, Colorado, for further examination.

On August 16, 2005, the NTSB investigator-in-charge, a representative of Boeing, and a representative of the USFS examined the helicopter. Examination of the airframe revealed the fuselage was crushed and deformed. The tail boom was fractured into several fragments. Damage to the tail boom was consistent with impact forces and main rotor blade strikes. The main rotor hub assembly and components were destroyed and consistent with sudden stoppage. All five main rotor blades were separated from the rotor head and exhibited fractured and bent spars, skin delamination, cuts and gouges.

The main transmission rotated when the main rotor system was turned by hand. Continuity was established to the tail rotor output pinion and the engine input quill when the transmission was rotated. The tail rotor drive shaft was fractured into multiple segments which corresponded to the fractures in the tail boom structure. The tail rotor gearbox was fractured across the case elbow. The tail rotor gearbox output quill rotated when turned by hand. One tail rotor blade was fractured into three sections with one fracture at the pitch change arm, one at the root fitting, and one approximately 10 inches from the blade end. The other tail rotor blade was fractured at a point just past the blade doubler.

The longitudinal and lateral cyclic flight controls and collective flight controls exhibited continuity from the controls to the upper flight controls. The upper flight controls were damaged; however, movement of the controls operated the flight control links. Anti-torque flight control continuity was established from the foot pedals to the separated control rod located at the aft fuselage station 100. The tail rotor control rods and bell cranks were bent and fractured in numerous locations.

Examination of the engine revealed damage consistent with the impact to the exhaust and combustion sections. Continuity was established to N1 and N2 control linkage from the throttle and collective to the fuel control and power governor. No anomalies that would have precluded operation were noted with the airframe systems and engine.

A review of the external load manifest for the accident flight revealed the load consisted of long line, swivel, lead line, net, remote hook, 14 bladder bags of water, and hose. The USFS "manifest preparer" calculated the load to be 632 pounds (lbs). After the accident, a review of the actual weights and equipment on the external load revealed the USFS manifest preparer miscalculated the load. The total for the external load at the time of the accident was 732 lbs. The pilot was not aware of the miscalculation at the time of the accident.

Prior to any external load flight, the pilot was responsible to complete a USFS FS-5700-17, Interagency Load Calculation, form. On July 18, 2005, the pilot completed the form based on the following: departure pressure altitude 5,000 feet; departure temperature 25 degrees Celsius; destination pressure altitude 9,000 feet; destination temperature 30 degrees Celsius; and helicopter operating weight 2,515 lbs. A review of that form revealed the pilot incorrectly completed the form in several areas; performance reference, gross weight, adjusted weight, selected weight, operating weight and allowable payload. The pilot's non-jettisonable allowable payload was calculated to be 465 lbs for hover in and out-of-ground effect (IGE and OGE), and a jettisonable allowable payload of 1,235 lbs for OGE. The improperly completed form was signed off by the pilot and USFS Helicopter Manager.

National Transportation Safety Board

## FACTUAL REPORT

AVIATION

NTSB ID: DEN05TA113

Occurrence Date: 07/19/2005

Occurrence Type: Accident


## Narrative (Continued)


A recalculation was performed by a USFS Helicopter Inspector Pilot after the accident. The recalculation revealed the non-jettisonable IGE and OGE allowable payloads were 569 lbs and 259 lbs respectively, and the jettisonable OGE allowable payload was 379 lbs.

On the day of the accident, the pilot completed another Interagency Load Calculation form based on the following: departure pressure altitude 9,500 feet, departure temperature 35 degrees Celsius; and helicopter operating weight of 2,454 lbs. A review of that form revealed the pilot incorrectly completed the form in several areas; adjusted weight, selected weight, and allowable payload. Based on the conditions listed by the pilot, the pilot's calculated jettisonable OGE allowable payload was 646 lbs. The improperly completed form was signed off by the pilot and the USFS Helicopter Manager. According to the USFS Helicopter Inspector Pilot who reviewed the form after the accident, the allowable payload calculations could not be performed because the pressure altitude and temperature values exceeded the manufacturer's performance limitations for the helicopter.

According to the USFS, at the time of the accident, the gross weight of the helicopter was 3,072 lbs, based on an aircraft weight of 1,860 lbs; pilot 200 lbs; fuel 280 lbs; and an external load of 732 lbs. The reported actual environmental conditions were pressure altitude 8,000 feet, and temperature 32 degrees Celsius. In accordance with the Rotorcraft Flight Manual, CSP-FF-1, dated August 14, 1998, with revision 5, dated October 3, 2003, Page 8-4, Figure 8-3, Hover Ceiling, Out of Ground Effect, Engine Air Particle Separator Inlet with Mist Eliminator, indicated that the maximum gross weight for OGE was 2,940 pounds.

According to the Federal Aviation Administration's Rotorcraft Flying Handbook, FAA-H-8083-21, Chapter 11, LTE at Altitude, "At higher altitudes, where the air is thinner, tail rotor thrust and efficiency is reduced. When operating at high altitudes and high gross weight, especially while hovering, the tail rotor thrust may not be sufficient to maintain directional control and LTE can occur. In this case, the hovering ceiling is limited by tail rotor thrust and not necessarily power available. In these conditions gross weights need to be reduced and/or operations need to be limited to lower density altitudes."

 <b>National Transportation Safety Board</b> <b>FACTUAL REPORT</b> <b>AVIATION</b>		NTSB ID: DEN05TA113			
		Occurrence Date: 07/19/2005			
		Occurrence Type: Accident			
<b>Landing Facility/Approach Information</b>					
Airport Name	Airport ID:	Airport Elevation Ft. MSL	Runway Used NA	Runway Length	Runway Width
Runway Surface Type:					
Runway Surface Condition:					
Approach/Arrival Flown: NONE					
VFR Approach/Landing: None					
<b>Aircraft Information</b>					
Aircraft Manufacturer Hughes		Model/Series 369FF		Serial Number 0041FF	
Airworthiness Certificate(s): Normal					
Landing Gear Type: Skid					
Amateur Built Acft? No	Number of Seats: 4	Certified Max Gross Wt.	3750 LBS	Number of Engines: 1	
Engine Type: Turbo Shaft	Engine Manufacturer: Allison	Model/Series: 250-C30	Rated Power: 650 HP		
- Aircraft Inspection Information					
Type of Last Inspection AAIP	Date of Last Inspection 04/2005	Time Since Last Inspection 50 Hours	Airframe Total Time 2988 Hours		
- Emergency Locator Transmitter (ELT) Information					
ELT Installed?/Type Yes /	ELT Operated? Yes	ELT Aided in Locating Accident Site? No			
<b>Owner/Operator Information</b>					
Registered Aircraft Owner Utility Aviation, Inc.		Street Address P.O. Box 667			
		City Fort Collins	State CO	Zip Code 80522	
Operator of Aircraft FORT COLLINS-LOVELAND MUNI		Street Address 740 Simms St			
		City Golden	State CO	Zip Code 80401	
Operator Does Business As:			Operator Designator Code: U8IA		
- Type of U.S. Certificate(s) Held:					
Air Carrier Operating Certificate(s):					
Operating Certificate:			Operator Certificate: Aircraft External Load		
Regulation Flight Conducted Under: Part 91: General Aviation					
Type of Flight Operation Conducted: Public Aircraft - Federal					

 <p><b>National Transportation Safety Board</b> <b>FACTUAL REPORT</b> <b>AVIATION</b></p>	NTSB ID: DEN05TA113
	Occurrence Date: 07/19/2005
	Occurrence Type: Accident

**First Pilot Information**

Name On File	City On File	State On File	Date of Birth On File	Age 53
-----------------	-----------------	------------------	--------------------------	-----------

Sex: M	Seat Occupied: Left	Occupational Pilot?	Certificate Number: On File
--------	---------------------	---------------------	-----------------------------

Certificate(s): Airline Transport; Commercial

Airplane Rating(s): Multi-engine Land; Single-engine Land; Single-engine Sea

Rotorcraft/Glider/LTA: Helicopter

Instrument Rating(s): Airplane

Instructor Rating(s): None

Current Biennial Flight Review? 05/2005

Medical Cert.: Class 2	Medical Cert. Status: With Waivers/Limitations	Date of Last Medical Exam: 02/2005
------------------------	--	------------------------------------

- Flight Time Matrix	All A/C	This Make and Model	Airplane Single Engine	Airplane Multi-Engine	Night	Instrument		Rotorcraft	Glider	Lighter Than Air
						Actual	Simulated			
Total Time	9000	65	8200	800	500	350	300	1600		
Pilot In Command(PIC)										
Instructor										
Instruction Received										
Last 90 Days								65		
Last 30 Days										
Last 24 Hours										

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

**Flight Plan/Itinerary**

Type of Flight Plan Filed: None


Departure Point	State	Airport Identifier	Departure Time	Time Zone
Remote Area	CO		1504	MDT
Destination	State	Airport Identifier		
Local Flight				

Type of Clearance: None

Type of Airspace:

**Weather Information**


Source of Wx Information:  
Unknown

 <p><b>National Transportation Safety Board</b> <b>FACTUAL REPORT</b> <b>AVIATION</b></p>	NTSB ID: DEN05TA113
	Occurrence Date: 07/19/2005
	Occurrence Type: Accident

<b>Weather Information</b>					
WOF ID	Observation Time	Time Zone	WOF Elevation Ft. MSL	WOF Distance From Accident Site NM	Direction From Accident Site Deg. Mag.
Sky/Lowest Cloud Condition: Scattered			8000 Ft. AGL	Condition of Light: Day	
Lowest Ceiling: None		Ft. AGL	Visibility: 10	SM	Altimeter: "Hg
Temperature: 28 °C	Dew Point: °C	Weather Conditions at Accident Site: Visual Conditions			
Wind Direction: 270		Wind Speed: 7	Wind Gusts: 15		
Visibility (RVR): Ft.	Visibility (RVV): SM				
Precip and/or Obscuration: No Obscuration; No Precipitation					

<b>Accident Information</b>		
Aircraft Damage: Destroyed	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					
- TOTAL ABOARD -			1		1
Other Ground					
- GRAND TOTAL -			1		1

 National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION	NTSB ID: DEN05TA113	
	Occurrence Date: 07/19/2005	
	Occurrence Type: Accident	

Administrative Information

Investigator-In-Charge (IIC)

Aaron M. Sauer

Additional Persons Participating in This Accident/Incident Investigation:

Larry Gentz  
Federal Aviation Administration  
Denver, CO

Joseph R Kluk  
United States Forest Service  
Albuquerque, NM

Adrian Booth  
Boeing  
Mesa, AZ