National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB ID: NYC03LA037	Aircraft Registration Number: N8170V
Occurrence Date: 01/12/2003	Most Critical Injury: Serious
Occurrence Type: Accident	Investigated By: NTSB

Location/Time

Nearest City/Place	State	Zip Code	Local Time	Time Zone	
Glady	WV	26268	1220	EST	

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

Aircraft Information Summary

Aircraft Manufacturer	Model/Series	Type of Aircraft
Sikorsky	S-61A	Helicopter

Revenue Sightseeing Flight: No

Air Medical Transport Flight: No

Narrative

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

On January 12, 2003, about 1220 eastern standard time, a Sikorsky S-61A, N8170V, was substantially damaged when it impacted terrain during a forced landing near Glady, West Virginia. Both certificated commercial pilots sustained serious injuries. Visual meteorological conditions prevailed for the commercial logging flight, and a company flight plan was filed for the flight conducted under 14 CFR Part 133.

According to the crew, after the helicopter came out of maintenance, the captain and first officer conducted a test flight, and then ferried the helicopter to the area of operation. On the day of the accident, the first officer flew flights one and three, and the captain flew flights two and four. Each flight lasted about 1 hour 20 minutes, the helicopter was hot refueled between flights, and the flying pilot would occupy the left seat. During the previous flights, no flight control anomalies were identified, and on the accident flight, the captain was in the left seat and flying the helicopter.

After completing approximately the seventh load of the flight, the captain maneuvered the helicopter over the ground tenders, and entered a 155-foot out of ground effect hover. The tenders connected the chokers to the cargo hook, and called "clear." About the same time, the helicopter started a slow uncommanded yaw to the right. The captain applied full left pedal, released the load, and the ground tenders called "kick out." With full left pedal applied, the helicopter continued to yaw right. During the first revolutions, the captain identified a small clear area to the north. The area was approximately level with the helicopter, and approximately 150 feet away on a ridgeline. The captain tried to maneuver the helicopter to the clear area, but by the fourth revolutions, the yaw rate had increased drastically, and helicopter controllability became a major issue. The first officer placed his left hand on the throttles, and the captained called for engines to idle. The captain entered an autorotation, and applied full collective before entering the trees. The helicopter impacted the ground, came to rest up right, and both pilots exited with the assistance of one of the ground tenders. The crew estimated they had conducted 75 loads on the day of the accident. In addition, the first officer estimated the winds were approximately 270 degrees at 10 knots.

Examination of the tailrotor flight control system revealed that the left tailrotor control cable was broken. The break was in the aft part of the cabin and associated with a pulley assembly.

Examination of the cable break revealed that some of the cable strands were bent rearward, and deformed. Examination of the cable fracture surfaces under a stereomicroscope revealed that some of the fractures were irregular and deformed. Examination of the associated keeper pins under a stereomicroscope revealed that both pins displayed wear marks, and light scratches consistent with control cable contact. The associated pulley was intact. The pulley channel contained an oil-based debris, and control cable fragments.

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Occurrence Date: 01/12/2003

Occurrence Type: Accident

Narrative (Continued)

Examination of the maintenance records revealed the helicopter had undergone extensive repairs before being returned to service on January 11, 2003. While in maintenance, both tailrotor cables were removed and then reinstalled on January 9, 2003. At the time of the accident, the helicopter had flown 5.3 hours since returning to service, and total flight time was 14,603 hours.

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NTSB ID: NYC03LA037

Occurrence Date: 01/12/2003

Occurrence Type: Accident

Landing Facility/Approach Information

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

Runway Surface Type: Unknown

Runway Surface Condition: Unknown

Approach/Arrival Flown: NONE

VFR Approach/Landing: Forced Landing

Aircraft Information

Aircraft Manufacturer	Model/Series	Serial Number
Sikorsky	S-61A	

Airworthiness Certificate(s): Restricted (Special)

Landing Gear Type: Tricycle

Amateur Built Acft?	Number of Seats:	Certified Max Gross Wt.	Number of Engines:
No	2	2200 LBS	2

Engine Type:	Engine Manufacturer:	Model/Series:	Rated Power:
Turbo Shaft	General Electric	CT58-140-1	1500 HP

- Aircraft Inspection Information

Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Airframe Total Time
Continuous Airworthiness	01/2003	5.3 Hours	14591.2 Hours

- Emergency Locator Transmitter (ELT) Information

ELT Installed?/Type		ELT Aided in Locating Accident Site?
Yes /	Yes	No

Owner/Operator Information

Registered Aircraft Owner	Street Address		
Carson Helicopters, Inc.	828 Brookside Blvd.		
	City: Grants Pass	State: OR	Zip Code: 97526

Operator of Aircraft	Street Address		
Carson Helicopters, Inc.	828 Brookside Blvd.		
	City: Grants Pass	State: OR	Zip Code: 97526

Operator Does Business As:

Operator Designator Code:

- Type of U.S. Certificate(s) Held:

Air Carrier Operating Certificate(s): Large Helicopter

Operating Certificate:

Operator Certificate: Aircraft External Load

Regulation Flight Conducted Under: Part 133: Rotorcraft Ext. Load

Type of Flight Operation Conducted: Other Work Use

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FACTUAL REPORT AVIATION

NTSB ID: NYC03LA037

Occurrence Date: 01/12/2003

Occurrence Type: Accident

First Pilot Information

Name	City	State	Date of Birth	Age
On File	On File	On File	On File	48

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

Certificate(s): Commercial

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

Rotorcraft/Glider/LTA: Helicopter

Instrument Rating(s): Airplane

Instructor Rating(s): None

Current Biennial Flight Review? 06/2001

Medical Cert.: Class 2 | Medical Cert. Status: Valid Medical--no waivers/lim. | Date of Last Medical Exam: 06/2001

- 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	18807	10346		20				18796		
Pilot In Command(PIC)	1400	6000	1067	20				5980		
Instructor										
Instruction Received										
Last 90 Days	251							251		
Last 30 Days	23							23		
	4							4		
	Yes		Yes			No			Yes	

Flight Plan/Itinerary

Type of Flight Plan Filed: Company VFR

Departure Point	State	Airport Identifier	Departure Time	Time Zone
Glady	WV	NONE	1200	EST

Destination	State	Airport Identifier
Same as Accident/Incident Location		NONE

Type of Clearance: None

Type of Airspace: Class G

Weather Information

Source of Wx Information:

Unknown

National Transportation Safety Board

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NTSB ID: NYC03LA037

Occurrence Date: 01/12/2003

Occurrence Type: Accident

Weather Information

WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
EKN	1251	EST	1987 Ft. MSL	12 NM	140 Deg. Mag.

Sky/Lowest Cloud Condition: Few 3200 Ft. AGL

Condition of Light: Day

Lowest Ceiling: None Ft. AGL

Visibility: 10 SM

Altimeter: 30.32 "Hg

Temperature: -7 °C

Dew Point: -14 °C

Weather Conditions at Accident Site: Visual Conditions

Wind Direction:

Wind Speed: Calm

Wind Gusts:

Visibility (RVR): Ft.

Visibility (RVV) SM

Precip and/or Obscuration:

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		1			1
Student Pilot					
Flight Instructor					
Check Pilot					
Flight Engineer					
Cabin Attendants					
Other Crew					
Passengers					
- TOTAL ABOARD -		2			2
Other Ground					
- GRAND TOTAL -		2			2

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FACTUAL REPORT

AVIATION

NTSB ID: NYC03LA037

Occurrence Date: 01/12/2003

Occurrence Type: Accident

Administrative Information

Investigator-In-Charge (IIC)

David S. Muzio

Additional Persons Participating in This Accident/Incident Investigation:

Paul Reynolds
FAA/FSDO
Charlestown, WV

National Transportation Safety Board

FACTUAL REPORT
AVIATION

NTSB ID: ATL03FA065	Aircraft Registration Number: N81664
Occurrence Date: 03/23/2003	Most Critical Injury: Fatal
Occurrence Type: Accident	Investigated By: NTSB

Location/Time

Nearest City/Place	State	Zip Code	Local Time	Time Zone	
Kimble	TN	37347	0800	CST	

Airport Proximity: Off Airport/Airstrip — Distance From Landing Facility: 0

Aircraft Information Summary

Aircraft Manufacturer	Model/Series	Type of Aircraft
Sikorsky	S-61A	Helicopter

Revenue Sightseeing Flight: No — Air Medical Transport Flight: No

Narrative

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

HISTORY OF FLIGHT

On March 23, 2003, at 0800 central standard time, a Sikorsky S-61A, N81664, registered to and operated by Carson Helicopters Incorporated, collided with trees and subsequently the ground and burst into flames during a logging operation in a remote area near Kimble, Tennessee. The flight was conducted under the provisions of Title 14 CFR Part 133 for external load operations and visual flight rules. Visual meteorological conditions prevailed at the time of the accident. The commercial pilot was fatally injured and the commercial rated co-pilot received serious injuries. The helicopter was substantially damaged. The flight departed the staging area near Kimble, Tennessee, at 0730 on March 23, 2003.

According to the co-pilot, the purpose of the flight was to move logs from one-drop area to another using a 150-foot long line attached to the helicopter. On the second airlift, shortly after the logs were laid on the ground, a shudder was felt in the helicopter airframe followed by a slight yaw to the right. On the instrument panel, there was a needle jump in the triple tachometer gauge followed by a very loud bang. The pilot asked, what was that? The co-pilot replied, 'I think we just had a bad input slip". The helicopter began a violent left hand descending spin towards the ground. At this point the pilot stated, "I'm losing it, I'm losing it, pull the throttles". As the helicopter descended, it collided with trees and subsequently the ground. After the helicopter came to a complete stop the co-pilot exited the helicopter. Within seconds an explosion was heard, the helicopter burst into flames. The radio ground guide assisted in the ground handling of the operation. As the helicopter descended the radio ground guide departed the area but returned to the accident site to assist after the helicopter came to a complete stop.

PERSONNEL INFORMATION

The pilot was issued a commercial pilot certificate on August 17, 1994, with airplane single-engine land and rotorcraft-helicopter, (VFR ONLY). Review of the pilot records revealed that he had a total flight time of 29,325 hours, and a total of 5,300 flight hours in the Sikorsky S-61A. The commercial pilot held a second-class medical certificate dated April 2, 2001, valid when wearing corrective lenses for near vision.

The co-pilot was issued a commercial pilot certificate on July 17, 2000, with airplane single and multiengine land airplane, helicopter and instrument airplane. Review of the pilot records revealed a total helicopter flight time of 4,742, flight hours and a total of 2030 flight hours in the Sikorsky S-61A. The commercial pilot held a second-class medical certificate dated March 6, 2002.

AIRCRAFT INFORMATION

The helicopter was originally delivered to the US Navy as a Sikorsky Aircraft HSS-2, Bureau Number

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AVIATION

NTSB ID: ATL03FA065
Occurrence Date: 03/23/2003
Occurrence Type: Accident

Narrative (Continued)

148989, in October 1961. It was later altered by Carson under FAA form 337 and registered as N81664 in the FAA's Restricted Category by Carson as an S-61A. The helicopter was equipped with two General Electric CT-58-140-1 turbo-shaft engines. The left engine, serial number: 280-107 MA had a total time of 21,529 hours, and 411 hours since overhaul. The right engine, serial number: 285-243 had a total time of 7,616 hours, and 4,638 since overhaul. The helicopter's last inspection was a continuous airworthiness inspection, preformed on March 22, 2003, at a total time of 18,580 hours.

METEOROLOGICAL INFORMATION

The Chattanooga Love Field Airport weather observation facility reported at 0753 central standard time, sky condition: few at 10000 feet AGL, visibility 10 statue miles, temperature 9 degrees Celsius, dew point 7 degrees Celsius, and altimeter 30.05.

WRECKAGE AND IMPACT INFORMATION

Examination of the wreckage site revealed the helicopter came to rest 75 feet down a ravine on its left side. There were freshly broken trees approximately 50 feet above the wreckage site. The lower pick up hook of the long-line rested on a dirt path with approximately a 50-foot section of long-line extending down towards the helicopter. The 150 foot long-line assembly displayed fire damage. The cockpit and the main fuselage of the helicopter were fire damaged. The tail boom was partially fire damaged, and tail rotor blades were bent and connected to the tail rotor transmission. The tail rotor drive shaft was intact and connected to the main rotor transmission. The five main rotor blades were connected to the main rotor head and displayed buckling and deformation damage. A 38-foot section of the long-line was found on one of the main rotor blades. The engines were fire and deformation damaged.

Examination of the airframe revealed, the forward and main cabin sections were fire damaged. The tail cone and pylon were charred, and several areas within the wreckage revealed congealed aluminum material. The tail landing gear area was intact and soot residue was also present. The left main landing gear assembly was fire damaged. The right main landing gear assembly was buckled.

All five main rotor blades were recovered at the accident site. No evidence of leading edge damage was noted. The tail rotor was intact with bending, and scoring on the blades. The tail rotor head was still mounted to the vertical pylon section, and the pitch change links were bent. Examination of the main rotor head revealed all five main rotor blade spindles were damaged, and attached to the main rotor head, and the droop flap stops were damaged.

Examination of the transmission and drive shafts established that the tail rotor gearbox had rotational continuity from the tail rotor drive shaft at the intermediate gearbox back to the tail rotor head. Examination of the intermediate gearbox revealed that it was still mounted to the base of the vertical pylon. The intermediate gearbox chip detector was examined, and no chips were noted on the magnetic pick-up. Examination of the tail rotor driveshaft revealed that all five sections were found in their normally installed positions. Continuity was established from the tail takeoff drive at the main gearbox back to the tail rotor head. Examination of the main gearbox confirmed continuity from both inputs to the main rotor head, tail takeoff drive, and accessory pads on the rear cover.

Further examination of the main transmission revealed that the left input free wheel unit turned and freewheeled, but made a grinding noise when turned in the freewheel direction. Further examination of the left input free wheel unit revealed the gear housing was worn, with numerous roller impressions. The rollers were also rough in surface appearance. The right input free wheel unit operated in both directions without making any detectable noise. No detectable wear in the gear housing or the rollers was noted. The IFWU camshafts revealed a light wear marks. Both freewheeling units were recovered for further examination.

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NTSB ID: ATL03FA065
Occurrence Date: 03/23/2003
Occurrence Type: Accident

Narrative (Continued)

Examination of the left engine revealed that the engine was fire damaged. There was front-end damage to the engine. There was no evidence of any rotating part uncontainment. The power turbine was observed to turn freely when rotated through the input drive shaft. The input drive shaft, which connects to the main transmission gearbox, appeared slightly bent when rotated. The gas generator could not be turned through the started drive input.

Examination of the right engine revealed that the engine was fire damaged. There was no evidence of any rotating part uncontainment. The power turbine was observed to turn freely when rotated through the input drive shaft. The input drive shaft, which connects to the main transmission gearbox, appeared slightly bent when rotated. The gas generator also turned freely when rotated through the starter drive input.

MEDICAL AND PATHOLOGICAL INFORMATION

The office of the chief medical examiner, Tennessee Department of Health, performed the pathological diagnoses of the pilot on March 23, 2003. The cause of death was blunt force trauma. The Forensic Toxicology Research Section, Federal Aviation Administration, Oklahoma City, Oklahoma performed postmortem toxicology of specimens from the pilot. The results were negative for carbon monoxide, cyanide, and ethanol. Quinine was detected in the blood, and present in the liver.

ADDITIONAL INFORMATION

Examinations of the input free wheel unit assemblies were conducted at the Sikorsky M&P Technology Laboratory in July 2003. It was reported that the time since overhaul on the components was 960 hours. Sikorsky recommends free wheel unit time between overhaul of 350 hours. The material lab examination discovered the following:

1. Wear marks were found on the left hand side cam flats, gear housing roller path, and rollers. The wear patterns on the gear housing roller path and rollers showed evidence of roller "skidding". (According to Sikorsky the word skidding refers to a more gross condition of sliding in the contact, as in the case where a rolling element fails to maintain epicyclic speed of rotation for more than just an instant.)
2. The left hand side roller retainer had indentations. Along the forward inside diameter, indicating contact with the edges of the cam, which may be associated with cage misalignment due to Oilite™ bushing wear.
3. The left hand side aft Oilite™ bushing was found to contain numerous radial cracks intersecting the inside diameter.
4. Destructive metallurgical examination of the left hand side camshaft in a cam flat area, gear housing in a roller path area, and two rollers selected at random, indicated conformance to composition and hardness requirements.
5. The regions directly under the worn working surfaces exhibited white layers and metal flow appearances.
6. Non-destructive surface hardness tests indicated conformance to case hardness requirements on the right hand side cam shaft and gear housing, and conformance to the through-hardened requirement on two randomly selected right hand side rollers.
7. The right hand side gear housing and roller retainer both contained "Rotair" part markings. "Rotair" is not a Sikorsky-approved supplier. The left hand side roller retainer did not have any manufacturer markings.
8. Accumulated sludge-like material found inside both of the gear housing was found by FTIR analysis to contain evidence of Mobil 27 grease, which is not allowed in the subject gearbox.
9. Components from both the left hand side and right hand side free wheel units encompassing both camshafts, gear housings, and roller retainers, were magnetic particle inspected, with no cracks found.

The review of FAA-H-8083-21 Rotorcraft Flying Handbook, section Height/Velocity Diagram states

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Narrative (Continued)

that: the critical combinations of airspeed and altitude should an engine failure occur. Operating at the altitudes and airspeeds shown within the crosshatched or shaded areas of the Height/Velocity diagram may not allow enough time for the critical transition from powered flight to autorotation. The helicopter operated about 150 feet above the ground inside the shaded area of the Height/ Velocity Curve.

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Occurrence Date: 03/23/2003

Occurrence Type: Accident

Landing Facility/Approach Information

Airport Name	Airport ID:	Airport Elevation	Runway Used	Runway Length	Runway Width
		0 Ft. MSL	NA		

Runway Surface Type: Unknown

Runway Surface Condition: Unknown

Approach/Arrival Flown: Unknown

VFR Approach/Landing: Unknown

Aircraft Information

Aircraft Manufacturer	Model/Series	Serial Number
Sikorsky	S-61A	61063

Airworthiness Certificate(s): Restricted (Special)

Landing Gear Type: Skid; Tailwheel

Amateur Built Acft?	Number of Seats:	Certified Max Gross Wt.	Number of Engines:
No	2	10500 LBS	2

Engine Type:	Engine Manufacturer:	Model/Series:	Rated Power:
Turbo Shaft	General Electric	CT58-140-1	1500 HP

- Aircraft Inspection Information

Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Airframe Total Time
Continuous Airworthiness	03/2003	3 Hours	18579 Hours

- Emergency Locator Transmitter (ELT) Information

ELT Installed?/Type		ELT Aided in Locating Accident Site?
No	No	No

Owner/Operator Information

Registered Aircraft Owner	Street Address		
Carson Helicopters Incorported	952 Blooming Glen Road		
	City: Perkasie	State: PA	Zip Code: 18944

Operator of Aircraft	Street Address		
Carson Helicopters Incorported	952 Blooming Glen Road		
	City: Perkasie	State: PA	Zip Code: 18944

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: Part 133: Rotorcraft Ext. Load

Type of Flight Operation Conducted: Other Work Use

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Occurrence Date: 03/23/2003

Occurrence Type: Accident

First Pilot Information

Name	City	State	Date of Birth	Age
On File	On File	On File	On File	56

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

Certificate(s): Commercial

Airplane Rating(s):

Rotorcraft/Glider/LTA: Helicopter

Instrument Rating(s):

Instructor Rating(s):

Current Biennial Flight Review?

Medical Cert.: Class 2 | Medical Cert. Status: Valid Medical--w/ waivers/lim. | Date of Last Medical Exam: 05/2001

- 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	29325	5300			6					
Pilot In Command(PIC)	4500									
Instructor										
Instruction Received										
Last 90 Days	120									
Last 30 Days										
	Yes		Yes			Yes			Yes	

Flight Plan/Itinerary

Type of Flight Plan Filed: None

Departure Point	State	Airport Identifier	Departure Time	Time Zone
Same as Accident/Incident Location			0730	CST

Destination	State	Airport Identifier
Same as Accident/Incident Location		

Type of Clearance: Unknown

Type of Airspace: Class G

Weather Information

Source of Wx Information:

Company

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Occurrence Date: 03/23/2003

Occurrence Type: Accident

Weather Information

WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
CHA	0753	CST	682 Ft. MSL	41 NM	294 Deg. Mag.

Sky/Lowest Cloud Condition: Few 10000 Ft. AGL

Condition of Light: Day

Lowest Ceiling: None Ft. AGL

Visibility: 10 SM

Altimeter: 30.05 "Hg

Temperature: 9 °C

Dew Point: 7 °C

Weather Conditions at Accident Site: Visual Conditions

Wind Direction:

Wind Speed:

Wind Gusts:

Visibility (RVR): Ft.

Visibility (RVV) SM

Precip and/or Obscuration:

Accident Information

Aircraft Damage: Destroyed

Aircraft Fire: Ground

Aircraft Explosion Ground

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

National Transportation Safety Board

FACTUAL REPORT

AVIATION

NTSB ID: ATL03FA065

Occurrence Date: 03/23/2003

Occurrence Type: Accident

Administrative Information

Investigator-In-Charge (IIC)

Eric H. Alleyne

Additional Persons Participating in This Accident/Incident Investigation:

Bernice J Haire
Nashville FSDO
Nashville, TN

Christopher Lowenstein
Sikorsky Aircraft Corporation
Stratford, CT

David Gridley
GE Aircraft Engines
Lynn, MA