Aviation Investigation Final Report

Location:	NACHES, Washington	**Accident Number:**	SEA98TA074
Date & Time:	May 9, 1998, 16:55 Local	**Registration:**	N345SC
Aircraft:	Bell UH-1H	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 Minor, 3 None
Flight Conducted Under:	Public aircraft		

Analysis

The pilot reported that shortly after takeoff, he noticed that the rpm was low, as if it were bleeding off. The pilot tried to increase the rpm by using the increase/decrease button on the collective which had no effect. The pilot opted to reverse direction to return to land. The rpm continued to decrease and the pilot initiated an autorotation to a field in a narrow valley. The rpm continued to decay to a point in which the pilot could not perform a normal autorotation due to low airspeed and altitude. The helicopter landed hard and rocked forward onto it nose before settling back on the skids. The engine was removed and sent to a facility for a test run. During the engine run, there were no anomalies found that effected engine operation.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: Loss of engine power for undetermined reasons.

Findings

Occurrence #1: LOSS OF ENGINE POWER
Phase of Operation: CRUISE

Findings
1. (C) REASON FOR OCCURRENCE UNDETERMINED

Occurrence #2: FORCED LANDING

Phase of Operation: EMERGENCY DESCENT/LANDING

Occurrence #3: HARD LANDING
Phase of Operation: EMERGENCY DESCENT/LANDING

Factual Information

On May 9, 1998, at 1655 Pacific daylight time, at Bell UH-1H, N345SC, registered to and operated by the Pierce County Sheriff's Department as a Public Use Search and Rescue training operation, experienced a loss of engine power shortly after takeoff from a field near Naches, Washington. The pilot initiated an autorotation to a field and the helicopter subsequently landed hard. Visual meteorological conditions prevailed at the time and no flight plan was filed. The helicopter was substantially damaged and the two certificated commercial pilots were not injured. One crewman received minor injuries, while the other crewman was not injured.

The pilot reported that he had been flying in the local area and transporting search and rescue personnel for operations training. The mission began at 1300 and the last refueling was at 1600. The second mission took off at 1625.

The pilot reported that shortly after takeoff, with the second pilot at the controls, he noticed that the rpm was low, as if it were bleeding off, and down to about 6,300 rpm. The pilot checked the torque gauge which indicated 36 - 37 pounds. The pilot reported that he tried to increase the rpm by using the increase/decrease button on the collective which had no effect. The pilot took over the controls and began a left turn to return to land. While in the turn, the rpm began to increase to 6,900 rpm, and the high rpm light illuminated. The pilot stated that he suspected a possible N2 gear failure, and increased the collective to attempt to load the rotor system and reduce the engine/rotor rpm. This action had no effect on the rpm and the pilot began to reduce the engine throttle to lower the rpm. At this time, the engine/rotor rpm was in the 6,200 - 6,500 rpm range. The pilot stated that he decided to land the helicopter and initiated an autorotation to a field that was in a narrow valley. Trees populated the sides of the field and valley. The engine rpm began to decay down to 6,000 - 6,200 rpm. The pilot initiated the approach at an altitude of 200 - 400 feet above ground level, and attempted to increase the throttle to regain engine/rotor rpm. The pilot stated that he was in a profile in which a normal autorotation was not possible due to low airspeed, which was at 40 - 60 knots, and low altitude. The pilot decreased the helicopter's forward motion at about 75 feet, and at about 15 feet pulled full collective to attempt to transfer the rotor system kinetic energy, and what engine power was left, to slow the rate of descent. The helicopter landed hard and rocked forward onto its nose before settling back on the skids. A main rotor blade contacted the tail boom.

The engine was removed from the airframe and shipped to AlliedSignal, Phoenix, Arizona, for an engine run/teardown.

The engine was inspected and determined that an engine run was possible. The engine was installed in a test cell and a normal engine start was conducted. No abnormalities were noted

for ground idle and flight idle operations.

During the inlet guide vane operation test, the full open position was observed at 96.4 percent NG at 100 degrees F. This speed is approximately 0.2 percent NG below the minimum NG speed specified for the full inlet guide vane open position. AlliedSignal technicians reported that this condition would result in a less open inlet guide vane position during engine acceleration, but would not have an effect on engine operation due to the small magnitude.

The bleed band operation test found that the bleed band closed at 78 percent NG at an ambient temperature of 100 degrees F. Specifications indicate that the bleed band is required to close at approximately 82.2 percent NG. AlliedSignal technicians reported that this condition would result in increased measured gas temperature being produced between 78 to 82.2 percent NG.

The tests for engine vibration, military rated power operation and emergency fuel flow operation were within specifications and no anomalies were observed.

During the NP governor operation test, it was found that the governor limited fuel flow to 640 pounds per hour (pph), at 105 percent NP (high-speed stop), and 496 pph at 85.1 percent NP (low-speed stop). The maximum fuel flows exceeded specifications. The high and low speed stops are field adjustable and they were not adjusted during the engine test. AlliedSignal technicians reported that this condition would result in a higher NP speed being reached prior to governor response, but would not adversely affect satisfactory engine operation.

Additional tests performed determined no anomalies for normal engine operation at NRP with and without compressor bleed air extraction; snap accelerations from idle to takeoff power, and snap decelerations from takeoff power to idle.

Finally, a series of load and throttle transients were performed in an attempt to simulate the control inputs and rotor response that the pilot described during the accident sequence. No anomalies were observed.

The fuel regulator and the power turbine governor were removed and sent to Pueblo Airmotive, Tucson, Arizona, for bench testing. Slight deviations were noted during the testing of the fuel regulator, however, the operation of the regulator was normal. No anomalies were noted during the testing of the governor.

Pilot Information

Certificate:	Commercial	**Age:**	43,Male
Airplane Rating(s):	None	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	Helicopter	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	October 5, 1997
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	2000 hours (Total, all aircraft), 1850 hours (Total, this make and model), 1400 hours (Pilot In Command, all aircraft), 17 hours (Last 90 days, all aircraft), 7 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Bell	**Registration:**	N345SC
Model/Series:	UH-1H UH-1H	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:		**Serial Number:**	66-16345
Landing Gear Type:	Skid	**Seats:**	13
Date/Type of Last Inspection:	June 14, 1997 AAIP	**Certified Max Gross Wt.:**	9500 lbs
Time Since Last Inspection:	106 Hrs	**Engines:**	1 Turbo shaft
Airframe Total Time:	6821 Hrs	**Engine Manufacturer:**	Lycoming
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	T53L13BA
Registered Owner:	PIERCE COUNTY SHERIFF'S DEPT	**Rated Power:**	1400 Horsepower
Operator:		**Operating Certificate(s) Held:**	None
Operator Does Business As:		**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	YKM ,1095 ft msl	**Distance from Accident Site:**	12 Nautical Miles
Observation Time:	16:56 Local	**Direction from Accident Site:**	125°
Lowest Cloud Condition:	Scattered / 7000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Overcast / 10000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	3 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	340°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29 inches Hg	**Temperature/Dew Point:**	18°C / 8°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:		**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:	16:25 Local	**Type of Airspace:**	Class G

Airport Information

Airport:		**Runway Surface Type:**	
Airport Elevation:		**Runway Surface Condition:**	
Runway Used:	0	**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Minor, 3 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Minor, 3 None	**Latitude, Longitude:**	46.779468,-120.880706(est)

Administrative Information

Investigator In Charge (IIC):	Eckrote, Debra
Additional Participating Persons:	DONNIE WARE; SPOKANE , WA BRIAN HOLMES; SEATTLE , WA DAVID LOOPER; PHOENIX , AZ
Original Publish Date:	February 15, 2001
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=42825