Aviation Investigation Final Report

Location:	Dayton, Washington	**Accident Number:**	SEA02LA051
Date & Time:	March 8, 2002, 14:55 Local	**Registration:**	N116DR
Aircraft:	Bell/Garlick UH-1H	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 None
Flight Conducted Under:	Part 137: Agricultural		

Analysis

The pilot of the UH-1H rotorcraft had completed a fertilizer drop and was returning to the servicing area for fuel with the empty, 300 pound bucket attached by a 30 foot line. While approximately 300 feet above ground, he heard a series of loud reports coming from the engine, the rotorcraft yawed and the low RPM audio warning sounded. The pilot lowered collective and then maneuvered the rotorcraft towards an area of smaller trees. He then jettisoned the empty bucket and executed a hard auto-rotation landing on a road striking trees in the process. Post crash examination revealed approximately 30 gallons(~210 pounds) of fuel in the fuel tanks. The pilot reported that the rotorcraft was equipped with a low fuel warning system, which included an annunciator light that illuminated with approximately 170 pounds of fuel remaining, and that the annunciator light normally illuminated when the rotorcraft was flying with a load due to adverse operating angles. Once the rotorcraft's load was released and the rotorcraft returned to a level attitude, the light extinguished. He reported that the light is designed to provide a 20 minute warning before fuel is exhausted. He also remarked that the system was operating normally prior to the accident and that during the return flight after the last fertilizer drop, the light remained illuminated. The rotorcraft's Lycoming/Honeywell T53-L13B turboshaft engine was examined and no mechanical malfunction of the engine was found. The fuel system and its indicating system was examined with no discrepancy noted and fuel was found at the fuel control filter. The fuel control was examined and bench checked at the facilities of B.F. Goodrich, Pump & Engine Control Systems and no significant anomalies were noted during the examination and testing.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: A loss of power for undetermined reason(s). Contributing factors were the pilot's delayed

decision to jettison the empty bucket and the trees impacted during the auto-rotation landing.

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

Findings
2. AUTOROTATION - PERFORMED - PILOT IN COMMAND

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

Findings
3. (F) OBJECT - TREE(S)
4. (F) LOAD JETTISON - DELAYED - PILOT IN COMMAND

Factual Information

On March 8, 2002, approximately 1455 Pacific standard time, a Bell/Garlick UH-1H, N116DR, registered to/being operated by Northwest Helicopters, Inc., and being flown by an airline transport rated pilot, was substantially damaged during a hard landing following a loss of engine power during cruise approximately three nautical miles west of the Shelton airport, Shelton, Washington. The pilot was uninjured. The pilot reported the meteorological conditions at the time/place of the accident as VMC, and no flight plan had been filed. The flight, which was engaged in fertilizer dispensation, was operated under 14CFR137, and had departed from the remote service site earlier in the afternoon.

The pilot reported he had completed a fertilizer drop and was returning to the servicing area for fuel with the empty, 300-pound bucket attached by a 30-foot line. He was one-half mile from the intended landing site when he heard a series of loud reports coming from the engine. The helicopter yawed and the low RPM audio warning sounded. He reported N1 speed as deteriorating as the aircraft was traversing 100-foot high trees. The helicopter was approximately 300 feet above ground at 80 knots airspeed. The pilot lowered collective and maneuvered north toward an area of smaller trees, which he estimated, were 10-25 feet tall. He then jettisoned the empty bucket and began a flare to the intended landing area (a road).

The pilot reported that as he pulled pitch there was little inertia left in the rotor system. The rotor blades began contacting trees and slowed rapidly and the helicopter impacted terrain in a slightly left/nose level attitude. He reported that upon exiting the aircraft the fuel gauge read 680 pounds (refer to attached NTSB Form 6120.1).

The pilot was interviewed by an inspector from the Federal Aviation Administration's (FAA) Renton Flight Standards District Office (FSDO) and reported that the fertilizer dump zone was approximately 30-40 seconds flying time from the refill truck. He also reported that refueling of the rotorcraft occurred when the fertilizer truck needed refilling, or approximately every 11 trips to the zone; and that the rotorcraft was hot-fueled taking approximately 30-50 seconds. Fuel was added until the fuel gauge read 800 to 900 pounds (approximately 50-60 gallons taken on at each refueling). The pilot reported that fuel consumption for the rotorcraft was about 80 to 90 gallons per hour (refer to attached statement PIS-I).

The pilot also explained that the rotorcraft was equipped with a low fuel warning system, which included an annunciator light, and that the annunciator light normally illuminates when the rotorcraft is flying with a load due to adverse operating angles. Once the rotorcraft's load is released and it returns to a level attitude, the light goes out. He reported that the light is designed to provide a 20 minute warning before fuel is exhausted. He also remarked that the system was operating normally prior to the accident and that during the return flight after the last fertilizer drop, the light remained illuminated (refer to attached statement PIS-I).

The Technical Manual for the UH-1H rotorcraft (TM 55-1520-210-10) contained a reference within the emergency procedures section relating to the "20 Minute Fuel Caution Light" which stated that should the light illuminate the pilot should land as soon as practicable. An additional reference within the same manual stated that the "20 MINUTE FUEL caution light will illuminate when there is approximately 170 pounds remaining." (refer to attachment TM-I).

Post-crash examination of the aircraft's Lycoming/Honeywell T53-L13B turboshaft engine was conducted under the oversight of an inspector from the FAA's Renton FSDO. The examination was conducted at the facilities of Northwest Helicopters, Inc. Prior to the examination, approximately 30 gallons of fuel was recovered from the rotorcraft's fuel tanks. The examination determined that both the two-stage gas producer (N1) turbine and the two-stage power (N2) turbine were free to rotate. Manual rotation of the N1 turbine resulted in commensurate rotation of the compressor assembly and accessory drive output, while rotation of the N2 turbine resulted in commensurate rotation of the reduction gearing assembly. There was no evidence of any turbine or stator blade damage noted during the turbine section examination. Additionally, the fuel system was examined from the fuel tank up to but not including the fuel control/pump/governor unit. No evidence of a fuel delivery problem was noted. The fuel indicating system was checked with no discrepancy noted and fuel was found within the fuel control filter. The compressor section was also removed and examined and there was no significant evidence of foreign object damage or ingestion noted (refer to attachment NWH-I).

The Chandler Evans Control Systems (fuel control/pump/governor unit) was examined and tested at the facilities of B.F. Goodrich, d/b/a Pump & Engine Control Systems, Goodrich Corp. West Hartford, Connecticut. No significant anomalies were noted during the examination and testing (refer to attached Goodrich report number S-1652).

Pilot Information

Certificate:	Airline transport; Commercial; Flight instructor; Private	**Age:**	42,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	Airplane; Helicopter	**Second Pilot Present:**	No
Instructor Rating(s):	Helicopter	**Toxicology Performed:**	No
Medical Certification:	Class 2 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	February 11, 2002
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	February 13, 2002
Flight Time:	9340 hours (Total, all aircraft), 3189 hours (Total, this make and model), 8944 hours (Pilot In Command, all aircraft), 65 hours (Last 90 days, all aircraft), 52 hours (Last 30 days, all aircraft), 5 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Bell/Garlick	**Registration:**	N116DR
Model/Series:	UH-1H	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Restricted (Special)	**Serial Number:**	66-16949
Landing Gear Type:	Skid	**Seats:**	1
Date/Type of Last Inspection:	February 27, 2002 100 hour	**Certified Max Gross Wt.:**	9500 lbs
Time Since Last Inspection:	25 Hrs	**Engines:**	1 Turbo shaft
Airframe Total Time:	10128 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming/Honeywell
ELT:	Installed, not activated	**Engine Model/Series:**	T53-L13B
Registered Owner:	Northwest Helicopters, Inc.	**Rated Power:**	1400 Horsepower
Operator:		**Operating Certificate(s) Held:**	
Operator Does Business As:		**Operator Designator Code:**	WYFL

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	OLM,206 ft msl	**Distance from Accident Site:**	22 Nautical Miles
Observation Time:	14:54 Local	**Direction from Accident Site:**	125°
Lowest Cloud Condition:	Few / 700 ft AGL	**Visibility**	1 miles
Lowest Ceiling:	Overcast / 1700 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	5 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	190°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.2 inches Hg	**Temperature/Dew Point:**	2°C / 0°C
Precipitation and Obscuration:	N/A - None - Fog		
Departure Point:	Dayton, WA	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:		**Type of Airspace:**	Class G

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	47.268054,-123.220832

Administrative Information

Investigator In Charge (IIC):	McCreary, Steve
Additional Participating Persons:	Chuck Reynolds; FAA Flight Standards District Office; Renton, WA Russell V Comstock; Goodrich Corporation; West Hartford, CT
Original Publish Date:	April 8, 2003
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=54322