National Transportation Safety Board
Aviation Accident Final Report

Location:	Peach Springs, AZ	**Accident Number:**	LAX05LA155
Date & Time:	05/02/2005, 0945 MST	**Registration:**	N3895D
Aircraft:	Bell 206L-1	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 None
Flight Conducted Under:	Part 133: Rotorcraft Ext. Load		

Analysis

The helicopter descended to ground impact following an interruption of power while performing a long line sling load operation. The purpose of the flight was to sling load fuel cans from a landing strip that is located on the rim of the Grand Canyon to the canyon floor directly below to refuel the tour boats operating on the Colorado River. The accident flight was the first flight of the day. The pilot utilized a 50-foot-long line and a net to transfer 15 fuel cans down to the canyon floor. The pilot said that when he picked up the load at the top of the canyon (elevation 4,800 feet msl) he performed a power check and the torque required was 75 percent for an out of ground effect hover. After stabilizing the load he began a descent to the canyon floor below (at an elevation of 1,300 feet msl) and was at a descent rate of about 50 feet per minute as he neared the ground. The wind conditions were reported by witnesses and the pilot as being calm, or nearly so. His head was outside the cockpit watching the ground crew, when he heard a tone, and then heard a series of three low frequency popping noises. The pilot said he was unsure if the popping sounds were coming from the engine or from the main rotor blades The helicopter then began to settle toward the ground and descended to a hard impact into desert scrub brush. The pilot said he closed the throttle after hearing popping noises and entered an autorotation. Witnesses to the accident reported that the approach was a controlled approach, and there was no sway or other unusual movement in the load. As a ground crewmember reached for the load, about 5 feet above the ground, he saw the helicopter sink down and impact the scrub brush and the ground. The witness did not perceive any unusual popping sounds preceding the descent and impact. The Rolls-Royce 250-C30P engine was removed from the airframe shipped to a repair facility with a test cell. There were no significant irregularities noted in the engine test cell runs that were conducted. Both the power turbine governor and gas producer fuel control were tested at the manufacturer's facilities and there were no conditions identified that would have prevented normal operation of either unit.

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 reasons.

Findings

Occurrence #1: LOSS OF ENGINE POWER
Phase of Operation: HOVER - OUT OF GROUND EFFECT

Findings
1. (C) REASON FOR OCCURRENCE UNDETERMINED

Occurrence #2: FORCED LANDING
Phase of Operation: EMERGENCY DESCENT/LANDING

Findings
2. AUTOROTATION - ATTEMPTED - PILOT IN COMMAND

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

Findings
3. TERRAIN CONDITION - HIGH VEGETATION
4. TERRAIN CONDITION - GROUND

Factual Information

On May 2, 2005, at 0945 mountain standard time, a Bell 206L-1, N3895D, landed hard in desert scrub brush on the Grand Canyon floor near the Grand Canyon West Airport (1G4), Peach Springs, Arizona. Monarch Enterprises, Inc., d.b.a. Papillon Helicopters, operated the helicopter under the provisions of 14 CFR Part 133 as an external load long line operation. The helicopter sustained substantial damage. The commercial pilot, the sole occupant, was not injured. The ground crew loaders in the landing zone area (LZ) were not injured. Visual meteorological conditions prevailed for the local flight that departed 1G4 about 0940.

According to the Director of Operations, the purpose of the flight was to sling load fuel cans from 1G4 that is located on the rim of the Grand Canyon to the canyon floor to refuel the tour boats operating on the Colorado River. The accident flight was the first flight of the day. The pilot utilized a 50-foot-long line and a net to transfer 15 fuel cans down to the canyon floor.

In his written statement, the pilot reported that when he picked up the load at the top of the canyon (elevation 4,800 feet msl) he performed a power check and the torque required was 75 percent for an out of ground effect hover. After stabilizing the load he began a descent to the canyon floor below (at an elevation of 1,300 feet msl) and was at a rate of about 50 feet per minute as he neared the ground. The wind conditions were reported by witnesses and the pilot as being calm, or nearly so. His head was outside the cockpit watching the ground crew, when he heard a tone, and then heard a series of three low frequency popping noises. The pilot said he was unsure if the popping sounds were coming from the engine or from the main rotor blades The helicopter then began to settle toward the ground and descended to a hard impact into desert scrub brush. The pilot said he closed the throttle after hearing popping noises and entered an autorotation.

Witnesses to the accident reported that the approach was a controlled approach, and there was no sway or other unusual movement in the load. As a ground crewmember reached for the load, about 5 feet above the ground, he saw the helicopter sink down and impact the scrub brush. The witness did not perceive any unusual popping sounds preceding the descent and impact.

Papillon's Director of Operations indicated that the external load weighed about 690 pounds, and there was 340 pounds of fuel on board the helicopter.

According to a Federal Aviation Administration (FAA) inspector, conditions at the accident site were light winds, about 3 knots or less, with a temperature of 75 degrees Fahrenheit. The accident site elevation was about 1,300 feet.

The engine was a Rolls-Royce 250-C30P, serial number CAE 890182, part number 23004545. The total time on the engine was reported to be 12,348.7 hours

The engine was removed from the airframe by Papillon Helicopters maintenance personnel and shipped to Aeromaritime America, Mesa, Arizona. A test cell run was conducted on May 12, 2005, under the supervision of an FAA Inspector from the Scottsdale, Arizona, Flight Standards District Office. The Aeromaritime engine test cell was neither calibrated nor correlated to the Rolls-Royce master at the time of the engine run in Mesa.

The printed results of the engine run on the test stand indicate the difference between the horsepower observed in this run and spec horsepower ranged from 2 percent below at takeoff

to 4.1 percent above at the Cruise B test point.

The test stand operator's attempts to conduct acceleration and droop tests were hampered by the test cell automatic shutdown point. The test cell was reported to be set to stop the flow of fuel at an arbitrary value of 107.1 percent N2. The 250-C30 Series Operation and Maintenance Manual identifies the N2 limits for continuous operation as varying linearly from 114 percent at flight autorotation to 107 percent at takeoff power. The 15-second transient N2 limitations vary from 119 percent at flight autorotation to 109 percent at takeoff power. In as much as the test cell arrested the flow of fuel well below the transient limits listed, no valid conclusion could be drawn regarding the operation of the power turbine governor in responding to large and rapid power changes.

There were no significant irregularities noted in the engine test cell runs that were conducted. A copy of the test cell results provided by Aeromaritime is included in the public docket materials for this accident. At the conclusion of the test cell run, Papillon Helicopters sent the engine to Premier Turbines for disassembly, examination, and repair as necessary to return the engine to service.

In the course of their disassembly inspection in late May 2005, Premier Turbines noted that the compressor "bump" clearance was measured at 0.022 inches, 0.007 inches above the allowable range established in the Rolls-Royce Overhaul Manual. Premier reported none of the measured pressures recorded during the bleed valve test were within the allowable tolerance. These discrepancies were not reported to the Safety Board or to Rolls Royce until after the engine had been repaired and returned to service.

Rolls-Royce Model 250 engineering personnel analyzed the results of the engine test cell runs as well as the measurements and observations noted during the Premier Turbine disassembly and repair of the engine. The performance difference noted between the two engine runs is attributed to the combined effects of the increased clearance and an overboard leak of the bleed valve of approximately 1 percent. The performance degradation is likely to have been a subtle onset over time and would not account for the loss of power described by the pilot. A summary of the engineering evaluation is included in the public docket materials for this accident.

Both the power turbine governor and gas producer fuel control were tested by Honeywell in South Bend, Indiana, on June 23, 2005. The Honeywell report concluded there were no conditions identified that would have prevented normal operation of either unit.

Pilot Information

Certificate:	Flight Instructor; Commercial	**Age:**	36, Male
Airplane Rating(s):	None	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	Seatbelt, Shoulder harness
Instrument Rating(s):	Helicopter	**Second Pilot Present:**	No
Instructor Rating(s):	Helicopter; Instrument Helicopter	**Toxicology Performed:**	No
Medical Certification:	Class 1	**Last Medical Exam:**	02/01/2005
Occupational Pilot:		**Last Flight Review or Equivalent:**	11/01/2004
Flight Time:	3586 hours (Total, all aircraft), 762 hours (Total, this make and model), 3514 hours (Pilot In Command, all aircraft), 115 hours (Last 90 days, all aircraft), 70 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	Bell	**Registration:**	N3895D
Model/Series:	206L-1	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	45590
Landing Gear Type:	Skid	**Seats:**	1
Date/Type of Last Inspection:	04/01/2005, 100 Hour	**Certified Max Gross Wt.:**	4150 lbs
Time Since Last Inspection:	10 Hours	**Engines:**	1 Turbo Shaft
Airframe Total Time:	21505 Hours	**Engine Manufacturer:**	Rolls-Royce
ELT:	Installed, not activated	**Engine Model/Series:**	250 C30P
Registered Owner:	Monarch Enterprises, Inc.	**Rated Power:**	650 hp
Operator:	Monarch Enterprises, Inc.	**Air Carrier Operating Certificate:**	On-demand Air Taxi (135)
Operator Does Business As:	Papillon Helicopters	**Operator Designator Code:**	PG9A

Meteorological Information and Flight Plan

Observation Facility, Elevation:		**Observation Time:**	
Distance from Accident Site:		**Condition of Light:**	Day
Direction from Accident Site:		**Conditions at Accident Site:**	Visual Conditions
Lowest Cloud Condition:	Clear	**Temperature/Dew Point:**	24°C
Lowest Ceiling:	None	**Visibility**	50 Miles
Wind Speed/Gusts, Direction:	Calm	**Visibility (RVR):**	
Altimeter Setting:	29.93 inches Hg	**Visibility (RVV):**	
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Peach Srpings, AZ (1G4)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:	0940 MST	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	N/A	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 None		

Administrative Information

Investigator In Charge (IIC):	Tealeye C Cornejo	**Adopted Date:**	05/29/2007
Additional Participating Persons:	Danny Cachero; Federal Aviation Administration; Las Vegas, NV Rick Thorpe; Rolls-Royce Allison; Indianapolis, IN Patrick Mallen; Papillon Helicopters; Grand Canyon, AZ		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov, or at 800-877-6799. Dockets released after this date are available at http://dms.ntsb.gov/pubdms/.		

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