Aviation Safety Investigation Report 199502654

Bell Helicopter Co JetRanger III

17 August 1995

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Occurrence Number: 199502654 **Occurrence Type:** Accident
Location: 56 km E Wittenoom, (ALA)
State: WA **Inv Category:** 4
Date: Thursday 17 August 1995
Time: 1552 hours **Time Zone** WST
Highest Injury Level: None

Aircraft Manufacturer: Bell Helicopter Co
Aircraft Model: 206B (III)
Aircraft Registration: VH-HRE **Serial Number:** 2745
Type of Operation: Charter Passenger
Damage to Aircraft: Substantial
Departure Point: Hooley Station, WA
Departure Time: 1535 WST
Destination: Hooley Station, WA

Crew Details:

Role	Class of Licence	Hours on Type	Hours Total
Pilot-In-Command	ATPL	2600.0	3500

Approved for Release: Friday, April 12, 1996

The aircraft was cruising at 2,000 ft above ground level when the pilot heard an unusual noise coming from the engine. He immediately placed the aircraft into an autorotation descent. The chip detector light illuminated, the airframe began to vibrate and the engine-out warning sounded prior to landing. The pilot was able to complete a safe but heavy emergency landing in a heavily timbered area.

Inspection indicates the engine failure was caused by the decoupling of the power module. Once separated, the fourth stage turbine wheel breached the turbine casing.

The turbine assembly and the fourth stage wheel had completed 1612 hours time in service since they were last overhauled. The turbine had 1887 and the wheel had 2032 hours to run to their next overhaul.

Examination of the power turbine components indicates that the power turbine coupling fractured in the reduced section of the coupling, aft of the region that forms the number six bearing inner race. The number six bearing components were also extensively damaged. Most of the damage was consistent with eccentric rotation of the power turbine assembly.

A blade had been lost from the fourth stage turbine wheel. The shroud ring and blades are an integral part of the wheel. Blade separation requires fractures in both the shroud ring and the blade aerofoil section. The shroud had fractures on both sides of the blade. The blade had fractured near its base. Fatigue cracking was associated with all three fractures. The failures in the shroud ring were consistent with slow fatigue crack growth under a uniform loading environment over many engine cycles (low cycle fatigue). The failure in the blade was consistent with crack growth in a variable amplitude loading environment over a lesser number of engine cycles (high cycle fatigue). No abnormalities were found which may have contributed to fatigue crack initiation.

The different nature of the fatigue cracks in the shroud and blade indicate that the shroud fractures preceded the crack in the blade. The fracture of an integrally cast shroud ring on both sides of a turbine blade would result in a changed loading condition that could lead to premature blade failure. The loss of a blade from the fourth stage wheel would create an out of balance condition. This probably led to failure of the power turbine rotor assembly.

The circumstances which caused fatigue cracking and final failure in the shroud could not be established.