Aviation Safety Investigation Report 199502225

Robinson Helicopter Co R22

17 July 1995

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Aviation Safety Investigation Report

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Occurrence Number: 199502225 **Occurrence Type:** Accident
Location: Brighton Downs Station
State: QLD **Inv Category:** 3
Date: Monday 17 July 1995
Time: 1950 hours **Time Zone** EST
Highest Injury Level: Fatal
Injuries:

	Fatal	Serious	Minor	None	Total
Crew	1	0	0	0	1
Ground	0	0	0	0	0
Passenger	0	0	0	0	0
Total	**1**	**0**	**0**	**0**	**1**

Aircraft Manufacturer: Robinson Helicopter Co
Aircraft Model: R22 BETA
Aircraft Registration: VH-BEI **Serial Number:** 2494
Type of Operation: Miscellaneous Ferry
Damage to Aircraft: Destroyed
Departure Point: Headingly Station
Departure Time: 1700 EST
Destination: Pot Jostler Outstation

Crew Details:

Role	Class of Licence	Hours on Type	Hours Total
Pilot-In-Command	Commercial	787.0	794

Approved for Release: Thursday, November 21, 1996

1. FACTUAL INFORMATION

Summary

The helicopter did not arrive at its destination following a ferry flight. The wreckage of the helicopter was found by chance, late at night. It had crashed during a dark night. The engine had stopped before impact. The helicopter fell several thousand feet out of control.

The investigation did not find any mechanical defects which could have contributed to the accident.

History of the flight

During the day, the pilot flew on mustering tasks and an hour's ferry flight from Avon Downs to Headingly station. There he refuelled the helicopter with 50 litres of aviation gasoline. None of the Headingly station staff had the opportunity to speak with the pilot during his short stopover, but they saw the helicopter depart to the south-east at 1700 EST.

At 1950, the manager of Brighton Downs station heard a message from the pilot on the station's citizen band radio. The pilot said that he was 4 NM from Pot Jostler outstation and that he could see the lights of the house. The manager replied that a kangaroo shooter and his family occupied the house and that he could get a meal from them. The last radio message from the pilot wished the manager good night.

At about 2100, the kangaroo shooter and his family were returning from a paddock about 20 km north of the outstation. They saw a piece of perspex lying on the access track about 5 km short of the house and recognised it as a part of a helicopter. A short search by truck headlights revealed a tail boom sticking out of the ground. They found the main fuselage of the helicopter some 300 m south of the tail boom.

The family said that they had not left any lights on at the outstation in their absence. The only lighting available was gas powered.

Weather conditions

Last light is regarded as the time when the ambient light value falls below that required for aircraft operating under day visual flight rules and is defined as the time when the setting sun is six degrees below the western horizon. Ambient light may be varied by a cloud cover which has the effect of bringing on an earlier last light. Last light at Pot Jostler outstation was calculated as 1832, 1 hour and 18 minutes before the pilot radioed Brighton Downs.

The Bureau of Meteorology analysis of the weather conditions agreed with reports from local observers. There was a cloud cover of five octas strato-cumulus, base of about 2,000 ft. Above the lower layer of cloud was a higher level alto-cumulus cover of five to six octas. Cloud obscured any starlight. The moon was in its last quarter and did not rise over the accident site until 2305. A ground observer stated that it was a very dark night without a visible horizon.

The wind at ground level was relatively strong and gusting at 10-20 knots from the south-south-east.

Whether the pilot obtained a weather forecast is not known.

The helicopter

The helicopter had undergone a periodic inspection on 14 July 1995 at the company's maintenance facility at Mt Isa. A new maintenance release was issued and was valid until 14 July 1996 or 595.2 hours total time in service. It was valid for day visual flight rules operations in the categories of private, aerial work, and charter. The helicopter's hour meter recorded 12.7 hours since the maintenance release was issued.

The helicopter was not fitted with attitude instruments essential for night operation. Along with other company helicopters, it was fitted with a global positioning system. The fitment allowed pilots to save flight time by being able to track direct to a destination over featureless terrain.

Flight fuel

Direct track distance between Headingly station and the crash site was 186 NM. Given a flight time of 170 minutes, the average groundspeed was calculated at 65 kts. Normal cruise speed is 80-85 kts true airspeed. The loss of 15-20 kts in ground speed confirmed the earlier weather assessment. The helicopter's fuel endurance was approximately 3.5 hours from full tanks. Whether the pilot filled the tanks to capacity at Headingly station is not known.

Wreckage examination

The wreckage was scattered along a 1,000-metre trail, aligned with the prevailing wind, 165/345 degrees magnetic. The investigation team found small pieces of perspex at the northern extremity of the trail and the tail boom was 300 m north of the main fuselage, which was the southernmost piece of wreckage. The fuselage gave the appearance of having been involved in a very heavy landing. It was upright but squashed to half its normal height. One complete main rotor blade and one half of the other were still attached to the mast. A remnant of the second blade had come to rest a short distance away. Both blades were bent. One blade was bent up, the other was S-shaped. The mast had been subjected to one severe mast bump. The base of one blade had crimped the mast. The main rotor blades had severed the tailboom and penetrated the cabin.

Those first at the scene said that there had not been any fuel smell. The main fuel tank was holed on impact but the auxiliary tank was intact. The latter contained 1.5 litres, the equivalent of unusable fuel. Stretched light globe filaments revealed that the following warning lights were illuminated at impact: Clutch, Low Fuel, Low Rotor RPM, and Rotor Brake. A later specialist metallurgical examination of crimped sections of exhaust manifold found that the manifold was cold at impact. The engine was stripped later in an engineering workshop, but nothing was found which could have prevented normal operation.

The flight manual warned that when the Fuel Low warning light illuminates, the pilot has five minutes to land the helicopter before fuel exhaustion.

Trajectory analysis of the wreckage trail found that the helicopter broke up between 2,400-2,800 ft above ground level.

Pilot experience

The pilot was first issued with a commercial helicopter pilot licence on 11 May 1993. The company had employed him since 2 May 1995. He had previously been employed by a Western Australian pastoral company where pilots worked as ringers in a private operation. Another pilot from this Western Australian company reported that pilots were required to fly excessive hours per week, often beyond daylight hours.

When the present company's chief pilot gave him a check on company flying operations, the pilot indicated that he had previously flown a Robinson R22 helicopter at night. The chief pilot warned him not to continue the practice with this company. Extracts from his detailed notebook recovered from the wreckage indicated that the pilot had flown at night on two subsequent occasions. One entry, dated 23 June 1995, read: 'Left Serpentine at 5 pm for Pot Jossler (Jostler). Arrived at Pot Jossler in pitch dark at 7:10 pm. Flew last 20 min. at 4,500 ft so as not to run into anything'.

An inspection of his logbook revealed that the pilot had not received any formal training in night flying, nor had he logged any solo night flying.

The manager of Brighton Downs station said that the pilot had worked the property several times and was becoming familiar with it. The pilot had flown 11 hours on the day of the accident, a large proportion of it in mustering, which is a high workload task.

2. ANALYSIS

Conduct of the flight

The pilot's diary indicated that he had on occasions continued to fly the helicopter at night after joining his present employer. Company supervision had not been sufficient to discover these practices. The helicopter was not equipped with the necessary flight instruments to safely conduct flights after last light. It was fitted with a global position system navigational aid.

The terrain along track is relatively featureless and the area is poorly serviced by radio navigation aids. A global positioning system is a useful aid, but in this case it would have enabled the pilot to continue flight after last light when navigation by other means was impossible.

Fuel

Those first at the scene could not smell any fuel. Subsequent specialist examination confirmed that the Fuel Low warning light was on at impact and the engine was cold, an indication that it had stopped. All evidence pointed to fuel exhaustion as the reason for engine stoppage.

Disorientation

When the pilot radioed the manager of Brighton Downs station he said that he could see the lights of the house. Since there were, in fact, no lights on at the house, the pilot must have seen some other light, perhaps a star visible through a small break in the cloud cover. Such a mistaken belief would have caused immediate disorientation by giving him a false horizon reference.

The sudden illumination of the bright Fuel Low warning light may also have contributed to the pilot becoming disorientated. This light, which is a bright red colour, is designed for daytime operation and cannot be dimmed. The pilot would have lost any outside visual reference in the low ambient light conditions following illumination of the warning light.

Either or both of the two events could have led to a loss of control. Such loss of control must have been sudden because the pilot did not transmit on the radio link established earlier.

Fatigue

Having flown for 11 hours, the pilot had exceeded the daily duty time limitations of Civil Aviation Order 48 by 2 hours. These limits were formulated to prevent pilots flying when fatigued. Such a long working day culminating in a stressful night flight could only have left the pilot fatigued. One of the most dangerous aspects of performance degradation with fatigue is that a person is unlikely to be aware of the manner and extent of this deteriorating performance (see F.H.Hawkins, Human Factors in Flight, Ashgate, Aldershot, 1987). Fatigue can result in a number of significant performance decrements such as poor self monitoring, increased susceptibility to distraction, lowered arousal and increased reaction time.

3. CONCLUSIONS

3.1 Findings

1. The helicopter was certified for day, visual flight rules operations only.

2. The pilot had operated the helicopter at night.

3. The pilot was not qualified for night flying.

4. The night was very dark without a visual horizon.

5. The pilot was probably 'fatigued', having flown excessive hours that day.

6. The engine probably stopped due to fuel exhaustion.

7. The pilot probably became disorientated and lost control of the helicopter.

8. The rotor RPM decayed significantly.

3.2 Significant factors

1. The pilot continued the flight after dark when neither he nor the helicopter was equipped to do so.

2. The pilot probably lost control following fuel exhaustion.