

**Aviation Safety Investigation Report
199801298**

**Bell Helicopter Co
JetRanger III**

10 April 1998

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NOTE: All air safety occurrences reported to the ATSB are categorised and recorded. For a detailed explanation on Category definitions please refer to the ATSB website at www.atsb.gov.au.

Occurrence Number: 199801298 **Occurrence Type:** Accident
Location: 22km N Dampier
State: WA **Inv Category:** 4
Date: Friday 10 April 1998
Time: 0515 hours **Time Zone** WST
Highest Injury Level: Minor
Injuries:

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

Aircraft Manufacturer: Bell Helicopter Co
Aircraft Model: 206B (III)
Aircraft Registration: VH-WCQ **Serial Number:** 2781
Type of Operation: Charter Positioning
Damage to Aircraft: Destroyed
Departure Point: China Steel Realistic Oil Rig
Departure Time:
Destination: Dampier WA

Crew Details:

Role	Class of Licence	Hours on	
		Type	Hours Total
Pilot-In-Command	Commercial	900.0	4100

Approved for Release: Friday, September 18, 1998

FACTUAL INFORMATION



At 0450 WST, the Bell 206 helicopter departed the heliport on East Intercourse Island to conduct a marine pilot transfer to a ship waiting at the outer buoy in Dampier Sound. The pilot reported that although there was a high overcast, which mostly obscured the moon and made the sky very dark, the horizon was visible. The towns of Dampier and Karratha were to the south-east of the ship. The wind was calm and the sea surface almost mirror-like. The pilot reported that the horizon was clearly discernable during the transit to the ship. The moon set at 0452 and sunrise was at 0633. The helicopter landed on the ship at about 0505 and disembarked the marine pilot. At about 0514, the helicopter departed towards the north-east. The pilot reported that as the helicopter climbed through 500 ft, the tail rotor pedals felt unusual. Whilst he was attempting to determine the nature of the tail rotor pedal problem, he did not monitor the helicopter's flight attitude and performance, and the helicopter descended into the sea. A deck hand on the ship reported to the ship's bridge staff at about 0515 that he saw the helicopter's lights enter the water off the ship's port side. At approximately 0615, a port authority vessel recovered the uninjured pilot. The helicopter sank in about 18 m of water in the main shipping channel to Karratha.

An inspection of the recovered wreckage did not reveal the cause of the reported fault in the tail rotor control system. The pilot reported that although the pedals had felt unusual, there had been no loss of directional control before the impact.

The helicopter was fitted with a radio altimeter that had a low height alert warning light. The pilot reported that the alert was set to activate at 150 ft but did not recall seeing the low light illuminate before the helicopter struck the water. The helicopter was not fitted with an autopilot or height hold facility. The operator reported that the collective of the helicopter had a tendency to fall if not closely controlled by the pilot.

The pilot had recorded approximately 4,200 hours flying experience on a variety of helicopters, including approximately 900 hours on the Bell 206. He had completed 20 hours on this helicopter in the 30 days immediately prior to the accident. The pilot had a valid night visual flight rules (night-VFR) rating and 51 hours night-VFR experience. However, he had accumulated only 5.5 hours instrument flying time and he did not have an instrument rating. The pilot commenced night marine pilot transfer training about 2 months prior to the accident, and had received 21 hours of night-VFR training that included more than 63 landings on ships at night. About half of these landings were to brightly lit decks. About 70 per cent of the landings had been conducted under dark-night conditions but his training did not include practice emergencies or distractions during night departures. He began carrying passengers less than 1 month prior to the accident.

The pilot had been working alternate days for 8 days prior to the accident. The longest shifts had been two of 8 hours duty time each.

Human performance levels vary through physiological cycles of approximately 24 hours. These are referred to as circadian rhythms. The most significant circadian low-point occurs between approximately 0200 and 0600. The effects of circadian dysrhythmia include poor judgement, increased reaction times, mental haziness or lethargy and a general decrement in psychomotor performance. On the day of the accident, the pilot had been awakened by a call from work at 0400 to pick up two marine pilots for a departure 1 hour later.

A constraint in human performance when operating at night is the eye's poor ability to quickly adjust from brightly lit areas, such as a ship's deck, to dark environments, such as over water. The human eye generally achieves a large amount of dark adaptation after 15 minutes with full adaptation occurring after about 40 minutes.

The Civil Aviation Regulations (CARs) permitted the operation of aircraft under night-VFR with certain provisions. Although the CARs restricted single-engine aircraft charter operations, the Civil Aviation Orders (CAOs) provided exemptions to these limitations for marine pilot operations. CAOs also required that operations that were conducted during visual meteorological conditions at night, do so in accordance with the helicopter's flight manual. Although the regulations and orders did not require a visual horizon when flying at night, there was no on-going requirement for a pilot to demonstrate an ability to fly an aircraft with sole reference to the aircraft's flight instruments.

The company operations manual required night-VFR flights to be flown such that flight attitude could be maintained by reference to external objects adequately illuminated by ground or celestial lighting. The helicopter's flight manual required that the pilot maintain orientation through visual reference to ground objects solely as a result of lights on the ground or adequate celestial illumination. Neither publication provided guidance or caution on the human factor limitations associated with night visual flying.

ANALYSIS

The pilot had a visual horizon during the transit to the ship and the lights of the town of Dampier would have provided a horizon to the south-east for the return transit. The ambient and ground lighting conditions would probably have been sufficient to meet the requirements of the company operations manual and the helicopter's flight manual, although it is unlikely that such conditions existed during the departure from the ship. The moon had set 13 minutes prior to the helicopter's arrival at the ship. The transit time to the ship would probably have been sufficient for the pilot to attain a large proportion of his visual dark adaptation and therefore he may have ascertained that there was an adequate horizon to the north-east. However, after landing on the ship, the pilot's dark adaptation would have been substantially destroyed by the ship's lights illuminating the deck area. Although the company operations manual and helicopter's flight manual required sufficient lighting to maintain flight attitude, neither publication provided guidance or caution on the human factor limitations associated with dark adaptation. Consequently, although the pilot thought he had an adequate horizon on which to maintain the helicopter's flight attitude, he had no objective measure with which he could ascertain the suitability of the conditions for continued flight in accordance with the company manuals.

The departure from the ship was unlikely to have been made with any discernible horizon because the moon had set 22 minutes before, the high overcast had obscured much of the celestial lighting and the pilot could not have achieved any dark adaptation in the brief period from the takeoff to water impact. Deprived of an adequate external visual horizon, the pilot would have been unable to maintain the helicopter's attitude and departure profile without referring to the helicopter's flight instruments. Given his minimal instrument flying experience, the pilot may have had difficulty transitioning from visual reference to instruments during the departure. When the pilot became concerned at the "feel" of the tail rotor pedals, he diverted his attention from the helicopter's attitude and performance indications for an extended period. While the pilot was not monitoring the helicopter's flight attitude or performance, it is likely that the helicopter's collective control fell and the helicopter descended. Having been awakened at 0400, the pilot was working within the most pronounced low point of his circadian cycle which may have also adversely affected his ability to maintain his situational awareness during the distraction. His relative inexperience at conducting night marine transfers associated with possible circadian dysrhythmia may have reduced his situational awareness because he was unaware that the helicopter was descending until it struck the water.

SAFETY ACTION

The Bureau of Air Safety Investigation is currently investigating a perceived safety deficiency that has been identified as a result of this occurrence. The deficiency relates to:

- human factors involved with operating helicopters over water at night;
- passenger safety provisions for over-water helicopter operations; and
- the adequacy of current night-VFR requirements for over-water helicopter operations.

Any recommendation issued as a result of this investigation will be published in the Bureau's Quarterly Safety Deficiency Report.

Local safety action

The operator has increased the training requirements for pilots operating to ships under night VFR. These requirements include night training under moonless conditions and total cloud coverage, the introduction of basic instrument flying proficiency checking and the introduction of annual written human factors examinations.

