

**AVIATION OCCURRENCE REPORT**

**MAIN ROTOR STRIKE**

**PEMBERTON HELICOPTERS INC.  
BELL 206B II C-GJPK  
SQUAMISH, BRITISH COLUMBIA 10 NM EAST  
26 JUNE 1996**

**REPORT NUMBER A96P0105**

The Transportation Safety Board of Canada (TSB) investigated this occurrence for the purpose of advancing transportation safety. It is not the function of the Board to assign fault or determine civil or criminal liability.

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#### Summary

The British Columbia Ministry of Forests, Forest Service division, chartered the Bell 206B helicopter, serial number 1206, to fly two inspectors to various logged areas to conduct an aerial and surface inspection. The helicopter pilot was to land and let the inspectors out of the helicopter at a clearcut so they could inspect it from the ground. The terrain was sloped at angles ranging from 15 to 25 degrees and was transected by a decommissioned logging road.

The pilot attempted to off-load his passengers while touching down on one skid on the off-level road. The skid had just touched down when the pilot determined that the site was not suitable, and he had just decided to reject the landing when he detected a vibration in the cyclic control. The passengers heard a bang. The pilot immediately raised the collective control and brought the helicopter up 10 feet. He then turned about 270 degrees to the right in an attempt to find a more suitable landing site. The vibrations increased in intensity during the turn, and the pilot noticed that the main rotor speed was decaying. He attempted to land on the off-level road; however, on touchdown, the helicopter rolled over, coming to rest almost upside down. The front-seat passenger received a cut to the head from flying debris and the rear-seat passenger was bruised; the pilot was not injured. The helicopter was substantially damaged. All occupants were able to exit from the helicopter with some help from each other. One passenger climbed up the slope and radioed for help. A helicopter was dispatched to the site with a first-aid attendant.

*Ce rapport est également disponible en français.*



### Other Factual Information

Helicopters are frequently used during logging operations and pilots often use the access roads as landing sites. Ministry of Forests regulations require logging companies to dig up the access roads used by the logging trucks when the logging operation is terminated so that the area can return to its natural state more quickly. Both air and ground checks are conducted as part of the required final harvesting inspections. The area of mountainside where the accident took place had been logged and the access road on this cut block had been decommissioned. In combination with the steep slope of the terrain, this left no suitable place for a helicopter to make a normal landing.

The pilot decided to attempt to disembark the passengers by placing one skid on the ground to stabilize the helicopter while the passengers exited. The site at which the pilot was attempting this hovering landing was a mound of gravel on the former logging road.

Upon closer examination, however, the pilot felt that the site was not sufficiently stable for disembarking the passengers, and he had just made the decision to reject the landing when the bang and vibration were noted. There was a suitable landing site within one mile of this area, and the pilot had been planning to land there if he found no means of dropping off his passengers at this location.

The hovering landing technique of placing one skid on the ground to stabilize the helicopter while holding the other skid level, without actually landing, is a recognized practice when embarking and disembarking properly briefed passengers on off-level terrain.

The passengers had only been briefed for an exit following a normal landing, however, and exiting a helicopter when some or all of its weight is still supported by main rotor lift involves different techniques and considerations on the part of the passengers and the pilot. That the passengers had not been briefed was another factor in the pilot's decision to reject the off-level, hovering landing.

The approach to the site was made parallel to the road; to the left of the helicopter was higher terrain containing tree stumps. On examination, the tree stumps were found to exhibit numerous cuts and marks as a result of the logging operation, and it was not possible to determine if any of the stumps had been struck by the main rotor blades. One stump, however, was within the plane of the main rotor and was high enough to have been struck by the blades as the helicopter touched down on one skid.

The main rotor shaft sheared during the accident sequence, and the main rotor hub, with parts of the blades still attached, was found 45 feet from the wreckage. Wood fibres were found lodged in a blade tip, and chordwise scratches were etched into the bottom surface of the blade. The other blade tip was not found.

The pilot had begun working for the company two-and-a-half months before the accident. He had accumulated over 3,000 hours of flying experience since starting his flying career in 1991. He held the appropriate licences and ratings.

The pilot was wearing his seat-belt, shoulder harness, and a helmet.

Shoulder harnesses were available to both passengers but neither was wearing one at the time of the accident. Air Navigation Order (ANO) Series II, Number 2 requires that a shoulder harness be available and be worn by every person on board during special purpose operations such as this aerial survey work.

The passengers were familiar with helicopter operations; both had been passengers on numerous similar flights. They reported that they were uncomfortable with the area the pilot had chosen to land as they had expected to exit the helicopter after a normal landing.

They did not communicate their discomfort to the pilot.

The helicopter was not equipped with an emergency locator transmitter (ELT) on this particular flight because it had been removed for maintenance that morning. ANO Series II, No. 17, the *Emergency Locator Transmitter Order*, permits operation of aircraft without an ELT provided the aircraft remains within 25 nautical miles of the aerodrome of departure. The area in which the helicopter was operating was within 25 nautical miles of the point of departure.

The lack of an ELT did not cause any delay in the rescue of the helicopter's occupants because the inspectors were carrying Forest Service two-way radios.

### **Analysis**

A bang, vibrations, and a loss of rotor speed are typical symptoms of a main rotor strike. Although no clearly identifiable rotor strike marks were found on the stumps in the area of the attempted landing site, the marks and the trapped wood fibres on the main rotor blade tip are consistent with a rotor strike, likely against a stump that protruded into the area of the rotor disk.

It is likely that, when the pilot approached the decommissioned road, his attention was focused on evaluating the suitability of the landing surface and he did not recognize that a stump extended into the main rotor disk area. Although the helicopter was airborne, the vibrations and the decaying main rotor speed which resulted from the strike forced the pilot to land immediately. The helicopter touched down on the steep sloping terrain and rolled over.

### **Findings**

1. The pilot attempted an off-level, hovering landing at an unsuitable site.
2. The main rotor blade likely struck a stump, causing vibrations and the main rotor speed to decay.
3. The pilot was forced to land on steep sloping terrain, which caused the helicopter to roll over.
4. The passengers were not wearing the available shoulder harnesses.

### **Causes and Contributing Factors**

The pilot was attempting a hovering landing at an unsuitable site when the main rotor blades likely struck a stump. The pilot was subsequently forced to land on steep sloping terrain, which caused the helicopter to roll over.

### **Safety Action Taken**

Following this accident, the BC Ministry of Forests took the following actions:

1. Forestry inspectors were coached to be more vocal in situations where they felt uncomfortable;
2. A memo was issued to employees reminding them of the policy requiring the wearing of shoulder harnesses during flights; and
3. A new policy was established requiring that an ELT be carried on board any aircraft chartered by the Ministry regardless of the circumstances.

*This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board, consisting of Chairperson Benoît Bouchard, and members Maurice Harquail, Charles Simpson and W.A. Tadros, authorized the release of this report on 05 March 1997.*