AMENDED REPORT

AVIATION OCCURRENCE REPORT
A99W0034

COLLISION WITH WIRE

CANADIAN HELICOPTERS LIMITED
BELL 206B C-FOAH
ENTRANCE, ALBERTA
26 FEBRUARY 1999

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Summary

The pilot and two film crew were conducting an aerial photographic flight filming Canadian National (CN) train traffic in the area near Hinton, Alberta. As a train approached Entrance, Alberta, about five miles west of Hinton, the pilot manoeuvred the helicopter over the train cars. Once directly over the cars and about 40 cars behind the locomotives, the pilot descended the helicopter to a skid height of about 12 feet above the rolling stock and adjusted his flight speed so that he was slowly overtaking the locomotives. About 30 seconds into the film run, the helicopter struck two steel electrical wire conductors which crossed the rail line at a 90-degree angle. The wires contacted the helicopter just above the windshield and moved aft into the pitch control rods and main rotor mast. The pitch control rods were severed and aircraft control was lost. The aircraft pitched up, yawed left, then right, and descended in a 45-degree nose-down attitude, striking the ground about 90 feet left of the passing train and about 600 feet beyond the point where the wire strike occurred. The accident occurred at about 1610 mountain standard time (MST). All occupants of the aircraft were wearing both lap and shoulder harnesses, and the pilot was wearing a helmet. The passenger in the left front seat sustained serious injuries, and the pilot and other passenger, in a rear seat, received minor injuries. The helicopter was substantially damaged.

Ce rapport est également disponible en français.

Other Factual Information

On the morning of the occurrence, the pilot attended a briefing at the Canadian Helicopters Limited facility at Edmonton City Centre Airport, Alberta. A pre-flight briefing was attended by members of the filming crew, including their ground support staff, Canadian Helicopters Limited management, and CN rail staff. During the briefing, the pilot was cautioned by the CN member present to be judicious in his choice of altitude when overflying the train as they did not want to startle the train crew. The film director requested that the pilot fly as low and as fast as possible, consistent with flight safety. The pilot briefed the passengers for the flight, and filed a flight plan with the Edmonton Flight Service Station. For the flight, the pilot occupied the right pilot seat, the cameraman, the left front seat, and the film director, the right rear seat. The film crew was briefed on normal and emergency procedures.

A Tyler 206 Nose Mount II was mounted on the lower forward section of the helicopter as per Federal Aviation Authority (FAA) STC SH2256NM. The camera was attached to the nose mount. The nose mount, as installed, provided 200-degree tilt for the film camera. The pan and roll axis were fixed to the helicopter yaw and roll axis. The camera operator, seated in the left front seat, held a control console in his lap. The control console had a monitor and tilt controls. The lens, as installed for this flight, was taped with duct tape to a fixed aperture. To compensate for the mass of the camera and mount, 50 pounds of ballast was placed at station 164.0.

The helicopter was not fitted with a wire strike protection system (WSPS) nor was it required to be by regulation. The company did not fit WSPS to helicopters except where helicopters were to be used extensively for low-level operations.

After departure from Edmonton, the crew conducted some filming before their arrival at Hinton. During the filming, the director maintained contact with his ground support team by cellular telephone, and the ground support team was in contact with CN staff at Edmonton.

The aircraft departed Hinton at about 1410 MST[1] and worked east of Hinton with some train traffic. After landing to reload the externally mounted camera, the pilot flew to the west of Hinton where the crew planned on filming a westbound train. Initially, the train was filmed with the helicopter situated in a hover alongside a trestle. The helicopter then moved vertically and into forward flight while passing over the train. As the train moved under a highway crossing, the helicopter made a right-hand 360-degree turn, manoeuvred directly over the train, and descended to a skid height of about 12 feet above the rail cars. Shortly thereafter, the helicopter struck two steel wire conductors which crossed the twin train tracks at 90 degrees.

The wires were about 35 feet above the tracks, supported by poles 75 m from the tracks. The pole to the south could not have been seen by the pilot, and the pole to the north could have been seen for about four seconds before the wire strike occurred. The wires were oxidized, and the background to the wires was dull terrain and trees. When viewing the film which was taken during the flight, the wires were not distinguishable from the background prior to the impact.
The train was being hauled by two locomotives. Cars 1 through 8 were transporting glycol; cars 9 through 20, liquid caustic soda; cars 21 through 32, flammable liquid; and cars 33 through 107, lumber products and

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1 All times are MST (Coordinated Universal Time minus seven hours) unless otherwise noted.

agricultural products. The height of cars 1 through 32 was 15.6 feet to the top of the railings located at midpoint on the cars. The train crews had been advised that they might encounter a helicopter working at low altitude between Edmonton and Jasper, Alberta. This information was passed to the train crews as general information. When the CN dispatch in Edmonton became aware that the helicopter was working with a specific train, the crew members of that train were not advised so that they would not change their procedures.

Analysis of a film recovered from the camera after the accident shows the helicopter descending for a final run as the train passed under a road. As the helicopter moved over the train, the pilot descended to a skid height of about 12 feet above the cars. The helicopter speed was slightly higher than that of the train. As the helicopter passed over car 25, it struck the wire conductors. The film shows the helicopter pitching and rolling before impact. The last 2 to 3 seconds of film were exposed to light and the last visible information shows the helicopter in a steep descent into trees to the left (south) of the train.

Analysis of videotape provided to CN by the film company shows that, on numerous occasions during this and prior flights, low-level helicopter flights were conducted. On several of these flights, the helicopter was filming the train from below treetop level, and on at least two occasions, from about the roadbed level. Some of the filming was done in eastern Canada and the United States by a different aircraft operator.

Before all the filming runs, except the last run, the pilot carried out an aerial reconnaissance of the area to check for wires and other obstructions. Just before the last pass, the train was entering an area with a view of the mountains in the distance. The rails continued in a westward direction for several miles, thus providing a clear view of the mountains in the background for several minutes as the train moved westward. The pilot, in consultation with the film director, decided that, if one final pass was made, filming would be completed. The wire strike occurred about 30 seconds before the run was to have been terminated.

During the helicopter/ground impact, the pilot's left lap belt failed. Markings on the seat-belt indicated that it was manufactured by the Pacific Scientific Company in February 1973, that it conformed to FAA TSO C22, and that it was rated at 1,500 pounds. The right side of the belt, which had not failed, was pulled to destruction in a tensile testing machine and failed at 1,630 pounds. TSO C22 requires that belts rated at 1,500 pounds fail at no less than 2,250 pounds. Therefore, although this belt's strength exceeded the 1,500-pound rating, it no longer met the requirements of TSO C22. Although it is possible that this reduction in strength was the result of damage during the crash, there was no such visual evidence. Previous experience has found that exposure to sunlight at levels associated with normal service can cause this magnitude of strength reduction to seat-belt webbing after many years of use.

The following TSB Engineering Branch report was completed:

LP 30/99 - Seat-belt Examination, Bell 206B

Analysis

The pilot is responsible for the safe operation of an aircraft. Based on the type of flying that was planned and executed, the pilot was aware that obstacles, such as wires crossing the rail tracks, were his primary concern during low-altitude operations. The pilot stated that he had carried out aerial reconnaissances of all the film runs

except the last film run. The area beyond where the film run was started provided several miles of track where an aerial reconnaissance could have been completed and the filming requirements met. The pilot's decision to complete the task without conducting an aerial reconnaissance resulted in his overlooking a vital safety precaution. As indicated by the CN representative, low flight was not required for the tasking; however, the pilot decided to fly at a skid height of about 12 feet above the train. This decision to fly at such a low altitude placed the helicopter in such a position that it struck the wires crossing the rail tracks. The resulting wire strike caused the pitch control rods to fail, and the pilot lost control of the helicopter.

More serious injuries to the occupants of the aircraft probably were prevented by the wearing of the lap and shoulder harnesses. The serious injuries to the cameraman probably were related to the camera console that he was carrying.

The helicopter was not equipped with a WSPS. The helicopter struck the wire at a position where a WSPS probably would have cut the wire.

Findings

1. The helicopter was being used to film CN trains while flying at low altitude.

2. The pilot had been briefed that he should not overfly the train at low altitude.

3. The pilot and company chief pilot had discussed the hazards of low flight before the beginning of the operation.

4. The portion of track being used for the final film run had not been reconnoitred by the pilot before the filming run.

5. While at a height of about 12 feet above the rolling stock, the helicopter struck two electrical wires which spanned the track at right angles to the direction of flight.

6. The wires contacted the pitch control rods which failed, and the pilot lost control of the helicopter.

7. The helicopter was not fitted with a wire strike protection system.

8. The pilot's lap belt failed. The failure was most likely attributed to a deterioration in strength due to long-term exposure to sunlight.

Causes and Contributing Factors

The pilot lost control of the helicopter when the pitch control rods failed following a wire strike while flying at low level. Contributing to the accident was the fact that the pilot did not conduct a reconnaissance flight to ensure that the flight path was free of obstacles.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board, consisting of Chairperson Benoît Bouchard, and members Jonathan Seymour, Charles Simpson, W.A. Tadros and Henry Wright, authorized the release of this report on 23 December 1999.