



Descent Below Normal Surveillance Altitude Ends in Fatal Wire Strike

While flying over a frozen river in search of illegal fishing operations, the Canadian Coast Guard helicopter struck an unmarked power line. The pilot was killed and three passengers were injured in the accident.

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FSF Editorial Staff

The Canadian Coast Guard Bell 206L turboshaft helicopter, while on a surveillance mission, struck an unmarked power line that spanned the Margaree River on Cape Breton Island, Nova Scotia. The pilot was unable to maintain control of the helicopter, and it struck the ice-covered surface of the river.

The pilot, an employee of Transport Canada (TC) Aircraft Services, was killed, and the pilot's daughter and two Canada Department of Fisheries and Oceans (DFO) officers were seriously injured in the Feb. 25, 1995, accident. The helicopter was destroyed.

The Transportation Safety Board of Canada (TSB), in its official accident investigation report, determined that "the pilot did not see the power line in time to take avoidance action." Contributing factors "were the pilot's decision to conduct the portion of the flight over the river at low altitude without having first completed a reconnaissance of the area for obstructions, and the absence of clearly defined procedures on the conduct of fisheries surveillance flights."

The flight was being conducted to detect illegal fishing activity that had been reported in the region, the report said.

The report said that the bottom area of the main windscreen of the helicopter struck the power line (Figure 1, page 2). "The helicopter was in a level attitude, about 70 feet [21 meters] above the river and at about the midpoint of the width of the river, flying at an estimated airspeed of 80 knots [148

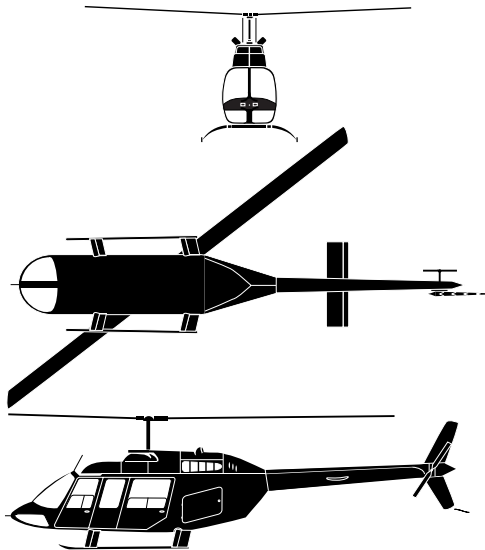


kilometers per hour (kph)], when it struck the power line," the report said. "The power line broke in two places: where it contacted the helicopter and where it joined onto the western pole. The broken section of the power line made contact with one main rotor blade and [the main rotor blade] was then thrown forward. It was found [324 meters (1,063 feet)] from the initial point of the power-line contact."

The helicopter struck the ice-covered surface of the river in a nose-down, 15-degree right bank about 201 meters (660 feet) from the point of wire contact, the report said. "The main lower fuselage section was torn away, and the fuel tanks were ruptured. After initial ground impact, the main cabin area slid forward [52 meters (170 feet)], and the cockpit nose area was located [16.5 meters (54 feet)] from the main cabin area. The total wreckage trail extended [269 meters (883 feet)]."

Seat-belt buckles remained attached during the accident sequence, the report said, but fuselage structures around the seat-belt attachments failed. "The pilot and the two DFO ... officers were found lying on the ice outside of the cockpit/cabin area," the report said.

The helicopter's fuel cells were ruptured during the accident sequence, and a large quantity of fuel was pooled around the wreckage. "All persons on board were soaked by the pooled fuel, which resulted in substantial chemical-burn injuries to the occupants," the report said.



Bell 206L

The Bell 206L LongRanger first flew in 1974. Developed from the 206B JetRanger, it has a longer fuselage that can accommodate seven seats. The 206L has a maximum takeoff weight of 1,882 kilograms (4,150 pounds) and a maximum cruising speed at 5,000 feet (1,525 meters) of 110 knots (204 kilometers per hour). It has a service ceiling of 20,000 feet (6,100 meters) and a range of 360 nautical miles (666 kilometers) at an altitude of 5,000 feet with no reserves.

Source: *Jane's All the World's Aircraft*

Accident investigators found no evidence of preimpact airframe failure or engine malfunction. Warning lamps for low rotor revolutions per minute (rpm), engine out, engine relight, transmission oil, battery hot and float arm were not lit at impact, the report said.

There was also no evidence that incapacitation or other physiological factors affected the pilot's performance, the report said. There were no recorded radio transmissions from the accident helicopter before the wire strike.

The helicopter's emergency locator transmitter (ELT) was found intact and with the function switch in the "off" position and intact. The undamaged condition of the switch "led to the conclusion that the ELT was in the 'off' position prior to impact," the report said. "It could not be determined when the 'off' selection had been made."

The pilot, 44, held a commercial pilot's certificate and had logged a total of 3,813 hours of flight time, of which 1,636 were in type. "The pilot was qualified on Bell 206 helicopters and held a valid license," the report said, adding that the pilot had flown DFO flights prior to the accident flight.

The weather-reporting facility nearest to the accident site is 76 kilometers (47 miles) to the east in Sydney, Nova Scotia. Weather at the time of the accident was reported as visual meteorological

conditions with a measured broken ceiling at 3,000 feet (915 meters) and a second overcast layer at 25,000 feet (7,625 meters). Visibility was 15 miles (24 kilometers) and winds were from 270 degrees at 16 knots (30 kph) gusting to 22 knots (41 kph), the report said.

"Witnesses to the accident indicated that there was generally clear sky with good visibility," the report said. "The sun was 70 degrees above the horizon and was overhead and slightly in front of the helicopter at the time of the [accident] [at 1321 local time]. The survivors described the visibility and flight conditions as very good. Turbulence was described as light."

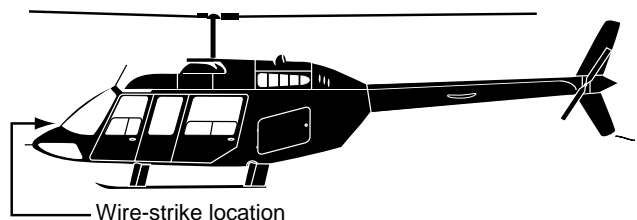
The flight originated at the Coast Guard base in Shearwater, located near Halifax, Nova Scotia. Several lakes on the island's north end were inspected first, and the helicopter was refueled at Neil's Harbour, on the northeast coast of Cape Breton Island, the report said.

The helicopter then proceeded south. After inspecting another area, the pilot turned the helicopter north and flew over the western coast of Cape Breton Island to the mouth of the Margaree River. The wire strike occurred about four kilometers (2.5 miles) from the mouth of the river. "Witnesses along this portion of the river saw the helicopter descend to an estimated 100 feet [31 meters] AGL [above ground level] at the mouth of the Margaree River and then fly up the river at this altitude," the report said.

The report said that one DFO officer was seated in the front-left cockpit seat. The DFO officer told accident investigators that during the flight up the river he saw a small evergreen tree stuck in the river's ice-covered surface. "Such small evergreen trees are known by DFO officers to be used by poachers to prevent holes cut in the ice from freezing. These holes are then used to set illegal fish nets under the ice surface.

"The DFO officer could not recall any conversations in the aircraft during this short flight segment up the Margaree River. He recalled that, after overflying the small tree, the pilot completed a low-level 360-degree turn to the left. The pilot had completed the turn and had just initiated a climb when the helicopter struck the power line. The DFO officer only saw the power line after it had been struck by the helicopter. He

Power-line Contact on Accident Helicopter, Feb. 25, 1995, Nova Scotia, Canada



Source: Transportation Safety Board of Canada

Figure 1

recalled that, after the wire strike, the pilot tried to regain control of the helicopter until the impact with the ice-covered surface.”

The three survivors told accident investigators that there was no evidence of mechanical problems before the wire strike, the report said.

The power line, erected in 1940, was galvanized steel wire, one centimeter (0.4 inch) in diameter. The report said that the wire was grayish-white and “provided little contrast with the ice-covered surface of the river and the higher snow-covered terrain in the background.”

The report added: “The power line was suspended from poles on either side of the river. Both of the supporting poles were surrounded by tall evergreen foliage and dense ... trees, and the cut-line [clearing] normally associated with [power] lines had been overgrown with vegetation.”

The power line was not marked and was not required to be marked under Canadian regulations, the report said. “In addition, the power line was not depicted on aviation navigation charts,” the report said.

After a new power line was erected investigators flew over the accident area. “It was determined that, even with optimal vision and under ideal visibility conditions, the line and its support structure were extremely difficult to detect due to the camouflaging effect of the surrounding terrain and vegetation,” the report said.

When overflown at an altitude of about 300 feet (92 meters), the wire “remained virtually invisible,” but the “wire’s support structure and the associated cut-lines were visible on either side of the river.”

Under Canadian regulations, wires that are more than 300 feet AGL are required to have obstruction marking.

“In certain circumstances, wires lower than 300 feet may be the subject of an aeronautical study to determine whether marking and/or lighting is necessary to increase the wire’s conspicuity,” the report said. “Prior to undertaking such a study, the following factors are considered: the location of objects on high terrain; the surrounding topography; [the] air traffic density; and the proximity of obstructions to water aerodromes and heliports.

“As a rule, wires deemed to be a hazard to air navigation and to require marking would also be depicted on air navigation charts. No records were found of an aeronautical study having been conducted on this specific power line.”

But the report concluded: “Had an aeronautical study been conducted on this specific power line, it is likely that the power line would not have been marked for several reasons. The height of the power line above the Margaree River was well below the

altitude expected to be flown by helicopters or fixed-wing aircraft. In addition, that portion of the Margaree River is not on a visual flight route normally flown by helicopters or other aircraft, nor is the power line in the vicinity of an aerodrome or heliport.”

The report said that the DFO surveillance flights require the pilot to fly at an altitude that “provides adequate obstacle clearance and at an airspeed that allows the DFO officers to view any activity on the ground. Generally, an altitude of 200 feet [61 meters] to 300 feet AGL and an airspeed of about 80 knots is appropriate for the flight. Whenever an item of specific interest is located, the helicopter may be flown at lower altitudes and slower airspeed[s], depending on the circumstances.”

The charter of such surveillance flights is part of an agreement between TC and the DFO, but the agreement does not address the operational aspects of the flight, the report said.

The report said that there were no standard operating procedures (SOPs) for the flights, which would have “delineated the duties of the persons involved in the surveillance flights, nor was any awareness training provided.”

SOPs, the report said, “provide the personnel with clear guidance for carrying out the operation. Adherence to such formal [SOPs] is widely known to enhance the safety of flight operations.”

If SOPs had been in place for “such elements as altitudes, airspeeds and reconnaissance overflights prior to descents to low altitudes, the risks inherent within the mission would have been mitigated, ensuring a safer and more predictable operation,” the report said.

A wire-strike protection system (WSPS) is available for the Bell 206L, the report said. “The system is engineered to prevent entry of a wire into the cockpit area, reduce the possibility of flight-control damage during a wire strike and decrease the chance of wires becoming entangled in the landing gear. The WSPS manufacturer states that the system has been demonstrated at angles up to 45 degrees and at speeds as low as [six kph (four miles per hour)] and that it is effective against multiple wire strikes.”

The WSPS comprises “an upper and a lower cutter/deflector and a windshield deflector/guide.” The report said that “each [cutter] is equipped with a high-tensile steel sawtooth edge. The windshield deflector/guide serves to move the wire over the cockpit area and into the cutters.”

The report concluded: “In this accident, the helicopter contacted the wire in a position where WSPS has been demonstrated to be effective. Had this helicopter been fitted with a WSPS, it is very likely that the power line would have been cut. In that event, the outcome of the [accident] would likely have been considerably less severe.”

The power line was not marked and was not required to be marked under Canadian regulations.

In 1991, TC issued an air carrier advisory circular (ACAC) urging helicopter operators to install WSPS, "as the benefits greatly outweigh the costs of both equipment and crews in the event of a wire strike."

The ACAC followed a recommendation by the Canadian Aviation Safety Board (CASB), the forerunner of the TSB, to "develop appropriate legislation requiring the mandatory fitment of such equipment." TC responded that because the WSPS is not feasible for all helicopters, WSPS installation should remain at the discretion of operators, the report said.

The report said that all TC helicopters were to have WSPS installed within 15 months of the November 1995 publication of the report.

The pilot was not wearing his helmet on the accident flight because it had been sent for repair at a TC facility. Additional helmets were available at the Coast Guard base in Shearwater, but it was unlikely that the pilot was aware of this, the report said.

"The three survivors suffered varying degrees of head injuries," the report said. "Although the pilot also suffered some head injuries, these head injuries were determined to be relatively minor." [The report did not publish the cause of the pilot's death.]

A directive in the TC helicopter flight operations manual (HFOM) requires all pilots and engineers to wear helmets while engaged in helicopter operations. "The TC HFOM has no ... provisions for the wearing of helmets by passengers on specialty low-level flights," the report said.

The report said that carrying "nonessential passengers on such high-risk, low-level operations unnecessarily exposes additional persons to the dangers inherent in such operations." TC has since prohibited nonessential passengers on specialty flights, the report said.

Accident investigators could not determine why the pilot descended below the normal surveillance flight altitude of 200 feet to 300 feet.

"There were no apparent operational requirements for the pilot to descend as low as he did without having first completed a reconnaissance of the area, nor did the pilot make any comments [that] would explain his intentions," the report said. "Had a reconnaissance overflight been conducted, it is possible that the power line or its associated support structure would have been observed, and the flight profile could have been altered accordingly."

The report concluded: "The airspace below 300 feet AGL is generally regarded by the helicopter pilot community as a hostile environment. Helicopter pilots are habitually cautioned about the increased risks of wire strikes at these low altitudes and are warned not to venture into this airspace before taking measures to reduce the risk of a wire strike."♦

Editorial note: This article is based on the official accident investigation report, *Wirestrike — Government of Canada, Canadian Coast Guard, Bell 206L, C-GCHN, Margaree River, Nova Scotia, 25 February 1995*, by the Transportation Safety Board of Canada, Report no. A95A0040. The report includes figures and appendices.

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