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Helicopter Strikes Wires While Installing Cable on Tower

The pilot was maneuvering the helicopter to aid installation of cable on an electric-power transmission tower when a wire strike occurred; the helicopter then began an uncontrolled descent and struck the ground. The pilot was seriously injured, and a crewmember was killed.

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Patrick R. Veillette, Ph.D.

At 1610 local time June 2, 1998, the tail rotor on a McDonnell Douglas 530F Model 369FF struck a fiber-optic cable while the helicopter was being maneuvered near an electric-power transmission tower during an external-line construction operation near Shoshone, Idaho, U.S. The helicopter descended out of control and struck the ground. The helicopter was destroyed. The pilot was seriously injured. A crewmember — a lineman who was standing on a helicopter skid — was killed.

The U.S. National Transportation Safety Board said, in its final report, that the probable cause of the accident was the pilot's "failure to maintain clearance from wires" and that "a transmission wire was a factor [in the accident]."

The helicopter was operated by Winco of Molalla, Oregon, under U.S. Federal Aviation Regulations Part 133, which pertains to rotorcraft external-load operations. The operator had been hired by a construction company that was under contract to Idaho Power Co. to install 270 statute miles (434 kilometers) of fiber-optic cable in Idaho. The operator said that the purpose of the accident flight was to attach fiber-optic cable to electric-power transmission towers.

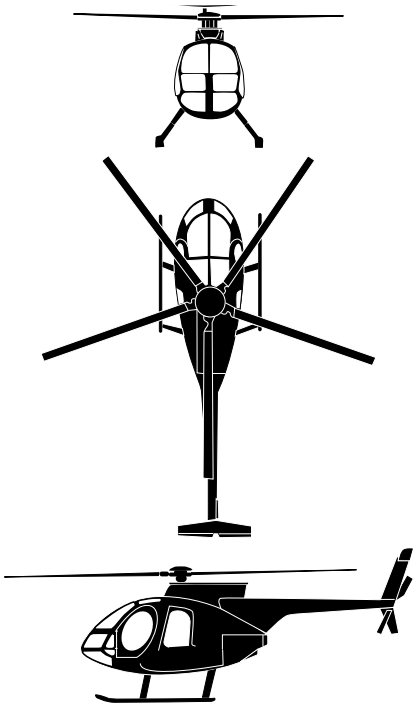
Visual meteorological conditions prevailed. Conditions at a weather-observation facility 22 nautical miles (41 kilometers) south-southwest of the accident site included a 4,900-foot thin overcast, 10 statute miles (16 kilometers) visibility, surface winds from the west at 18 knots (33 kilometers per hour [kph]) gusting to 21 knots (39 kph), an outside air temperature of 56 degrees Fahrenheit (13 degrees Celsius) and light rain.

Witnesses said that the surface winds at the accident site were light and variable. One witness said that a storm was approaching from the south and that rain began to fall soon after the accident occurred.

The pilot said, "The wind was generally out of the west-southwest and light. I remember that it was not so windy as to hamper our work. At one point in the day, around noon, the wind did increase in velocity and varied in direction but soon subsided and returned to a light west-southwesterly wind."

The pilot, 32, had a commercial pilot certificate, a helicopter flight instructor rating and an instrument rating for helicopters and airplanes. He had 5,646 flight hours, including 5,538 flight hours in helicopters and 907 flight hours in type. He had flown 145 hours in the 90 days preceding the accident.

The pilot said that he had experience flying helicopters in tuna-spotting operations in support of fishing vessels and in long-line, external-load operations for logging and fire suppression. He had no experience flying helicopters in transmission-cable-installation operations before being hired by Winco on April 2, 1998. His training included flights with



McDonnell Douglas 530F Model 369FF

The McDonnell Douglas 530F is a derivative of the Hughes 500, which entered production in 1968. Designed for operation at high altitudes and at high ambient temperatures, the 530F has higher engine-power ratings and longer rotor blades than previous models. The helicopter entered production in 1983. Hughes Helicopters became a subsidiary of McDonnell Douglas in 1984.

The 530F has a 650-shaft-horsepower (485-kilowatt) Allison 250-C30 turboshaft engine derated to 425 shaft horsepower (317 kilowatts) for takeoff and to 350 shaft horsepower (261 kilowatts) for maximum-continuous power.

Diameter of the five-blade main rotor is 27.3 feet (8.3 meters). Diameter of the two-blade tail rotor is 4.8 feet (1.5 meters).

The helicopter can accommodate a pilot and up to four passengers. Maximum takeoff weight is 3,100 pounds (1,406 kilograms). An optional cargo-hook system can carry an external load of up to 2,000 pounds (907 kilograms).

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

another company pilot until April 24, 1998; he then flew single-pilot flights for the company.

The helicopter had 5,350 service hours and had been flown 42 hours since a 100-hour inspection May 11, 1998.

The day before the accident, a maintenance technician found a crack in the engine exhaust stack and replaced the exhaust stack.

"He stated that no other maintenance was performed on the helicopter and that everything checked out OK," the report said. "There were no open squawks [uncorrected maintenance discrepancies], and the pilot did not indicate that there were any problems."

On the day of the accident, the pilot worked with three linemen to "clip" (that is, permanently install) fiber-optic cable on approximately 16 towers and to attach vibration dampers to the fiber-optic cable. The cable was 0.6 inch (1.5 centimeters) in diameter.

The fiber-optic cable was being installed near the tops of the towers, which were approximately 85 feet (26 meters) tall. Six electric-power transmission wires were suspended eight feet to 10 feet (2.4 meters to three meters) below the fiber-optic cable; each wire was approximately 1.1 inches (2.8 centimeters) in diameter. (Figure 1, page 3, shows a tower and the approximate position of the helicopter when the wire strike occurred.)

One lineman said that before beginning work that morning, the pilot and the three linemen conducted a 45-minute safety briefing.

"We talked about everything that we were going to do, because we had just had about a week and a half off [duty]," the lineman said. He said that work began at 0900 and, except for a one-hour lunch break, was "pretty steady" until the accident.

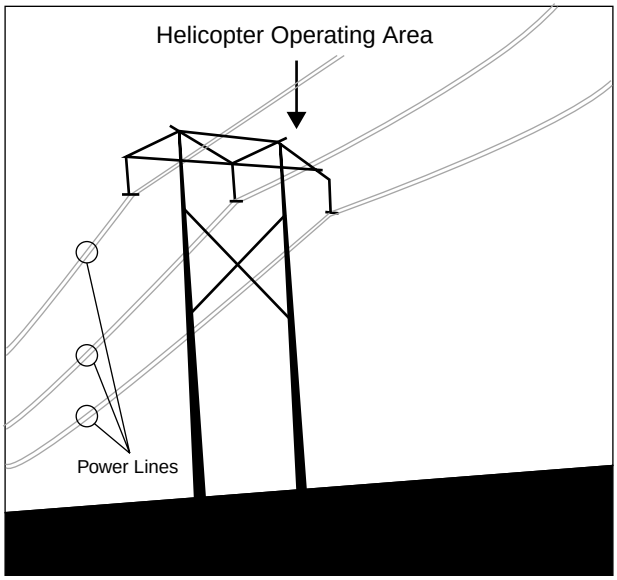
The pilot flew the helicopter from the left seat. He said that the helicopter was equipped to carry two linemen standing on the left landing skid. He said that counterweight on the right side of the helicopter was not necessary under most conditions. The pilot said that he had not experienced problems with cyclic-control authority while flying with two linemen on the left skid.

The linemen wore special boots with high heels and braced the heels against the skid to prevent slipping. The upper portion of the skid was covered with a material that prevents slipping. Each lineman wore a safety harness around his waist while being transported by the helicopter and while working from the helicopter. Each safety harness was attached to the fuselage with a rope. One harness-attachment point was on the door post behind the pilot's seat. The other harness-attachment point was on the cabin floor.

Before the accident flight, the pilot flew two linemen to two separate towers (one lineman on each tower). The linemen, called "polemen," exited from the helicopter while the pilot hovered the helicopter near each tower. Their task was to clip the fiber-optic cable, which had been strung temporarily across the tops of the towers.

The pilot then flew the helicopter back to the landing area and picked up another lineman. This lineman, called a "skidman," was responsible for attaching the vibration dampers to the fiber-optic cable. The skidman performed this work while standing on the helicopter skid.

McDonnell Douglas 530F;
Shoshone, Idaho, U.S.; June 2, 1998



Source: Adapted from U.S. National Transportation Safety Board report SEA98FA084 by Flight Safety Foundation.

Figure 1

After picking up the skidman, the pilot flew the helicopter to one of the towers on which a poleman was waiting to clip the fiber-optic cable. The pilot used an external apparatus on the helicopter to position the cable for clipping.

An external line was attached to the bottom of the fuselage and was draped over the front of the left skid, in full view of the pilot. The line extended down about four inches (10 centimeters) from the skid. Attached to the end of the line was a U-shaped metal device, called a shoe.

The poleman said that the pilot maneuvered the helicopter to pick up the fiber-optic cable in the shoe and to position the cable for clipping. The pilot then maneuvered the helicopter to release the cable from the shoe.

The poleman said that he was clipping the cable to the tower when the pilot maneuvered the helicopter backwards approximately five feet (1.5 meters), where the skidman was to attach a vibration damper to the cable.

The poleman then heard a "clicking" sound.

"It sounded like the [helicopter's] blades … a clicking sound like [the blades] just hit something," the poleman said. "It sounded like … when you stick [playing] cards in the spokes [of a bicycle wheel]."

The poleman turned and saw pieces of the helicopter in the air.

"When I turned and saw pieces flying, [the helicopter] was behind me, and should have been beside me; so, I knew [that the helicopter] was into the wires," the poleman said.

The other poleman, who was on another tower, said that he felt movement of the tower and reduced tension in the fiber-optic cable. He then observed that the fiber-optic cable was severed and that the helicopter was spinning and was "into the wires."

A witness, who was in a motor vehicle parked near the accident site, said that the helicopter hovered above the electric-power lines, picked up one of the lines on the top of the tower with a "hook" or "shoe" and moved the line to another location.

The witness said that the helicopter lowered the line to a man who appeared to attach the cable to the tower. When the helicopter descended, the cable detached from the shoe. Then, as the helicopter was lifting up, something "popped," and the cable "grabbed" the shoe.

The witness said that the helicopter twisted sideways and "went over on its side." The rotor blades struck the transmission lines, and the helicopter descended between the transmission lines. The tail boom separated, and the helicopter spun about two times before striking the ground.

"There was a man standing on the skid of the [helicopter] while all this was going on," the witness said. "This was the man who was killed. After the [helicopter] hit the ground, myself, my daughter and a coworker ran to try to help all we could."

The witness said that the pilot said, several times, that he had "no collective." [In a helicopter, the pilot uses the collective-control lever to change the pitch of the main-rotor blades; the "collective" provides the primary control of vertical velocity.]

The pilot did not remember what happened after he conducted the approach to the tower with the skidman aboard the helicopter.

"I do not remember anything after our approach to the tower, which was normal and uneventful," the pilot said. "I do remember repeatedly telling fellow workers at the accident site, 'I have to remember what happened.' I remember nothing more until after waking up in the hospital."

The report said that the fiber-optic cable was severed and had scrape marks about nine feet (2.8 meters) from where the break occurred.

Four transmission wires (the middle pair and the pair farthest from where the helicopter had been flown) were damaged. The two transmission wires closest to where the helicopter had been flown were not damaged.

The fuselage came to rest on its right side approximately 30 feet (9.2 meters) from the tower. The fuselage structure had collapsed, and the windshield had broken out. The instrument panel had separated and was next to the fuselage.

The tail boom had separated forward of the tail-boom-attachment flange. The tail boom, the tail-rotor drive section, another main-rotor blade and part of the tail cone were within 50 feet (15.3 meters) of the main wreckage. The tail-rotor blades were 700 feet (214 meters) from the main wreckage. One tail-rotor blade was in two pieces; the other tail-rotor blade was in three pieces. Both tail-rotor blades had wire-strike marks at the separation points.

All five main-rotor blades had separated from the main-rotor hub assembly. One main-rotor blade was on top of the fuselage. The other four main-rotor blades were 300 feet (92 meters) from the wreckage.

All main-rotor blades were deformed severely. Two main-rotor blades had wire-strike marks. One main-rotor blade had marks showing that the blade had struck the tail boom and had become wrapped partially around the tail boom. One blade was in two pieces. One blade was twisted.

The collective-control lever had full motion, but the motion to the upper limit was restricted. The cyclic-control lever had been fractured at the base attach point. All flight-control linkages and all engine-control linkages showed continuity.

The tail boom and the tail cone received extensive impact damage. The tail cone was buckled and twisted. The trailing edge of the vertical stabilizer had two circular gouges above and below the anti-collision light support; the indentations were similar in size to the diameter of the transmission lines.

The report said, "During the postcrash wreckage documentation and inspection, no evidence was found to indicate a mechanical failure or malfunction."♦

[Editorial note: This article, except where specifically noted, is based entirely on U.S. National Transportation Safety Board factual accident report and brief-of-accident report SEA98FA084. The reports comprise 76 pages and include diagrams and photographs.]

About the Author

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