The NTSB says an operating radio altimeter likely could have prevented the fatal crash of a Eurocopter EC 135P2 on an EMS repositioning flight.

Dark-Night EMS

BY LINDA WERFELMAN

The wreckage of the EMS helicopter was pulled from the Potomac River south of Washington after the January 2005 accident.

An emergency medical services (EMS) Eurocopter EC 135P2 was being flown in dark night conditions over the Potomac River on a low-altitude positioning flight when it crashed into the water near Oxon Hill, Maryland, U.S. The pilot and flight paramedic were killed, and the flight nurse was seriously injured in the accident, which destroyed the helicopter.

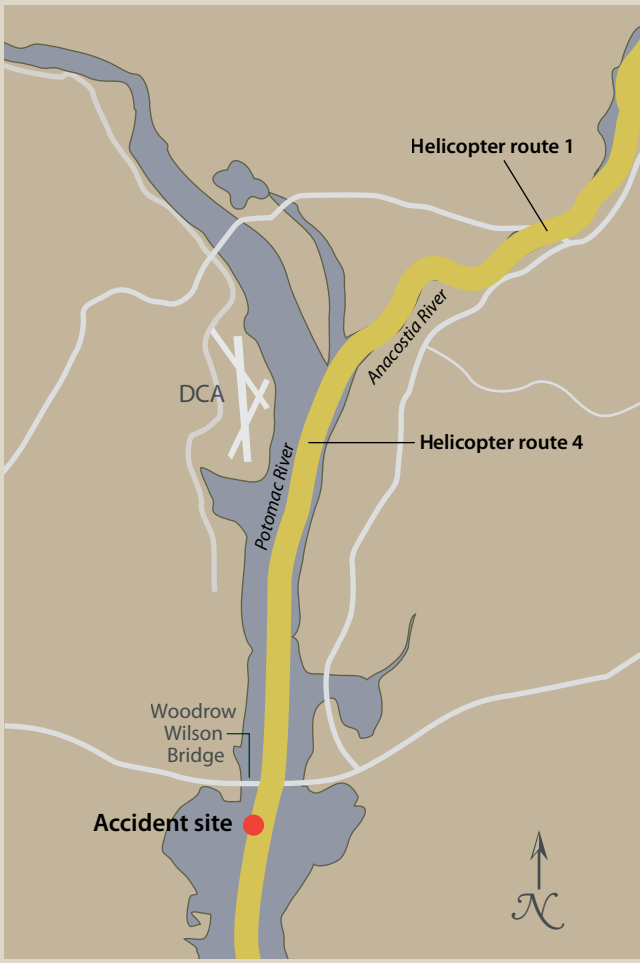
The U.S. National Transportation Safety Board (NTSB) in its final report said that the probable cause of the Jan. 10, 2005, accident was "the pilot's failure to identify and arrest the helicopter's descent, which resulted in controlled flight into terrain." Contributing factors were "the dark-night conditions, limited outside visual references and the lack of an operable radar [radio] altimeter in the helicopter," the NTSB said.

The flight, operated by LifeNet, began about 2304 local time at the Washington Hospital Center Helipad (DC08) in Washington, D.C., with a destination of Stafford Regional Airport, about 40 nm (74 km) southwest. The pilot followed a published helicopter route through Washington to the southwest, toward the intersection with another published route that ran north-south along the Potomac River.

Air traffic control (ATC) radar data showed that the pilot intercepted the second published route and flew the helicopter south along the river toward the Woodrow Wilson Bridge. The helicopter's Mode C transponder — which provided information on the helicopter's altitude above mean sea level in 100-ft increments — indicated that altitude varied from zero to 100 ft but increased to 200 ft when the helicopter was about 0.5 nm (0.9 km) north of the bridge, the report said. The elevation of the Potomac River in the area is about 10 ft.

At 2311:30, when the helicopter was 0.25 nm (0.46 km) north of the bridge at 200 ft, the pilot responded to an ATC traffic advisory, saying that the helicopter would "be out of [the] way" of an Airbus on final approach to Ronald Reagan Washington National Airport (DCA). There were no further radio communications from the helicopter.

The flight nurse, who had been seated in the left front (copilot's seat), said that as the Airbus approached, the helicopter pilot "made a change in his flight path and started to descend."



Susan Reed

ATC radar data showed that, at 2311:39, the helicopter had crossed the bridge to the south at 200 ft with a ground track of 180 degrees. At 2311:43, the helicopter was at 100 ft with a ground track of 190 degrees. The last recorded position, at 2311:48, showed an altitude of zero and a ground track of 200 degrees. The Airbus was about 2.2 nm (4.1 km) south of the helicopter at 1,700 ft.

NTSB analyses determined that the helicopter's flight path angle was minus 3 degrees and it was banked about 12 degrees right when it struck the water 3.5 seconds after the last radar return. The NTSB also ruled out any possibility that the accident resulted from wake turbulence or a bird strike.

The flight nurse said that the helicopter's master caution lights and panel segment lights did not illuminate and that he heard no audio alarms before the crash. The pilot had not

Eurocopter EC 135

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The Eurocopter EC 135 is a light utility helicopter. Its first prototype was flown in 1988 and was known then as a BO 108; the first two production EC 135s were delivered in 1996.

The EC 135P2 was introduced in 2001, with two Pratt & Whitney PW 206B2 engines, each capable of 463 kw (621 shp) at takeoff and 419 kw (562 shp) maximum continuous.

The EC 135 can be configured to carry seven people, including one or two pilots. The accident helicopter was configured with two pilot's seats, an aft-facing passenger seat in the left aft cabin and an area for one medical patient in the aft cabin.

Maximum empty weight is 3,284 lb (1,490 kg), and maximum takeoff weight is 6,250 lb (2,835 kg). Maximum cruise speed is 138 kt, maximum rate of climb at sea level is 1,500 fpm, and service ceiling is 9,600 ft.

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

performed any evasive maneuvers or indicated that there were any difficulties, the flight nurse said. The report said that the flight nurse had told investigators that after the helicopter flew over the southern part of the bridge, his next memory was of "being submerged in water with his seatbelt on and his helmet off." He exited the helicopter and waited in the water near the tail section, where the occupants of a rescue boat found him.

The pilot, 56, was hired in 2004 by LifeNet, a Chesterfield, Missouri, operator with 89 helicopters and airplanes at numerous locations across the United States. He had a commercial pilot certificate with ratings for single- and multi-engine land airplanes, helicopters and instrument helicopters, and a second-class medical certificate. When he applied for his medical certificate in May 2004, the pilot said that he had 1,500 flight hours of civilian experience; he also had 2,400 flight hours in military helicopters, accumulated while he was a pilot in the U.S. Army from 1968–1971.

In his employment application, the pilot said that he had been retired since 1997 but that he was current for operations under U.S. Federal Aviation Regulations Part 135, "Commuter and On-Demand Operations" and had passed Part 135 check rides in a Bell 206 in February 2004 and in a BK-117 in April 2004. From 1971 until 1997, he had worked for a corporation in flight positions and non-flight positions, accumulating 400 flight hours in Agusta 109s and Sikorsky S-76s and 300 flight hours in airplanes.

The resume submitted to LifeNet did not mention his most recent previous employer, another Part 135 helicopter operator for whom the pilot worked for two weeks in April 2004. According to the company's chief pilot, the accident pilot's employment was terminated because he was "unable to adequately perform complex tasks in the helicopter or fly a 'complete mission' involving several tasks in a series," the report said. LifeNet was unaware that the pilot had held the job — and unaware of the termination.

The report said that two medical crewmembers who had flown with the pilot the night before the accident, on the same route as the accident flight, had said that the pilot "flew the helicopter in a manner equivalent to other pilots in the company."

The helicopter, manufactured in 2004, had 167 total hours at the time of the accident. It had been maintained according to an FAA-approved aircraft inspection program, with the last 50-hour inspection program on Dec. 17, 2004, and the last 100-hour inspection on Nov. 23, 2004.

A Jan. 10, 2005, notation in the maintenance logbook indicated that the radio altimeter was inoperative. An entry in the maintenance log's section on "Record of Minimum Equipment List

(MEL) Items and Deferred Maintenance" said that maintenance on the radio altimeter could be deferred until Jan. 20, 2005. Examination of the wreckage revealed no mechanical problems that would have contributed to the crash, the report said.

Dark night visual meteorological conditions prevailed at the time of the accident, the report said. Information recorded at DCA, 3.5 nm (6.5 km) north of the accident site, at 2251 included calm wind, visibility of 10 mi (16 km) and broken clouds at 13,000 ft and 20,000 ft. A new moon, below the horizon, provided no illumination, the report said.

Professional helicopter pilots who frequently fly along the Potomac River near the Wilson Bridge told investigators that the area south of the bridge is very dark, in large part because park and bird habitats in the area limit the extent of lighting on the shoreline.

"Flying at night from north to south over the Woodrow Wilson Bridge is very similar to going into actual instrument conditions," one helicopter pilot said. "A pilot [flying] low-level north of the bridge is typically flying VFR [visual flight rules] due to the intense amount of ground lights available along the river. Once the pilot crosses the bridge, he is now flying into a black void. At this point, an instrument scan must be established to maintain altitude. Because of the close proximity to water … a radar altimeter is necessary to ensure altitude awareness."

The report cited the FAA *Aeronautical Information Manual*'s discussion of illusions in flight, which says that "an absence of ground features, as when landing over water, darkened areas and terrain made featureless by snow, can create the illusion that the aircraft is at a higher altitude than it actually is."[1]

The report said that, because the helicopter was being flown in dark night conditions, references to flight instruments would have been required to help maintain a safe altitude above the river.

"However, about eight seconds before the onset of the helicopter's banking descent, the pilot diverted his attention from the instruments, at least momentarily, because he stated to the controller that he was looking for the approaching Airbus traffic," the report said. "Additionally, the flight nurse stated that, because of the traffic, the pilot 'made a change in his flight path and started to descend."

If the pilot had detected an unintentional descent, the report said, "he would have had to respond immediately to arrest it because of the helicopter's cruise speed and low altitude."

A functioning radio altimeter would have provided constant height information and a visual and/or aural alert that the helicopter had descended below a preset altitude, the report said, noting that the radio altimeter had been functioning the night before the accident, when the same pilot flew the same route without difficulty.

In a concurring statement accompanying the final accident report, NTSB Member Kathryn O'Leary Higgins called for a review of pilot hiring practices.

"Could LifeNet have learned more about this pilot before hiring him?" she asked. "If they had known that he had been terminated by another EMS operator after two weeks because he did not meet their standards, would they have offered him a job?"

An existing law — the Pilot Records Improvement Act — requires some operators to request and evaluate information from the previous employers of applicants for piloting jobs. In this case, however, the pilot did not identify his most recent previous employer, the report said.

As a result of the investigation of this accident and a 2004 Bell 206L-1 EMS accident,[2] the NTSB issued two safety recommendations emphasizing the critical role of radio altimeters in EMS operations. The recommendations said that the FAA should require the installation of radio altimeters in all helicopters used in EMS night operations and should ensure that the MELs for these helicopters require that radio altimeters be operable during night operations.

Both accidents "likely could have been prevented if the helicopters' [radio] altimeters were operative and used by the pilots as tools to avoid CFIT [controlled flight into terrain]," the NTSB said. "Because of the complexity of flying in night conditions, [radio] altimeters can provide invaluable and potentially live-saving information to flight crews, particularly when they are flying at low altitudes." ●

This article is based on NTSB Aviation Accident Brief NYC05MA039.

Notes

1. FAA. *Aeronautical Information Manual: Official Guide to Basic Flight Information and ATC Procedures*, Chapter 8-1-5, "Illusions in Flight, Featureless Terrain Illusion." Washington, D.C.: FAA, 2006.
2. The Bell 206L-1 accident occurred during night visual meteorological conditions on April 20, 2004, in Boonville, Indiana, U.S., when the helicopter crashed into up-sloping terrain while transporting a patient from one hospital to another. The patient was killed in the crash and the pilot, paramedic and flight nurse received serious injuries. The NTSB said in its final report that the probable cause of the accident was the pilot's "inadequate planning/decision, which resulted in his failure to maintain terrain clearance." The report cited as contributing factors the pilot's "inadequate preflight planning, his diverted attention and the dark-night conditions." The report said that a pilot who had flown the helicopter before the accident flight had reported that the radio altimeter was operating "erratically."