



Air Ambulance Strikes Terrain After Takeoff in Fog

Visibility was less than 0.25 statute mile (0.40 kilometer) when the crew of the Sikorsky S-76A began the night repositioning flight. Less than two minutes after takeoff, the helicopter struck a tree-covered hillside.

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FSF Editorial Staff

At 2208 local time June 14, 1999, a Sikorsky S-76A helicopter being operated by Petroleum Helicopters Inc. (PHI) as an air ambulance for the University of Kentucky Medical Center (37KY) at Lexington, Kentucky, U.S., collided with terrain in instrument meteorological conditions (IMC) during departure from Jackson, Kentucky. The helicopter was destroyed, and all four people in the helicopter — two pilots and two medical crewmembers — were killed.

The U.S. National Transportation Safety Board (NTSB) said, in its final report, that the probable cause of the accident was “the failure of the PIC [pilot-in-command] to adequately supervise the SIC [second-in-command] and maintain a positive climb.” The report said that factors in the accident were fog and dark-night conditions.

The 49-year-old PIC held a commercial pilot certificate with rotorcraft-helicopter and instrument-helicopter ratings; he had a second-class medical certificate with a requirement that he have corrective lenses for near vision in his possession. He learned to fly helicopters in the U.S. Army and was hired in 1984 by PHI. He had accumulated 6,859 flight hours, including 2,319 flight hours in S-76As. His instrument flight experience totaled 382 flight hours, including 111 hours in simulators and 39 flight hours in actual IMC.

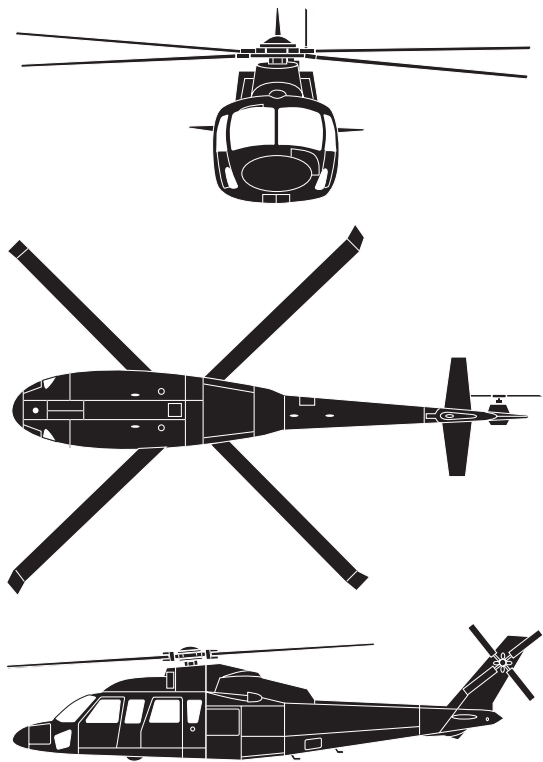
The report said that his initial checkout in an S-76A was as an SIC in February 1990. During a March 1996 six-month recurrent



instrument flight check, one item — “stabilized approach concept” — initially was recorded as unsatisfactory and later recorded as satisfactory. The check airman’s written remarks said that the pilot failed to call for a missed approach “with the airspeed 25 knots slow.”

In September 1991, the pilot was upgraded to PIC. In March 1997, he failed a six-month recurrent instrument flight check. The report said that the PIC “was rated unsatisfactory in the following areas: use of checklists, emergency procedures, flight planning, ILS [instrument landing system] approaches, VOR [very-high-frequency omnidirectional radio] approaches and missed approach.” The check airman made a number of written remarks, including, in reference to flight planning, that “he did not understand the operations manual with regard to IFR [instrument flight rules] takeoff minimums.” The next day, the PIC repeated the check ride and passed all items. He also passed check rides in September 1997 and April 1998.

He received training in the Bell 412 in 1998 and passed an SIC check ride. The report said that training records “noted several areas of deficiency found during the training” and included the following remarks: “unstabilized ILS at middle marker” and “before takeoff IFR, nav [navigation] and com [communication] radios — airman was confused about [a functional] check and what radios were displayed where.” The pilot re-qualified in



Sikorsky S-76

The Sikorsky S-76 first flew in 1977. The S-76A is configured to accommodate 12 passengers and two pilots. It has a maximum takeoff weight of 10,300 pounds (4,672 kilograms), a maximum cruising speed of 145 knots and a service ceiling of 15,000 feet. The S-76A has a maximum range of 404 nautical miles (748 kilometers) with 12 passengers, standard fuel and 30-minute reserves. The S-76A is powered by two Allison 250-C30 turboshaft engines, each rated at 650 shaft horsepower (485 kilowatts).♦

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

the S-76A as PIC in September 1998 and passed a six-month recurrent instrument flight check in February 1999.

The 46-year-old SIC held a commercial pilot certificate with ratings for airplane, single-engine land; airplane multi-engine land; and rotorcraft-helicopter. He also held instrument ratings for airplanes and helicopters and a mechanic certificate with an airframe rating and a powerplant rating. He was issued a first-class medical certificate in August 1998. He had accumulated 7,739 flight hours, including 6,574 flight hours in helicopters. His instrument flight experience totaled 181 flight hours, including 92 flight hours in actual IMC.

Company records showed that he was hired as a maintenance technician in 1976 and subsequently participated in a company program to become a pilot. He began flying single-engine helicopters in 1982. His initial checkout in the S-76A occurred in May 1997, and he passed two subsequent six-month recurrent

instrument flight checks. In May 1998, he failed an oral exam required to become an S-76A PIC; the flight check was not conducted.

Training records said that the SIC was “weak in several areas related to instrument procedures and flight planning.” Another oral examination was administered in June 1998, and he re-qualified as an S-76A SIC. He subsequently passed two six-month recurrent instrument flight checks.

In post-accident interviews, other pilots from the operator’s Lexington base said that the two pilots often flew together.

“Both pilots were reported to have demonstrated varying degrees of assertiveness in the cockpit,” the report said. “No negative comments were generated for either pilot. However, one pilot did report that the SIC told him he felt uncomfortable flying with the PIC under IFR conditions. No specifics were given for the reported statement of the SIC.”

The S-76A is type-certificated for two pilots when operated under IFR. The accident helicopter was one of two medical helicopters operated by PHI from 37KY. The helicopter was equipped with three sets of attitude indicators and directional indicators. The helicopter also was equipped with dual VOR receivers, distance-measuring equipment (DME) and an IFR-approved global positioning system (GPS) receiver. The helicopter did not have an autopilot. The helicopter was equipped with a cockpit voice recorder (CVR) and continually energized lip microphones at the first pilot’s station and second pilot’s station.

During the six months before the accident, two attitude indicators and three vertical gyros on the accident helicopter had been replaced. At the time of the accident, PHI operated 24 S-76 helicopters, and company records showed that, during the same six-month period, 40 vertical gyros on 15 helicopters and 11 attitude indicators on seven helicopters had been replaced.

The morning of the accident, the flight crew reported for duty at 1100 hours at 37KY. They were on the fourth day of a seven-day rotation, and their shift was to end 12 hours later, at 2300.

At 1356, the crew began a flight to reposition the helicopter to Julian Carroll Airport (JKL), an uncontrolled airport at the top of a hill at 1,381 feet in Jackson, Kentucky, about 67 nautical miles (124 kilometers) southeast of Lexington. JKL had no published takeoff criteria for Runway 19, which was equipped with medium-intensity runway edge lights. There was a VOR/DME and GPS approach to Runway 1.

The helicopter was landed at JKL at 1426. At JKL, the helicopter was fueled with 35 gallons (132 liters) of Jet-A fuel with an anti-icing fuel additive. The crew had access to a lounge area for rest. The lounge contained a computer with a direct user access terminal system (DUATS), which could be used to check weather and file flight plans. Records from the U.S. Federal Aviation Administration showed that the PIC had

used DUATS three times in preparation for their night flight to reposition the helicopter to 37KY.

The first time was at 1912, when he requested an abbreviated weather briefing for the state of Kentucky, including aviation routine weather reports (METARs) and aerodrome forecasts (TAFs) with data for JKL and Blue Grass Airport in Lexington, near 37KY. The second time was at 2005, when he filed an IFR flight plan for a direct flight from JKL to the Lexington VOR but did not request weather data. The third time was at 2121, about 45 minutes before the flight, when he requested an abbreviated weather briefing for the state of Kentucky, including METARs and TAFs. JKL weather at that time included calm winds and visibility of 0.5 statute mile (0.8 kilometer), with the sky obscured, vertical visibility of 100 feet and fog. The temperature and dew point both were 18 degrees Celsius (C; 64 degrees Fahrenheit).

The flight to 37KY was planned to take 30 minutes.

The airport manager at JKL said that he observed the crew in the lounge, planning an IFR flight to Lexington, and that “they had a manual out and were talking about maintaining a 250-foot-a-minute rate of climb to 3,000 feet.”

“The airport manager observed the flight crew walk to the helicopter,” the report said. “He reported that visibility was reduced by fog, and he could not recognize the pilots but only saw vague shapes as they boarded the helicopter.”

At 2154, after boarding the aircraft and starting both engines, the crew checked the JKL automated surface observations system (ASOS). The ASOS information, which was recorded several times by the CVR, said that visibility at JKL was less than 0.25 statute mile (0.40 kilometer) in fog, the sky was overcast with a ceiling of 200 feet, and the temperature and dew point were 18 degrees C.

The CVR did not record any comments by the crew about the visibility being less than 0.25 mile. Although the flight was conducted under U.S. Federal Aviation Regulations Part 91, which does not specify IFR takeoff minimums for Part 91 operators, the chief pilot said that he expected company pilots always to follow the guidance contained in the company *Air Taxi Operations Manual* for Part 135 flights. The manual said that “one-quarter statute mile or touchdown zone RVR [runway visual range] of 1,200 [feet] may be used if either HIRL (high-intensity runway lights), CL (centerline lights), RCLM (runway centerline markings), or adequate visual reference to continuously identify the takeoff surface of the runway and maintain directional control throughout the takeoff run is available.”

Subsequent interviews with the pilots at the Lexington base confirmed that they all believed that the IFR section of the *Air Taxi Operations Manual*, including takeoff minimums, applied to flights conducted under Part 91. Several pilots said that this requirement was discussed as a regular part of their recurrent training.

At 2159, the flight crew contacted Indianapolis (Indiana, U.S.) Air Route Traffic Control Center (ARTCC) and requested activation of their flight plan and an IFR clearance. ARTCC asked if the helicopter was in the air, and the crew replied that they were “sitting on the ramp at Julian Carroll” and would be “ready to go in five minutes.” ARTCC issued the clearance and told the crew to climb to and maintain 4,000 feet.

The CVR recorded the sounds of the crew conducting a checklist; checking radios, instruments and other equipment; and setting the radar altimeter to 500 feet before beginning to taxi the helicopter to Runway 19.

Soon after 2200, the airport manager heard the PIC say on the UNICOM (a communication radio frequency used to broadcast information at some airports) that the helicopter was taking off on Runway 19.

The PIC said, “We’ll be a, uh ... south departure, right turn, we, be, uh, west out of the area.” The crew then lifted the helicopter to a hover.

A certified weather observer at JKL, who had just completed an hourly observation, observed the takeoff.

“When they rolled onto the runway, I walked out to watch them take off,” he said. “At the runway/taxiway intersection, they turned left for Runway 19 and pulled up into a hover about 20 feet above the runway. They then proceeded down Runway 19. I lost [sight of] them in the fog about half way between the taxi/runway intersection and the end of the runway. As a certified weather observer, I concur with the ASOS visibility of (less than) one-quarter mile. I estimate that the visibility was about one-eighth of a [statute] mile [0.2 kilometer] or slightly more.”

At 2206:18, the CVR recorded the SIC on the interphone as he said, “I’m gonna lift to a hover, and we’ll get 60 knots before we get solid in it, I guess. Try to keep it with the lights down here.” The PIC acknowledged the SIC’s statement.

At 2206:28, the SIC said on interphone, “Here we go.” This was followed by a sound similar to transient main-rotor droop (the temporary decrease in main-rotor speed after an application of power).

At 2206:51, the PIC said, “Airspeed’s alive, positive rate of climb. ... You’re at 30 (knots) ... heading one nine zero. ... I’m gonna kill the landing (lights).” The SIC acknowledged the statement.

At 2207:22, the PIC said, “You’re at 80 ... wanna hold 80, or V_{broc} (velocity best rate of climb).” [In an S-76A, V_{broc} is 74 knots at sea level.]

At 2207:32, the PIC said, “Indy [Indianapolis] Center, Sikorsky two seven four three echo. We’re, ah, passing one thousand six hundred for four thousand.”

At 2207:51, the PIC said on the interphone, "Go ahead and stay on your heading."

At 2208:03, the PIC said, "OK, you're in a right-hand turn and descending."

The SIC replied at 2208:05 "OK, I think my gyro just quit." There was no acknowledgement from the PIC.

At 2208:10, the SIC asked, "You have the controls?"

The PIC did not answer the question but said, "You're in a left-hand turn and descending ... turn ... turn back and level, level us off." There was no acknowledgement from the SIC.

At 2208:16, the CVR recorded an increase in ambient noise.

At 2208:18, the PIC said, "right-hand turn ... right-hand turn." There was no acknowledgement from the SIC.

At 2208:24, the CVR recorded the initial sound of the impact and then stopped functioning.

The aircraft struck terrain 116 seconds after departure from JKL.

ARTCC radar data showed that the helicopter initially was flown to 1,600 feet. Then, while in a left turn, the helicopter began to descend. The final radar contact at 2208:14 showed the helicopter at 1,300 feet.

A witness who lived near the accident site said that he heard the helicopter while he was inside his home and that he went outside and "heard a pop, saw a bright flash, then — silence." He said that about 30 seconds to 45 seconds later, he "saw and heard a large explosion" at the accident site and called law enforcement authorities.

The burned wreckage was found on a tree-covered slope approximately 1,000 feet above mean sea level, or 381 feet below the elevation of the departure airport, which was about two nautical miles (3.7 kilometers) northwest of the accident site.

After the accident, PHI said in a letter to NTSB that the company, which already provided initial training and recurrent training in crew resource management (CRM), had "enhanced our crew concept procedures" to include mandatory use of CRM principles and expansion of the stabilized-approach concept to other phases of flight. The chief pilot said that the company had begun using line-oriented simulations (LOS) during simulator training to include CRM debriefings that were designed to challenge the CRM abilities of the flight crew. If the LOS sessions reveal "serious shortcomings in procedure or CRM," crewmembers receive additional training, he said.♦

[FSF editorial note: This article, except where specifically noted, is based on the U.S. National Transportation Safety Board final report on accident no. NYC99FA140. The report comprises 218 pages and includes photographs, a map and figures.]

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