

IMC in the Mountains

The pilot of a Bell 412SP emergency medical services (EMS) helicopter was navigating through dark night conditions and intermittent fog on a positioning flight when the helicopter struck a Southern California mountainside, killing the pilot and two medical crewmembers.

The U.S. National Transportation Safety Board (NTSB) said the probable cause of the Dec. 10, 2006, accident in Hesperia, California, U.S., was “the pilot’s inadvertent encounter with instrument meteorological conditions [IMC]

and subsequent failure to maintain terrain clearance.” Contributing factors were “dark night conditions, fog and mountainous terrain,” the NTSB said.

The pilot had 3,371 flight hours, including 3,094 flight hours accumulated during 12 years as a military helicopter pilot and 57 flight hours in airplanes. He held a U.S. Federal Aviation Administration (FAA) commercial pilot certificate for helicopters and an instrument rating. He was hired in December 2005 by Mercy Air Services to work at its Bell

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Investigators say an EMS helicopter crashed into a ravine after the pilot inadvertently flew into a fog-shrouded mountain pass.

BY LINDA WERFELMAN



U.S. National Transportation Safety Board

The wreckage was found on a mountainside in Southern California's Cajon Pass.

222U base in Twentynine Palms, California. After completing his initial training, he began flying EMS flights as pilot-in-command. He accumulated 220 flight hours while working for Mercy Air.

He moved to the operator's base in Victorville, California, in August 2006 and completed transition training for Bell 412SPs. His most recent U.S. Federal Aviation Regulations Part 135 check ride was conducted Aug. 29, 2006, and included 0.3 flight hours with an instrument training device.

"The check ride form noted that the pilot was not authorized [for] the use of an autopilot under instrument flight rules (IFR) flights," the report said. "The pilot was not IFR current, and not authorized by his company to conduct medical flights under IFR conditions, or [authorized for] the use of night vision goggles [NVGs] under any flight conditions."

The accident report did not say when the helicopter was manufactured but that it had a total airframe time of 9,978 hours, recorded during its last inspection. The date of the inspection was not included in the report. The helicopter had two Pratt & Whitney Canada PT6T-3B engines; at the last inspection, the left engine had 17,799 hours total time and 4,528 hours since

major overhaul, and the right engine had 5,521 hours total time.

The helicopter was certified for day/night visual flight rules (VFR) operation by a single pilot. Although it had standard instruments for IFR flight, was certified for single-pilot IFR operations and had been approved by the FAA for VFR or IFR flights, either during the day or at night, the helicopter was assigned to a VFR base and was used only for VFR flights. It was equipped with a satellite-based automatic flight following system that provided the ground base with reports every 30 seconds that included the helicopter's global positioning system (GPS) latitude and longitude. Mercy Air had not yet installed the software upgrade that would have added reports of altitude and airspeed.

Mercy Air had begun equipping its helicopters with NVGs, but an NVG system had not been installed in the accident helicopter.

A VFR-Only Base

At the time of the accident, Mercy Air, operating as LifeNet, was a subsidiary of Air Methods Corp. of Englewood, Colorado. Air Methods employed about 700 pilots, including 335 LifeNet pilots and 50 Mercy Air pilots, and operated about 200 helicopters at EMS bases across the United States. The Mercy Air base in Victorville was one of five bases in Air Methods' Region 1. Because Victorville was designated as a VFR-only base, all pilots operated under VFR rules. They held instrument ratings but typically were not current in IFR operations.

The company was authorized to use specific helicopters and their autopilot systems in IFR conditions, so long as the autopilot was operational and the pilot had satisfactorily completed a proficiency check, the report said.

In addition to requiring an annual Part 135 check ride and annual safety training, the company encouraged its pilots to undergo training every six months that usually emphasized recovery from unusual attitudes and inadvertent IMC encounters.

The Victorville base was staffed by a lead pilot, one safety pilot and two line pilots, who operated in a regular rotation. Each flight was conducted by a pilot and, typically, two medical crewmembers.

The company's operations manual said that pilots were expected to use an operational risk assessment matrix before each mission flight — but not before non-mission flights in which only the crew was aboard — to help identify, evaluate and manage risks. Base policies called for the results of the risk assessment to be recorded on a flight manifest form. The accident pilot completed risk assessments for the first two missions of the day; in both cases, the risk was recorded as “G” — or “green,” which typically means “normal operations.”

Autopilot Use Encouraged

The company encouraged — but did not require — pilots at its VFR bases, including Victorville, to use the autopilot during operations in marginal VFR weather conditions or during night VFR flights. The check airman told investigators that some pilots, but not all, “configured the helicopter's autopilot with appropriate features and headings for a quick engagement if necessary” and used it regularly.

The operations manual said that, in the event of an inadvertent encounter with IMC, “the pilot's primary responsibility was to maintain attitude control (level the helicopter), heading control (turn to avoid known obstacles), add climb power and attain climb airspeed. The pilot should then climb to the area's minimum safe altitude, make no turns greater than a standard rate turn, contact air traffic control (ATC) and squawk 7700 [emergency code setting on the transponder].”

Weather conditions in Victorville, 15 nm (28 km) northeast of the accident site, at the time of the crash, included visibility of 10 mi (16 km), broken clouds at 3,800 ft and overcast at 4,900 ft. At Ontario (California) International Airport, 19 nm (35 km) southwest of the site, visibility was 10 mi, with a broken cloud layer at 3,800 ft and an overcast at 5,500 ft.

The area forecast had included an airmen's meteorological information notice (AIRMET)

for IFR conditions, with mountains obscured by clouds, precipitation, mist and fog.

After being notified that an accident had likely occurred in the Cajon Pass, a safety officer in Victorville checked weather conditions in the area and determined that they included ceilings of about 4,000 ft.

Flight Request Denied

Pilots at the Victorville base work 12-hour shifts, either from 0800 to 2000 local time or from 2000 to 0800; their schedules call for a rotation of seven days on duty, followed by seven days off. The accident pilot began a seven-day work

Bell 412



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The Bell 412, a variation of the Bell 212, was first delivered in 1981. It was Bell's first production helicopter with a four-blade main rotor. The 412 SP (Special Performance version) has an increased maximum takeoff weight and fuel capacity, and more seating options than the original Model 412.

The 412SP has two Pratt & Whitney Canada PT6T-3B-1 turboshaft engines that together are rated to produce 1,400 shp (1,044 kw) of power for takeoff and 1,130 shp (843 kw) of power for continuous operation.

The 412SP has a maximum takeoff and landing weight of 11,900 lb (5,398 kg), maximum cruising speed at sea level of 124 kt and maximum range at sea level with standard fuel and no reserves of 354 nm (656 km).

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

rotation Dec. 8, 2006, working from 0800 to 2130; on Dec. 9, he worked from 0800 to 2030.

The following day, he began duty at 0800. He declined the first flight request of the day because of poor weather conditions in the Cajon Pass. Later in the day, he conducted three medical flights. After the third medical flight, the pilot began a repositioning flight at 1742 to the base at Southern California Logistics Airport in Victorville from Loma Linda University Medical Center. Because only the crew was in the helicopter, the flight was conducted not under Part 135 but under the less stringent requirements of Part 91.¹ Nighttime visual meteorological conditions prevailed along most of the route, and a company VFR flight plan was filed.

Each of the day's flights had traversed the Cajon Pass, a primary flight path between Victorville and the San Bernardino/Riverside area east of Los Angeles. Company personnel told investigators that if visibility in the pass was obscured, their flights would "hug the east or west sides of the canyon, away from the obscurations," the report said.

"Satellite tracking data from the operator indicated that the helicopter appeared to follow the Interstate 15 (I-15) highway in the lower portion of the Cajon Pass," the report said. "The highway makes a large S-shaped route as it gains in elevation toward the top of the pass, which is about 4,200 feet mean sea level (MSL). The route along the highway is away from a [well-lighted] residential/industrial area, having a well-defined light horizon, toward rising and dark terrain. Once at the top of the pass, as the highway turns toward the northeast, the upper desert communities are once again well [lighted]. Near the upper end of the pass, the helicopter flight track indicated that it proceeded toward the east, away from the highway."

The tracking data showed that the helicopter had followed I-15 northbound almost as far as the summit of the Cajon Pass. Then, at a point where the highway turned north, the helicopter "inexplicably" traveled northeast instead of continuing along the highway, the report said. The last position data, recorded at 1755, showed

that the helicopter was 0.4 nm (0.7 km) east of I-15. Wreckage was found 0.7 nm (1.3 km) east of the highway in a ravine on the mountainside at 4,026 ft MSL; it was at the base of a 100-ft (31-m) electrical transmission tower — one of a series of electrical towers depicted on aeronautical navigation charts east of the Cajon Pass running from north-northeast to south-southwest.

The report quoted a witness as saying that he had been in the area about the time of the crash and saw "what appeared to be the glow of a small grass fire" and watched it grow within five seconds into "a large fireball."

"The glow of the fire was obscured by waves of fog that would drift over the area in patches," the report said. The witness said the fog was "not very thick but would 'swoop down' and dissipate" at about 3,500 ft. The witness, who said that he flew kites, also told investigators that earlier in the day, he had measured winds in the area blowing "to the northwest" at about 13 mph (21 kph), with gusts to 29 mph (47 kph).

When authorities began receiving telephone calls reporting a fire on the mountain, callers mentioned fog in the area that obscured the tops of mountain ridges at the top of the pass, and the electrical towers. Rescue personnel said that "intermittent waves of fog" complicated their search for the wreckage. At the same time, skies at the destination airport were clear, and weather conditions at the bottom of the Cajon Pass were suitable for VFR flight.

Examination of the engines, airframe and flight control components that had not been destroyed by fire revealed no indication of pre-impact anomalies that would have precluded normal operation of the helicopter. ➔

This article is based on NTSB accident report LAX07FA056 and supporting docket information.

Note

1. An NTSB special investigation, conducted after this and several other EMS crashes, contained several recommendations to the FAA, among them a call to require all EMS flights, including positioning flights, to be conducted in accordance with Part 135 (ASW, 9/08, p. 12).

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