

# Disorientation After Dark



The flight path of the Bell 206L-1 was characteristic of a pilot's spatial disorientation and loss of control, the NTSB says.

BY LINDA WERFELMAN

The pilot's spatial disorientation after an inadvertent entry into dark night instrument meteorological conditions was responsible for the loss of control and in-flight break-up of a Bell 206L-1 LongRanger on an emergency medical services (EMS) positioning flight in Walnut Grove, Arkansas, U.S., the U.S. National Transportation Safety Board (NTSB) says.

The pilot, flight nurse and flight paramedic were killed in the crash at 0355 local time on Aug. 31, 2010. The main rotor and tail boom separated from the helicopter, operated by Air Evac EMS, before it struck the ground in an area of "forested and rolling terrain" at an elevation of about 585 ft above mean sea level (MSL), 3.5 nm (6.5 km) south of the intended landing site.

According to radar, global positioning system (GPS) receiver data and a witness, the helicopter had reversed course "multiple times" immediately before the crash, the NTSB said in its final report on the accident. "The flight path ... was consistent with spatial disorientation and subsequent loss of control."

Flight preparations had begun after the Van Buren County emergency dispatcher contacted the Air Evac Communications Center in West Plains, Missouri, at 0316 to request "that a flight be placed on standby to transport a patient from Crabtree, Arkansas." The dispatcher added that she was not certain the helicopter would be able to make the flight because of "some crappy weather" in Van Buren County.

After the communications center operator contacted the flight crew, however, the crew said the weather was "good" for the flight. At 0335, the helicopter departed from Vilonia, Arkansas, and at 0339, the crew contacted the Air Evac Communications Center, estimating the flight — to be conducted at an altitude of 1,200 ft above ground level (AGL) — would take 27 minutes. They also said that the "risk assessment score" for the flight was 15 points — which meant that risks were low enough that the pilot could accept the flight without consultation with the company's operational control center.

Radar data showed that the helicopter was flown primarily at altitudes between 2,000 and 2,600 ft MSL over rolling terrain, with the last radar information indicating an altitude of 2,700 ft.

The last flight data recorded by the helicopter's GPS showed that the helicopter was at 1,760 ft. The last minute of data on the GPS also showed that the helicopter had turned to the left and then to the right, followed by "a reversal to the left, a reversal back to the right and then a final reversal to the left," the report said.

A flight-tracking program used by Air Evac's operational control center, which recorded flight data every 60 seconds, showed the helicopter at 1,800 ft and 4.4 mi (7 km) southeast of the intended destination about one minute before the crash.

**The helicopter had reversed course 'multiple times' immediately before the crash, the NTSB said.**

### Former Military Pilot

The 35-year-old pilot was the pilot supervisor at the company's base in Vilonia, Arkansas, and had a commercial pilot certificate with a helicopter rating and instrument helicopter

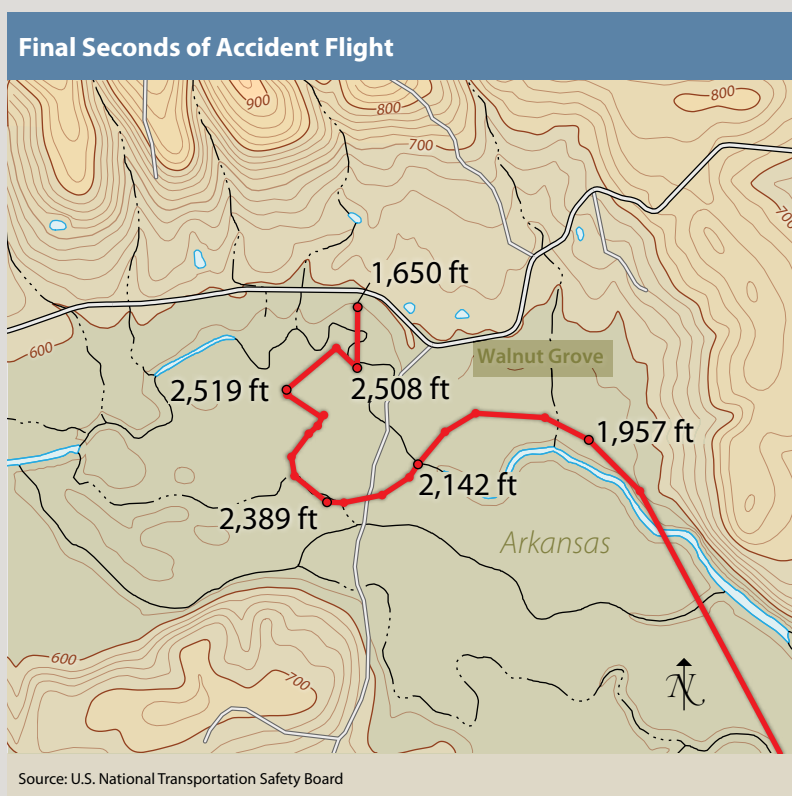


Figure 1

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rating and an airplane single-engine land rating; he also had an airline transport pilot certificate with an airplane multiengine land rating.

A former military pilot, he had accumulated at least 3,312 flight hours in rotorcraft, including 489 hours in Bell 206Ls, 622 hours at night and 311 hours in actual or simulated instrument conditions, and more than 200 hours using night vision goggles (NVGs). In the 90 days preceding the accident, he had 35 flight hours, including 12 hours at night.

Company records showed that he had accepted 11 night flights in the previous three months and had used NVGs on five of them. Investigators could not determine whether the pilot was using NVGs on the accident flight.

The pilot completed a competency/proficiency check on Sept. 1, 2009, with a satisfactory rating in all areas that were tested. He completed an NVG flight proficiency check ride, including simulation of inadvertent flight into instrument meteorological conditions (IMC) on Dec. 11, 2009. Both proficiency flights were in Bell 206Ls.

The Air Evac safety director said there had been no safety issues involving the accident pilot.

The accident occurred on the pilot's fourth night of a night-shift rotation — from 1900 to 0900 local time — that was to have lasted seven days. Three days before the accident, he had recorded 2.5 hours of flight time, including 0.2 hours during the day, 0.6 hours at night and 1.7 hours using NVGs.

The accident helicopter was manufactured in 1978 and had total airframe time of 24,690 hours. It was maintained under an approved aircraft inspection program, and maintenance records showed that a 150-hour engine inspection had been completed Aug. 29, 2010.

A post-accident examination of the airframe, engine and related systems showed no pre-impact anomalies.

The helicopter was equipped for flight into IMC but was not certified for instrument flight rules (IFR) flight; Air Evac's policy was not to operate in IMC. In addition to the GPS, it had

a radar altimeter and a night vision imaging system. It did not have a helicopter terrain awareness and warning system, and the system was not required; the GPS, however, provided visual and aural terrain awareness warnings.

The GPS was damaged beyond repair in the crash, but flight data related to the accident flight were extracted from a memory device for use in the investigation.

Accident investigators also examined recordings of communications between the Van Buren emergency personnel and the accident helicopter, but there was only one clear transmission from the helicopter in which a male voice called the base operator. In the background, investigators also could hear — but could not identify — a short tone that increased in pitch. The other communications on the recording were between the base operator and personnel who were members of the ground unit transporting the patient.

### 97 Bases, 400 Pilots

Air Evac was granted an operating certificate from the Federal Aviation Administration (FAA) in 1986 for on-demand EMS flights. At the time of the accident, the company operated at 97 bases in 14 states and employed 400 pilots. It was audited and accredited by the Commission on Accreditation of Medical Transport Systems and several air medical associations in the two years before the accident; all audit results were satisfactory, the report said.

All new pilots were required to have a minimum of 2,000 flight hours, including 500 hours of turbine time, as well as experience with night flight and instrument flight.

The company's operational control center in West Plains, Missouri, was staffed by several dispatchers, who took calls and provided flight following. Although they were not FAA-certified flight dispatchers, they were trained in emergency response.

The control center also was staffed with operational controllers, who were responsible for helping pilots with weather, publications and

emergency information. They also had the authority to decline a flight request or to terminate a flight, if required by safety concerns.

### Warnings of IMC

Satellite images showed low clouds throughout the region, as well as clouds directly above the accident site. Doppler radar did not show precipitation in the area, but mist had been reported in the hours before the accident.

Witnesses near the accident site described the weather as hazy or foggy, with an overcast, and said the sky was very dark and the moon was not visible, although the U.S. Naval Observatory said that, above the clouds, “60 percent of the moon’s visible disk [was] illuminated.”

At Clinton Municipal Airport, 6 nm (11 km) northeast of the accident site, the routine aviation weather report issued at 0355 reported visibility of 10 mi (16 km), few clouds at 1,600 ft, broken clouds at 4,900 ft and an overcast at 6,000 ft. Three hours earlier, visibility had been as low as 4 mi (6 km) in mist, and a National Weather Service AIRMET (airman’s meteorological information) warned of IMC, with low ceilings and poor visibility. A weather service area forecast called for marginal visual meteorological conditions throughout Arkansas.

The NTSB said accident investigators had found no record that the pilot had obtained a weather briefing from either an FAA flight service station or the Direct User Access Terminal System. Air Evac said its pilots were encouraged to obtain information from a flight service station or another approved source and that its bases were equipped with computer terminals to enable frequent weather checks. In

addition, all helicopters had satellite radio weather information.

“It could not be determined which resources were used by the pilot prior to the flight,” the NTSB report said, adding that the pilot had not discussed weather with the dispatcher before or during the flight.

The burned wreckage was found in a forested area, and the wreckage distribution pattern was consistent with the in-flight separation of the main rotor and the tail boom, the accident report said. The main rotor assembly was found 715 ft (218 m) northwest of the main wreckage at an elevation of 611 ft MSL, and the tail boom was 190 ft (58 m) southwest of the main wreckage at 578 ft (176 m).

### Risk Assessment

Air Evac required its pilots to use a risk assessment worksheet before all air medical flights and air medical repositioning flights.

The first portion of the risk assessment system was the “short form,” which required pilots to answer questions in 17 areas, including pilot experience with the company, with the make and model of helicopter to be flown and with the weather and terrain likely to be encountered during the flight. The pilots tallied the points associated with each of their answers, and if the total was less than 35, “pilots were advised that the flight [was] at their discretion,” the report said.

“If the total of the short form was 35 or greater, the pilot was required to complete the long form and consult with the operational control center.”

The long form presented questions in 31 areas, and pilots responded and added up the resulting scores. Again, a score of 35 or less indicated a low-risk flight, “with the conduct of the flight

being pilot’s choice,” the report said. Scores up to 60 indicated a low to moderate risk, “advising the pilot to exercise caution.” Scores of 61 to 99 were considered moderate to high risk, and the pilot was urged to exercise extreme caution.

“A score of 100 and above was high risk, and the flight was not permitted,” the report said.

### Pilot Training

When the accident occurred, Air Evac provided its pilots with annual ground training in areas including situational awareness, human factors, patient interaction and awareness, critical incident task saturation, workload management, risk assessment, loss of tail rotor effectiveness and weather. Additional training included night operations, NVG operations and recovery from inadvertent entry into IMC.

Pilots had simulator training twice a year, including unusual attitudes and recovery from inadvertent entry into IMC, simulated whiteouts (blowing snow) and brownouts (blowing dirt or sand), emergency procedures and various types of instrument approaches.

NVG training also was provided, including various maneuvers and emergency procedures, system failures and flight into different types of lighting conditions. IMC was simulated.

After the accident, Air Evac “took several steps to increase safety within their operations,” the report said. “Air Evac placed additional focus and emphasis on [inadvertent entry into] IMC training during night operations, in addition to [inadvertent entry into] IMC procedures at night while using the night vision goggles.”

*This article is based on NTSB accident report CEN10FA509 and related information from the accident docket.*