NATIONAL TRANSPORTATION SAFETY BOARD
Western Pacific Region
Gardena, CA

December 1, 2008

Group Chairman's Factual Report

OPERATIONS GROUP

CEN09MA019

A. ACCIDENT

Accident Number:	CEN09MA019
Operator:	Air Angels
Location:	Aurora, IL
Date:	October 15, 2008
Time:	2358
Airplane:	Bell 222, N992AA

B. OPERATIONS GROUP

Chairman:	Van S. McKenny IV Group Chairman National Transportation Safety Board Gardena, CA
Member:	Phil Huth Director Flight Operations, Air Angels Bolingbrook, IL 60490

C. SUMMARY

On October 15, 2008, at 2358 central daylight time, a Bell 222 helicopter, operated by Air Angel's Inc., and piloted by a commercial pilot, was destroyed when it impacted a radio station tower and the ground in Aurora, Illinois. The medical transport flight was conducted under Title 14 Code of Federal Regulations (CFR) Part 135, and was en route from the Valley West Hospital Heliport, Sandwich, Illinois, to the Children's Memorial Hospital Heliport , Chicago, Illinois, when the accident occurred. All four occupants, including the pilot, a flight paramedic, a flight nurse, and the patient, were fatally injured. The flight originated about 10 minutes prior to the accident.

D. DETAILS OF THE INVESTIGATION

The NTSB Operations Group Chairman arrived in Chicago, Illinois, on October 20, 2008. Upon arrival he went to the NTSB Chicago Field Office and received a situation brief from the investigator-in-charge. On October 21 the Operations Group was formed.

On October 21, 2008, interviews were conducted by the Operations Group with the managers, pilots, and mechanics of Air Angels, at the Air Angels facility in Bolingbrook, IL. The Operations Group concluded its field phase of the accident investigation in Chicago, IL, on October 25, 2008

Between October 25, 2008 and December 1, 2008, the Group Chairman conducted additional phone interviews with witnesses to the accident as well as Air Angels personnel. He also examined the Air Angels Operating Manual, Training Manual, collected hospital landing pad reference material, and reviewed the pilot's FAA medical and airman certificate records.

The interviewees were:

1. Mr. Phil Huth, Director of Flight Operations & Chief Pilot, Air Angels
2. Mr. Jeff Meisenger, Line Pilot, Air Angels
3. Mr. Chris Heiter, Director of Maintenance, Air Angels
4. Mr. Craig Rundle, Director of Operations, Air Angels
5. Mr. Joseph Diliberto, Paramedic, Air Angels
6. Mr. Dave Bond, Paramedic, Air Angels
7. Ms. Janice Racine, Flight Nurse, Air Angels
8. Ms. Liz Stapay, Communications Specialist, Reach Air Medical Services.
9. Mr. Bradley Waugh, son of the pilot.
10. Ms. Jill Waugh, former wife of the pilot.
11. Ms Debra Snyder, ER Manager, Valley West Hospital
12. Mr. Dave Krant, JA Air Services, service manager
13. Mr. Craig Decker, FAA POI

1.0 Company History & Operations

Air Angels Inc is a commercial on demand air taxi operator. The company was established in 1998 and operates out of Clow International Airport, Bolingbrook, Illinois. Air Angels received its 14 Code of Federal Regulations (CFR) Part 135 Operating Certificate, number X34A833I, on March 11, 1999. The company provides air and ground critical care transportation throughout Northern Illinois and Northwest Indiana.

At the time of the accident Air Angels operated two Bell 222 helicopters and had recently purchased an additional Bell 222 that was being outfitted for medical transport. In June of 2007, Reach Medical Holdings, Inc. had acquired Air Angels. Reach is a California based company that operates numerous medical transport companies throughout the United States. Air Angels employed 3 pilots, 3 full time mechanics, 1 part time mechanic, and 10-12 full time medical personnel. The company's Chief Pilot had just left the company a week prior to the accident to pursue different employment. The Director of Air Operations took on the responsibilities of the Chief Pilot until they could find a replacement.

Air Angels operated in accordance with FAA approved Operations Specifications (Ops Spec) for a 14 CFR Part 135 operation under certificate number X34A833I. The latest Ops Spec revision was dated August 8, 2008. Contained in the Ops Spec was authorization for visual flight rules (VFR) day and night operations with nine or less passengers. Conducting flights under instrument flight rules (IFR) was not authorized when exercising their Part 135 certificate.

Air Angels utilized an approved training program as required by 14 CFR Part 135.341. The training manual contains sections addressing new hire training, initial aircraft training, recurrent training, requalification training, transition training, and upgrade training. Within each of these training categories, subject matter regarding ground training, emergency training, flight training, differences training, testing and checking were outlined. Additionally an appendix contained maneuver diagrams, check airman and instructor training, list of company instructors, and company training forms. The FAA approved the training manual on October 5, 2001, and the latest revision was revision seven, dated August 1, 2008.

The Director of Flight Operations (DFO) manages and exercises operational control of Air Angels aviation operations and is responsible for crew scheduling. The DFO started working for Air Angels early in 2004. He became the Chief Pilot in June 2004, then became the DFO in July 2006. He is a former Army aviator and the majority of his 6,900 flight hours are in helicopters. He holds an airline transport pilot certificate (ATP), and is the company's check airman. The pilots are normally scheduled for a week on (7 days), week off (7 days) schedule, with a crew day consisting of a 12-hour shift, from 0700 to 1900, and 1900 to 0700. The duty schedule consists of alternating a week of day shift, followed by week of night shift. On October 6, the Chief Pilot left the company for other employment. This reduced the number of company pilots from four to three. To cover the schedule with three pilots, the DFO requested the other two pilots perform an extra week of duty until another pilot could be hired, effectively extending one of their duty periods from 7 days to 14 days. The accident pilot volunteered to extend his week on the night schedule an additional week.

The Director of Operations (DO) is responsible for directing and managing all ground ambulance activities, flight nurse and paramedic schedules, and general administrative duties. The DO has 23 years of Emergency Medical Services (EMS) experience. He has been employed by Air Angels for 8 years and has held the DO management position for 4 years. He oversees 10 to 12 flight nurses and paramedics. A medical crew consists of a flight nurse and paramedic. Although their titles are different, the flight nurses and paramedics go through the same flight crew training, perform the same duties, and have the same responsibilities. The duty schedule is broken down to three teams, black, red, and gold, and each crew stands a 24-hour duty day, with 48 hours off between duty periods. A flight nurse or paramedic could normally expect to alternate between ground ambulance transport and air ambulance transport duties every couple of weeks.

The Director of Maintenance (DM) has worked for Air Angels for the last 7 years. The maintenance department employs two other full time airframe and powerplant (A&P) mechanics, and one part time A&P mechanic. Their normal working hours are from 0730 to 1630 Monday-Friday. One of the mechanics is always on-call at all other times. The DM said that he is not under any pressure to operate with an insufficient budget or to cut corners. In fact, he said that since Reach acquired the company they had been able to make the roof beam repairs that had kept N992AA out of service for a year, replace much of the interior plastic molding, and purchase a third helicopter. Having two operational helicopters reduces pressure on the maintenance department because one helicopter can perform the mission while the other is being repaired, which allows for thorough and

unrushed maintenance practices.

Air Angel flights are dispatched from the Reach Air Medical Services office in Santa Rosa, California. The dispatch office receives the request for medical transport and helps coordinate with the sending and receiving facilities. Reach dispatch keeps a detailed log of all coordinating activities and aircraft status. Once a receiving facility has been identified dispatch will contact the duty pilot via a dedicated cell phone and brief him regarding the sending and receiving facility details. The duty pilot will check the weather along the route of flight and report back to dispatch accepting or rejecting the flight based on weather. A formal risk assessment was not an action required to be performed by the pilot. Once the flight has been accepted, dispatch then briefs the medical crew about the condition of the patient being transported. Once airborne, the pilot communicates with dispatch utilizing a dedicated radio in the helicopter that transmits to a repeater which then routes the comms through a VOIP (voice over internet protocol) connection to Santa Rosa. The Chief Pilot said that he has never experienced a problem communicating with dispatch using this system. While en route to the sending facility, the paramedic usually sits in the right hand seat and assists the pilot with radios and visual lookout.

Before takeoff, the pilot is required to check in to dispatch with a flight following call. The flight following call includes the following information; total take-off weight, helicopter center of gravity (CG) and CG range, destination, estimated time en route (ETE), souls on board, and fuel (time). While transporting the patient, both the flight nurse and paramedic are in the cabin with the patient. Every 15 minutes the pilot is required to send dispatch a position report. The position report includes the following information; latitude, longitude, estimated time of arrival (ETA), ground speed, and heading.

The en route segment of the flight was usually flown around 1,500 feet mean sea level (msl) during the day and 1,500 -1,700 feet msl at night; 1,800 feet msl would usually provide 1,000 feet agl within the local area. Airspeed was normally between 125 and 130 knots, 90% engine torque. Once at the cruising altitude, most pilots engage the autopilot to hold altitude and heading.

The helicopter was equipped with four radios which were set to the following: local ATC frequency, on the GNS 430, dispatch on the Kenwood radio, and 123.025 (helo air-to-air common) on the third radio. The medical crewmembers had a Technosonic radio in the cabin that they would use to communicate with the hospital.

In accordance with 14 CFR Part 135.21, Air Angels kept current a General Operating Manual (GOM) which identified management policies and responsibilities, and the procedures for which flights are to be conducted. The latest revision of the GOM was revision 19, dated July 1, 2008. Chapter 5, paragraph 19, establishes the minimum cruising altitude employed by Air Angels flight crews as, “Cruising altitude will be at an altitude that will ensure a safe landing should an emergency arise. Altitudes are prescribed in 14 CFR Parts 91 and 135.” FAR 135.203, VFR Minimum altitudes, states “Except when necessary for takeoff and landing, no person may operate under VFR – (b) A helicopter over a congested area at an altitude less than 300 feet above the surface.”

2.0 Helicopter Information

The helicopter was a Bell 222, serial number 47062. It was configured for medical transport of a single patient on a gurney. A removable partition separated the cockpit from the cabin area of the helicopter. Air Angels acquired the helicopter in February. 1999. The crew consisted of a single pilot, flight nurse, and paramedic. A review of the helicopter's maintenance records revealed that it had 5,302.6 hours total time as of October 14, 2008. The helicopter had two Lycoming LTS-101-650C engines. The number 1 engine had 5,694.0 hours total time, and the number 2 engine had 3,717.1 hours total time. The most recent phase inspection was performed on September 24, 2008, at 5,270.9 hours total airframe time.

In the pilots flight following radio call he reported that the weight of the helicopter was 7,635 pounds, the center of gravity (CG) at 251.7 inches and a CG range of 247.65 to 256.0 inches. The Bell 222 Flight Manual, limitations section lists the max gross weight for takeoff and landing is 7,850 pounds. Referring to the Bell 222 Flight Manual gross weight center of gravity chart, the CG that the pilot reported was within the normal operating limits as defined by that chart.

The helicopter had been equipped with a Garmin GNS 430, which is a combined GPS, navigation, and communications radio that is mounted into the instrument panel. The maintenance records include a FAA form 337 (Major Repair and Alteration) that documents the GNS 430 installation on April 8, 1999, and a placard reading "GPS not approved for IFR operation" had been placed on the instrument panel. The GNS 430 software was updated on January 9, 2008, by JA Air Services, at the Du Page, IL, airport. The DFO and DM stated that the GNS 430 was configured with the Jeppesen aviation database, last updated on June 1, 2008. Hospital helipad locations were stored as waypoints in the GNS 430 for the pilots to access during in flight planning and navigation. Although the GNS 430 can display terrain and obstacles, and provide terrain/obstacle alerts on its display, the software for that function was not installed, and had never been installed. The DFO stated that the GNS 430 was their primary source of navigation information.

The helicopter was equipped with an autopilot system. The autopilot provided heading hold, attitude hold, and vertical speed hold. The system could be coupled to a ILS (instrument landing system) signal and fly the helicopter down to 50 feet agl. The system would not automatically track on a desired course or airway, the pilot was required to make course adjustments with the heading bug or manually fly the helicopter to make course corrections.

3.0 Personnel Information

A review of Federal Aviation Administration records revealed that the pilot held commercial pilot certificate issued on February 5, 1970, with rotorcraft-helicopter and instrument-helicopter ratings. The pilot held a second class medical certificate, issued on January 15, 2008.

The accident pilot was hired by Air Angles in July, 2006. A review of the pilot's Air Angles

training record indicated that he had accumulated 3,564.7 flight hours total time. He had logged 3,182.7 hours in helicopters, and 382 hours in fixed wing aircraft. While employed by Air Angels he had accumulated 282.7 hours in the Bell 222. He had accumulated approximately 50 hours with in the last 90 days and approximately 23 hours within the last 30 days, all in the Bell 222.

The Director of Flight Operations (DFO) performed all the pilot's new hire and initial training in July, 2006, his most recent recurrent training in August, 2008, and conducted his annual line check (14 CFR Part 135.299) on September 25, 2008. All elements of the line check were completed, marked satisfactory, with no additional comments in the record. The DFO stated that the pilot was a very experienced helicopter pilot, having flown helicopters in Vietnam, and who looked forward to flying each day. He was a very reliable and conscientious pilot, who flew his landing approaches in a slow, meticulous, manor. During the pilot's line check, they received a call from dispatch to perform a patient transfer. The flight was conducted in accordance with the general operating manual, and he did observe the pilot use the autopilot while on the en route phase of the flight.

The pilot's home was in Carmel, Indiana, which is about 200 miles southeast of Clow International Airport. Because of the distance, the pilot would not commute while he was on his duty week, instead he would stay in the Air Angels pilot's bunk room when off duty. The DFO said that this situation was not a problem because the other three pilots lived locally and did not require the bunk room very often. The bunk room is located in a fairly isolated portion of the Air Angels office. The pilot was one day into his second week of night shift work at the time of the accident. He had not flown the night before the accident and his most recent flight had been on October 13th, flying for 54 minutes. When the other line pilot relieved him on the morning of October 14th, they talked about the good amount of rest he had been getting on the night shift. A review of the pilot's activities during the 72 hours prior to the accident revealed that the pilot maintained his normal routine and stayed in the Air Angels pilot bunk room during the day. He appeared well rested and in his normal good spirit when he reported for his shift on October 15th.

The paramedic that assisted the pilot with pulling the helicopter out of the hanger and starting the engines using the ground start cart on the night of the accident related to a Safety Board investigator that after the pilot received the dispatch page for this flight his demeanor changed. The pilot was no longer his good natured humorous self, but had become humorless and nervous. The paramedic asked the pilot if he'd been to Children's Hospital before, and the pilot indicated that he had not. The paramedic then mentioned that there was a steeple to be aware of north or northeast of the landing pad. He tried to liven up the pilot's mood a bit by joking but the pilot remained anxious.

4.0 Chronological Events of the Accident Flight

Reach dispatch received the request to transport a patient and opened the case record on October 15, 2008, at 2112:49[1]. The requested transport was a single patient from Valley West Community Hospital in Sandwich, Illinois. Angel-1 accepted the transfer flight at

[1] All times central daylight time (CDT)

2113:59. The flight was delayed until a receiving hospital could be identified by dispatch. At 2246 Angel-1 was dispatched. At 2249:52 the receiving facility was confirmed as Children's Memorial Hospital, Chicago, Illinois. At 2254:18 Angel-1 was en route to Valley West Hospital, and arrived at 2311:20. At 2338:25 the pilot made his flight following call, which is required by Reach/Air Angels protocol, prior to takeoff with a patient. The flight following call included the following information: pilots planned initial heading would be 080 degrees, distance was 38 miles, eta 18 minutes, destination was Children's Memorial Hospital, 4 people onboard, and 1.5 hours of fuel onboard. At 2350:34 the helicopter was en route to Children's Memorial Hospital. At 2355:21 the pilot checked in with Dupage Airport tower and stated, "Ah sir we are just over Aurora en route to Children's Hospital ah downtown Chicago at about 1,400 feet." At 2355:36, the controller responded, "Lifeguard Angel 1 cleared through the delta current altimeter 3014."[2] The pilot acknowledged the altimeter setting at 2355:42. According to Chicago Terminal Radar Approach Control (TRACON) the helicopter disappeared from radar at 2358:26.

A magnetic course of 080 degrees from West Valley Community Hospital passes 4.5 miles south of the WBIG radio tower and between Naper Airport and Clow International Airport, but is not a direct course to Children's Memorial Hospital. A direct course of 068 degrees passes within a mile from the WBIG radio tower. A 068-degreee course as well as a 080-degree course from the West Valley Community Hospital would cross over increasingly congested ground lights that extend towards the horizon.

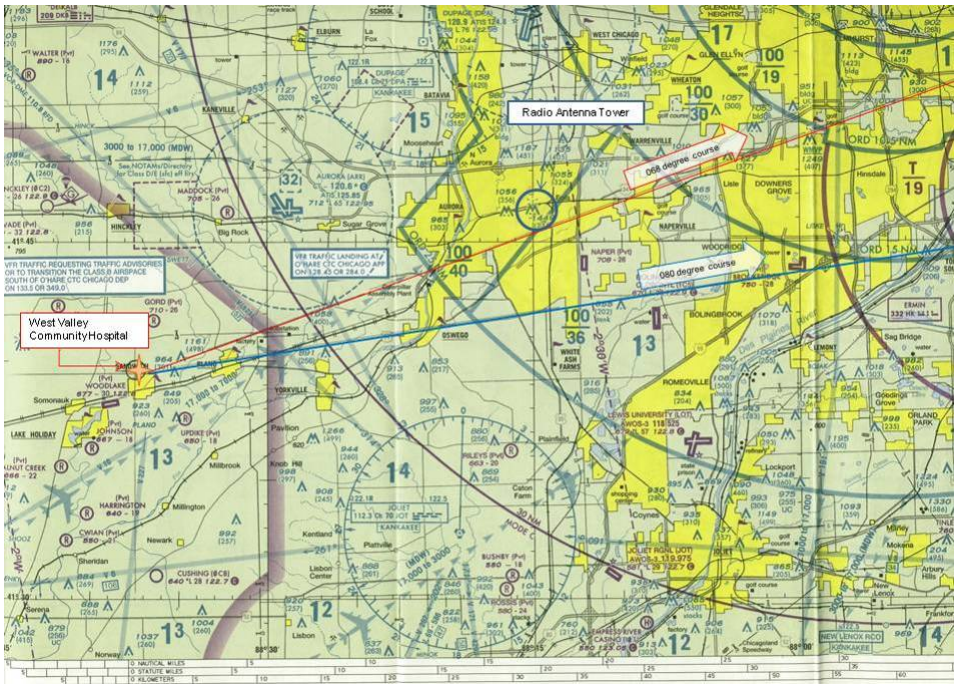


Figure 1- Chicago Terminal Area Chart with courses 080 & 068 Plotted.

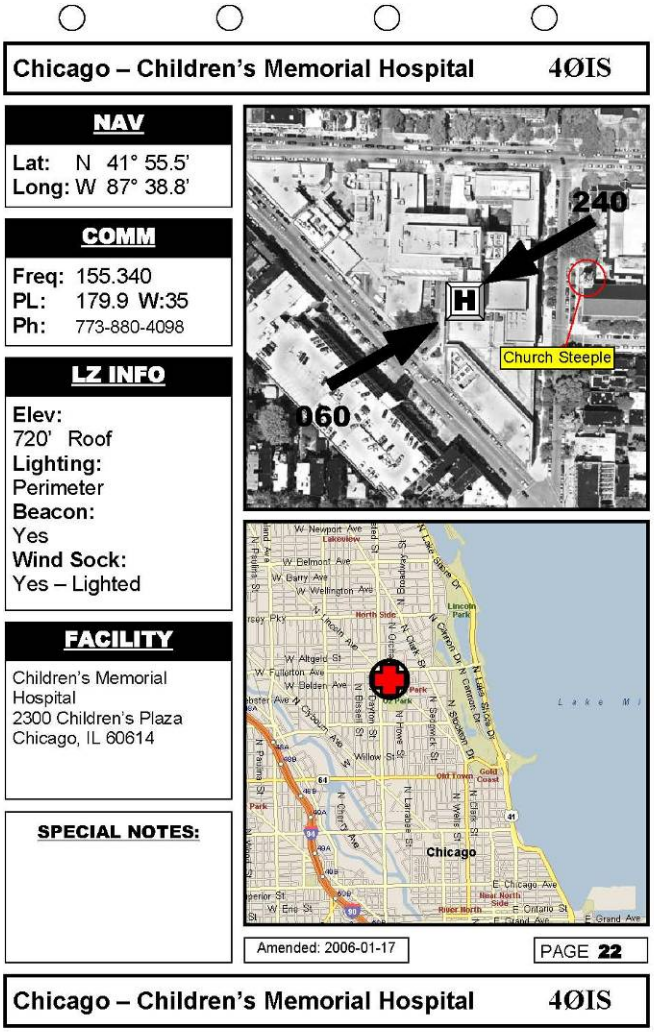
5.0 Information Available to the Pilot

The Illinois Department of Transportation publishes the Illinois Hospital Heliport Directory. The purpose of the directory is to provide information to the aeronautical community for

[2] NTSB CEN09MA019 , ATC Group Chairman Factual Report

planning purposes when operating to and from hospital heliports in the state of Illinois. The 146-page directory contains the location of 139 hospital helipads (latitude and longitude), communications frequencies, elevation and lighting information, and the recommended landing and takeoff directions with an aerial photo and map. The guide does not publish the landing pad dimensions or note nearby obstacles. According to the DFO, this heliport directory was kept in the cockpit of the helicopter.

The published information for the helicopter pad at Children's Memorial Hospital, designated 40IS, included the pad elevation, 720 feet, and the recommended approach direction was either a northeast to southwest approach on a course of 240-degrees, or its reciprocal course 060-degrees southwest to northeast course. The pad dimensions were not published, and the church steeple to the east was in the photo depiction of the facility but was not highlighted or called out in any way.



Heliport Directory. The steeple is identified in this depiction.

The Air Angels Director of Flight Operations (DFO) stated that the helipad at Children's Memorial Hospital was not optimal. It is a small landing pad that is 13 stories up, on the roof of the hospital. Once on the helipad a good portion of the tail boom of a large helicopter, like the Bell 222, would hang over the edge. There is a steeple that is an obstruction to the northeast, and an elevator shaft close to the pad that can cause some concern when making an approach from north. In his experience, wind turbulence off the building is not a concern at this location.

The WBIG-1280 AM radio tower is located 7 miles north-northwest of Clow International Airport, and is marked as 1,449 feet msl (734 feet agl) elevation, with high intensity lights on the Chicago Aeronautical Sectional, the Chicago VFR Terminal Area Chart, and the Chicago Helicopter Route Chart. The tower was configured with sets of three strobe lights, each covering a separate 120-degree arc around the tower, at two different levels. The first level was located approximately 2/3 up the tower, and the second set of strobe lights were mounted at the top. The tower height information (feet) depicted on the VFR Terminal Area Chart is slightly obscured by an airspace boundary line the same color as the height information. The

WBIG antenna is the tallest antenna within a 10-mile radius of Clow International Airport.

The nearest weather reporting facility to the destination hospital was Chicago Midway Airport (KMDW), which is located 11 miles southwest of Children's Memorial Hospital. Between 0900 (0200Z) and midnight (0500Z) the winds were prevailing from the north 330 to 340 degrees, between 7 and 10 .knots, and the visibility was 10 statute miles.

The next closest weather reporting facility to Children's Memorial Hospital was Chicago O'Hare International Airport (KORD), which is located 14 miles northwest of the destination hospital; at 2251(0351Z) the recorded winds were 330-degrees, 11 knots gusting to 18. Between 2340 (0440Z) and midnight O'Hare was reporting winds from the north (340-350 degrees) between 10 and 11 knots, and the visibility was 10 statute miles.

The nearest weather reporting facility closest to the accident site was Dupage Airport (KDPA), which is located 7 miles north of the accident location. Between 0900 (0200Z) and midnight the winds were prevailing from the north, 320-330 degrees, between 7 and 11 knots, and visibility was 10 statute miles.

AC-90-48C (Advisory Circular) discusses night vision, night illusions, and visual scanning. At night peripheral vision is the most useful in spotting collision threats, and conflicting ground lights increase the difficulty of detecting other aircraft (or objects). Innumerable light sensitive nerves called 'cones' and 'rods' are located at the back of the eye or retina, a layer upon which all images are focused. The cones are located in the center of the retina, and the rods are concentrated in a ring around the cones. In the absence of normal light the process of night vision is placed almost entirely on the rods. The fact that rods are distributed in a band around the cones and do not lie directly behind the pupils makes off center viewing important during night flight. A visual search at night depends almost entirely on peripheral vision. Additionally, the pilot's eyes may require several seconds to refocus when switching views between items in the cockpit and distant objects. Apparent movement is almost always the first perception of a collision threat and probably the most important, because it is the discovery of the threat that triggers the events leading to proper evasive action.

6.0 Meteorology

The KLOT 0.50-degree Base Reflectivity product for 2357:13 (0457:13 UTC) and the Velocity Azimuth Display (VAD) Wind Profile product 2311-0008 October 15-16 (0411-0508 UTC) indicate winds from the north-northwest at 20 knots.[3]

The NWS NCEP operates a series of numerical model analyses and forecasts. One of the operational systems is the North American Mesoscale (NAM) model. The NAM model data for October 16 were obtained from the National Oceanic and Atmospheric Administration (NOAA) Air Resources Laboratory (ARL) Internet site. The model data for the winds between 384 m (1,260 feet) msl and 599 m (1,965 feet) msl were 7.3 m/s (14 kts) and 10.1 m/s (19.6 kts).[3]

[3] NTSB CEN09MA019, Meteorological Factual Report

7.0 Company Pilot Training Program

Air Angels conducted all training in house and has separated curricula for the following training categories; new hire training, initial aircraft training, recurrent training, requalification training, transition training, and upgrade training. All training was outlined and defined in the company training manual. The manual lists the required subject material to be covered during training, and has a section that breaks down the material into important subject categories, and establishes what the demonstrated completion standard is.

The DFO stated that much of the ground portion of training uses a computer base training program, Avstar. Avstar modules cover the required general training, such as, meteorology, navigation, air traffic procedures, Federal Aviation Regulations (FAR's), concepts of instrument procedures, and en route and terminal area planning. Some modules are specific to the Bell 222, such as, weight and balance, and helicopter performance. The Avstar system requires the trainee to complete a test prior to moving on to the next module. Company specific training is done on a one-on-one basis between the pilot and instructor, such as, duties and responsibilities, and the General Operating Manual. The instructor would measure the pilot's knowledge level orally through discussion. Flight proficiency would be performed during instructional flights and check rides.

As part of a new pilot's initial training, the DFO stated that a familiarization with the most frequently used helicopter pads, flight routes, and local area orientation is preformed. There are no specific guidelines in the training manual that addresses local area familiarization, most frequently used helicopter landing zones, or area hazards. There is no local area familiarization test or exam given to the pilot and this material is generally not covered in the recurrent training syllabus.

8.0 Medical & Pathological Information

An autopsy was performed on the pilot on October 16, 2008, by the Dupage County Coroner, Wheaton, Illinois. The coroner's report concluded that the pilot died of severe traumatic injuries to the head and body. The report also noted the finding of eyeglasses in a flight suit pocket. The pilot's distant vision was recorded on his most recent Application for Airman Medical Certificate on January 15, 2008 as 20/20 uncorrected in his right eye and in both eyes together, and 20/60 in his left eye corrected to 20/20; his near vision was noted as 20/50 in his right eye, 20/40 in his left eye and in both eyes together, and 20/20 corrected in each eye and in both eyes together; his intermediate vision (32 inches) was noted as 20/25 uncorrected in each eye and in both eyes together.

Forensic toxicology was performed on specimens from the pilot by the FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma. The toxicology report stated no carbon monoxide was detected in the blood, the test for cyanide was not performed, no ethanol was detected in the liver or muscle, and no drugs were detected in the liver.

9.0 Federal Aviation Administration Oversight

Air Angels holds an operating certificate issued by the FAA on March 11, 1999, to conduct on-demand air taxi operations under the provisions of 14 CFR Part 135. FAA Flight Standards District Office (FSDO) in West Chicago, Illinois manages the operating certificate.

The FAA's Program Tracking and Reporting Subsystem (PTRS) showed that FAA inspectors conducted a total of 58 surveillance activities on Air Angels within the last 12 months. Inspectors from the West Chicago FSDO conducted 56 of those activities. There were 23 surveillance activities performed by operations inspectors, and 25 surveillance activities performed by airworthiness inspectors. These surveillance activities included one base inspection, 4 ramp checks, one spot check, numerous airman checks, maintenance record inspections, and technical assists. The pattern of the FAA surveillance activities indicates that an inspector was working with Air Angels or visiting the Air Angels facility every month or two.

Van McKenny
NTSB, Western Pacific Region