NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety
Washington, DC 20594

Specialist's Factual Report

November 24, 2008

OPERATIONAL FACTORS/HUMAN PERFORMANCE

A. ACCIDENT

Location:	District Heights, Maryland
Date:	September 27, 2008
Time:	2358 Eastern Daylight Time
Aircraft:	Aerospatiale (Eurocopter) SA-365
NTSB Number:	MIA08MA203

B. OPERATIONAL FACTORS STAFF

Specialist:	Jill M. Demko, Air Safety Investigator National Transportation Safety Board Eastern Regional Office Ashburn, Virginia
Specialist:	Malcolm Brenner, Human Performance Specialist National Transportation Safety Board Washington, DC
Member:	Michael DeRuggiero Maryland State Police, Aviation Command Baltimore, MD

C. SUMMARY

On September 27, 2008, at 2358, eastern daylight time an Aerospatiale (Eurocopter) AS365N1 helicopter, N92MD, call sign Trooper 2 (T2), registered to and operated by the Maryland State Police as a public use medical evacuation flight, sustained substantial damage when it collided with trees and terrain in Walker Mill Regional Park, District Heights, Maryland. The flight had been cleared by air traffic control for an instrument landing system (ILS) approach to runway 19R at Andrews AF B (ADW), Camp Springs, Maryland. Instrument

meteorological conditions prevailed at the time of the accident. The commercial pilot, one flight paramedic, one field provider, and one of two automobile accident patients being transported were killed. The other patient being transported survived the helicopter accident, and was hospitalized with serious injuries. The flight originated from a landing zone at Wade Elementary School, Waldorf, Maryland, on September 27, 2008, at 2337, destined for the Prince George's County Hospital (PG), Cheverly, Maryland.

The operations specialist responded to the accident site on September 28, 2008, and collected data pertaining to the MSP pilot and flight paramedic. During the investigation, MSP and Federal Aviation Administration (FAA) records were reviewed, and the pilot's logbook was examined. In addition, witnesses were interviewed, which included MSP company personnel, first responders, family members, and fellow pilots.

D. DETAILS OF THE INVESTIGATION

1.0 HISTORY OF FLIGHT

Review of computerized dispatch data revealed the Maryland State Police System Communications (SYSCOM) duty officer received the medical evacuation mission request on September 27, 2008, at 2301:51. Review of SYSCOM audio recordings revealed T2 was notified of the mission at 2302:13, and departed ADW at 2310:22 for the automobile accident site to pick up the two patients. The flight arrived at the landing zone about 2320, and after departing about 2339:30, diverted for ADW at 2347:30 because of unfavorable weather conditions at PG.

Review of communication transcripts for the Federal Aviation Administration (FAA) Potomac Approach Control and ADW Tower revealed T2 contacted Washington Tower at 2344:24, and stated, "Uh yes sir we just ran into some heavy stuff. I don't think we're going to be able to make it all the way to the hospital." At 2348:12, T2 contacted Potomac Approach, requested an ILS approach to ADW and was issued radar vectors by the controller for the ILS runway 19R approach. The controller advised T2 that the most recent weather report for ADW showed ceiling 1,800 feet broken, visibility 7 statute miles, temperature 21 degrees Celsius (C), and dew point 19 degrees C. At 2355:03, T2 was instructed to contact ADW Tower. The ADW Tower controller cleared T2 for the option and provided the current wind at 2355:30. At 2356:43, T2 informed the controller he was not picking up the glide slope. The controller replied, "T2 roger it's showing green on the panel but you're the only aircraft we've had in a long time so I don't really know if it's working or not." T2 responded at 2356:59, Ok could I get an ASR approach in?" The controller responded at 2357:04, "There isn't anybody to do that I'm, I'm not current on that I can't do it." There were no further transmissions received from T2.

2.0 ORGANIZATIONAL INFORMATION

MSP Aviation Command was comprised of eight Bases in the State of Maryland (4 Regions, with 2 Sections in each Region). The accident helicopter was based at the MSP Washington Section (Andrews AFB), and it was the only MSP helicopter based there. The designation for the helicopter assigned to Washington Section was “Trooper 2.” The specific (N number) helicopter that flew as “Trooper 2” could change from day-to-day, depending on helicopter availability.

At the time of the accident, five pilots were based at Washington Section.

2.1 Public Aircraft vs. Civil Aircraft Operations

Historically, aircraft owned and operated by MSP Aviation were considered to be “public aircraft” and were exempt from many of the requirements in FAA regulations applicable to “civil aircraft.” The passage of Public Law 103-411, made a major change in the definition of “public aircraft.”

According to Public Law 103-411, the status of an aircraft as “public aircraft” or “civil aircraft” depends on its use in government service and the type of operation that the aircraft is conducting at the time. Examples of government functions used to qualify aircraft as “public” included: firefighting, search and rescue, law enforcement, aeronautical research, biological and geological resource management.” Medical evacuation flights might be an included governmental function, depending on the particular circumstances of the operation. An operation conducted “for commercial purposes,” where there is a receipt of compensation, could not be considered a public aircraft operation[1].

FAA Order 8900.1, Public Aircraft, stated medical evacuation flights, as a general matter, were not considered a government (“public”) function unless the following criteria were met: the nature of the operation required the use of an aircraft with special configurations, which may not be eligible for a standard airworthiness certificate, the victim cannot be accessed by ground transportation, insufficient number of properly certified and equipped civil aircraft operating under the appropriate rule, are available to complete the mission, or other, similar non-routine factors are present.

MSP Aviation Command performed medical evacuation (medevac), law enforcement/homeland security, search and rescue, and damage assessment missions with their fleet of Aerospatiale (Eurocopter) AS365 helicopters.

According to MSP interpretation of Public Law 103-411, Aviation Command medevac flights were considered a “civil aircraft operation” and search and

[1] See FAA Advisory Circular (AC) 00-1.1 (04/19/95)

rescue, law enforcement/homeland security operations were considered "public aircraft operations[2]."

FAA Order 8900.1, stated government aircraft operators, holding any type of FAA certification, will be included in the normal surveillance activities such as, spot inspections of the aircraft and aircraft records. Any aircraft or operation certificated by the FAA is subject to this surveillance regardless of whether they are operating as "public" or "civil."

A search of FAA surveillance records relating to MSP, revealed no surveillance was performed, during the year prior to the accident, in the following areas: enroute inspections, base inspections, station inspections, simulator inspections/checks, manual reviews, training programs, ramp inspections, records inspections. Surveillance inspections for the MSP Part 145 Maintenance Repair Station were routinely performed during the year prior to the accident. Additionally, the MSP had one pilot who was also a FAA Designated Pilot Examiner (DPE). The review of FAA surveillance records revealed during the year previous to the accident, surveillance was performed in reference to that DPE[3].

2.2 Number of Missions Flown

In the year previous to the accident, the Washington Section completed 1,201 scene medevac missions, 29 inter-hospital transfers, 155 law enforcement missions, 50 search and rescue missions, 122 support missions, and 79 homeland security missions. The total number of scene medevac missions flown by all sections of MSP was 5,769, and the total number of missions flown (including all types of missions) was 8,607.

2.3 MSP Funding

The MSP Aviation Command is funded by the State of Maryland. According to interviews with MSP personnel, funding is not contingent upon the number of missions flown. In the State of Maryland, all requests for scene medevac missions must be made to MSP first (through SYSCOM), before any private medevac operator. If MSP Aviation is not able to respond to a scene, SYSCOM then notifies private medevac operators, or other government agencies[4]. The exception to this is if MSP is not able to accept a mission due to weather. In this case, private operators are also required to turn down the mission.[5] Private operators based in Maryland primarily perform inter-hospital patient transports.

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[2] See Attachment 1: Public vs Civil Aircraft Documents
[3] See Attachment 1: Public vs Civil Aircraft Documents
[4] MSP Aviation has Memorandums of Understanding (MOU) with each private operator in Maryland, as well as, U.S. Park Police, U.S. Coast Guard, and a mutual relationship with Delaware State Police.
[5] MOUs with these organizations reflect this agreement to eliminate pressure to launch.

2.3 MSP Accident History

According to MSP personnel, they had not had an accident since 1986, and had flown over 100,000 flight hours since then. The 1986 accident involved a pilot who became disoriented after encountering inadvertent IMC, while returning to his base.

A search of the NTSB database revealed one additional MSP accident, which occurred September 9, 1989[6]. This accident involved a pilot's failure to follow procedures, which resulted in his loss of control while performing a night takeoff in a confined area.

3.0 PILOT INFORMATION

The pilot was hired by MSP as a state trooper on January 5, 1970. He applied for a position in the aviation division on May 29, 1979, and began employment in that division on July 15, 1981.

He "retired" on June 30, 1998, and was rehired as a "civilian pilot" on July 1, 1998. The difference between a civilian pilot and non-civilian (trooper pilot) was their sworn trooper status. A civilian pilot remained an MSP employee, but not a state trooper, and was able to collect both his MSP retirement and his civilian duty pay.

3.1 Certificate Information

At the time of the accident, the pilot held an FAA commercial pilot certificate with ratings for rotorcraft-helicopter and instrument-helicopter. He also held a private pilot certificate, with a rating for airplane single engine land and a flight instructor certificate with ratings for rotorcraft-helicopter and instrument helicopter.

A search of FAA and company records revealed no FAA enforcement actions, incidents, or company disciplinary actions.

A review of FAA airmen records indicates the following chronology of acquired airman certificates:

AIRMAN CERTIFICATE	ORIGINAL ISSUE DATE
Private Pilot – Airplane Single-Engine Land	October 13, 1978
Commercial Pilot – Rotorcraft-Helicopter	June 28, 1979
Flight Instructor – Rotorcraft-Helicopter	August 20, 1985
Commercial Pilot – Instrument Helicopter	April 14, 1988
Flight Instructor – Instrument Helicopter	April 18, 1988

[6] Accident reference number: BFO89FA079

3.2 Medical Information

The pilot held a second-class medical issued September 26, 2008 with a limitation, "must wear corrective lenses." As of that date, his height was 75 inches and his weight was 293 pounds. A review of the pilot's FAA medical file revealed his medical certificate had never been suspended, denied, or revoked.

According to his wife, the pilot was in good health and experienced no major changes in his health during the previous 12 months. He wore bifocals to correct his vision and wore them on the evening of the accident. He suffered a slight hearing loss in certain frequencies from working around helicopters, but did not require a hearing aid. He did not complain of insomnia or other sleeping problems and was able to nap during the day. He typically drank several cups of coffee per day, did not smoke tobacco, and took no prescription medication or other drugs.

The FAA Civil Aeromedical Institute (CAMI) conducted toxicological testing on fluid and tissue samples collected posthumously from the pilot. A urine sample tested negative for ethanol and a broad drug screen tested negative for major drugs of abuse, prescription drugs, and illicit drugs[7].

The State of Maryland, Office of the Chief Medical Examiner, performed an autopsy on the pilot on September 29, 2008. The cause of death was multiple injuries.

3.3 Pilot Flight Time

According to the pilot's logbook[8] ("logbook #3": June 17, 2006 – September 13, 2008) and MSP September Duty Time printout, he recorded the following time[9]:

Total Flight Experience	5225.1 hours
Total PIC Experience	5200.9
Total Time in Eurocopter SA-365	2770
Instrument Time Reflected in Logbook #3 (previous 2 years)	1.9 hours of actual; 6.4 hours of simulated
Instrument Time in Last 6 months	1.5 hours; 2 ILS approaches (IPC[10])
Total Night Experience	1919.9 hours
Helicopter Multi-Engine Time	2770 (all in SA-365)
Total Flying Time Last 90 days	48.1 hours; 18.5 at night

[7] See Attachment 2: Toxicology Report
[8] See Attachment 3: Pilot Logbook excerpt and September Duty Time Printout
[9] The pilot's family was unable to locate previous logbooks; therefore, the accuracy of these numbers could not be confirmed. The referenced times are based solely on the pilot's accuracy in carrying-over the flight times.
[10] IPC = Instrument Proficiency Check

Last 30 days	16.2 hours; 8.5 at night

3.4 Pilot Training

The pilot obtained his rotorcraft commercial pilot certificate through an approved commercial training course (AgRotors Inc., Gettysburg, Pennsylvania). At the time he applied to the Aviation Division, it was a prerequisite for pilots to acquire their rotorcraft commercial pilot certificate on their own.

He began his flight experience with MSP, in the Bell 206, and flew this type aircraft from 1981 to 1988.

According to MSP and Eurocopter records, the pilot received initial training in the SA-365 from November 14, 1988 to December 7, 1988 (40 hours ground school and 20 hours flight instruction), at the American Eurocopter facility in Grand Prairie, Texas[11].

Since 1988, the pilot accumulated 2,770 hours of total flight experience in the SA-365.

The pilot's most recent Instrument Proficiency Check (IPC) was completed on May 13, 2008, in a similar make and model to the accident helicopter. This training included 1.0 hour of ground instruction and 1.4 hours of flight instruction. According to the pilot's training folder, he conducted an ILS and TACAN approach, at ADW, and a GPS approach at St. Mary's County Airport (2W6), Leonardtown, Maryland[12]. The paperwork did not specify which ILS approach was performed; however, it stated both approaches were practiced coupled and uncoupled with the autopilot. According to the instructor pilot, there was nothing unusual about the flight and the pilot "did pretty well." He additionally reported the accident pilot was "above average" as compared to other pilots, and had "no trouble" with instrument approaches.

Examination of the pilot's training records indicated the pilot's signoff for the IPC was as follows:

> "Mr. Bunker was given an annual Instrument Proficiency Check for single pilot authorization. All of the required maneuvers were completed in accordance with the Aviation Command Standardization Guide, Operations Manual and Federal Aviation Regulations (FARs) according to Practical Test Standards. Mr. Bunker has a current second class medical and may act as <u>Single</u>

[11] See Attachment 4: Training Records
[12] The pilot's logbook reflected the ILS and TACAN approach were flown; however, the GPS approach was not documented in the logbook.

Pilot PIC for IFR Operations (Recovery Only) in the SA365N1/N2/N3."

According to MSP personnel, pilots are signed off during their IPCs as either "Single-Pilot PIC" qualified, or "Single-Pilot (Recovery Only)." The "Single-Pilot PIC" signoff is given after a pilot passes a command instrument single-pilot checkride. The pilots that receive this certification complete a more stringent checkride, consisting of filing an IFR flight plan, a cross-country flight to unfamiliar airports and instrument approaches. After they pass the checkride and receive the certification, they are to maintain the "Single-Pilot PIC" signoff during subsequent IPCs. These pilots are authorized to conduct flights in IMC.

The "recovery only" limitation means a pilot is only signed-off for intentional and inadvertent entry into IFR (and recovery) while en route[13]. Personnel estimated the ratio of these signoffs was about "50/50."

The pilot's prior IPC was completed on October 27, 2007, as part of an annual aviation command flight evaluation. This evaluation included a 30-day check flight, an IPC, a biennial flight review (BFR), and a CFI re-instatement, completed in 1.6 hours of flight time. During the IPC portion of the flight, the pilot performed an ILS 1L and TACAN 1L approach at ADW. The signoff for this Evaluation did not include the limitation of "Recovery Only[14]". According to the IP who flew with the pilot, his instrument skills were "slightly above average when compared to other pilots."

The pilots IPC on May 13, 2008 was also his most recent (logged) instrument approach. According to the pilot's logbook, he accumulated the following instrument time during the previous 2 years:

Date	Instrument Flight Time	Approaches Flown
August 24, 2006	0.9 hours simulated	(3) ILS approaches at ADW (practice with IP)[15]
October 29, 2006	0.5 hours simulated	(2) ILS approaches at ADW; (1) GPS approach at W29 (with safety pilot)
November 21, 2006	0.2 hours simulated	(1) GPS approach at 2W6 (Annual Pilot Evaluation)

[13] MSP personnel indicated that this type of IFR operation was safer than maintaining VFR flight in deteriorating weather conditions.
[14] According to the Chief Pilot, the IP that conducted the October 27, 2007 IPC was not aware that the pilot had completed his "Command Instrument Single Pilot Certification" in November 2007. The IP's signoff should not have included the "recovery only" limitation. See Attachment 5: November 16, 2008 memo.
[15] Entries described as "practice" in this column were not logged under the "Training Received" column in logbook

February 13, 2007	1.0 hours simulated	(3) ILS approaches at ADW (training with IP)
March 15, 2007	0.9 hours simulated	(3) ILS approaches (practice with safety pilot)
April 27, 2007	1.3 hours actual	(1) ILS 1R; (1) TACAN 1L; (1) TACAN 19L; (1) GPS 19R; (1) ILS 19R all at ADW (training with IP)
May 6, 2007	1.4 hours simulated	(2) Approaches, type not specified; performed in simulator
October 27, 2007	0.6 hours actual	(1) ILS 1L; (1) TACAN 1L at ADW (Annual Pilot Evaluation/IPC)
May 13, 2008	1.5 hours simulated	(1) VOR and (1) ILS at ADW; runway not specified (IPC)

According to medics that flew with the accident pilot, they described him as "comfortable" and "calm" in the cockpit. They also reported he liked to "teach while he flew," and was very knowledgeable in procedures and maneuvers.

On November 27, 2007, MSP Aviation Command changed their instrument training program. As of that date, pilots would receive two IPCs with Instructor Pilots per year to maintain FAA currency[16]. Prior to that date, pilots would perform 6 approaches every 6 months to maintain currency[17]. According to MSP personnel, because MSP is primarily a single-pilot operation, the only opportunity pilots had to fly with each other was during a shift change, or if they were at headquarters where another pilot might be located. According to the chief pilot, pilots were not conducting "quality training" when practicing with other pilots, so he decided to change the training program. His goal was to reduce flight time and provide a more structured and consistent pilot training plan[18].

On September 22, 2008, a pilot from the Cumberland Section sent a memorandum to the MSP Commander noting hazardous flying conditions in his section, due to the mountainous terrain. In the memo, the pilot requested that "Cumberland and Frederick Section pilots should be allowed to resume the previous instrument currency training: six practice or actual approaches every six months. Getting half the previous number of practice approaches and going six months between training opportunities provides neither the frequency nor the quantity of instrument practice needed for this demanding and hazardous flying environment." The pilot noted that instrument proficiency was dependent on:

[16] FAR 61.57 (d), "Recent flight experience: Pilot in command" required a pilot to perform either 6 approaches during a 6 month timeframe, or an Instrument Proficiency Check to maintain FAA currency
[17] See Attachment 6: MSP Aviation Command Operations Manual page 2-54
[18] See Attachment 7: MSP Memorandum dated November 27, 2007.

quality of initial instrument training, total instrument experience, time elapsed since last instrument experience, and quantity of recent instrument experience[19].

According to MSP personnel, in addition to the required IPC every 6 months, pilots with an “Instrument Single Pilot Certification” endorsement were encouraged to file and fly in IFR conditions whenever possible to maintain their proficiency. With the appropriate oversight, MSP pilots could fly a patient to a trauma center in IMC conditions, either hospital-to-hospital or from a scene when unforecasted IMC conditions are encountered en route. They can also reposition an aircraft; return to their assigned base after delivering a patient to a hospital; and/or conduct a VIP transport in IFR conditions, if necessary. With the exception of a MSP pilot having to obtain a "pop up" IFR clearance when experiencing IMC conditions en route to a hospital with a patient onboard, all of these flights would be "preplanned" and conducted with the requisite instrument flight plan on file.

All MSP pilots, were encouraged to fly instrument approaches back to their assigned section in VFR conditions, after mission completion, whenever possible.

Additionally, if a MSP pilot had any IFR proficiency concerns, they could make a request for additional training with an instructor pilot.

The pilot’s most recent training was a continuing education class, completed three days prior to the accident, on September 24, 2008. This training included information on cockpit resource management (CRM), ADIZ Operations, minimum equipment list (MEL), Tug Operations, and GPS Approaches[20].

3.5 72-Hour Pilot History

According to information provided by MSP, the pilot’s recent duty time was as follows[21]:

09/24/08: Continuing Education Training in Baltimore (0800-1600)
09/25/08: Off duty
09/26/08: Off duty
09/27/08: Late shift (1900-0700 shift)

The pilot’s wife provided additional information about his activities prior to the accident. On September 24, 2008, following his training at Baltimore, the pilot and his wife ate dinner at a restaurant. The wife believed he went to bed at his normal time, between midnight and 0100. On September 25, 2008 he spent the day at home with routine activities, while on September 26, 2008 he completed

[19] See Attachment 8: MSP Memorandum dated September 22, 2008 and Mike DeRuggiero email dated November 21, 2008
[20] See Attachment 9: MSP Form 17 dated September 11, 2008
[21] See Attachment 10: MSP Duty Time Records

his annual flight physical. He slept normally on both days, awakening between 0800 and 0830 and going to bed between midnight and 0100. On September 27, 2008, the pilot awoke about 0800 and joined his wife for breakfast, ate lunch at a restaurant about 1500, and reported for work about 1800 in preparation for his 1900 start of duty. The wife indicated that his activities and demeanor in the days prior to the accident were routine.

4.0 FLIGHT PARAMEDIC

The flight paramedic was hired as a MSP trooper on October 1, 2004, and assigned to the aviation command on April 25, 2007. Prior to his acceptance into aviation command, the flight paramedic already held his national flight paramedic certification, and State of Maryland certification.

According to interviews with MSP personnel, flight paramedics have limited aviation-related duties in the cockpit. These duties included: entering data into the GPS, communicating with SYSCOM, visually obtaining traffic, and conducting searches utilizing the FLIR. Flight paramedics would typically sit in the front (cockpit) of the helicopter while en route to pickup patients. After picking up patients, flight paramedics would sit in the rear while tending to the patients.

Flight paramedics also complete “pinch hitter” training every two years. This training includes ground training and one hour of flight training on cockpit instruments and basic concepts of flight.

The flight paramedic’s recent duty time was as follows:

09/24/08: Off duty
09/25/08: Off duty
09/26/08: Late shift (1900-0700 shift)
09/27/08: Late shift (1900-0700 shift)

5.0 WEATHER INFORMATION

According to the MSP Aviation Command Operations Manual (SOP)[22], at the beginning of each shift, pilots are required to obtain a full weather briefing to include current and forecasted weather, all NOTAMS, PIREPS and forecasted winds aloft. In addition to obtaining an overall briefing, the pilot will ensure that he/she gathers all information available to make him/her familiar with the weather situation throughout the state, as well as adjoining areas of neighboring states.

Pilots are required to obtain sufficient weather information to ensure that their original weather briefing remains valid. The frequency of these additional weather checks will be determined by the severity of existing or forecasted weather. However, if the section is “call-by-call” a check of the weather should be

[22] MSP Aviation Command Operations Manual page 2-25

conducted at a minimum every 2 hours. These weather reports are kept for a period of 90 days.

The MSP SOP stated that all flights "will be made in accordance with Aviation Command weather minimums." No helicopter VFR flight could be initiated when the reported or observed weather at the departure, en route and/or destination is below the following:

For **Daylight** Operations – if the ceiling is less than 600 feet AGL and/or the visibility is less than two miles.

For **Night** Operations – if the ceiling is less than 800 feet AGL and/or the visibility is less than three miles.[23]

5.1 Pilot Evaluation of Weather

Paperwork provided by MSP[24] indicated the pilot obtained (and printed) weather for the surrounding airports (ADW, BWI, ILG, MGW, IAD, DCA, WAL, and DOV[25]), from DUAT[26], at 1851, on the day of the accident.

At that time, the most recent METAR report for ADW was the 1755 observation. That observation included wind from 090 degrees at 5 knots, 7 miles visibility, few clouds at 1,000 feet, temperature 21 degrees C, dew point 20 degrees C, and altimeter setting 29.90 inches of mercury[27].

At 2302, the SYSCOM Duty Officer (DO) contacted the ADW hangar to pass on the request for a helicopter transport in Waldorf. The pilot answered the phone, and the DO asked if they were able to fly a mission. The pilot asked where the mission was, and the DO responded, "Waldorf where else.." [28]

The pilot stated, "I don't know if we can get to the hospital," to which the DO responded, "well that's fine, if you can't make the mission you can't make the mission." The pilot continued, "they say College Park is 800 feet up there..that is

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[23] FAA 91.155 (a) VFR weather minimums for Class B airspace were: clear of clouds and 3 miles visibility

[24] See Attachment 11: Pilot's Preflight Paperwork

[25] Baltimore/Washington International Airport (BWI), Baltimore, Maryland; New Castle Airport (ILG), Wilmington, Delaware; Morgantown Municipal Airport (MGW), Morgantown, West Virginia; Washington Dulles International Airport (IAD), Dulles, Virginia; Ronald Reagan Washington National Airport (DCA), Arlington, Virginia; Wallops Flight Facility (WAL), Wallops, Virginia; Dover Air Force Base (DOV), Dover, Delaware

[26] DUAT is the FAA's Direct User Access Terminal (DUAT) service for pilots. This service provides direct access to weather briefing, flight planning, and flight plan filing information to allow pilots to obtain a self briefing and file a flight plan prior to flying.

[27] According to an MSP pilot who arrived at the Trooper 2 hangar after the accident, the HEMS (ADDS) weather tool was displayed on the pilot's computer in the hangar (see Attachment 13: witness statements).

[28] See Attachment 12: SYSCOM recorded transmissions

only a mile north of the hospital, ah PG is on fly by anyway.[29]" The DO subsequently confirmed that the hospital was no longer "on fly by," and the pilot responded, "ok, we can give it a shot." After a brief conversation regarding the coordinates of the landing zone, the pilot stated, "maybe they will change their mind." The DO responded "well hold on, they ain't going to change their mind, if you tell them you will go, they want you to go…that's up to you, do you think you can fly it?" The pilot stated, "College Park is 800 and National is 12, I just heard MedStar go to MedStar, if they can do it we can do it." The DO responded, "ok it is up to you," and the pilot subsequently stated, "yeah we ought to be able to do it…we're going to try it."

At 2347, the flight paramedic called SYSCOM from the air and stated, "okay PG Hospital is completely fogged in and we can't land there, we are going to return to Andrews, I'll give you an eta in a second, ah, we are going to have to have at least one or two ground units meet us there." The DO reported he would notify them. The flight paramedic contacted SYSCOM again at 1151 and reported he was en route to Andrews, "a probable eta of 10 minutes to get back down to Andrews." The DO asked to confirm the information, the flight paramedic repeated the transmission, and no further reports were heard from Trooper 2.

5.2 Witness Observations

According to the Westlake Fire Department Assistant Fire Chief, who was at the scene of the auto accident, at the time the request for the helicopter was made, the sky was clear, it was not raining, and there was no wind. He did report it had rained prior to the auto accident[30].

At 0000, on the night of the accident, a pilot based at Trooper 8 (Norwood Section) heard on the police scanner that Trooper 2 was unable to land at PG Hospital due to fog and they were returning to ADW with patients. The Trooper 8 pilot then checked the weather "which was good for GAI[31] and ADW, but below minimums, approximately 500 to 600 feet at CGS and FME[32]." The pilot also noted the dewpoint and temperature was about the same with calm winds "which usually leads to ground fog."

After contact was lost with Trooper 2, SYSCOM contacted Trooper 8 (about 0030) to request a search for Trooper 2. The pilot again checked the weather, which was "marginal but within division minimums," and agreed to accept the mission. About 2 miles from the departure base, the crew encountered deteriorating weather conditions, and subsequently aborted the mission and returned to the base.

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[29] According to MSP interviews, "PG on fly by" meant the hospital was full to incoming patients by air. At the time of the accident, beds came available and the hospital was open to air transports.
[30] See Attachment 13: Witness Statements
[31] Montgomery County Airpark (GAI), Gaithersburg, Maryland
[32] College Park Airport (CGS), College Park, Maryland; Tipton Airport (FME), Fort Meade, Maryland

Another pilot was flying a helicopter for a private medevac operator in the local area, on the night of the accident. The pilot heard a transmission from Trooper 2 on the Washington National Airport (DCA) Tower frequency[33], which included the (accident) pilot reporting a ceiling of 1,000 feet after picking up patients in Waldorf. The pilot was traveling toward Waldorf, so he continued the flight, although he knew the weather was deteriorating. As he continued toward Waldorf, the pilot noted the cloud ceiling was lower than Trooper 2 reported (about 500-600 feet). Since the pilot could no longer conduct the mission VFR, he turned the helicopter around and returned to his departure point.

According to a U.S. Park Police helicopter pilot, he was contacted about 0040 by SYSCOM and requested to assist in the search for Trooper 2. He was informed that the last contact with Trooper 2 was when they were diverting to ADW, after attempting to land at PG Hospital. The pilot was also informed that Trooper 8 had already attempted a search, but could not continue due to weather. He was given the GPS coordinates for the last position of Trooper 2, which he determined to be in Walker Mill Park.

The Park Police pilot departed his base in southeast Washington D.C. at 0050 and attempted to fly toward the park. He tried three different routes, all of which got him within about 2 miles on each side of the park, before he had to divert due to low cloud ceilings. The pilot stated DCA Tower controllers told him the cloud ceiling was at 1,400 feet; however, he informed them it was much lower, about 450 feet. After flying for 45 minutes, the pilot returned to his base and after landing, got into his car and drove toward the park. He drove past ADW, on the way to the park, and noted the fog layer continued to the ground.

The pilot additionally stated at the time he launched ADW was not reporting current weather. He arrived at the park around 0220, and Trooper 2 had already been located when he arrived.

5.3 Canceling Missions Due to Weather

MSP Aviation operated under a “unanimous cockpit” philosophy. If either the pilot or medic felt uncomfortable with the weather (or for any other reason), they could deny the mission without penalty.

According to interviews with MSP personnel, no one felt any pressure to accept a mission or was afraid to deny one.

5. 4 Weather Resources Available to the Pilot

[33] The pilot could not recall if he heard the report from Trooper 2 directly, or if the controller was relaying information that Trooper 2 gave to him.

MSP pilots have many sources available to them to check the weather prior to launch. The primary tools used by pilots are the internet-based Aviation Digital Data Service (ADDS), produced by the FAA's Aviation Weather Research Program, and DUAT. The ADDS provides digital and graphical analyses, forecasts and observations of meteorological variables. Pilots also routinely call other bases or Air Traffic Control Towers to acquire local weather reports.

The helicopter had weather radar onboard for the pilot to monitor precipitation en route. The weather radar would not have reflected clouds or fog layers.

6.0 AIRPORT INFORMATION

The pilot had the following 12 instrument approaches available to him at ADW[34]:

1. ILS or LOC RWY 1L
2. ILS or LOC RWY 1R
3. ILS or LOC RWY 19R
4. ILS or LOC/DME RWY 19L
5. RNAV (GPS) RWY 1L
6. RNAV (GPS) RWY 19R
7. TACAN RWY 1L
8. TACAN RWY 1R
9. TACAN RWY 19L
10. TACAN RWY 19R
11. NDB RWY 1L
12. NDB RWY 19R

The ILS approaches provided precision guidance utilizing both lateral (localizer) and vertical (glideslope) information. The LOC approaches provided non-precision guidance, or lateral, course information only. The terminal procedures for both types of approaches assured obstacle clearance during descent to the runway.

The accident pilot was performing an ILS approach to runway 19R at ADW, when it impacted terrain. The ILS RWY 19R approach required that the helicopter intercept the glideslope, at an altitude of 2,000 feet, and a distance of 5.2 miles from the end of the runway. If the helicopter remained on the glideslope it would have maintained a constant rate descent until reaching the decision altitude (DA) of 473 feet[35].

The ILS 19R approach required the pilot to acquire visual contact with the runway upon reaching the DA. If no visual contact was made, the pilot was required to perform the missed approach procedure, which was: "climb to 900 then climbing left turn to 2500 direct RATTA and hold."

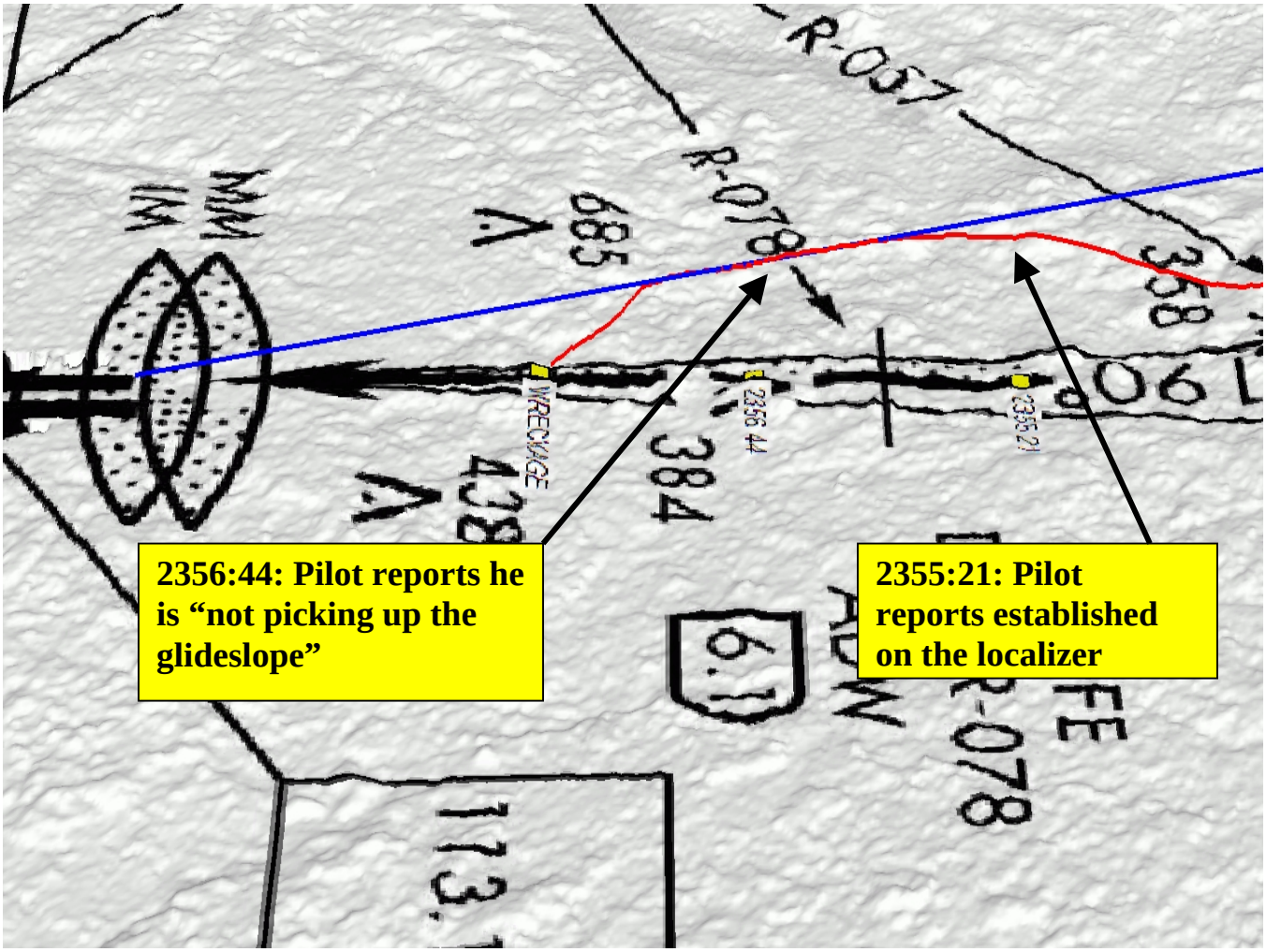
[34] According to ATC information, there were no system outages in the facility logs
[35] See Attachment 15: ILS RWY 19R Approach Plate

The LOC 19R approach required the helicopter to maintain an altitude of 2,000 feet until the FAF, where it could descend to the minimum descent altitude (MDA), which was 680 feet. If no visual contact was made with the runway by the MDA, the pilot was required to perform the missed approach procedure when he was half a mile from the runway. The missed approach procedure was the same as described above for the ILS approach.

Examination of air traffic control (ATC) radar data and voice communications revealed the pilot reported established on the localizer at 2355:21, at an altitude of 1,900 feet, and a distance of 6 nautical miles (nm) from runway 19R. At 2356:44, the pilot reported he was “not picking up the glideslope;” however, radar data indicated at that time the helicopter was maintaining a descent consistent with following the glideslope[36].

[36] See Figure 1. Blue line indicates published ILS RWY 19R approach plate glideslope; red line indicates helicopter radar track

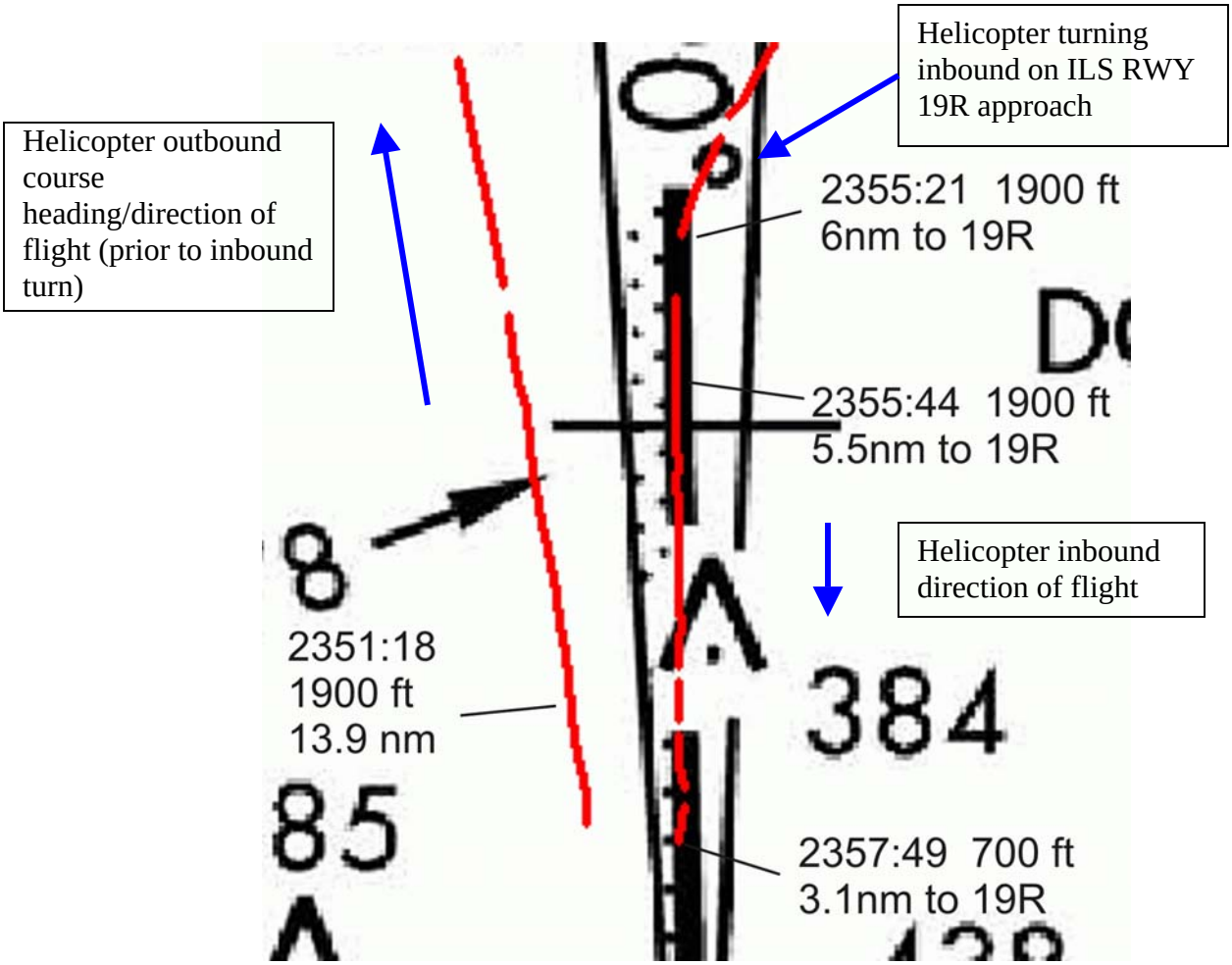
Figure 1 Radar Data Plot with Voice Transmissions



The helicopter maintained an altitude of 1,900 feet, until it was 5.5 nm from the runway, where it initiated a descent. Over the next two minutes, the helicopter continued its descent until the last radar hit at 700 feet, 3.1 nm from the runway[37]. The wreckage was located on a heading of 190 degrees (aligned with the localizer), about 2.7 miles north of the end of runway 19R.

[37] See Figure 2. Red line indicates helicopter radar track superimposed on ILS RWY 19R approach plate.

Figure 2 Radar Data Plot Indicating Helicopter Descent



The ILS Runway 19R approach was flight checked by the Federal Aviation Administration after the accident. No anomalies were noted with the approach[38]. Additionally, the navigation (glideslope) equipment in the helicopter was tested post-accident and no pre-impact anomalies were noted[39].

7.0 INSTRUMENT PROCEDURES

According to the MSP SOP[40], when a helicopter encounters inadvertent IMC and an instrument recovery is required, the PIC will obtain an IFR clearance from ATC. The flight will not continue beyond the next landing unless the weather conditions are at or above the weather minimums. However, if the PIC is command authorized for IFR, the PIC may obtain a clearance prior to entering

[38] See Air Traffic Control Specialist's Report for more information.
[39] See Structures Specialist's Report for more information.
[40] MSP Aviation Command Operations Manual Page 2-28

IMC conditions and continue the flight to the final destination in compliance with FARs.

7.1 FAA Guidance and Regulations

According to the Airman Information Manual (AIM) 1-1-9 Instrument Landing System (ILS), (d) Glide Slope/Glide Path…pilots should (5) Make every effort to remain on the indicated glide path. A caution was noted to avoid flying below the glide path to assure obstacle/terrain clearance is maintained.

Additionally, the AIM stated, “when the glide slope fails, the ILS reverts to a nonprecision localizer approach.”

According to FAR 91.175, Takeoff and Landing under IFR, “no pilot may operate an aircraft below the authorized MDA or continue an approach below the authorized DA/DH unless the airplane is in a continuous position to land, the visibility is not less than the visibility required for the approach, and at least one of the following is distinctly visible and identifiable to the pilot:

1. Approach light system
2. The threshold
3. The threshold lights
4. The threshold markings
5. The runway end identifier lights
6. Visual approach slope indicator
7. Touchdown zone or touchdown zone markings
8. Touchdown zone lights
9. Runway or runway markings
10. Runway lights”

8.0 AIRCRAFT EQUIPMENT

The helicopter was equipped with redundant instrument systems. The pilot had a horizontal situation indicator (HSI) and attitude director indicator (ADI) available on his (right) side of the cockpit, and the same instruments on the co-pilot (left) side of the cockpit. Examination of the pilot’s HSI revealed it was set to 190 degrees, and the navigation frequencies were set to 110.5 (19L LOC frequency), and 111.5 (19R LOC frequency). It could not be determined which frequency was selected, although radar data indicated the helicopter maintained a flight path consistent with selection of the 19R LOC frequency. The glideslope function of the unit was tested and no mechanical anomalies were noted[41].

Instrument approaches could be hand flown or by using the autopilot/coupler control unit. The coupler had a glideslope capture function, which was initiated “when the deviation was less than 1/3 point.”

[41] For additional helicopter equipment information, see the Structures Group Chairman Factual Report.

8.1 Terrain Awareness and Warning System (TAWS)

The accident helicopter was not equipped with TAWS; however the MSP fleet had three helicopters in service with the system. Those helicopters were primarily based at the Cumberland and Frederick Sections due to mountainous terrain[42].

8.2 Radar Altimeter (RA)

The accident helicopter was equipped with a radar altimeter (RA). Examination of the RA after the accident indicated it was set to 300 feet.

According to the MSP SOP[43], the decision height bug will be set on command aircraft RAs to an altitude that will provide appropriate response time to alert crew members if they should have an unintentional descent near the water or ground.

Interviews with MSP pilots revealed RAs were always set to the decision height during an instrument approach.

Another MSP pilot flew the accident helicopter on September 24, 2008, during which he conducted an ILS 19R approach at ADW. The instruments used for the uncoupled approach operated without anomaly.

9.0 RISK ASSESSMENT

At the time of the accident, there was no formal paperwork process for pilots to evaluate risk prior to accepting a mission. There was information posted at each Section, and pilots routinely performed "mental assessments[44]." Risk assessment is also part of continuing education classes.

According to MSP personnel, there was a risk assessment matrix included in the Health and Safety Plan that could be used for mental assessments[45]; however, pilots did not routinely use it.

Additionally, at the time of the accident, MSP had a policy, "unanimous cockpit," that if one of the crewmembers (pilot or medic) feels uncomfortable, the mission was cancelled[46]. Also, pilots or medics are required to report safety issues through Aviation Safety Reports (ASRs), which were facilitated through the risk management section. If warranted safety recommendations could be made by

[42] See Interviews and Mike DeRuggiero statement
[43] MSP Aviation Command Operations Manual Page 2-23
[44] According to MSP Safety Officer
[45] Attachment 16: Risk Assessment Tool from Health & Safety Plan January 2008
[46] MSP Aviation Command Operations Manual Page 2-27 and Mike DeRuggiero Interview

the council, to the commander. The risk management council was comprised of multiple pilot and flight paramedic representatives[47].

10.0 DISPATCH SYSTEM

MSP uses the Systems Communication Center (SYSCOM) for dispatch and flight following functions. SYSCOM is a 24-hour operations center that provides central aircraft dispatching and emergency communications liaison between 911 centers, police stations or barracks, hospital systems, responding aircraft and ground units. SYSCOM operates as an interagency team, combining roles, responsibilities and personnel from the MSP Aviation Command and from the Maryland Institute for Emergency Medical Services Systems (MIEMSS).

The duties of SYSCOM include processing calls, mission tracking, aircraft/crew accountability, and airspace coordination. SYSCOM duty officers (SDO) are not "aviation-trained" or certified. They do not have an active role in monitoring weather for pilots. According to the SOP, pilots are required to monitor the weather; however, if pilots are unable (already on a mission), the duty officer (DO) may assist pilots. The DO is required to obtain a statewide forecast at the beginning of each shift.[48]

When a call comes into SYSCOM from a 911 center requesting a helicopter transport, the SYSCOM DO will notify the closest MSP Aviation Section with the details of the mission. Those details include: incident type, number of patients, approximate age of patients, condition of patients, and landing zone information. If the flight crew at the Section accepts the mission, the SYSCOM DO then forwards them a mission package and calls the requesting fire department back to give them an estimated time of arrival (ETA) for the helicopter (or inform them if the flight crew denies the mission). The SYSCOM DO does not weigh in on the necessity of the helicopter request (made by the fire department) or the availability of the helicopter. The flight crew at the Section is typically the only personnel that can accept or deny the mission. The DO is primarily a facilitator of the request[49].

10.1 Flight Following

SYSCOM uses the Automatic Dependent Surveillance Broadcast (ADS-B), global navigation system for tracking and flight following. The data provides status, location, altitude, speed and course of the aircraft. This information assists the SYSCOM duty officer in fleet management and providing crews with GPS coordinates of hospitals, airports, landing zones, etc[50]. For additional

[47] See Attachment 17: MSP Risk Management Pilot Responsibilities Memo dated June 25, 2007
[48] MSP Aviation Command Operations Manual Page 3-3
[49] See Attachment 19: Interview Summaries
[50] MSP Aviation Command Operations Manual Page 2-43

information regarding the role of flight following in the subject accident, see the survival factors specialist's report.

11.0 DECISION TO REQUEST A MEDEVAC HELICOPTER

The Maryland Institute for Emergency Medical Services Systems (MIEMSS), a state licensing board that oversees EMS services in the State of Maryland,[51] provided guidelines to medical responders through a trauma decision tree developed by the American College of Surgeons and adopted by the State of Maryland[52]. This tree provided standards based on current mortality/injury evidence for responders to classify four levels of serious injury consistent with required treatment at a trauma center, from "A" (the most serious) to "D" (the least serious). The tree also provided guidance concerning when to use helicopter transport: "Patients within a 30-minute drive time of the closest appropriate trauma/specialty center shall go by ground unless there are extenuating circumstances. Consider helicopter transport if of clinical benefit."

Responders to the accident from the Waldorf fire station, who were among the first at the scene, confirmed that they were all familiar with the trauma decision tree and employed it in their evaluations of the accident victims. They had received training on recent upgrades to the trauma decision tree through a 60-90 minute video presented at their station house between January and May 2008 and their use of the tree was regularly reinforced at station safety reviews.

In the case of the accident, responders determined that the victims required treatment at a trauma center because of two factors: intrusion of the passenger compartment greater than 18 inches, and patient complaints of back and neck pain. Helicopter transport was requested, and responders recognized that the nearest trauma center was more than a 30-minute drive time. An ambulance driver at the site noted that the local roads were slightly damp and slippery. Based on a postcrash investigation, MIEMSS concluded that the decision to request helicopter transport to a trauma center was appropriate.

As a result of the accident, MIEMSS updated the trauma decision tree in the State of Maryland to require consultation with a local emergency room or trauma center for victims classified "C" or "D" to reach agreement on the most appropriate mode of transport. According to the Executive Director of MIEMSS, the dispatch center (SYSCOM) has coordinated these consultations efficiently and there have been more joint decisions to use ground transportation. MIEMSS will evaluate mortality trends to judge the effectiveness of this new rule.

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[51] According to its fact sheet: "The Maryland Institute for Emergency Medical Services Systems (MIEMSS) oversees and coordinates all components of the statewide EMS educational programs, operates and maintains a statewide communications system, designates trauma and specialty centers, licenses and regulates commercial ambulance services, and participates in EMS-related public education and prevention programs."

[52] See Attachment 18: Trauma Decision Tree

Further, MIEMSS developed a quality assurance procedure in the past two years to assist local jurisdictions in evaluating the need for helicopter transports. Using satellite imagery, MIEMSS plotted data on the location of medevacs superimposed on computer-generated shaded arcs showing 30-minute driving times around trauma centers. Whenever helicopter transport was requested from a shaded zone, MIEMSS asked the local jurisdiction to review the launch decision. According to the Executive Director of MIEMSS, the response was positive and requested helicopter launches declined by about 23%. The use of satellite mapping for quality assurance, as well as the use of a consultation rule, represented innovative procedures that were being evaluated for possible national standards that could assist future launch decisions.

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