



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: Sep 24, 2001

In reply refer to: A-01-35 through -40

Honorable Jane F. Garvey
Administrator
Federal Aviation Administration
Washington, D.C. 20591

In this letter, the National Transportation Safety Board recommends that the Federal Aviation Administration (FAA) take action to address inadequate air traffic controller awareness of and response to situations in which an aircraft may be in distress or an emergency situation and inadequate training of air traffic control (ATC) supervisory personnel in the management of such situations. The Safety Board identified these safety issues during investigations of several general aviation accidents that occurred between June 8, 1998, and October 6, 2000, and during its investigation of an in-flight diversion of a Boeing 737 passenger flight on May 17, 2000.

June 8, 1998, Accident Near Bangor, California

On June 8, 1998, about 0804 Pacific daylight time,¹ a Piper PA-28-181, N9703C, experienced an in-flight loss of control and crashed in hilly terrain near Bangor, California.² The personal flight was being conducted under the provisions of 14 *Code of Federal Regulations* (CFR) Part 91. The pilot and his passenger were killed, and the airplane was destroyed. According to information furnished by the pilot as part of a preflight weather briefing, he was planning to depart from Lincoln, California, and fly to Sun River, Oregon, on an instrument flight rules (IFR) flight plan. However, no IFR flight plan was filed, and according to FAA airman records, the pilot did not possess an instrument rating. Recorded FAA radio and radar data showed that the airplane departed from Lincoln airport shortly before 0743. The pilot did not request or receive an IFR clearance once he was airborne. About 0743, the pilot contacted Sacramento (MCC) Terminal Radar Approach Control (TRACON) and requested radar flight following to Sun River, Oregon. The MCC controller identified the airplane and instructed the pilot to maintain visual flight rules (VFR) conditions. The pilot later reported passing through some clouds, and the controller again instructed the pilot to remain in VFR conditions. About

¹ All times in this letter are expressed in local time and in 24-hour format.

² The description for this accident, LAX98FA188, can be found on the Safety Board's Web site at <<http://www.nts.gov>>.

0758, N9703C was transferred to Oakland (ZOA) Air Route Traffic Control Center (ARTCC) for continued radar flight following.

About 0759, the pilot contacted ZOA sector 42, and the controller responded with the local altimeter setting, telling the pilot to maintain VFR conditions. The pilot responded, "I'm ah not VFR I'm in the clouds I'm on autopilot." After a brief discussion about the pilot's intended route and destination, the pilot reported that his heading was 340°. The ZOA controller then stated, "Use caution and maintain VFR, sir." The pilot replied, "I'm in the clouds, I can't maintain VFR at this time." After about 45 seconds, the controller told the pilot that the Oroville, California, airport was about 10 miles ahead. The pilot asked for the weather conditions at Oroville, and was told that there was no weather reporting service there. The pilot then asked for and received the Chico, California, weather; the controller also provided weather information for Marysville, California. The pilot asked for the bearing from his position to Marysville and was given a suggested heading of 195°. At 0804:23, the ZOA controller attempted to verify that N9703C was established on heading 195, but the pilot did not respond. There was no further contact with the airplane. Its wreckage was located about 0.34 miles from the last observed FAA radar position.

In a postaccident interview, the ZOA radar controller who handled N9703C stated that he did not consider the airplane to be in an emergency situation. The controller stated that the airplane's altitude varied between 1,700 and 2,400 feet yet acknowledged that he thought that the minimum instrument altitude (MIA) in the area was 5,800 feet.³ He further stated that he did not attempt to establish whether the pilot was capable and qualified for IFR flight or to correlate the airplane's radar-observed position with terrain maps, which were located near the sector, in order to establish the airplane's proximity to nearby terrain.⁴ Recorded voice data also showed that no safety or terrain alerts were issued to N9703C.

When asked to explain FAA procedures for assisting VFR aircraft in weather difficulty as outlined in paragraph 10-2-8, the controller responded that he should "determine if the pilot is IFR capable and qualified, then issue a radial that he can climb on, and if not then advise the pilot of the MEA [minimum en route IFR altitude]."⁵ He was unable to explain either the functioning of the minimum safe altitude warning (MSAW)⁶ system operating at ZOA or the keyboard

³ The MIA establishes the lowest safe altitude for aircraft operating under IFR in a given geographic area and would generally constitute the lowest safe altitude for an aircraft that was unable to maintain visual separation from nearby obstacles because of clouds or other obstructions to vision. According to FAA charts, the MIA in the area was actually 5,000 feet.

⁴ In accordance with FAA Order 7110.65, "Air Traffic Control," paragraph 10-2-8, "Radar Assistance to VFR Aircraft in Weather Difficulty," controllers are required to "ask the pilot if he/she is qualified for and capable of conducting IFR flight" if a pilot is flying VFR and requests radar assistance when he encounters or is about to encounter IFR weather conditions.

⁵ According to paragraph 10-2-8, controllers should inform the pilot of airports where VFR conditions are reported, inform the pilot of the appropriate terrain/obstacle clearance minimum altitude, and furnish a heading or radial on which the aircraft should climb to reach the appropriate minimum altitude.

⁶ MSAW alerts air traffic controllers when an aircraft is either observed or predicted to be operating at an altitude that does not provide safe clearance from terrain or obstacles.

entries needed to initiate MSAW processing for VFR aircraft, despite the requirement in paragraph 10-2-8 that MSAW be enabled in situations such as this.⁷

Investigators also interviewed the operational supervisor on duty in the ZOA radar controller's operational area. The supervisor stated that she was called to the sector by the radar controller after the pilot of N9703C reported being in the clouds. She stated that after evaluating the situation, she considered the flight to be in an emergency situation and began to attempt to compare its radar altitude and position to the MIA chart posted above the sector. The supervisor stated that she was not aware that a safety alert about minimum altitudes required to clear terrain and obstacles had not been issued to the pilot. When asked to explain FAA procedures for assisting VFR aircraft in weather difficulty, she responded that the controller should ask the pilot if he is IFR qualified, ask for his intentions, and then offer whatever ATC assistance they can. When asked about the MSAW status of VFR aircraft, she said that she had "heard" that it is suppressed.⁸

Examination of the ZOA controller's training records revealed that in the 2 years preceding the accident, the controller had completed four FAA training units about providing assistance to VFR aircraft in weather difficulty, as well as other units on MIAs, MSAW, and safety alert procedures. Safety Board investigators reviewed FAA lesson plans and refresher training modules on this subject and were unable to locate any specific discussion of the significance of inadvertent encounters with instrument meteorological conditions (IMC) or any guidance to controllers on how to recognize and assess the urgency of such situations. Investigators noted that the FAA training materials covering these topics were essentially no more than a review of the contents of FAA Order 7110.65, which, as will be discussed later in this letter, provides little basis for controllers to develop judgment about the seriousness of various emergency and distress scenarios that they may encounter in the course of their duties.

January 20, 1999, Accident Near Albuquerque, New Mexico

On January 20, 1999, about 1528 mountain standard time, a Cessna P210 Centurion, N79NL, was destroyed when it broke up in flight and collided with terrain in the Sandia Mountain Wilderness Area near Albuquerque, New Mexico, following an apparent failure of some or all vacuum-driven flight instruments.⁹ The instrument-rated private pilot and two passengers were killed.

⁷ Paragraph 10-2-8 states the following regarding MSAW: "The following shall be accomplished on a Mode C equipped VFR aircraft which is in emergency but no longer requires the assignment of code 7700:

1. TERMINAL. Assign a beacon code that will permit terminal minimum safe altitude warning (MSAW) alarm processing.

2. EN ROUTE. An appropriate keyboard entry shall be made to ensure en route MSAW (EMSAW) alarm processing."

⁸ MSAW alerts are, in fact, initially suppressed for VFR aircraft. The steps outlined in paragraph 10-2-8 (quoted in the preceding footnote) are intended to terminate this suppression.

⁹ The description for this accident, DEN99FA034, can be found on the Safety Board's Web site at <<http://www.nts.gov>>.

The Centurion had departed from Scottsdale, Arizona, on an IFR flight plan to Wichita, Kansas, and was in communication with Albuquerque ARTCC (ZAB) sector 17 (R17). According to ATC transcripts, at 1519:10, the R17 controller transmitted to the pilot of N79NL, “verify you’re level at two three zero showing you four hundred feet low.” At 1519:14, the pilot replied, “uh...we’ve just figured out that we’ve had a dual vacuum pump failure we’ve uh we’ve lost both our vacuum pumps uh so we’re gonna need to look for uh someplace we’ve got electric uh back up systems here but we uh we’re having a little trouble holding altitude and everything.” The R17 controller responded, “okay let me know if you need any uh assistance.” At 1519:35, the pilot asked the controller, “uh how uh what’s the bottom of the cloud layer we’re i-f-r at this time.” Another ZAB controller overheard the pilot report the vacuum pump failures and advised the R17 controller, “...when he loses his vacuum pumps...he’s basically just blind up there so the sooner you can get him down the better off he is.” The R17 controller replied, “oh okay thanks I didn’t know that.”

Shortly after this exchange, the R17 controller cleared N79NL to descend to 14,000 feet. At 1520:48, the controller coordinated the descent clearance with Albuquerque TRACON (ABQ) and advised, “I’ve got uh an aircraft out there about seven northeast of the VOR [Very High Frequency Omnidirectional Range¹⁰] his code is zero seven zero four he’s at flight level two three zero needs to descend down to fourteen I guess he lost his vacuum pumps or whatever.”

The R17 controller initiated a discussion with the pilot about whether he wished to continue to Wichita or land at a closer airport. The pilot stated that if he could get into visual conditions below the clouds, he wished to change his destination to Liberal, Kansas. The sector 17 radar associate controller (RA17) passed the information to the radar controller in sector 16, which was the next sector N79NL would enter. The sector 16 radar controller (R16) responded, “okay he still hasn’t figured out what’s wrong though huh.” The RA17 controller said, “he has,” and the R16 controller replied, “his vacuum cleaner’s broke.” RA17 replied, “vacuum tube lossage,” which the R16 controller repeated. The RA17 controller then replied, “yes both of them.”

At 1524:16, the R17 controller told the pilot of N79NL to contact ABQ and to advise them if he needed any further assistance. The pilot did not respond. At 1524:33, the R17 controller again attempted to contact N79NL. At 1524:35, the pilot transmitted, “we’re having trouble I think we’re in a spin.” Fifteen seconds later, the pilot transmitted, “we’re back with you.”

Following the apparent loss and recovery of control, the pilot decided to land at ABQ and requested vectors to the airport. The R17 controller coordinated the change with ABQ approach and was told by ABQ to put N79NL on a heading of 260°. The pilot was given the heading and instructed to contact ABQ approach.

At 1525:44, the pilot of N79NL made initial radio contact with the north approach controller at ABQ. Hearing no response, the pilot made another call at 1525:52. At 1525:59, in

¹⁰ VOR is a navigational radio beacon.

response to the approach controller's request to repeat his call sign, the pilot transmitted, "seven nine november lima Albuquerque approach." At 1526:02, the ABQ controller replied, "seven niner november lima verify at uh one seven thousand six hundred." At 1526:06, the pilot replied, "uh that's affirmative...we've lost both our vacuum pumps and uh I think we just went through a uh a a roll uh we're we've got electric driven backup systems uh electric horizon electric uh compass and they're not uh agreeing with each other at this time so we're gonna need some help."

At 1526:25, the ABQ controller replied, "sierra five echo romeo (sic) roger uh you're uh stable there at uh one seven thousand four hundred." At 1526:32, the pilot responded, "negative...we're uh not necessarily stable." At 1526:32 the controller transmitted, "roger uh can you accept uh...uh just uh standard right turns for the uh vectors." At 1526:48, the pilot replied, "we're gonna need some help." At 1526:55, the controller transmitted, "uh the altimeters uh two niner eight six and it appears you're northwest bound at this time." At 1527:07, the pilot transmitted, "we're at one four thousand four hundred." At 1527:12, the controller replied, "uh if you can just uh turn right standard turn to the uh right." At 1527:20, the pilot made another transmission indicating that he had lost control of the airplane. Shortly afterward, radar contact was lost, and there were no further communications with the airplane.

Vacuum pump and attitude instrument failures can present pilots with serious control difficulties. The Safety Board is concerned that the controllers involved in handling the accident airplane appeared to have little or no understanding of the problem facing the pilot, even after his clear description of the system failure and the first reported loss of control. Controllers responsible for handling aircraft operating in IMC should be fully cognizant of the symptoms and possible consequences of such failures so that they can respond effectively when these events occur. This may require education on aircraft systems and instrument flight operations that is not incorporated in current FAA training materials.

August 13, 1999, Accident Near Mount Pocono, Pennsylvania

On August 13, 1999, at 1005 eastern daylight time, a Cessna 210, N4827C, experienced an in-flight loss of control and crashed near Mount Pocono, Pennsylvania.¹¹ The flight originated at Manassas, Virginia, on a VFR flight plan to Mount Pocono. The pilot and his passenger were killed, and the airplane was destroyed.

At the time of the accident, N4827C was receiving VFR flight following and traffic advisory services from Wilkes-Barre TRACON (AVP). According to FAA records, the pilot contacted AVP about 0958 and was instructed to report when he had the Mount Pocono airport in sight. About 1003, the AVP controller asked the pilot if he had the airport in sight. The pilot's response was "No not yet as a matter <unintelligible> I am in the soup right now." The controller instructed the pilot to maintain VFR, informed him that the airplane was north of the airport, and provided a heading to follow to get back to the airport. About 1004, the pilot again stated that he was "in the soup" and asked for the reported ceiling at the airport. Recorded radar

¹¹ The description for this accident, NYC99FA198, can be found on the Safety Board's Web site at <<http://www.nts.gov>>.

data showed that at the time, N4827C was passing within 3/4 mile of the airport at approximately 700 feet above ground level (agl). About 1005, the controller advised the pilot to fly heading 240°, but the pilot did not respond. The controller stated, “Radar contact lost” at 1005:53, and there were no further communications. Local authorities reported a possible accident near the Mount Pocono airport about 1010.

The Safety Board’s investigation revealed that the controller in communication with N4827C at the time of the accident, in addition to working the south radar position, was also the designated controller-in-charge for the shift. When asked what he thought the pilot meant when he twice reported being “in the soup” after being instructed to remain in VFR conditions, the controller stated that he believed the pilot’s comment was a reference to haze in the area. According to the controller, nothing the pilot said indicated to him that the airplane was operating in less than VFR weather conditions. Board investigators concluded that the pilot’s comments were more than sufficient to warrant specific questions to the pilot about the airplane’s flight conditions and were concerned that the controller did not recognize the urgency of the situation or begin following the established procedures for assisting VFR aircraft in weather difficulty.

November 26, 1999, Accident in Newark, New Jersey

On November 26, 1999, about 1053 eastern standard time, a Beechcraft S35, N8992M, was destroyed when it impacted a building in a residential area.¹² The certificated airline transport pilot and the two passengers were killed. In addition, two individuals on the ground received serious injuries, and 25 received minor injuries. IMC prevailed, and an IFR flight plan was filed. The personal flight departed Linden, New Jersey, about 1049 and was conducted under 14 CFR Part 91.

A review of ATC communication tapes revealed that after departing Linden, the pilot contacted New York Departure Control. He was instructed to turn left to a heading of 010° and to maintain 5,000 feet. A few seconds later, the controller revised the clearance and instructed the pilot to maintain 2,000 feet. Thirty-four seconds later, the controller instructed the pilot to turn left to a heading of 270°, to which the pilot did not reply. The controller reissued the heading but again received no response.

The controller made two more attempts to reestablish communications. After the second attempt, the pilot responded, “I have a problem.” The controller inquired about the problem, and the pilot responded, “I had a gyro problem momentarily. It looks straightening now. I must have had water in the system.” Twenty seconds after that, the controller radioed “continue the right turn all the way around...correction you’re in a left turn now.” The pilot responded “yes sir...left turn climbing to niner thousand.” The controller stated, “stop your climb at two thousand, turn left, left turn heading two seven zero.” The controller then asked the pilot if he could navigate. The pilot responded, “I think I have a problem.” The pilot then requested a climb. The controller instructed the pilot to maintain 2,000 feet and requested the pilot’s current heading. The pilot responded, “looks like zero three zero.” The controller then instructed the pilot to turn left to

¹² The description for this accident, NYC00FA039, can be found on the Safety Board’s Web site at <<http://www.nts.gov>>.

270°, but the pilot did not respond. The controller reissued the altitude and heading but again received no response. The controller then radioed “niner two mike I need to be acknowledged please.” The pilot replied, “I have a problem.” This was the last recorded transmission from the accident airplane.

According to radar data, N8992M was heading east at an approximate altitude of 900 feet when the pilot first reported a problem. Over the next 2 minutes, the ground track for N8992M’s target changed from east, to north, to northeast, to northwest, and then back to north. In the last 30 seconds of radar data, the target reached a maximum altitude of 2,800 feet and 161 knots of airspeed before beginning a descent that reached approximately 10,000 feet per minute. The weather observation about 1051 for Newark International Airport, Newark, New Jersey, was 2 1/2 miles of visibility, light rain and mist, with scattered clouds at 600 feet and a broken ceiling at 1,300 feet. Examination of the airplane wreckage revealed evidence indicating that the turn coordinator and the horizontal situation indicator,¹³ which provides heading information to the pilot, had failed.

In a postaccident interview, the controller who handled N8992M stated that he was aware before the accident that gyroscopic instrument failures affect a pilot’s ability to maintain aircraft control. When asked to characterize the seriousness of such failures, he responded, “Now I know that it’s pretty serious.” The controller reported that he had received annual emergency training on the facility’s radar simulator but had not completed many of the computer-based instruction units available because ATC staffing issues had reduced the amount of time available for viewing training modules. When asked to describe his knowledge of ATC procedures to be used when an aircraft reports a failure in a gyroscopic instrument, he stated that he could not recall specific simulator training in handling aircraft with such failures but that he had “heard of no-gyro procedures.”¹⁴ However, when asked to define a “standard rate” turn (upon which no-gyro procedures are based), the controller incorrectly said that it meant that the aircraft was using a 30° angle of bank; he made no mention of turn rate in degrees.

Although ATC actions were not found to be causal or contributory to the accident, the Safety Board is concerned that the controller handling this airplane was not fully versed in the proper procedures for handling situations in which an aircraft system failure results in loss of attitude instrumentation. The observed track of the airplane and the pilot’s comments should have been sufficient to indicate to the controller that special assistance was required.

October 6, 2000, Accident Near La Verne, California

On October 6, 2000, about 1942 Pacific daylight time, a Piper PA-34-200, N222ES, collided with terrain following an attempted instrument approach to the airplane’s apparent

¹³ These instruments are gyroscopically driven and are used by pilots to maintain aircraft control when visual references are not available because of weather conditions or darkness.

¹⁴ “No-gyro” procedures provide a defined method for controllers to issue heading changes to aircraft that have a defective gyroscopic heading indicator. The procedure entails the pilot making turns at a “standard rate” of 3° of heading change per second when instructed to do so by the controller. For example, to change an aircraft’s heading by 45°, the controller tells the pilot to “start turn,” waits 15 seconds, then tells the pilot to “stop turn.”

destination, Brackett Field (POC), La Verne, California.¹⁵ The airplane was being operated by a private pilot accompanied by a certified flight instructor on a training flight. The accident site was located about 0417 on October 7, 2000, on a mountainside at 2,053 feet above mean sea level (msl) in the Angeles National Forest, approximately 3 1/2 miles north of POC. Both occupants were killed, and the airplane was destroyed.

Preliminary findings indicate that N222ES departed from the Chino airport about 1926 and contacted the Southern California TRACON (SCT) Pomona sector. The pilot requested and received clearance for the VOR-A approach at POC about 1927. The Pomona sector provided the pilot with the 1847 weather observation for POC, which reported visibility at 2 miles in mist, ceiling 1,500 overcast, and wind 260° at 8 knots. The pilot acknowledged this transmission. At 1930:36, the pilot contacted the POC tower and reported that he was on the approach course outside the final approach fix. The tower controller instructed the pilot to report passing the final approach fix.

At 1932:03, after noting that N222ES appeared to be deviating off the approach to the west, the radar associate controller at SCT Pomona sector called POC to ask if the airplane was circling for the airport. The POC tower controller responded that he would check and call Pomona back. The POC tower controller then advised the pilot of N222ES that he appeared to be west of course and asked if he had the airport in sight. At 1932:10, the pilot reported that he had the airport in sight. The POC tower controller then asked the pilot if he wished to cancel his IFR flight plan or continue the approach; the pilot replied that he wished to continue. The POC tower controller instructed the pilot to report when he had the runway in sight, which the pilot acknowledged. At 1932:30, the POC tower controller advised the Pomona sector at SCT that the pilot had the airport in sight; the tower controller also incorrectly informed the Pomona sector radar associate controller that the pilot was canceling his IFR flight plan. The Pomona controller replied, "canceling with the airport in sight thank you." Because they were informed that the pilot had canceled his IFR flight plan, the Pomona sector controllers believed that they no longer needed to monitor the airplane's progress and dropped the data block for N222ES from their display at 1932:36.

The POC tower controller continued his attempts to assist the pilot of N222ES in locating the airport as the airplane continued to deviate from the approach course. Recorded MSAW data from SCT showed that the radar system generated a low altitude alert¹⁶ beginning at 1933:10 that continued (with only a 10-second interruption) for the remaining 5 minutes of the airplane's flight. Because the Pomona sector controllers were no longer monitoring the airplane's data block, the MSAW alert was only displayed on the Digital Bright Radar Indicator Tower Equipment (D-BRITE) scope at POC tower.

¹⁵ The description for this accident, LAX01FA004, can be found on the Safety Board's Web site at <<http://www.nts.gov>>.

¹⁶ This alert was visually displayed on the Digital Bright Radar Indicator Tower Equipment (D-BRITE) at POC tower as a flashing "LA" in the data block for N222ES and would have been visible to the Pomona sector controllers had they still been monitoring the flight.

At 1934:25, the tower controller transmitted, “Seneca two echo sierra what are you doing now sir you’ve got the airport in sight confirm?” At the time of this transmission, the airplane was 3 to 4 miles west of the airport on a heading of 250°, which was virtually in the opposite direction from the runway. After further discussion with the tower controller, the pilot turned eastbound toward the field, then northbound toward the mountains north of POC. At 1937:10, the POC tower controller asked the pilot to report his heading. He responded by asking to execute the missed approach procedure. The POC tower controller told the pilot to execute the missed approach and called the Pomona sector to coordinate the action.

At 1937:30, the POC tower controller began discussing the situation with both of the Pomona sector controllers, who questioned the pilot’s request for a missed approach. Because the POC tower controller had earlier told the Pomona sector controllers that the pilot had canceled his IFR flight plan, the pilot would not be expected to later execute the missed approach procedure. At 1937:39, the Pomona sector controllers redisplayed the data block for N222ES, which would also have made the airplane’s ongoing MSAW alert visible to them. Throughout the discussion between the POC and Pomona sector controllers, the airplane was still proceeding northbound toward high terrain although the missed approach procedure called for a turn toward the south. At 1938:09, the Pomona radar associate controller suggested that the POC tower controller instruct the pilot to turn southbound immediately. At 1938:15, the POC tower controller transmitted, “seneca two echo sierra turn back to a heading to the south sir you should be on a missed approach now do you know what the missed approach is.” At 1938:20, the pilot replied, “yes sir we are trying to go back to the VOR turning back to a heading one five zero seneca two echo.” This transmission was cut off. Recorded MSAW data shows that the low altitude alert for the airplane terminated at 1938:25. According to SCT radar data, the last target for N222ES was recorded at 1938:19. At that time, the airplane was flying at about 2,100 feet msl in an area where topographical maps show the terrain elevation to be 2,000 to 2,200 feet msl. The 1947 weather observation for POC reported visibility at 1 mile, ceiling 1,000 overcast, and wind 260° at 8 knots.

According to postaccident interview statements by the controller-in-charge of the area that included the Pomona sector, the Pomona controllers summoned him to their sector and informed him that N222ES was on a missed approach from POC. The controller-in-charge stated that when he saw the airplane, it was tracking northbound approximately 2 miles north of POC at 1,500 feet and was approaching an area in which the minimum vectoring altitude (MVA) was 6,000 feet, but may not have actually entered the area yet.¹⁷ He stated that he left the area to retrieve the operational supervisor and that when they returned, the data block for N222ES was in “coast” status, which indicated that the airplane was no longer visible to the radar system.

The controller-in-charge acknowledged that the airplane was seen to be heading north but that the direction of the missed approach procedure was south. When asked if he was concerned about the situation, he responded, “We weren’t talking to the aircraft, and POC had advised that the aircraft was on a missed approach.” The controller-in-charge stated that he did not issue instructions to the Pomona controllers about N222ES at any time. He also stated that he did not

¹⁷ When asked how far north of POC the 6,000-foot MVA boundary starts, he replied, “About three miles.”

feel that it was his place as controller-in-charge to intervene because two fully qualified controllers were sitting at the sector and he considered their judgment to be the same as his.

When the Pomona sector controllers noticed that N222ES was not following the approach procedure, they responded appropriately by asking the POC tower controller about the pilot's intentions. However, the tower controller was unable to explain why he then informed the Pomona controllers that the pilot had canceled his IFR flight plan after the pilot clearly stated that he wished to continue the IFR approach. The weather at POC was reported below VFR minimums, and both the tower controller and the Pomona sector controllers were aware of this. Although weather conditions effectively required the pilot to continue under IFR until landing, the Pomona controllers failed to question the report that N222ES had canceled his IFR flight plan. The Pomona controllers stated that they assumed that the pilot had requested "special VFR," a procedure that allows VFR operations in less-than-standard VFR weather conditions. However, there is no record of any communications between POC and the Pomona sector that would support the Pomona controllers' conclusion.

Because the Pomona controllers dropped the data block for N222ES from their display after being told that the pilot had canceled his IFR flight plan, the POC tower controller was the only controller monitoring the airplane's progress and receiving MSAW alerts. The Pomona controllers' decision to drop the data block, although possibly justifiable based on the incorrect information they were provided by the tower controller, caused them to be unaware of the subsequent MSAW alert. As a result, they were unable to comply with an ATC procedural requirement to notify the tower (in this case POC) if an MSAW alert is generated or it is otherwise noticed that an aircraft appears to be in unsafe proximity to terrain.¹⁸ When interviewed, the tower controller stated that he saw no alerts on the D-BRITE.¹⁹ However, recorded data shows that SCT's radar data processing system generated alerts almost continuously for 5 minutes and sent them to POC for display.

The Safety Board is concerned that the controllers involved in this incident did not aggressively intervene when N222ES was observed tracking toward terrain that extended well above the airplane's observed altitude. The last opportunity to prevent the accident occurred as N222ES turned toward the mountains and continued northbound; however, valuable time was spent discussing the airplane's flight plan status rather than directing the airplane to turn to a safer heading. By the time the controllers took direct action based on their observation of the airplane's track, the airplane's collision with terrain was likely unavoidable.

¹⁸ Tower controllers are not required to continuously monitor radar displays such as D-BRITE and, therefore, may not notice a visual alert unless their attention is specifically drawn to it by either an audible alarm or another controller.

¹⁹ Because of the potential for tower controllers to not see a visual MSAW alert, the Safety Board issued Safety Recommendation A-95-120 on November 30, 1995, asking the FAA to develop a policy that would require the installation of aural MSAW alerting equipment in those VFR terminal facilities that receive radar information from a host radar control facility and would otherwise receive only a visual MSAW alert. Safety Recommendation A-95-120 was classified "Closed—Acceptable Action" on February 3, 2000, after the FAA agreed to install an MSAW aural alarm at every VFR facility and tower that receives alphanumeric information from a host radar facility. The audible warning system was being installed at POC around the time the accident occurred and was in service by the end of 2000.

May 17, 2000, Medical Emergency On Board US Airways flight 278

On May 17, 2000, about 1630 eastern daylight time, US Airways flight 278 (USA278), a Boeing 737 en route from Charlotte, North Carolina, to Newark, New Jersey, was delayed after diverting to Baltimore-Washington International (BWI) Airport, Maryland, to obtain medical treatment for an unconscious 66-year-old passenger, who later died.²⁰ Preliminary findings indicate that about 1607, while under control of the Washington ARTCC (ZDC), the pilot of USA278 informed the controller, “[we have a] medical emergency, like to divert to Baltimore and get there as quick as we can.” ZDC controllers acknowledged the pilot and cleared him to proceed “direct [to] Baltimore when able.” The ZDC supervisor on duty was informed of the situation, contacted the supervisor at BWI TRACON, and informed her that USA278 was “coming direct to the airport with a medical emergency.” The BWI TRACON supervisor called the tower controller-in-charge to advise him that an airplane with a medical emergency was inbound for landing. The controller-in-charge stated in a postincident interview that when he received the message, he made a general announcement about the medical emergency but did not provide specific information (such as the airplane’s identification or the need for special handling) directly to any of the tower controllers.

About 1631, the ZDC supervisor called BWI TRACON to coordinate the airplane’s entry into the terminal area and to ensure that the airport control tower had been advised about USA278. At the same time, on a different line, the BWI TRACON arrival data (AD) controller intercepted a coordination call²¹ from the ZDC R17 controller and told R17 to instruct the pilot of USA278 to fly heading 360° and to descend to 15,000 feet. The AD controller did not share this information with any of the controllers handling the emergency or the BWI TRACON supervisor, who was near the AD position.

As USA278 neared the airport, the ZDC R17 controller called BWI TRACON to coordinate a lower altitude for USA278. The supervisor approved descent to 10,000 feet. The supervisor then told the Graco sector controller, who would be next to handle the flight, that the airplane would be “heading westbound, descending to ten thousand feet.” The Graco controller made adjustments to other traffic to ensure separation from USA278 based on the belief that the airplane would be following a westbound course as coordinated.

As a result of a request from the Graco controller, the BWI TRACON supervisor called ZDC and amended USA278’s descent clearance to 14,000 feet. She also told ZDC to instruct the pilot to execute “a right turn, right turn heading two two zero” without coordinating this instruction with the Graco controller. Because this decision would require USA278 to fly a nearly complete circle (which ultimately delayed the airplane’s arrival at BWI by approximately 5 minutes) the ZDC controller handling USA278 immediately questioned the clearance and inquired whether the supervisor knew that the flight had a medical emergency. The supervisor

²⁰ The description for this incident, DCA00SA051, can be found on the Safety Board’s Web site at <<http://www.nts.gov>>.

²¹ During postincident interviews, the AD controller stated that he took the telephone call in an effort to assist the other controllers handling the situation.

responded, “we have traffic.” When interviewed, the supervisor stated that her decision to turn USA278 to the southwest was based on a concern that BWI runway 15 departures might conflict with USA278’s arrival from the southeast and was also based on her personal evaluation of the airplane’s altitude, descent rate, and distance from the airport. In postincident interviews with Safety Board investigators, no flight crewmember or controller other than the supervisor ever expressed any concern about USA278’s ability to execute a safe approach and landing from its position at that time. After USA278 was transferred from ZDC to the Graco sector, the operational supervisor left the Graco position to return to general supervisory oversight of the TRACON and did not specifically monitor the remainder of USA278’s flight.

Following completion of the turn directed by the BWI TRACON supervisor, USA278 was 25 miles southeast of BWI at 13,000 feet. The Graco controller vectored USA278 to join the runway 10 final approach course in a routine manner. A review of recorded radio and radar data revealed no evidence of any special handling being provided to the airplane. During interviews, the Graco controller stated that he passed a printed flight strip marked with USA278’s emergency status to the south final controller, who would be the next controller to handle the flight as it approached the airport. The Graco controller stated that he decided not to distract the south final controller by verbally stating that USA278 was a medical emergency because the south final controller was very busy. In a postincident interview, the south final controller stated that he did not recall reading the flight strip. The pilot of USA278 eventually told the south final controller, “we’re a medical emergency we need to get on the ground.” Although the south final controller acknowledged the request for emergency handling, he could do little at that point in the arrival process to expedite the flight’s arrival. Following a track similar to any routine arrival from the south, USA278 joined the final approach segment approximately 7 1/2 miles from the approach end of runway 10.

USA278 contacted the BWI tower local controller about 1646. When interviewed, the tower supervisor said that about the same time, he made a general statement to the controllers on duty similar to, “let’s not send him [USA278] around.” After landing and exiting the runway, the pilot of USA278 requested and received clearance to taxi to gate D26. However, another aircraft was obstructing the taxiway needed to reach D26 and had to move out of the way, which further delayed USA278’s progress. The ground controller did not recall any specific coordination about USA278’s emergency status. He said that had he known the details of the situation, he could have cleared USA278 on a different taxi route that would have avoided the taxiway conflict.

During the Safety Board’s postincident interviews with the controllers involved, it became apparent that many believed that an aircraft experiencing a medical emergency does not warrant the same handling as that provided an aircraft experiencing a mechanical difficulty. For example, the Graco controller stated that he believed medical emergencies are handled differently than other emergencies, such as engine failure, adding “not that it’s right, that’s just the way it is.” The south final controller stated that he interpreted the phrase “medical emergency” to mean “no undue delay” and that it is different than an aircraft in distress. The BWI tower controller-in-charge stated that medical emergencies are not infrequent and that they are different than “typical aircraft emergencies.”

This notion seems to be the result of controllers' experience since some pilots who declare a medical emergency do not request diversions or unusual handling but only ask for direct routing to their original destination. The Safety Board notes that FAA Order 7110.65 does not recognize or designate a hierarchy of emergency events. Once a pilot has declared an emergency for any reason, controllers are required to establish the pilot's needs and act quickly and effectively to meet them.

As a result of the BWI incident, the FAA issued General Notice 7110.232,²² which instructed all facility managers to conduct mandatory briefings and reiterated to controllers the emergency procedures contained in FAA Order 7110.65. However, this notice did not explain the nature and circumstances of the incident that provoked its issuance. Coincidentally, Safety Board investigators were conducting an accident investigation in another FAA radar facility when the notice was received and were able to fully explain the incident to the managers and supervisors responsible for delivering the required briefing. Subsequent discussion indicated that the additional detail enabled the supervisors to provide a more effective briefing than simply reiterating the language of existing emergency guidance.

Discussion

FAA Procedures and Guidance Regarding ATC Handling of Aircraft in Emergency Situations

Chapter 10, "Emergencies," of FAA Order 7110.65 provides controllers with the following guidance on recognizing and handling emergency situations:

10-1-1 Emergency Determinations

An emergency can be either a Distress^[23] or an Urgency^[24] condition as defined in the "Pilot/Controller Glossary." ...If...you are in doubt that a situation constitutes an emergency or potential emergency, handle it as though it were an emergency...Because of the infinite variety of possible emergency situations, specific procedures cannot be prescribed. However, when you believe an emergency exists or is imminent, select and pursue a course of action which appears to be most appropriate under the circumstances and which most nearly conforms to the instructions in this manual.

²² General Notice 7110.232 stated, "All air traffic facility managers shall provide a mandatory briefing item on FAA Order 7110.65M, Chapter 10, Emergencies, with particular emphasis on paragraph 10-1-2, Obtaining Information, and paragraph 10-2-1, Information Requirements. This action is to ensure that all operational personnel are aware of their duties and responsibilities in providing assistance to aircraft that are in an emergency situation...Operational personnel must solicit sufficient information in order to provide effective emergency assistance. Aircraft in an emergency situation should not be handled routinely. An aircraft in an emergency situation should, to the maximum extent possible, be given priority over all other aircraft."

²³ The "Pilot/Controller Glossary" defines distress as a condition of being threatened by serious and/or imminent danger and of requiring immediate assistance.

²⁴ The "Pilot/Controller Glossary" defines urgency as a condition of being concerned about safety and of requiring timely but not immediate assistance; a potential distress condition.

10-1-2 Obtaining Information

Obtain enough information to handle the emergency intelligently. Base your decision as to what type of assistance is needed on information and requests received from the pilot because he/she is authorized by 14 [CFR] Part 91 to determine a course of action.

10-1-3 Providing Assistance

Provide maximum assistance to aircraft in distress. Enlist the services of available radar facilities...as well as their emergency services and facilities, when the pilot requests or when you deem necessary.

Paragraph 10-2-5, "Emergency Situations," instructs controllers to consider that an aircraft emergency exists when any of the following occur:

- a. An emergency is declared by either:
 1. The pilot.
 2. Facility personnel.
 3. Officials responsible for the operation of the aircraft.
- b. There is unexpected loss of radar contact and radio communications with any IFR^[25] or VFR^[26] aircraft.
- c. Reports indicate it has made a forced landing, is about to do so, or its operating efficiency is so impaired that a forced landing will be necessary.
- d. Reports indicate the crew has abandoned the aircraft or is about to do so.
- e. An emergency radar beacon response is received.
- f. Intercept or escort aircraft services are required.
- g. The need for ground rescue appears likely.
- h. An Emergency Locator Transmitter (ELT) signal is heard or reported.

The circumstances of the accidents discussed in this letter indicate that the preceding guidance may be overly general. Although the Safety Board recognizes that specific guidance cannot be provided for all possible emergencies that controllers may encounter in the course of their duties, training modules and printed materials reviewed following the incidents described in this letter mainly reprise basic rules contained in FAA Order 7110.65 and do not support the development or application of good judgment in recognizing and handling unusual or emergency situations. In part, judgment comes from experience, and the FAA training program does not appear to effectively transfer the experience of "lessons learned" by controllers involved in an incident or accident to other controllers who may not yet have encountered aircraft in similar circumstances. The Board addressed this issue previously when it issued Safety

²⁵ Generally, pilots of IFR aircraft operate under FAA control and receive specific separation services.

²⁶ Generally, pilots of VFR aircraft operate independently of FAA control and are expected to visually avoid other aircraft and terrain. Under some circumstances, the FAA provides radar advisory and separation services to VFR aircraft.

Recommendation A-93-160 following its investigation of an April 19, 1993, accident in which a public use airplane operated by the South Dakota Department of Transportation crashed while attempting an approach to an emergency landing at Dubuque Regional Airport, Dubuque, Iowa.²⁷ Safety Recommendation A-93-160 asked the FAA to:

Provide expanded emergency procedures training for air traffic controllers. The general capabilities of airplanes in various emergency scenarios involving air traffic control should be a focal point of this training, and past air traffic control-related accident reports should be used.

On December 8, 1994, the FAA responded that it had developed a training course to address emergency procedures training for air traffic controllers and that it had developed a training aid titled “ATC Challenge” to help improve and strengthen controllers’ knowledge of other topics involving emergency situations. On June 20, 1995, the Safety Board classified this recommendation “Closed—Acceptable Action.” However, in January 2001, the Board learned that “ATC Challenge” was no longer in use.²⁸ The performance of the controllers involved in the events discussed in this letter suggests that the action taken by the FAA in response to Safety Recommendation A-93-160 may not have been sufficient and that controllers and supervisors would benefit from additional training in recognizing and responding to distress or emergency situations.

The Need for ATC Assistance to VFR Aircraft That Encounter IMC and IFR Aircraft That Experience Instrument Failure

Analysis of Safety Board accident statistics shows that, for the years 1997 through 2000, there were 113 fatal accidents involving attempted VFR flight in IMC, resulting in 220 fatalities. Not all of the aircraft involved in these events were in communication with air traffic controllers. However, given the frequently fatal outcome of these events, it is critical to flight safety that controllers be prepared to respond immediately and effectively when they are called upon to assist VFR aircraft unexpectedly encountering IMC. Recognizing the importance of ATC assistance to pilots in such circumstances, FAA Order 7110.65 contains procedures that enable ATC to render assistance by minimizing pilot workload during inadvertent operation in IMC. Specifically, paragraph 10-2-8, “Radar Assistance to VFR Aircraft in Weather Difficulty,” states:

- a. If a VFR aircraft requests radar assistance when it encounters or is about to encounter IFR weather conditions, ask the pilot if he/she is qualified for and capable of conducting IFR flight.

²⁷ National Transportation Safety Board. 1993. *In-Flight Loss Of Propeller Blade And Uncontrolled Collision with Terrain Mitsubishi MU-2B-60, N86SD Zwingle, Iowa, April 19, 1993*. Aircraft Accident Report NTSB/AAR-93-04. Washington, D.C.

²⁸ The “ATC Challenge” training aid closely resembled a board game and had question and answer cards that were based on phraseologies and procedures contained in FAA Order 7110.65. However, the cards were not updated as revisions were made to FAA Order 7110.65, and the game gradually fell into disuse.

- b. If the pilot states he/she is qualified for and capable of IFR flight, request him/her to file an IFR flight plan and then issue clearance to destination airport, as appropriate.
- c. If the pilot states he/she is not qualified for or not capable of conducting IFR flight, or if he/she refuses to file an IFR flight plan, take whichever of the following actions is appropriate:
 1. Inform the pilot of airports where VFR conditions are reported, provide other available pertinent weather information, and ask if he/she will elect to conduct VFR flight to such an airport.
 2. If the action in subparagraph 1 above is not feasible or the pilot declines to conduct VFR flight to another airport, provide radar assistance if the pilot:
 - (a) Declares an emergency.
 - (b) Refuses to declare an emergency and you have determined the exact nature of the radar services the pilot desires.
 3. If the aircraft has already encountered IFR conditions, inform the pilot of the appropriate terrain/obstacle clearance minimum altitude. If the aircraft is below appropriate terrain/obstacle clearance minimum altitude and sufficiently accurate position information has been received or radar identification is established, furnish a heading or radial on which to climb to reach appropriate terrain/obstacle clearance minimum altitude.
- d. The following shall be accomplished on a Mode C equipped VFR aircraft which is in emergency but no longer requires the assignment of code 7700:
 1. TERMINAL. Assign a beacon code that will permit terminal minimum safe altitude warning (MSAW) alarm processing.
 2. EN ROUTE. An appropriate keyboard entry shall be made to ensure en route MSAW (EMSAW) alarm processing.

Paragraph 10-2-9, "Radar Assistance Techniques," states:

Use the following techniques to the extent possible when you provide radar assistance to a pilot not qualified to operate in IFR conditions:

- a. Avoid radio frequency changes except when necessary to provide a clear communications channel.
- b. Make turns while the aircraft is in VFR conditions so it will be in a position to fly a straight course while in IFR conditions.
- c. Have pilot lower gear and slow aircraft to approach speed while in VFR conditions.
- d. Avoid requiring a climb or descent while in a turn if in IFR conditions.
- e. Avoid abrupt maneuvers.
- f. Vector aircraft to VFR conditions.
- g. The following shall be accomplished on a Mode C equipped VFR aircraft which is in emergency but no longer requires the assignment of code 7700:

1. TERMINAL. Assign a beacon code that will permit terminal minimum safe altitude warning (MSAW) alarm processing.
2. EN ROUTE. An appropriate keyboard entry shall be made to ensure en route MSAW (EMSAW) alarm processing.

These procedures are most effective if controllers properly assess the situation and react in a timely manner.

Minutes before the airplane involved in the August 13, 1999, accident near Mount Pocono, crashed, the pilot informed ATC that he could not see the airport. He also made two statements about being “in the soup” and inquired about the reported ceiling when he was about 700 feet agl. All of these cues should have been sufficient reason for the controller to ask the pilot a direct question about his flight conditions, but he did not. Consequently, the established procedures for assisting VFR aircraft in weather difficulty were not applied. The Safety Board notes that FAA Order 7110.65 states that controllers “must remain vigilant” for situations that may require a safety alert.²⁹ It also states that “recognition of situations of unsafe proximity may result from...pilot reports” and that if controllers are “in doubt that a situation constitutes an emergency or potential emergency, [they should] handle it as though it were an emergency.”

The procedures specified for assisting VFR flights in weather difficulty (paragraphs 10-2-8 and 10-2-9) are also appropriate for situations in which IFR aircraft experience instrument failures. Pilots who conduct flights under IFR compensate for the absence of visual cues by using aircraft attitude information obtained from instruments such as heading indicators, attitude indicators, and turn coordinators. If the instruments or their power sources fail, it can be difficult for the pilot to maintain control of the aircraft. Although instrument-rated pilots receive specific training about how to identify and react to instrument failures, such failures can be subtle and very confusing until the pilot realizes that at least some of the instruments are providing incorrect data. In practical terms, an IFR pilot operating in IMC with malfunctioning attitude instrumentation is in much the same situation as a VFR pilot operating in IMC without having been trained to do so. Both situations greatly increase the likelihood of an accident.

Continued flight under such conditions may present the pilot with a very high workload that requires his full attention to maintain control of the aircraft, leaving little time for other tasks, such as navigation and communication. When this occurs, it is important that air traffic controllers understand the problem and be prepared to assist the pilot. The circumstances of the January 20, 1999, accident near Albuquerque demonstrate that the air traffic controllers who handled N79NL did not understand the significance of vacuum pump loss in IMC. Even after the pilot reported that he had just recovered from a spin and a roll, the controllers did not modify their control techniques or attempt to minimize the pilot's workload. The controllers did not avoid assigning turns and frequency changes nor did they locate areas where VFR conditions existed or assist the pilot in establishing the airplane in stable flight. All of these actions would have been appropriate under the circumstances, reducing the likelihood that the pilot would lose control of the airplane. The ABQ approach controller was current and qualified to provide airport

²⁹ A safety alert is a warning issued to a pilot when a controller believes that an aircraft is in unsafe proximity to terrain or another aircraft.

surveillance radar approaches³⁰ but was unprepared to respond effectively when the service was actually needed.

During the Safety Board's investigation of the November 1999 accident involving N8992M in Newark, New Jersey, it became apparent that the controller involved may not have recognized the seriousness of the pilot's situation and was unfamiliar with the proper application of no-gyro procedures that could have been useful in assisting the pilot in returning to the airport. Similar concerns about recognition and response to emergencies arose from the Bangor, California, and Mount Pocono, Pennsylvania, accidents described in this letter. Because ATC assistance to aircraft in such situations can be critical, the Safety Board believes that the FAA should amend FAA Order 7110.65, "Air Traffic Control," paragraph 10-2-5, "Emergency Situations," to include as emergencies (1) inadvertent entry into IMC by a VFR aircraft and (2) in-flight failure of attitude instruments needed to operate safely in IMC if the affected aircraft cannot remain in VMC for the remainder of its flight.

The Need to Improve ATC Knowledge and Skills in Recognizing and Responding to Distress and Emergency Situations

Review of training records for all of the controllers involved in the preceding incidents and accidents showed that they had received all required initial and refresher training on emergencies and unusual situations. However, on the basis of their actions in responding to the various accidents discussed in this letter, the Safety Board is concerned that FAA guidance and training in the handling of distress and emergency situations may be insufficient to ensure that controllers fully understand the significance and potential consequences of such situations and are prepared to respond effectively. For example, despite having completed four FAA training units about assisting VFR aircraft in weather difficulty, the controller who handled the airplane involved in the June 8, 1998, accident near Bangor failed to recognize that the airplane was in an emergency situation. Consequently, he failed to take the steps outlined in paragraph 10-2-8.

Because the circumstances of the accidents and incidents discussed in this letter suggest that the training currently provided to ATC personnel in recognizing and responding to emergency situations is inadequate, the Safety Board believes that the FAA should develop and ensure that air traffic controllers receive academic and simulator training that teaches controllers to quickly recognize and aggressively respond to potential distress and emergency situations in which pilots may require ATC assistance, including but not limited to (1) recognition of situations in which VFR aircraft may be encountering IMC; (2) an understanding of common aircraft system failures that may require ATC assistance or special handling; and (3) the application of specific techniques for assisting pilots that encounter such weather difficulties and aircraft system failures. Further, this training should be based on actual accidents or incidents, include a comprehensive review of successful flight assists and the techniques used, and be reviewed annually to ensure that the training materials remain current and effective.

³⁰ Airport surveillance radar approaches can be used by controllers to assist pilots in safely finding an airport after failures in navigational or attitude instruments.

The circumstances of these accidents and incidents also suggest that controllers providing IFR services may benefit from an increased understanding of flight operations and IFR procedures. The Safety Board notes that the FAA instrument pilot written examination is a tool that is readily available for achieving this goal. The Board's review of current FAA training materials for controllers, such as lesson plans and computer-based instruction modules, revealed that very little content is related to aircraft operations and navigation, the possible consequences of aircraft system and instrument failures, understanding of instrument approach charts and procedures, comprehension of notices to airmen, and the application of Federal Aviation Regulations. Requiring that controllers periodically take and pass the FAA instrument pilot written examination would ensure that they have a basic academic understanding of all aspects relevant to instrument flight operations. The intent of such a requirement is not to encourage controllers to "fly the airplane" for the pilot. Rather, enhanced training in IFR operations would ensure that controllers are exposed to various issues affecting IFR flight, enabling them to better understand the variety of ways ATC actions can affect flight safety. Therefore, the Safety Board believes that the FAA should require controllers employed at IFR ATC facilities to take and pass the instrument pilot written examination as part of their initial training and to repeat the examination at least every 5 years while employed at these facilities.

The Safety Board also notes that advice from a pilot-qualified employee may be valuable to a controller without pilot experience who is handling an aircraft with in-flight difficulties. This would have been especially helpful in the January 20, 1999, accident involving N79NL near Albuquerque but could be of value in many other similar situations where knowledge of flight operations may assist controllers in handling unusual or emergency situations. For example, a controller with pilot and/or instructor ratings might be able to suggest questions to ask the pilot to establish the nature and severity of the problem and then recommend possible ATC actions to increase the likelihood of a successful outcome to the situation. Familiarity with aircraft navigational systems and procedures may also help in orienting lost pilots, and type-specific knowledge of aircraft performance and limitations may be useful in identifying suitable emergency airports. To facilitate this assistance, it may be beneficial for air traffic facilities to maintain a list of facility personnel with flight experience who can be called on to assist other controllers as necessary. Therefore, the Safety Board believes that the FAA should amend FAA Order 7210.3, "Facility Operation and Administration," to require that air traffic managers provide a list of facility employees who hold pilot licenses, including their ratings and the types of aircraft with which they are familiar, for use in emergency situations. This list should be updated at least annually.

ATC Supervision and Response to Aircraft in Distress and Emergency Situations

When supervising an abnormal or emergency situation, it may be appropriate for ATC supervisory personnel to assess the traffic situation and direct actions that facilitate expeditious handling of the aircraft needing assistance. For example, a supervisor may consider imposing temporary traffic restrictions or assigning a controller to handle only the specific aircraft involved. The Safety Board's investigation of the October 6, 2000, accident involving N222ES noted deficiencies in the performance of the controller-in-charge on duty in the area that included the Pomona sector. According to postaccident interview statements, the controller-in-charge was

aware that the pilot was operating in IMC at night with as little as 100 to 800 feet of terrain clearance, well off the instrument approach procedure, and sometimes over heavily populated areas. However, he chose to leave the area to locate the supervisor rather than intervene by instructing the controllers to issue a safety alert about the terrain or an immediate instruction to the pilot to turn around.

The Safety Board's investigation of the May 17, 2000, in-flight diversion of USA278 to BWI also revealed deficiencies in ATC supervisory oversight. For example, the BWI TRACON supervisor issued numerous clearances for ZDC controllers to relay to USA278 but did not ensure that all relevant information was conveyed to the Graco and south final sector controllers. In addition, the TRACON supervisor did not manage traffic flows in a manner that afforded USA278 emergency priority in accordance with FAA Order 7110.65.

During interviews, the TRACON supervisor and the Graco sector controller stated that they were concerned that BWI runway 15 departures might conflict with USA278's arrival from the southeast. It was this concern, in part, that prompted the TRACON supervisor to issue the clearance to turn the flight to the southwest. The Safety Board's investigation determined that without delaying USA278's arrival, the TRACON supervisor could have better resolved the potential conflict by instructing the tower to temporarily stop using runway 15, but no such instruction was issued. The supervisor also did not coordinate with the feeder sectors to create a gap in the arrival traffic flow to accommodate USA278, which would have possibly reduced the delays encountered by the flight. Further, after USA278 was transferred from ZDC to the Graco sector, the supervisor left the Graco position and ceased monitoring the flight, which reduced her opportunity to ensure that effective control actions and coordination were completed.

Deficiencies in ATC supervision were also noted in the BWI tower's operations. When the tower controller-in-charge was advised of USA278's status by the TRACON supervisor, he made only general announcements to the tower controllers that a medical emergency was inbound to the airport. This method of communicating an emergency did not comply with previously issued FAA guidance.³¹ The failure of the controller-in-charge to directly inform the ground controller of the airplane's emergency status may have led to the ground controller clearing USA278 on a route that was blocked by another aircraft, further delaying its arrival at the gate.

Therefore, the Safety Board believes that the FAA should amend FAA Order 7110.65, "Air Traffic Control," to require that supervisory or controller-in-charge personnel directly monitor the handling of aircraft in emergency status until emergency services are no longer required. Further, based on the supervisory actions taken during these two occurrences, the Safety Board believes that the FAA should develop and annually provide to supervisory and controller-in-charge personnel specific training on their roles in handling emergencies, including monitoring and supervising control actions, coordinating actions internally and with other ATC

³¹ The FAA published an article titled "Blanket Broadcast" in the December 1995 issue of the Air Traffic Bulletin that addressed the dissemination and coordination of pertinent information that could be critical to flight. The article stated, in part, "A 'blanket broadcast' in busy operational quarters to controllers should not be used to pass important information that each controller should receive."

facilities, and the need to act assertively to ensure successful resolution of emergency situations. This training should be based on actual accidents or incidents, include a comprehensive review of successful flight assists and the techniques used, and be reviewed annually to ensure that the training materials remain current and effective.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Amend FAA Order 7110.65, "Air Traffic Control," paragraph 10-2-5, "Emergency Situations," to include as emergencies (1) inadvertent entry into instrument meteorological conditions (IMC) by a visual flight rules aircraft and (2) in-flight failure of attitude instruments needed to operate safely in IMC if the affected aircraft cannot remain in visual meteorological conditions for the remainder of its flight. (A-01-35)

Develop and ensure that air traffic controllers receive academic and simulator training that teaches controllers to quickly recognize and aggressively respond to potential distress and emergency situations in which pilots may require air traffic control (ATC) assistance, including but not limited to (1) recognition of situations in which visual flight rules aircraft may be encountering instrument meteorological conditions; (2) an understanding of common aircraft system failures that may require ATC assistance or special handling; and (3) the application of specific techniques for assisting pilots that encounter such weather difficulties and aircraft system failures. Further, this training should be based on actual accidents or incidents, include a comprehensive review of successful flight assists and the techniques used, and be reviewed annually to ensure that the training materials remain current and effective. (A-01-36)

Require controllers employed at instrument flight rules air traffic control facilities to take and pass the instrument pilot written examination as part of their initial training and to repeat the examination at least every 5 years while employed at these facilities. (A-01-37)

Amend FAA Order 7210.3, "Facility Operation and Administration," to require that air traffic managers provide a list of facility employees who hold pilot licenses, including their ratings and the types of aircraft with which they are familiar, for use in emergency situations. This list should be updated at least annually. (A-01-38)

Amend FAA Order 7110.65, "Air Traffic Control," to require that supervisory or controller-in-charge personnel directly monitor the handling of aircraft in emergency status until emergency services are no longer required. (A-01-39)

Develop and annually provide to supervisory and controller-in-charge personnel specific training on their roles in handling emergencies, including monitoring and

supervising control actions, coordinating actions internally and with other air traffic control facilities, and the need to act assertively to ensure successful resolution of emergency situations. This training should be based on actual accidents or incidents, include a comprehensive review of successful flight assists and the techniques used, and be reviewed annually to ensure that the training materials remain current and effective. (A-01-40)

Acting Chairman CARMODY and Members HAMMERSCHMIDT, GOGLIA, and BLACK concurred in these recommendations.

By: Carol J. Carmody
Acting Chairman