FLIGHT SAFETY FOUNDATION
Accident Prevention
Vol. 52 No. 4 *For Everyone Concerned with the Safety of Flight* April 1995

Charter Captain Chooses Not to Use ILS Glideslope, Misjudges Landing in Fog, Runs Off Runway End into Blast Fence

Investigators found that nonstandard parts had been used to attach some seat belts in the accident airplane, official U.S. report says.

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The crash of a twin-engine piston-powered Piper PA-31-350 Navajo Chieftain, owned and operated by Action Airlines Inc., in Stratford, Connecticut, U.S., has resulted in recommendations by the U.S. National Transportation Safety Board (NTSB) to the U.S. Federal Aviation Administration (FAA) regarding the inspection of U.S. Federal Aviation Regulations (FARs) Part 139–certificated airports for adequate runway safety areas and nonfrangible [resistant to breaking apart] objects. Eight of the nine aircraft occupants were killed, and the remaining occupant, a passenger, was seriously injured in the April 27, 1994, accident when the aircraft crashed into a jet-blast fence after landing (photo, page 2).

The accident aircraft was operating under FARs Part 135 as Action Air Flight 990 on a series of chartered flights that began on the morning of April 27. The NTSB accident report said: "The flights were contracted by an independent representative of Resorts International Inc., a gambling casino operator located in Atlantic City, New Jersey [U.S.]." The flights operated from Hartford, Connecticut, to Pomona Airport (ACY), Atlantic City, with an intermediate stop at Sikorsky Memorial Airport (BDR), Stratford, Connecticut, with a return flight in the evening to return the passengers to their points of origin.

On the application for his FAA medical certificate (approximately one month before the accident), the captain indicated that his total flight time was 3,500 hours. The captain had been employed by Action Air for approximately eight months. His training records at the time he was hired indicated that he had 1,000 hours of multi-engine flight time as pilot-in-command, 1,000 flight hours as second-in-command and 527 flight hours in the PA-31 at the time of the accident.

The report said, "The captain of [the accident flight] had no FAA accident, incident or enforcement record. According to company records, he was assigned by Action Airlines as a captain flying single-engine Cessna 172 and Piper PA-32 Cherokee Six airplanes in May 1990. He also flew as a PA-31 Navajo copilot. In April 1991, he went to work with Corporate Air Inc. and flew as a captain on Piper PA-31 Navajo, Piper PA-23 Aztec and Beech 58 Baron airplanes."

"In May 1992, he was employed by Precision Airlines Inc. as a copilot on the Dornier DO-228," the NTSB report said. "He was furloughed from Precision Airlines [in January 1993], and was recalled to flying [in March 1993]. During this period, until the time of the accident, he continued to fly part-time for Corporate Air Inc. When he was scheduled for furlough from Precision Airlines, to be effective [in September 1993], he returned to Action Airlines and was rehired [in August 1993]. He received training and qualification as captain on the Piper PA-31 Navajo and the Piper PA-34 Seneca. According to the

The accident aircraft, a Piper PA-31, impacted a jet-blast fence after landing long. The pilot had elected to make a visual approach despite reduced visibility. The end of the runway is visible in the lower-left corner. (Source: Robert Benzon, U.S. National Transportation Safety Board.)

company president, the captain had flown the PA-34 only in training. After he was rehired, all of his flights for Action Airlines were in the PA-31 Navajo."

The report added: "The captain reported for duty at 0800 [local time]. … The flight was scheduled to depart [Hartford] at 0830 with two passengers and one company employee; however, the flight was delayed because the BDR weather was below landing minimums. According to company records, Action Air 990 was released at 0845 and was airborne at 0855. The flight landed routinely at BDR and picked up five additional passengers." The accident airplane was equipped with two pilot seats and eight passenger seats.

"No arrival times at BDR were reported by the captain to the company," the report said. "After departure, the flight reported a takeoff time of 0931 and proceeded to ACY. The captain reported arriving at ACY with a landing time of 1020.

"After arrival, the captain joined several other pilots from Action Airlines and proceeded to a local diner for a meal. Afterwards, several crew members rode in a company-provided automobile to a hotel to commence a rest period until the flight departures that evening. The captain shared a room with another pilot from Action Airlines. According to the roommate, the captain remained in the hotel during the afternoon hours. His activities consisted of telephoning his wife, watching television and sleeping for a period of about four hours. According to hotel records, the captain checked out of the hotel about 2000. He departed with fellow pilots in the company car and arrived at the airport about 2020.

"The scheduled departure for the accident flight was 2200, with the same eight passengers who had been brought in on the morning flight. The departure times were not reported since company policy did not require the pilot to do so unless a delay of 30 minutes or more was incurred. The captain had filed an instrument flight rules (IFR) flight plan; however, it was never activated. The airplane departed about 2200 and operated under visual flight rules (VFR). The route of flight was ACY direct to BDR, and the cruise portion was flown at an altitude of 5,500 feet [1,677 meters] above mean sea level (msl). Radio contact was made with the New York Terminal Radar Approach Control (TRACON) to request flight following through the New York area Class B airspace."

"About 2225, Learjet N400EP called BDR tower and was advised by the tower controller that the tower visibility was one-half mile and that the controller did not think N400EP would be able to land at the airport in VFR conditions," the report said. "At 2230, BDR tower closed for the evening. About 2237, the pilot of N303A, a Sabre 65, conducted a missed approach from the very high frequency omnidirectional radio range (VOR) approach to Runway 29 and diverted to White Plains, New York. According to the pilot, the weather on downwind was two miles visibility with fog. About 2242, [the pilot of a twin-engine]

Turbo Commander planned to land on Runway 24 at BDR. However, about five miles from the runway, the pilot lost sight of the runway lights. He then overflew the runway and could see the runway and other lights at the airport from overhead. He then diverted to New Haven, Connecticut. He later stated that there were no defined tops to the fog at the airfield.

"Also, at 2242, Action Air 990 advised the TRACON that the flight was initiating a VFR descent out of 5,500 feet and was proceeding direct towards BDR. At 2251, Action Air 990 switched to the common traffic advisory frequency (CTAF) for BDR because the tower had closed.

"The captain of Learjet N400EP reported that at about 2252, after landing at BDR, he received a radio transmission (believed to be from the accident captain) inquiring, 'How was the weather down there?' A second transmission was received asking, 'How was the ground fog?' The reply from the copilot of Learjet N400EP was, 'Not bad until you get on the ground.' The captain of the Learjet later stated that a Piper Navajo reported eight miles [12.9 kilometers] out for landing at BDR. This was the last known transmission by the pilot of Action Air 990."

The report said, "Examination of the recorded radar data indicate that the accident airplane was cruising at approximately 5,400 feet [1,647 meters] msl, began to descend and then approached BDR Runway 6 from the southwest on a magnetic heading of approximately 25 degrees. The airplane approached BDR in a shallow flightpath angle varying between 0.5 and 2.2 degrees. The groundspeed of the flight started out at approximately 190 knots near the top of the descent and gradually decreased during the descent.

As it continued its approach, the report said, 'The airplane … remained more than one dot high and two dots left of course relative to the glideslope and the localizer …'

"The airplane entered the BDR Runway 6 glideslope from below and crossed the glideslope centerline at approximately 2253:31, at which time its airspeed and groundspeed began decreasing further. The airplane's position at the time it crossed the glideslope centerline was approximately 1,400 feet msl [427 meters] and 4.23 nautical miles (nm) [6.8 kilometers] from the runway threshold (0.77 nm [1.24 kilometers] inside the STANE initial/final approach fix for the ILS [instrument landing system] 6 approach), and its speeds were approximately 152 KIAS [knots indicated airspeed] and 167 knots groundspeed.

"The airplane flew through the one-dot-high boundary of the glideslope at 2253:45 (its position then was about 1,340 feet [409 meters] msl and 3.63 [nautical miles (nm)] [5.8 kilometers] out) and crossed the localizer centerline at 2253:50 at a position about 1,330 feet [406 meters] msl and 3.38 [nm] [5.4 kilometers] out. The airplane then proceeded through the full fly-right boundary of the localizer, started a right turn with a maximum roll angle of approximately 11 degrees, and significantly increased its descent rate and downward flightpath angle. As the airplane descended through 1,000 feet [305 meters] msl, its descent rate and flightpath angle peaked at approximately 1,200 feet per minute (FPM) [366 meters per minute] and -4.3 degrees, respectively, and its speeds decreased to 140 KIAS and 159 knots groundspeed."

As it continued its approach, the report said, "The airplane decreased its deviations … but remained more than one dot high and two dots left of course relative to the glideslope and the localizer, respectively, at the point where the radar data end."

The first six radar data points show the airplane decreasing its descent rate and decreasing its downward flightpath angle. "The last radar data point shows the airplane descending through 400 feet [122 meters] msl at a point 0.52 [nm] [0.83 kilometers] from the BDR Runway 6 threshold," said the report. "The speeds estimated from the last two radar data points are approximately 126 KIAS and 138 knots groundspeed. Extrapolation indicated that maintaining the final flightpath angle would place the airplane at approximately 150 feet [456 meters] msl at the runway threshold (runway threshold elevation is seven feet [2.1 meters]) and on the runway surface approximately 3,000 feet [915 meters] down the runway, assuming no flare prior to touchdown.

"The touchdown marks found on Runway 6 indicate that the airplane touched down approximately 3,471 feet [1,141 meters] down the runway and 43 feet [13 meters] left of runway centerline. It then began leaving tire skid marks consistent with braking approximately 4,200 feet [1,281 meters] down the runway. The tire skid marks were intermittent and asymmetric (no left tire skid but heavy right tire skid, vice versa, or asymmetric darkness) after initiation, as though brake pressure was being modulated or tire/runway surface friction or contact/down force was varying. The tire skid marks became heavy and continuous approximately 50 feet [15.2 meters] prior to impact with the steel blast fence at the end of Runway 6 (approximately 4,697 feet [1,432 meters] down the runway)."

The only witness to the accident, the surviving passenger, told investigators about the events of the flight. The report said, "According to the surviving passenger, the captain performed the preflight with the aid of a flashlight at ACY. The captain then told the survivor to sit in the right seat while the passengers boarded the airplane. [The survivor was an instrument-rated private pilot employed by Action Airlines as a dispatcher and general assistant.] He [the survivor] stated that he listened to the briefing, since he was not familiar with the Piper Navajo. The captain then told the survivor that he always filed an IFR flight plan, even though he might fly VFR.

"The passengers seemed to be in good spirits. They were not inebriated or unruly. When asked if the passengers had their seat belts on to land, the survivor stated that he thought most of them did."

The report continued: "The flight departed ACY behind another company flight bound for Albany, New York. During the flight, the survivor monitored the company radio frequency while the captain talked to ACY and New York TRACON air traffic controllers. He stated that as the flight approached BDR, he could see Long Island, and he noticed that fog was developing along the coast. He said that he saw the rotating beacon at BDR and observed fog developing there also. When the BDR radio frequency was tuned, he said that he and the captain heard a Learjet making an approach to BDR. The Learjet crew indicated that there was a thin fog."

The report said, "There were no tower communications, and the survivor did not recall if New York TRACON issued any weather information. Everything sounded routine to the survivor. The captain did not appear to be rushed or anxious. He accomplished the checklist by touching each appropriate object rather than reading it out loud. The survivor stated that the captain made no comments about any personal or physiological problems during the flight and that he seemed well rested. The survivor stated that he believed nothing was wrong with the airplane, and that the captain would have said so if there was. The survivor also stated that the captain was 'very religious' about checklists."

The report added, "During the approach, the survivor could see the runway, and to him 'everything seemed normal.' He said that he assumed that since he could see the runway, the captain could too. He thought that they were a little bit high during the approach to the runway. He did not know whether the localizer frequency had been tuned in. As they flew down the approach path, the captain said to him, 'See this button up here?' [referring to the landing light switch] 'Turn that on when I tell you to. He also stated that during the approach he had no sense of a tailwind.

"The survivor stated that although he never lost sight of the runway during the approach or landing, he could not see the beginning and the end of the runway at the same time. He did not recall the runway lighting, but he did remember the threshold bars painted on the runway, a runway number painted on the runway (he could not recall the number), and the white lines (side markings) of the runway. He did not see the area of skid marks in the touchdown zone. He saw the pavement, and he thought that he might have seen a strobe light at the approach end of the runway."

The report said, "During the approach, he saw the captain making throttle adjustments, and he watched him lower the flaps. He did not know the flap setting used. He said that it was foggy when they 'rounded out' and were going down the runway. The captain said, 'Turn it on,' referring to the landing light. Then, almost immediately, he said, 'Turn it off.' He did not add any power and was 'fishing for the runway.' The survivor said that he observed a considerable adjustment of the yoke. He did not know the length of the runway, but he thought that their approach was high and long. He did not know if it was a normal touchdown because of his unfamiliarity with the type of airplane. He did not hear the stall warning just before touchdown, and he stated that he was familiar with that sound.

"After touchdown, the braking was initially hard. The survivor stated that his head was down at the time and that when he looked up, he saw the blast fence at the end of the runway. He thought that he and the captain saw it at the same time. The last thing the captain said at that time was 'Oh no' or 'Uh oh.' He stated that the impact with the 'wall' felt like 'we hit it at 100 miles an hour [161 kilometers per hour]' (photo, page 5).

"Following impact, the passengers were calm, and they seemed to be catching their breaths. After impact, both he and the captain were conscious. The captain then turned toward the passengers and said, 'Don't panic,' and 'It's all right.' The survivor stated that at the time, the captain may have taken off his seat belt to turn and talk to the passengers. Concerning his own seat belt, he stated that he could 'feel the belt' during the impact, and he believes that he may have unbuckled his seat belt at the same time as the captain.

"The survivor then stated he then looked down toward the fuel shutoff valve handle. After what he estimated to be three to five seconds, the airplane 'exploded.' Then the passengers began to scream. When he looked up, he saw that a passenger had been thrown into the windshield during impact. This individual was on fire. He believed it to be the passenger seated behind the captain. He did not think that the passenger had his seat belt on at the time of impact.

"He pushed the passenger and himself out the window onto the ground. He stated that they were out of the airplane in seconds. He held the passenger, and together they rolled away from the fire until the survivor thought the fire was out. He then ran back toward what he thought was the rear of the airplane. He ran into a person that he thought was a woman passenger and rolled her out on to the ground. He remembered getting to a cool place and that the person that he had initially pushed out of the airplane was on the ground talking."

The investigation reviewed the injuries received by the pilot and passengers during the crash. The report said, "There were five male and three female passengers on this flight, ranging in age from 33 to 76 years. Of the eight passengers, seven sustained fatal injuries, and the 37-year-old male passenger, who occupied the co-pilot's seat, sustained a facial fracture and serious thermal injuries to 50 percent of his upper torso."

"The local medical examiner determined that the pilot and seven passengers died as a result of smoke inhalation and thermal injury," the report said. "The eighth passenger, who survived for several hours after the accident, died as a result

The U.S. National Transportation Safety Board concluded that crash-impact forces were survivable, but an immediate postcrash fire was fatal for eight of the nine occupants. (Source: Robert Benzon, U.S. National Transportation Safety Board.)

of thermal injuries only, and, according to his attending physician, smoke inhalation was not a factor because his carbon monoxide (CO) level was within normal limits."

Following the accident, toxicological tests were conducted on urine and blood samples from the captain. These tests were negative for major drugs of abuse, including alcohol, the report said.

Investigators evaluated the weather at the time of the accident. The report said, "Analysis of available weather data indicated that at the time of the accident, the surface conditions at the airport most likely consisted of a totally obscured sky, prevailing visibility of less than one-quarter mile [0.40 kilometer] in fog, and surface winds about 250 degrees at four knots. The tailwind component on final approach was about 21 knots at 3,000 feet [915 meters], around 20 knots at 2,000 feet [610 meters], and diminishing to around four knots at the runway. … The wind direction provided a tailwind throughout the descent approach and landing."

The report said, "The captain, when confronted with weather conditions that seriously reduced his chances of successfully completing a visual landing, should have immediately executed a go-around. Actual landing conditions could then have been better assessed. If necessary, an IFR clearance could have been obtained, and an instrument approach could have been flown to minimums. If the weather was below minimums, then a diversion to another suitable airport would have been appropriate."

The NTSB said that the probable causes of the accident were "the failure of the captain to use the available ILS glideslope, his failure to execute a go-around when the conditions were not suitable for landing and his failure to land the airplane on the runway at a point sufficient to allow for a safe stopping distance; the fatalities were caused by the presence of the nonfrangible blast fence and the absence of a safety area at the end of the runway."

When investigators examined the passengers' seats, they found one seat where no lap belt was attached to the seat frame. The report said, "The lap-belt assembly was subsequently found undamaged under the copilot's seat unit, with both halves buckled together. The buckle functioned properly during examination. Examination of the inboard and outboard lap-belt attachment points indicated that undersized bolts were in place at improper lap-belt attachment points on the seat frame, and the 'D' ring's bolt hole on the seat belt passed freely over the bolt that was on the seat frame."

On another passenger seat, the report said, "The right half of the lap belt was about 30 inches [76.2 centimeters] long. A representative of the operator stated that lap belts, when not in use, are typically stowed by passing the insert end of the lap belt under the right-front of the seat cushion, and then over the seat cushion, and connecting it to the buckle on top of the seat cushion. Examination of the inboard lap-belt attachment point to the seat frame found that a nonstandard bolt, not

manufactured for use in airplanes, was installed at an improper lap-belt attachment point to the seat frame."

Investigators found four other passenger seats where the insert end of the lap belt was about 30 inches long, the report said.

When investigators examined the two rear passenger seats, they found that the seat belts on both seats were stowed around the seat cushions. The report said, "It was not apparent which seat was occupied by a passenger, but one of these two seat units was occupied due to the number of people aboard the airplane."

The report concluded that "because of the lack of seat, seat-buckle and seat-belt damage, and the length of the belts, it is likely that some of the passengers in the cabin were not wearing their seat belts at impact. They might have been stunned by the impact, and died in a confused and delayed attempt to escape the airplane. It is conceivable that if the passengers in the rear of the airplane had been wearing their seat belts, they would not have been stunned, and they could have escaped through the boarding door. However, the passengers in the front of the airplane, belted or not, were afforded virtually no opportunity to escape because of the rapid outbreak of intense fire in that area. The Board also believes that because of the rapid development of intense fire in the seconds after impact, and the destruction that resulted, the exact circumstances of the escape effort will never be known."

As a result of its examination of the seats and restraint systems on the accident airplane, "the Safety Board inspected seats installed in three other PA-31-350 airplanes and one PA-34 Seneca airplane owned by Action Airlines," the report said. "The seats had been reupholstered, and the seat belts of the four airplanes had been installed by Harrington Industries Inc., Aiken, South Carolina."

The report said that as a result of the examination of Action Airlines' fleet, investigators visited Harrington Industries.

Investigators conducted burn tests of the accident airplane's interior furnishings at the FAA Technical Center in Atlantic City, New Jersey. The tests found that the materials complied with the requirements described in FARs Part 25.853.

As a result of the information obtained by investigators during their visit to Harrington Industries, the NTSB made two urgent safety recommendations to the FAA in May 1994:

- "Take immediate action to evaluate the quality of maintenance performed by Harrington Industries, including the qualifications of the FAA-certified airframe and powerplant mechanics employed there, to ensure that the work performed is in compliance with approved practices; [and,]

- "Take immediate action to identify airplanes that have been repaired, refurbished or repainted by Harrington Industries, inspect their safety belts and seat assemblies for proper installation and use of approved hardware, inspect their flight control surfaces to ensure that balance is within tolerance limitations, and inspect them for any other airworthiness conditions if the need is indicated during the evaluation … ."

The FAA investigated Harrington Industries, and made the following response to the NTSB:

"The [FAA] West Columbia Flight Standards District Office (FSDO) conducted an investigation and an inspection of Harrington Industries. During the investigation, the certificated mechanics employed by Harrington Industries successfully demonstrated the procedures that they used to check the balance of aircraft flight controls. The procedures used were not unlike the procedures used by the majority of aircraft manufacturers. The scales used in the balance procedure were checked for calibration and found to be within tolerance.

"Regarding the possible use of unapproved hardware, the only hardware found in the Harrington Industries facility that may have been purchased at an automotive store was a box of Tinnerman nuts used for attachment of decorative interiors. During the investigation, it was noted that the control surfaces of a Mitsubishi MU-2-36 aircraft had been balanced using a manufacturer's maintenance manual that was not current. It was also noted that the [FAA] type certificate data sheets referenced when performing annual inspections were not current. The FAA has taken appropriate corrective action."

The FAA also said that it took the following actions:

- "The West Columbia FSDO reviewed work sheets from Harrington Industries and identified 10 aircraft that had been painted by Harrington Industries within the last year. The FAA sent letters to the owners of the 10 aircraft, requesting that they bring their aircraft to Harrington Industries to have their flight control balance checked. All but three owners responded;

- "The flight controls were removed and checked for balance on the seven aircraft that were evaluated. The evaluation revealed that the balance of two surfaces was out of limits on one aircraft, and that one surface was determined to be out of limits on two aircraft. All defects were immediately corrected. All other control surfaces were within balance limits; [and,]

- "On September 28, 1994, the [FAA] notified all owners and operators of aircraft that have had maintenance performed by Harrington Industries that their aircraft may have been maintained using unapproved data and/or techniques. Additionally, the FAA published this same information as a special notice in the November issue of Advisory Circular (AC) 43-16, *General Aviation Airworthiness Alerts*, to alert the aviation community."

Investigators reviewed the background and qualifications of the captain. He was 33 years old, and held a U.S. commercial pilot certificate for single- and multiengine land, and an instrument rating. He also held an FAA Class I medical certificate, with a limitation requiring that he wear correcting lenses for near and distant vision. "When asked if the captain was wearing glasses during the accident flight, the surviving passenger stated that he did not recall," the report said. "The captain's wife stated that he did not wear contact lenses."

The airplane was found to be within the prescribed weight-and-balance limitations for takeoff and landing. The maintenance records were reviewed and investigators found "no discrepancies that were relevant to the circumstances of the accident," the report said.

Investigators examined the runway used by the accident airplane. The report said, "Runway 6/24 is 4,677 feet [1,426 meters] long and 150 feet [45.7 meters] wide. The safety area for the approach end of Runway 6 is 100 feet, measured from the threshold. The safety area at the approach end of Runway 24 is zero feet. The width of the safety area surrounding Runway 6/24 is 250 feet [76 meters], from each side of the runway centerline. In addition, the first 1,500 feet [457 meters] of Runway 6 pavement is noted to be 'uneven,' according to a note on the Jeppesen airport diagram dated October 15, 1993.

"A nonfrangible metal blast fence is located 342.5 feet [104 meters] northeast of the east edge of the Runway 24 displaced threshold," the report said. "In 1993, a 200-foot [61-meter] wide, eight-foot nine-inch [2.67-meter] high central portion of the previous nonfrangible blast fence was replaced with this stronger fencing." This section of the blast fence was replaced to protect a two-lane paved road, 10 feet [three meters] from the blast fence. The report said, "The blast fence was constructed with galvanized structural steel upright sections and double reverse galvanized corrugated sheet metal.

"In 1977, the blast fence was approved by the FAA, funded and installed. In 1993, the blast fence was rebuilt with FAA, state and local funding and approval because the old fence no longer provided adequate public protection from blast and debris. A heavier metal frame of steel 'C' channel material was used to support the metal fence because of the proximity of the fence to turbine-powered airplanes during takeoff thrust."

The BDR airport is certificated by the FAA in accordance with FARs Part 139. The report cited FARs Part 139.309, which states: "No object may be located in any safety area, except for objects that need to be located in a safety area because of their function. These objects shall be constructed, to the extent practical, on frangibly mounted structures of the lowest practical height with the frangible point no higher than three inches [7.6 centimeters] above grade."

The report said, "During the course of the investigation, the BDR Airport Director reported that previous conversations and meetings had taken place with BDR, the FAA and the Connecticut Department of Transportation representatives regarding moving [the two-lane road] and constructing an RSA [runway safety area] for Runway 24. The Airport Director reported that such changes could and should be accomplished; however, they remained concerned about community resistance because of environmental issues. Nevertheless, in January 1995, a new airport master plan, which includes relocating [the two-lane road], removing the blast fence and constructing an RSA for Runway 24, is scheduled to be submitted to the City of Bridgeport for approval." [Editorial note: According to Kurt Sendlein, superintendent of operations, Sikorsky Memorial Airport, the airport master plan has been adopted by the Sikorsky Memorial Airport Commission.]

During the investigation, the NTSB accident data base was reviewed for accidents at BDR during the last 10 years. The NTSB said that the data base "showed that three accidents have occurred during approaches to Runway 6, and that one other accident (in addition to Action Air 990) occurred upon landing roll-out and impact with the original nonfrangible blast fence at the departure end of Runway 6 during instrument meteorological conditions (IMC). Four fatalities occurred during the approach accidents, and no fatalities occurred during the landing roll-out accident."

As a result of its investigation, the NTSB developed 19 findings, which included the following:

- "The landing gear, brakes and tires were in good condition and were functional at touchdown;
- "The airplane was maintained according to [FARs], with the exception of anomalous seat-belt attachment methodology and hardware, and there was no evidence of any systems or [engine] malfunction that might have contributed to the accident;
- "The captain had ILS glideslope data available during the approach but did not fly the ILS glideslope. If he had used the ILS, he would have been better able to assess the touchdown point;
- "The tailwind during descent, approach and landing required a higher descent rate and resulted in a higher groundspeed at touchdown than that required if there had been a headwind or no wind. An alternate runway selection to provide a headwind component for landing would have been preferred;
- "The partial obscuration of the airport environment, due to ground fog, contributed to the captain's failure to recognize that the airplane was high on both his approach to the airport and subsequent landing attempt;
- "The captain continued his attempt to land in the partial

obscuration conditions, although reduced forward visibility restricted his ability to determine the length of runway remaining;

- "The PAPI [precision approach path indicator lights] for Runway 6 would not operate at its highest setting;

- "After the tower closed at 2230, the pilot became responsible for determining the existing visibility and wind conditions at the airport;

- "Both engines were operating at low or idle power at impact with the blast fence;

- "Crash impact forces resulting from N990RA's impact with the blast fence were survivable; however, the immediate postcrash fire created nonsurvivable conditions for occupants who remained in the front of the cabin;

- "FAA interaction and communication with local communities, although persistent, were unsuccessful in gaining support for runway safety area improvements, and for the installation of approach lighting for Runway 6;

- "Two of the four accidents at [BDR] in the past 10 years might have been avoided if approach lighting had been installed and had been operating on Runway 6; [and,]

- "The captain was probably wearing his seat belt at impact, but at least two of the passengers were probably not wearing their seat belts."

As a result of its findings, the NTSB made the following recommendations to the FAA:

- "Inspect all [FARs] Part 139 certificated airports for adequate runway safety areas and nonfrangible objects, such as blast fences, and require that substandard runway safety areas be upgraded to [FAA] Advisory Circular 150/5300-13 minimum standards wherever it is feasible; [and,]

- "Within 90 days, and in coordination with the City of Bridgeport and the Town of Stratford, implement a plan to resolve environmental considerations, and proceed with the installation of an approach lighting system on Runway 6 as soon as possible."

The NTSB also recommended to the Connecticut Department of Transportation, City of Bridgeport, Town of Stratford and Sikorsky Memorial Airport that a highway close to the threshold of Runway 24 be moved to protect vehicles and people from jet blast, that a runway safety area at the approach end of Runway 24 should be established, that the nonfrangible blast fence at the approach end of Runway 24 should be removed, and that the installation of an approach lighting system on Runway 6 should proceed as soon as possible.♦

Editorial note: This article was adapted from *Aircraft Accident Report: Impact with Blast Fence upon Landing Rollout, Action Air Charters Flight 990, Piper PA-31-350, N990RA, Stratford, Connecticut, April 27, 1994*, Report No. NTSB/AAR-94/08, prepared by the U.S. National Transportation Safety Board. The 70-page report includes figures and appendices.

ACCIDENT PREVENTION

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