



# National Transportation Safety Board

Washington, D.C. 20594  
Safety Recommendation

Log 2552 B

---

**Date:** May 16, 1995

**In reply refer to: A-95-53 through -56**

Mr. Seth E. Schofield  
Chairman and Chief Executive Officer  
USAir Group, Inc.  
2345 Crystal Drive, Crystal Park 4  
Arlington, Virginia 22227

---

On July 2, 1994, about 1843 eastern daylight time, a Douglas DC-9-31, N954VJ, operated by USAir, Inc., as flight 1016, collided with trees and a private residence near the Charlotte/Douglas International Airport, Charlotte, North Carolina, shortly after the flightcrew executed a missed approach from the instrument landing system (ILS) approach to runway 18R. The captain, first officer, one flight attendant, and one passenger received minor injuries. Two flight attendants and 14 passengers sustained serious injuries. The remaining 37 passengers received fatal injuries. The airplane was destroyed by impact forces and a postcrash fire. Instrument meteorological conditions prevailed at the time of the accident, and an instrument flight rules flight plan had been filed. Flight 1016 was being conducted under 14 Code of Federal Regulations (CFR) Part 121 as a regularly scheduled passenger flight from Columbia, South Carolina, to Charlotte.<sup>1</sup>

The National Transportation Safety Board has determined that the probable causes of this accident were: 1) the flightcrew's decision to continue an approach into severe convective activity that was conducive to a microburst; 2) the flightcrew's failure to recognize a windshear situation in a timely manner; 3) the

---

<sup>1</sup>For more detailed information, read Aircraft Accident Report -- "Flight Into Terrain During Missed Approach, USAir Flight 1016, DC-9-31, N954VJ, Charlotte/Douglas International Airport, Charlotte, North Carolina, July 2, 1994" (NTSB/AAR-95/03)

6413A

flightcrew's failure to establish and maintain the proper airplane attitude and thrust setting necessary to escape the windshear; and 4) the lack of real-time adverse weather and windshear hazard information dissemination from air traffic control, all of which led to an encounter with and failure to escape from a microburst-induced windshear that was produced by a rapidly developing thunderstorm located at the approach end of runway 18R.

Contributing to the accident were: 1) the lack of air traffic control procedures that would have required the controller to display and issue airport surveillance radar (ASR-9) weather information to the pilots of flight 1016; 2) the Charlotte tower supervisor's failure to properly advise and ensure that all controllers were aware of and reporting the reduction in visibility and the runway visual range value information, and the low level windshear alerts that had occurred in multiple quadrants; 3) the inadequate remedial actions by USAir to ensure adherence to standard operating procedures; and 4) the inadequate software logic in the airplane's windshear warning system that did not provide an alert upon entry into the windshear.

At the Safety Board's public hearing on the accident, USAir's Director of Training testified that the crew resource management (CRM)<sup>2</sup> program trains teams rather than individuals; and that the CRM program encourages crewmembers to use all of the resources at hand, which includes standard operating procedures. However, the Federal Aviation Administration's (FAA's) principal operations inspector for USAir testified that a recognized trend exists at USAir in which pilots do not comply with standard operating procedures.

Check airmen, who were interviewed after the accident, stated that pilots have different methods of accomplishing checklists. The Safety Board notes with concern that in a training department, which promotes and enforces standardization, a lack of standardization apparently exists among company check airmen. One check airman was unaware of a company requirement for flight crewmembers to brief visual approaches, while another one was aware of it.

The Safety Board has long been an advocate of CRM training because its accident investigations have shown that human error is a contributing factor in 60 to 80 percent of all air carrier incidents and accidents.

---

<sup>2</sup>Advisory Circular (AC) 120-51A, Crew Resource Management Training, February 10, 1993.

A study commissioned by the Boeing Commercial Airplane Group examined "crew-caused" accidents and identified the following deficiencies in standardization and discipline in the study group's company-operated aircraft:

A strong check airman program acts as a continuous quality control check on the training department. Standards for check airman candidates exist in writing and the highest level of flight operations management participates in the evaluation and selection process. Methods exist for assuring the uniformity of check pilot techniques and instruction, usually accomplished during periodic (monthly) meetings of all check pilots. There is a special system of recurrent checks for check pilots that is independent of the line pilot recurrent training program. An effort is made to assure the uniformity of checking techniques by correlating reported nonstandard behavior in students to check pilots where possible. (emphasis added)

There is a firm requirement for in-depth takeoff and approach briefings for each segment. This provides the entire crew with knowledge of precisely how the event is to be performed....

The approach briefing is usually done at the top of descent before workload increases. It covers the navigation, communication and procedural details of the approach for the specific runway involved, including missed approach details.

Cockpit procedural language is tightly controlled to maintain consistency and to avoid confusion from nonstandard callouts that can result from crew members using differing phraseology. Callouts and responses are done verbatim. The recurrent training program and check pilot system rigidly enforce this requirement.

The Safety Board believes that the flight crewmembers in this accident were comfortable with each other in the cockpit. However, their actions, especially during the final phase of flight, appeared to be those of individuals rather than members of a team. This was evident from their lack of adherence to sterile cockpit procedures, inadequate checklist responses, and abbreviated, personally stylized or nonstandard briefings. The Safety Board is concerned with the flightcrew's behavior because it suggests that they, as well as other pilots, do not adhere to standard operating procedures during routine and nonroutine phases of flight.

The investigation revealed that at the time of the accident, USAir's windshear training program curriculum was comparable to the industry standards, which are contained in the *Windshear Training Aid*. The flightcrew of flight 1016 had received this training, which covered the necessity of avoiding windshear, and it emphasized cues that would indicate either the possibility of a windshear or an actual encounter. Nonetheless, the Safety Board believes that the flightcrew involved in this accident did not apply the principles of this training adequately during the flight.

The Safety Board believes that the flightcrew was exposed to at least three windshear probability cues, two of which were rated as high. They were the convective weather conditions that existed at the airport; the flightcrew's visual observations and decision to make the missed approach to the right; and the subsequent intracockpit discussions about the location of the rain. Finally, the flightpath that would have resulted from following the prescribed ILS approach procedure offered a strong likelihood of an encounter with microburst windshear activity. The initiation and continuation of the approach under these circumstances was contrary to the provisions of USAir's *Flight Operations Manual*, which states that convective type clouds should be avoided by 5 miles. Therefore, based on the guidance and training provided by USAir to this flightcrew, the Safety Board believes that sufficient microburst windshear cues were presented that should have prompted them to abandon the approach earlier.

There were 52 passengers and 5 crewmembers aboard flight 1016. The passenger manifest listed 50 names, but it did not include the names of two in-lap infants. Federal Aviation Regulations specifically address the issue of passenger manifests. 14 CFR 121.693(e) specifies that the maximum allowable variation in the passenger count for determining weight and balance is 2.

USAir procedures for accounting for in-lap infants require that the gate agent place an "Infant Boarding Pass-Non Assigned Seat" sticker and the remark "Plus Infant" in the name field of the accompanying adult's flight coupon. Neither of the adult flight coupons that were associated with the two in-lap infants included an "infant boarding pass" sticker. Although, one coupon included a handwritten notation "+ infant," the second coupon did not do so; thus, the infant was not included on the passenger manifest. The FAA also issued Action Notice 8340.29 and Air Carrier Operations Bulletin No. 8-91-2 to reaffirm that every occupant, who is not a crewmember with assigned duties, must be listed on the passenger manifest.

Because a number of previous accident investigations identified inaccuracies in passenger manifests, the Safety Board issued Safety Recommendations A-79-65 and A-90-105 asking the FAA to require air carriers to standardize the reporting of passengers on manifests. As a result, the FAA established rules requiring an accurate listing of occupants (14 CFR 121.693(e)) on manifests. The Safety Board classified both of these recommendations "Closed--Acceptable Action."

Although USAir has procedures for accounting for in-lap infants, these procedures are not consistently followed. Therefore, the Safety Board believes that USAir should review its procedures to ensure that manifests reflect an accurate count of airplane occupants.

Therefore, as a result of its investigation of this accident, the National Transportation Safety Board recommends that USAir:

Conduct periodic check airmen training and flight check reviews to ensure standardization among check airmen with regard to complying with USAir's operating procedures. (Class II, Priority Action) (A-95-53)

Reemphasize the necessity for flightcrews to achieve and maintain diligence in the use of all applicable checklists and operating procedures. (Class II, Priority Action) (A-95-54)

Reemphasize in pilot training and flight checking the cues available for identifying convective activity and recognizing associated microburst windshears; and provide additional guidance to pilots on operational (initiation and continuation of flight) decisions involving flight into terminal areas where convective activity is present. (Class II, Priority Action) (A-95-55)

Review company procedures regarding passenger counts on manifests to ensure their accuracy and accountability of all occupants on the airplane. (Class II Priority Action) (A-95-56)

Also, the Safety Board issued Safety Recommendations A-95-40 through A-95-51 to the Federal Aviation Administration, and A-95-52 to the National Weather Service.

The National Transportation Safety Board is an independent federal agency with the statutory responsibility "...to promote transportation safety by conducting independent accident investigations and by formulating safety improvement recommendations" (Public Law 93-633). The Safety Board is vitally interested in any actions taken as a result of its safety recommendations and would appreciate a response from you regarding action taken or contemplated with respect to the recommendations in this letter. Please refer to Safety Recommendations A-95-53 through A-95-56 in your reply.

Chairman HALL, Vice Chairman FRANCIS, and Member HAMMERSCHMIDT concurred in these recommendations.

By:   
Jim Hall  
Chairman