



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: February 28, 1994

In reply refer to: A-94-24 through -
31

Honorable David R. Hinson
Administrator
Federal Aviation Administration
Washington, D.C. 20591

On April 14, 1993, about 0659:43 central daylight time, American Airlines flight 102 (AAL102), a McDonnell Douglas DC-10-30, departed runway 17 left, following landing at Dallas/Fort Worth International Airport, Texas, after a nonstop, overnight flight from Honolulu International Airport, Hawaii. It was raining at the time of the landing, and there were numerous thunderstorms in the area. There were 189 passengers, 3 flightcrew members and 10 cabincrew members aboard the airplane. Two passengers received serious injuries, and 35 passengers, 1 flightcrew member, and 2 cabincrew members received minor injuries during the evacuation of the airplane. The airplane sustained substantial damage.¹

The National Transportation Safety Board has determined that the probable cause of the accident was the failure of the captain to use proper directional control techniques to maintain the airplane on the runway.

Like many airlines, AAL's recordkeeping system maintains the training

¹For more detailed information, read Aircraft Accident Report--"Runway Departure Following Landing, American Airlines Flight 102, McDonnell Douglas DC-10-30, N139AA, Dallas/Fort Worth International Airport, Texas, April 14, 1993" (NTSB/AAR-94/01)

6109B

files of its flightcrew in a composite format. The system does not retain performance information generated during actual training, such as examination scores, and simulator instructor performance evaluations and comments. The investigation revealed that these original records were routinely disposed of for pilots who have successfully completed training but that their record of satisfactory completion was entered into the system. Federal Aviation Regulations (FAR) Part 121.683 states, in part, "Maintain current records of each crewmember...." The FAR does not specify which training records are to be maintained, does not define "training" records, and does not specify that training performance data should be maintained. Other than the record of training taken and its satisfactory completion, no records of previous training performance for the accident flightcrew were available to Safety Board investigators. In addition, the records were inadequate to use for trend analysis or for evaluating an individual's performance during training.

The air traffic control (ATC) system was not a factor in this accident; however, because of procedural shortcomings, windshear advisory information was not provided to the flightcrew in a timely manner.² At 0656:36, the flightcrew of AAL102 made initial contact with the local controller. A windshear alert had occurred at 0653:25, but the controller did not issue an advisory in accordance with the ATC handbook. It states that after the last windshear alert, a windshear advisory will be issued to all pilots for 20 minutes by either an automatic terminal information service (ATIS) message or, at facilities without ATIS, by a controller. In this case, the ATIS broadcast containing the windshear advisory was not broadcast until after the accident. Although windshear was not a factor in this accident, the rapidly changing weather conditions at the airport might have been more apparent to the flightcrew of AAL102 if a timely windshear advisory had been made.

Despite the availability of an ATIS, the information may not be immediately available because of the time required to record and review the revised ATIS broadcast. Even if a recording were broadcast in a timely manner, pilots would not normally monitor the ATIS while they were on final approach because of

²When an approach change, such as requested by AAL102, occurs at DFW, airport operations, arrivals, and departures, must be stopped at such nearby airports as Dallas Love Field, NAS Dallas, Addison Field, and Meacham Field. Their proximity to DFW and the overall airspace configuration makes it operationally impractical to allow an opposite direction approach each time it is requested. Additionally, the DFW air traffic control facility has a local order which states that unless an emergency condition exists, opposite direction approaches will not be conducted.

the high workload. Because pilots rely on controllers to issue pertinent and timely weather information, such as windshear alerts, the Safety Board believes that the ATC handbook should be amended to require controllers to continue broadcasting windshear advisories until they are assured that the information has been recorded and is being broadcast on the ATIS, and pilots have had time to receive the information.

There is no current requirement for tower controllers to continually display or relay information from low-level windshear alert system (LLWAS) wind sensors other than from the one located at the centerfield. In the tower cab, centerfield wind information is always displayed because of the requirement for controllers to issue the wind direction and speed from this sensor. Wind information from the LLWAS wind sensors is displayed only when a windshear alert condition exists or if the controller selects a particular sensor for displaying its information.

During the approach of AAL102, when the controller issued "wind calm" in the clearance to land at 0656:39, the west wind sensor indicated 270 degrees at 16 knots. The difference in the west wind sensor and the network mean wind was not enough to trigger a windshear alert. However, this information would have been important to the flightcrew because it indicated the highly variable nature of the wind at the airport. If the flightcrew had had this additional information, it could have assisted them in deciding to land or to execute a missed approach. Although the lack of wind information from the west sensor is not considered a contributing factor in this accident, the Safety Board believes that providing such wind sensor information to flightcrews would be a safety improvement in the ATC system.

Another area of concern to the Safety Board is the fact that in this accident, the emergency lighting did not operate properly because the emergency overhead lighting system battery packs were out of sequence. This condition resulted in enough electrical power to indicate on the flight engineer's console that the system was fully charged, but the power was insufficient to operate the overhead emergency lighting for a specified 5 minutes. In addition, the manufacturer's instructions did not describe specific maintenance instructions and recommended care practices, such as the importance of properly sequencing the batteries in each pack.

The investigation revealed that the surface texture of the landing runway, 17L-35R, had deteriorated as a result of high levels of jet traffic and

weather-related erosion. Federal Aviation Administration (FAA) guidance, as stated in Advisory Circular (AC) 150/5320-12B, addresses runway wear. By definition, "maintenance planning" for this runway was called for, and the friction levels of the majority of the runway fell within acceptable levels for airplane operations. However, a buildup of rubber that was found at the approach end of 17L showed a coefficient of friction below the FAA minimum standards. According to airport records for the past 3 years, rubber removal was conducted at 4- and 8-month intervals. There was an average of 261 landings on 17L each day. FAA guidance suggests a rubber removal frequency every 2 months for runways with a frequency of turbojet landings of more than 210 per day. Although this buildup did not contribute to the loss of directional control on the runway, the Safety Board believes that Dallas/Fort Worth International Airport should monitor the runways more frequently and remove the rubber buildup on all runways, as necessary, in accordance with the directive.

Although the FAA provides AC guidance for runway friction measurement and runway maintenance, there is no formal requirement for FAA oversight of airports regularly performing friction measurements. In addition, there are no formal requirements for the FAA to regularly inspect certificated airports to ensure that they have adequate friction measurement or rubber removal programs.

Since 1973, the Safety Board has issued 19 safety recommendations concerning runway friction and friction measurement. As a result of the Safety Board's continued concern over this issue, on December 12, 1992, the FAA advised that it had revised AC 150/5320-12B to include guidance and procedures for the design and construction of skid-resistant pavement, pavement evaluation with or without friction equipment, and maintenance and high skid-resistant pavements. However, as a result of the investigation of this accident, the Safety Board believes that the FAA should take a more assertive role in overseeing airport runway friction measurement programs. Therefore, the Safety Board believes that FAA airport safety and certification inspectors should have the responsibility for ensuring that airports certificated under 14 Code of Federal Regulations (CFR), Part 139, establish and maintain programs for measuring coefficient of friction levels to an acceptable standard above that of "maintenance planning" on runways handling air carrier operations. In addition, FAA airport certification and safety inspectors should be required to review airport certification manuals to ensure that friction measurement programs are established and continued. Moreover, these FAA inspectors should be provided with the training and resources necessary to conduct friction measurement checks.

The Safety Board is also aware that because of budgetary constraints, airport inspection resources are limited and workloads are heavy. Nonetheless, a number of aviation safety workforce positions, such as air traffic controllers, flight standards inspectors, and flight service staff are categorized in special emphasis workforce positions, which provide for minimum staffing levels and hiring priorities to ensure that safety is not compromised. The Safety Board believes that airport certification and safety inspectors are also critical to aviation safety, and that the FAA should provide special emphasis status to such positions.

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

Review the pilot training recordkeeping systems of airlines operated under FAR Parts 121 and 135 to determine the quality of information contained therein, and require the airlines to maintain appropriate information on the quality of pilot performance in training and checking programs. (Class II, Priority Action)
(A-94-24)

Amend the ATC handbook, 7110.65, Chapter 3, "Airport Traffic Control - Terminal," Section 1, General: paragraph 3-8, "Low Level Windshear Advisories," to state that tower controllers should issue the LLWAS advisory, "Low Level Windshear Advisories in Effect," whether or not the facility is equipped with an ATIS. The advisory should continue to be transmitted by ATC, relative to all runways in operation at the airport, until either the information is confirmed to be on the ATIS, or the prescribed 20-minute time limit from the time of the alert has expired. (Class II, Priority Action)
(A-94-25)

Revise ATC handbook, 7110.65, Chapter 3, "Airport Traffic Control - Terminal," Section 1, General: paragraph 3-8, "Low Level Windshear Advisories," to require controllers to select for display all sensors on the LLWAS when adverse weather conditions, such as thunderstorms, are forecast or present in the terminal area to improve controller and pilot perception of wind conditions affecting the entire airport. (Class II, Priority Action)
(A-94-26)

Require the manufacturers of rechargeable batteries to provide specific maintenance instructions and recommended care practices. (Class II, Priority Action) (A-94-27)

Issue an advisory circular that provides proper maintenance instructions to aviation battery maintenance and repair facilities. (Class II, Priority Action) (A-94-28)

Require all 14 CFR Part 139 airports to perform runway friction tests regularly. (Class II, Priority Action) (A-94-29)

Provide FAA certification and safety inspectors with the training and resources necessary to oversee airport runway friction measurement programs. (Class II, Priority Action) (A-93-30)

Place airport certification and safety inspectors on the special emphasis workforce list. (Class II, Priority Action) (A-94-31)

Also, as a result of its investigation of this accident, the Safety Board issued Safety Recommendations A-94-32 to Dallas/Fort Worth International Airport and A-94-33 and -34 to American Airlines, Inc.

Chairman VOGT, Vice Chairman COUGHLIN, and Members LAUBER, HAMMERSCHMIDT, and HALL concurred in these recommendations.

Carl W. Vogt
By: Carl W. Vogt
Chairman