NATIONAL TRANSPORTATION SAFETY BOARD
Washington, D.C. 20594

DCA-94-MA-065
OPERATIONS GROUP CHAIRMAN'S
FACTUAL REPORT

Renee M. Mills
Operations Group Chairman

Operations Group Chairman's Factual Report
DCA-94-MA-065

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USAir DC-9 Pilot's Handbook = DC-9 PH
USAir Flight Operations Manual = FOM
Flight Operations Training Manual = FOTM

NATIONAL TRANSPORTATION SAFETY BOARD
OFFICE OF AVIATION SAFETY (AS-30)
Washington, D.C. 20594

August 23, 1994

OPERATIONS GROUP CHAIRMAN'S
FACTUAL REPORT

A. ACCIDENT

Airline: USAir Flight 1016
Airplane: N954VJ, DC-9-31
Date: July 2, 1994, 1842:25
Location: Charlotte/Douglas International, Charlotte, NC
NTSB No.: DCA-94-MA065

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C. SUMMARY

On July 2, 1994, about 1843 eastern daylight time (EDT), a Douglas DC-9-31, N954VJ, owned by USAir, Inc. and operated as USAir Flight 1016, collided with trees and a private residence while executing a missed approach to runway 18R at Charlotte/Douglas International, Charlotte, North Carolina. The captain and one flight attendant received minor injuries; the first officer, two flight attendants and 18 passengers sustained serious injuries; and 37 passengers received fatal injuries. The airplane was destroyed

by impact forces and a post-accident fire. Instrument meteorological conditions prevailed, and an instrument flight rules (IFR) flight plan had been filed. Flight 1016 was being conducted under 14 Code of Federal Regulations (CFR), Part 121, as a domestic, scheduled passenger service flight from Columbia, South Carolina, to Charlotte.

D. DETAILS OF THE INVESTIGATION

The GO-TEAM arrived at Charlotte (CLT) at about 12:30 am on July 3. The Operations group formed at 9:00 a.m. FAA member Green joined late that afternoon and Douglas member Tansley joined the following day. The group broke up on July 8, to reconvene in Pittsburgh (PIT).

The field phase of the investigation continued in Pittsburgh on July 12. FAA group member Green was replaced by Jeff Rich. Douglas member Tansley was replaced by Captain Dineen. Member Schuetz was released on July 13, 1994.

E. HISTORY OF FLIGHT

The following history of flight is a compilation of the pilots statements and information gained during interview of the flight crew.

The morning of the accident, the captain drove from his home to Dayton Cox International Airport (DAY), Dayton, Ohio, and caught a 6:45 a.m. flight to PIT, which arrived at about 7:45 a.m. The first officer arrived in PIT at about 9:30 a.m., returning from a three day trip where his last overnight was in St. Louis. Their report for duty time was 9:45 a.m. and scheduled departure time to La Guardia (LGA) was 10:45 a.m.

The captain and first officer had never flown together before. They met for the first time at the aircraft in PIT. The crew was scheduled to depart PIT at 10:45 a.m. and arrive at La Guardia (LGA) at 11:59 a.m., to depart LGA at 12:50 p.m. and arrive CLT at 2:40 p.m., to depart CLT at 4:50 p.m. and arrive Columbia, SC (CAE) at 5:29 p.m., to depart CAE at 6:10 p.m. and arrive at CLT 6:52 p.m. Thereafter, they were scheduled to depart CLT at 7:40 p.m. and arrive in Memphis (MEM) at 9:13 p.m. to spend the night. Flight 1016 was flying from CAE to CLT when the accident occurred while the first officer was acting in the capacity of the flying pilot. The accident occurred on the fourth flight of the first day of a three day trip.

The flight planned route was to depart CAE, fly the CAE VOR 314° radial to intercept the CLT 232° radial to UNARM intersection, and join the UNARM1 standard terminal arrival route (STAR) to CLT.

The estimated time in route was 23 minutes. The ACARS message showed that the aircraft blocked out of the gate on schedule at 6:10 p.m. and was airborne at 6:23 p.m. The alternate airport listed on the flight plan was Tri-City Regional (TRI), Bristol, TN.

The crew got the flight release weather information and determined that the weather was forecast to be the same as it had been on their flight to CAE. The cruise to CLT was planned at 12,000 feet, but they flew it at 10,000 feet as assigned by ATC. They said they saw no significant weather enroute, although they did avoid some buildups. About 30 miles from CLT, they said that they performed their preliminary checklist, briefed for a visual approach, and obtained the CLT Automatic Terminal Information System (ATIS) weather. The captain said that the ATIS was calling for a broken ceiling of 4,500 and 5,500 feet, that it was hazy and hot, and visual approaches were in progress.

They began their descent profile and were vectored on the west side of the airport for the downwind leg of an approach pattern to 18R. While south, southwest of the airport they noticed two cells, one south of CLT and a very small one east of the airport that they considered to be of no factor to the flight. The airborne weather radar showed the cell to the south as red in the center with yellow around. They said there was nothing to either side and it did not look threatening.

As they joined the localizer, the captain and first officer discussed the cell south of the airport. They decided that if they had to execute a go-around, they would turn right rather than fly straight ahead as was called for on the published missed approach procedure, so as to avoid the cell. They turned onto base leg and said that they were cleared for a visual approach. They turned onto the final approach course and could see the airport and the runway environment. They maintained a speed of V_{REF} + 10 knots. The first officer was hand flying the airplane by reference to the instruments, while the captain was looking outside. The captain was also checking the radar and he could see the cell south of the airport. The captain's navigational radio was tuned to the CLT VOR for Distance Measuring information.

On the final approach path about 9 miles from the airport, the TCAS made them aware that there were two aircraft ahead of them but they did not actually recall seeing them. As they passed the outer marker, they completed the final checklist and set the flaps to 40°. They could see a rain shower trailing from the clouds between their aircraft and the runway, but they could still see through it. The captain asked for a wind check and learned that the wind had changed direction. The captain turned on the windshield wipers. The air was smooth but he requested information on ride reports from the aircraft ahead. The ride reports were smooth.

The ride continued to be smooth, but it began to rain very

heavily. The captain stated that he had not previously experienced rainfall as heavy. He began to consider going around. At 1,200 feet msl the captain commanded a go-around. He said that his decision to go-around was based on the absence of visibility, the intense rain, the information on the winds, and his consideration for landing on a wet runway with a cross wind.

The captain saw the first officer advance the throttles. As a procedural habit the captain voiced the go-around procedure, which is; max power/flaps 15 degrees. The first officer was still hand flying the aircraft. Neither the captain nor the first officer were using the flight director.

The first officer went to maximum power, climbed and turned to the right and brought the nose up to 15° as he made the turn. He called for flaps to be positioned to 15°. They were in heavy rain and he noticed a rapid decrease in airspeed. The captain called for firewall power and the captain's hand went over his on to the throttles to advance them. The first officer could not recall if the engines spooled up and that the entire event happened very quickly.)

Then, both pilots described feeling as though the aircraft had dropped out from under them. The captain said that he took control of the aircraft from the first officer, without announcing that he was doing so. He said this was not a conscious decision but he did so because perceived that the situation was going badly. When asked if the first officer could also have been on the controls, he said that he did not believe so because he did not feel any contrary inputs. The first officer, however, believed that he retained control of the aircraft.

Neither pilot remembered seeing a positive rate of climb on the vertical speed indicator (VSI) and they did not remember raising the landing gear. They could not give a rate of descent but said they saw a trend of a rapid decrease in airspeed.

They recalled the stickshaker activating and the captain said that he checked the yoke to stop the stick shaker. From the airspeed indication, the captain believed that they were experiencing a windshear. He looked out and saw that they were below the tree tops and heard the GPWS aural warning "TERRAIN". The captain said knew that they would hit the trees but he tried to keep the wings level and control the aircraft.

The captain described the initial impact as not too hard. Then he saw the ground and the road. He saw the nose drop and tried to pull on the yoke to keep from impacting in a nose down attitude. Then they experienced an extremely hard impact, another impact, and the airplane stopped.

F. WEIGHT & BALANCE

The flight release showed that aircraft N954VJ was released from CAE with a gross takeoff weight of 86,325 lbs. Fuel on board was 14,000 lbs and was distributed 7,000 lbs in each main tank. The passenger weight was calculated to be 9,000 lbs and the cargo weight 1,575 lbs. The calculated zero fuel weight was 72,325 lbs and maximum zero fuel weight was 87,000 lbs. Maximum takeoff weight was 99,400 lbs. The center of gravity was 25% of mean aerodynamic chord (MAC) and the stabilizer setting was 4.7°.

The planned total fuel burn was 4,100 lbs. The enroute fuel burn caused the center of gravity to move forward 0.5% to an approximate MAC of 24.5%. The estimated aircraft weight at the time of the accident was 82,725 lbs.

G. ILS 18R CHARLOTTE/DOUGLAS INTERNATIONAL

Guidance for ILS procedure to runway 18R at Charlotte, NC, was available to the flight crew as a Jeppesen 11-3 approach plate dated April 24, 1992. The localizer frequency is 111.3 and course is 181°. Field elevation is 749' msl. The initial approach fix is TOMME, located 13.7 nautical miles north of CLT VOR.

The final approach fix is SOPHE, which occurs where the glide slope intercepts 3,000' msl (2,257' AGL) on the localizer. The glide slope angle is 3°. Minimums are runway visual range (RVR) of 2,400 feet or prevailing visibility of ½ mile. Decision height is 943' (200 AGL). In the event of a missed approach, the procedure is to climb to 3,600 feet outbound via the CLT VOR 186° radial and inbound on the Fort Mill (FML) VOR 003° radial to the FML VOR and enter a holding pattern.

H. AIRCRAFT PERFORMANCE

At the gross takeoff weight of 86,325 lbs., the takeoff "V" speeds for flaps 5° on runway 11 at CAE were V_1 131 knots, V_R 133 knots, and V_2 139 knots. Stabilizer trim setting was 4.7°. The exhaust pressure ratio (EPR) setting for an assumed temperature of 113° F was 1.81.

Landing weight was about 82,325 lbs. For purpose of obtaining landing speeds, the weight would have been rounded up to 83,000 lbs. An 83,000 lb landing weight indicated V_{zf} maneuvering speed of 191 knots, flaps 15° 139 knots, flaps 25° 126 knots, and flaps 40° ref 121 knots. Go-around EPR for an elevation of 749" and 88 degrees should have been about 1.90 EPR.

I. AIR CARRIER INFORMATION

USAir is a wholly owned subsidiary of the USAir Group, Inc., a publicly owned corporation whose stock is traded on the New York Stock Exchange. The company was founded by Richard C. Dupont in Delaware in 1929 as an air carrier named All American Aviation. Through the years, the company has undergone a number of mergers. The most recent mergers were with Pacific Southwest Airlines (PSA) of San Diego, CA and Piedmont Airlines of Winston-Salem, NC.

USAir employs over 44,000 persons of whom, more than 6000 are pilots. At the time of the accident, USAir operated 74 DC-9 aircraft. The crew domiciles are Los Angeles, San Francisco, Boston, Philadelphia, Charlotte, Washington, D.C., Baltimore, and Pittsburgh. There are 674 pilots currently flying the DC-9, 403 of whom are domiciled in Pittsburgh.

This accident is the fourth that USAir has experienced over the last five years. In order of occurrence, the previous accidents occurred September 20, 1989, February 1, 1991, and March 22, 1992.[1] They also had an incident on September 8, 1989[2]. The most recent Piedmont accident occurred October 25, 1986[3].

USAir's Quality Assurance Department voluntarily initiated a new section of their department in 1989 to incorporate the intent of FAA advisory circular AC-120-59, Air Carrier Internal Evaluation Program. Since June of 1991, USAir has undergone the following external and internal audits:

1. USAir Quality Assurance, June 1991
2. Department of Defense, June 1992

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[1]National Transportation Safety Board. 1990. USAir, Inc., flight 5050, Flushing, NY, September 20, 1989. Aircraft Accident Report NTSB/AAR-90/03. Washington, D.C.;
National Transportation Safety Board. 1991. USAir, Inc., flight 1493, Los Angeles, CA, February 1, 1991. Aircraft Accident Report NTSB/AAR-91/08. Washington, D.C.;
National Transportation Safety Board. 1993. USAir, Inc., flight 405, Flushing, NY, March 22, 1992. Aircraft Accident Report NTSB/AAR-93/02. Washington, D.C.

[2]National Transportation Safety Board. 1990. USAir, Inc., flight 105, Kansas City, MO, September 8, 1989. Aircraft Incident Report NTSB/AAR-90/04. Washington, D.C.

[3]National Transportation Safety Board. 1987. Piedmont, Inc., flight 467, Charlotte, NC, October 25, 1986. Aircraft Accident Report NTSB/AAR-87/08. Washington, D.C.

3. Phaneuf Associates Internal Audit, June to August 1992
4. National Aviation Safety Inspection Program, March 1993
5. Department of Defense, March 1994

Pilot Training

USAir conducts flight crew training for the eight different types of aircraft that they fly under 14 CFR § 121. This includes the B-727, B-737-200, B-737-300/400, B-757/767, DC-9, MD-80, F-28, and F-100. Training is outlined in USAir's Flight Operations Training Manual (FOTM).

USAir's flight crew training program consists of both ground and flight training. Ground training is accomplished at three locations: PIT, CLT, and Los Angeles, CA (LAX). Basic indoctrination, general emergency and special curriculum training, along with upgrade, recurrent and requalification on the MD-80, DC-9, B-727, B-737-200, B-737-300/400, B-757/767, and F-100 are all accomplished in PIT. The CLT training facility conducts initial equipment, transition, upgrade and recurrent training on the F-28. CLT also conducts recurrent ground training on the B-727, B-737-200, B-737-300/400, B-757/767, and F-100. LAX conducts recurrent ground training on the B-737-300/400.

USAir's flight training is conducted at PIT at their Simulator Center and at the CLT Training Center. The PIT Simulator Center houses the MD-80, DC-9, B-727, B-737-200, B-737-300, B-757, and F-100 simulators. The CLT Training Facility has B-727, B-737-200, B-737-300, B-737-400, and F-28 simulators.

The USAir DC-9 Pilot's Handbook states that their philosophy of flight training is "Train the way you fly, fly the way you train". It further states:

> "The flight training program prepares the student for Airplane Qualification and/or the FAA rating check ride (or equivalent) emphasizing flight safety, passenger comfort, and operational efficiency. If necessary, additional training and/or practice may be given to improve the pilot's proficiency to desired levels. If any pilot is unable to successfully demonstrate the ability to meet the required standards, s/he shall either be removed from schedule, or ***not*** assigned to schedule, whichever is applicable."

The flight training department was described by the PIT chief pilot as a pilot service organization.

Section 9 of the USAir Check Airman Handbook addresses proficiency checks. It states:

> A summary of the FAA Inspectors Handbook regarding type ratings is provided in the Appendix of this manual. This

section of the handbook outlines guidelines for conducting FAA Certification of Type Ratings. There are some differences between a type rating and proficiency check, but they are still very similar. Therefore, the type rating summary should be used as a guideline for conducting a check. This document provides philosophical comments, required maneuvers, and performance parameters among other things and amplifies the FAR and USAir guidelines.

There are no minimum time requirements for a proficiency check except that all required maneuvers must be completed. It should be emphasized that the only way training can be conducted during a proficiency check is to stop the check, do the training required, and then restart the check. Unless the check is stopped in this manner, the check airman must not become involved with training during the session.

Appendix 1 of the USAir Check Airman Handbook is a summary of guidelines for airmen certification. This section outlines the guidelines for the administration of Airline Transport Pilot Certificates. Standard airline transport pilot practical test standards are listed herein. The USAir Check Airman Handbook does not address standards for the administration of recurrent training, proficiency checks, or line checks.

Training Records

The USAir pilot training records are maintained with a computerized system which received final FAA approval December 4, 1987. The company operations specifications require the retention of source documents of all training completed for a minimum of 30 days.

Section 11 of the USAir Check Airman Handbook addresses documentation for type ratings and proficiency checks in the simulator. It states:

- If a maneuver/procedure must be repeated before it is graded (S), this must be noted in REMARKS section, i.e., TAKEOFFS, (Rejected) was repeated.

The computerized record has fields for pilot identification, ratings, type training, position, training hours, training dates, and remarks. The Air Transportation Inspector's Handbook, FAA Order 8400.10, Volume 3, Section 4, addresses Computer-Based Recordkeeping. It does not address record content. However, Volume 3, paragraph 545B, Conduct of Proficiency and Competency Checks, states:

B. Training to Proficiency. When a check airman determines that an event is unsatisfactory, the check airman may conduct training and repeat the testing of that event. This provision

has been made in the interest of fairness and to avoid undue hardship and expense for airmen and operators. Training may not be conducted, however, without recording the failure of these events. The quality control of a training program is accomplished, among other means, by identifying those events on checks which crewmembers fail. POI's shall ensure the following guidance is supplied to operators and check airmen concerning the practice of training to proficiency:

(1) Training and checking cannot be conducted simultaneously. When training is required, the check must be temporarily suspended, training conducted, and then the check resumed.

(2) When training to proficiency is required, the check airman must record the events which were initially failed and in which training was given. (emphasis added)

The FAA Aircrew Program Manager (APM) indicated that he was not familiar with this requirement and that this is not accomplished in USAir pilot training records.

In Volume 6, paragraph 255 Objectives of Proficiency and Competency Check Inspections, the Handbook further states:

(g) Effectiveness of an Operator's Trend Analysis, Standardization, and Quality Control Program. Operators should collect, record, and analyze the results from proficiency and competency checks to detect and correct deficiencies in training programs, procedures, and checklists. POI's shall encourage operators with more than 10 crewmembers in any duty position to establish trend analysis. POI's shall evaluate the effectiveness of these programs....

USAir flight operations management began to perform trend analysis on flight crew performance in February 1994. The DC-9 trend program did not begin until June of 1994. However, the information entered into the system is "sterilized"; disassociated with the airman's record. The methodology of the trend program is not in the USAir Check Airman Handbook but was issued to check airmen as an interoffice memorandum.

Training v Checking

Under USAir's FAA approved program, captains are required to have within the preceding 12 months, a proficiency check and, in addition, within the preceding 6 months, either a proficiency check or simulator training for each airplane type. First Officers are required to have within the preceding 24 months, a proficiency check and, in addition, within the preceding 12 months, either a proficiency check or simulator training for each airplane type. First officers may be called in more frequently to crew LOFT

training for captains.

14 CFR § 121.409 Training courses using airplane simulators and other training devices provides for simulator training in lieu of proficiency check conducted under 14 CFR § 121.441. This may be accomplished if that course:

> (1) Provides at least 4 hours of training at the pilot controls of an airplane simulator as well as a proper briefing before and after the training:
>
> (2) Provides training in at least the procedures and maneuvers set forth in appendix F to this part [§121]; or
>
> (3) Provides line-oriented training that -
> (i) Utilizes a complete flight crew;
> (ii) Includes at least the maneuvers and procedures (abnormal and emergency) that may be expected in line operations'
> (iii) Is representative of the flight segment appropriate to the operations being conducted by the certificate holder; ...

The Safety Board examined advisory circular AC 120-35B Line Operational Simulations. The purpose of this advisory circular is to present guidelines for the design and implementation of Line Operational Simulations, including Line-Oriented Flight Training (LOFT), Special Purpose Operational Training, and Line Operational Flight Evaluation.

In the mid-1970's, the concept of LOFT was introduced as a form of simulator training for a complete crew. LOFT was later allowed to be substituted for alternate proficiency checks under recurrent training programs. The advisory circular provides the following definition.

> Recurrent LOFT An approved flight simulator course of LOFT which may be used to meet recurrent flight training requirements and to substitute for alternate proficiency checks. Recurrent LOFT meets the requirements of FAR §121.409 as allowed under FAR § 121.441(a).

The advisory circular further states:

> APPROVAL OF SCENARIOS. Scenarios will be approved by the FAA. When submitting LOFT scenarios for approval, operators should state what training objectives are expected to be attained through completion of the LOFT. Operators may elect to submit specific LOFT scenarios or a description of a system which uses a menu of different flight situations and environmental conditions which can be selected randomly to construct a variety of LOFT scenarios. In any case, scenarios which

comply with the elements provided in this AC and meet the operator's stated training objectives may be approved. When updated, scenarios should conform to the same guidelines that apply to original approval.

During the course of the investigation, USAir provided the Safety Board with LOFT scenarios 101, 102, 103, and 104 dated July 13, 1991 and scenarios 513 and 902 are dated February 2, 1994. LOFT scenarios 513 and 902 have a cover sheet that identifies them as recurrent and indicates that they are intended to be run together as one LOFT. None of these individual LOFT scenarios exhibits indication of FAA approval but a USAir representative indicated that they had blanket approval. He further indicated that LOFT scenarios 101, 102, 103, and 104 were certification LOFTs administered after type rating during transition training.

USAir's FAA approved training program FOTM page 2-2-28 dated May 1, 1993, has a table that "lists the control number of each LOFT scenario for each aircraft type". It lists the DC-9 scenarios as control number "DC-9-1" for LOFT conducted initial, transition, or upgrade training and "DC-9-1R" for recurrent. A FAA representative from AAI-100 stated: "The USAir DC-9 program has two approved LOFT scenarios. One LOFT scenario is conducted at the end of initial or transition upgrade training; the other scenario is conducted during recurrent training."

The Safety Board determined that USAir conducts pilot certification from at least four LOFT scenarios while the FAA personnel charged with oversight responsibility believe that USAir uses one LOFT. While it appears that there may be only one recurrent LOFT scenario, there is no indication that it is the approved "DC-9-1R".

The Safety Board further determined that the USAir Check Airman Handbook does not provide check airmen or instructors with procedures for conduct of Recurrent Training LOFT.

Missed Approach

Appendix F to Part § 121 - Proficiency Check Requirements lists the maneuvers and procedures required by §121.441 pilot proficiency checks. It states:

> III (e) Missed approach
> (1) Each pilot must perform at least one missed approach from an ILS approach
> (2) Each pilot in command must perform at least one additional missed approach.
> A complete approved missed approach procedure must be accomplished at least once....

The FOTM Recurrent LOFT Module lists "Missed Approach" (FOTM

2-4-113). The recurrent LOFT 513/902 contains missed approaches. The Safety Board was not able to find guidance provided to check airmen that prevented them from administering LOFT scenarios 101, 102, 103, or 104 as recurrent LOFTs. These do not contain missed approaches.

Windshear Training

Windshear is taught by USAir in basic indoctrination, initial, and recurrent ground school. Windshear simulator training is given during initial, upgrade, transition, and recurrent flight training. Therefore, it is possible that a first officer may only fly a windshear simulation once each 24 months. (FOTM 1-7-125, 126)

Section 9 of the USAir Check Airman Handbook addresses Proficiency Training. It states:

> Proficiency training is similar to a proficiency check in appearance....Some additional procedures such as windshear recovery are practiced during this period.

The current FAA approved windshear scenario in use in the PIT DC-9 simulator is a shear at 100 feet departing CLT. The FOTM Recurrent Loft Module lists "Wind Shear Demonstration" (FOTM 2-4-113). The recurrent LOFT 513/902 contains this windshear but did not list the weather conditions to be given by the instructor in the time frame of the shear. The Safety Board was not able to find guidance provided to check airmen that prevented them from administering LOFT scenarios 101, 102, 103, or 104 as recurrent LOFTs. These do not contain windshear.

The USAir Check Airman Handbook indicates that windshear training must be completed on all Proficiency Training sessions and all Proficiency Checks administered in place of proficiency training. There is no Check Airman Handbook guidance for conduct of recurrent training LOFT, consequently, that document has no direction to train windshear on a recurrent training LOFT.

CRM Training

USAir teaches CRM in both indoctrination (8 hours) and recurrent (1 hour) ground schools. CRM flight training is conducted in conjunction with each pilot's recurrent LOFT flight training. The session is video taped to allow the crewmembers to view their performance. (FOTM 1-7-127, 128)

In December 1992, USAir developed and implemented a two day, 14 hour course specifically for check airmen/instructors. This course was developed in conjunction with NASA/UT. NASA and USAir have developed evaluation surveys that are an on going part of the recurrent LOFT.

Radar Training

Airborne weather radar is listed as a subject in the USAir DC-9 PIC/SIC initial/transition ground school. (FOTM 2-4-91) The Director of Flight Training indicated that this training was a video taped presentation.

J. Guidance Provided to USAir Pilots

The following guidance is provided to USAir pilots. Guidance concerning airborne weather radar and severe precipitation have been made attachments to this report.

Approach Briefing

The Flight Operations section of the USAir Flight Operations Manual page 4-30-2, contains the following guidance concerning approach briefing.

> An approach briefing shall be completed prior to each approach and landing. The approach briefing shall consist of the following items, except when conducting visual approaches:
>
> 1. Name of Approach
>
> 2. Inbound Course & Frequency
>
> 3. FAF Altitude
>
> 4. Minimums/Missed Approach Point (if applicable)
>
> 5. Initial Altitude and Heading of missed Approach (if applicable)
>
> When conducting visual approaches, the following items are required to be briefed:
>
> 1. Runway of intended landing
>
> 2. Inbound Course and Frequency
>
> Additionally, the following shall be briefed for all approaches (if applicable). Special considerations such as but not limited to:
>
> 1. Airport Advisory Page Information
>
> 2. Braking Action
>
> 3. Windshear

ILS Approach Procedures

The training section of the USAir DC-9 Pilot Handbook, page 18-31-1, provides the following guidance.

GENERAL

The appropriate ILS frequency should be selected well in advance of its intended use. Monitor for station identification and normal operation, checking the flag alarm system as well as other indications. All other instruments and cockpit components which are to be used during the approach should be checked and set.

The appropriate approach plate should be referred to and all applicable supplementary aids tuned and identified. Outbound, procedure turn, and inbound headings and altitudes should be studied. The appropriate minimums and missed approach procedure should be noted.

Prior to starting the approach, the PRELIMINARY LANDING checklist shall be accomplished and the airplane slowed to approach speed as outlined in this handbook. This will enable the flight crew to give undivided attention to tracking the localizer and glide path during the descent.

On being cleared for a descent or an approach (or outbound), the wing flaps should be positioned to 15°/EXT (15° maneuver speed target). Aircraft maneuvering to the final approach course will vary according to whether radar vectors, check pilot vectors, or the trainee's own navigation is being used. Normally, the aircraft should intercept the final course at least five miles from the outermarker so that the correct inbound heading can be established by the time the outermarker is passed. Proper interception of the localizer and glideslope simplify and increase the accuracy of the ILS approach.

When the glideslope becomes active and no later than 1½ dots, lower the gear. At approximately ½ dot below the glideslope, flaps 25°. At final fix inbound, flaps 40°/50°. In VFR conditions, 40°/50° flap extension may be delayed no lower than 1,000 feet AGL. Complete the LANDING checklist.

NORMAL TWO-ENGINE ILS APPROACH & LANDING, page 18-31-1

Establish V_{REF} plus 5 knots plus wind additives as necessary. Stabilize final approach speed by 800-500 feet above field elevation on a straight-in approach. Monitor speed and rate of sink closely. Regardless of whether approach is being made with raw information, the integrated instrument system, or the autopilot coupler, the localizer needle and glideslope pointer

are the main indicators to be monitored. These are the end result; other instruments and aids are only a means of obtaining this result. All instruments and indications must be continually cross-checked.

Category I & II Approaches

CATEGORY I and II APPROACHES, page 18-31-3

USAir predicates CATEGORY I approaches on the use of dual flight directors or a single flight director and the approach coupler...

Flight Director Approach

FLIGHT DIRECTOR APPROACH,
Flight Operations Manual, page 4-30-3

During a flight director approach, consistent with MEL, enroute, and approach requirements, (such as checking intersections, etc.), both sets of instruments should normally be utilized in identical modes and with the same course, heading, radio, and other associated data fed in. This provides continuous cross-check capabilities which should be utilized to the extent possible throughout the approach....

Missed Approach

The following procedure was taken from a normal two-engine ILS approach and landing diagram in Training section of the USAir DC-9 Pilot's Handbook, page 18-31-3.

MISSED APPROACH
- Maximum power
- Flaps 15°/EXT
- Maximum 15° nose-up
- Rotate towards V_2
- Gear up with positive rate of climb.
- Spoilers disarmed.
- Clean up as in normal climb
- AFTER TAKEOFF checklist

Weather Radar

The Adverse Weather section of the USAir DC-9 Pilot's Handbook, page 3-41-3, held the following excerpt. A larger portion of this section is contained the in attachment to this report.

- Provide reasonable clearance around rain areas by selecting a heading which will clear storm cells by:

  - 5 miles when OAT is above freezing
  - 10 miles when OAT is below freezing
  - 20 miles when at or above 25,000 feet

- Prior to commencing descent from cruise altitude in aircraft equipped with Collins WXR-700X radar, select desired range and adjust antenna tilt to 0°. During the descent, adjust the tilt up so the following schedule is met:

  - 30,000 feet - 1°
  - 20,000 - 1° up
  - 10,000 feet - 2° up

Use the schedule as a guide to keep the scope relatively free from ground clutter. In mountainous terrain, more tilt may be required.

The Safety Board obtained a copy of the Collins WXR-700X Weather Radar System Pilot's Guide, which is attached to this report. It states:

> Flight operations below 10,000 feet, such as takeoffs and landings, require a tilt setting of 2 to 3 degrees upward tilt. This will provide target detection up to 40 nmi, without excessive ground returns and eliminate frequent tilt adjustment. The tilt setting should be changed to optimize any targets that are encountered.
>
> If there is significant weather activity, the tilt angle should be adjusted to provide a solid ground return outside the desired range to ensure that no overscanning will occur.
>
> For example, if operating at a 40-nmi range, a solid ground return between 35 and 40 nmi ensures targets inside 35 nmi will be detected. The WXR-700X flat plate antenna has small side lobes capable of providing returns from a target. If tilt settings below 4 degrees are used at takeoff, some ground return will be detected until a ground separation of 5000 feet is reached. The side lobe returns disappear at separations greater than 5000 feet.

Windshear Guidance

USAir The Training section of the USAir DC-9 Pilot's Handbook, page 18-26-1, provides that following guidance on windshear recovery technique.

> Windshear recognition is crucial to making a timely recovery decision. The recommended recovery procedure shall be

initiated any time the flight path is threatened below 1,000 feet AGL on takeoff or approach or when a "windshear" or "pull up" warning occurs. The windshear lights on the panel can aid in early detection of windshear of windshear on airplanes so equipped.

NOTE: The following flight procedures must be adhered to when an alert by the windshear detection system is actuated:

An aural windshear warning in conjunction with the flashing red warning lamp will require a go-around except in the situation when at the pilots' discretion it would be safer to complete the landing; i.e., warning activated close to runway with flare started and throttles closed.

A flashing amber caution (increasing performance) or steady amber caution (temperature lapse rate) should alert the pilot to the possibility of windshear and should be prepared to execute a G/A if a flashing red warning should occur.

The guidelines for unacceptable flight path ***degradation*** are repeated below:

- TAKEOFF/APPROACH
  - ± 15 knots indicated ***airspeed***
  - ± 500 FPM ***vertical speed***
  - ± 5° ***pitch attitude***
- APPROACH
  - ± 1 dot ***glideslope displacement***
  - Unusual ***throttle position*** for a significant period of time.

Again these should be considered as guidelines since exact criteria cannot be established. In every case, it is the responsibility of the pilot flying to assess the situation and use sound judgement in determining the safest course of action. In certain instances where significant rates of change occur, it may be necessary to initiate recovery before any of the above are exceeded.

If windshear is inadvertently encountered after lift-off or during approach, immediately initiate the recommended recovery technique. If on approach, do not attempt to land. However, if on approach and an increasing performance shear is

encountered, a normal go-around, rather than the recovery maneuver, may be accomplished.

The technique for recovery from a windshear encounter alter lift-off or during approach is the same for both cases. This technique is described as follows:

- THRUST

Aggressively apply necessary thrust (FIREWALL POWER) to ensure adequate airplane performance. Disengage the autothrottle if necessary. When airplane safety has been ensured, adjust thrust to maintain engine parameters within specified limits.

- PITCH

The pitch control technique for recovery from a windshear encounter after lift-off or on approach is as follows:

- At a normal pitch rate, increase or decrease pitch attitude as necessary toward an initial target attitude of 15°. The autopilot/flight director should be turned OFF, unless specifically designed for operations in windshear. If the airplane is equipped with windshear guidance similar to the manually flown maneuver.

- Always respect stickshaker. Use intermittent stickshaker as the upper pitch limit. In a severe shear, stickshaker may occur below 15° pitch attitude.

CAUTION: Continued operation at stickshaker speeds may result in a stalled condition.

- If attitude has been limited to less than 15° to stop stickshaker, increase attitude toward 15° as soon as stickshaker stops.

- If vertical flight path or altitude loss is still unacceptable after reaching 15°; further increase pitch attitude smoothly in small increments.

- Control pitch in a smooth, steady manner (in approximately 2° increments) to avoid excessive overshoot/undershoot of desired attitude.

Once the airplane is climbing and ground contact is no longer an immediate concern, airspeed should be increased by cautious reductions in pitch attitude.

- CONFIGURATION

Maintain flap and gear position until terrain clearance is

assured. Although a small performance increase is available after landing gear retraction, initial performance degradation may occur when landing gear doors open for retraction....

- ADDITIONAL CONSIDERATIONS

If flight director and/or auto-flight systems are not specifically designed for operation in windshear, they may command a pitch attitude change to follow target airspeeds or a fixed pitch attitude regardless of flight path degradation. This guidance may be in conflict with the proper procedures for windshear recovery. These systems must be disregarded if recovery is required and, time permitting, switched OFF.

Avoid stabilizer trim changes in response to short term windshear-produced airspeed/stick force changes. However, stabilizer trim should be used to trim out stick force due to thrust application.

Throughout the recovery, the pilot not flying should call out vertical flight path deviation using the barometric altimeter, radio altimeter, or vertical speed indicator as appropriate.

Example: "sinking 500, altitude 200, climbing 400, altitude 300, etc."

Rapidly changing winds may cause rapid excursions in pitch and roll with little or no pilot input as well as varying the attitude for stickshaker activation.

The Safety board determined that the USAir DC-9-30 series aircraft flight director and/or auto-flight systems are not specifically designed for operation in windshear.

Airborne Windshear Alert/Warning

The INST/NAV/COMM section of USAir DC-9 Pilot's Handbook, page s 13-71-1 to 13-71-4, contains a system and operational description of the Honeywell Windshear Detection system. It is included as an attachment to this report.

None of the pilots interviewed with regard to this accident had experienced a windshear caution or warning from this system but three knew of other crewmembers that had. Check airmen interviewed observed that when training windshear in the simulator, that by the time the warning activated, the aircraft was all ready in the windshear. Therefore, these check airmen were training flight crews to rely on other windshear clues, such as airspeed excursions, to determine when to initiate the windshear escape maneuver.

Severe Precipitation

The USAir DC-9 Pilot's Handbook provides guidance regarding a "Severe Precipitation". The following is an excerpt from that guidance, but the guidance, pages 3-39-1 to 3-39-7 are attached to this report.

AVOIDANCE

Flight crews should carefully evaluate all available weather information for the purpose of avoiding unusually severe storms with extreme precipitation. Avoidance of these severe storms is the only measure assured to be effective in preventing exposure to multiple engine damage.

During an unavoidable encounter with sever rain or ice in flight, the following procedure should be used:

- IGNITION - OVRD
- ENGINE ANTI-ICE - ON
- AIRFOIL ANTI-ICE - ON
- APU - START
- COMMUNICATIONS - USE #1 TRANSCEIVER"

Ground Proximity Warning

The USAir DC-9 Pilot's Handbook, page 18-25-1, provides that following guidance regarding a "Terrain Warning".

"If a TERRAIN warning is activated, the crew must immediately focus its attention on terrain proximity and make a rapid determination as to the validity of the warning. If the crew cannot immediately determine that the warning is invalid, the pilot must rapidly apply GO-AROUND POWER while simultaneously rotating to an attitude of 15° nose up. If positive performance is not achieved, do not hesitate to advance power to firewall power while rotating to 15° pitch.

If stick shaker or buffet occurs before 15°, stop rotation and maintain an attitude that results in intermittent stick shaker or buffet, until terrain clearance is assured.

If sink rate continues and the stick shaker has not activated, use a pitch angle greater than 15° in order to change flight path direction.

CAUTION: Continued operation at stick shaker speeds will result in a stalled condition.

These actions altering the flight path to stop the warning should be initiated immediately; smoothness should be of no concern if adding maximum power and rotating the aircraft is

determined to be necessary to gain terrain clearance. They are especially appropriate under the following conditions:

- While conducting approached over unlighted terrain; maneuvering - for an approach at night; or in instrument conditions.

- When established on an approach where vertical guidance is unreliable.

- In maneuvering for, or establishing on, an approach when ambient conditions such as turbulence or windshear cause the approach to become unstabilized."

K. FAA OVERSIGHT

Principal Operations Inspector (POI)

The POI is a former Airforce KC-135 pilot. He also has general aviation and corporate experience and holds an airframe and powerplant mechanics certificate and flight instructors certificates. He has been employed by the FAA 7 years and has had FAA supervisory program training. He is DC-9 rated, He has been the USAir principal operations inspector (POI) for 3½ years.

He described his relationship with USAir as a proactive partnership, where both parties help each other and information is shared. The POI also felt he has a good working relationship with Airline Pilots Association (ALPA). He visits USAir on regular basis and tries to educate them up front on FAA issues. He said that USAir has a self disclosure program. He has quarterly safety meetings with USAir.

He said his responsibility was to help USAir to comply with the regulations and to promote aviation safety. When asked if he felt successful at that, he said yes. He said that when he first became POI and gave input to USAir, they would not always respond to him or responded in a negative manner. He said USAir has made improvement in that area.

When asked if flight crews were operating in a standardized manner from domicile to domicile or aircraft to aircraft, he said that there were "different cultures" within USAir. He said that this was not acceptable but by USAir's selection of Director of Training and technical writers, there was indication that they wanted to change this. He believed that the Advanced Qualification Program (AQP) would help the crews to become standardized.

Asked why USAir has replaced people in key management positions in the last few months, he said that he thought it was because of retirement buy-outs, not because of any problem area.

He said that he did not know of any increase in incidents. He indicated that in response to previous accidents, USAir has changed their CRM and de-icing program. He said he is not involved in the selection process of management pilots.

He said that previous management structure had acted as a barrier to standardization. An example he gave was where students were taught one method of operation in ground school, another in simulator, and another yet on the line. The ground and simulator instructors answered to different managers and line check airmen to someone else yet. The structure has now changed so that they all answer to the Director of Training.

He did not know the pilot check ride failure rate. He said it varied from program to program. He said the B-757 failure rate was high until it was taken in-house, and then it went down. USAir philosophy is train to proficiency. He said that he believed that this philosophy results in lower failure rates. He said he was not exposed to other carriers enough to compare USAir's DC-9 procedures to theirs.

He said that there are variants in DC-9 crew standardization. He said that this was not acceptable to him but he recognized that it would take years to change the culture and that he has seen an improvement. He said he believed that the training program and AQP will change it. He said he believes that USAir's written guidance is clear enough so that pilots know what the company expects them to do and so that the crews can be standard to each other.

He described that difference in culture as Allegheny pilots allowing captains a great deal of discretion and USAir allowing for less. He said that spotting captains that used their own procedures rather than USAir's was difficult because they would use USAir's procedures with the FAA on the jumpseat.

He said that he has not received any negative input about USAir from other FAA offices. He felt that he had a good group of FAA Aircrew Program Managers (APMs). He said the APM level of staffing in his office was adequate but overall he felt that the FAA was understaffed.

Aircraft Program Manager (APM)

The APM is a former US Army helicopter pilot who served 12 months in Viet Nam. He is also an Army Reserve instructor and maintenance test pilot. He was hired by the FAA in 1986 at the PHL FSDO, moved to the Allegheny FSDO, and joined the PIT office in 1988. He was rated in the DC-9 and became the USAir DC-9 APM in May of 1992.

He said did not notice an increase in incidents but that he

attributed the overall high number of incidents at USAir to their high number of operations and felt their exposure is high. He explained that USAir predominantly operates in a high density environment and bad weather in the northeast.

He said he felt he had an excellent, proactive relationship with USAir. He said that management had changed. The Director of Training came from a progressive program. He thought the change was due to the accidents and the focus was on safety.

He said that the Handbook (FAA Order 8400.10, Air Transportation Inspector's Handbook) requires that check airmen be monitored once annually. He monitors each check airmen at least once per year, most of them he is able to see every three months.

He did not know the check ride failure rate but believed it to be 1 to 2%. He said that this was because USAir trains to proficiency. He said that if an instructor feels that the student will not pass, the student can get more instruction or not go up for the check ride and return to his previous seat. On a proficiency check, he said that if an airman is trained to proficiency in an area, there is no record. He said that it is not a requirement.

He did not know criteria USAir used to select check airmen or if it was in writing. He evaluated those that were selected and recommended them to the POI. When asked what would prevent him from recommending a candidate, he said that while he was watching him conduct a check ride and failed to interpret an airman's unsatisfactory performance as unsatisfactory.

He performs enroute inspections 3 or 4 times per week. He said that USAir's pilots checklist usage was good while he was present on the jumpseat but he suspects it to be not as good when he was not there. He occasionally sees pilots stumbling through responses or doing checklists from memory. Overall he felt that their checklist usage is improving.

He said that briefings have been an emphasis item and have come a long way. He expects pilots to brief visual approaches and to brief again if the conditions change.

He said that USAir pilots performed well in the simulator. He had not observed go-arounds to be a problem. He had observed difficulties in windshear recovery where pilots failed to pitch to the stickshaker but not on a regular basis. He said that the biggest problem was inadequate pitch. On the part of pilot-not-flying, he said the most common mistake was to make speed calls during the event rather than altitude and sink rate.

He thought crew standardization was improving. When asked if the first officers would think that the captains were standardized,

he said "They would think there is a lot of room for improvement". He said he believes that there were still pilots out there that were raising their own gear and flaps while acting as the flying pilot. He senses this when observing, but because he doesn't actually witness the act, he can't police it. He does debrief the crew on this subject if he feels that this is their procedure when not under inspection.

He said he believes that USAir is providing the crews with enough guidance but the crews were not consistently assimilating it.

National Aviation Safety Inspection Program (NASIP)

A NASIP inspection was conducted by a team of 14 FAA inspectors from seven different FAA regions. It took place over a period from February 22, until March 19, 1993.

The Operational findings were summarized as follows:

The training (Section 1.3) contained 7 findings. Several of these relate to inter/intra departmental lack of communication; i.e., lack of understanding of what is contained in the approved training program. Five (5) additional findings, all related to manuals currency, were found in the dangerous goods/Hazmat area, were attributed to inadequate coordination between affected departments.

In Crew Qualification (Section 1.4), there were seven findings. These findings were primarily due to a lack of communications between the training department and the record keeping department.

Operational findings that relate specifically to this accident were as follows:

1.3.6

On 3-12-93, a team member observed a simulator proficiency training period with two captains receiving training. Only one captain was given windshear training, contrary to FOTM 2-4-112, FARs § 121.404(b) and § 121.427(a)(d)(1). The training was indicated as complete on USAir form OF-32.

The follow-up action to this finding on April 23, 1993, was that the captain who did not complete windshear training was brought back and completed the required training. The check airman that conducted the training was removed from check airman status.

1.4.1

Review of the past 90 day source documents revealed the USAir pilot records system did not properly document accomplishment of recurrent windshear training for 51 pilot crewmembers. Reference: FAR § 121.427(d)(1), § 121.683(a)(1), §121.683(c), § 121.433(e).

The response to this finding also came on April 23, 1993 and stated that "There is no requirement by this office to list windshear on the source document in question. Our investigation revealed that windshear is listed as a part of recurrent training and is being documented in accordance with the USAir approved automated record keeping system."

L. FLIGHT CREW INFORMATION

Captain Michael Reese Greenlee holds airline transport pilot certificate number [redacted], with ratings for airplane multi-engine land and DC-9. Additionally, he holds a flight instructor's certificate with ratings for multi-engine and instrument aircraft. He became employed by USAir on April 24, 1985 as a Boeing B-737 first officer. He upgraded to DC-9 captain in January of 1990 and is domiciled in PIT. His total time is 8,065 hours and time in the DC-9 is 1,970 hours. His last proficiency check was January 20, 1994 and last line check was March 20, 1994. Records indicate that his performance on these checks was found to be satisfactory. His last first class flight physical was dated June 15, 1994 and listed no restrictions.

He holds the rank of Captain with the 906th Reserve Fighter Group based at Wright Paterson Airforce Base. He has served in the Reserve since 1982. In that capacity, he has flown the T-37, T-38, AT-38, F-4, and F-16. His most recent flight assignment in the Reserve has been the F-16. He was a Distinguished Graduate from Airforce pilot training. He is currently Squadron Safety Officer and designated as a Flight Leader and a Mission Commander.

A search of NTSB and FAA records showed that Captain Greenlee had no accident, incident, or violation history. Over a period from March 15, 1994 to June 20, 1994, the FAA Program Tracking and Analysis System (PTRS) showed that FAA inspectors performed cockpit enroute inspections with Captain Greenlee seven times. His performance was found to be satisfactory in all of these inspections.

USAir's PIT Chief Pilot performed Captain Greenlee's initial captain training on the DC-9. He described Captain Greenlee as being in the upper 10% of USAir pilots. The chief pilot liked his professionalism, mannerisms, calm command presence and felt that he was a quick learner. The check airman who had performed Captain Greenlee's last simulator proficiency check and line check, could

not remember the simulator check. However, he did remember the line check and described it as excellent. Pilots interviewed who had recently flown with Captain Greenlee described his performance in similar positive terms.

Captain Greenlee's pilot certification history was reviewed. His progress from private to airline transport pilot was without interruption except that he did not satisfactorily complete the flight check portion of his instrument check ride in 1978. The reason listed on the FAA Notice of Disapproval was "Pilot operations III, ADF and ILS approaches unsatisfactory, first failure." After additional instruction, he was retested five days later and his performance was found to be satisfactory.

First Officer James Philip Hayes holds airline transport pilot certificate number [redacted], with ratings for airplane multi-engine land and MU-300. His date of hire at Piedmont Airlines (which was purchased by USAir) was October 12, 1987. His total time is 12,980 hours and time in the DC-9 is 3,180 hours. His last proficiency check was July 16, 1992 and his last recurrent training LOFT was March 15, 1994. Records indicate that his performance on these events was found to be satisfactory. He is domiciled in PIT. His last first class flight physical was dated April 13, 1994 and listed no restrictions.

The check airmen who had performed First Officer Hayes' last simulator training LOFT and proficiency checks were interviewed but could not remember any details of those events. The computerized record shows them to be satisfactory but does not indicate which LOFT scenario he was given. Pilots interviewed who had recently flown with First Officer Hayes described his performance in positive terms.

First Officer Hayes' pilot certification history was reviewed. His progress from private to airline transport pilot is without interruption except that he did not satisfactorily complete the flight check portion of his airline transport pilot in 1981. The reason listed on the FAA Notice of Disapproval was "Pilot operations IIC, ILS approaches was unsatisfactory, first failure." He was retested three days later and his performance was found to be satisfactory.

M. OTHER INFORMATION

Statements made by flight crewmembers who had recently flown with Captain Greenlee and First Officer Hayes are an attachment to this report. Pilots in various stages of flight operations before, during, and after the accident were interviewed. Their statements are also an attachment to this report.

Check Airman Interview I

When asked how USAir achieves standardization, he said through meetings, CRM, writing lofts, and coordinating corrections in check pilot group. He said that the Director of Training writes the check airmen's manual. He thought that it was the same manual in use across the fleet.

He said each individual pilot has a different method of accomplishing checklists. He said that USAir offers latitude as to when the checklist is to be accomplished due to work load.

He said there was nothing in the manual that would require that a visual approach to be briefed. He said that on a visual, it was USAir policy to use all available navigational aides and to brief those. If a pilot had briefed for a visual and was subsequently cleared for an ILS because the conditions had changed, he said there was need for a further brief.

He said USAir trains to avoid windshear. In the simulator and in the airplane he believed that the airborne windshear detector lagged the event. He said that he believed that the manufacturer programmed it that way to prevent nuisance alarms.

During a windshear event, the thrust is increased and it would be recommended to callout "Firewall power". Pitch target is 15 degrees and the aircraft remains configured. Asked if the pilot flying (PF) always executes missed approach. He commented that it would depend on the captain. The captain is always responsible and could always take the airplane. He did not recall if there was written guidance on this. On a Cat I ILS, if the first officer were the PF, he would expect the first officer to fly the missed approach. He did not know if there is written guidance on this.

He has not observed pilots having difficulties executing go-arounds in the simulator except that they forget to disarm the spoilers. He said that if the first officer was the PF he would be the person expected to fly the go-around in a normal ILS or visual approach. He didn't know where this was written.

He performs about 2 line checks per month and has never had a pilot fail one of his line checks. He did not see any difference in procedures between USAir and the companies that they merged with.

Check Airman Interview II

He indicated that crews are to brief visual approaches. They are to get the approach plate out and cover the frequencies, course, and field elevation. He does not believe that there is

written guidance on this. He regularly finds on line checks that crews do not brief visual approaches. He said that if the crew is subsequently cleared for an instrument approach, that he expected them to brief that also. However, if they remained in visual conditions he would not expect a new briefing. He also stated that time could be a factor if this is a last minute change.

In the simulator he observes that when executing a go-around, pilots chronically do not set exact go-around power. He said the PF makes the go around but is not sure where it is written. He said he had not observed pilots having difficulty getting target pitch. He described procedure for setting maximum power but could not identify limits or where the definition was written.

In the current windshear scenario, there is light turbulence. Airspeed drops 5, 10, then 15 knots just before the event. He was not sure when exactly the windshear warning fires.

No one has failed one of his line checks. He said crews are standardized.

Check Airman Interview III

He expects pilots to brief for visual approaches and re-brief if conditions change.

He has not observed USAir pilots to have difficulty performing go-arounds or windshear recoveries in the simulator. If the first officer is the PF, he expects the first officer to execute the go-around. He also stated that this is not in writing. He said that maximum power is not defined in the manual. He said that there were callouts for the windshear recovery, "windshear, firewall power". The pilot not flying (PNF) is to check the power and callout trend information; altitude and descent rates. He said that he stresses these callouts in the simulator.

In the simulator, by the time you get the warning, you are already in the windshear. The scenarios that he gives, if the pilots use proper recovery technique, are survivable.

He prefers that pilots use the flight director but if they do not, he said that they remain in compliance with USAir procedures. He said that there was no written guidance on levels of performance or conduct of line checks but there was for initial observation experience (IOE).

He has never had a pilot fail one of his line checks.

Check Airman Interview IV

He said that crews consistently brief both visual and instrument approaches when he conducts line checks. In addition to the normal items, he expects them to also brief special conditions such as braking action or suspected windshear.

He has not seen pilots have any difficulty in the simulator executing either go-arounds or windshear recovery maneuvers except that they forget to disarm the spoilers.

He said he felt that the pilots have enough written guidance to operate in a standardized manner. He stated the number of changes to the manuals "sometimes get heavy". He acknowledged that there had been recent changes to Chapter 3, Normal Operating Procedures, but that he observed that pilots were complying with those new procedures.

He observed that in a windshear where there is an increase in speed, a pilot is less quick to react than if the windshear causes the airspeed to decrease. He does not give pilots non-survivable windshear scenarios in the simulator. He acknowledged that maximum power has no published EPR or EGT value. On a recovery he would accept constant stickshaker but not pitch above shaker. Asked about difference between go-around and windshear recovery, stated "urgency, power, and configuration".

He teaches pilots not to use the flight director in a windshear recovery. He said he did not believe that there was not a written procedure to bias out the "V" bars in the event of a shear. He expects crews to use the flight director on visual approaches (4000+ RVR), but if they did not use the flight director, he saw no problem.

He said that the instructors are standard to each other. He said that the Flight Instructor/Check Airman manual does not cover or give acceptable parameters for line checks. He has not had a pilot fail a line check. The biggest item he debriefs on line checks is the verbiage on checklists and responses.

Director of Training (DOT)

The DOT has a Civil Aviation and corporate background, became employed by Allegheny in 1978. Upgraded on the BAC-111 in 1984 and joined the training department as a check airman in 1986. 1989 he became Flight Manager on the F-100 and brought the airplane on line. 1991-92 he was manager of CRM and AQP. 1993 to 94 he was a check airman on the B-767, international and initial observation experience (IOE). He became DOT one week before this accident.

He was invited to interview by the V.P. of Flight Operations. He believed that the reason he was selected was because of his previous work on the F-100 program. He also brought Human Factors

program to USAir and instituted phases 1, 2, and 3 of the FAA CRM advisory circular.

He stated his duties and responsibilities; to give direction, to act as a go between the pilots and upper management, and to carry out the Flight Operations Manual and Total Quality Management (TQM). When he took the job, he asked for the resignation of all of the Fleet Managers, evaluated them and retained 3 of the 6. He stated that he needed a team concept to achieve standardization. He has had no management or employee complaints, because they are new and enthusiastic.

He referred to standardization difficulties as manufacturing differences (Boeing/Douglas) and glass cockpit v electro-mechanical. He said that standardization at USAir was not a problem. He said that he believed that USAir's written guidance was sufficient to maintain standardization. He was dropping the number of revisions issued to the pilot operating handbooks down to 4 times per year allow pilots to digest the changes.

He said that USAir's pilot check ride failure rate was 2% but is now less. They don't release pilots if they are not ready to take a check ride. He said that in the current training structure, a first officer could get a windshear training event twice but no less than once per year.

With regard to CRM on emphasis on situational awareness, he stated that situational awareness is a marker. He did not indicate that it was an emphasis item.

When asked about the reasons for the new type of training, he referred to the number of daily departures (2600) and the "last rash of incidents". When asked about the "rash" he said he meant the accidents over the last 5 years.

He said that direction for evaluation of a line check is found in the check airman's handbook and that there were some changes from aircraft to aircraft.

He supervises 300 people: check airmen, pilot training schedulers, equipment managers, and ground school personnel. He has not had budgetary difficulty.

With regard to windshear training, he said that if windshear might be present during an approach, he would expect it to be discussed during an approach briefing.

Aviation Safety Hotline Brief

During the course of the investigation, the Safety Board requested incidents produced by the FAA's anonymous Safety Hotline. The only similar incident that came to light was reported by an

anonymous caller on June 7, 1994 about a USAir flight on June 6, 1994. The caller alleged that a USAir flight departed in heavy weather conditions. The report indicated that the incident was under investigation by the PIT FSDO. The brief an attachment to this report.

Aviation Safety Reporting System (ASRS)

During the course of the investigation, the Safety Board requested ASRS reports in related areas. That search produced a report made by the pilot of a large aircraft who experienced difficulty with weather and air traffic control at CLT. The narrative of is an attachment to this report.

[redacted] 8/23/94

Renee M. Mills
Operations Group Chairman

AS-30
8-23-94

SEVERE TURBULENCE

AVOIDANCE

Careful preflight planning and inflight analysis using all available information must be done to avoid severe turbulence. Although cruising altitudes available permit topping some thunderstorms and avoiding others, there are also other hazards to consider, such as clear air turbulence and reducing the margin between stall and mach buffet.

WEATHER RADAR

Airborne weather radar provides the most accurate, consistent information regarding the location of rain cells. Beyond the range of the radar, U.S. Weather Bureau radar and pilot reports should be used.

Carefully adjusting the radar for use is one key to having a picture that will help to circumnavigate storm cells. For the optimum picture, the adjustment procedures outlined in the Originating Check must have been completed.

The DC-9 is equipped with the Collins WXR-700X radar. This radar has a much more discrete beam width and greatly reduced side lobes and it is, therefore, more sensitive to antenna tilt adjustments. Antenna tilt should be adjusted as follows:

— In preparation for takeoff, adjust the antenna for a setting of 3° upward tilt. This will provide target detection up to 40 NM without excessive ground returns and eliminates frequent tilt adjustments. Engaging the IDNT function will suppress ground clutter. Due to precession error caused by acceleration during takeoff, ground clutter supression will reduce the intensity of the ground return, enabling the pilot to more easily identify weather targets. Ground clutter suppression (IDNT) should not be used during normal operation, as it may also suppress some weather targets.

— The tilt settings should be changed to optimize any targets that are encountered. If there is significant weather activity, the tilt angle should be adjusted to provide a solid ground return outside of the desired range to ensure that no overscanning will occur.

— The tilt angle of the antenna, while scanning for weather target, depends upon aircraft altitude and the range selected. The best general guideline is to tilt the antenna downward until a small amount of ground return appears at the outer edge of the display.

— When storm targets are detected, the antenna tilt should be adjusted with care, up and down, to locate the level of the most intense activity within the storm. When this level is found, remember that the returns behind the cell may extend further back than is shown on the indicator display.

WEATHER RADAR (cont'd.)

— The WXR-700X radar does not have a contour mode; however, red returns are displaying the same level of rainfall as contour. The system is also equipped with turbulence detection that will show areas of rainfall movement which is usually associated with turbulence, and will be depicted in magenta. This will be annunciated as WX+T and is enabled only in the 50 or 25 NM ranges. Specific raintall rates are shown in green, yellow, red, and magenta.

— Active Gain in WX mode is normally operated in the CALibrated position. It may, however, be positioned to MAX or −1 thru −7 or MIN. This will increase the receiver's sensitivity to targets within 80 NM of the aircraft. When selected to other than the CALibrated position, weather returns will appear more intense.

NOTE: PAC ALERT (attenuation warning) is disabled when out of the CALibrated position.

— Be aware of the effect of areas of heavy precipitation masking returns from storms farther away. While the X-band radar is excellent for detecting storm areas, the radar energy is attenuated by rainfall, the degree of degradation increasing rapidly when the precipitation between the storm cell and the radar antenna increases from "moderate" to "heavy". When the aircraft is in an area free of precipitation, the radar is excellent for detecting and evading turbulence, but once in rainfall, its usefulness is diminished. It is not as satisfactory for use as a storm penetration aid.

— The PAC Alert annunciation identifies areas of severe attenuation. Should the intervening precipitation be so intense that the signal is attenuated below the minimum discernible signal level, a yellow arc (PAC Alert bar) is painted at the outermost range mark to indicate the azimuth direction where heavy precipitation is encountered. The targets displayed beyond the intervening storm cell in this direction may not be accurately displayed. This is available only within 80 NM of the aircraft, regardless of range selected and only when in CALibrated Gain.

— Areas which show the greatest change in rainfall rate will be displayed as narrow bands of color running close together. This indicates a steep gradient; where as, wide bands of color indicate more gradual gradients of rainfall rate. The narrower bands, or steeper the gradient, the greater the turbulence associated with the area.

— Scalloped edges of a return also indicate the presence of hail. Hail itself does not provide a good return and may not be visible on the indicator unless covered by a coating of water. Hail can be encountered at any altitude, even when flying between storm cells or under an anvil top of a thunderstorm. Any thunderstorm topping 25,000 feet can be a hail producer. A thunderstorm reaching 35,000 feet can be just as severe as a super cell reaching 60,000 feet.

WEATHER RADAR (cont'd.)

— Provide reasonable clearance around rain areas by selecting a heading which will clear storm cells by:

  — 5 miles when OAT is above freezing.
  — 10 miles when OAT is below freezing.
  — 20 miles when at or above 25,000 feet.

— Prior to commencing descent from cruise altitude in aircraft equipped with the Collins WXR-700X radar, select desired range and adjust antenna tilt to 0°. During the descent, adjust the tilt up so that the following schedule is met:

  — 30,000 feet — 1°
  — 20,000 feet — 1° up
  — 10,000 feet — 2° up

  Use the schedule as a guide to keep the scope relatively free from ground clutter. In mountainous terrain, more tilt may be required.

BEFORE ENTERING KNOWN TURBULENCE

Knowledge of adequate maneuvering margins, determination of best penetration altitude and heading, and common sense are all criteria for this type operation.

Establish target penetration speed. Above 10,000 feet, fly at 285 knots to M.76. Do not chase airspeed.

Fly attitude, "fly loose", sacrificing altitude to maintain attitude. Do not chase altitude.

Maintain thrust which gives target speed in smooth air to minimize pitch changes and deviations in speed and altitude. Change only with extreme airspeed variation.

Use ignition if entering areas of known heavy turbulence and precipitation or when encountering moderate to severe turbulence in clear air.

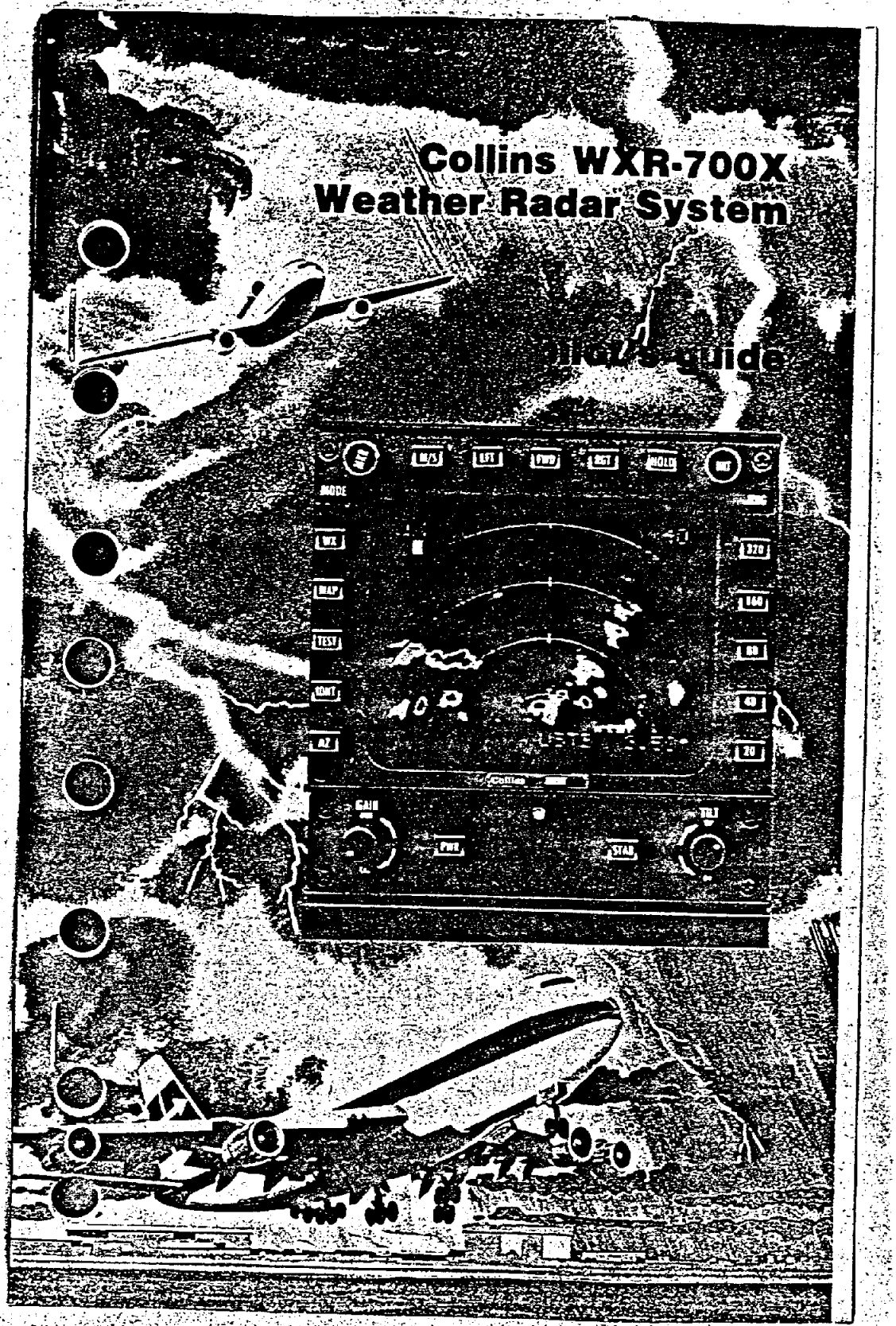
USE OF AUTOPILOT

With the autopilot engaged, pitch hold mode shall be used (aircraft in level flight attitude). Having the autopilot engaged in turbulence has several advantages:

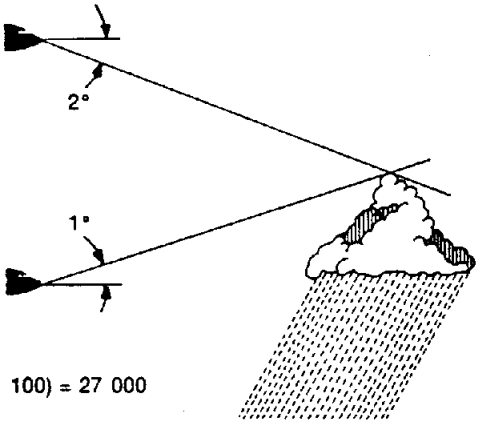
— Control force application will be moderate, minimizing the additional "G" forces imposed on the aircraft.

— It allows the flight crew more time to thoroughly monitor flight operations.

Monitoring stabilizer trim position is required when using the autopilot corrections in the pitch axis since this might impose high "G" loads on the aircraft.


Collins WXR-700X
Weather Radar System
MODE
WX
MAP
TEST
GAIN
PWR
STAB

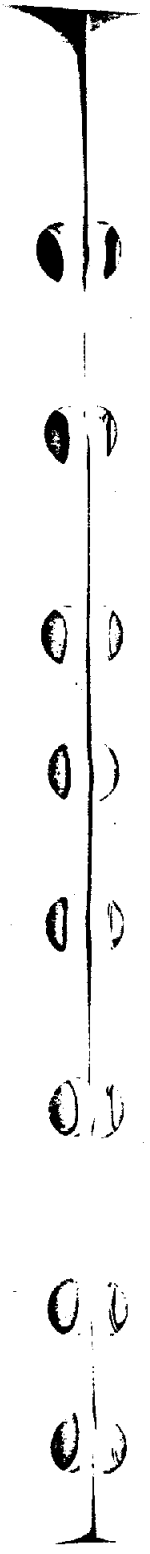
HOUGH THIS FORMULA IS VALID FOR IMATING THE WET TOPS OF STORM LS WITHIN 100 MILES, PILOTS SHOULD AWARE THAT THE WEATHER RADAR . NOT "PAINT" FROZEN DRY TOP PRE-TATION SUCH AS SNOW OR HAIL (DUE LOW REFLECTIVITY). THESE LOW LECTIVITY TARGETS ARE FRE-NTLY ACCOMPANIED BY SEVERE BULENCE. THIS FACT SHOULD BE EN INTO ACCOUNT — FOR THIS REA-IT IS NOT RECOMMENDED THAT)TS ATTEMPT TO OVERFLY OR ERFLY STORM CELLS.



100) = 27 000

100) = 27 500

TOP OF THE PRECIPITATION ACTIVITY OT NECESSARILY THE TOP OF THE GER AREA. DANGEROUS TURBU-CE FREQUENTLY EXISTS AT HIGHER TUDES SIGNIFICANTLY ABOVE THE OF THE DETECTABLE PRECIPITATION.



tilt control below 10 000 feet

Flight operations below 10 000 feet, such as takeoffs and landings, require a tilt setting of 2 to 3 degrees upward tilt. This will provide target detection up to 40 nmi, without excessive ground returns and eliminate frequent tilt adjustment. The tilt setting should be changed to optimize any targets that are encountered.

If there is significant weather activity, the tilt angle should be adjusted to provide a solid ground return outside the desired range to ensure that no overscanning will occur.

For example, if operating at a 40-nmi range, a solid ground return between 35 and 40 nmi ensures targets inside 35 nmi will be detected. The WXR-700X flat plate antenna has small side lobes capable of providing returns from a target. If tilt settings below 4 degrees are used at takeoff, some ground return will be detected until a ground separation of 5000 feet is reached. The side lobe returns disappear at separations greater than 5000 feet.

The photographs that follow illustrate the antenna being swept through a storm target. The aircraft is flying below 20 000 feet; hence, the tilt angles for the optimized return are near 0 degree.

WINDSHEAR DETECTION SYSTEM (HONEYWELL)

SYSTEM DESCRIPTION

FUNCTIONAL

The primary purpose of the Honeywell Standard Windshear System is to provide windshear annunciations to the flight crew in the event of a detected and potentially hazardous windshear condition. This is accomplished by integrating data from existing aircraft subsystems with internal windshear computer performance and control algorithms to produce signals for windshear annunciation.

PHYSICAL

The Standard Windshear Computer chassis is 3/8 ATR short, as defined by ARINC Specification 404A, with a total weight of less than 15 lbs. (including internal sensors). This unit includes self-contained accelerometers and pressure sensors, power supply, processor, interface circuitry, and several types of memory, all installed on multi-layer printed circuit boards. Various types of memory components (EEPROM, RAM, UVPROM) are utilized for the storage of program and static data, program variables, windshear computer performance data, and windshear system failure information. Convective cooling is employed.

OPERATIONAL DESCRIPTION

DETECTION

The windshear computer monitors the aircraft's aerodynamic and inertial states to determine when a severe windshear condition is present which could affect an aircraft's performance capabilities. A severe windshear is defined as a windshear of such intensity and duration that it would exceed the performance capability of a particular aircraft type, and likely cause inadvertent loss of control or ground contact. In order to distinguish between windshears of varying intensity and duration, and to preclude nuisance windshear annunciations, the windshear computer employs crosschecks and thresholds to ascertain when the severe windshear criteria are met.

Decreasing and Increasing Detection

The windshear computer detects both increasing and decreasing performance windshears in the longitudinal and vertical axes. For longitudinal and vertical detection, the acceleration of the aircraft relative to the air mass is compared to its inertial acceleration. A windshear is indicated when a significant difference between the two accelerations exceeds a computed threshold. This, in effect, is the length of time that the current difference can be sustained before significant energy loss has occurred. The allowable time before annunciation is dependent upon the magnitude and duration of the acceleration difference.

OPERATIONAL DESCRIPTION (cont'd.)

DETECTION (cont'd.)

Decreasing and Increasing Detection (cont'd.)

In general, increasing performance detection is the result of a significant and/or sustained increase in headwind, decrease in tailwind, or updraft. Decreasing performance detection is the result of a significant and/or sustained decrease in headwind, increase in tailwind, or downdraft.

Temperature Lapse Rate Detection

In the classical microburst environment, it has been found that a unique temperature profile exists, which is characterized as a dry adiabatic condition followed by a cold outflow condition. To enhance windshear detection, the windshear computer measures temperature change with altitude during the descent phase of flight and uses this temperature lapse rate calculation to predict the potential presence of a microburst. This lapse rate calculation begins at approximately 10,000 feet pressure altitude during the descent and continues until touchdown. Temperature lapse rate detection will be indicated when the calculated temperature profile from the aircraft's descending flight path shows a temperature increase, typical of a dry adiabatic condition, followed by a temperature decrease which is typical of a cold outflow condition.

Activation

The conditions described below only address a normal flight. Additional mode transitions are possible to provide windshear detection under most abnormal conditions.

TAKEOFF MODE (T/O) — The Takeoff mode is defined to include flight from liftoff until the aircraft climbs through a change in pressure altitude of 1,500 feet or 3 minutes have elapsed. In this windshear computer mode, both increasing and decreasing windshear detection and annunciation is provided to the flight crew.

APPROACH FLIGHT REGIME

Windshear computer operation within the approach flight regime is subdivided into two modes: Approach (APPR) and Go-Around (G/A). The following outlines the approach flight regime as defined by the windshear computer modes of operation:

— APPROACH MODE (APPR): The aircraft is in the APPR mode when calibrated airspeed is reduced to less than 175 knots with landing gear extended or flaps extended to a predetermined approach setting, until either touchdown (weight-on-wheels) or a go-around is initiated.

OPERATIONAL DESCRIPTION (cont'd.)

DETECTION (cont'd.)

Activation (cont'd.)

— GO-AROUND MODE (G/A): The aircraft is in the G/A mode when any engine N_1 is greater than 90% while in the APPR mode or the designated go-around switch is hit while an increasing or decreasing windshear is being annunciated, until the aircraft has climbed 1,500 feet from the altitude at which the go-around was initiated, 3 minutes have elapsed, or touchdown (weight-on-wheels).

In both of these windshear computer modes, increasing and decreasing windshear detection and annunciation is provided to the flight crew. Additionally, while in the APPR mode, temperature lapse rate detection is provided.

VISUAL ANNUNCIATIONS

Decreasing and Increasing Annunciations

Visual windshear annunciations are of two types: a flashing red windshear WARNING (CAPT and F/O) and a flashing amber windshear CAUTION (CAPT and F/O). The flashing red WARNING lamps are illuminated only upon windshear computer detection of a decreasing performance windshear and the flashing amber CAUTION lamps are illuminated only upon windshear computer detection of an increasing performance windshear. The CAUTION and WARNING annunciations are independent of each other, with a flashing red WARNING annunciation always overriding a flashing amber CAUTION annunciation.

Each annunciation will alternatelly flash at a 2 Hz rate (i.e., while the Captain's lamp is illuminated, the First Officer's lamp will be extinguished and vice versa) for the duration of the windshear encounter or a minimum of 3 flashes, whichever is greater. Once the aircraft exits the detected windshear condition, the red windshear WARNING or amber windshear CAUTION lamps will be extinguished.

Temperature Lapse Rate Annunciation

Upon windshear computer detection of an unstable air mass, a steady amber windshear CAUTION annunciation will be provided. This annunciation will be illuminated for the duration of the temperature lapse rate encounter (10 seconds minimum/30 seconds maximum) or until weight is on the wheels. Additionally, windshear CAUTION and windshear WARNING annunciations always override a steady amber TEMPERATURE LAPSE RATE annunciation.

OPERATIONAL DESCRIPTION (cont'd.)

AURAL ANNUNCIATIONS

Windshear Warning

A dedicated cockpit loudspeaker broadcasts an aural windshear warning in conjunction with the flashing red windshear WARNING lamp. This loudspeaker is located in the cockpit overhead. The aural warning annunciation message consists of 3 annunciations per occurrence (WINDSHEAR! — WINDSHEAR! — WINDSHEAR!) with an interval of 1½ seconds between annunciations. The windshear aural warning is only activated during the initial and subsequent windshear computer detections of a decreasing performance windshear. To prevent excessive aural distractions in the cockpit, a minimum of 30 seconds must elapse between successive windshear annunciation cycles. Should the windshear computer detect a second potentially hazardous windshear condition within 30 seconds after the first detection, only the first detection will activate the windshear aural warning.

Annunciation Option

The default configuration is to annunciate increasing and decreasing performance windshears and temperature lapse rate detections in all valid flight regimes. The following annunciation option was selected by USAir: Inhibit both increasing and decreasing performance windshear annunciations during the Takeoff Roll mode only.

SEVERE PRECIPITATION

AVOIDANCE

Flight crews should carefully evaluate all available weather information for the purpose of avoiding unusually severe storms with extreme precipitation. Avoidance of these severe storms is the only measure assured to be effective in preventing exposure to multiple engine damage.

During an unavoidable encounter with severe rain or ice in flight, the following procedure should be used:

— IGNITION — OVRD.

— ENGINE ANTI-ICE — ON.

— AIRFOIL ANTI-ICE — ON.

— APU — START.

— COMMUNICATIONS — USE #1 VHF TRANSCEIVER.

Slow to turbulence penetration speed, using speedbrakes as necessary. Use smooth power changes, maintain thrust as high as possible.

In extremely heavy precipitation, try not to make throttle changes, trade altitude for airspeed if possible. If thrust must be changed, move throttle slowly. Do not reverse direction of throttle movement until RPM stabilizes.

If throttles are at IDLE when extreme precipitation is encountered, wait for N_2 spool-down. Delay advancing throttles for as long as possible, then advance throttles one at a time. If no N_2 response is seen, return throttles to IDLE until N_2 RPM is normal idle.

ICE AND WATER INGESTION BY TURBINE ENGINES

Recent incidents have raised questions concerning the ingestion of water and ice particles by turbine engines. The following will explain the effects of this ingestion on engine operation and offer techniques to reduce its impact.

The complicated and varied interactions that determine the effects of water ingestion on turbine engine operation preclude detailed quantitative engine module by module analysis. The magnitude of the shifts in gas generator performance will vary depending on the particular circumstances. However, the overall qualitative changes in engine operation resulting from the ingestion of water through the engine are listed below for a constant throttle position.

SECTION 6: CREW RESOURCE MANAGEMENT CURRICULUM SEGMENT OUTLINE

Indoctrination: [8 Hrs]

Recurrent: [1 Hr] >>>

Note: *This training period is included as part of the total training hours listed for each applicable aircraft ground training curriculum outline.*

A. **OBJECTIVE OF TRAINING:** USAir's aircraft specific flight crew training programs focus on the technical aspects of flying; i.e. systems knowledge and flying proficiency. CRM or Crew Resource Management Training is designed to enhance safety by increasing the efficiency of USAir flight crewmembers as they interact in the cockpit. This goal is achieved by providing training in communication skills, teamwork, task allocation and decision making during an Indoctrination or Awareness phase. In addition, crewmembers are provided the opportunity to practice the skills they have learned during a SPOT (Special Purpose Operational Training) flight simulator session.

B. **CRM INDOCTRINATION GROUND TRAINING:** The Indoctrination phase of CRM (called the Awareness Phase in Advisory Circular 120-51) consists of a seminar presentation and focuses on interpersonal relations and crew coordination. This phase of training provides flight crewmembers with common terminology and a framework for identifying and describing crew coordination problems. The Indoctrination phase consists of a one day seminar which provides training in such areas as communication processes, decision behaviors, team building, team maintenance, workload management/situation awareness.

C. **CRM RECURRENT GROUND TRAINING:** Recurrent CRM training is presented as part of each pilot's recurrent ground training curriculum and serves to reinforce the principles of CRM that were presented in the Indoctrination Phase.

D. **CRM FLIGHT TRAINING:** Completion of the flight training portion of CRM Training at USAir will fulfill the initial CRM exposure for USAir flight crewmembers. This flight training is referred to as the Practice and Feedback phase. CRM flight training will be conducted during a 2 hour SPOT (Special Purpose Operational Training) flight simulator sessions, conducted in conjunction with each pilots recurrent flight training, and will provide flight crewmembers with a self/ peer-critique vehicle to improve communication, decision making and leadership skills. Video feedback will give crewmembers a chance to view themselves from a third-person perspective.

SECTION 6A: CREW RESOURCE MANAGEMENT TRAINING MODULES

A. CRM RECURRENT GROUND TRAINING:

1. COMMUNICATIONS PROCESSES AND DECISION BEHAVIORS MODULE:
   - Briefings
   - Inquiry/Advocacy/Assertion
   - Crew Self Critique
   - Conflict Resolution
   - Communications/Decisions

2. TEAM BUILDING AND TEAM MAINTENANCE MODULE:
   - Leadership/Followership/Concern for Task
   - Interpersonal Relationships/Group Climate

3. WORKLOAD MANAGEMENT/SITUATION AWARENESS MODULE:
   - Preparation/Planning/Vigilance
   - Workload Distribution/Distraction Avoidance

4. INDIVIDUAL FACTORS MODULE:
   - Recognition of stressors
   - Captain's authority

B. CRM FLIGHT TRAINING:

This phase of training will be a no-jeopardy SPOT (Special Purpose Operational Training) conducted in the flight simulator utilizing a line-qualified complete crew. Video feedback will be used to allow crewmembers to view themselves from a third-person perspective as they use the skills learned in the Indoctrination/Awareness phase.

FLIGHT OPERATIONS TRAINING MANUAL

The following table lists the control number of each LOFT scenario for each aircraft type. The "-1" scenarios denote LOFT sessions conducted during Initial, Transition, or Upgrade Training. The "-1R" scenarios denote LOFT sessions conducted during recurrent training.

AIRCRAFT TYPE	LOFT CONTROL NO.
MD-80	MD8-1
	MD8-1R
DC-9	DC9-1
	DC9-1R
B-727-200	B727-1
	B727-1R
B-737-200	B732-1
	B732-1R
B-737-300/400	B733-1
	B733-1R
B-757/767	B756-1
	B756-1R
F-28	F28-1
	F28-1R
F-100	F10-1
	F10-1R

3. RECURRENT LOFT

Briefing
Preflight Inspection
Checklists
Normal T/O, Low Visibility
Crosswind T/O
Area Departure
Area Arrival
Non-Precision Approach (2)
CAT II Approach
Crosswind Landing
Abnormal Procedures
V1 Cut
Single Engine ILS
Engine Out Landing
Rejected T/O
Missed Approach
Rejected Landing
Wind Shear Demonstration
Debriefing

SECTION 4. RECURRENT FLIGHT TRAINING MODULES

1. PROFICIENCY CHECK MODULE
   - Oral Exam
   - Preflight Inspection
   - Checklists
   - 600 RVR Takeoff
   - Area Departure/Arrival
   - Steep Turns
   - Approaches to Stalls
   - Holding
   - CAT II ILS
   - Takeoff (V1 Cut)
   - Single-Engine ILS
   - Engine-Out Landing
   - Non-Precision Approaches
   - Rejected Takeoff
   - Crosswind Takeoff and Landing
   - Missed Approaches
   - Abnormal Procedures
   - Emergency Procedures
   - Debriefing

2. PROFICIENCY TRAINING MODULE
   - Oral Exam/Briefing
   - Preflight Inspection
   - Checklists
   - 600 RVR Takeoff
   - Area Departure/Arrival
   - Steep Turns
   - Approaches to Stalls
   - Holding
   - CAT II ILS
   - Takeoff (V1 Cut)
   - Single-Engine ILS
   - Engine-Out Landing
   - Non-Precision Approaches
   - Rejected Takeoff
   - Crosswind Takeoff and Landing
   - Missed Approaches
   - Abnormal Procedures
   - Emergency Procedures
   - Windshear
   - Debriefing

USAIR

CREW HISTORY REQUEST

Flight: 1016

Date: 7/02/94

Forming:

CAPTAIN Michael R. Greenlee | Employee # 17114 | Base PIT

Address Deleted Per Mills | Telephone Deleted Per Mills

Social Security # | Date of Birth [redacted]

Certificate Type/# ATPC #[redacted] | Ratings AMEL, DC-9

Last Proficiency Check 1/20/94 | Time in Equipment 1,970.

Last Line Check 4/20/94 | Time in Equipment last 90 days 180.

Last Physical 6/15/94 | Time last 90 days 180.

Lifetime Hours 8,065. | Duty Time

FIRST OFFICER James P. Hayes | Employee # 70059 | Base PIT

Address Deleted Per Mills | Telephone Deleted Per Mills

Social Security # | Date of Birth [redacted]

Certificate Type/# ATPC #[redacted] | Ratings AMEL, MU-300

Last Proficiency Check 3/15/94 | Time in Equipment 3,180.

Last Line Check 9/07/90 | Time in Equipment last 90 days 180.

Last Physical 4/13/94 | Time last 90 days 180.

Lifetime Hours 12,980. | Duty Time

EDIT 'SAS DATA SET: KMPRES3.PRIMAA' SCROLL ===> 1
COMMAND ===> 138 132

EMP NBR: 17114 EMP NAME: GREENLEE MICHAEL R
BSE: PIT POS: CAP EQUIP: D9 SUPERVISOR TYPE: 0
INT GS TYP: U INT GS COMP DTE: 01/19/90 HRS: 56:00 INST: 12769
*** FLIGHT TRAINING/CHECK/RATING ***
SIM TRN HRS: 24:00 SIM TRN INST: 449 RESULTS: S
A/C TRN HRS: 0:50 A/C TRN INST: 4444 RESULTS: S
SIM CK/RATING DTE: 02/08/90 FAA /CKP: 6711/0449 HRS: 2:05 RESULTS: S
A/C CK/RATING DTE: 02/09/90 FAA /CKP: 6711/4444 HRS: 0:30 RESULTS: S
RMKS: _____
LOFT COMP DTE: _____ HRS: _____ INST: _____ RESULTS: _ SNR NBR: __
OPER EXP COMP DTE: 02/25/90 JS HRS: _____ LC HRS: 34:03 LANDINGS: 27
OPER EXP INST: 2835 FAA: D BOWDEN RESULTS: S
PUCE COMP DTE: _____ HRS: _____ PUCE INST: _____

EDIT SAS DATA SET: KMPRECS.PRIMARY SCREEN

COMMAND ===>

*** RECURRENT TRAINING ***

EMP NBR: 17114 EMP NAME: GREENLEE MICHAEL R
BASE: PIT POS: CAP EQ: D9 SEN NBR: 2684 HIRE DTE: 24APR85
SUPERVISOR TYPE: 0
GS BASE MON: JAN TRANSOCEANIC GS BASE MON: ___
GS DATE: 01/21/94 INST: 0 RES: S TO DATE: _____ INST: _____ RES: _
1ST DTE: 01/19/94 INST: 17474 RES: S 1ST DTE: _____ INST: _____ RES: _
2ND DTE: 02/10/93 INST: 3495 RES: S 2ND DTE: _____ INST: _____ RES: _
3RD DTE: 12/13/91 INST: 3495 RES: S 3RD DTE: _____ INST: _____ RES: _
PC BASE MON: FEB / AUG
PC DATE: 01/24/94 HRS: 0:00 INST: 0 TYPE: ? RES: ? SCNR NBR: 0
RMKS: :
1ST DTE: 01/20/94 HRS: 2:00 INST: 6711 TYPE: SPC RES: S SCNR NBR: 0
RMKS: :
2ND DTE: 08/13/93 HRS: 4:00 INST: 5414 TYPE: SPT RES: S SCNR NBR: 0
RMKS: :
3RD DTE: 02/11/93 HRS: 2:00 INST: 6376 TYPE: SPC RES: S SCNR NBR: 0
RMKS: :

EDIT SAS DATA SET: KMPRECS.PRIMARY SCREEN
COMMAND ===> OBS 25?

*** RECURRENT TRAINING ***

EMP NBR: 70059 EMP NAME: HAYES JAMES P
BASE: PIT POS: F/O EQ: D9 SEN NBR: 4642 HIRE DTE: 12OCT87
SUPERVISOR TYPE: 0
GS BASE MON: AUG TRANSOCEANIC GS BASE MON: ___
GS DATE: 08/24/93 INST: 0 RES: S TO DATE: _____ INST: _____ RES: _
1ST DTE: 08/19/93 INST: 3495 RES: S 1ST DTE: _____ INST: _____ RES: _
2ND DTE: 08/21/92 INST: 3495 RES: S 2ND DTE: _____ INST: _____ RES: _
3RD DTE: 07/26/91 INST: 3495 RES: S 3RD DTE: _____ INST: _____ RES: _
PC BASE MON: FEB / AUG
PC DATE: 03/16/94 HRS: 0:00 INST: 0 TYPE: ? RES: ? SCNR NBR: 0
RMKS: :
1ST DTE: 03/15/94 HRS: 4:00 INST: 6376 TYPE: RLF RES: S SCNR NBR: 0
RMKS: :
2ND DTE: 07/10/93 HRS: 4:00 INST: 7213 TYPE: SPT RES: S SCNR NBR: 0
RMKS: :
3RD DTE: 07/16/92 HRS: 1:45 INST: 5414 TYPE: SPC RES: S SCNR NBR: 0
RMKS: :

SUMMARY ===

EMP NBR: 70059 EMP NAME: HAYES JAMES F
BSE: PIT POS: F/O EQUIP: D9 SUPERVISOR TYPE: 0
INT GS TYP: T INT GS COMP DTE: 08/17/90 HRS: 56:00 INST: 12769
*** FLIGHT TRAINING/CHECK/RATING ***
SIM TRN HRS: 24:00 SIM TRN INST: 5478 RESULTS: S
A/C TRN HRS: _____ A/C TRN INST: _____ RESULTS: _
SIM CK/RATING DTE: 08/31/90 FAA /CKP: /5478 HRS: 4:45 RESULTS: S
A/C CK/RATING DTE: _____ FAA /CKP: _____ HRS: _____ RESULTS: _
RMKS: GD KNLDG SYSTEMS, NEEDS WORK ON SCAN
LOFT COMP DTE: 09/01/90 HRS: 4:00 INST: 5478 RESULTS: S SNR NBR: __
OPER EXP COMP DTE: 09/07/90 JS HRS: _____ LC HRS: 19:34 LANDINGS: 15
OPER EXP INST: 12984 FAA: _____ RESULTS: S
PUCE COMP DTE: _____ HRS: _____ PUCE INST: _____

STATEMENT OF CAPTAIN MICHAEL REESE GREENLEE

1.

My name is Michael Reese Greenlee. Address deleted Kevin Mullis
My date of birth is [redacted] I am thirty-eight (38) years old.

2.

I give this statement for use by the National Transportation Safety Board in connection with the Board's investigation into the facts and circumstances surrounding the operation of USAir Flight 1016 at Charlotte, North Carolina on July 2, 1994, and for no other purpose whatsoever.

3.

Pursuant to § 7 of the Board's Aircraft Accident/Incident Investigation Procedures (49 C.F.R. § 831.7), I elect to exercise the right to be accompanied, represented and advised by counsel during the field investigation. I am represented by Kevin D. Fitzpatrick, Jr. Mr. Fitzpatrick is an attorney employed by the Air Line Pilots Association. His address is Air Line Pilots Association, Atlanta Field Office, 2314 Sullivan Road, College Park, Georgia 30337, (404) 763-3800, fax (404) 763-4976. I request that representatives of the Board direct all future contact through counsel.

4.

I served as Captain and Pilot-In-Command of Flight 1016.

5.

I hold Associates of Science and Bachelor of Science degrees from Embry Riddle University. Both degrees were awarded in 1979. In addition to Embry Riddle, I also spent two years at Case Western Reserve University.

6.

I first began to fly as a child. I have been logging time since age fifteen. I first made aviation a livelihood by working as Chief Flight Instructor for William Whitesell in Ormand Beach, Florida in 1978 and 1979. Concurrently, I worked for the Miami, Florida firm of Bellamy and Lawson as a DC-6 pilot. From late 1979 to 1981, I was employed by Madison Aviation as a pilot and Chief Flight Instructor, flying the Beech-18 and other aircraft. From 1981 to 1982, I was employed as a charter pilot by Ohio Aviation in Dayton, Ohio.

7.

I hold the rank of Captain with the 906th Reserve Fighter Group based at Wright Patterson Air Force Base. I have served in the Reserve since 1982. In that capacity, I have flown the following aircraft: T-37, T-38, AT-38, F-4, F-16. I was a Distinguished Graduate from Air Force pilot training. I currently serve as Squadron Safety Officer. In addition, I am designated as a Flight Leader and a Mission Commander.

8.

I have more than 9,000 total flight hours. Of these, 1400 are in high performance fighter aircraft.

9.

I am the holder of an Airline Pilot Certificate, Number [redacted]. A copy of that certificate is attached hereto.

10.

I have never before been a participant in any NTSB accident or incident investigation.

11.

I was hired by USAir on April 24, 1985. I was initially assigned as a First Officer on the B-737-200 and 300. Company procedures were later refined to provide for the segregation of the 737-200 and 737-300 fleets. I was then assigned to the 737-200. I upgraded to Captain on the DC-9 in 1990.

12.

With the exception of a six month period in which I was assigned as a DC-9 First Officer due to a force reduction at the Company, I have been a DC-9 Captain since 1990. I have been based at PIT during my entire tenure at USAir.

13.

My activities in the forty-eight hours prior to the accident include the following. On the evening of Thursday, June 30, I played 18 holes of golf. I went to bed at approximately 11:00 p.m. I arose the next morning, Friday, July 1, at approximately 7:30 a.m. I recall running and stretching that morning, as well as performing some household errands. Later in the day, I worked out for 2 hours at a karate studio. I went to bed that evening at approximately 10:00 p.m. I awoke the next morning, Saturday, July 2, at approximately 4:55 a.m. I drove to the Dayton airport in time to catch a 6:45 a.m. departure to PIT. We arrived in PIT at approximately 7:45 a.m. I recall reading the newspaper; updating my Jeppesen manuals and purchasing a book during the three hours between my arrival in PIT and the start of my flying assignment.

14.

Flight operations in the DC-9 are conducted by a two-member crew. One member of the crew, designated as the "Pilot Flying," is responsible for manipulating the controls of the aircraft in flight. The remaining member, designated as the "Pilot Not Flying," is responsible for handling communications with ATC and the Company; running checklists; and assisting the Pilot Flying as needed during the course of the flight. At the discretion of the Captain, Pilot Flying and Pilot Not Flying duties are typically rotated between crew members on successive legs.

15.

Flight 1016 occurred on the first day of a three day flying assignment. First Officer Phil Hayes was assigned to serve as Second-In-Command during this three day trip. I had never flown with First Officer Hayes prior to July 2, 1994.

16.

We departed PIT for LGA at approximately 10:45 a.m. That flight was uneventful. I served as the Pilot Flying on that leg.

17.

We departed LGA for CLT at approximately 12:50 p.m. First Officer Hayes was the Pilot Flying on that leg. That flight was also uneventful. While in CLT, we made an equipment change. The aircraft we picked up was Ship No. 954.

18.

I inspected the aircraft maintenance log before departing on the next leg. I do not recall seeing any deferred items or inoperable components in the log.

19.

We departed CLT for CAE at approximately 4:50 p.m. I served as the Pilot Flying on that leg. That flight was conducted in the absence of any unusual occurrences.

20.

We had a forty-two minute layover in CAE. During this layover, First Officer Hayes and I went to an airport restaurant to purchase sandwiches. We returned to the aircraft and ate the sandwiches before departing on Flight 1016.

21.

Prior to departing CAE on Flight 1016, I checked local weather from the CAE ATIS, and the enroute weather and CLT terminal weather from USAir supplied materials. Conditions enroute and at CLT were VMC, and forecast to remain so.

22.

First Officer Hayes served as the Pilot Flying on Flight 1016.

23.

The flight from CAE to CLT proceeded normally. I recall that we deviated from course on one or two occasions in order to provide a smoother ride.

24.

When we were approximately thirty miles from the field, I checked the current ATIS at CLT. In accordance with the Preliminary Landing Checklist, I advised First Officer Hayes to expect a clearance for a visual approach to 18L, 18R or 23. We were subsequently vectored for an Approach to 18R.

25.

As we began our downwind leg, we could see a cell located one to two miles South of the field, and directly off the departure end of 18R. I determined distance by reference to the CLT VOR DME. I then activated the aircraft weather radar. The radar indicated the presence of two cells. These included the cell that was South of 18R and a smaller cell that was located East of the field.

26.

A normal missed approach to runway 18R is conducted by flying the runway heading. Because of the presence of the cell on the published missed approach path, I briefed First Officer Hayes that we would turn to the right if a go-around was called.

27.

The aircraft turned onto the Final Approach path approximately nine miles from the field. Although I kept a scan of cockpit instruments, my primary attention was directed out of the aircraft. I could see the runway. I could also see that the cell was still situated South of the field. TCAS indications showed two aircraft on the 18R localizer ahead.

28.

The Approach continued normally. Landing Gear was down and locked, and flaps extended to forty degrees.

29.

When the aircraft was approximately two miles from the end of the runway, it began to rain. I reached up and activated the windshield wipers. I then reminded First Officer Hayes of the Decision Height for 18R at CLT.

30.

In order to determine the effect of the Southern cell on the landing environment, I contacted ATC and asked for Pilot Reports concerning the weather conditions close to the runway. The two aircraft immediately ahead of us reported "smooth" approaches to runway 18R. I then asked for a Wind Check.

31.

I recall hearing ATC broadcast a Wind Shear Advisory. At about this time, rain intensity increased abruptly and dramatically. I do not ever recall seeing rain fall that heavily.

32.

The flight remained smooth. I recall looking at the Airspeed Indicator and observing that we were at bug plus 10 KIAS. At approximately 1200 feet MSL, we lost all visibility. I then commanded a go-around.

33.

First Officer Hayes then began to push up the throttles; pitch up the nose and execute a turn to the right. I advised ATC that we were "on the go," and began to call out the Missed Approach procedures ~~(Max Power, Flaps 15, Positive Rate, Gear Up, and Stow the Spoilers).~~ I'm in group

34.

I remember calling "Max Power" and "Flaps 15." I do not recall seeing a positive rate on the IVSI. In a very short time, I felt a severe sink rate. I took control of the aircraft; called "Fire Wall Power," and shoved the throttles to the fire wall. We then got a stick shaker.

35.

Looking outside the aircraft, I could see that we were below the tops of trees. The GPWS began to cycle. I noticed that the airspeed was decreasing at a rapid rate and checked the back pressure. I attempted to keep the wings level and maintain aircraft control.

36.

I recall making three impacts. After the first impact, I recall seeing the ground in front of us. I pulled back on the yoke. The second impact was very severe. I recall my hands being torn away from the aircraft controls. We came to a rest with the third impact.

37.

I released my seat belt and looked over at First Officer Hayes. I could see that he was conscious and in the process of releasing his seat belt. I then opened the cockpit door and discovered that there was no aircraft beyond that point.

38.

I climbed out of the wreckage and saw Flight Attendant Rich Demary. I also saw Flight Attendant Shelly laying injured on the ground. First Officer Hayes was limping. Demary and I helped Hayes away from the aircraft. Shelly was helped to a spot near Hayes. A man came up to us. I told him to "call 911." He replied that the call had already been made.

39.

I recall that Demary stated that he could not find another Flight Attendant, Karen. I told Rich to walk around the wreckage in one direction, and that I would walk in the other. It was then that I noticed a fireball. I worked my way around the wreckage and found Karen standing. Her hands were severely burned. I brought her over to Demary. Demary then told me that there were people in the house

40.

We went into the house and could hear people behind a door. Voices were saying "get us out of here." Demary attempted to kick the door open. It opened only slightly. I could then see parts of the aircraft in the house.

41.

I walked out of the house to try to assess the condition of the other people. I was very disoriented at this point. I could see individuals and small groups of injured people sitting on the ground on the other side of the driveway. I walked over to check their condition. They were all conscious.

42.

Police and Paramedics began to arrive. A Paramedic asked me to sit down. He asked if I needed anything. I asked for water. He then brought me two glasses of water. I recall walking over to Demary and some other individuals that were standing near the house. I requested that they back away from the house because of the risk of fire or structural collapse. A paramedic then told me that he wanted Hayes, Shelly and I to travel to the hospital in the same ambulance. We were boarded into an ambulance and transported to the hospital.

43.

I suffered numerous lacerations on the head, arms, hands, and legs.

FURTHER AFFIANT SAYETH NOT.

This fifth day of July 1994.

[redacted]

Michael Reese Greenlee

STATEMENT OF FIRST OFFICER JAMES PHILLIP HAYES

1.

My name is James Phillip Hayes. Address deleted Reno Mills
My date of birth is [redacted] I am forty-one (41) years old.

2.

I give this statement for use by the National Transportation Safety Board in connection with the Board's investigation into the facts and circumstances surrounding the operation of USAir Flight 1016 at Charlotte, North Carolina on July 2, 1994, and for no other purpose whatsoever.

3.

Pursuant to § 7 of the Board's Aircraft Accident/Incident Investigation Procedures (49 C.F.R. § 831.7), I elect to exercise the right to be accompanied, represented and advised by counsel during the field investigation. I am represented by Kevin D. Fitzpatrick, Jr. Mr. Fitzpatrick is an attorney employed by the Air Line Pilots Association. His address is Air Line Pilots Association, Atlanta Field Office, 2314 Sullivan Road, College Park, Georgia 30337, (404) 763-3800, fax (404) 763-4976. I request that representatives of the Board direct all future contact through counsel.

4.

I served as First Officer and Second-In-Command of Flight 1016.

5.

I attended Dekalb Community College in Atlanta, Georgia and Spartan Aeronautical School in Tulsa, Oklahoma.

6.

I first began to fly in 1970. I first made aviation a livelihood by working as a Flight Instructor for Fulton Air Service in Atlanta, Georgia from 1974 to 1977. From 1977 to 1979, I was a pilot for Modern Air Freight in Atlanta, Georgia. From 1979 to 1987, I worked as a corporate pilot for the following firms: Edwards Warren Tire Company, Wiggins and Associates, West Lumber Company, Healthdyne and Oxford Industries.

7.

I have approximately 13,000 total flight hours.

8.

I am the holder of an Airline Pilot Certificate, Number [redacted]. A copy of that certificate is attached hereto.

9.

I have never before been a participant in any NTSB accident or incident investigation.

10.

I was hired by Piedmont Airlines on October 12, 1987. I was initially assigned as a Second Officer on the B-727 at GSO. I transferred to CLT in 1989. In the following year, 1990, I upgraded to the position of First Officer on the B-737-200 in PIT. After a couple of months in that position, I transitioned to a First Officer's position on the DC-9 in PIT.

11.

I have been a PIT based DC-9 First Officer since August 1990.

12.

My activities in the forty-eight hours prior to the accident included the following. I was on duty on Thursday, June 30. This was the second day of a four day flying assignment. I arrived at TRI at approximately 10:45 p.m. for an RON. I went to a Perkins Restaurant with the Captain and a Flight Attendant and purchased takeout food. ~~After dinner~~, I returned to the hotel. I went to bed at approximately 1:30 a.m. I arose the following morning, Friday, July 1, at approximately 9:00 a.m. I had cereal and coffee in the hotel; watched a television news program and read. I ate lunch at a Cracker Barrel restaurant located next to the hotel. I reported to the airport, with the rest of the flight crew, at approximately 12:40 p.m. We arrived at STL at approximately 8:40 p.m. for an RON. I went to bed between 11:00 and 11:30 p.m. that night. I arose the following morning, Saturday, July 2, between 6:00 and 6:30 a.m. We departed STL for PIT at approximately 8:10 a.m. on the last scheduled leg of that four day trip. We arrived in PIT at approximately 9:30 a.m. I began a three day flying assignment later that morning.

13.

Flight operations in the DC-9 are conducted by a two-member crew. One member of the crew, designated as the "Pilot Flying," is responsible for manipulating the controls of the aircraft in flight. The remaining member, designated as the "Pilot Not Flying," is responsible for handling communications with ATC and the Company; running checklists; and assisting the Pilot Flying as needed during the course of the flight. At the discretion of the Captain, Pilot Flying and Pilot Not Flying duties are typically rotated between crew members on successive legs.

14.

Flight 1016 occurred on the first day of a three day flying assignment. Captain Michael Greenlee was assigned to serve as Pilot-In-Command during this three day trip. I had never flown with Captain Greenlee prior to July 2, 1994.

15.

We departed PIT for LGA on our first leg at approximately 10:45 a.m. That flight was uneventful. I served as the Pilot Not Flying on that flight.

16.

We departed LGA for CLT at approximately 12:50 p.m. I was the Pilot Flying on that flight. That flight was also uneventful. While in CLT we made an equipment change. The aircraft we picked up was Ship No. 954.

17.

We departed CLT for CAE at approximately 4:50 p.m. I served as the Pilot Not Flying on that leg. That flight was conducted in the absence of any unusual occurrences.

18.

We had a forty-two minute layover in CAE. During this layover, Captain Greenlee and I went to an airport food vendor and purchased sandwiches, which we brought back to the aircraft. I ate half my sandwich, and stowed the remainder to eat later in CLT.

19.

I served as the Pilot Flying on Flight 1016.

20.

The flight from CAE to CLT proceeded normally. I recall that we deviated from course on one or two occasions in order to provide a smoother ride.

21.

While performing the Preliminary Landing Checklist, Captain Greenlee briefed that we would could expect a Visual Approach to 18L, 18R or 23.

22.

As we began our downwind leg I could see a cell located South of the departure end of runway 18R. The cockpit weather radar similarly was painting (red) a cell South of the field.

23.

A normal missed approach to runway 18R is conducted by flying the runway heading. Captain Greenlee briefed that we would turn to the right if a go-around was called.

24.

The aircraft turned onto the Final Approach path approximately nine miles from the field. Although I kept a scan of outside conditions, my primary attention was directed at cockpit instruments. I was flying the aircraft with reference to the localizer and glideslope. I could see that the cell was still situated South of 18R. I could see some rainfall between the aircraft and the runway. I do not recall seeing the runway.

25.

The Approach continued normally. Landing Gear was down and locked, and flaps extended to forty degrees. V Ref was approximately 122 KIAS. I maintained an airspeed of bug plus 10 KIAS.

26.

Captain Greenlee contacted ATC requesting Pilot Reports from the aircraft ahead of us. The two aircraft immediately ahead of Flight 1016 reported "smooth" rides on the approach to 18R.

27.

I recall the Captain requesting a wind check.

28.

When the aircraft was approximately two miles from the end of the runway, it began to rain. Captain Greenlee then briefed me on the Decision Height for 18R.

29.

The rain abruptly became very heavy. I recall that the airspeed indicator made a sudden increase of ten knots and then returned to bug plus ten.

30.

At approximately 1200 feet MSL, we lost all visibility. Captain Greenlee then called for a go-around.

31.

I pushed the throttles forward to Max Power; rotated the nose to a fifteen degree pitch attitude and began to execute a turn to the right. Captain Greenlee advised ATC that we were going around.

32.

Almost immediately, I felt a severe sink rate. I recall seeing the airspeed decrease below 120 KIAS. Captain Greenlee called "Fire Wall Power." He then placed his right hand over my left hand. We both pushed the throttles to the fire wall.

33.

We then got the stick shaker. Looking outside the aircraft, I could see that we were below the tops of trees ahead of us.

34.

I recall two impacts with the ground. The aircraft broke apart. When the nose section came to a rest, I looked over my right shoulder and saw fire outside the cockpit. I released my seatbelt and struggled out of my seat. As I climbed out of the aircraft, I realized that my foot was injured. I fell to the ground; got up and fell again. Captain Greenlee and Flight Attendant Rich Demary helped me across a driveway. I stayed there until paramedics placed me in an ambulance. I have a very poor concept of how much time passed. I heard Flight Attendant Shelly, who was sitting behind me on the driveway, screaming. I heard other screams and a baby crying. My head was cut and I was bleeding badly. I recall fire trucks arriving on the scene.

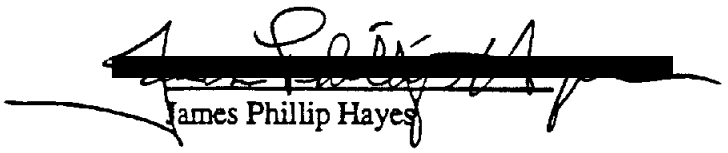
35.

A paramedic approached me and said that he wanted to keep the flight crew together. A short time later, Captain Greenlee, Shelly and I were boarded on an ambulance and transported to the Carolina Medical Center.

I suffered a severe laceration on my head, numerous other lacerations and a broken foot.

FURTHER AFFIANT SAYETH NOT.

This fifth day of July 1994.



James Phillip Hayes

DAVID GREENHAM

NOTES ARE NOT NECESSARILY IN SEQUENTIAL ORDER

July 2, 1994 Thoughts

- Trip pairing 82036
- Departed :41 late due to being overloaded with freight
- Heavy rain began at approximately 6:35pm
* Pushed back 6:41pm
* Push back crew advised that they would be closing ramp after our push-back
* Taxi from gate C12 to spot #2 near "A" concourse
- Turned on radar rounding "B" concourse...painted nothing despite very heavy precipitation
* Tried radar on numerous ranges, 5, 10, 20, 40 & 80 miles and still no precipitation showing.
* Observed obscuration over NW airport boundry. Heaviest rain appeared to be concentrated over TD zone of 18R, while midfield 18R had less clouds and precipitation.
- Observed a B-727 go-around approximately 4,000 ft. down runway
- Heard radio conversations from Ground Control apparently to CFR vehicles...cleared to cross all runways. CFR vehicles speeded past our right wing, one large vehicle fish-tailing near our right wing
- Saw smoke rising from behind trees approximately abeam a point 2000-3000 ft down runway.
* Heard Ground Control mention 50pax + 5 crew - souls on board apparently talking to CFR
* CFR was unable to exit the airport ramp area due to locked gate.
* Heard bits and pieces such as "Was it one of ours?" from a pilot taxiing and "Yes, it was one of ours", apparently from Ground Control.
* Not certain, but I believe CFR finally drove through locked gate. Precious time was lost...seemed like an eternity. All in cockpit expressed despair.
* At approximately 6:55-7:00pm, noticed smoke changing colors...apparently fire was being extinguished
* Approximately 7:05 smoke had turned to steam...fire finally out!!!
- All crew very upset, considered returning to gate. As a group, we decided to continue to PIT.
* Passengers on our flight (flight 392) never witnessed the accident, nor did we inform them. We kept the nose pointed at crash site so passengers could not see.

To: Herb LeGrow 6 Jul 94
Subject: Accident Investigation

I have been asked to put in writing the contents of my conversation with the accident investigation team on July 4th.

On July 2nd I was operating flight 808 from CLT to EWR. The flight was scheduled to depart the gate at 1800 but was delayed until 1825 due to passenger boarding. The aircraft was a DC-9. Taxi and takeoff were uneventfull and our takeoff time was 1835. Prior to departing the gate (concourse B) I noticed a cloud cover over the airport itself with clear skies to the immediate southeast through southwest. During taxi the skies appeared somewhat darker to the north and northeast. It appeared to be raining but I could not determine the intensity. We utilized the weather radar during taxi out but because of the location of the terminal building we could not get a good picture of the situation to the north. We were assigned runway 18L for departure. During the taxi out I observed no hazards to flight; surface winds were light and there was no precipitation taking place. The takeoff and climbout were normal. We encountered light rain from about 100 knots until gear retraction. The aircraft accelerated normally and no turbulence was encountered.

Capt K. Volodzko

[redacted]

TO: A.L.P.A., USAir

FROM: CAPT. ANDREW J. LACZKO, CLT B727

On July 3, 1994 I was Captain of USAir #332 departing AVL 18:20 scheduled CLT 18:57. Having just flown CLT-AVL one hour earlier, I was expecting flt 332 to be routine. Weather was typical summer afternoon with TCB, but no clouds giving radar return. Departing AVL I was cleared direct "Shine" then vectored for ILS 18R. VMC conditions prevailed with 4-7 mi. vis. and haze. My crew and I realized that there was precip between us and 18R when we were on 10 mi final and we heard CLT tower broadcast variable winds with gusts. We briefed for windshear and ILS. We were following a commuter and US #1016 with normal spacing. At aprox 18:39 we encountered heavy precip and noticed "down drafting" trend on G/S, made normal recovery. We heard #1016 say he was "on the go." Tower tried to reach #1016 unsuccessfully then told commuter to go around. We we still cleared to land and continued approach to aprox 500' AGL in heavy rain, nil visibility, but smooth ride. At aprox 500 AGL we were told to go around by tower. On go around we saw RW 18R centerline with fog patches but good visibility (as when a storm has passed. I landed USAir #332 aprox 25 minutes later on 36R CLT.

[redacted]

FAX 525-8350 [redacted]

** TOTAL PAGE.001 **

July 8, 1994

National Transportation Safety Board

Attention: Renee Mills

TO WHOM IT MAY CONCERN:

Pursuant to the request made by the NTSB, I am providing this summary of my telephone conversation today.

I flew with First Officer Phil Hayes on a trip pairing from June 22-25, 1994. Following our conversation, I had an opportunity to review a calendar to confirm these dates. During the course of this four-day trip, the crew overnighted in Flint, Michigan, Huntington, West Virginia, and Knoxville, Tennessee. During the course of this trip, I observed First Officer Hayes' operation of the aircraft and believe that he followed all appropriate checklists and all standard USAir procedures. To the best of my recollection, all of the approaches were VFR; there were no missed approaches or go arounds. I believe that First Officer Hayes is a very competent pilot.

Sincerely,

[redacted]

Captain Jay Lyle

07 July, 1994

From: Michael J. McGraw

To: NTSB Operations Investigation Group
USAir flight 1016 of 02 July, 1994
Charlotte, NC.

Via: Bob Tully
USAir/ALPA Accident Investigation Team
Charlotte, NC.

Subj: Statement for the ops group Chairman : Observation of Capt. Mike Greenlee's conduct of USAir trip pairing 75011 on 25 June, 1994.

Madam Chairman,

On June 25 1994 I was assigned by USAir system crew scheduling to fly as first officer on trip pairing 75011, a DC-9 one day grouping of flights 921 (DCA to CHS), and 84 (CHS to LGA). I reported to DCA at 08:30 and met Capt. Greenlee at 09:00. At this time Capt. Greenlee was contacted by system crew scheduling requesting that we also operate ferry flight 8029 (LGA to ROC) for aircraft positioning, then dead-head to our respective bases. I was immediately impressed with Capt. Greenlee's operational abilities and professionalism as he worked through the logistics of these irregular operations.

Flight 921 originated at 10:12 after crew introductions and preflight duties. Our cabin crew consisted of three new flight attendants on their first trip. Capt Greenlee took note of this fact and included many operational insights in his briefing to help them. His cockpit briefing was through and professional. The operation through out the day was conducted in a most professional manner and in compliance with all USAir operating procedures. Capt. Greenlee is a highly competent pilot and leader. His operations are conducted by the book and in an atmosphere of respect, cooperation and team work.

In review of my qualifications and back ground you will recall that I was employed by USAir in December of 1985, have flown the DC-9 for over 7 years as first officer and the FK-28 as captain from March to December of 1990. I have worked closely with the USAir DCA Chief Pilot office and the USAir ALPA safety organization in the capacity of base Local Air Safety chairman, and member of the accident investigation team. My military background includes 10 years of active duty flying Navy fighters and continues today where I am the Commanding Officer of a Navy Reserve adversary "Hornet" squadron flying the F/A-18. I have served as a Safety Officer in each of my Navy squadrons, including accident investigations.

I hope that you find this statement useful, please contact me with any questions/requests you may develop. I found Capt. Greenlee to be most competent and professional, and would not hesitate to fly with him any time. Thank you for your efforts.

Sincerely,

[redacted]

July 8, 1994

I flew with Michael Greenlee for three days, beginning June 20,1994. Mike was very professional, conducted a cockpit briefing as well as briefing the flight attendants. He had excellent CRM skills and made everyone feel comfortable right away. He conducted the trip the way he had briefed.

The first day was six legs PIT-ORD-PIT-ROC-SYR-BDL-BUF. We arrived in Buffalo at 2102 EST after a 12:07 duty day. Two flight attendants went for wings and the rest of the crew went to their rooms.

The next day the Captain told me, he get up, ate breakfast, worked out and went for a run. We started at 1225, flew BUF-PHL-DTW-CLT-MEM. Our departure was delayed out of Charlotte and we had to be rerouted. We departed on the Sadie transition to get around a line of weather and turned back to Volunteer when we were able. We arrived late in Memphis at 2243 and had to delay the next mornings departure for crew rest.

Day three we had a crew meal in Memphis, departed 0800 and flew MEM-CLT-TRI. Mike had been on duty for six days so he had to deadhead back to Pittsburgh.

I've been with USAir for over seven years, two on the BAC-111 and five on the DC-9. Based on this experience, Mike was an above average pilot and conducted all approaches VFR and IFR with standard briefings and procedures. His situational awareness was excellent and he had a good working knowledge of radar and always asked for vectors around weather. His flying was smooth and comfortable and landings excellent.

Sincerely,

Jenean Prince

Attn: Dan Sicchio ALPA

During the evening of July 2, 1994, I was the Captain on U S Air flight #52 departing from Charlotte Douglas airport headed for Stewart Field, New York. We were flying a DC-9-30, and tookoff at approximately 6:40 p.m. Pushback was normal at 6:29 p.m. but took a little longer then normal because it was a single mechanic operation. As we started to taxi for runway 18L, we heard a crack of lightning and it started to rain. I turned on the radar as we taxied, using the 10 or 20 mile scale, and we observed what could have been a cell north of the field. We were getting heavy rain which the radar painted red. When tower cleared us into position, we requested to hold in position and observe the weather. We observed no cells to the south. We also requested a PIREP from the previous departure and were told he had a good, smooth ride on departure. As we started the takeoff roll, the winds were reported as a crosswind at 10 to 12 knots. After the takeoff was in progress a windshear was reported by the tower. I do not remember the direction or intensity but remember my impression was that it was not bad, more like a gust. Our takeoff roll was normal with the exception of heavy rain. We used normal takeoff thrust with no reduction due to the wet runway, a flaps 5 setting, and aileron into the wind. We experienced no unusual wind on taxi or takeoff nor did we see any fluctuations in the engine instruments. I called for the wipers on high during the takeoff roll but everything else was normal. Once airborne we flew out of the rain and could see blue sky and some small clouds. Tower asked about our ride and conditions and we reported that we were out of the rain, in the clear and had encountered no turbulence on the climb out. As we turned to the east for the SID, I visually observed a line of clouds which appeared to be over the airport. It was at our 9 o'clock and appeared to go toward our 6 o'clock. I saw no evidence of a buildup and the tops of the clouds appeared to be in the 15,000 to 16,000' area. We had no other indication of the severity of the weather.

[redacted]

[redacted]

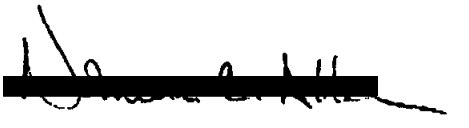
7-8-94

Statement from Norman Allen, Captain of "Carolina flight 5211" on July 2, 1994 at Charlotte international airport.

We were enroute from HKY to CLT. The weather was good VFR with scattered thunderstorms. CLT weather was reported as one mile visibility with rain. From about 30 miles out we could see a small cell in the vicinity of CLT. It also appeared on radar (Collins WXR 270). We were vectored for the ILS 18R behind US Air 1016. The rain appeared to be very localized with the heaviest rain over the center of the airport with a band of rain extending from about one mile north of the approach end of 18R, to the airport boundary to the west, to about 1/2 of the length of the runway toward the south. I recall the tower giving LLWS warnings at least two times. Once in the rain , US air 1016 soon advised they were" going around". The controller responded with "roger, fly runway heading and maintain 3000". 1016 then stated "we need a right turn". The US Air flight failed to respond to further transmissions from the tower.

At about this point, we were decending thru 1,000 ft agl on glideslope still in the clear. I mentioned to the first officer (FP) to be ready to go around , as we were approaching the rain. Upon entering we experienced moderate turbulence , 10 to 15 kt A/S fluctuations, along with moderate to heavy rain reducing forward visibility to near zero. At about 600ft AGL we were told to go around by the tower. We initiated normal go around procedures with a right turn so as to get out of the rain more quickly. The only thing we noticed that was unusual was that our airspeed was about 15kts faster than normal for go around pitch. Within seconds we were in the clear with a smooth ride. We turned left to parallel the runway and could clearly see the southern half of 18R in the sun, less than 1/2 mile away. We were asked if we saw anything, we did not. The remainder of our flight was uneventful.

The rain and turbulence from this cell was heavier than I had expected from my visual evaluation.



Wally Rees

July 8, 1994

ALPA Command Post
Holiday Woodlawn, Charlotte, NC
FAX ext. #1841
(704) 525-8350

Reference Captain Mike Greenlee.

I have approximately 12,000 hours, about 2,000 in the DC-9, the rest in jet transport aircraft at USAir, Frontier Airlines, and in the U.S. Navy. I am forty-nine years old.

I flew with Captain Greenlee on June 26 and 27. We flew several legs, had a 13-hour layover in St. Louis, and then flew a couple of legs the next day. I remember that we were tired from a hard day of flying through weather, and went straight to our rooms when we got to the hotel in St. Louis. I believe Mike was "out of time for the month", and so another reserve Captain picked up the remainder of the four-day trip in Charlotte on the 27th.

During the two days with Mike, we flew through weather and around thunderstorms, and I observed him using the radar in a professional manner. He adjusted pitch to gauge the height of thunderstorms, adjusted the intensity, and changed scales to gauge intensity.

This was the first time I had met or flown with Captain Greenlee. He immediately made me feel comfortable, and had a way of doing things "by the book", but in such a way that I felt that I was an important part of his team. He briefed me that he liked to do everything in the standard way, and that he used all the checklists according to normal company procedures. In fact, during the two days we flew together, I did not see him do anything other than standard company procedures. He always tuned his radios, used proper call-outs, etc.

We flew through a lot of weather on that trip and although I can't remember specific legs, I know that we had some thunderstorms in and around terminal areas, and flew some instrument approaches. As a somewhat seasoned First Officer, I would rate both his piloting skills and his "commandability" as excellent.

My wife reminds me that when I got home from that four-day trip, (of which Mike flew the first two days) that I was exhausted, and said it was the worst weather I had dealt with in years. If I had to pick a Captain to do that with again, Captain Greenlee would be at the top of the list.

Respectfully Submitted,

[redacted]

First Officer, USAir

On July 2, 1994 we operated FLT 983 from MDT to CLT. We flew the trip at FL2 and operated the Radar for the duration to observe numerous cells along our route. While approaching CLT we initially were planning a visual for 23 ~~but after~~ After vectoring and getting a visual on Rwy 23 we decided we were not in a good position for landing Rwy 23. CLT Approach gave us the option for a visual to 18R which we accepted. Heavy rain showers covered the south end of the field. We made a normal visual Approach to 18 R. We experienced no turbulence and no Airspeed Fluctuations. Smooth ride all the way to touchdown. On short final we started picking up rain and after touchdown and rollout rain Intensity increased. We cleared Rwy 18R on the reverse high speed E5. After taxing to the gate and securing the Aircraft, ~~at the~~ the rain stopped after Approximately 5 minutes. ~~and the sun was shining~~ Soon after the Sun was out again.

Capt. [redacted]
FO [redacted]

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Co./Dept. USAir	Co. USAir	
Phone #	Phone # [redacted]	
Fax #	Fax #	

July 8, 1994

Phone interview with Captain Gerard P. Fenzel, Base Manager - Pittsburgh, DC9, F100 and Renee Mills - NTSB, July 6, 1994

This interview was conducted by Renee Mills of the Operation Group investigating the aircraft accident of USAir flight 1016 which crashed in Charlotte on July 2, 1994.

Rence opened the interview stating the purpose of the interview and with introductions of the attending personnel..

The reason that I was chosen to be interviewed was because I had some supervisory responsibilities associated with the flight crew of flight 1016.

I told her that I was at the hospital in Charlotte on July 2, 1994 but was unable to see the flight crew of flight 1016. I did speak to Bob Gaudioso from ALPA.

Renee asked me about my aviation background which I gave as: Military Helicopter Pilot, Army trained, Vietnam experience, basic flight instructor through college, commuter airline pilot for approximately six years, hired by USAir in 1982 as a F/O BAC111, Captain BAC111, Captain F100, Line Instructor F100, Captain MD80, Check Airman MD80, presently flying the MD80 and currently working as a Base Manager in the Pittsburgh Chief Pilot's Office.

Renee asked if I was acquainted with the captain. I was familiar with his name but I could not picture him. I didn't see either of the pilots at the hospital.

Have I had any supervisory duties with regard to either of the accident pilots? Not at this time, I do not believe so.

Do you recall any events that either of them came to you for assistance? No, but I do recognize Mike's name. (As a note I am familiar with the Captain's name due to the fact that he usually sends me a copy of his military orders for his monthly drills).

We then spoke about some of the aspects of my job in reference to solving the operational problems which are written up by our line pilots. I gave an example of a problem which a line pilot may experience with catering and how that pilot would report the incident to his Chief Pilot Office. We also spoke on the subject of interpersonal relationships between different employee groups and how we intervene if there are problems and an example was given. We need this input from the pilot group so we as managers can address these operational or personal problems.

Is it safe to say that Mike has been cooperative? Absolutely, if he saw a problem out on the line I'm sure he would write it up. He is concerned with the company and how it is working out there as a line pilot going from point A to B.

Have I had any dealing with Phil? Not to my knowledge.

Did we have a professional crew? Both crew members were well qualified in the aircraft.

We then discussed the workings of the Chief Pilot's Office and the flow of information through the office; how the Chief Pilot passes on information to his Base Managers and the pilot group and how the Base Managers and pilots pass on the information to the Chief Pilot.

Submitted by: Captain G. Fenzel [redacted]