

**NATIONAL TRANSPORTATION SAFETY BOARD**

Office of Aviation Safety  
Washington, D.C. 20594

November 10, 1999

## **Human Performance**

### **Human Performance Group Chairman's Factual Report**

#### **A. ACCIDENT**

Operator: American Airlines (Flight 1420)  
Location: Little Rock, Arkansas  
Date: June 1, 1999  
Time: 2351 central daylight time<sup>1</sup>  
Aircraft: McDonnell Douglas, MD-82, N215AA  
NTSB Number: DCA99MA060

#### **B. HUMAN PERFORMANCE GROUP**

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<sup>1</sup> All times are central daylight time based on a 24-hour clock, unless otherwise noted.

### C. SUMMARY

On June 1, 1999, at 2351, a McDonnell Douglas MD-82, N215AA, operated by American Airlines as flight 1420, overran the end of runway 4R and collided with the approach light stanchion at the Little Rock National Airport (LIT), in Little Rock, Arkansas. The captain and 10 passengers sustained fatal injuries; the remaining 134 passengers and crewmembers sustained various injuries.

### D. DETAILS OF THE INVESTIGATION

The Human Performance Group convened in Little Rock, Arkansas, on June 3, 1999, to begin the field phase of accident investigation. The group interviewed by telephone ground personnel who were in contact with the flightcrew of AAL1420 before departure from Dallas/Fort Worth International Airport (DFW) on June 1. Ground support personnel from Chicago O'Hare International Airport (ORD -- the flightcrew's origination city for the trip) and Salt Lake City International Airport (SLC -- an intermediate stop) were also interviewed by telephone.<sup>2</sup> The group chair participated in the interview of the first officer from AAL1420 that was conducted by the Operations Group at the University Hospital of the University of Arkansas for Medical Sciences in Little Rock. The Human Performance Group provided support to the Meteorology Group interview of the AAL1420 dispatcher, and one group member (ML) attended that interview. Human Performance Group members also attended Operations Group interviews of pilots who had previously flown with the AAL1420 flightcrew (see Operations Group Field Notes). David Mayer (AS-50) participated in some interviews conducted by the Human Performance Group. Group activities in Little Rock concluded on June 6, 1999.

The group reconvened from July 19-21, 1999, at the American Airlines Training Center in Fort Worth, Texas, with the Operations Group, to conduct interviews of AAL and FAA personnel.<sup>3</sup> On July 22, 1999 both groups re-interviewed the AAL1420 first officer in Los Angeles, California.<sup>4</sup>

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<sup>2</sup> See attachment F.1 for interview summaries.

<sup>3</sup> Mike Leone and Evan Byrne were not present during these interviews. Barry Strauch, Chief of the Human Performance Division, served as interim chair during this period.

<sup>4</sup> Transcripts of the interviews conducted from July 19-22, 1999 are attached to the Operations Group Chairman's Factual Report.

## E. FACTUAL INFORMATION

### 1.1 History of Flight

#### 1.1.1 Pre-Departure DFW Activities

Flight 2080 from SLC arrived at DFW at 2010, 39 minutes late because of an airborne hold for weather during the approach into the DFW terminal area. As they taxied in, the flightcrew saw that there was no airplane at gate C16, which was the departure gate for flight 1420. Flight 1420 was originally scheduled to depart at 2028 and arrive LIT at 2141. However, before arrival at DFW, an ACARS<sup>5</sup> message showing a delayed departure time of 2100 for flight 1420 was sent to the flightcrew.

After deplaning, the flightcrew proceeded to the departure gate for flight 1420. According to ground personnel, the scheduled departure time continued to extend, in what they characterized as a creeping 15 minute delay, because the airplane had not arrived. Sometime after 2100 the first officer notified customer service personnel working the flight that they would reach their duty time limit about 2316.<sup>6</sup> He asked for the telephone number for dispatch and used the phone at the gate to contact the dispatcher.<sup>7</sup> The first officer told the dispatcher that they would time out soon and asked him to look into getting another airplane or canceling the flight. After the phone call, the flightcrew proceeded to the operations area. They returned about 10-15 minutes later and were on the airplane by about 2215.

According to gate personnel, announcements were made during the passenger boarding that there would be a crew duty time legality problem if the boarding was not expedited. Normal preboarding procedures for frequent fliers was not done. Gate agents said the flight was ready to depart about 2240.

While on the ground at DFW the captain called his wife and told her that storms had delayed their departure to LIT and they would be leaving shortly. The captain's wife described the call as routine and said that he sounded normal and did not seem anxious or tired.

According to the gate agents working the flight, the flightcrew was getting along, displayed a sense of humor, and it appeared that they wanted to go on the trip. The first officer told investigators that at DFW they wanted to get going, wanted to get to LIT, and were OK when they departed. He added that 14 hours was a long day but it was not out of the ordinary.

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<sup>5</sup> Automatic communication and reporting system.

<sup>6</sup> See Operations Group Chairman's Factual Report for information on contractual duty time limitations at AAL.

<sup>7</sup> The dispatcher stated that he received the first officer's call between 2150 and 2200.

## 1.5 Personnel Information

### 1.5.1 The Captain

The captain, age 48, was married (27 years) and had 2 children (20 year old daughter; 16 year old son). He was a 1972 graduate of the United States Air Force Academy and had left active military service in 1979 at the rank of Captain. In the Air Force he flew T-33 and EB-57 (Canberra) airplanes and held positions of Command Flight Examiner (B-57), Flight Scheduler, Safety Inspector, Squadron Safety Officer, and Instructor Pilot (B-57). After leaving the Air Force, he earned a M.S. in Chemistry.

The captain was hired by American in 1979.<sup>8</sup> In July 1998 the captain was promoted to check airman on the MD-80. According to the MD-80 Fleet Manager, the captain was recommended for selection to check airman by the ORD Base Manager and by another check airman because of his technical competence, performance as a line pilot, and because they believed that he had the ability and desire to instruct. A first officer who had flown with the captain in mid-1998 (before he upgraded to check airman) described him as professional and conservative in the cockpit, and a nice guy.

In January 1999, the captain was promoted to Chief Pilot at the ORD base. The ORD Base Manager stated that the captain was selected because he had the traits and skills that would make him a good chief pilot, including educational background, flying background, company achievements, leadership skills, communication skills, and compatibility with the other ORD managers.<sup>9</sup> The ORD Base Manager described the captain as a good leader and said that he was knowledgeable about the MD-80, had performed successfully as a check airman, and had a great deal of common sense. According to the ORD Base Manager, the captain wanted to become a chief pilot because he had been flying the MD-80 for a long time and wanted a change. The base manager said the captain seemed happy in the chief pilot position.

A first officer who flew one leg with the captain from ORD-DFW described him as a knowledgeable pilot who was not intimidating. The ORD Base Manager, who flew 2 legs with the captain in May said he was extremely comfortable flying with the captain and described the captain's style as relaxed but standard. An ORD-based check airman who knew, but had not flown with the captain, described the captain as "someone who does the right thing when no one's looking" and stated that the captain was a pilot who exhibited wisdom, experience, and did not advocate pressing things.

Company records show that the captain flew three trips in May totaling 14 hours 27 minutes. He last flew on 26 May 1999. The captain was scheduled to fly approximately 66 hours in June to satisfy a policy that required chief pilots to fly one month per year as a line pilot. The ORD Base Manager also encouraged chief pilots to fly the line once a week.

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<sup>8</sup> For additional details on the captain's AAL career see the Operations Group Chairman's Factual Report.

<sup>9</sup> The captain was ranked 3 of 15 candidates being considered for the position.

According to his wife, the captain was a nonsmoker, took no prescription medications, was an avid runner, and in good health. At the time of the accident he held a First Class medical dated February 9, 1999, with no restrictions. His consumption of alcohol was described as minimal. In the days before the accident he was reported to be in good health and was not taking medications. No significant life events occurred in the days or weeks before the accident.

When not working the captain enjoyed working around his house in a southwestern suburb of Chicago, Illinois, and participating in his children's sports activities. He also remained active in the USAF reserve as at the rank of Lieutenant Colonel and was in charge of the Northern Illinois Air Force Academy Liaison Program. The captain's finances and his personal situation were reported to be stable in the 12 months before the accident.

#### **1.5.1.1 72 Hour History**

The captain's wife described the his activities in the 3 days before the accident as routine. On non-flying days the captain would typically go to sleep between 2130 and 2200 and wake up about 0515, to leave for work about 0600. He worked a 5 day work week.

On Friday 28 May, the captain returned home from work about 1700-1730 and attended a neighborhood block party in the evening. According to his wife, there were no scheduled events during the period from Saturday to Tuesday morning and she described it as a quiet period. According to his wife, the captain went to sleep about the normal time (about 2200) and woke up later than usual (between 0700-0730) because the timing of the trip did not necessitate an early wake-up. The captain checked in for the first flight of the day at 1038.

#### **1.5.1.2 Other Information**

A search of records at the National Driver Register found no history of driver's license revocation or suspension.

#### **1.5.2 The First Officer**

The first officer, age 35, was married (about 4 years) and had one son (age 6 months). In 1987 he earned a B.S. in business administration. In 1988 he joined the United States Navy and completed primary flight training and had been selected for advanced jet training before he was given an honorable discharge in 1991 because of a reduction in forces. From 1991 to 1993 he worked as a corporate pilot flying C-210, Lear 35, and King Air airplanes. From 1994 until his date of hire at American, he was the director of operations/chief pilot for an air-charter company where he also flew a Lear 35.

The check airman who administered the first officer's Initial Operating Experience (IOE) at American described him as well prepared, of above average intelligence, and easy to get along with. A captain who flew with the first officer over 5 legs (12 hours flight time) in the month before the accident told investigators that he considered the first officer an above average new hire who was very competent and knowledgeable. Another captain who flew with the first officer in the month before the accident described him as an experienced pilot with good cockpit discipline. He stated that he had given the first officer an outstanding rating on his probationary report. Probationary reports in the first officer's personnel file contained above average ratings and favorable comments.<sup>10</sup>

Company records show the first officer had flown 65 hours in the month before the accident. He last flew on May 22 and 23, 1999. At the time of the accident he held a first class medical certificate with no restrictions dated November 12, 1998. In his application to AAL he stated he was a nonsmoker. The first officer stated he was not taking any medications during the accident trip.

The first officer lived in Redondo Beach, California, and was based in Chicago.<sup>11</sup> He reported a stable life situation. He was described by other pilots as happy to be an American Airlines pilot.

### 1.5.2.1 72 Hour History

On Sunday May 30, 1999 the first officer traveled from his home in California to Chicago.<sup>12</sup> He remained in the Chicago area relaxing around the house and was involved in routine activities on Sunday and Monday (May 30-31, 1999). On Monday he went to bed about 2200<sup>13</sup> and awoke the next day about 0730 feeling rested. He described his activities on the morning of the accident as normal for a 1044 show-time. The first officer checked in at ORD about 1018.

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<sup>10</sup> Captains flying with probationary pilots are requested to submit a probationary report after each trip. Compliance with this request is good, but there is no accounting to ensure a report is provided and no penalty for failing to submit one.

<sup>11</sup> The first officer said that he had been commuting from Los Angeles to Chicago for about 3 months before the accident and as a result he felt that his body clock was on central time.

<sup>12</sup> Information in this paragraph is from the interview of the first officer conducted on June 4, 1999. See Operations Group Chairman's Factual Report for a summary of this interview.

<sup>13</sup> In an interview on July 23, 1999, the first officer stated that he went to bed sometime between 2000 and 2200.

### 1.5.3 Flights 1226 and 2080

About 1143, the flightcrew departed ORD flying flight 1226 to SLC. The flight was described as routine and it arrived SLC at 1458. At SLC the flightcrew was observed working together in operations. About 1647, the flightcrew departed SLC flying flight 2080 to DFW. The flight was described as routine, except for a brief airborne hold because of weather over the DFW terminal area. All personnel interviewed who were in contact with the flightcrew on June 1, 1999, including those before departure from DFW, described the pilots as having good rapport and a good working relationship.

The first officer stated that he ate a full meal on the flight to SLC, ate half a meal on the flight to DFW, and had a fruit smoothie at DFW. The lead flight attendant on flights 1226 and 2080<sup>14</sup> stated that she served the crew meals and picked up empty trays on both flights.

### 1.5.4 Flight & Duty Time

At the time of the accident the flightcrew had accumulated 7 hours and 49 minutes flight time.<sup>15</sup> During the day, the captain accumulated 5 hours and 24 minutes ground time and the first officer accumulated 5 hours and 44 minutes ground time.<sup>16</sup> Therefore, the captain's duty day was 13 hours and 13 minutes, and for the first officer it was 13 hours and 33 minutes. Table 1 contains detailed information about the duty day on June 1.

Table 1.

Phase or Flight	Time of		Flight Time	Ground Time	
	Departure	Arrival		Captain	First Officer
ORD ground	---	---	---	1:05	1:25
1226 ORD-SLC	1143	1458	3:15	---	---
SLC ground	---	---	---	1:49	1:49
2080 SLC-DFW	1647	2010	3:23	---	---
DFW ground	---	---	---	2:30	2:30
1420 DFW-LIT	2240	2351	1:11	---	---
	Totals		7:49	5:24	5:44

<sup>14</sup> She said the meal was served to the flightcrew about 45 minutes after takeoff on this flight.

<sup>15</sup> Flight time is based on an accident time of 2351. AAL records estimate an arrival time to LIT of 2355 which would result in 7:53 flight time.

<sup>16</sup> Differences are the result of check-in time.

### 1.13 Medical and Pathological Information

Tissue specimens from the captain tested negative for ethanol and a wide range of drugs, including major drugs of abuse.<sup>17</sup> According to the American Airlines Medical Review Officer, post-accident drug and alcohol testing was not performed on the first officer because of the medical treatment he received on admission to the hospital.<sup>18</sup>

### 1.17 Organizational and Management Information

#### 1.17.1 Flight Safety

At the time of the accident, the Managing Director of Flight Safety<sup>19</sup> reported directly to the Vice President of Flight and Chief Pilot and was responsible for coordinating incident and accident investigation in support of the Managing Director of Safety and Environmental.<sup>20</sup> The Managing Director of Flight Safety also was responsible for investigating pilot reports from the Flight Net<sup>21</sup> system, assisting in the review of policy and procedures as they relate to flight technical and flight training, administering the American Airlines Safety Action Program<sup>22</sup> (ASAP), and coordinating flight department activities with the FAA. The Managing Director of Flight Safety said that he has a direct line to the Chief Executive Officer and the Executive Vice President of Operations if an identified safety concern has not been addressed at the vice president level.

Following an incident or accident, the Managing Director of Flight Safety meets with vice presidents from other departments to examine procedures and policies. FAA personnel are also included in these reviews as is the Manager of Human Factors and Safety Training. In addition, historical data from ASAP and OF-25<sup>23</sup> reports are examined to identify whether incident trends exist related to the event. Following the review initiated by the Managing Director of Flight Safety, the company determines whether corrective action is required.

The Managing Director of Flight Safety stated that American's corporate safety philosophy advocates that the personnel responsible for daily operations are also responsible and accountable for safety. Following a reorganization of management structure on January 1, 1999, the vice presidents of each operational department were

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<sup>17</sup> The five drugs of abuse tested in postaccident analysis are marijuana, cocaine, opiates, phencyclidine, and amphetamines.

<sup>18</sup> See attachment F.6

<sup>19</sup> Known as the Managing Director of Flight Operations Safety before January 1, 1999.

<sup>20</sup> The Managing Director of Safety and Environmental reports directly to the Executive Vice President of Operations and is responsible for coordinating among the operational departments at the company to maintain occupational safety.

<sup>21</sup> See 1.17.2

<sup>22</sup> See 1.17.2.2

<sup>23</sup> See 1.17.2.1



made responsible for and held accountable for ensuring safety under their respective operational control.

### 1.17.2 Pilot Reporting System

American collects information from flight crews about significant operational and safety information under its Flight Net system. There are two components in the system (OF-25 and ASAP) which co-exist to disseminate pilot information to the appropriate management unit. Approximately 18,000 to 21,000 pilot reports are received annually (including about 3,500 ASAP reports).

#### 1.17.2.1 OF-25 Reporting System

The OF-25 reporting system was implemented in 1992. Under this system, pilots are required to submit an OF-25 following the occurrence of one of 21 operational or safety-related events listed in the Flight Manual Part 1 (Section 18, Paragraph 1.2). For example, in-flight diversions, over weight landings, and passenger misconduct require an OF-25 report to be filed. Pilots can also voluntarily submit an OF-25 to notify management of other concerns or events not included in the mandatory reporting criteria. OF-25 reports are filed electronically by the captain and can be completed in about 10 minutes.

OF-25 reports are not confidential. Reports are routed to the chief pilot's office for initial review, categorization, and determination of corrective action. For example, OF-25 reports of diversions are evaluated by the chief pilot to determine the nature of the event, establish a root cause, and determine what corrective action is required.<sup>24</sup> The reporting pilot and chief pilot can route OF-25 reports to the ASAP program if they reflect a significant safety concern or a possible deviation from procedures. OF-25 reports are retained in the company's Flight Net database.

#### 1.17.2.2 American Airlines Safety Action Program

The American Airlines Safety Action Program (ASAP) was conceived in 1992 as a confidential reporting system to expand the Certificate Action Program and provide a means for collecting and disseminating information about incidents as a way to raise awareness and prevent accidents. Over the next 2 years, the program was defined by consensus agreement among American management, the Allied Pilots Association, and the FAA, and it started on 1 June 1994.<sup>25</sup> The Managing Director of Flight Safety is responsible for administering the ASAP program. In its first 5 years the ASAP program generated approximately 18,000 reports.

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<sup>24</sup> The ORD Base Manager said he reviewed about 12 diversion reports in the last year and did not recall any corrective actions being taken.

<sup>25</sup> See also FAA AC 120-66 Aviation Safety Action Programs (ASAP).

To participate in the ASAP program, pilots must submit reports within 24 hours of the event or the time in which the pilot became aware that the event occurred.<sup>26</sup> Pilots must also comply with any recommendations for corrective action made by the ASAP Event Review Team, which consists of representatives of the company, the pilot union, and the FAA. Deliberate, intentional, and criminal acts are excluded from the ASAP program.

ASAP reports are confidential and input directly to the Flight Safety department. Reports are distributed to the Managing Director of Flight Safety, a Manager of Flight Safety, and the Event Review Team.<sup>27</sup> The Event Review Team conducts an investigation and determines the corrective action required.<sup>28</sup> During the investigation, the Event Review Team will review pilot statements, interview pilots, and in some cases review flight recorder information. Following events in which pilot performance is questioned, an initial determination of pilot competency and proficiency is made using simulator training or line observation. If it is determined that a pilot is not competent then the pilot is excluded from the ASAP program and the FAA may conduct its own investigation and take appropriate action. If the investigation determines that the event was the result of a lack of proficiency, additional training may be required before the pilot is allowed back on the line. Where no pilot issue is involved, the investigation will review technical data or system procedures and make appropriate recommendations for corrective action.

Information derived from ASAP reports is disseminated to other pilots in the company. Bulletins containing ASAP emphasis areas and de-identified reports are circulated every 6 weeks to all pilots. ASAP reports are also maintained in a company database. The database is evaluated by the Manager of Human Factors and Safety Training on a periodic basis. Both the nature and categories of the events are examined in addition to a determination of a list of underlying contributing factors. On the basis of these analyses, American has established a top 10 list of event categories found in the ASAP data. Listed among the top 10 are: operational distractions / rushing to comply, automation dependency, and maintaining awareness of obstacles and terrain. Reporting trends are evaluated by the Managing Director of Flight Safety and used to refine recurrent training efforts and as topics in safety bulletins. Continued trend analysis is also used to determine the effectiveness of the targeting effort in reducing the incidence of reported events in a given category.

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<sup>26</sup> According to the Managing Director of Flight Safety, prompt notification is a requirement for both coordination requirement with the FAA and to demonstrate that the pilot was forthright and willing to come forward to notify the company of the event.

<sup>27</sup> By agreement, the FAA has immediate access to ASAP reports.

<sup>28</sup> In some cases, the Event Review Team may route the ASAP report to the OF-25 system if it does not represent a significant safety concern or if it would be better addressed under the OF-25 reporting system structure.

### 1.17.3 Human Factors and Safety Training

Since 1990, the company has had a Manager of Human Factors and Safety Training<sup>29</sup> (HFST) who reports directly to the Managing Director of Flight Training / Standards, who reports to the Vice President Flight and Chief Pilot.

The Manager HFST is supported by a staff of 10. Five of the current facilitators are qualified on the MD-80. Facilitators are line pilots (captains and first officers) detailed to the HFST program, many of whom have had previous experience in safety or instruction. First Officer facilitators are required to fly the line every third month, and when in the office, they are required to fly the line 2 days per month. Captain facilitators also serve half-time as check airmen on one aircraft fleet. Facilitators described ongoing communication among them as a way to review what is happening in the system, with training, and to fine tune the delivery of the training courses. In addition, a non-line-qualified lead program developer is assigned to the department to develop and coordinate curriculum content and teach classes.

All courses administered by the HFST program emphasize 4 fundamental cornerstones: situation awareness, communication, teamwork, and technical proficiency. In addition, courses address assertiveness, the continuing need to exchange information,<sup>30</sup> and the need to ensure that layers of protection are in place to guard against safety threats and error. Scenarios are developed for each course to generate discussion of these issues. Facilitators are trained to guide class discussion through a complete discussion of the scenario. This includes addressing the individual failures and factors which may have prevented the incident from becoming an accident.

Specific needs HFST course modules are given to flight dispatchers, flight attendants,<sup>31</sup> and pilots. Specific needs modules go beyond the basic 4 cornerstones by addressing information and raising issues relevant to the target audience with a customized set of event scenarios. In addition to a basic indoctrination module (3 hours) and a Reno integration module (2 hours), the following HFST modules are provided:

- First Officer Upgrade – 4-hour course attended by new first officers. Primary emphasis is on the first officer's role and responsibilities in the cockpit as a co-pilot. Expectations that the company has for first officers are presented via a video presentation of a round table discussion of the issue by fleet managers, training

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<sup>29</sup> Known as Manager, Crew Resource Management before 1996.

<sup>30</sup> This is also contained in the American Airlines Flight Manual Part 1, Section 3, Chapter 1 (Responsibility and Authority) and Chapter 19 (Human Factors Policy). See attachment F.6.

<sup>31</sup> These courses emphasize communication between the cabin and the cockpit and coordination during ground evacuations, emergency, and abnormal events. Courses are facilitated by a pilot-facilitator. Indoctrination training is 1 hour and the recurrent training program is 45 minutes.

personnel, and check airmen. The expectation and need for first officers to speak up and continue to speak up is emphasized in this course.<sup>32</sup>

- Captain Upgrade – 1-day course attended by new captains. Events pertinent to new captains are discussed. How to be an efficient manager of events is emphasized.
- Recurrent – 2-hour course attended jointly by flight engineers, first officers, and captains. Emphasis areas parallel the recurrent simulator events. The 1998 course focused on the need to identify threats in the environment and establish layers of protection. The 1999 course emphasized decision making and the management of the environment when faced with conflicting demands and information.
- Check Airman Course – 2-day course in which check airmen are trained to be facilitators and instructed in the application of HFST to LOFT debriefings.

Facilitators develop courseware under the direction of the Manager HFST. Most scenarios used in each module are derived from ASAP events and are re-created in simulators for video presentation. Scenarios are reviewed by check airmen to ensure that their content does not contradict policy and procedures. Facilitators work with the Manager HFST to establish program elements to discuss in each scenario. Selection and production of scenarios for the recurrent training module occurs during the first 6 months of the year. Other modules are not revised on an annual basis but may be fine tuned on the basis of current trends.

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<sup>32</sup> This is also presented in the Flight Manual Part I, Section 3, and is not limited to first officers. Paragraph 1.6 Flight Crewmember Responsibility to Offer Advice states: "Any cockpit crewmember who believes the aircraft is being handled improperly or placed in jeopardy, will immediately inform the Captain. The Captain may choose to disregard this advice, but regardless of the degree or frequency with which advice may go unheeded, cockpit crewmembers will be held responsible for continuing to offer advice for the Captain's consideration."

**F. LIST OF ATTACHMENTS**

F.1: Interview Summaries

F.2: Selected Excerpts From AAL2080 Flight Papers

F.3: Flight Schedule for June 1, 1999.

F.4: Letter From AAL Medical Review Officer.

F.5: Final Forensic Toxicology Fatal Accident Report

F.6: Selected Pages From American Airlines Flight Manual Part 1.

Submitted by:

*[original signed]*

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Evan A. Byrne  
Chairman, Human Performance Group

Date