

NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

June 6, 2000

Human Performance

Human Performance Group Chairman's Factual Report

A. ACCIDENT

Operator: EgyptAir (Flight 990)
Location: Near Nantucket, MA
Date: October 31, 1999
Time: 0150 eastern standard time¹
Aircraft: Boeing 767-366ER, SU-GAP
NTSB Number: DCA-00-MA-006

B. HUMAN PERFORMANCE GROUP

Bartholomew Elias, Ph.D. (Chair)
National Transportation Safety Board
490 L'Enfant Plaza East, SW
Washington, D.C. 20594

Barry Strauch, Ph.D.
National Transportation Safety Board
490 L'Enfant Plaza East, SW
Washington, D.C. 20594

Kristin Bolte, Ph.D.
National Transportation Safety Board
490 L'Enfant Plaza East, SW
Washington, D.C. 20594

Malcolm Brenner, Ph.D.
National Transportation Safety Board
490 L'Enfant Plaza East, SW
Washington, D.C. 20594

Major General (Ret.) Dr. Adel Fouad
Psychiatric Consultant, Medical Board
Egyptian Civil Aviation Authority
Heliopolis, Cairo, Egypt

Alan C. Brantley
Supervisory Special Agent
National Center for the Analysis of
Violent Crime, FBI Academy
Quantico, VA 22135

¹ All times are eastern standard time based on a 24-hour clock, unless otherwise noted.

C. SUMMARY

About 0150 eastern standard time (EST), on October 31, 1999, a Boeing 767-366ER, SU-GAP, operated by EgyptAir as Flight 990, crashed into the Atlantic Ocean about 60 miles south of Nantucket, MA. EgyptAir Flight 990 was being operated under the provisions of Egyptian Civil Aviation Regulations Part 121 and United States Title 14 Code of Federal Regulations Part 129 as a scheduled, international flight from John F. Kennedy Airport (KJFK), New York, New York to Cairo International Airport in Cairo, Egypt. The flight departed KJFK about 0122 EST, with four flight crewmembers, 10 flight attendants, and 203 passengers on board. There were no survivors. The airplane was destroyed by impact forces. Floating debris from the aircraft was recovered on the morning of October 31, 1999.

D. DETAILS OF THE INVESTIGATION

On November 1, 1999, Dr. Bart Elias and Dr. Barry Strauch of the Human Performance Group, along with P. D. Weston and Luke Schiada of the NTSB convened at the John F. Kennedy International Airport, Jamaica, New York. On November 2, 1999, pilots from EgyptAir Boeing 767 flight crews were interviewed at the Pennsylvania Hotel in Manhattan, New York. The New York phase of the investigation concluded on November 2, 1999.

On November 18, 1999, Dr. Bart Elias and Mr. Alan Brantley traveled to Cairo Egypt with the Operations Group and participated in interviews at EgyptAir Flight Operations and Egyptian Civil Aviation Authority (ECAA) Headquarters. While in Cairo, the NTSB investigation delegation sought to contact flight crew family members by making requests to do so through EgyptAir and also through the American Embassy in Cairo (see Attachment 7). The Cairo phase of the investigation concluded on November 27, 1999.

Follow-up investigation activities were conducted from NTSB Headquarters in Washington, DC. On January 20, 2000, Dr. Bart Elias and Dr. Malcolm Brenner of the NTSB along with Capt. Shaker Kelada from EgyptAir and Capt. Moshen ElMissiry of the Egyptian Civil Aviation Authority had a telephone conversation with Dr. Adel Fouad of the Egyptian Civil Aviation Authority Medical Board to review the content of the questionnaire for families of active flightcrew aboard EgyptAir Flight 990. During this conversation, it was agreed that Dr. Fouad would assist the family members with understanding the content and purpose of the questionnaire. On February 8, 2000, a formal letter and a copy of the questionnaire to be answered by the immediate family of active flight crewmembers aboard EgyptAir Flight 990 was sent to Ambassador Fahmy of the Egyptian Embassy, Washington, D.C. (Appendix 5, Item 5.6). This questionnaire was provided to the ambassador in response to his offer to assist the NTSB by facilitating contact with the flight crew's family members. A copy of the February 8, 2000, letter to Ambassador Fahmy and family questionnaire was also provided to the Egyptian investigation delegation on March 3, 2000. As of June 6, 2000, the human performance group had not received any responses to these questionnaires. On February 23, 2000, a letter containing questions to be answered by EgyptAir was delivered to the Egyptian investigation

delegation in Washington, D.C. (Appendix 5, Item 5.4). On May 15, 2000, the human performance group received a written response to this letter from EgyptAir (Appendix 5, Item 5.10).

On March 29-31, 2000, Dr. Malcolm Brenner and Dr. Kristen Bolte of the Human Performance Group participated in a flight simulation demonstration conducted at Boeing engineering test facilities in Seattle, Washington. Capt. Shaker Kelada from EgyptAir and Capt. Moshen ElMissiry of the Egyptian Civil Aviation Authority attended this demonstration. The simulator demonstration is the topic of a separate study report. The Seattle phase of the investigation concluded on March 31, 2000.

1. FACTUAL INFORMATION

1.1. History of Flight

1.1.1. Pre-Departure Activities

According to the EgyptAir flight dispatcher who accompanied the accident flight crew from the hotel to the airport, the flight crew departed the Pennsylvania Hotel in Manhattan at approximately 2330 eastern daylight time on October 30, 1999 and arrived at the John F. Kennedy International Airport (KJFK) about 40 minutes later. The dispatcher stated that during this time, the flight crewmembers appeared normal to him and there was nothing noteworthy in their conversations.

After arriving at KJFK, the captain that had operated SU-GAP as EgyptAir Flight 990 from KLAX to KJFK that evening reported that he met briefly with the accident flight crewmembers. He stated that they inquired about any problems with the aircraft, to which he responded that there were none other than an inoperative thrust reverser. He described the flight crew's mood as generally happy, but indicated that his conversation with them was very brief.

A pre-flight route and weather briefing was conducted inside the Alitalia dispatch office at the John F. Kennedy International Airport (KJFK). The EgyptAir dispatcher that conducted the briefing noted that the cruise captain and cruise first officer were not present at this briefing for unknown reasons.² According to the EgyptAir dispatcher, it is not necessary for both the command and cruise flight crews to attend this briefing, however, in his experience it is typical for both the command and cruise flight crews to be in attendance at this briefing.

According to the Alitalia dispatcher on duty the night of October 31, 1999, EgyptAir Flight 990 was pushed back from its gate at approximately 0105 and the

² EgyptAir operates its flights between New York's John F. Kennedy International Airport (KJFK) and Cairo International Airport (HECA) using two flight crews. The command crew, consisting of a command captain and command first officer on the Boeing 767, performs the takeoff and landing. The cruise crew, consisting of a cruise captain and a cruise first officer on the Boeing 767, relieves the command crew at a time agreed upon by the command captain. The terms "command" and "cruise" are used throughout this document to refer to the respective flight crews and flight crewmembers.

off block time based on air traffic control takeoff clearance was recorded as 0620 Zulu (0120 eastern standard time).

1.2. Injuries to Persons

1.3. Damage to Aircraft

1.4. Other Damage

1.5. Personnel Information

1.5.1. The Command Captain

1.5.1.1. Background

The command captain, age 57, received his Egyptian Airline Transportation Pilot License in 1990. He held type ratings in the Boeing 707, the Boeing 737, and the Boeing 767 (200 and 300 series) and had accumulated about 14,300 total flight hours. He received his most recent medical examination on October 21, 1999 and was found to be medically fit to fly with glasses according to the standards specified in Egyptian Civil Aviation Regulations Part 67, "Medical Standards and Certification" (Attachment 2).

1.5.1.2. 72-Hour History

The command captain arrived in New York during the afternoon of October 28, 1999, after serving as an active crewmember aboard EgyptAir Flight 989 from Cairo to New York. The command captain stayed at the Pennsylvania Hotel in Manhattan during his layover in New York before serving as the command captain aboard EgyptAir Flight 990 on October 31, 1999. Hotel records of his stay are summarized in Attachment 4.

1.5.2. The Command First Officer

1.5.2.1. Background

The command first officer, age 36, obtained his Egyptian Commercial Pilot License in 1990. He held type ratings in the Boeing 737-200 and the Boeing 767 (200 and 300 series) and had accumulated about 2,900 total flight hours. He had received his most recent medical examination on October 6, 1999, and was found to be medically fit to fly according to the standards specified in Egyptian Civil Aviation Regulations Part 67.

1.5.2.2. 72-Hour History

The command first officer arrived in New York during the afternoon of October 28, 1999, after serving as an active crewmember aboard EgyptAir Flight 989 from Cairo to New York. The command first officer stayed at the Pennsylvania Hotel in Manhattan during his layover in New York before serving as the command

first officer aboard EgyptAir Flight 990 on October 31, 1999. Hotel records of his stay are summarized in Attachment 4.

On the evening of October 30, 1999, the command first officer met with another EgyptAir Boeing 767 first officer in the hotel. They discussed the command first officer's upcoming wedding in Cairo and the command first officer was reported to be in a good mood.

1.5.3. The Cruise Captain

1.5.3.1. Background

The cruise captain, age 52, received his Egyptian Airline Transportation Pilot License in 1979. Prior to his civilian flying career, the cruise captain served as a pilot in the Egyptian military. He held type ratings in the Airbus A300-600R, the Boeing 737-500, the Airbus A300-B4, and the Boeing 767 and had accumulated about 11,850 total flight hours. He received his most recent medical examination on June 6, 1999, and was found to be medically fit to fly with glasses according to the standards specified in Egyptian Civil Aviation Regulations Part 67.

1.5.3.2. 72-Hour History

The cruise captain arrived in New York during the evening of October 28, 1999, after serving as an active crewmember aboard EgyptAir Flight 990 from Los Angeles International Airport (KLAX) to New York (KJFK). Previously, the cruise captain had operated EgyptAir Flight 989 as the command captain from Cairo to New York on October 21, 1999, and then operated EgyptAir Flight 989 from New York to Los Angeles on October 23, 1999. The cruise captain stayed at the Pennsylvania Hotel in Manhattan during his layover in New York before serving as the cruise captain aboard Flight 990 on October 31, 1999. Hotel records of his stay are summarized in Attachment 4.

1.5.4. The Cruise First Officer

1.5.4.1. Background

The cruise first officer, age 59, received his Egyptian Commercial Pilot License in 1965. He held type ratings in the Boeing 737, and the Boeing 767 (200 and 300 series) and had accumulated about 12,450 total flight hours. He received his most recent medical examination on July 28, 1999, and was found to be medically fit to fly with glasses according to the standards specified in Egyptian Civil Aviation Regulations Part 67.

Prior to his employment at EgyptAir, the cruise first officer was employed as a flight instructor for the Egyptian military and later for a civilian flight training institute in Egypt. The cruise first officer was reported to have taught basic aerobatics in single engine aircraft in these positions.

According to several EgyptAir pilots interviewed, the cruise first officer was typically addressed as "Captain" because he had taught many of the EgyptAir pilots at the Egyptian flight training institute. When asked why the cruise first officer had

never upgraded to captain at EgyptAir, EgyptAir employees interviewed stated that the cruise first officer chose not to study for or take the Airline Transportation Pilot written examination because it was administered in English and he had considerable difficulty with the English language. Without completing the requirement for the Airline Transportation Pilot license, the cruise first officer was not eligible to be promoted to captain. Also, because the cruise first officer was hired at EgyptAir in 1987 at the age of 47, he had a limited amount of time to be promoted to captain. According to the General Manager of Training for EgyptAir, pilots over the age of 55 are not put through transition training because of an EgyptAir policy that stipulates that pilots over 55 cannot be promoted. The cruise first officer would have reached age 60 on February 4, 2000, and according to Egyptian Civil Aviation Regulations (ECARs) established based upon International Civil Aviation Organization (ICAO) standards, he would have been required to retire from his flying career with EgyptAir on or before that date.

The cruise first officer was married and had five children. Three of his children were grown. His fourth child was attending a university in Cairo. The cruise first officer's youngest child, a 10-year old daughter, was diagnosed with lupus at the age of eight and had received medical treatment for this condition both in Egypt and in Los Angeles, California.

1.5.4.2. 72-Hour History

The cruise first officer arrived in New York during the evening of October 28, 1999 after serving as an active crewmember aboard EgyptAir Flight 990 from Los Angeles International Airport (KLAX) to New York. Previously, the cruise first officer had served as the command first officer aboard EgyptAir Flight 989 from Cairo (HECA) to New York (KJFK) on October 21, 1999 and EgyptAir Flight 989 from New York (KJFK) to Los Angeles (KLAX) on October 23, 1999. The cruise first officer stayed at the Pennsylvania Hotel in Manhattan during his layover in New York before serving as the cruise first officer aboard Flight 990 on October 31, 1999. Hotel records of his stay are summarized in Attachment 4.

During his layover in New York, the cruise first officer met informally with an EgyptAir Boeing 767 captain at the Hotel Pennsylvania on October 30, 1999. According to the Boeing 767 captain, the cruise first officer spoke about plans for his upcoming retirement during this meeting. The Boeing 767 captain also reported that the cruise first officer gave him a small sum of money. The captain that received this money stated that the cruise first officer told him that the money should be given to the cruise first officer's son in the event that anything should happen to the cruise first officer.

During his layover in New York, the cruise first officer also met informally with an EgyptAir Boeing 777 captain (who was also a neighbor of the cruise first officer in their Cairo neighborhood) at the Hotel Pennsylvania. The two met at about 1400 and again at about 2030 on October 30, 1999. During one of these meetings the cruise first officer gave this captain two Viagra pills from a sample package. According to the captain, the cruise first officer also gave him a pineapple. The Boeing 777 captain recalled that the cruise first officer seemed normal, "as he knew [him]," during their meetings on October 30, 1999.

Sometime after 2030 on October 30, 1999, the cruise first officer spoke by telephone to a Boeing 767 captain who was also staying at the Pennsylvania Hotel. During this telephone conversation, the two talked about family. Later that evening, the two met briefly before the cruise first officer departed for the airport. The Boeing 767 captain described the cruise first officer as a good friend who was about his age, and characterized the cruise first officer's mood on that evening as good.

1.5.5. The Boeing 767 Chief Pilot

1.5.5.1. Background

The Boeing 767 chief pilot for EgyptAir had been employed by EgyptAir since 1968 and had previously served as a pilot in the Egyptian military. He received his Egyptian Airline Transportation Pilot License in 1986. On July 14, 1988, his medical examination revealed a right bundle branch block in his electrocardiogram, however, coronary angiography revealed normal coronary vessels and normal left ventricular function. After assessment by cardiology and aviation medical consultants, he was granted a waiver finding him fit to fly with glasses with the stipulation that he was to be accompanied by a qualified pilot on the same type of aircraft when operating as a required flight crewmember. He received his most recent medical examination on May 23, 1999 and was found to be medically fit to fly with glasses according to the standards specified in Egyptian Civil Aviation Regulations Part 67 so long as he was accompanied by a qualified pilot on the same type of aircraft.

EgyptAir Boeing 767 pilots interviewed described the Boeing 767 chief pilot as a highly respected individual who was regarded as a father figure to many of the Boeing 767 pilots.

1.5.5.2. 72-Hour History

The 767 chief pilot was reported to be onboard Flight 990 only as a passenger, returning to Cairo after having conducted a line check of a 767 captain on a previous flight. In the early morning of October 30, 1999, the 767 chief pilot reportedly spent time with an EgyptAir Boeing 777 captain that had arrived at the hotel earlier that day. According to the EgyptAir Boeing 777 captain, he and the 767 chief pilot talked and drank some whiskey during this meeting which took place from about 0000 until about 0420 on the morning of October 30, 1999, in the 767 chief pilot's hotel room.

1.5.6. Mental Standards and Psychiatric Assessment of Pilots in Egypt

Part 67 of the Egyptian Civil Aviation Regulations specifies mental standards for issuance of first, second and third class medical certificates. These standards require that the applicant has no established medical history or clinical diagnosis of the following:

- 1) A personality disorder repeatedly manifested by overt acts;

- 2) A psychosis;
- 3) A bipolar disorder;
- 4) Substance dependence or substance abuse within the preceding two years (other than tobacco or ordinary xanthine- containing [e.g., caffeine] beverages); or,
- 5) Any other mental condition that the ECAA Surgeon determines will cause or be expected to cause the applicant to be unable to safely perform the duties or exercise the privileges of the airman certificate applied for or held.

Currently, Egyptian pilots are referred for psychiatric evaluation by a Egyptian Civil Aviation Authority (ECAA) Medical Board psychiatric consultant under the following circumstances:

- 1) At the start of initial flight training and upon application for a Private, Commercial or Airline Transportation Pilot license;
- 2) When referred for psychiatric evaluation by another medical section;
- 3) After missing several periodic medical examinations with the ECAA Medical Board;
- 4) After an accident of any type;
- 5) Upon testing positive during urine screening for substances of abuse during periodic medical examinations; or,
- 6) When referred for psychiatric evaluation by any other source (e.g., the person himself, family doctors, or company management).

The command captain passed his first full medical examination and psychiatric assessment on October 23, 1960. He passed his medical examination with psychiatric evaluation for his Commercial Pilot license on December 5, 1963, and passed his medical examination with psychiatric evaluation for his Airline Transportation Pilot license on February 12, 1970. There was no reported history of psychiatric consultation nor any reports regarding his behavior, either professionally or in groups, throughout his career as a pilot.

The command first officer passed his first full medical examination and psychiatric assessment to be a student pilot on March 4, 1982. He passed his medical examination with psychiatric assessment for his Commercial Pilot license on December 7, 1989 and passed a full medical examination and psychiatric assessment to be an EgyptAir pilot on July 30, 1992. There was no reported history of psychiatric consultation nor any reports regarding his behavior, either professionally or in groups, throughout his career as a pilot.

The cruise captain passed his medical examination with psychiatric evaluation for his Commercial Pilot license on May 10, 1979 and passed his medical examination with psychiatric evaluation for his Airline Transportation Pilot license on November 8, 1979. The cruise captain also passed the full medical examination to be an EgyptAir pilot on May 26, 1980. There was no reported history of psychiatric consultation nor any reports regarding his behavior, either professionally or in groups, throughout his career as a pilot.

The cruise first officer passed his full medical examination and initial psychiatric assessment, which was performed by the Egyptian Air Force Medical Council as part of his full medical examination for fitness to be a pilot in the Egyptian Air Force, on December 11, 1958. The cruise first officer passed his medical examination for his Commercial Pilot license on July 27, 1961. According to the Chief of the Egyptian Civil Aviation Medical Board, when the cruise first officer was hired by EgyptAir, his previous psychiatric evaluation performed by the Air Force Medical Council was reviewed by the chief of the Egyptian Civil Aviation Medical Board at that time (see Attachment 5.11). During his military and civilian flying career there was no reported history of psychiatric consultation nor any reports regarding his behavior, either professionally or in groups.

1.5.7 Height and Weight Data of EgyptAir Pilots Identified on the Cockpit Voice Recorder

Six EgyptAir pilots were positively identified on the cockpit voice recorder by the cockpit voice recorder group. These individuals consisted of three members of the flight 990 flightcrew, the EgyptAir Boeing 767 Chief Pilot, and two deadheading first officers. Height and weight data for these pilots was provided by the ECAA Medical Board based on records from the pilot’s most recent medical examination and are shown in Table 1.

Table 1. Height and weight data for EgyptAir pilots identified on the cockpit voice recorder.

Pilot	Height		Weight	
	Cm	Inches	Kg	Pounds
Ahmed Mohamed El Habashy (Command Captain)	169	66	105	231
Adel Anwar Hosny (Command First Officer)	177	69	80	176
Gameel Ahmed El Batoty (Cruise First Officer)	181	71	90	198
Hatem Aly Rushdy (767 Chief Pilot)	176	69	85	187
Rafaat Ayad (Deadheading First Officer)	172	68	97	214
Hesham Farouk (Deadheading First Officer)	173	68	91	200

1.6. Aircraft Information

1.7. Meteorological Information

1.8. Aids to Navigation

1.9. Communications

1.10. Aerodrome Information

1.11. Flight Recorders

1.12. Wreckage and Impact Information

1.13. Medical and Pathological Information

1.14. Fire

1.15. Survival Aspects

1.16. Tests and Research

1.17. Organizational and Management Information

1.17.1. *EgyptAir Office of Flight Safety*

The EgyptAir Office of Flight Safety is managed by the Director of Flight Safety who reports to the General Manager of Flight Operations. The office staff consists of the Director of Flight Safety, his secretary and four to five line pilots who volunteer their time working in the Office of Flight Safety. The office is responsible for flight incident and accident reporting, publishing a quarterly flight safety magazine, and distributing air safety information to pilots and management. According to the Director of Flight Safety, EgyptAir does not have a formal Crew Resource Management (CRM) training program for pilots. However, both the Director of Flight Safety and the General Manager of Training indicated that CRM principles and training are incorporated into simulator training and a formal CRM program for all pilots is under development.

1.18. Additional Information


1.19. Useful or Effective Investigation Techniques

LIST OF ATTACHMENTS

1. Interview Summaries
2. Egyptian Civil Aviation Regulation (ECAR) Part 67: Medical Standards and Certification
3. Egyptian Civil Aviation Authority Medical Board Summaries of Flight Crew Medical Histories
4. Hotel Record Summary
5. Correspondence
6. Records of Telephone Conversations and Meetings
7. Summary of Activities to Contact Flight Crew Family Members in Egypt
8. Excerpt on Egypt from 1999 CIA World Factbook

Submitted by:


6/7/00



Bartholomew Elias, Ph.D.
Chairman, Human Performance Group

June 6, 2000

Date