Turbulence injury, Boeing 757-2B7, May 24, 1998

Micro-summary: This Boeing 757-2B7 experienced severe turbulence in cruise, seriously injuring a flight attendant.

Event Date: 1998-05-24 at 1931 CDT

Investigative Body: National Transportation Safety Board (NTSB), USA

Investigative Body's Web Site: http://www.ntsb.gov/

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1. Accident reports can be and sometimes are revised. Be sure to consult the investigative agency for the latest version before basing anything significant on content (e.g., thesis, research, etc).

2. Readers are advised that each report is a glimpse of events at specific points in time. While broad themes permeate the causal events leading up to crashes, and we can learn from those, the specific regulatory and technological environments can and do change. ***Your company's flight operations manual is the final authority as to the safe operation of your aircraft!***

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National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB ID: FTW98LA243	Aircraft Registration Number: N619AU
Occurrence Date: 05/24/1998	Most Critical Injury: Serious
Occurrence Type: Accident	Investigated By: NTSB

Location/Time

Nearest City/Place	State	Zip Code	Local Time	Time Zone	
WICHITA	KS	67200	1931	CDT	

Airport Proximity: Off Airport/Airstrip	Distance From Landing Facility:	Direction From Airport:

Aircraft Information Summary

Aircraft Manufacturer	Model/Series	Type of Aircraft
Boeing	757-2B7	Airplane

Sightseeing Flight: No Air Medical Transport Flight: No

Narrative

Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:

On May 24, 1998, at 1931 central daylight time (CDT), US Airways flight 007, a Boeing 757-2B7, N619AU, encountered severe turbulence during cruise flight at 39,000 feet mean sea level (msl) approximately 75 nautical miles (NM) southeast of Wichita, Kansas. There were 120 passengers, 2 flightcrew members, and 6 flight attendants aboard the airplane. One flight attendant was seriously injured, and three flight attendants and three passengers sustained minor injuries. There was no damage to the airplane. The regularly scheduled passenger flight was operating under 14 Code of Federal Regulations Part 121. Flight 007 departed from Pittsburgh, Pennsylvania, at 1810 eastern daylight time and was en route to Los Angeles, California. An instrument flight rules (IFR) flight plan had been filed; however, according to the flightcrew, the airplane was operating in visual meteorological conditions at the time of the accident. Following the turbulence encounter, the flight diverted to Will Rogers World Airport in Oklahoma City, Oklahoma, and landed without further incident at 2004 CDT.

According to the captain, as the flight approached the Wichita area, he "altered [the] flight path to the left to avoid weather observed on [the airplane's] weather radar and reported by other aircraft." The captain reported that the "nearest radar returns were 40 - 50 NM off to our right." He further reported that he turned on the seat belt sign and made an announcement to the passengers when the flight encountered "light chop approximately eight minutes prior to the severe turbulence encounter." Following the turbulence encounter, the lead flight attendant advised the captain that two of the flight attendants were injured, and he elected to divert to Oklahoma City for medical assistance.

The first officer's recollection of the event agreed with the captain's. According to the first officer, "the nearest radar returns were well off to our right, approximately 60 NM."

The seriously injured flight attendant reported that the seat belt sign was on and an announcement to the passengers had been made. It "started getting turbulent," and she entered the rear galley to assist another flight attendant in closing and latching compartments. She stated that, "the next thing I knew was my head hit the ceiling and then I was slammed onto the floor." According to the flight attendant, in addition to muscle strains and bruises, she sustained "4 hairline fractures in the L2 & L4 vertebrae and the knobs had been broken off."

Of the three flight attendants who received minor injuries, one was in the rear galley with the seriously injured flight attendant, another was assisting the lead flight attendant in stowing a cart at the rear of the first class cabin, and the third was in the first class galley. All three reported that following "some mild turbulence," there was a sudden "violent jolt that slammed [them] against the ceiling of the aircraft."

According to information provided by the FAA's Kansas City Air Route Traffic Control Center, at 1926, flight 007 requested a deviation of 10 degrees left of course for about 100 miles. The air

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Narrative (Continued)

traffic controller working the flight approved this request. At 1932, flight 007 advised the controller that the flight needed to deviate more to the left, about 20 degrees. Flight 007 further advised the controller that the flight had encountered occasional severe turbulence about 10 miles ago. At 1940, flight 007 advised the controller that the severe turbulence had injured two flight attendants and requested to proceed direct to Oklahoma City.

Review of flight data recorder information indicated that the turbulence encounter occurred at approximately 1931. Radar data provided by Kansas City Center indicated that at this time, the airplane was located about 37 degrees 00 minutes 29 seconds north latitude and 96 degrees 05 minutes 53 seconds west longitude, at a pressure altitude of 39,000 feet msl (flight level (FL) 390).

An NTSB meteorologist reviewed Geostationary Operational Environmental Satellite (GOES) data. The GOES 9 visible images for 1900 and 1930 showed a large convective cloud area west-northwest of the location of the turbulence encounter (to the right of the flight path). Looping of the visible images indicated that this area was expanding to the east-southeast (towards the flight path). Plotting the radar data provided by Kansas City Center on the 1930 GOES 9 infrared image showed that when the airplane was at locations corresponding to radar return times of 1925:22 to 1934:58, maximum cloud tops were greater than FL 350 but less than FL 390.

The NTSB meteorologist also reviewed Doppler weather radar data from the Tulsa, Oklahoma, WSR-88D site (KINX). Cross sections of weather radar reflectivity (in dBZ) along the flight path of flight 007 were constructed for KINX times of 1919:37, 1925:27, and 1931:18. For the area where the turbulence encounter occurred, the cross sections showed weather radar echoes to a height of 13 kilometers (43,000 feet) at 1919:37, to a height near 14 kilometers (46,000 feet) at 1925:27, and to a height near 14 kilometers at 1931:18. The maximum radar reflectivities in the region of the turbulence encounter were 29 dBZ (very weak weather echoes) at 1919:37, 46 dBZ (very strong weather echoes) at 1925:27, and 50 dBZ (intense weather echoes) at 1931:18.

Plan view weather radar reflectivity images at several elevation angles for KINX times 1919:37, 1925:27, and 1931:18 were examined. Within about a 10-kilometer (5.4 NM) radius of the turbulence encounter location, the images showed a maximum weather radar echo intensity of 37 dBZ (moderate weather echo) at 1919:37, 46 dBZ (very strong weather echo) at 1925:27, and 55 dBZ (extreme weather echo) at 1931:18. The images also showed a large area of intense weather radar echoes located about 38 nautical miles west (to the right) of the flight path of flight 007.

Additionally, the NTSB meteorologist reviewed Convective SIGMET, Center Weather Advisory, and Tornado Watch messages in effect at the time of the event. There were no Convective SIGMETs or Kansas City Center Weather Advisories in effect for the location of the turbulence encounter. Tornado Watch number 409 issued at 1712 was in effect for an area that included the location of the turbulence encounter. In addition to tornadoes, the watch warned of 3-inch hail at the surface and aloft, wind gusts to 70 knots, and maximum cell tops to 55,000 feet msl. For further weather information, see the NTSB Meteorological Factual Report.

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Occurrence Date: 05/24/1998

Occurrence Type: Accident

Landing Facility/Approach Information

Airport Name	Airport ID:	Airport Elevation	Runway Used	Runway Length	Runway Width
		Ft. MSL	0		

Runway Surface Type:

Runway Surface Condition:

Type Instrument Approach:

VFR Approach/Landing:

Aircraft Information

Aircraft Manufacturer	Model/Series	Serial Number
Boeing	757-2B7	27198

Airworthiness Certificate(s): Transport

Landing Gear Type: Retractable - Tricycle

Homebuilt Aircraft?	Number of Seats:	Certified Max Gross Wt.	Number of Engines:
No	191	230000 LBS	2

Engine Type:	Engine Manufacturer:	Model/Series:	Rated Power:
Turbo Fan	Rolls-Royce	RB211-535E4	40100 LBS

- Aircraft Inspection Information

Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Airframe Total Time
Continuous Airworthiness	04/1998	311 Hours	26261 Hours

- Emergency Locator Transmitter (ELT) Information

ELT Installed?	ELT Operated?	ELT Aided in Locating Accident Site?

Owner/Operator Information

Registered Aircraft Owner	Street Address	City	State	Zip Code
US AIRWAYS, INC.	2345 CRYSTAL DRIVE	ARLINGTON	VA	22227

Operator of Aircraft	Street Address	City	State	Zip Code
Same as Reg'd Aircraft Owner	Same as Reg'd Aircraft Owner			

Operator Does Business As:

Operator Designator Code: USAA

- Type of U.S. Certificate(s) Held:

Air Carrier Operating Certificate(s): Flag Carrier/Domestic

Operating Certificate:

Operator Certificate:

Regulation Flight Conducted Under: Part 121: Air Carrier

Type of Flight Operation Conducted: Scheduled; Domestic; Passenger Only

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB ID: FTW98LA243

Occurrence Date: 05/24/1998

Occurrence Type: Accident

First Pilot Information

Name	City	State	Date of Birth	Age
On File	On File	On File	On File	55

Sex: M | Seat Occupied: Left | Principal Profession: Civilian Pilot | Certificate Number: On File

Certificate(s): Airline Transport; Commercial

Airplane Rating(s): Multi-engine Land; Single-engine Land

Rotorcraft/Glider/LTA: None

Instrument Rating(s): Airplane

Instructor Rating(s): None

Type Rating/Endorsement for Accident/Incident Aircraft? Yes | Current Biennial Flight Review?

Medical Cert.: Class 1 | Medical Cert. Status: Valid Medical--w/ waivers/lim. | Date of Last Medical Exam: 03/1998

- Flight Time Matrix	All A/C	This Make and Model	Airplane Single Engine	Airplane Mult-Engine	Night	Instrument Actual	Instrument Simulated	Rotorcraft	Glider	Lighter Than Air
Total Time	15979	1538								
Pilot In Command(PIC)										
Instructor										
Last 90 Days		155								
Last 30 Days		72								
Last 24 Hours		4								

Seatbelt Used? Yes | Shoulder Harness Used? Yes | Toxicology Performed? No | Second Pilot? Yes

Flight Plan/Itinerary

Type of Flight Plan Filed: IFR

Departure Point	State	Airport Identifier	Departure Time	Time Zone
PITTSBURG	PA	PIT	1810	EDT

Destination	State	Airport Identifier
LOS ANGELES	CA	LAX

Type of Clearance: IFR

Type of Airspace: Class A

Weather Information

Source of Briefing: Company

Method of Briefing:

National Transportation Safety Board

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Occurrence Date: 05/24/1998

Occurrence Type: Accident

Weather Information

WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
	0000		0 Ft. MSL	0 NM	0 Deg. Mag.

Sky/Lowest Cloud Condition: Clear 0 Ft. AGL

Condition of Light: Day

Lowest Ceiling: Unknown 0 Ft. AGL

Visibility: 0 SM

Altimeter: 29.00 "Hg

Temperature: °C

Dew Point: °C

Wind Direction:

Density Altitude: Ft.

Wind Speed:

Gusts:

Weather Condtions at Accident Site: Visual Conditions

Visibility (RVR): 0 Ft.

Visibility (RVV) 0 SM

Intensity of Precipitation: Unknown

Restrictions to Visibility: None

Type of Precipitation: None

Accident Information

Aircraft Damage: None

Aircraft Fire: None

Aircraft Explosion None

Classification: U.S. Registered/U.S. Soil

- Injury Summary Matrix	Fatal	Serious	Minor	None	TOTAL
First Pilot				1	1
Second Pilot				1	1
Student Pilot					
Flight Instructor					
Check Pilot					
Flight Engineer					
Cabin Attendants		1	3	2	6
Other Crew					
Passengers			3	117	120
- TOTAL ABOARD -		1	6	121	128
Other Ground	0	0	0		0
- GRAND TOTAL -	0	1	6	121	128

National Transportation Safety Board

FACTUAL REPORT
AVIATION

NTSB ID: FTW98LA243

Occurrence Date: 05/24/1998

Occurrence Type: Accident

Administrative Information

Investigator-In-Charge (IIC)

GEORGIA R. SNYDER

Additional Persons Participating in This Accident/Incident Investigation:

BYRON WALTON
FAA FSDO
OKLAHOMA CITY, OK 73108