



AVIATION



HIGHWAY



MARINE



RAILROAD



PIPELINE

# Aviation Investigation Final Report

<b>Location:</b>	Aylett, Virginia	<b>Accident Number:</b>	DCA24LA124
<b>Date &amp; Time:</b>	March 9, 2024, 13:31 Local	<b>Registration:</b>	N411WN
<b>Aircraft:</b>	Boeing 737	<b>Aircraft Damage:</b>	None
<b>Defining Event:</b>	Turbulence encounter	<b>Injuries:</b>	1 Serious, 1 Minor, 105 None
<b>Flight Conducted Under:</b>	Part 121: Air carrier - Scheduled		

## Analysis

On March 9, 2024, at 1331 eastern standard time, Southwest Airlines flight 4318 encountered turbulence during initial descent into Baltimore Washington International airport (BWI), Baltimore, Maryland. The flight was a regularly scheduled passenger flight from Northwest Florida Beaches International Airport (ECP), Panama City, Florida to BWI. As a result of the turbulence, one flight attendant sustained serious injuries. The airplane was not damaged, and the flight continued to BWI without further incident.

The flight deck crew reported that they were aware of, and had received, pilot reports of turbulence at lower altitudes on arrival into BWI. They had coordinated with the cabin crew during their preflight briefing about securing the cabin early and reiterated this again (as well as asking them to take their seats afterward) just prior to starting a standard terminal arrival (the RAVNN SIX) into BWI. As they began the arrival, they learned of a pilot report of severe turbulence at flight level (FL) 250 from an airplane on arrival into nearby Ronald Reagan Washington National Airport (DCA), Arlington, Virginia.

While the cabin crew were securing the cabin and galleys, the airplane encountered severe turbulence as it descended through FL270. The captain immediately made a public address announcement to the cabin for the flight attendants to take their seats. Flight attendants B and C were “tossed around....sent into the air” before landing on the floor of the aft galley. Flight attendant C sustained a hairline fracture to the left arm. A non-revenue Southwest Airlines flight attendant who was seated in the rear of the airplane rendered assistance to flight attendant C.

The captain declared a medical emergency and received an expedited approach into BWI. The first officer coordinated with airline operations and arranged for medical personnel to meet the airplane at the gate.

A post-accident review of weather records revealed that there were four pilot reports of moderate to severe turbulence from FL160 to FL250 in an area to the southwest of the accident location. A high-resolution rapid refresh numerical model computed for the time and location of the accident revealed that conditions were conducive for moderate clear air turbulence from FL250 to FL280. Infrared and visible satellite imagery depicted a transverse wave cloud pattern (often observed in turbulent conditions) over the accident area. The cloud temperatures were consistent with cloud tops near 33,000 ft above mean sea level.

A graphical Airmen’s Meteorological (G-AIRMET) information Tango (turbulence), issued by the National Weather Service, valid at the time of the accident advised of occasional moderate turbulence between FL180 and FL380 for much of the mid-Atlantic and northeast states. Graphic turbulence guidance products predicted areas of moderate turbulence over central Virginia moving northwest between 1300 and 1400 eastern standard time, at FL240.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

An encounter with clear air turbulence during descent.

Findings	
Environmental issues	Clear air turbulence - Effect on personnel
Environmental issues	Clear air turbulence - Awareness of condition

## Factual Information

### History of Flight

Enroute-descent	Turbulence encounter (Defining event)
-----------------	---------------------------------------

### Pilot Information

Certificate:	Airline transport	Age:	55,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	5-point
Instrument Rating(s):	Helicopter	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	
Medical Certification:	Class 1 Without waivers/limitations	Last FAA Medical Exam:	November 14, 2023
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	July 27, 2023
Flight Time:	19000 hours (Total, all aircraft), 11500 hours (Total, this make and model), 7600 hours (Pilot In Command, all aircraft), 194 hours (Last 90 days, all aircraft), 65 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

### Co-pilot Information

Certificate:	Airline transport	Age:	49,Male
Airplane Rating(s):	Multi-engine sea	Seat Occupied:	Right
Other Aircraft Rating(s):	None	Restraint Used:	5-point
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	
Medical Certification:	Class 1 Without waivers/limitations	Last FAA Medical Exam:	December 14, 2023
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	August 6, 2023
Flight Time:	10473 hours (Total, all aircraft), 5369 hours (Total, this make and model), 190 hours (Last 90 days, all aircraft), 83 hours (Last 30 days, all aircraft), 6 hours (Last 24 hours, all aircraft)		

## Cabin crew Information

<b>Certificate:</b>		<b>Age:</b>	Female
<b>Airplane Rating(s):</b>		<b>Seat Occupied:</b>	None
<b>Other Aircraft Rating(s):</b>		<b>Restraint Used:</b>	None
<b>Instrument Rating(s):</b>		<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>		<b>Toxicology Performed:</b>	
<b>Medical Certification:</b>		<b>Last FAA Medical Exam:</b>	
<b>Occupational Pilot:</b>	No	<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>			

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Boeing	<b>Registration:</b>	N411WN
<b>Model/Series:</b>	737 7H4	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	2001	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Transport	<b>Serial Number:</b>	29821
<b>Landing Gear Type:</b>	Retractable - Tricycle	<b>Seats:</b>	148
<b>Date/Type of Last Inspection:</b>	March 6, 2024 Continuous airworthiness	<b>Certified Max Gross Wt.:</b>	155000 lbs
<b>Time Since Last Inspection:</b>		<b>Engines:</b>	2 Turbo fan
<b>Airframe Total Time:</b>	74369 Hrs at time of accident	<b>Engine Manufacturer:</b>	CFM INTL.
<b>ELT:</b>	C126 installed, not activated	<b>Engine Model/Series:</b>	CFM56-7B24
<b>Registered Owner:</b>	SOUTHWEST AIRLINES CO	<b>Rated Power:</b>	24000 Lbs thrust
<b>Operator:</b>	SOUTHWEST AIRLINES CO	<b>Operating Certificate(s) Held:</b>	Flag carrier (121)

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Instrument (IMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	KOFP, 206 ft msl	<b>Distance from Accident Site:</b>	13 Nautical Miles
<b>Observation Time:</b>	13:32 Local	<b>Direction from Accident Site:</b>	225°
<b>Lowest Cloud Condition:</b>		<b>Visibility</b>	4 miles
<b>Lowest Ceiling:</b>	Broken / 9 ft AGL	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	8 knots / 21 knots	<b>Turbulence Type Forecast/Actual:</b>	Clear air / Clear air
<b>Wind Direction:</b>	180°	<b>Turbulence Severity Forecast/Actual:</b>	Moderate / Severe
<b>Altimeter Setting:</b>	29.75 inches Hg	<b>Temperature/Dew Point:</b>	12°C / 12°C
<b>Precipitation and Obscuration:</b>	Light - None - Mist		
<b>Departure Point:</b>	Panama City, FL (ECP)	<b>Type of Flight Plan Filed:</b>	IFR
<b>Destination:</b>	Baltimore, MD (BWI)	<b>Type of Clearance:</b>	IFR
<b>Departure Time:</b>	11:10 Local	<b>Type of Airspace:</b>	Class A

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 Serious, 1 Minor, 2 None	<b>Aircraft Damage:</b>	None
<b>Passenger Injuries:</b>	103 None	<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	1 Serious, 1 Minor, 105 None	<b>Latitude, Longitude:</b>	37.846,-77.232(est)

## Administrative Information

Investigator In Charge (IIC):	Brazy, Douglass
Additional Participating Persons:	AVP-110; FAA; Washington, DC
Original Publish Date:	April 30, 2024
Last Revision Date:	
Investigation Class:	<a href="#">Class 4</a>
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	<a href="https://data.ntsb.gov/Docket?ProjectID=193920">https://data.ntsb.gov/Docket?ProjectID=193920</a>

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).