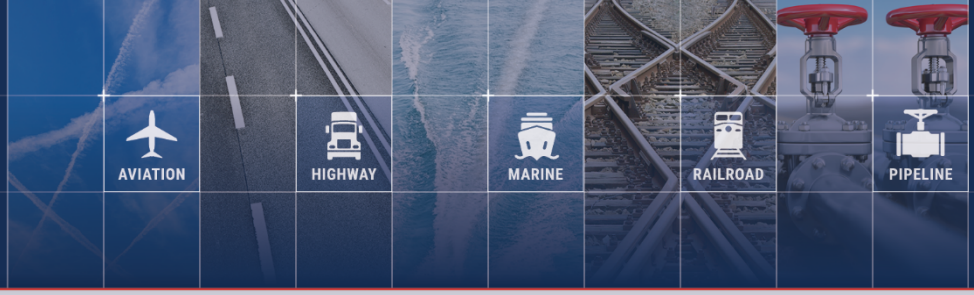

Aviation Investigation Final Report

Location:	Aylett, Virginia	**Accident Number:**	DCA24LA124
Date & Time:	March 9, 2024, 13:31 Local	**Registration:**	N411WN
Aircraft:	Boeing 737	**Aircraft Damage:**	None
Defining Event:	Turbulence encounter	**Injuries:**	1 Serious, 1 Minor, 105 None
Flight Conducted Under:	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

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

Aircraft and Owner/Operator Information

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

Meteorological Information and Flight Plan

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

Wreckage and Impact Information

Crew Injuries:	1 Serious, 1 Minor, 2 None	**Aircraft Damage:**	None
Passenger Injuries:	103 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Serious, 1 Minor, 105 None	**Latitude, Longitude:**	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:	Class 4
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=193920