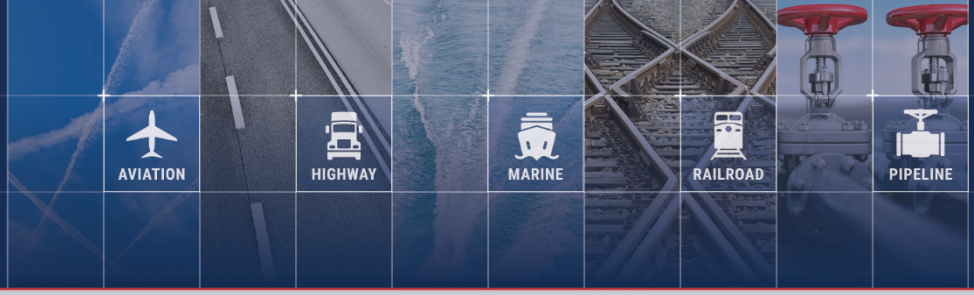

Aviation Investigation Final Report

Location:	Waynesville, North Carolina	**Accident Number:**	DCA20CA071
Date & Time:	February 7, 2020, 01:05 Local	**Registration:**	N610NN
Aircraft:	Bombardier CL-600-2D24	**Aircraft Damage:**	Minor
Defining Event:	Turbulence encounter	**Injuries:**	1 Serious, 22 Minor, 50 None
Flight Conducted Under:	Part 121: Air carrier - Scheduled		

Analysis

On February 7, 2020, about 0105 eastern standard time, PSA Airlines flight 5634, a Canadair CRJ-900, N610NN, encountered turbulence during enroute descent to McGhee Tyson Airport (KTYS), Knoxville, Tennessee. Of the 73 passengers and crew onboard, one flight attendant received serious injuries and there were 21 minor injuries. The airplane sustained minor damage. The regularly scheduled domestic passenger flight was operating under the provisions of 14 Code of Federal Regulations Part 121 from Charlotte Douglas International Airport (KCLT), Charlotte, North Carolina, to KTYS.

The accident flight departed 4 hours late due to the late arrival of the inbound airplane in KCLT because of persistent severe weather that had been in the area. According to the flight crew, they kept the seatbelt sign illuminated for the entire flight because of the late night and weather in the area. They indicated that the takeoff, climb, and cruise were uneventful. Most of the flight was conducted at flight level (FL) 220 in clear air, with clouds beneath.

As they approached KTYS, the flight was cleared to descend at pilot's discretion to 13,000 feet. During the descent, the onboard radar was on but did not depict any precipitation in the cloud layer below them. In the early stages of the descent, the flight began entering and exiting various cloud layers and experienced very light/intermittent chop. At about FL 185, the flight went into a cloud and encountered severe turbulence, causing the autopilot to disengage and the airplane pitched nose down rapidly. The pilot flying reduced power, leveled the wings, and the airplane quickly exited the clouds into visual meteorological (VMC) conditions again. The flight continued to experience moderate turbulence during the descent.

The captain called back to check on the flight attendants (FA) and passengers but initially received no reply. A short time later, the captain called back again and was informed by a dead-heading flight attendant (FA) that both FAs had been injured.

At the time of the turbulence encounter, the forward FA was preparing the galley for landing and was thrown to the ceiling and back to the floor, injuring both ankles. The FA could not stand, and a dead-heading pilot helped her to a passenger seat. The aft FA was conducting final compliance checks in the cabin and was also thrown to the ceiling and back to the floor, causing her to black out for a short time. Multiple passengers received various injuries, that included head bumps/bruises, scrapes, and anxiety issues. Two dead-heading FAs assumed the duties of the two injured FAs for the remainder of the flight. After landing, paramedics met the airplane at the gate and the two FAs and several passengers were transported to the hospital. The forward FA was diagnosed with fractures in both ankles.

Post accident examination of the weather data determined that the turbulence encounter occurred in a strong sheared environment with a 155-knot jet stream. There were several pilot reports (PIREPs) of moderate to severe turbulence in the area, and there was a National Weather Service SIGMET current for severe turbulence in the area.

Probable Cause and Findings

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

An encounter with severe convective turbulence associated with a strong sheared environment associated with the jet stream.

Findings

Environmental issues	Convective turbulence - Effect on personnel

Factual Information

History of Flight

Enroute-descent	Turbulence encounter (Defining event)

Pilot Information

Certificate:	Airline transport	**Age:**	53,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):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine	**Toxicology Performed:**	No
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	November 4, 2019
Flight Time:	8700 hours (Total, all aircraft), 2800 hours (Total, this make and model), 7700 hours (Pilot In Command, all aircraft), 235 hours (Last 90 days, all aircraft), 70 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Co-pilot Information

Certificate:	Airline transport	**Age:**	30,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**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:**	No
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	April 12, 2019
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	January 18, 2020
Flight Time:	3106 hours (Total, all aircraft), 1300 hours (Total, this make and model), 1602 hours (Pilot In Command, all aircraft), 9 hours (Last 90 days, all aircraft), 9 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Bombardier	**Registration:**	N610NN
Model/Series:	CL-600-2D24	**Aircraft Category:**	Airplane
Year of Manufacture:	2019	**Amateur Built:**	
Airworthiness Certificate:	Transport	**Serial Number:**	15476
Landing Gear Type:	Retractable - Tricycle	**Seats:**	
Date/Type of Last Inspection:		**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	Turbo fan
Airframe Total Time:		**Engine Manufacturer:**	General Electric
ELT:		**Engine Model/Series:**	CF34-8C5
Registered Owner:	American Airlines Inc.	**Rated Power:**	
Operator:	PSA Airlines	**Operating Certificate(s) Held:**	Flag carrier (121)

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Night
Observation Facility, Elevation:	TYS	**Distance from Accident Site:**	55 Nautical Miles
Observation Time:	05:53 Local	**Direction from Accident Site:**	119°
Lowest Cloud Condition:		**Visibility**	10 miles
Lowest Ceiling:	Overcast / 2800 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	9 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	280°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.35 inches Hg	**Temperature/Dew Point:**	6°C / 3°C
Precipitation and Obscuration:			
Departure Point:	Charlotte, NC (CLT)	**Type of Flight Plan Filed:**	IFR
Destination:	Knoxville, TN (TYS)	**Type of Clearance:**	IFR
Departure Time:	05:35 UTC	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	1 Serious, 1 Minor, 2 None	**Aircraft Damage:**	Minor
Passenger Injuries:	21 Minor, 48 None	**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	1 Serious, 22 Minor, 50 None	**Latitude, Longitude:**	35.488609,-82.988609

Administrative Information

Investigator In Charge (IIC):	Lovell, John
Additional Participating Persons:	
Original Publish Date:	January 26, 2021
Last Revision Date:	December 19, 2024
Investigation Class:	Class 4
Note:	This accident report documents the factual circumstances of this accident as described to the NTSB.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=100913