



AVIATION



HIGHWAY



MARINE



RAILROAD



PIPELINE

# Aviation Investigation Final Report

<b>Location:</b>	Wood, South Dakota	<b>Incident Number:</b>	DCA16IA215
<b>Date &amp; Time:</b>	August 11, 2016, 20:09 Local	<b>Registration:</b>	N632JB
<b>Aircraft:</b>	Airbus A320 232	<b>Aircraft Damage:</b>	Minor
<b>Defining Event:</b>	Turbulence encounter	<b>Injuries:</b>	27 Minor, 124 None
<b>Flight Conducted Under:</b>	Part 121: Air carrier - Scheduled		

## Analysis

The scheduled passenger flight was enroute at a cruise altitude of flight level 320 (FL320), when the airplane encountered severe turbulence. Of the 2 pilots, 3 flight attendants, and 146 passengers onboard, all three flight attendants and 28 passengers sustained minor injuries. The pilots subsequently diverted to a nearby airport and landed without further incident.

The pilots reported that the onboard weather radar depicted some precipitation along the route, and the captain informed the flight attendants to remain seated and turned the seatbelt sign on. After the flight exited some of the light precipitation, the crew observed cumulonimbus clouds ahead and subsequently requested and were granted a deviation around the clouds; however, the airplane encountered turbulence as it flew through the edge of the clouds. The first officer stated that it "felt like they went up and then dropped," and the captain described the encounter as "very violent and very quick."

The flight attendants reported that the flight had been experiencing light turbulence when the captain called to state that it would continue for the next 30 to 45 minutes. One of the flight attendants made a public address announcement to the passengers to remain seated with their seatbelts on; at this time, all three of the flight attendants were seated in their jumpseats. The turbulence continued for about 10 minutes before it smoothed out, and all three flight attendants got up from their seats to conduct various tasks throughout the cabin. The airplane subsequently encountered what they described as "extreme," "violent" turbulence, and all three sustained injuries.

A review of the flight plan showed convective SIGMETs and thunderstorms that were forecasted and valid on or near the route of flight. The pilots reported that they only saw areas of green returns on their onboard radar and did not see any indication of severe weather. Additionally, there were no pilot reports (PIREPs) to indicate that other aircraft were encountering severe turbulence, nor did air traffic control provide any information to indicate that they might encounter such turbulence.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this incident to be: an inadvertent encounter with convective turbulence while in cruise flight.

### Findings

Environmental issues	
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	Convective turbulence - Effect on personnel
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# Factual Information

## History of Flight

### Enroute-cruise

### Turbulence encounter (Defining event)

On August 11, 2016, about 2010 central daylight time, JetBlue Airways flight 429, an Airbus A-320-232, N632JB, encountered severe turbulence while in cruise flight and diverted to the Rapid City Regional Airport (KRAP), Rapid City, South Dakota. Of the 151 passengers and crew onboard, 31 received minor injuries. The flight was operated as a Title 14 *Code of Federal Regulations (CFR)* Part 121 regularly scheduled domestic passenger flight from General Edward Lawrence Logan International Airport (KBOS), Boston, Massachusetts, to Sacramento International Airport (KSMF), Sacramento, California.

The flight departed on schedule, and the taxi, takeoff, and initial climb were uneventful. The captain was the pilot flying and the first officer (FO) was the pilot monitoring at the time of the event. The captain reported that the flight had been experiencing intermittent "light chop" turbulence and that they had queried air traffic control (ATC) to see if a higher altitude might provide a smoother flight. When the controller advised that the turbulence would be worse at a higher altitude, they decided to remain at flight level 320. Shortly before the turbulence encounter, the onboard weather radar depicted precipitation ahead, and the controller advised of moderate precipitation; the captain subsequently informed the flight attendants to be seated in their jumpseats and turned the seatbelt sign on. After the flight exited some of the light precipitation, the crew observed cumulonimbus clouds and requested and were subsequently cleared for a deviation to the left; however, the airplane encountered turbulence as it flew through the edge of the clouds. The captain described the turbulence as "very violent and very quick."

During the turbulence encounter, computed airspeed increased from about 275 knots (kts) to 285 knots as the airplane was in a left bank, and the vertical acceleration increased to +1.7 g. After fluctuating at positive g values for about 6 seconds, the vertical acceleration began to decrease, reaching a maximum negative value of 0.75 g.

The flight attendants stated that the flight had been experiencing light turbulence when the captain called them to state that "it would be like this" for the next 30 to 45 minutes. One of the flight attendants made an announcement to the passengers to remain seated with their seatbelts on; at this time, all three of the flight attendants were seated in their jumpseats. The turbulence continued for about 10 minutes before it smoothed out, and all three flight attendants got up from their seats to conduct various tasks throughout the cabin. The airplane subsequently encountered what they described as "extreme," "violent" turbulence, and all three sustained injuries.

After the turbulence encounter, the captain contacted the flight attendants via the interphone, who informed him that they were injured. The captain decided to divert to KRAP and transferred control to the FO so that he could go back to the cabin and assess the injuries.

A review of the flight plan showed convective SIGMETs and thunderstorms were forecasted and valid on or near the route of flight. The pilots reported that they only saw areas of green returns on their onboard radar and did not see any indication of severe weather. Additionally, there were no pilot reports (PIREPs) to indicate that other aircraft were encountering severe turbulence nor any advisories of turbulence from air traffic control.

## Information

<b>Certificate:</b>	<b>Age:</b>
<b>Airplane Rating(s):</b>	<b>Seat Occupied:</b>
<b>Other Aircraft Rating(s):</b>	<b>Restraint Used:</b>
<b>Instrument Rating(s):</b>	<b>Second Pilot Present:</b>
<b>Instructor Rating(s):</b>	<b>Toxicology Performed:</b>
<b>Medical Certification:</b>	<b>Last FAA Medical Exam:</b>
<b>Occupational Pilot:</b>	<b>Last Flight Review or Equivalent:</b>
<b>Flight Time:</b>	

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Airbus	<b>Registration:</b>	N632JB
<b>Model/Series:</b>	A320 232 232	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	2006	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Transport	<b>Serial Number:</b>	2647
<b>Landing Gear Type:</b>	Retractable - Tricycle	<b>Seats:</b>	
<b>Date/Type of Last Inspection:</b>		<b>Certified Max Gross Wt.:</b>	169756 lbs
<b>Time Since Last Inspection:</b>		<b>Engines:</b>	2 Turbo fan
<b>Airframe Total Time:</b>		<b>Engine Manufacturer:</b>	IAE
<b>ELT:</b>		<b>Engine Model/Series:</b>	V2500SERIES
<b>Registered Owner:</b>	JETBLUE AIRWAYS CORP	<b>Rated Power:</b>	9895 Horsepower
<b>Operator:</b>	JetBlue Airways	<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>	Night
<b>Observation Facility, Elevation:</b>		<b>Distance from Accident Site:</b>	
<b>Observation Time:</b>		<b>Direction from Accident Site:</b>	
<b>Lowest Cloud Condition:</b>	Scattered / 35000 ft AGL	<b>Visibility</b>	
<b>Lowest Ceiling:</b>	Broken / 45000 ft AGL	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	/	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>		<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>		<b>Temperature/Dew Point:</b>	
<b>Precipitation and Obscuration:</b>			
<b>Departure Point:</b>	Boston, MA (KBOS)	<b>Type of Flight Plan Filed:</b>	IFR
<b>Destination:</b>	Sacramento, CA (KSMF)	<b>Type of Clearance:</b>	IFR
<b>Departure Time:</b>	17:25 Local	<b>Type of Airspace:</b>	

## Wreckage and Impact Information

<b>Crew Injuries:</b>	3 Minor, 2 None	<b>Aircraft Damage:</b>	Minor
<b>Passenger Injuries:</b>	24 Minor, 122 None	<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	27 Minor, 124 None	<b>Latitude, Longitude:</b>	43.498611,-100.480003

## Administrative Information

**Investigator In Charge (IIC):** Lovell, John

**Additional Participating Persons:**

**Original Publish Date:** September 22, 2020

**Last Revision Date:**

**Investigation Class:** [Class](#)

**Note:** The NTSB did not travel to the scene of this incident.

**Investigation Docket:** <https://data.ntsb.gov/Docket?ProjectID=93818>

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.

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