



# National Transportation Safety Board Aviation Accident Final Report

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<b>Location:</b>	Pine Ridge, SD	<b>Accident Number:</b>	CEN18LA146
<b>Date &amp; Time:</b>	04/24/2018, 1000 MDT	<b>Registration:</b>	N9746C
<b>Aircraft:</b>	CESSNA T303	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Structural icing	<b>Injuries:</b>	3 Minor, 1 None
<b>Flight Conducted Under:</b>	Part 135: Air Taxi & Commuter - Non-scheduled		

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## Analysis

Before the air taxi flight, the commercial pilot obtained a weather briefing via the company computer system and reviewed the weather information with the company chief pilot. The pilot stated that based on the computer briefing, which did not include icing conditions, he was aware of the forecasted weather conditions along the route of flight and at the intended destination. However, the briefing was incomplete as it did not contain any in-flight weather advisories, which would have alerted the pilot of moderate icing conditions expected over the flight route in the form of AIRMET Zulu.

After takeoff and during the climb to 12,000 ft mean sea level (msl), the airplane encountered light rime ice, and the pilot activated the de-ice equipment with no issues noted. After hearing reports of better weather at a lower altitude, the pilot requested a descent to between 5,000 and 6,000 ft. During the descent to 6,000 ft msl and with the airplane clear of ice, the airplane encountered light to moderate icing conditions. The pilot considered turning back to another airport but could not get clearance until the airplane was closer to his destination. Shortly thereafter, the pilot stated that it felt "like a sheet of ice fell on us" as the airplane encountered severe icing conditions. The pilot applied full engine power in an attempt to maintain altitude. The airplane exited the overcast cloud layer about 500 ft above ground level. The pilot chose to execute an off-airport emergency landing because the airplane could not maintain altitude. During the landing, the landing gear separated; the airplane came to rest upright and sustained substantial damage to the wings and fuselage. The pilot reported that there were no preaccident mechanical malfunctions or failures with the airplane that would have precluded normal operation and that the airplane was within its maximum gross weight.

Structural icing was observed on the airframe after the landing. Based on the weather information, which indicated the probability of icing between 5,000 and 9,000 ft over the region and a high threat of supercooled large droplets between 5,000 and 7,000 ft, it is likely that the airplane, which was equipped for flight in icing conditions, inadvertently encountered severe icing conditions consistent with supercooled large droplets, which resulted in structural icing that exceeded the airplane's capabilities to maintain altitude.

## Probable Cause and Findings

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

The airplane's inadvertent encounter with severe icing conditions during descent, which resulted in structural icing, the pilot's inability to maintain altitude, and an emergency landing. Contributing to the accident was an incomplete preflight weather briefing.

### Findings

<b>Aircraft</b>	Aircraft structures - Capability exceeded (Cause) Altitude - Attain/maintain not possible (Cause)
<b>Personnel issues</b>	Weather planning - Not specified (Factor)
<b>Environmental issues</b>	Conducive to structural icing - Ability to respond/compensate (Cause) Freezing rain/sleet - Ability to respond/compensate (Cause)

## Factual Information

On April 24, 2018, about 1000 mountain daylight time, a Cessna T303 airplane, N9746C, impacted terrain during an emergency off-airport landing after encountering severe icing conditions near Pine Ridge, South Dakota. The commercial pilot and two passengers sustained minor injuries, and one passenger was not injured. The airplane sustained substantial damage to the wings and fuselage. The airplane was registered to and operated by Aberdeen Flying Service, Aberdeen, South Dakota, as a Title 14 *Code of Federal Regulations* Part 135 on-demand air taxi flight. Day instrument meteorological conditions (IMC) prevailed, and an instrument flight rules flight plan was filed for the flight. The flight departed Aberdeen Regional Airport (ABR), Aberdeen, about 0930 central daylight time, and was destined for the Pine Ridge Airport (IEN), Pine Ridge, South Dakota.

Prior to the flight, the pilot obtained a weather briefing via the company computer system and reviewed the weather information with the company chief pilot. The pilot stated that based on the computer briefing, which did not include icing conditions, he was aware of the forecasted weather conditions along the route of flight and at the intended destination.

After takeoff and during the climb to 12,000 ft mean sea level (msl), the airplane encountered light rime ice, and the pilot activated the de-ice equipment with no issues noted with the equipment. After crossing over the Pierre Regional Airport (PIR), Pierre, South Dakota, the pilot heard via the radio reports of better weather at a lower altitude, and the pilot requested a descent to between 5,000 and 6,000 ft. During a descent to 6,000 ft msl, the airplane encountered light to moderate icing conditions. Prior to the descent, the airplane was clear of ice accumulation. The pilot thought about turning back to PIR but could not get clearance until the airplane was closer to IEN due to poor radio coverage. Shortly thereafter, the pilot stated it felt "like a sheet of ice fell on us" as the airplane encountered severe icing conditions. The pilot applied full engine power in an attempt to maintain altitude. The airplane exited the overcast cloud layer about 500 ft above ground level (agl). The pilot decided to execute an off-airport emergency landing because the airplane could not maintain altitude. The airplane touched down in a field about 25 miles from IEN. During the emergency landing, the landing gear separated, and the airplane came to rest upright.

The pilot reported no preaccident mechanical malfunctions or failures with the airplane that would have precluded normal operation, and the airplane was below its maximum gross weight.

A review of photograph images obtained by the operator confirmed the airplane retained structural icing after the landing.

At 0852, the IEN Automated Surface Observation System (ASOS), located 19 miles west-southwest of the accident site, reported wind from 350° at 15 knots gusting to 22 knots, 5 miles visibility in unknown precipitation and mist, ceiling overcast at 1,200 ft agl, temperature 2° C, dew point 1° C, altimeter 30.43 inches of mercury (Hg).

At 0952, IEN ASOS reported wind from 360° at 11 knots gusting to 20 knots, 6 miles visibility in unknown precipitation and mist, ceiling overcast at 1,300 ft agl, temperature 2° C, dew point 1° C, altimeter 30.45 inches of Hg.

The National Weather Service Aviation Weather Center Current Icing Products, which were available online for the preflight briefing, reported the probability of icing at 5,000 ft, 7,000 ft, and 9,000 ft, as follows: the probability indicated a greater than 75% probability of icing over South Dakota from below 5,000 ft through 9,000 ft. In addition, the icing intensity was depicted as light to moderate intensity, with a high threat of Supercooled Large Droplets at 5,000 ft and 7,000 ft over the region.

The preflight weather briefing did not include any inflight weather advisories, which would have alerted the pilot of moderate icing conditions expected over the flight route in the form of airmen's meteorological information (AIRMET) Zulu that was issued at 0700 and valid for 0900. AIRMET Zulu included moderate ice between 5,000 ft and flight level 180 with conditions continuing beyond 0900.

The preflight weather briefing did include a pilot report which indicated light rime icing conditions encountered by a commercial airplane climbing through IMC conditions between 3,500 ft and 10,000 ft. There was no current significant meteorological information (SIGMET) to prohibit the flight from operating at the time of the accident.

According to the Federal Aviation Administration's Instrument Flying Handbook FAA-H-8083-15B; Chapter 10 on page 10-24: "The very nature of flight in IMC means operating in visible moisture such as clouds. At the right temperatures, this moisture can freeze on the aircraft, causing increased weight, degraded performance, and unpredictable aerodynamic characteristics. Understanding avoidance and early recognition followed by prompt action are the keys to avoiding this potentially hazardous situation ... Structural icing is a condition that can only get worse."

## History of Flight

Prior to flight	Preflight or dispatch event
Enroute-descent	Structural icing (Defining event)
Emergency descent	Off-field or emergency landing
Landing	Collision with terr/obj (non-CFIT)

## Pilot Information

<b>Certificate:</b>	Flight Instructor; Commercial	<b>Age:</b>	28, Male
<b>Airplane Rating(s):</b>	Multi-engine Land; Single-engine Land; Single-engine Sea	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	3-point
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	Airplane Single-engine; Instrument Airplane	<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 2 Without Waivers/Limitations	<b>Last FAA Medical Exam:</b>	03/30/2018
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	01/19/2018
<b>Flight Time:</b>	(Estimated) 4602 hours (Total, all aircraft), 5655 hours (Total, this make and model), 4403 hours (Pilot In Command, all aircraft), 45 hours (Last 90 days, all aircraft), 30 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	CESSNA	<b>Registration:</b>	N9746C
<b>Model/Series:</b>	T303 NO SERIES	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	1983	<b>Amateur Built:</b>	No
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	T30300210
<b>Landing Gear Type:</b>	Tricycle	<b>Seats:</b>	6
<b>Date/Type of Last Inspection:</b>	03/30/2018, Annual	<b>Certified Max Gross Wt.:</b>	5150 lbs
<b>Time Since Last Inspection:</b>	6 Hours	<b>Engines:</b>	2 Reciprocating
<b>Airframe Total Time:</b>	8929 Hours as of last inspection	<b>Engine Manufacturer:</b>	CONT MOTOR
<b>ELT:</b>	C91 installed	<b>Engine Model/Series:</b>	TSIO-520-AE
<b>Registered Owner:</b>	ABERDEEN FLYING SERVICE	<b>Rated Power:</b>	250 hp
<b>Operator:</b>	ABERDEEN FLYING SERVICE	<b>Operating Certificate(s) Held:</b>	On-demand Air Taxi (135)
<b>Operator Does Business As:</b>		<b>Operator Designator Code:</b>	BGJA

## Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument Conditions	Condition of Light:	Day
Observation Facility, Elevation:	IEN, 3332 ft msl	Distance from Accident Site:	25 Nautical Miles
Observation Time:	0952 MDT	Direction from Accident Site:	210°
Lowest Cloud Condition:	Clear	Visibility	6 Miles
Lowest Ceiling:	Overcast / 1300 ft agl	Visibility (RVR):	
Wind Speed/Gusts:	11 knots / 20 knots	Turbulence Type Forecast/Actual:	/ None
Wind Direction:	360°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30.45 inches Hg	Temperature/Dew Point:	2° C / 1° C
Precipitation and Obscuration:	Moderate - Freezing - Drizzle		
Departure Point:	Aberdeen, SD (ABR)	Type of Flight Plan Filed:	IFR
Destination:	Pine Ridge, SD	Type of Clearance:	IFR
Departure Time:	0930 CDT	Type of Airspace:	Class G

## Wreckage and Impact Information

Crew Injuries:	1 Minor	Aircraft Damage:	Substantial
Passenger Injuries:	2 Minor, 1 None	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	3 Minor, 1 None	Latitude, Longitude:	43.183056, -102.560000 (est)

## Administrative Information

Investigator In Charge (IIC):	Aaron M Sauer	Report Date:	05/29/2019
Additional Participating Persons:	William Howell; FAA; Rapid City, SD		
Publish Date:	05/29/2019		
Note:	The NTSB did not travel to the scene of this accident.		
Investigation Docket:	<a href="http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=97102">http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=97102</a>		

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The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).