Aviation Investigation Final Report

Location:	Winner, South Dakota	**Accident Number:**	CEN14LA284
Date & Time:	June 10, 2014, 20:41 Local	**Registration:**	N8564S
Aircraft:	Air Tractor AT-301	**Aircraft Damage:**	Substantial
Defining Event:	Aerodynamic stall/spin	**Injuries:**	1 None
Flight Conducted Under:	Part 137: Agricultural		

Analysis

The commercial pilot was conducting a local agricultural application flight. The pilot reported that shortly after liftoff from runway 31, at an altitude of 3-5 ft above the runway, he heard a loud bang and the airplane began to yaw left. The airplane descended and bounced off the left side of the runway. The pilot stated that he increased the airplane's pitch to gain altitude, but the airplane encountered an aerodynamic stall and the left wing dropped. As he attempted to dump the load of insecticide, the airplane nosed over into the ground and came to rest inverted. The airplane sustained substantial damage to the fuselage, both wings, and the empennage. A postaccident examination revealed no evidence of a mechanical malfunction or failure that would have precluded normal operation during the flight. The engine, which separated from the airframe during impact, exhibited impact-related damage and no mechanical malfunctions.

The surface wind at the time of the accident would have resulted in an 8-knot tailwind during the takeoff. The effect of the tailwind would have resulted in a greater groundspeed and additional runway length needed to attain the proper liftoff airspeed. The pilot likely conducted a premature liftoff at an inadequate airspeed, which resulted in the airplane exceeding its critical angle of attack and entering an aerodynamic stall.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's improper decision to attempt a takeoff with a tailwind and his failure to achieve the proper airspeed for liftoff, which resulted in the airplane exceeding its critical angle of attack and entering an aerodynamic stall shortly after liftoff.

Findings

Aircraft	Airspeed - Not attained/maintained
Aircraft	Angle of attack - Not attained/maintained
Personnel issues	Aircraft control - Pilot
Personnel issues	Decision making/judgment - Pilot
Environmental issues	Tailwind - Decision related to condition
Environmental issues	Tailwind - Effect on operation

Factual Information

History of Flight

Takeoff	Other weather encounter
Takeoff	Aerodynamic stall/spin (Defining event)
Takeoff	Collision with terr/obj (non-CFIT)

On June 10, 2014, about 2041 central daylight time, an Air Tractor AT-301 airplane, N8564S, was substantially damaged when it impacted terrain shortly after takeoff at Winner Regional Airport (ICR), Winner, South Dakota. The commercial pilot was not injured. The airplane was operated by Semper Fi Aviation, LLC, under the provisions of Title 14 *Code of Federal Regulations* Part 137 without a flight plan. Day visual meteorological conditions prevailed for the local agricultural application flight that was departing at the time of the accident.

The pilot stated the airplane weighed about 5,000 lbs after being loaded with 200 gallons of insecticide and 90 gallons of fuel. The pilot reported there were no anomalies with the engine or the wheel brakes during his taxi and before takeoff runup. The takeoff was made on runway 31 (4,500 ft by 75 ft, concrete) and liftoff was achieved with about ½ of the runway remaining. The pilot reported that shortly after liftoff, at an altitude of 3-5 ft above the runway, he heard a loud bang and the airplane began to yaw left. The airplane descended and bounced off the left side of the runway. The pilot stated that he increased aircraft pitch to gain altitude, but the airplane entered an aerodynamic stall and the left wing dropped. As he attempted to dump the load of insecticide, the airplane nosed over and impacted the ground alongside the runway. The airplane subsequently came to rest inverted. The pilot was able to exit the airplane uninjured through the left-side window.

A postaccident examination was completed by a Federal Aviation Administration (FAA) airworthiness inspector. Examination of the runway surface revealed a tire skid mark that began about 1,000 ft from the departure end of runway 31. The skid mark was consistent with the tread width of a main landing gear tire. The wavy tire marking continued about 30 ft until it departed the left runway edge. A second tire skid mark, about 10 ft right of the wavy tire marking, began about 10 ft from the left edge of the runway. The airplane exited the left runway edge about 970 ft from the end of the runway and entered a grass field. There were at least 12 propeller strike marks in the ground between where the airplane departed the left edge of the runway and main wreckage. The main wreckage was in a grass field about 100 ft left of the runway edge and about 750 ft from the end of runway 31. The airplane was inverted and was facing back toward the runway on a southeast heading. There were propeller strike marks and oil-covered grass immediately preceding the main wreckage. The airplane sustained substantial damage to the fuselage, both wings, and the empennage. The aft fuselage was crumpled immediately forward of the horizontal stabilizer. The empennage remained attached to the aft fuselage. The vertical stabilizer and rudder were crushed when the airplane nosed over. The elevator remained attached to the horizontal stabilizer. The flaps and ailerons remained attached to the wings. Flight control continuity was confirmed at the accident site. The right landing gear and tailwheel remained attached to the fuselage. The left landing gear leg had separated from the fuselage; however, visual examination of the attachment fittings revealed signatures consistent with overstress separation. The engine had separated

from the airframe and was found adjacent to the fuselage under the left wing. The propeller remained attached to the engine. An examination of the engine revealed impact-related damage and no mechanical malfunctions. The No. 5 exhaust valve body was fractured, its exhaust valve cover was deformed and crushed inward, and the valve cover attachment studs were bent. The observed damage to the exhaust valve body was consistent with impact-related damage and not a mechanical malfunction. The postaccident examination revealed no evidence of a mechanical malfunction or failure that would have precluded normal operation during the flight.

At 2053, about 12 minutes after the accident, the ICR weather observing system reported wind from 130° at 8 knots, 10 miles surface visibility, clear sky conditions, temperature 21°C, dew point 13°C, and an altimeter setting of 29.77 inches of mercury. Further review of recorded wind data revealed a southeasterly wind of 8-13 knots during the 3 hours before the accident and the hour following the accident. The surface wind at the time of the accident, from 130° at 8 knots, had resulted in a direct tailwind during takeoff. In his accident report, the pilot reported that the surface wind was 130° at 2 knots.

The FAA Pilot's Handbook of Aeronautical Knowledge, states that a normal takeoff is when an airplane is headed into the wind. The effect of a tailwind requires an airplane to achieve a greater groundspeed and to use additional runway length to attain the airplane's liftoff speed during takeoff. If a pilot attempts liftoff below the specified airspeed an airplane could be difficult to control, have a very low initial rate of climb, or enter an aerodynamic stall. Additionally, if an excessive angle of attack is used to achieve a premature liftoff, the airplane may not be able to climb out of ground effect.

Pilot Information

Certificate:	Commercial	**Age:**	48,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Single
Other Aircraft Rating(s):	None	**Restraint Used:**	4-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	May 12, 2014
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	April 24, 2014
Flight Time:	(Estimated) 1491 hours (Total, all aircraft), 1158 hours (Total, this make and model), 1491 hours (Pilot In Command, all aircraft), 23 hours (Last 90 days, all aircraft), 23 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Air Tractor	**Registration:**	N8564S
Model/Series:	AT-301	**Aircraft Category:**	Airplane
Year of Manufacture:	1978	**Amateur Built:**	
Airworthiness Certificate:	Restricted (Special)	**Serial Number:**	301-0161
Landing Gear Type:	Tailwheel	**Seats:**	1
Date/Type of Last Inspection:	April 25, 2014 Annual	**Certified Max Gross Wt.:**	7400 lbs
Time Since Last Inspection:	23 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	10616 Hrs as of last inspection	**Engine Manufacturer:**	Pratt & Whitney
ELT:	Not installed	**Engine Model/Series:**	R1340-59
Registered Owner:	Semper Fi Aviation, LLC	**Rated Power:**	600 Horsepower
Operator:	Semper Fi Aviation, LLC	**Operating Certificate(s) Held:**	Agricultural aircraft (137)

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	ICR,2032 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	20:53 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	8 knots /	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:	130°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	29.77 inches Hg	**Temperature/Dew Point:**	21°C / 13°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Winner, SD (ICR)	**Type of Flight Plan Filed:**	None
Destination:	Winner, SD (ICR)	**Type of Clearance:**	None
Departure Time:	20:41 Local	**Type of Airspace:**	Class G

Airport Information

Airport:	Winner Regional Airport ICR	**Runway Surface Type:**	Concrete
Airport Elevation:	2032 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	31	**IFR Approach:**	None
Runway Length/Width:	4500 ft / 75 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	43.390277,-99.842224(est)

Administrative Information

Investigator In Charge (IIC):	Fox, Andrew
Additional Participating Persons:	Gary L Soldwisch; Federal Aviation Administration, Rapid City FSDO; Rapid City, SD
Original Publish Date:	June 25, 2019
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=89413