



National Transportation Safety Board Aviation Accident Final Report

Location:	San Angelo, TX	Accident Number:	FTW03FA089
Date & Time:	01/24/2003, 1015 CST	Registration:	N944FE
Aircraft:	Cessna 208B	Aircraft Damage:	Destroyed
Defining Event:		Injuries:	2 Serious

Flight Conducted Under: Part 91: General Aviation - Instructional

Analysis

The airplane impacted a dirt field and a power line following a loss of control during a simulated engine failure while on a Part 135 proficiency check flight. Both pilots were seriously injured and could not recall any details of the flight after the simulated engine failure. Witnesses observed the airplane flying on a westerly heading at an altitude of 100 to 200 feet, and descending. They heard the sound of an engine “surging” and observed the airplane’s wings bank left and right. The airplane continued to descend and impacted the ground and power lines before becoming inverted. A pilot-rated witness reported that he observed about ¼ inch of clear and rime ice on the airplane’s protected surfaces (deice boots) and about ½ inch of ice on the airplane’s unprotected surfaces. An NTSB performance study of the accident flight based on radar data indicated that the airplane entered a descent rate of 1,300 feet per minute (fpm) about 1,100 feet above the ground. This rate of descent was associated with a decrease in airspeed from 130 knots to 92 knots over a span of 30 seconds. The airplane’s rate of descent leveled off at the 1,300 fpm rate for 45 seconds before increasing to a 2,000 fpm descent rate. The true airspeed fluctuated between a low of 88 knots to 102 knots during the last 45 seconds of flight. According to the aircraft manufacturer, the clean, wing flaps up stall speed was 78 knots. However, after a light rime encounter, the Pilot’s Operating Handbook (POH) instructed pilots to maintain additional airspeed (10 to 20 KIAS) on approach “to compensate for the increased pre-stall buffet associated with ice on the unprotected areas and the increased weight.” With flaps up, a minimum approach speed of 105 KIAS was recommended. The POH also stated that a significantly higher airspeed should be maintained if ½ inch of clear ice had accumulated on the wings.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The flight crew's failure to cycle the deice boots prior to conducting a simulated forced landing and their failure to maintain adequate airspeed during the maneuver, which resulted in an inadvertent stall and subsequent loss of control. A contributing factor was the ice accumulation on the leading edges of the airfoils.

Findings

Occurrence #1: IN FLIGHT ENCOUNTER WITH WEATHER
Phase of Operation: MANEUVERING

Findings

1. (F) WEATHER CONDITION - ICING CONDITIONS

Occurrence #2: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: APPROACH - VFR PATTERN - BASE LEG/BASE TO FINAL

Findings

2. (C) ANTI-ICE/DEICE SYSTEM - NOT ACTIVATED
3. (C) AIRSPEED - NOT MAINTAINED - FLIGHTCREW
4. (C) STALL - INADVERTENT - FLIGHTCREW

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Findings

5. TERRAIN CONDITION - GROUND

Factual Information

HISTORY OF FLIGHT

On January 24, 2003, about 1015 central standard time, a Cessna 208B single-engine airplane, N944FE, was destroyed when it impacted terrain while landing at Ducote Airpark (TS65), San Angelo, Texas. The airplane was registered to Federal Express Corporation, Inc., of Memphis, Tennessee, and was operated by Baron Aviation Services, Inc., of Vichy, Missouri. The check airman, who held an airline transport pilot certificate, and the pilot who was receiving a Part 135 proficiency check and also held an airline transport pilot certificate, sustained serious injuries. Visual meteorological conditions prevailed, and a flight plan was not filed for the 14 Code of Federal Regulations Part 91 instructional flight. The local flight originated at 0832 from the San Angelo Regional Airport/Mathis Field (SJT), San Angelo, Texas, and was destined for Ducote Airpark.

According to the check pilot, the purpose of the flight was to administer an FAR Part 135 proficiency check. He stated that the last event he could remember of the flight was when he had simulated an engine failure while on approach to Ducote Airpark. According to communication and aircraft radar data provided by the Midland's Air Traffic Control Tower (ATCT) approach sector and Terminal Radar Approach Control (TRACON), the flight was practicing instrument approaches at SJT. At the completion of the VOR (Very high Omni-directional Range navigational aid) 21 approach, the flight crew requested a visual transition to Ducote Airport (which is located about 5 miles west of SJT). After conducting the missed approach, the flight departed the SJT airport area and proceeded west toward TS65. No further air traffic control communications were received.

Witnesses at Ducote Airpark stated that they heard the sound of an airplane engine "surging" and observed the airplane approaching the airport on a westerly heading. They observed the airplane about 100 to 200 feet above ground level in a descent. They observed the airplane's wings bank left and right and the airplane then contacted the ground and struck power lines before coming to rest inverted. Witnesses stated that they smelled jet fuel fumes at the accident site. One pilot-rated witness reported that he observed about 1/4 inch of clear and rime ice on the airplane's protected surfaces and about 1/2 inch on the airplane's unprotected surfaces.

An aircraft performance study was conducted by the NTSB's Vehicle Performance Division utilizing radar data from the Federal Aviation Administration's (FAA) Continuous Data Recording at the San Angelo, Texas, Airport Surveillance Radar (ASR-9). The study was derived from ASR data assuming steady, coordinated flight and did not account for any ice accumulations. Approximately 3 minutes before the accident, the flight crew indicated that they would proceed to Ducote. The study revealed that around 1008:30, while the airplane was at a pressure altitude of 3,100 feet (1,100 feet above the ground) the airplane's computed true airspeed began decreasing from 130 knots, to 92 knots at 1009:00. This decrease in airspeed was associated with a relatively rapid descent rate that began at 1008:45, from a 300-foot/minute (fpm) climb to a 1,300 fpm descent. The rate of descent remained at 1,300 fpm for about 45 seconds, before increasing to its maximum of 2,000 fpm prior to impacting the ground. The true airspeed further decreased to about 82 knots and fluctuated for the last 40 seconds of flight between 82 and 102 knots.

PERSONNEL INFORMATION

Check Airman

The pilot who was acting as the check airman held an airline transport pilot certificate with a multi-engine airplane rating. He also held commercial and flight instructor certificates with single-engine and instrument airplane ratings. He was issued a second-class medical certificate, with no restrictions or limitations, on November 4, 2002.

The operator hired the pilot on August 31, 1998. He was approved as a check airmen in the Cessna 208 series of aircraft on July 2, 2001 by the company's principal operations inspector. A review of the pilot's annual resume, dated January 7, 2003, revealed that he had accumulated a total time of 4,356 hours.

He last obtained Cessna 208 training at Pan Am International Flight Academy between August 1 and 3, 2002, where he underwent 11 hours of ground training and 6 hours of simulator training. On October 25, 2002, the pilot passed an Anti-ice/Deicing Exam for Corporate Pilots following a review of a National Aeronautics and Space Administration (NASA) icing training video.

Second Pilot

The pilot receiving the Part 135 proficiency check also held an airline transport pilot certificate with a multi-engine airplane rating. He also held a commercial pilot certificate with a single-engine airplane rating. He was issued a second-class medical certificate, with no restrictions or limitations, on November 19, 2002.

The operator hired the pilot in April 1990. His latest annual resume, dated March 25, 2002, indicated that he had accumulated a total of 13,884 hours of flight time.

He last underwent Cessna 208 training at Pan Am International Flight Academy between June 27 and 29, 2002, where he received 11 hours of ground training and 5.5 hours of simulator training.

AIRCRAFT INFORMATION

The 1987-model airplane was equipped with a 675-horsepower PT6A-114 Pratt & Whitney turboprop engine, and a 3-bladed C-300 McCauley propeller. The airplane was also equipped with a flight into known icing package that included pneumatic deicing boots on the wings, wing struts, main landing gear struts, cargo pod, and the horizontal and vertical stabilizers.

The airplane was maintained on Baron Aviation's 12-Phase Approved Aircraft Inspection Program (AAIP), and the company utilized Cessna's CESCUM program to track, schedule and report maintenance activity. A phase is completed every 200 hours with a 100-hour mini-check conducted in between each phase. On January 4, 2003, the airframe, engine, and propeller underwent a Phase I Inspection. At that time the airframe and engine had accumulated a total of 7,493.5 hours and 6,808 cycles, and the propeller had accumulated a total of 2,792.5 hours. At the time of the accident the airplane/engine accumulated a total of 7,503.7 hours and 6,818 cycles.

There was only one discrepancy recorded in the flight log during the 9 previous flights, which stated that a Phase I inspection was due. The flight log page for the accident flight was not recovered from the accident site.

METEOROLOGICAL INFORMATION

At 1053, the weather observation facility at SJT reported the following weather conditions: wind from 100 degrees at 7 knots, visibility 10 statute miles, an overcast ceiling at 2,300 feet agl, temperature -02 degrees Celsius, dew point -11 degrees Celsius, and an altimeter setting of 30.43 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

On-scene documentation of the wreckage at the accident site was conducted by FAA inspectors from the San Antonio Flight Standard District Office (FSDO), and representatives from Cessna Aircraft Company, FedEx, and Baron Aviation. According to photographs and information supplied by those entities, the accident site was located at 31 degrees 20.99 minutes north latitude and 100 degrees 36.78 minutes west longitude, approximately 1/4 mile from the approach end of TS65 runway 35 at an elevation of 1,203 feet mean sea level (msl). The wreckage path was oriented along a magnetic heading of 300 degrees for about 300 feet, where at the 170-foot mark, the airplane impacted a fence and a power line. The left wing created a 170-foot furrow in the dirt field leading up to the fence/power line.

The fuselage came to rest inverted. The left wing was separated from the fuselage but remained attached to the airframe via the aileron control cables. The empennage was partially separated from the airframe and came to rest adjacent to the airframe's left side, but with the top of the vertical stabilizer pointing toward the nose of the airplane and the leading edges of the horizontal stabilizers pointing up in the air. The empennage remained attached to the airframe by some sheet metal and control cables. According to Cessna, all of the flight controls were accounted for and remained attached to their respective hinges. The flaps were in the retracted position, which was verified by the flap selector, the indicator and the flap actuator position. No evidence of a flight control malfunction was observed.

The right fuel selector handle was in the ON position and both right fuel tank shutoff valves were open. The left fuel selector handle was in the OFF position, but both left fuel tank shutoff valves were open. The left control cable was severed. Witnesses reported smelling fuel immediately following the accident, and a significant amount of fuel was removed from both fuel tanks during the aircraft recovery process.

The engine controls were examined and found in the following positions:

- Throttle - full forward

- Propeller - full forward

- Fuel Condition Lever - full forward

- Emergency Power Lever - above stop gate, in emergency regime, with the copper safety wire separated

The engine was partially separated from the firewall and the propeller, which was separated from the engine aft of the propeller flange, was located approximately half way between the fence line and the final wreckage position. All three propeller blades remained attached to the hub. The engine and propeller were shipped to their respective manufacturers' facilities where they were examined in more detail.

TESTS AND RESEARCH

On March 10 & 11, 2003 the engine was examined at the Pratt & Whitney Canada facility in Montreal, Canada, under the provisions of the NTSB investigator-in-charge (IIC). The engine

displayed impact damage; however, there was no evidence of a preimpact catastrophic failure. The compressor discharge air (P3) and power turbine control (Py) lines were continuous, and all connections and locking devices were in place. The chip detectors from the reduction gearbox and accessory gearbox were clean. The oil filter, fuel filters, and P3 filter were clean.

The accessory gearbox was separated from the engine. The fuel-to-oil heat exchange and the high-pressure fuel pump sustained damage to their respective mounting structures. The heater and pump were disassembled; no anomalies were noted. The fuel control unit was functionally tested; no anomalies were noted that could not be attributed to a field adjustment. The compressor bleed valve was functionally tested; the test resulted in anomalous readings that did not meet the manufacturer's specifications. Disassembly of the valve revealed that the anomalous readings were the result of a hole in the valve's internal diaphragm; however, according to the manufacturer, this would not have had a significant affect on the engine. The propeller and overspeed governors were functionally tested with no anomalies noted.

The 1st stage compressor blades displayed circumferential rubbing and the leading edges displayed heavy nicks and gouges. The 2nd and 3rd stage compressor blades displayed circumferential rubbing at the blade tips. The compressor stators, shrouds, spacers, impeller, and impeller shroud all displayed circumferential rubbing/scoring. The combustion section displayed no signs of distress and the soot patterns appeared normal. The compressor turbine guide vane ring displayed metallic material that was fused onto the vane trailing edges, and the inner ring displayed circumferential scoring. The compressor turbine (CT) shroud and blades displayed no signs of distress, and metallic material was fused onto CT blade airfoils. The power turbine guide vane ring and interstage baffle were circumferentially rubbed. The power turbine shaft was rotated smoothly by hand. Additionally, none of the engine's 4 bearings displayed signs of distress.

On March 12, 2003, the NTSB IIC examined the propeller at the McCauley Propeller's facility in Vandalia, Ohio. The examination revealed that all of the observed propeller damage (gouging, twisting, and bending) was due to impact forces with no evidence of any fatigue failures. The reverse stop and feather stop mechanisms were undamaged indicating that the propeller was not operating near those positions at the time of impact. According to the manufacturer, the propeller was being operated with power at the time of impact, but the exact blade angle or amount of power absorbed by the propeller blades could not be determined.

The aircraft was equipped with a power analyzer and recorder system (PAR). The PAR unit was recovered from the wreckage, and taken to Avionics Specialties Inc.'s facility for readout. The data collected on the PAR unit indicated that the last event recorded was a loss of electrical power. The maximum power of 610 horsepower (HP) was exceeded for 4.5 seconds at 698 HP. At the time of the excessive power, the following values were recorded:

Inter-Turbine Temperature = 691 degrees Celsius

Torque = 1,926 foot-pounds

Ng = 99.4%

Np = 1,904 RPM

Fuel Flow = 463 pounds per hour

Pressure Altitude = 1,532 feet

Indicated Airspeed = 90 knots

Outside Air Temperature = -4 degrees Celsius

It could not be determined whether or not this excessive power was associated with the 45-second rate of descent plateau discussed in the History of Flight section of this flight.

At the time when electrical power was lost, the PAR unit recorded the following parameters:

Inter-Turbine Temperature = 693 degrees Celsius

Torque = 1,937 foot-pounds

Ng = 98.3%

Np = 1,774 RPM

Fuel Flow = 465 pounds per hour

Pressure Altitude = 1,532 feet

Indicated Airspeed = 90 knots

Outside Air Temperature = -4 degrees Celsius

ADDITIONAL INFORMATION

General Cessna 208B Information

According to the pilot operating handbook, the normal (e.g., no ice) maximum gross weight stall speed with flaps up and idle power is 78 knots calibrated airspeed (KCAS). The stall characteristics are described as "conventional and aural warning is provided by stall warning horn which sounds between 5 and 10 knots above the stall in all configurations."

Cessna's Known Icing Equipment Supplement

The pilot operating handbook's Known Icing Equipment Supplement indicated that the pilots were to maintain a minimum "enroute airspeed" of 105 KIAS with 1/2-inch or more of rime ice accumulation. Notes associated with this section of the supplement indicated that "an accumulation of one inch of ice on the leading edges can cause a large (up to 500 FPM) loss in rate of climb, a cruise speed reduction of up to 40 KIAS, as well as a significant buffet and stall speed increase (up to 20 knots)."

The before landing segment of the supplement indicates that pilots were to select a minimum flap setting and maintain extra airspeed consistent with the available runway length. A note associated with the landing segment indicated that pilots were to cycle all deice boots to shed any accumulated ice prior to a landing approach. The supplement adds that since pre-stall buffet onset and stall speed are increased slightly when deice boots are actuated, pilots are to "maintain extra airspeed (10 KIAS) before actuating [the] boots." Another note indicates that after a light rime ice encounter, pilots were to "maintain extra airspeed (10-20 KIAS) on approach to compensate for the increased pre-stall buffet associated with ice on the unprotected areas and the increased weight...With flaps up, maintain a MINIMUM approach speed of 105 KIAS."

Cessna Caravan Icing Assessment and Recommendations

From 1987 to 2003, 26 icing-related accidents and incidents involving Cessna 208 series airplanes occurred. Fifteen of the 26 icing-related events resulted from ice that had

accumulated while the airplane was in flight (10 of those 15 in-flight events occurred during the approach and landing phases). As a result, the Safety Board conducted a safety assessment regarding the icing-related accidents. The assessment and follow-up meetings with Cessna Aircraft Company, Cessna 208 operators, and the FAA resulted in 4 recommendations directed toward the development and implementation of seasonal training, operational strategies and guidance materials for icing operations, and preflight inspection and deicing criteria.

In 2005/2006 the NTSB was involved in two foreign-led investigations involving Cessna 208 airplanes that crashed after encountering icing conditions. Another set of recommendations was issued when the Safety Board became concerned with the minimum recommended in-flight icing airspeed for the airplane. One of the accidents involved a Cessna 208B airplane equipped with a flight data recorder (FDR) and cockpit voice recorder (CVR). The data retrieved from the recorders indicated that the flight crew was reading the checklist for the descent when the airplane began to pitch up (from -0.1 to 7.3 degrees) and as the airspeed began to decrease. At the time the airplane was at 102 knots, the airplane experienced a decrease in vertical acceleration and a slight decrease in airplane pitch angle consistent with significant flow separation over the wings and the initiation of an aerodynamic stall. Calculation of the angle of attack indicated that it was about 9 degrees at the time of the upset. Additionally, the sound of the stall warning horn was not heard on the CVR before the upset.

Cessna's flight test personnel noted in certification data that with heavy ice accumulations, a "mild buffet or nose bobbing (partial stalls)" could occur at speeds as high as 95 KIAS and the flaps retracted.

As a result of the foreign investigations and data reviewed during the assessment, the Safety Board issued a series of recommendations during January 2006. One recommendation that would require a the minimum operating airspeed of 120 knots during flight in icing conditions, a second prohibiting Cessna 208 operators from flying in icing conditions determined to be more than light, and a third recommendation requiring Cessna 208 operators to disengage the autopilot and fly manually when operating in icing conditions.

Following the assessment and the Safety Board's recommendations, the FAA issued a number of airworthiness directives that resulted in updates to the pilot operating handbook's Known Icing Equipment Supplement. In 2005, the FAA issued Airworthiness Directive (AD) 2005-07-01, which called for the revision of the supplement by adding a warning indicating that "the stall warning system has not been tested in all icing conditions and should not be relied upon in icing conditions." In 2006, the FAA issued AD 2006-06-06, which again revised the handbook's supplement to create a new minimum airspeed limitation of 120 knots in a flaps-up condition for all phases of flight. In addition, operators were to place a placard on the instrument panel, which indicated the same. The supplement also included optional advisory and awareness systems. In 2006, the FAA issued AD2007-10-15, which required Cessna 208 operators to incorporate the most recent revision of the Known Icing Equipment supplement, which included the required installation of a functional low airspeed awareness system to operate the airplane in known icing conditions. The low airspeed advisory system included an aural warning when the propeller anti-ice switch was in the AUTO position and the indicated airspeed was less than 110 knots.

Wreckage Release Information

All pilot records were released to the operator's representative on March 5, 2003. The aircraft's

maintenance records were released to the operator's representative on April 4, 2003. On October 3, 2003, the wreckage was released to the operator's representative.

Check Pilot Information

Certificate:	Airline Transport; Flight Instructor; Commercial	Age:	42, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Right
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	Airplane Single-engine; Instrument Airplane	Toxicology Performed:	No
Medical Certification:	Class 2 Without Waivers/Limitations	Last FAA Medical Exam:	11/01/2002
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	03/01/2002
Flight Time:	4356 hours (Total, all aircraft)		

Pilot Information

Certificate:	Airline Transport; Commercial	Age:	63, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 2 With Waivers/Limitations	Last FAA Medical Exam:	11/01/2002
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	01/01/2002
Flight Time:	13884 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	Registration:	N944FE
Model/Series:	208B	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	208B0044
Landing Gear Type:	Tricycle	Seats:	2
Date/Type of Last Inspection:	01/01/2003, 100 Hour	Certified Max Gross Wt.:	8750 lbs
Time Since Last Inspection:	7493 Hours	Engines:	1 Turbo Prop
Airframe Total Time:	7503.3 Hours at time of accident	Engine Manufacturer:	Pratt & Whitney Canada
ELT:	Installed, not activated	Engine Model/Series:	PT6A-114A
Registered Owner:	Federal Express Corporation	Rated Power:	675 hp
Operator:	Baron Aviation Services Inc.	Operating Certificate(s) Held:	On-demand Air Taxi (135)
Operator Does Business As:		Operator Designator Code:	DEMA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	SJT	Distance from Accident Site:	
Observation Time:	1053	Direction from Accident Site:	
Lowest Cloud Condition:		Visibility	10 Miles
Lowest Ceiling:	Overcast / 2300 ft agl	Visibility (RVR):	
Wind Speed/Gusts:	7 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	100°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30.43 inches Hg	Temperature/Dew Point:	-2° C / -11° C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	San Angelo, TX (SJT)	Type of Flight Plan Filed:	None
Destination:	San Angelo, TX (TS65)	Type of Clearance:	VFR
Departure Time:	1005 CST	Type of Airspace:	

Airport Information

Airport:	Ducote Airpark (TS65)	Runway Surface Type:	Asphalt
Airport Elevation:	1974 ft	Runway Surface Condition:	Dry
Runway Used:	35	IFR Approach:	None
Runway Length/Width:	3700 ft / 30 ft	VFR Approach/Landing:	Simulated Forced Landing; Traffic Pattern

Wreckage and Impact Information

Crew Injuries:	2 Serious	Aircraft Damage:	Destroyed
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	2 Serious	Latitude, Longitude:	31.358333, -100.612778

Administrative Information

Investigator In Charge (IIC):	Jason A Ragogna	Report Date:	12/20/2007
Additional Participating Persons:	Frank G Fortmann; Federal Aviation Administration; San Antonio, TX Jesse Cavazos; Federal Aviation Administration; San Antonio, TX Emile Lohman; Cessna Aircraft Company; Wichita, KS Tom Teplik; Cessna Aircraft Company; Wichita, KS Matthew Duke; Federal Express; Memphis, TN C E Schmidt; Barron Aviation Services; Rolla, MO Thomas Berthe; Pratt & Whitney Canada; Montreal, QC, Tom Knopp; McCauley Propeller Systems; Vandalia, OH		
Publish Date:	10/28/2011		
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov , or at 800-877-6799. Dockets released after this date are available at http://dms.nts.gov/pubdms/ .		

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

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](#).