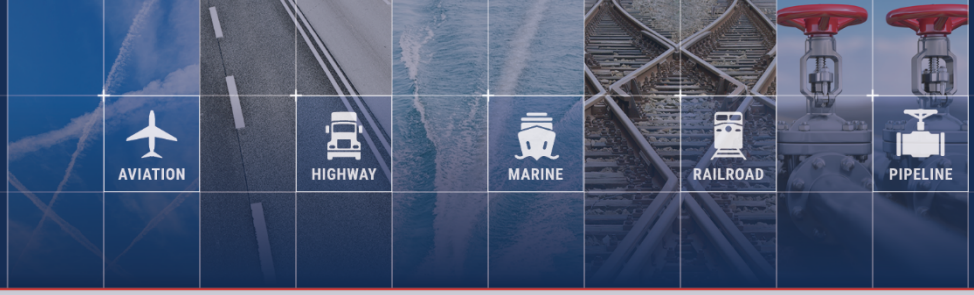


# Aviation Investigation Factual Report

| | | | |
|---|---|---|---|
| **Location:** | Morristown, New Jersey | **Accident Number:** | ERA12FA115 |
| **Date & Time:** | December 20, 2011, 10:05 Local | **Registration:** | N731CA |
| **Aircraft:** | Socata TBM 700 | **Aircraft Damage:** | Destroyed |
| **Defining Event:** | Loss of control in flight | **Injuries:** | 5 Fatal |
| **Flight Conducted Under:** | Part 91: General aviation - Personal | | |

## Factual Information

HISTORY OF FLIGHT

On December 20, 2011, about 1005 eastern standard time, a Socata TBM 700, N731CA, collided with terrain following an in-flight loss of aircraft control near Morristown, New Jersey. The airplane was registered to Cool Stream LLC and was operated by the pilot. Visual meteorological conditions prevailed and an instrument flight rules (IFR) flight plan was filed for the flight from Teterboro, New Jersey (TEB) to Atlanta, Georgia (PDK). The personal flight was conducted under the provisions of 14 Code of Federal Regulations Part 91. The certificated private pilot and four passengers were fatally injured, and the airplane was destroyed. The flight originated from TEB about 0950.

On December 20, 2011, at 0700, an IFR flight plan was filed for the flight using the Direct User Access Terminal System (DUATS). The flight plan listed a cruising speed of 292 knots and an en route altitude of flight level (FL) 260. At 0930, TEB clearance delivery issued an IFR clearance to the pilot and he subsequently contacted TEB ground control at 0943 for taxi clearance. The pilot was cleared to taxi to runway 6 and at 0948 the pilot reported that he was ready for departure for runway 6. According to air traffic control (ATC) recorded communications between TEB local control, ground control, and the pilot, weather information was not requested by, nor issued to, the pilot.

During the departure climb, while passing 8,000 feet for 10,000 feet, the pilot was directed to climb and maintain 14,000 feet. The controller then advised the pilot of moderate rime icing from 15,000 feet through 17,000 feet with light rime ice at 14,000 feet. The controller asked that the pilot advise him if the icing got worse, and the pilot responded with, “we’ll let you know what happens when we get in there and if we could go straight through, it’s no problem for us.” At 0958:24, the controller directed the pilot to climb and maintain 17,000 feet and to contact New York Center (ZNY). While climbing between 12,800 and 12,900 feet, at 116 knots ground speed, the pilot acknowledged and advised that they were entering instrument meteorological conditions (IMC).

At 1002:17, the ZNY controller advised the pilot that he would be cleared to a higher altitude when ATC could provide it, and that light icing would be encountered at 17,000 feet. The pilot responded with, “I can confirm that light icing…” and stated that, “…light icing has been present for a little while and a higher altitude would be great.” The altitude of the airplane at that time was 16,800 feet and 101 knots ground speed.

At 1002:34, the pilot reported, “we’re getting a little rattle here can we ah get ah higher as soon as possible please.” The ZNY controller responded with “stand by” and coordinated for a higher altitude with an adjacent sector controller.

At 1002:59, the ZNY controller directed the pilot to climb and maintain FL200 and the pilot acknowledged. At 1004:08, the airplane reached an altitude of 17,800 feet before it turned about 70 degrees to the left and entered a descent. At 1004:29, while descending through 17,400 feet, and at 90 knots ground speed, the pilot transmitted, “and N731CA’s declaring…” No subsequent radio transmissions were heard from the pilot. The final radar return at 1005:17 was observed at an altitude of 2,000 feet, about 600 yards west of the main wreckage impact site. The previous return, recorded 9 seconds earlier, indicated 6,200 feet.

Numerous witnesses observed the airplane during the accident sequence. A consistent observation was that the airplane descended at a rapid rate, and was trailing smoke. At least five witnesses saw pieces of the airplane separate during flight or they observed the airplane descending without a wing attached.

## PERSONNEL INFORMATION

The pilot, age 45, held a private pilot certificate with ratings for airplane single-engine land and instrument airplane. He reported a total flight experience of 1,400 hours on his latest second-class medical certificate application, dated July 14, 2011. The pilot’s personal logbook(s) were not located after the accident.

The pilot completed a TBM 700 two-day recurrent training course at the SIMCOM Training Center, Orlando, Florida on November 15, 2011. According to a representative from SIMCOM, ground training was accomplished that addressed the technical aspects of the installed ice protection and environmental systems, including preflight checking and testing. Normal and emergency checklist procedures were also discussed. Simulator training consisted of system checking, testing, and operation, including operating in icing conditions, at altitude, and system malfunctions. The SIMCOM representative stated that, “It is always stressed that the installed ice protection systems are intended to provide protection while departing icing conditions.”

SIMCOM training records showed that the pilot completed a similar recurrent course on November 15 and 16, 2010.

## AIRCRAFT INFORMATION

The airplane was manufactured in 2005 and was equipped with a single Pratt and Whitney Canada PT6A-64 turbo-prop engine. The airplane was issued a Standard Airworthiness Certificate on September 22, 2005 and was registered to Cool Stream LLC on October 25, 2005.

The most recent annual inspection was performed on July 27, 2011. At that time, the airplane had accumulated approximately 702.0 total flight hours. The last logbook entry was recorded on November 18, 2011, at an aircraft total time of 724.6 hours.

## METEOROLOGICAL INFORMATION

The public docket for this accident contains a Meteorology Factual Report and numerous attachments to support that report. All times that follow in this section are expressed in eastern standard time unless otherwise noted.

A search of the Direct User Access Terminal (DUAT), the DUATS, and Lockheed Martin Flight Services revealed that the pilot did not access weather services or receive a telephone weather briefing prior to the accident flight. It was not determined if the pilot received weather information from other sources.

The closest surface weather observation was at Morristown Municipal Airport (MMU), located about 3 miles east-northeast of the accident site at an elevation of 187 feet. The 0945 observation reported wind from 360 degrees at 8 knots with gusts to 13 knots, visibility of 10 miles or greater, ceiling overcast at 20,000 feet, temperature 6 degrees C, dew point -2 degrees C, and altimeter setting 30.17 inches of mercury. No precipitation was noted in the observation.

The 0951 surface weather observation for TEB, located about 20 miles east-northeast of the accident site at an elevation of 9 feet, included sky clear and visibility of 10 miles or greater.

The National Weather Service (NWS) Surface Analysis Chart for 1000 depicted a low pressure center near the Indiana/Ohio border with a stationary front extending east through Ohio into western Pennsylvania. A cold front extended from this point eastward through southern Pennsylvania and southern New Jersey, and continued over coastal waters. No present weather symbols were depicted in the accident region.

The portion of the Area Forecast directed toward northern New Jersey and in effect until 1000 included the following, ceilings overcast at 7,000 feet and cloud tops to FL180. The conditions between 1000 and 1600 forecasted ceilings broken at 15,000 feet. The Area Forecast Discussion issued at 0956 did not discuss any icing hazard to aircraft.

An Airmen's Meteorological Information (AIRMET) advisory, "ZULU," was issued at 0945 that included the area of the accident site. The AIRMET advised of moderate icing between the freezing level (identified as located between 2,000 feet and 8,000 feet) and FL200.

Prior to the 0945 AIRMET ZULU, an amended AIRMET ZULU was issued at 0645. The amended AIRMET advised of moderate icing between the freezing level (identified as located between 3,000 feet and 9,000 feet) and FL180.

Pilot reports made over New Jersey, southern New York, and eastern Pennsylvania between 0800 and 1300 were reviewed by investigators. More than 80 reports were compiled.

An urgent pilot report was received at 0749 from a pilot operating a Cessna Citation at 14,000

feet, about 15 nautical miles southwest of Modena, Pennsylvania. The pilot reported moderate to severe rime icing between 13,000 and 14,000 feet.

An urgent pilot report was received at 1042 from “multiple” types of aircraft at 14,000 feet near Schooley’s Mountain, New Jersey. The report included severe rime icing between 14,000 and 17,500 feet.

An urgent pilot report was received at 0808 from a flight crew operating a McDonnell Douglas MD-83 aircraft at 14,000 feet over MMU. The pilot reported moderate to severe rime icing between 14,000 and 16,500 feet. One of the flight crewmembers reported that the icing was the worst he had seen in 38 years of flying experience and that he had never seen ice accumulate so quickly. He described “golf ball-sized” accumulation on the windshield wiper.

An interview with the captain of a Bombardier CRJ aircraft that was operating close to the accident aircraft reported that the wing anti-ice system could not “keep up” with the accumulation. He estimated 2.5 inches of ice on the protected areas of the wing, and 4 inches accumulation on some unprotected areas in a time span of about five minutes.

WRECKAGE AND IMPACT INFORMATION

The airplane impacted the paved surfaces and a wooded median on Interstate Highway 287, about 1 mile south of Morristown. The point of initial impact of the main wreckage was in the southbound lanes, at coordinates 40 46.573 north, 074 28.624 west. The main wreckage debris field was oriented on a heading of about 070 degrees and was about 350 feet in length. The propeller assembly separated from the engine during impact and came to rest in a wooded area on the east side of the northbound lanes.

A post-crash fire was evident on the highway and in the wooded median, where sections of the fuselage, the left wing, and the vertical stabilizer came to rest. Due to the impact damage and fragmentation of the cockpit, cabin, and fuselage, the seating positions of the airplane occupants was not determined.

The outboard section of the right wing and several sections of the empennage, including the horizontal stabilizer, elevator, and rudder, were found between 0.20 and 0.23 nautical miles southwest of the fuselage, in a residential area.

The wreckage was recovered to a storage facility in Clayton, Delaware, where an examination and partial reconstruction of the wreckage was performed on January 3 and 4, 2012. The examination of the airframe and engine revealed no evidence of a pre-accident mechanical malfunction or anomaly.

A visual inspection of the pneumatic leading edge de-ice boots revealed no pre-existing ruptures or cracks and all observable boot fasteners were intact and secure. Impact damage prevented functional testing of the aircraft de-ice systems. The cockpit de-ice system panel

was found intact. The airframe de-ice, propeller de-ice, pitot heat 1 and 2, and stall warning heater switches were found in the “ON” positions. The ice inspection light, the left and right windshield de-ice, and the inertial separator switches were found in the “OFF” positions.

An examination of the C6 and C8 carry-through structure, where the wings were attached to the fuselage, exhibited twisting and bending distortion at the right wing attachment points, in the up and aft direction. The carry-through structure was fragmented. All fracture surfaces exhibited overload signatures. No evidence of pre-existing cracks or fatigue was observed.

An examination of the outboard section of the right wing revealed that the wing tip, aileron, and spoiler were still attached. Examination of the aileron attachment and actuator hardware revealed no evidence of stop-to-stop damage.

The horizontal stabilizer was separated from the airframe at location C21, with the C21 frame still attached to the assembly. The right-hand horizontal stabilizer was fractured in half, near the midpoint on the right-hand leading edge. The outboard half of the right-hand stabilizer was found adjacent to the larger portion that included the left-hand horizontal stabilizer and C21 frame. The right elevator was still attached to the outboard section of the right horizontal stabilizer by the trim tab actuators. The left elevator was attached to the left horizontal stabilizer.

During the examination of the airframe structure, the outboard section of the right wing was manually positioned, or “mated,” with the leading edge of the right-hand horizontal stabilizer to explore the possibility of in-flight contact. The examination revealed that deformation on the leading edge of the right wing was consistent with an in-flight contact with the leading edge of the right-hand horizontal stabilizer. Also, impact signatures and damage observed on the right wing leading edge, near positions N19 and N20, were consistent with an in-flight collision with the right side of the rudder.

The engine displayed contact signatures at the compressor first stage and shroud, compressor turbine, compressor turbine shroud, first stage power turbine vane ring, first stage power turbine, first stage power turbine shroud, second stage power turbine vane ring, second stage power turbine, and the second stage power turbine shroud. The engine housing exhibited severe radial deformation around the right hand circumference resulting in circumferential impact fractures of the compressor turbine blades and the first and second stage power turbine blades.

The examination of the propeller revealed that three of the propeller blades remained attached to the propeller hub and a fourth blade separated into two sections. The blades exhibited twisting, chord-wise scratching, “s” bending, and blade tip separations.

MEDICAL AND PATHOLOGICAL INFORMATION

A postmortem examination of the pilot was performed at the County of Morris Medical

Examiner's Office, Morristown, New Jersey, on December 21, 2011. The autopsy report noted the cause of death as "multiple injuries" and the manner of death was "accident."

Forensic toxicology testing was performed on specimens of the pilot by the Federal Aviation Administration (FAA) Bioaeronautical Sciences Research Laboratory (CAMI), Oklahoma City, Oklahoma. The CAMI toxicology report indicated negative for ethanol and drugs. Testing for carbon monoxide and cyanide was not performed.

## ADDITIONAL INFORMATION

The following "WARNING" was included in the TBM 700 Pilot's Operating Handbook (POH) and was applicable at the time of the accident:

WARNING

SEVERE ICING MAY RESULT FROM ENVIRONMENTAL CONDITIONS OUTSIDE OF THOSE FOR WHICH THE AIRCRAFT IS CERTIFICATED. FLIGHT IN FREEZING RAIN, FREEZING DRIZZLE, OR MIXED ICING CONDITIONS (SUPERCOOLED LIQUID WATER AND ICE CRYSTALS) MY RESULT IN ICE BUILD-UP ON PROTECTED SURFACES EXCEEDING THE CAPABILITY OF THE ICE PROTECTION SYSTEM, OR MAY RESULT IN ICE FORMING AFT OF THE PROTECTED SURFACES. THIS ICE MAY NOT BE SHED USING THE ICE PROTECTION SYSTEMS, AND MAY SERIOUSLY DEGRADE THE PERFORMANCE AND CONTROLLABILITY OF THE AIRCRAFT.

The POH also included information on how to detect and identify severe icing conditions. The POH directed the pilot to immediately request priority handling from air traffic control to facilitate a route or altitude change to exit the icing conditions.

Section 3, "Emergency Procedures" also described pilot actions in the event of flight into severe icing conditions. Excerpts from the POH are included in the public docket for this accident.

Part 91.3 of the Federal Aviation Regulations addresses the responsibility and authority of the pilot-in-command:

(a) The pilot in command of an aircraft is directly responsible for, and is the final authority as to, the operation of that aircraft.
(b) In an in-flight emergency requiring immediate action, the pilot in command may deviate from any rule of this part to the extent required to meet that emergency.

## Pilot Information

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|---|---|---|---|
| **Certificate:** | Private | **Age:** | 45,Male |
| **Airplane Rating(s):** | Single-engine land | **Seat Occupied:** | Unknown |
| **Other Aircraft Rating(s):** | None | **Restraint Used:** | |
| **Instrument Rating(s):** | Airplane | **Second Pilot Present:** | No |
| **Instructor Rating(s):** | None | **Toxicology Performed:** | Yes |
| **Medical Certification:** | Class 2 Without waivers/limitations | **Last FAA Medical Exam:** | July 14, 2011 |
| **Occupational Pilot:** | No | **Last Flight Review or Equivalent:** | November 15, 2011 |
| **Flight Time:** | 1400 hours (Total, all aircraft) | | |

## Aircraft and Owner/Operator Information

| | | | |
|---|---|---|---|
| **Aircraft Make:** | Socata | **Registration:** | N731CA |
| **Model/Series:** | TBM 700 | **Aircraft Category:** | Airplane |
| **Year of Manufacture:** | | **Amateur Built:** | |
| **Airworthiness Certificate:** | Normal | **Serial Number:** | 332 |
| **Landing Gear Type:** | Retractable - Tricycle | **Seats:** | 7 |
| **Date/Type of Last Inspection:** | July 27, 2011 Annual | **Certified Max Gross Wt.:** | 7394 lbs |
| **Time Since Last Inspection:** | | **Engines:** | 1 Turbo prop |
| **Airframe Total Time:** | 702 Hrs as of last inspection | **Engine Manufacturer:** | P&W CANADA |
| **ELT:** | Installed, not activated | **Engine Model/Series:** | PT6A-64 |
| **Registered Owner:** | COOL STREAM LLC | **Rated Power:** | 700 Horsepower |
| **Operator:** | Jeffery F. Buckalew | **Operating Certificate(s) Held:** | None |

## Meteorological Information and Flight Plan

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|---|---|---|---|
| **Conditions at Accident Site:** | Visual (VMC) | **Condition of Light:** | Day |
| **Observation Facility, Elevation:** | MMU,187 ft msl | **Distance from Accident Site:** | 3 Nautical Miles |
| **Observation Time:** | 09:45 Local | **Direction from Accident Site:** | 30° |
| **Lowest Cloud Condition:** | | **Visibility** | 10 miles |
| **Lowest Ceiling:** | Overcast / 20000 ft AGL | **Visibility (RVR):** | |
| **Wind Speed/Gusts:** | 8 knots / 13 knots | **Turbulence Type Forecast/Actual:** | / |
| **Wind Direction:** | 360° | **Turbulence Severity Forecast/Actual:** | / |
| **Altimeter Setting:** | 30.17 inches Hg | **Temperature/Dew Point:** | 6°C / -2°C |
| **Precipitation and Obscuration:** | No Obscuration; No Precipitation | | |
| **Departure Point:** | Teterboro, NJ (TEB ) | **Type of Flight Plan Filed:** | IFR |
| **Destination:** | Atlanta, GA (PDK ) | **Type of Clearance:** | IFR |
| **Departure Time:** | 09:50 Local | **Type of Airspace:** | |

## Wreckage and Impact Information

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| **Crew Injuries:** | 1 Fatal | **Aircraft Damage:** | Destroyed |
| **Passenger Injuries:** | 4 Fatal | **Aircraft Fire:** | On-ground |
| **Ground Injuries:** | N/A | **Aircraft Explosion:** | On-ground |
| **Total Injuries:** | 5 Fatal | **Latitude, Longitude:** | 40.77639,-74.476387(est) |

## Administrative Information

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| **Investigator In Charge (IIC):** | Hicks, Ralph |
| **Additional Participating Persons:** | Fred J Grill; FAA/FSDO; Saddle Brook, NJ |
| **Report Date:** | January 24, 2013 |
| **Last Revision Date:** | |
| **Investigation Class:** | Class |
| **Note:** | The NTSB traveled to the scene of this accident. |
| **Investigation Docket:** | https://data.ntsb.gov/Docket?ProjectID=82544 |