National Transportation Safety Board
Aviation Accident Final Report

Location:	Midland, TX	**Accident Number:**	CEN12LA095
Date & Time:	12/02/2011, 0810 CST	**Registration:**	N90QL
Aircraft:	BEECH F90	**Aircraft Damage:**	Destroyed
Defining Event:	Loss of control in flight	**Injuries:**	1 Serious
Flight Conducted Under:	Part 91: General Aviation - Positioning		

Analysis

The pilot obtained a weather briefing for the flight, during which light freezing drizzle was forecast for the proposed time and route. However, no advisories, either before or during the flight, were issued for the potential of hazardous icing conditions.

The pilot stated that he had all of the airplane's deicing equipment on; however, the airplane accumulated moderate to severe airframe icing. The airplane was cleared for a GPS approach to the airport, and the pilot reported that he used the autopilot to fly the airplane to a navigational fix. An air traffic controller saw that the airplane was off course and subsequently canceled the flight's approach clearance. The copilot's window iced up. The flight was then cleared for another approach attempt, during which the pilot's window became "halfway iced up." The controller advised that the airplane appeared to be "about a half mile south of the course" for runway 25. The pilot configured the airplane with approach flaps and extended the landing gear before the final approach fix. The airplane descended under the cloud deck, and the pilot began to look for the runway. The pilot stated when he advanced the throttles, the airplane rolled about 90 degrees to the left. He disengaged the autopilot and attempted to use the yoke to level the airplane. The airplane then rolled about 90 degrees to the right. The pilot was unable to regain airplane control, and the stall warning horn came on seconds before the airplane impacted the ground. The pilot stated that he believed the loss of control was "primarily due to ice."

The pilot stated that he maintained a target airspeed of 120 knots on approach, 100 knots "close to the ground," and was close to 80 knots when the airplane was in the 90-degree right bank. The airplane's recommended minimum airspeed for sustained flight in icing was 140 knots. The airplane's pilot operating handbook (POH) advises pilots to immediately request priority handling from air traffic control to facilitate a route or an altitude change to exit the icing conditions. Additionally, the handbook cautions the pilot that autopilot usage masks tactile cues, which indicate adverse changes in handling characteristics, and that use of the autopilot is prohibited when any specified visual cues exist in icing conditions.

While the National Weather Service (NWS) issued an icing advisory over an area bordering the destination to the north, no NWS icing advisory extended over the area where the accident occurred. While the pilot would have been aware of potential icing from his weather briefings, he may not have expected the hazard due to the absence of an icing advisory over his route. If the pilot relied upon the graphic presentation provided in the icing advisory, which did not extend to his intended route, he may have been led to believe that he could accomplish the flight safely.

Probable Cause and Findings

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

The pilot's failure to maintain the recommended airspeed for icing conditions and his subsequent loss of airplane control while flying the airplane under autopilot control in severe icing conditions, contrary to the airplane's handbook. Contributing to the accident was the pilot's failure to divert from an area of severe icing. Also contributing to the accident was the lack of an advisory for potential hazardous icing conditions over the destination area.

Findings

Aircraft	
Personnel issues	Use of automation - Pilot (Cause) Incorrect action selection - Pilot (Factor)
Environmental issues	Ceiling/visibility/precip - Contributed to outcome
Organizational issues	Between groups/organizations - Meteorological service (Factor)

Factual Information

HISTORY OF FLIGHT

On December 2, 2011, about 0810 central standard time, a Beech F90, N90QL, collided with terrain while on an instrument approach to the Midland Airpark (MDD), near Midland, Texas. The commercial pilot, who was the sole occupant, sustained serious injuries. The airplane was registered to and operated by Quality Lease Air Services LLC., under the provisions of 14 Code of Federal Regulations Part 91 as a positioning flight. Instrument meteorological conditions prevailed and an instrument flight rules (IFR) flight plan had been filed for the cross-country flight. The flight originated from the Wharton Regional Airport (ARM), Wharton, Texas, about 0626.

The pilot obtained a weather briefing for the flight to MDD. The briefing forecasted light freezing drizzle for the proposed time and route of flight.

While on approach to MDD, the airplane was experiencing an accumulation of moderate to severe icing and the pilot stated that he had all the deicing equipment on. According to the pilot, the autopilot was flying the airplane to a navigational fix called JIBEM. He switched the autopilot to heading mode and flew to the final approach fix called WAVOK. He deployed the deice boots twice before approaching WAVOK.

An Airport Traffic Control Tower (ATCT) controller informed the pilot, that according to radar, he appeared to be flying to JIBEM. The pilot responded that he was correcting back and there was something wrong with the GPS. The controller canceled the airplane's approach clearance and the controller issued the pilot a turning and climbing clearance to fly for another approach. The pilot stated that his copilot's window iced up at that point.

The pilot was vectored for and was cleared for another approach attempt. The pilot said that his window was "halfway iced up." About two minutes after being cleared for the second approach, the controller advised the pilot that the airplane appeared to be "about a half mile south of the course." The pilot responded, "Yep ya uh I got it." The pilot was given heading and climb instructions in case of a missed approach and was subsequently cleared to change to an advisory frequency. The pilot responded with, "Good day."

The pilot had configured the aircraft with approach flaps and extended the landing gear prior to reaching the final approach fix. The pilot stated the aircraft remained in this configuration and he did not retract the gear and flaps.

The pilot stated that he descended to 3,300 feet and was just under the cloud deck where he was looking for the runway. The pilot's accident report, in part, said:

Everything was flying smooth until I accelerated throttles from about halfway to about three quarters. At this point I lost roll control and the airplane rolled approximately 90 degrees to the left. I disengaged autopilot and began to turn the yoke to the right and holding steady. It was slow to respond and when I thought that I had it leveled off the airplane continued to roll

approximately 90 degrees to the right. At this time I was turning the yoke back to the left and pulling back to level it off, but it continued to roll to the left again. I was turning the yoke to the right again as I continued to pull back and the airplane rolled level, and the stall warning horn came on seconds before impact on the ground.

The pilot stated he maintained a target airspeed speed of 120 knots on approach and 100 knots while on final approach. He stated he was close to 80 knots when the aircraft was in the 90-degree right bank.

Witnesses in the area observed the airplane flying. A witness stated that the airplane's wings were "rocking." Other witnesses indicated that the airplane banked to the left and then nosed down. The airplane impacted a residential house, approximately 1 mile from the approach end of runway 25, and a postcrash fire ensued. The pilot was able to exit the airplane and there were no reported ground injuries.

PERSONNEL INFORMATION

The 53-year old pilot held a commercial pilot certificate with instrument airplane and airplane single and multi-engine land ratings. The pilot's most recent Federal Aviation Administration (FAA) second-class medical certificate was issued on August 3, 2011, with limitations for corrective lenses. The pilot reported having accrued 4,600 hours of total flight time and 25 hours of flight time in the same make and model as the accident airplane. He also reported that he had accumulated 224 hours of total flight time in actual instrument weather conditions and 5 hours of flight time in actual instrument weather conditions in the 90 days prior to the accident

AIRCRAFT INFORMATION

N90QL was a 1979 Beech, King Air, F90, twin-engine, T-tailed, seven-seat airplane with serial number LA-2. On June 6, 2011, the airplane received a phase three and four inspection. An airplane logbook entry in reference to that inspection showed that the Hobbs meter indicated 8,253 hours and the airplane's total time was the same. Two Pratt and Whitney Canada model PT6A-135 engines powered the airplane. Each engine drove their respective four-bladed Hartzell propeller. The airplane had two exits (viewed from the aft looking forward): the air stair door in the aft cabin on the left, and the overwing emergency exit on the right. The pilot reported that the airplane's maximum gross weight was 10,950 pounds and that the weight of the airplane at the time of the accident was 10,000 pounds.

The airplane's maximum flap extension speed for the approach flap position was 184 knots indicated airspeed (IAS). The airplane's maximum landing gear extended speed was 184 knots IAS. According to the airplane's "Stall Speeds - Power Idle" chart, the calculated stall speed for the airplane weighing 10,000 pounds with approach flaps extended was about 81 knots IAS at zero degrees of bank and was about 114 knots IAS at 60 degrees of bank.

The airplane's pilot operating handbook (POH) limitations section, in part, stated:

ICING LIMITATIONS...

Minimum Airspeed for Sustained Icing Flight...140 knots
Sustained flight in icing conditions with flaps extended is prohibited except for approach and landings. ...

LIMITATIONS WHEN ENCOUNTERING SEVERE ICING CONDITIONS (Required By FAA AD 98-04-24)

WARNING
Severe icing may result from environmental conditions outside of those for which the airplane is certificated. Flight in freezing rain, freezing drizzle, or mixed icing conditions (supercooled liquid water and ice crystals) may 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 protections systems, and may seriously degrade the performance and controllability of the airplane.

1. During flight, severe icing conditions that exceed those for which the airplane is certificated shall be determined by the following visual cues. If one or more of these visual cues exists, immediately request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the icing conditions.

a. Unusually extensive ice accumulation of the airframe and windshield in areas not normally observed to collect ice.

b. Accumulation of ice on the upper surface of the wing, aft of the protected area.

c. Accumulation of ice on the engine nacelles and propeller spinners farther aft than normally observed.

2. Since the autopilot, when installed and operating, may mask tactile cues that indicate adverse changes in handling characteristics, use of the autopilot is prohibited when any of the visual cues specified above exist, or when unusual lateral trim requirements or autopilot trim warnings are encountered while the airplane is in icing conditions.

3. All wing icing inspection lights must be operative prior to flight into known or forecast icing conditions at night. [NOTE: This supersedes any relief provided by the Master Minimum Equipment List (MMEL).]

The airplane's POH normal procedures section, in part, stated: This airplane is approved for flight in icing conditions as defined in FAR 25, Appendix C. These conditions do not include, nor were tests conducted in, all conditions that may be encountered (e.g., freezing rain, freezing drizzle, mixed conditions, or conditions defined as severe). Some icing conditions not defined in FAR 25 have the potential of producing hazardous ice accumulations, which: 1) exceed the capabilities of the airplane's ice protection equipment; and/or 2) create unacceptable airplane performance. Flight into icing conditions which lie outside the FAR-defined conditions is not prohibited; however, pilots must be prepared to divert the flight promptly if hazardous ice accumulations occur.

WARNING
Due to distortion of the wing airfoil, ice accumulations on the leading edges can cause a significant loss in rate of climb and in speed performance, as well as increases in stall speed. Even after cycling deicing boots, the ice accumulation remaining on the boots and unprotected areas of the airplane can cause large performance losses. For the same reason, the aural stall warning system may not be accurate and should not be relied upon. Maintain a comfortable margin of airspeed above the normal stall airspeed. In order to minimize ice accumulation on unprotected surfaces of the wing, maintain a minimum of 140 knots during operations in sustained [deicing] conditions. ... Prior to a landing approach, cycle the deicing boots to shed any accumulated ice.

The airplane's POH emergency procedures section, in part, stated:

THE FOLLOWING WEATHER CONDITIONS MAY BE CONDUCIVE TO SEVERE IN-FLIGHT ICING:

Visible rain at temperatures below 0 degrees Celsius ambient air temperature.

Droplets that splash or splatter on impact at temperatures below 0 degrees Celsius ambient air temperature.

PROCEDURES FOR EXITING THE SEVERE ICING ENVIRONMENT:
These procedures are applicable to all flight phases from takeoff to landing. Monitor the ambient air temperature.

While severe icing may form at temperatures as cold as -18 degrees Celsius, increased vigilance is warranted at temperatures around freezing with visible moisture present.

If the visual cues specified in the Limitations Section for identifying severe icing conditions are observed, accomplish the following:

1. Immediately request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the severe icing conditions in order to avoid extended exposure to flight conditions more severe than those for which the airplane has been certificated.

2. Avoid abrupt and excessive maneuvering that may exacerbate control difficulties.

3. Do not engage the autopilot.

4. If the autopilot is engaged, hold the control wheel firmly and disengage the autopilot.

5. If an unusual roll response or uncommanded roll control movement is observed, reduce the angle-of-attack.

6. Do not extend flaps when holding in icing conditions. Operation with flaps extended can result in a reduced wing angle-of-attack, with the possibility of ice forming on the upper surface further aft on the wing than normal, possibly aft of the protected area.

7. If the flaps are extended, do not retract them until the airframe is clear of ice.

8. Report these weather conditions to Air Traffic Control.

METEOROLOGICAL INFORMATION

A National Transportation Safety Board senior meteorologist produced a meteorology factual report. The report, in part, showed that at 0815, the automated weather observing system at MDD, reported wind from 030 degrees at 9 knots, visibility 1 and 3/4 statute miles, present weather mist, scattered clouds at 300 feet, overcast at 800 feet, temperature 1 degree C, dew point 1 degrees C, and a barometric pressure setting of 30.31 inches of mercury. Airmen's Meteorological Information (AIRMET) Sierra was issued as an advisory for IFR conditions and AIRMET Tango issued as an advisory for moderate turbulence below 8,000 feet over the route of flight to include the destination. AIRMET Zulu was issued indicating the possibility for moderate icing between the freezing level and 9,000 feet current for northwestern Texas.

AIRMET Zulu's boundary did not extend over the destination. The 0600 Midland upper air sounding observation was plotted by the senior meteorologist. The plotted sounding depicted a moist low-level environment with the relative humidity greater than 80 percent from the surface through 10,000 feet and supported low nimbus type clouds with light precipitation; with precipitable water value was 0.46 inches. The freezing level was identified at 451 feet above ground level with a defined temperature inversion associated with the frontal zone south of the area at 6,576 feet above mean sea level (MSL), where temperatures rose above freezing again between 6,000 and 9,000 feet. Severe icing warnings were not found in any published advisories for the destination area. The meteorology factual report is appended to the docket associated with this investigation.

AIDS TO NAVIGATION

Three instrument approach procedures (IAPs) were published for use at MDD. These included:

RNAV (GPS) RWY 25
RNAV (GPS) RWY 34
VOR/DME RWY 25
VOR-A

The RNAV approach to runway 25 at MDD included an inbound course of 248 degrees. The minimum descent altitude (MDA) was 3,220 feet MSL. The weather minimums for the RNAV (GPS) runway 25 approach were a MDA of 500-feet and 1-mile visibility for the straight-in approach. The approach plate is appended to the docket material associated with the case.

COMMUNICATIONS

The pilot was under radar and radio contact with Midland ATCT, Approach Control and he initially reported on that approach control frequency, about 0749, that the airplane was descending to 8,000 feet. About 0750, the controller gave the pilot a clearance to descend to 6,000 feet and proceed direct to the initial approach fix named CIRIT. About 0751, another airplane reported that there was light clear icing at 5,000 feet and the accident pilot affirmed

that he copied the icing report. The controller indicated that the pilot could remain at 7,000 feet if the pilot wanted. About 0755, the controller issued an approach clearance for the RNAV runway 25 approach. About 0758, the controller inquired if the pilot was heading to a fix named JIBEM and the pilot confirmed and indicated that he was correcting back. About 0800, the controller canceled the approach clearance. The pilot was vectored at 4,500 feet for a second approach and about 0804, the controller issued another approach clearance to the pilot for the RNAV runway 25 approach. About 0806, the controller advised the pilot that he appeared to be off course and the pilot acknowledged the advisement. About 0807, the controller gave the pilot an approval to change to an advisory frequency, which was acknowledged by the pilot. No further communications with the pilot were recorded on the approach frequency. A transcript of the approach frequency communications associated with the flight is appended to the docket material associated with the case.

AIRPORT INFORMATION

MDD is a public, non-towered airport located about 3 miles north of Midland, Texas, and it has a surveyed elevation of 2,803 feet MSL. The airport is serviced by two asphalt runways, Runway 16/34 and 7/25.

Runway 7/25 was 5,022 foot by 75-foot asphalt runway, which had non-precision runway markings. The runway was equipped with a 4-light, 3-degree glide path, vertical approach slope indicator.

WRECKAGE AND IMPACT INFORMATION

The airplane crashed into a house in a residential area, located northeast of the intersection of Trevino Street and Casper Court, Midland, Texas. A post-impact ground fire occurred. The fire melted the icing that the airplane had collected during the flight and the fire consumed the majority of the airplane.

ADDITIONAL INFORMATION

The pilot was accustomed to flying a 1974 Beech, King Air, E90, twin-engine, conventional-tailed airplane. According to the pilot, the avionics installed in both the F90 and E90 were different. The F90 had conventional avionics with a HSI and the E90 had Avidyne avionics installed. The F90 had a different type autopilot installed than the S-TEC autopilot, which was installed in the E90.

During an interview with a FAA inspector, the pilot stated that he believed the loss of control was "primarily due to ice."

History of Flight

Approach	Other weather encounter
Approach-IFR final approach	Loss of control in flight (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

Pilot Information

Certificate:	Commercial	**Age:**	53, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Seatbelt
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 With Waivers/Limitations	**Last FAA Medical Exam:**	08/14/2011
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	08/14/2011
Flight Time:	4600 hours (Total, all aircraft), 25 hours (Total, this make and model), 4400 hours (Pilot In Command, all aircraft), 99 hours (Last 90 days, all aircraft), 44 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	BEECH	**Registration:**	N90QL
Model/Series:	F90	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	LA-2
Landing Gear Type:	Retractable - Tricycle	**Seats:**	7
Date/Type of Last Inspection:	06/09/2011, Continuous Airworthiness	**Certified Max Gross Wt.:**	10950 lbs
Time Since Last Inspection:		**Engines:**	Turbo Prop
Airframe Total Time:	8253 Hours as of last inspection	**Engine Manufacturer:**	P&W Canada
ELT:	Installed	**Engine Model/Series:**	PT6A-135A
Registered Owner:	QUALITY LEASE AIR SERVICES LLC	**Rated Power:**	
Operator:	QUALITY LEASE AIR SERVICES LLC	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	KMDD, 2803 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	0815 CST	**Direction from Accident Site:**	250°
Lowest Cloud Condition:	Scattered / 300 ft agl	**Visibility**	2 Miles
Lowest Ceiling:	Overcast / 800 ft agl	**Visibility (RVR):**	
Wind Speed/Gusts:	9 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	30°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.31 inches Hg	**Temperature/Dew Point:**	1°C / 1°C
Precipitation and Obscuration:	Mist; No Precipitation		
Departure Point:	Wharton, TX (ARM)	**Type of Flight Plan Filed:**	IFR
Destination:	Midland, TX (MDD)	**Type of Clearance:**	IFR
Departure Time:	0626 CST	**Type of Airspace:**	

Airport Information

Airport:	Midland Airpark (MDD)	**Runway Surface Type:**	Asphalt
Airport Elevation:	2803 ft	**Runway Surface Condition:**	Unknown
Runway Used:	25	**IFR Approach:**	RNAV
Runway Length/Width:	5022 ft / 75 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Destroyed
Passenger Injuries:	N/A	**Aircraft Fire:**	On-Ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Serious	**Latitude, Longitude:**	32.042222, -102.080833 (est)

Administrative Information

Investigator In Charge (IIC):	Edward F Malinowski	**Report Date:**	02/03/2014
Additional Participating Persons:	Reginald Vessels; Federal Aviation Administration; Lubbock, TX Kris Wetherell; Beechcraft; Wichita, KS		
Publish Date:	04/11/2018		
Investigation Docket:	http://dms.ntsb.gov/pubdms/search/dockList.cfm?mKey=82446		