Aviation Investigation Final Report

Location:	Grand Canyon, Arizona	**Accident Number:**	LAX02FA278
Date & Time:	September 8, 2002, 11:35 Local	**Registration:**	N8261J
Aircraft:	Beech A36	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The airplane departed from controlled flight after encountering forecast conditions including moderate turbulence and icing during a cross-country instrument flight and collided with the ground in a near vertical spinning descent. The airplane was equipped with a Stormscope, but not weather radar. The pilot received a preflight weather briefing that included advisories for icing conditions, scattered thunderstorms, and moderate to severe turbulence. The briefer advised that radar indicated a large area of echoes extended over the route of flight with light to moderate intensities and that cloud tops were up to 24,000 feet with scattered thunderstorms and a high likelihood of icing conditions between 15,000 and 24,000 feet. The pilot filed his IFR flight plan with a cruising altitude of 17,000 feet. After takeoff and achieving 17,000 feet, the pilot asked the center controller for a clearance to a higher altitude of 19,000 feet, which was approved. Within the next 3 minutes the pilot made a request to deviate to the left and then to climb higher to 21,000 feet, which were all approved. Shortly thereafter, the pilot advised he "really went through some bad turbulence here," and the controller inquired about his heading and altitude. The pilot advised he wanted to climb back to altitude but he was still in IMC conditions. That was the last communication from the flight. According to the controller's memory of the radar display, the airplane was getting into some weather and had deviated north, made a u-turn and had gone down to 19,000 feet, and had started getting back on course when it disappeared. The requests from the pilot to climb to higher altitude was likely made to climb out of icing conditions and an attempt to climb over some of the towering cumulus clouds tops. A limited overlay of weather echoes that would have been available to the controller. The controller provided no weather deviations or support even after the flight encountered some weather, lost altitude, and reported encountering significant turbulence. The weather data showed a shear level was at 19,800 feet, with a 11.1 knot per 1,000 feet change in wind speed. This shear layer had a high probability of severe turbulence. The data also showed a 92 percent probability of rime icing at 20,000 feet.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the pilot's inadequate in-flight planning/decision and his failure to maintain adequate airspeed which resulted in an encounter with adverse weather conditions and the loss of control due to a stall. Contributing factors were thunderstorm related turbulence, icing conditions, the pilot's disregard of the weather forecast.

Findings

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

Findings
1. (C) WEATHER CONDITION - TURBULENCE(THUNDERSTORMS)
2. (C) IN-FLIGHT PLANNING/DECISION - INADEQUATE - PILOT IN COMMAND
3. (C) WEATHER CONDITION - ICING CONDITIONS
4. (F) WEATHER FORECAST - DISREGARDED - PILOT IN COMMAND

Occurrence #2: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: CRUISE

Findings
5. (C) AIRSPEED - NOT MAINTAINED - PILOT IN COMMAND
6. STALL/SPIN - ENCOUNTERED - PILOT IN COMMAND

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

Findings
7. TERRAIN CONDITION - GROUND

Factual Information

HISTORY OF FLIGHT

On September 8, 2002, about 1135 mountain standard time, a Beech A36, N8261J, descended from cruise altitude and collided with terrain about 20 miles west of Grand Canyon, Arizona. The private pilot/owner operated the airplane under the provisions of 14 CFR Part 91. The pilot was fatally injured, and the airplane was substantially damaged. The personal flight originated at Bullhead City, Arizona, at 1047, and was destined for Liberal, Kansas. Visual meteorological conditions prevailed at the departure point, and an instrument flight rules (IFR) flight plan had been filed.

The pilot contacted the Prescott Automated Flight Service Station (AFSS) between 0941 and 1008 on September 8, 2002, to file an IFR flight plan and to obtain a standard weather briefing. The briefer provided a synopsis of current conditions, a description of the weather radar, the in-flight advisory for icing conditions, the route forecast, and winds aloft data. The transcript of that briefing is included in the docket for this accident.

The AFSS briefer advised the pilot that "the worst of your flight, as far as the weather is going to be right through Arizona and the western section of New Mexico." Regarding the current radar image the briefer advised the pilot that "north of Kingman and north of Winslow, right now there is a fairly sizable echo return of precip17 its been a kind of broken band of precipitation all day long, like I say extending from the southwest to the northeast section of the state." The pilot acknowledged that and the briefer advised, "..you'll probably have to go through that at some point, right now it looks like light to occasionally moderate precip in that area and then there's another fairly sizeable return that is just to the east of Farmington." The pilot acknowledged. The briefer then advised "...you can count on having some precip whether it's the one I'm discussing with you or something else moving in (over the northern Arizona)." The briefer gave the pilot the current AIRMETs in effect and stated, "...also of a concern is one for icing and they're calling for light to occasional moderate rime in clouds from 15,000 to 24,000 (feet)..." The pilot acknowledged and the briefing continued with the other en route and destination forecast and ended at 0957 after the pilot filed his IFR flight plan with a cruising altitude of 17,000 feet.

The Federal Aviation Administration (FAA) Los Angeles (ZLA) Air Route Traffic Control Center (ARTCC) transcripts of radio communications from 1046 through 1137 between the facility and the accident airplane were reviewed.

At 1046, N8261J contacted ZLA Sector-6 (R-6) after departure from Bullhead City and requested an IFR clearance to Liberal, Kansas, which the controller issued. The pilot then reported climbing through 11,000 feet at 1051. Three minutes later the pilot requested higher

altitude and was cleared to 15,000 feet.

At 1101, the R-8 sector controller broadcasted Convective SIGMETs 30 for western Utah and Nevada, SIGMET 31 for western Arizona, and SIGMET 32 for western New Mexico and Arizona.

The flight was cleared to climb to 17,000 feet at 1104 and the pilot subsequently requested 19,000 feet at 1110, and the controller cleared the flight to the higher altitude.

At 1112, the pilot requested left deviation. The controller approved left deviation and cleared the flight direct to Liberal, Kansas, when the pilot was able. One minute later the pilot requested 21,000 feet and the controller approved the higher altitude.

The controller called N8261J at 1124, and the pilot reported "I really went through some bad turbulence here." The controller acknowledged the communication and then asked the pilot what his heading was and he advised "...270 (degrees) right now, I'll get back on course here in a minute." The controller then called traffic out to the airplane and asked the pilot if he was still descending or going back up. The pilot advised, "I'd like to go back up...but I'm still in the soup here." The controller advised the pilot that if he needed to change altitude and heading in the future, to let them know before he did it. There was no response. The recorded radar data showed the onboard transponder signal then went into a coast mode followed by a primary target only. Subsequently, an emergency locator transmitter (ELT) beacon signal was received. The wreckage was located on the Grand Canyon Vortac 265-degree radial at 21 nautical miles.

Review of the recordings disclosed that at 1145, during a position relief briefing, the R-8 controller advised the relieving controller that N8261J was getting into some weather, and had deviated north, made a U-turn and gone down to about 19,000 feet. The controller stated that N8261J had started going back on course and then disappeared.

PERSONNEL INFORMATION

According to the private pilot's logbook, he had accumulated about 2,124 total flight hours, with about 557 hours in the Prop-Jet Bonanza. The log showed 415 hours of instrument flight time and documented a flight review in compliance with the requirements of 14 CFR 61.56, occurring on October 2, 2000. His most recent second-class flight physical occurred on July 9, 2002.

AIRCRAFT INFORMATION

According to airframe logbook information, the most recent annual inspection occurred on December 5, 2001, at 1,036 total airframe flight hours.

The airplane had been modified by replacing the Continental TSIO-520 engine with a Allison 250-B17 turboprop engine. The airplane was also equipped with a WX1000 Stormscope,

thunderstorm avoidance system.

METEOROLOGICAL INFORMATION

A National Transportation Safety Board staff meteorologist conducted a study of the weather conditions as forecast and existing at the time of the accident. The study is included in the docket for this accident. In summary, the meteorologist found the following.

The closest upper air or rawinsonde observation was from the Flagstaff NWS Office, located approximately 50 miles southeast of the accident site. The 1200Z sounding on September 8, 2002, along with the observed and derived stability parameters indicated a moist low-level environment through 500-mb, with the relatively humidity exceeding 90 percent several times between the surface and cruising level of the accident airplane at 21,000 feet. The freezing level was identified at 611-mb or approximately 14,000 feet and had a relative humidity of 88 percent.

The wind profile indicated a surface wind from the southwest veering to the southwest and increasing in wind speed with height. The rawinsonde wind information was lost above 300-mb or approximately 30,000 feet with wind speeds of 69 knots. The accident airplane was last observed at 21,000 feet and the sounding indicated wind at that level was from 200 degrees at 41 knots, with a temperature of -11.7 degrees C. Immediately below this level at 488-mb or approximately 19,800 feet, a strong shear layer was noted with a 11.1 knot per 1,000 feet change in wind speed with a Richardson number (Ri) of 0.4, which indicated a probability of severe clear air turbulence (CAT). This layer also had a high relative humidity of 92 percent and a threat of light rime type icing with a liquid water content (LWC) of 0.64 grams per cubic meter.

The GOES-10 infrared image at 1830Z depicted a large area of low to middle layer clouds covering most of Arizona with four areas of convective clouds depicted by the enhanced colors. The largest area of convective clouds identified as cumulonimbus clouds was located over the southern portions of the image, located south of Phoenix (KPHX). The second area was over eastern Arizona, east of Winslow (KINW) and north of Show Low (KSOW). The third largest area was associated with a line of towering cumulus and cumulonimbus clouds extending from southern Nevada near Bryce Canyon (KBCE) southwestward to Kingman, Arizona (KIGN), and Bullhead City. The fourth area of convective clouds was identified ahead of this line west of Grand Canyon (KGCN) and immediately south of the accident site. The main centroid of this area of cumulonimbus clouds was located approximately 25 miles south of the accident site at 1830Z, with a radiative temperature showing cloud tops near 36,000 feet. Over the accident site, the radiative temperature corresponded to cloud tops near 27,000 feet.

The GOES-10 visible image for 1830Z on September 8, 2002, depicts an area of towering cumulus clouds over the accident site with a larger area of cumulonimbus clouds to the south of the accident site.

The closest available NWS Weather Surveillance Radar-1988, Doppler (WSR-88D) was located at Cedar City, Utah (KICX), approximately 93 miles northwest of the accident site. The radar beam center was located at approximately 17,465 feet over the accident site, with the base of the beam at 12,730 feet and the top at 22,250 feet. During the period from 1820Z through 1827Z the accident airplane was observed between 19,000 and 21,000 feet, within the 0.6 degree elevation scan.

The FAA Advisory Circular AC 00-24B titled "Thunderstorms" dated January 2, 1983, also defines the echo intensity levels and potential weather phenomena associated with those levels. If the maximum VIP Level are 1 "weak" and 2 "moderate," then light to moderate turbulence is possible with lightning. VIP Level 3 is "strong" and severe turbulence is possible with lightning. VIP Level 4 is "very heavy" and severe turbulence is likely with lightning. VIP Level 5 is "intense" with severe turbulence, lightning, hail likely, and organized surface wind gusts. VIP Level 6 is "extreme" with severe turbulence, lightning, large hail, extensive surface wind gusts and turbulence. These levels are also referenced in the Aeronautical Information Manual (AIM) under the Pilot/Controller Glossary under radar weather echo intensity levels.

Examination of the WSR-88D KICX 0.6 degree elevation scan base reflectivity image covering the accident site at 1830Z depicts a band of echoes from 20 miles east-northeast extending to a position approximately 50 miles south-southwest of the accident site. Maximum echoes within 5 miles of the accident site reach VIP Level 2 moderate echoes. At 1824Z, the image showed the airplanes flight track through the area of 25 to 37 dBZ echoes. At 1830Z, the image depicts the track of the accident airplane turning westward and then to the south and east back into the echo reentering into the 37 dBZ echo.

The Vertical Azimuth Display (VAD) wind profile is a by-product of the radial velocity data from the WSR-88D. The VAD wind profile measures wind speeds at various heights over time to help track movement and depth of certain weather features such as frontal systems and gust fronts. The product displays wind data within 20 miles of the radar site where weather echoes are detected. Between 1825Z and 1830Z, the VAD winds at 20,000 feet were from the south-southwest at 35 knots and increases to 45 knots at 25,000 feet.

The Area Forecast (FA) valid for this accident was issued at 1043Z on September 8, 2002, and was valid until 2300Z. The forecast had a warning in the header to see the latest AIRMET Sierra for current IFR conditions and mountain obscuration valid over portions of the forecast region. The header also warned that the mention of thunderstorms implied severe or greater turbulence, severe icing, low-level wind shear, and localized IFR conditions. The synopsis indicated that the main synoptic feature was associated with an upper level trough over the western United States, which was expected to weaken during the period. The forecast for Arizona was for scattered to broken clouds at 8,000 to 10,000 feet, and broken at 12,000 to 14,000 feet with tops to 24,000 feet, with broken cirrus clouds above. Widely scattered thunderstorms and rain showers were also forecast, with cumulonimbus cloud tops to 37,000 feet. The outlook from 2300Z through 0500Z was for VFR conditions to prevail with

thunderstorms and rain.

At 1055, the NWS Aviation Weather Center (AWC) issued Convective SIGMET15 30W for a line of thunderstorms over northern to western Utah to the north of the accident site, and advisory 31W for an area of thunderstorms over southern Arizona and advisory 32W for a developing line over southwest Arizona to New Mexico. The Convective SIGMETs extended well north, south, and southeast of the accident site.

The outlook portion of the advisory indicated that occasional advisories were anticipated due to thunderstorms across portions of Arizona, Utah, eastern Idaho, Montana, Wyoming, the Dakotas, western Nebraska, Colorado, and New Mexico later in the period. The outlook 20 section advised users to see the most recent convective outlook bulletin (ACUS1 KWNS) from the NWS Storm Prediction Center (SPC) for a synopsis and further meteorological details.

The NWS AWC issued Convective SIGMET 34 at 1854Z after the accident for an area of Arizona enclosed by the navigation fixes from 10 miles north-northwest of (POS), to 70 miles northeast of (INW), to 40 miles east of (SJN), to 50 miles south-southwest of (TUS), to 90 miles west of TUS, to 10 miles north-northwest of PGS. The advisory was issued for an area of thunderstorms moving from 210 degrees at 35 knots, with tops to 45,000 feet. The outlook section of the advisory provided no further details on the thunderstorms and advised users to see the latest convective outlook (bulletin ACUS1 KWNS) for a synopsis and further meteorological details. This accident site was on the northern border of this advisory.

The NWS AWC issued the following AIRMET16 advisories that were current at the time of the accident:

AIRMET Zulu update 2 at 1340Z for portions of Idaho, Montana, Wyoming, Utah, Colorado, Arizona (including the accident site), and New Mexico, and was until 2000Z. The advisory warned of light to moderate rime to mixed icing in-clouds between 15,000 to 24,000 feet. Conditions were expected to continue beyond 2000Z through 0200Z. The freezing level was identified from 8,000 to12,000 feet over the northern boundary of the region, to 14,000 to 16,000 feet over the southern portion of the region.

AIRMET Sierra update 3 was issued at 1650Z for IFR and mountain obscuration, valid until 2000Z, over an area covering the accident site.

AIRMET Tango update 3 was issued at 1715Z for occasional moderate turbulence between 18,000 and 37,000 feet due to an upper level trough. Conditions were expected to move east-northeast and continue beyond 2000Z, and end near 0200Z. The advisory extended approximately 90 miles north and northwest of the flight path, but did not extend over the accident site.

There were no other SIGMETs, Center Weather Advisories, or Severe Weather Forecast Alerts or Weather Watches current for the route of flight or over the accident site issued on

September 8, 2002.

The Terminal Aerodrome Forecast issued for KGCN at 1730Z, and valid from 1800Z on September 8, 2002, to 1800Z the following day. Beginning at 1800Z, wind from 210 degrees at 8 knots; visibility better than 6 miles with rain showers in the vicinity; scattered clouds at 1,900 feet agl; ceiling broken at 5,000 feet. Temporary condition between 1800Z and 2100Z of visibility 4 miles in moderate rain showers, with a ceiling broken at 1,900 feet. From 2100Z, wind from 220 degrees at 8 knots; visibility better than 6 miles; scattered clouds at 2,000 feet; ceiling broken at 5,000 feet in cumulonimbus clouds. Temporarily between 2100Z and 0200Z of wind variable at 15 knots gusting to 30 knots; visibility 2 miles in thunderstorm; moderate rain, and mist; ceiling overcast at 1,000 feet in cumulonimbus clouds. The forecast continued beyond 0200Z with a chance of rain and thunderstorms through 0600Z.

The NWS Storm Prediction Center recorded no severe weather events over Arizona on September 8, 2002, that included any tornadoes, severe thunderstorms, large hail, or damaging winds of 50 knots or more.

AIR ROUTE TRAFFIC CONTROL

At the time of the accident the pilot was under the control of Los Angeles Air Route Traffic Control Center (ZLA), located in Palmdale, California. A transcript of voice communications with ZLA is in the docket.

WRECKAGE AND IMPACT INFORMATION

The accident site was flat open rangeland with little vegetation and soft from rain. The elevation was about 6,000 feet mean sea level. The airplane was mostly intact with the wing tip tanks broken downward. The vertical stabilizer broke over towards the right, and the rudder severed from the vertical stabilizer in trail. The entire airplane displayed high vertical crush and collapse of the structure. All ground scars and wreckage debris were found immediately around the fuselage. Based on an examination of the ground scars and the wings and fuselage, the left wing was moving rearward and the right wing forward when the airplane impacted the ground.

The landing gears were in the retracted position with the gear handle in the up position. The wing flaps were in the retracted position with the flap selector position in the up position. In addition to the factory installed oxygen system, there were three additional medical oxygen bottles in the cabin area with nasal cannula breathing devices.

TESTS AND RESEARCH

The propeller shaft was found separated. It was submitted to the Safety Board's Materials Laboratory for examination. The propeller shaft, P/N 23008579, from an Allison 250-B17F2 engine fractured on a circumferential plane adjacent to a change in section and just

forward of the prop governor drive bevel gear. Visual examination of the fracture in the shaft revealed that much of the fracture had a smooth smeared appearance and contained deformation transverse to the axis of the shaft. This deformation produced a lip of metal around much of the perimeter of the fracture. The propeller shaft forward of the fracture contained slight bending deformation. Fracture features and deformation were consistent with an overstress shear fracture primarily from torsional loading. No evidence of fatigue cracking or other preexisting defects were noted.

MEDICAL AND PATHOLOGICAL INFORMATION

On September 10, 2002, the Coconino County Medical Examiner performed an autopsy on the pilot. During the procedure, they obtained samples for toxicological analysis by the FAA Civil Aeromedical Institute in Oklahoma City, Oklahoma. The results of the analysis were negative for carbon monoxide, cyanide, ethanol, and drugs.

ADDITIONAL INFORMATION

The Safety Board released the wreckage to the executor of the pilot's estate on May 7, 2003.

Pilot Information

Certificate:	Private	**Age:**	71,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
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 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	July 9, 2002
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	October 2, 2000
Flight Time:	2097 hours (Total, all aircraft), 557 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N8261J
Model/Series:	A36	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	E-2807
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	December 5, 2001 Annual	**Certified Max Gross Wt.:**	3833 lbs
Time Since Last Inspection:	134 Hrs	**Engines:**	1 Turbo prop
Airframe Total Time:	1170 Hrs at time of accident	**Engine Manufacturer:**	Allison
ELT:	Installed, activated, aided in locating accident	**Engine Model/Series:**	250B17F2
Registered Owner:	George Howard	**Rated Power:**	450 Horsepower
Operator:		**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	GCN,6606 ft msl	**Distance from Accident Site:**	20 Nautical Miles
Observation Time:	11:54 Local	**Direction from Accident Site:**	90°
Lowest Cloud Condition:	Scattered / 3600 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Broken / 10000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	12 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	230°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.28 inches Hg	**Temperature/Dew Point:**	19°C / 11°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	BULLHEAD CITY, AZ (IFP)	**Type of Flight Plan Filed:**	IFR
Destination:	LIBERAL, KS (LBL)	**Type of Clearance:**	IFR
Departure Time:	10:47 Local	**Type of Airspace:**	Class A

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	36.000831,-112.550003

Administrative Information

Investigator In Charge (IIC):	Petterson, G.
Additional Participating Persons:	Steve Kane; Federal Aviation Administration; Las Vegas, NV Brian D Cassidy; Raytheon Aircraft Company; Wichita, KS Mike A Weber; Rolls-Royce Corp; Indiananapolis, NC
Original Publish Date:	October 28, 2004
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=55652