National Transportation Safety Board
Aviation Accident Final Report

Location:	WAINWRIGHT, AK	**Accident Number:**	ANC97MA161
Date & Time:	04/10/1997, 2030 AKD	**Registration:**	N408GV
Aircraft:	Cessna 208B	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	5 Fatal
Flight Conducted Under:	Part 135: Air Taxi & Commuter - Scheduled		

Analysis

The pilot had contacted the FSS 11 times on the day of the accident to obtain weather briefings. The conditions were below VFR minimums, which were required to conduct the passenger-carrying commercial flight in a single-engine airplane. The conditions later improved and the pilot departed under a special VFR clearance. The pilot performed two approaches at the destination airport in IMC that were consistent with the two GPS approaches that were available there. Weather data and witnesses indicate that daylight conditions, low clouds and poor visibility prevailed, with cloud tops at 1,000 feet. After the second approach, the pilot radioed that he was heading back to the departure airport because he could not see the airport. No distress calls or unusual engine noises were heard. The airplane subsequently flew north of the airport and away from the departure airport at an altitude beneath the minimum radar coverage of 2,200 feet. It impacted the frozen Arctic Ocean in a right bank and at a 60-degree nose-down attitude about three miles away from the location of the pilot's last radio transmission. An examination of the airplane (before it sank through cracking ice) revealed no pre-impact mechanical malfunctions. An examination of the propeller revealed that it was under a power setting consistent with a maneuvering airspeed at the time of impact. An examination of the autopilot annunciator filament revealed that the autopilot was not engaged at impact. The airplane was nearly full of fuel and over its published maximum gross weight at impact. Small pieces of clear ice, about 1/4-inch thick, were found on portions of the tail surfaces. Interviews with operator employees and the pilot's wife revealed that the pilot may have felt pressure from himself and passengers to complete the flight.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's intentional VFR flight into instrument meteorological conditions and his failure to maintain altitude/clearance from terrain. Factors contributing to the accident were the weather conditions.

Findings

Occurrence #1: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: MANEUVERING

Findings
1. AIRCRAFT WEIGHT AND BALANCE - EXCEEDED - PILOT IN COMMAND
2. (F) WEATHER CONDITION - LOW CEILING
3. (F) WEATHER CONDITION - FOG
4. (F) WEATHER CONDITION - ICING CONDITIONS
5. (C) VFR FLIGHT INTO IMC - INTENTIONAL - PILOT IN COMMAND
6. (C) ALTITUDE/CLEARANCE - NOT MAINTAINED - PILOT IN COMMAND
7. TERRAIN CONDITION - WATER,FROZEN

Factual Information

HISTORY OF FLIGHT

On April 10, 1997, about 2030 Alaska daylight time, N408GV, operated by Hageland Aviation Services, Inc., as Flight 502, collided with the frozen Arctic Ocean while maneuvering near Wainwright, Alaska. The commercial pilot and all four passengers were fatally injured and the airplane was destroyed. Instrument meteorological conditions prevailed. The pilot had previously filed an instrument flight rules (IFR) flight plan, but departed with a visual flight rules (VFR) flight plan. The regularly scheduled commuter airline passenger flight had departed from Barrow, Alaska, at 1955 and was destined for Wainwright. The flight was operating under the provisions of Title 14 Code of Federal Regulations (CFR) Part 135.

According to transcripts, statements, and records (attached) provided by the Federal Aviation Administration (FAA), a person identifying himself as the pilot of N408GV telephoned the Barrow Flight Service Station (FSS) at 0819 on the morning of the accident and requested a "... standard briefing for the North Slope." The FSS briefer provided a briefing that described instrument meteorological conditions (IMC) at the Barrow Airport. The pilot continued to telephone and visit the FSS in person to determine if the weather would improve to visual meteorological conditions (VMC). [At the time of the accident, Federal Aviation Regulations (FAR) prohibited commercial passenger-carrying operations in single-engine airplanes during IMC.]

At 1231, the pilot telephoned the FSS again and asked if there were "... any changes in the weather?" The briefer again reported that the visibility at Barrow was below VFR minimums. About one hour later, the pilot telephoned a third time and told the FSS briefer that VMC were being reported by a local automated weather observation station (AWOS). Sky conditions at Barrow were reported as scattered clouds at 200 feet with a visibility of 10 miles. The pilot then filed an instrument flight rules (IFR) flight plan for a proposed 20-minute flight to Wainwright. The flight plan called for a cruising altitude of 4,000 feet with six hours of fuel on board and a departure time of 1430 local time.

Twenty minutes later, at 1402, the pilot called again and asked if the weather went "... back down again?" After the briefer responded that it had, the pilot stated: "Shoot... [as] soon as I call the passengers the darned stuff comes down." The briefer replied that "...VFR flights still not recommended..." and told the pilot that the reported visibility at Barrow was one and one-half mile with an indefinite ceiling of 300 feet overcast. The pilot asked the briefer "... if it's legal?" The briefer stated: "Well I don't know. I don't delve into the legal or no-legal area. You have to decide."

Thirty-six minutes later, at 1440, the pilot called the FSS again and was told that the ceiling remained at 300 feet overcast. At 1600, the pilot personally visited the FSS and obtained an abbreviated weather briefing. The reported weather conditions had not changed. After casually talking with the briefer, the pilot left the FSS. He then called the FSS four more times at 1645, 1703, 1733, and 1853. Each time he was told by the FSS briefer that the weather conditions had remained the same.

At 1920, the pilot called the FSS once more. The briefer told the pilot "... VFR flight still not recommended," and that the ceiling had risen to 500 feet overcast with a visibility of 7 miles. The pilot responded with: "Okay, that's fine. I guess I'm going to Wainwright." The pilot then

boarded the passengers and began the flight.

At 1952, the pilot contacted the FSS by radio and requested a "taxiing advisory." The briefer replied that the "...weather in the Barrow Class E surface area is below VFR minimas. Air traffic control clearance is required to depart the surface area. Say intentions." The pilot requested and was granted a special VFR clearance out of the Barrow Class E surface area. He also filed and activated a VFR flight plan to Wainwright.

At 1958, the pilot reported that he was clear of the Class E surface area. This was his last recorded radio transmission with the FSS.

The Safety Board requested and received recorded radar data from the U.S. Air Force for the time and location of the accident. According to recorded radar data (raw data attached), a radar target was tracking from Barrow toward Wainwright (plot of data attached) beginning about 30 minutes before the accident. The radar track began near Barrow at 2002 and ended near Wainwright at 2021. The recorded track of the target never deviated from 243 degrees during the entire period of recorded radar coverage. The recorded ground speed of the target varied between 135 and 145 knots during the majority of the track, and then gradually increased to 157 knots as the target descended toward Wainwright. The recorded altitude values initially varied between 4,000 feet and 5,000 feet msl, and then gradually decreased to 2,200 feet as the target approached Wainwright and disappeared below radar coverage.

According to a representative of the U.S. Air Force's 611th Communication Flight in Anchorage, Alaska, the recorded values for latitude, longitude, speed, and heading from the radar equipment are considered reliable and accurate; however, the altitude values have a tolerance of plus and minus 3,000 feet due to the characteristics of the radar and the lack of a mode-C signal from the target. The radar data is a computer compilation of data extracted from three Air Force FPS-117 long range, three-dimensional Alaska radar antenna sites located in Barrow, Olitok, and Cape Lisburne. According to the Air Force representative, the radar has a usable range of 200 miles and utilizes a FYQ-93 computer processor.

According to a Wainwright ground agent employed part-time by Hageland Aviation Services (statements attached), the pilot contacted him by radio about 2030 to report that the flight was inbound for landing. The ground agent stated that he was outside on the ramp of the Wainwright Airport at the time. He stated that he was communicating with the pilot via a portable marine radio that was tuned to "Marine 83." He stated that the normal procedure was to communicate with Hageland pilots via the marine radio, not the aviation radio, for improved communications.

The ground agent stated that he heard an airplane make two passes over the Wainwright Airport. During the first pass, the ground agent could hear the airplane, but he could not see it. The ground agent stated that the airplane approached the airport "... from the north" and was "... above the weather." During the second approach, the ground agent remembered that the airplane flew "... from the south heading north," and the airplane was flying "... parallel to the runway." He stated that he "... could see definitely the windows and tail of the airplane" as it flew overhead during the second pass, but "... there was weather" between him and the airplane.

The ground agent stated that he told the pilot via radio that the weather was overcast and the visibility was about 1/4-mile to the east with a "half a sock" of wind. At the time the ground agent heard the airplane directly overhead during the first approach, the pilot radioed

something similar to: "I can't see the village. I'm going down south to make another run through."

The ground agent remembered that as the pilot flew overhead during the second pass, the pilot announced that he could not see the airport and he was "going to go back." The ground agent stated that he could see the outline of the airplane in the haze, about 500 to 600 feet above the ground, on a northerly heading, and one-eighth of a mile laterally from the center line of the runway. The ground agent stated that the propeller sounded like the airplane was at landing speed.

The ground agent stated that the pilot immediately responded with a "good bye" statement, and he "...picked up no weird noises [from the airplane and] no frustration in [the pilot's] communications... no excitement." About 10 seconds later, he radioed to the pilot in order to ask him when he would be returning again. He received no response from the pilot. The ground agent stated that he may have asked the pilot a second time, but he is not sure. He never heard from the pilot again. Another ground witness, a resident of Wainwright who was employed as a part-time ticket agent for another operator, reported (statement attached) that he was in his home near the Wainwright Airport on the evening of the accident. He stated that he heard the Hageland ground agent over his citizens band radio talking to other villagers. He heard that the Hageland airplane was going to be landing at Wainwright, so he "... turned up the volume" on his airport scanner. "A few minutes later," the resident heard "clicking" over the airport radio and surmised that the pilot was attempting to activate the pilot-controlled lighting at the Wainwright Airport.

The resident stated that he then attempted to contact the pilot via his airport radio to tell the pilot that he "... didn't want [the pilot] to land..." because the weather was "pretty bad." The resident attempted to contact the pilot "four or five times," and he tried three different aviation frequencies; he never received a response from the pilot.

The resident remembered that he heard the airplane fly over his house on two separate occasions. He stated that it flew "... from the north... coming up over the village toward the airport" on the "first pass." The airplane then sounded like it "turned left." On the "second pass," he thought that the airplane "... sounded like he was higher." He also stated that the engine sounded "normal" during both passes, and that "about 10 minutes passed" between the first and second "passes."

The North Slope Borough Search and Rescue Unit was subsequently notified of an emergency locator transmitter (ELT) signal near Wainwright. The airplane wreckage was located 4.3 nautical miles northwest of Wainwright in the partially frozen Arctic Ocean the following day. The accident occurred during the hours of daylight near the following coordinates: 70 degrees, 42.2 minutes North and 160 degrees, 05.4 minutes West.

PERSONNEL INFORMATION

The pilot, male, age 41, possessed a commercial pilot certificate containing ratings for single-engine land, single-engine sea, multiengine land, and instrument airplanes. He also held a flight instructor airman certificate containing a rating for single engine land airplanes. According to FAA records, the pilot was issued an FAA First Class Medical Certificate on July 1, 1996, with the limitation that he "...shall wear correcting lenses while exercising the privileges of his/her airman certificate."

An examination of Hageland's pilot training records and daily flight logs (excerpts attached)

indicate that the pilot had accumulated a total of about 3,660 hours of flight time at the time of the accident, most of which was accrued in single engine, piston-powered airplanes. The records further indicate that the pilot accumulated 299 hours of total instrument time.

The records further indicate that pilot had flown a total of about 60 hours in the Cessna 208B, all of which were accrued during a 60-day period preceding the accident. No evidence was found to indicate that the pilot had ever flown any aircraft other than a single or multiengine, piston-powered airplane prior to his experience in the turbine-powered Cessna 208B.

The pilot was hired and began training at Hageland Aviation Services on February 2, 1997, about two months prior to the accident. He had been previously employed as a pilot by another 14 CFR Part 135 operator in Barrow for about five months prior to his resignation from that operator in order to become employed by Hageland Aviation Services. During his previous employment, he flew the single-engine, piston-powered Cessna 207. After being hired by Hageland, the pilot was subsequently sent to FlightSafety International in Wichita, Kansas, for a one-week pilot initial training course in the Cessna 208B. (At the time of the pilot's training, Hageland Aviation Services held an FAA exemption that authorized the use of FlightSafety International for the training and checking of pilots.)

After receiving 6.5 hours of Cessna 208B flight simulator training, the pilot satisfactorily completed an FAA Part 135 Airmen Competency/Proficiency Check (FAA Form 8410-3 attached) on February 14, 1997, in Wichita. The final FlightSafety check ride was 1.5 hours in duration and included instrument procedures and approaches.

The pilot returned to Barrow and began initial operating experience (IOE) in the Cessna 208B on February 24, 1997. He accumulated 13.8 hours and 13 landings during IOE, and satisfactorily completed the experience required by the FAA on February 27, 1997. During the next six weeks, according to Pilot Daily Flight Log sheets, the pilot exclusively flew the accident airplane on VFR revenue flights to villages along Alaska's North Slope, including Wainwright, on an almost daily basis.

According to the FAA, the pilot had no previous accidents; however, a review of the pilot's history of enforcement actions revealed a pending enforcement action for failure to remove a tail stand prior to flight in the accident airplane in March 1997.

In an interview with the Safety Board, the chief pilot of Hageland Aviation Services reported that he went to Barrow after the tail stand incident to take corrective action. The chief pilot stated that he was more concerned with the pilot's failure to check for damage after landing with the tail stand attached, than with the initial failure to remove it prior to flight. The chief pilot stated that after this incident, the company made a change to their checklist to prevent a similar incident from happening again. The chief pilot also stated that he had a long talk with the pilot of the accident aircraft and severely chastised him. He also reassured the pilot that he was doing a "good job," that his job was not in jeopardy, and that the pilot must "slow down."

The chief pilot stated that he considered the accident pilot to be an above average airman with above average judgement. He also stated the pilot may have felt self-induced pressure, or pressure from the passengers to conduct a flight under adverse conditions, but that the company did not pressure him.

In an interview with the Safety Board, Hageland Aviation Service's director of operations was asked if he felt there was any pressure on the pilot to conduct flights under adverse conditions. The director stated that all of the pilots are paid a salary and are not paid by the hour, and that

the company stresses safety. He stated that there was no pressure from the company to fly because the pilots are paid whether they fly or not. The director also stated that the pilot may have felt some pressure to conduct the accident flight from the passengers and also from the pilot's own desire to perform satisfactorily for the company.

In an interview with the Safety Board, the pilot's wife stated that she had also been hired by Hageland Aviation Services in February 1997. She stated that she and her husband worked as a team and that her duties included performing the office work at the Barrow base. The pilot's wife stated that working as a team was new for them. She stated that the pilot had been working all winter in Barrow, and that he would routinely arrive home about 1900 every evening.

The pilot's wife stated that she and her husband were being paid a salary and there was no pressure to fly. She also stated that there was no pressure from the U.S. Post Office to fly by-pass mail, and that the by-pass mail had never been taken away from them. She stated that the payments to carry the mail often made up the difference (profit) after the passenger revenue.

The pilot's wife said that the pilot's normal sleep pattern was to go to sleep around 2200 or 2230 at night, and then awaken about 0730 the following morning. She stated that there appeared to be nothing unusual about the pilot on the day of the accident and that he was well-rested.

The pilot's wife stated that the pilot viewed Hageland Aviation Services as a "good company," and that there were ample communications and support from management. She also stated that one of the pilot's complaints about his previous employer was that there was not enough company support.

The pilot's wife stated that there were two scheduled flights to Wainwright on the day of the accident. Three of the four passengers aboard the accident flight were scheduled to depart on the morning flight. She stated that they had waited all day to go and were anxious to leave Barrow. The fourth passenger was a non-revenue company employee who had decided to go to Wainwright later in the day.

The FSS briefer, whom the pilot visited on the day of the accident, was also interviewed by the Safety Board. He stated that he enjoyed meeting and talking with the pilot. He stated that the pilot appeared to be feeling well and was not exhibiting any anxiety or stress about rushing to Wainwright. He also stated that the pilot expressed his pleasure about his new employment with Hageland Aviation Services, and about how he enjoyed flying "on salary" rather than per flight. He stated that the pilot also appeared to be pleased that he was now joined by his family in Barrow, and that the pilot made no mention of any problems with his personal health or the condition of the airplane.

AIRCRAFT INFORMATION The aircraft, N408GV, a Cessna model 208B "Caravan I," was manufactured by the Cessna Aircraft Company in 1995. Upon delivery from the factory, it was sold and registered to Gussic Ventures of Anchorage, Alaska, who then leased it to Hageland Aviation Services, Inc. The airplane was powered by a single Pratt & Whitney PT6A-114A turboprop engine rated at 675 shaft horsepower.

The accident airplane was equipped with the capability of seating up to nine passengers. According to the operator, four of the passenger seats would have been installed at the time of the accident flight, and the remaining five seats would have been stored inside the airplane. The accident airplane also carried a cargo pod located underneath the belly of the airplane.

According to receipts and logs (copies attached) obtained from the fueling service in Barrow, the accident airplane received 175.8 gallons of Jet-A fuel at 1055 on the day of the accident. When interviewed by a representative of the North Slope Borough (record of interview attached), the refueler reported that both tanks were "topped off" with fuel.

The airplane's published maximum gross takeoff weight was 8,750 pounds in non-icing conditions. The takeoff weight of the airplane on the morning of the accident was calculated by Safety Board investigators to be 9,109 pounds, using the following data derived from available weight and balance records, known fuel load, occupant weights provided by the FAA and the North Slope Borough, baggage receipts (copies attached), and by-pass mail cargo weights as reported verbally by the operator one day after the accident (cargo manifest documents to verify the cargo weight were not recovered):

Empty weight of airplane -- 4,926 lbs. Usable fuel on board (322 gallons) -- 2,224 lbs. Pilot & Passengers -- 994 lbs. Baggage (inside airplane) -- 315 lbs. Cargo (By-pass mail) -- 660 lbs. (verbally reported)

Total Weight at Takeoff -- 9,119 pounds

The Safety Board estimated that the airplane would have consumed no more than 200 pounds of fuel during the accident flight, which left the airplane at least 169 pounds over its maximum gross takeoff weight at the time of the accident, providing that the reported cargo weight is accurate. Insufficient information was available regarding the specific loading locations of the baggage compartment and cargo pod; therefore, the Safety Board was unable to adequately estimate the center of gravity of the airplane at takeoff or during the accident. The airplane was equipped with an icing equipment package certified for flight in icing conditions. The package included pneumatic deicing boots on the wings, wing struts, horizontal stabilizer, and vertical stabilizer. The package also included an electrically-heated propeller blade anti-ice boots, a detachable, electrical windshield anti-ice panel, an electrical pitot/static heat system, a standby electrical system, and inertia separator. The airplane was not equipped with any ice protection equipment on its landing gear struts or cargo pod. The Safety Board could not determine if the windshield anti-ice panel was installed at the time of the accident.

The airplane was equipped for flight into IMC. The airplane was also equipped with a II Morrow Apollo model 820C Global Positioning System (GPS) receiver. The receiver was placarded for "VFR use only." The airplane was also equipped with a Bendix/King KFC-150 autopilot.

Hageland maintained the airplane as per an Approved Aircraft Inspection Program (AAIP) in accordance with FAR Part 135.419, and FAA Operations Specifications Part D73. The AAIP was developed from the Cessna Aircraft Company's Recommended Maintenance Program for the Cessna 208B aircraft. This AAIP is comprised of 12 "Phase" inspections, one accomplished each 200 flight hours, with "Mini" (abbreviated) inspections accomplished at 200 flight hour intervals, such that an inspection is accomplished each 100 flight hours. The entire aircraft is inspected with the accomplishment of any four consecutive phase inspections, such that the entire aircraft is inspected three times during the 12 phase inspections. Hageland also utilized a computer-based tracking and reporting system for tracking the status of inspections and components on all of their Cessna 208B airplanes.

The most recent maintenance records for the airframe and the engine were dated March 26, 1997, at 1,694.7 hours of total time on the airframe (TTAF). The record entries indicated

compliance with a Mini check with no unresolved discrepancies.

The airplane was equipped with an ELT, manufactured by Pointer, Inc., Tempe, Arizona. The ELT model number is 3000-1 and is of an FAA Technical Standard Order (TSO) C91 type design. METEOROLOGICAL CONDITIONS

According to a Meteorological Factual Report (attached) prepared by a Safety Board meteorological specialist, the following pertinent aviation routine weather reports were recorded for Barrow:

[Local time 1950] Winds 120 degrees at 11 knots; visibility 7 miles; ceiling 500 feet overcast; temperature -8.6 degrees C; dew point -9.6 degrees C; altimeter setting 30.56 inches of Hg.

[Local time 2058] Winds 150 degrees at 12 knots; visibility 7 miles; ceiling 500 feet overcast; temperature -9.6 degrees C; dew point -10.4 degrees C; altimeter setting 30.54 inches Hg. 8/8 stratus.

The Meteorological Factual Report also describes a pilot report that was recorded at 1802, about two and one-half hours prior to the accident. The pilot report indicated that the crew of a DC-6 airplane, descending toward Barrow, observed a cloud ceiling of 300 feet overcast with the top of cloud layer at 1,000 feet. The pilot also reported that he picked up "light" ice while on final approach to Barrow.

The Meteorological Factual Report also documents satellite images that "... show clouds along a straight line route from [Barrow] to [Wainwright]" about the time of the accident. The report further documents that the following area forecast for the Arctic Slope coastal area was issued at 1745 on the day of the accident: "Temporarily [Tempo] ceilings below 1,000 feet visibility below 3 miles in mist. Otherwise... scattered clouds at 500 feet and scattered clouds at 20,000 feet... Turbulence... None significant... Ice and freezing level... None significant. Freezing level above the surface." The area forecast was valid until 0600 on the morning after accident for Wainwright and Barrow.

No SIGMETs were issued or had been valid for the area of Northern Alaska at the time of the accident. One AIRMET was valid, and it reported: "Temporary ceilings below 1,000 feet and visibility below 3 miles in mist. Cloud tops to 1,000 feet." AERODROME AND GROUND FACILITIES

The Wainwright Airport consists of a single gravel runway, oriented 040-220 degrees magnetic, with no air traffic control or aircraft ground services. The field elevation is 30 feet above mean sea level (msl). Runway 4-22 is 4,500 feet long and 90 feet wide. Its extended centerlines are marked with blue 55-gallon drums. According to the FAA, about 800 air taxi operations were reported at the airport in 1996.

At the time of the accident, the airport was served by a published GPS non-precision approach to both Runway 4 and Runway 22. According to the terminal approach procedure diagram (attached), the minimum descent altitude (MDA) for an approach to Runway 4 is published as 560 feet msl, or 523 feet above the ground (when using an altimeter setting obtained from Barrow). If the runway environment is not visible at the MDA, the published procedure calls for the execution a missed approach procedure involving an immediate, straight-out climb to 2,000 feet msl on runway heading. There were no other published instrument approaches to the airport other than the two GPS approaches. Runway 4 is also served by Medium

Intensity Runway Lighting (MIRL). The MIRL is pilot-activated by keying a microphone on a frequency of 122.9 megahertz. The microphone must be keyed at least three times in rapid succession to activate the runway lights at the lowest setting. Keying five or seven times increases the lighting intensity. Upon activating the lights, the lights will remain illuminated for about 15 minutes, unless additional keying occurs. Runway 4 was also served by a Visual Approach Slope Indicator (VASI) lights. No anomalies were reported with the airport lighting immediately before, during or immediately following the accident.

There is no official weather reporting capability at the Wainwright Airport.

WRECKAGE AND IMPACT INFORMATION

On the morning of April 11, one day prior to the Safety Board's arrival at the accident site, representatives of the North Slope Borough photographed and videotaped the accident site immediately after its discovery. They then began to disturb the wreckage in order to recover the airplane occupants. The wreckage was examined at the accident site by Safety Board investigators on April 12, 1997. During the Safety Board's examination, the ice began to break up beneath the wreckage and the investigators were forced to abandon the wreckage after about three hours of documentation and component retrieval. The retrieved components included the propeller, autopilot controller/computer, and navigation/communication transceivers (except the GPS receiver which was not found). The remainder of the wreckage subsequently sank in the Arctic Ocean and was never recovered.

The Safety Board utilized the North Slope Borough's documentation as part of its investigation. The wreckage was initially found about 4.3 nautical miles northwest of Wainwright. It was lodged in shifting, broken ice and was found partially submerged in a nose-down attitude. Its longitudinal axis was aligned along a northerly heading. Prior to its movement by search and rescue personnel, the majority of the airframe remained intact and was lying upright within the confines of its preimpact dimensions.

The fuselage structure was substantially damaged. The forward portion of the fuselage structure, beginning at the wing attach points, was buried into the ice on an angle of about 60 degrees from the horizon. The ice thickness was about 12 inches. The remainder of the airframe was resting about 30 degrees downward as referenced from the horizon. Small pieces of debris, the pitot tube and the left tire were found distributed along a 100-foot path to the northwest of the airframe. The deice windshield was not recovered (the operator reported that the windshield would have normally been installed). No evidence of fire or in-flight structural failure was found.

The engine remained attached to the forward portion of the fuselage. A visual examination of the engine mounts did not reveal any evidence of preimpact twisting or damage. A visual examination of the exterior of the engine also did not reveal any evidence of preimpact catastrophic mechanical failure. The propeller had separated from the engine flange. The flange was bent and its mounting bolt holes exhibited evidence of gouging and stretching.

A Fiberglas cargo pod was installed on the belly of the fuselage. The pod was crushed beneath the fuselage and had disintegrated. Cargo debris was found in the area of the disintegration. The cargo was not recovered or weighed.

Both wings remained attached to the fuselage and were substantially damaged. The right wing received more impact damage than the left wing. The entire span of the right wing's leading edge received "accordion" crush damage aftward and was curled upward about 60 degrees

from its chord line. The entire span of the left wing's leading edge also received "accordion" crush damage aftward and was curled upward; however, the upward curl decreased along the outboard span. The left wing's leading edge exhibited less upward curl than the right wing.

The tailcone and empennage remained attached to the airframe, but were bent towards the right about 60 degrees from the longitudinal axis of the airframe as viewed aft to forward. The right side of the tailcone structure had buckled just aft of the cargo door frame. The left horizontal stabilizer, left elevator, vertical stabilizer, and rudder were not damaged; however, the outboard halves of the right horizontal stabilizer and elevator were crushed aftward and upward. The rudder, including its balance weight, was secured to the vertical stabilizer.

The deice boots for the horizontal stabilizers were found intact, except for the outboard portion of the right stabilizer boot that was impact damaged. An examination of the boots revealed that some ice had adhered to portions of the boots as well as to the unprotected portions of their adjacent leading edges. The ice was mostly clear and reached a maximum thickness of about 1/4-inch. The deice boots for the vertical stabilizer were also intact and exhibited evidence of some ice accretion that was similar to the ice found on the stabilizers. About a 1/4-inch layer of ice was also found along the entire unprotected leading edge of an antenna mounted on the right side of the vertical stabilizer. The deice boots from the wings and wing struts were severely damaged due to impact forces.

The airplane had fixed tricycle landing gear. Both main landing gear spring steel struts remained attached to the fuselage and were bent rearward. The right strut was bent aft more than the left strut. The nose landing gear was crushed underneath the fuselage.

No evidence of a preimpact flight control malfunction was found. All of the flight control surfaces were accounted for at the accident site. Flight control cable continuity could not be verified due to the disturbance of the wreckage prior to the Safety Board's arrival. The exposed portion of the elevator trim tab actuator was measured to be 1.5 inches in length, which corresponds to an elevator trim tab setting of 10 degrees tab down (maximum deflection is 15 plus/minus 2 degrees up or down) according to technical information provided by Cessna. The actuator was intact and undamaged. The rudder trim system in the cockpit was destroyed. There is no rudder trim tab installed on the airplane. The exposed portion of the aileron trim tab actuator, located near the right wingtip, was measured to be 1.75 inches in length. This was reported by Cessna to correspond to an aileron trim tab setting of 10 degrees tab down (left wing up trim - maximum deflection is 15 plus/minus 2 degrees up or down). Both wing flaps were attached to their respective wings and received impact damage. They were both found in the retracted position relative to the chordline of the wing structure. The electrically-driven flap jackscrew actuator could not be accessed at the accident site.

The power lever, fuel condition lever, and propeller control lever were mangled and crushed into their pedestal and a determination of their preimpact position could not be made; however, they were all aligned laterally with each other. The emergency power lever was found in the "NORMAL" position.

The majority of the flight instruments and cockpit gauges were impact-damaged. Some of the instruments had been torn from their brackets and their glass faces were shattered. The airspeed indicator needle was broken. The radio altimeter indicated 300 feet. The vertical speed indicator read 2,200 feet per minute descent.

The heading indication on the horizontal situation indicator (HSI), found in the left cluster of

flight instruments, read 128 degrees. The left-side directional indicator was partially crushed and read about 120 degrees. The heading indication of the right-side directional indicator read 013 degrees. The HSI and left-side directional indicator are powered by an electrically-driven gyro, while the right-side directional indicator is powered by a vacuum-driven gyro. The left-side attitude indicator, powered by a vacuum-driven gyro, indicated a 10-degree nose up pitch attitude and a left bank. The right-side attitude indicator, powered by an electrically-driven gyro, indicated a 10-degree nose down pitch attitude and a 30-degree right bank. The gyros could not be extracted and examined at the accident site.

The instrument gauge needles for engine oil temperature, interturbine temperature, torque, propeller revolutions per minute (rpm), and gas generator rpm (Ng) percent all read zero. The fuel flow gauge needle read 320 pounds per hour.

All cockpit anti-ice/deice switches and controls were found in the "OFF" position.

The circuit breaker panel was intact, but received some impact damage. All of the circuit breakers were found in the retracted position, except for the Generator Field breaker, which was extended in the "tripped" position. The breaker panel was bent in the area of this breaker. The propeller anti-ice and windshield anti-ice were partially retracted. The volt/ammeter selector switch was found in the "ALT" position. The alternator load gauge read zero amps. The standby power switch was found in the "OFF" position.

The overhead panel containing the fuel selector handles for the right and left wing tanks had been torn from the airplane. The selector valve linkages were attached to the handles, but had separated from the selector valves. MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot by Dr. Michael T. Probst, M.D., of the Alaska State Medical Examiner Office, Anchorage, Alaska, on April 14, 1997. According to the autopsy report, the cause of death was cited as: "Multiple impact injuries." No evidence that was consistent with pilot incapacitation was noted.

Specimens taken from the pilot were analyzed by the FAA Civil Aeromedical Institute, Oklahoma City, Oklahoma. According to their report (attached), negative results for ethanol, carboxyhemoglobin, cyanide, and all screened drugs were reported.

TESTS AND RESEARCH

Propeller Disassembly and Inspection

On June 3, 1997, the Safety Board disassembled and inspected (report attached) the recovered propeller of the accident airplane at Hartzell Propeller, Inc., in Piqua, Ohio.

The propeller is a 3-bladed, metal, single-acting, hydraulically-operated, constant-speed model with full feathering and reversing capabilities. Oil pressure from the primary propeller governor is used to move the blades to the low pitch (blade angle) direction. Blade-mounted counterweights and feathering springs actuate the blades towards the high pitch direction in the absence of governor oil pressure. Propeller rotation is clockwise as viewed from the pilot.

The propeller blade designated as no. 1 had separated and was not available for inspection; however, a section of the blade was retained by the clamp. An examination of this section revealed that about a 200-degree arc of blade retention shoulder was located in the clamp. The fracture surface lines were oriented in a spanwise direction. No evidence of a fatigue failure or blade-to-clamp rotation/slippage was found.

Blade no. 2 was bent forward about 10 degrees in a "double S" manner. The tip end was twisted slightly towards the low pitch direction. No evidence of blade-to-clamp rotation/slippage was found.

Blade no. 3 was bent rearward about 80 degrees. Two distinct bends were noted, one at the mid-deice area, and the second about 12 inches inboard from the tip end. The tip end was twisted towards low pitch. An approximate 2-inch gouge, curled toward the face side of the blade, was located on the leading edge outboard of the deice boot. Smaller nicks and gouges were located on the leading edge midspan and near the tip end. No evidence of a blade-to-clamp rotation/slippage was found.

The spinner dome was crushed and deformed rearward and inward around the blades. Deformation of the dome was opposite to propeller rotation. The spinner bulkhead was deformed rearward, nearly 90 degrees, between the no. 1 and no. 2 blade positions.

Examination of Communication/Navigation Transceivers

On June 24, 1997, the Safety Board disassembled and inspected (report attached) the airplane's communication/navigation transceivers at AlliedSignal (formerly Bendix/King) in Olathe, Kansas. Both units received severe impact damage and could not be powered up. The non-volatile memory circuit chips were extracted from the transceivers and placed in a test unit. The test unit was powered up and the following frequencies were displayed:

TRANSCEIVER No. 1 (Bendix/King KX-165, s/n 55532): In-use communication frequency - 127.77 (pilot "chat" frequency for the local area) Stand-by communication frequency - 122.80 (Wainwright Airport CTAF) In-use navigation frequency - 116.20 (Barrow VOR frequency) Stand-by navigation frequency - 109.10 (Barrow localizer frequency for Runway 6)

TRANSCEIVER No. 2 (Bendix/King KX-165, s/n 55599): In-use communication frequency - 123.60 (Barrow Airport CTAF/FSS) Stand-by communication frequency - 122.80 (Wainwright Airport CTAF) In-use navigation frequency - 109.10 (Barrow localizer frequency for Runway 6) Stand-by navigation frequency - 116.20 (Barrow VOR frequency)

Examination of Autopilot Components

On June 24, 1997, the Safety Board disassembled and inspected (report attached) the airplane's autopilot flight computer/controller (Bendix/King KC-192) at AlliedSignal in Olathe, Kansas. The unit received severe impact damage; no reliable switch positions could be obtained. The unit was connected to a KFC-150 autopilot system test harness and powered. None of the annunciators were functional, but the system passed pre-flight test normally. All autopilot and flight director modes engaged and the system responded correctly to roll and pitch commands. The pitch and roll rate monitors were tested and found to be functional. Automatic pitch trim and manual electric trim functions were normal, and the autopilot disconnect/trim interrupt functioned correctly. All servo clutches engaged and disengaged normally with autopilot mode cycle. The control wheel steering (CWS) mode functioned normally.

The autopilot mode annunciator bulbs were intact and non-functional. The flight director bulb was examined under a microscope. The examination revealed that the light bulb filament was broken with and exhibited no stretching. This observation was confirmed by the Safety Board's materials laboratory (report attached) in Washington DC. According to AlliedSignal, the autopilot system requires that the flight director mode to be engaged in order to allow the autopilot mode to be engaged.

ADDITIONAL INFORMATION

Background and Safety Record of the Operator

At the time of the accident, Hageland Aviation Services was based in St. Mary's, Alaska, and had been in a period of expansion. The company began in 1985 and has about 115 employees. They were authorized to conduct nine or less scheduled and on-demand passenger and cargo operations. The airline operates from eight Alaska towns and maintained their fleet in three Alaska towns. Hageland Aviation Service's fleet consisted of 28 aircraft, including four Cessna 402C multiengine airplanes, one Beech E-18 multiengine airplane, 20 single-engine reciprocating Cessna airplanes, and three turbine-powered Cessna 208Bs.

According to Safety Board records, airplanes operated by Hageland Aviation Services were involved in 13 accidents from 1985 through April 1998. Three of the accidents involved fatalities.

Release of Aircraft Wreckage

All aircraft wreckage, except for the propeller and selected navigation/communication equipment, was released to Mr. Dennis Cork, Insurance Adjuster, Professional Adjusters of Alaska, Inc., Anchorage, Alaska, on April 14, 1997. Mr. Cork was representing the registered owner of the airplane at the time of this release. The remaining components were subsequently released to Mr. Derrill Fulkerson, Claims Manager, AIG Aviation, Los Angeles, California, on March 3, 1998. Mr. Fulkerson was representing the registered owner of the airplane at the time of this release.

Pilot Information

Certificate:	Flight Instructor; Commercial	**Age:**	41, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land; Single-engine Sea	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane Single-engine	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 Valid Medical--w/ waivers/lim.	**Last FAA Medical Exam:**	07/01/1996
Occupational Pilot:		**Last Flight Review or Equivalent:**	
Flight Time:	3660 hours (Total, all aircraft), 60 hours (Total, this make and model), 3460 hours (Pilot In Command, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N408GV
Model/Series:	208B 208B	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	208B0455
Landing Gear Type:	Tricycle	**Seats:**	5
Date/Type of Last Inspection:	03/26/1997, AAIP	**Certified Max Gross Wt.:**	8750 lbs
Time Since Last Inspection:	45 Hours	**Engines:**	1 Turbo Prop
Airframe Total Time:	1740 Hours	**Engine Manufacturer:**	P&W
ELT:	Installed, activated, aided in locating accident	**Engine Model/Series:**	PT6A-114A
Registered Owner:	GUSSIC VENTURES	**Rated Power:**	675 hp
Operator:	HAGELAND AVIATION SERVICES	**Operating Certificate(s) Held:**	Commuter Air Carrier (135)
Operator Does Business As:		**Operator Designator Code:**	EPUA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Unknown	**Condition of Light:**	Day
Observation Facility, Elevation:	ABR, 44 ft msl	**Distance from Accident Site:**	73 Nautical Miles
Observation Time:	2058 ADT	**Direction from Accident Site:**	90°
Lowest Cloud Condition:	Unknown / 0 ft agl	**Visibility**	7 Miles
Lowest Ceiling:	Overcast / 500 ft agl	**Visibility (RVR):**	0 ft
Wind Speed/Gusts:	11 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	150°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	16°C / 14°C
Precipitation and Obscuration:			
Departure Point:	BARROW, AK (BRW)	**Type of Flight Plan Filed:**	VFR
Destination:	, AK (AWI)	**Type of Clearance:**	None
Departure Time:	1955 ADT	**Type of Airspace:**	Class G

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	4 Fatal	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	5 Fatal	**Latitude, Longitude:**	

Administrative Information

Investigator In Charge (IIC):	JEFFREY B GUZZETTI	**Report Date:**	11/10/1998
Additional Participating Persons:	VICTORIA E ANDERSON; WASHINGTON, DC FRED LEEPER; WICHITA, KS ROGER W STALLKAMP; PIQUA, OH RON J TWETO; ST. MARYS, AK		
Publish Date:			
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.ntsb.gov/pubdms/.		