National Transportation Safety Board
Aviation Accident Final Report

Location:	NUIQSUT, AK	**Accident Number:**	ANC00MA125
Date & Time:	09/18/2000, 1510 AKD	**Registration:**	N220CS
Aircraft:	Piper PA-31T3	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	5 Fatal, 5 Serious
Flight Conducted Under:	Part 135: Air Taxi & Commuter - Scheduled		

Analysis

The airline transport certificated pilot was landing at a remote village on a scheduled domestic commuter flight with nine passengers. The accident airplane, a twin-engine turboprop certified for single-pilot operations, was equipped with a fuselage-mounted belly cargo pod. Witnesses saw the airplane touch down on the gravel runway with the landing gear retracted. The belly pod lightly scraped the runway for about 40 feet before the airplane transitioned to a climb. The propeller tips did not contact the runway. As the airplane began climbing away from the runway, the landing gear was extended. The airplane climbed to about 100 to 150 feet above the ground, and then began a descending left turn, colliding with tundra-covered terrain. A postcrash fire destroyed the fuselage, right wing, and the right engine. The flaps were found extended to 40 degrees. The balked landing procedure for the airplane states, in part: "power levers to maximum, flaps to 15 degrees, landing gear up, and then retract the flaps." Five passengers seated in the rear of the airplane survived the crash. The survivors did not recall hearing a gear warning horn before ground contact. The airplane was landed gear-up eight months before the accident. The airplane was nearly landed gear-up four months before the accident. Each time, a landing gear warning horn was not heard by the pilot or passengers. A postcrash examination of the airplane and engines did not locate any preimpact mechanical malfunction. The FAA's Fairbanks, Alaska, FSDO conducted an inspection of the operator six months before the accident, and recommended the operator utilize two pilots in the accident airplane. Following the accident, the Fairbanks FSDO required the operator to utilize two pilots for passenger flights in the accident airplane make and model.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's failure to extend the landing gear, his improper aborted landing procedure, and inadvertent stall/mush. Factors in the accident were an improper adjustment of the landing gear warning horn system by company maintenance personnel, and the failure of the pilot to utilize the prelanding checklist.

Findings

Occurrence #1: DRAGGED WING,ROTOR,POD,FLOAT OR TAIL/SKID
Phase of Operation: LANDING - FLARE/TOUCHDOWN

Findings
1. (F) CHECKLIST - NOT USED - PILOT IN COMMAND
2. (F) MAINTENANCE,ADJUSTMENT - IMPROPER - COMPANY MAINTENANCE PERSONNEL
3. (C) GEAR EXTENSION - NOT PERFORMED - PILOT IN COMMAND

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

Findings
4. (C) ABORTED LANDING - IMPROPER - PILOT IN COMMAND
5. (C) STALL/MUSH - INADVERTENT - PILOT IN COMMAND

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

Findings
6. TERRAIN CONDITION - TUNDRA

Factual Information

HISTORY OF FLIGHT

On September 18, 2000, about 1510 Alaska daylight time, a Piper PA-31T3 airplane, N220CS, was destroyed by impact and postimpact fire after colliding with tundra-covered terrain, about 300 yards south of the Nuiqsut Airport, Nuiqsut, Alaska. The airplane was being operated as a visual flight rules (VFR) scheduled domestic commuter flight under Title 14, CFR Part 135, when the accident occurred. The airplane was operated as Flight 181 by Cape Smythe Air Service Inc., Barrow, Alaska. The airline transport certificated pilot and four passengers received fatal injuries; the remaining five passengers received serious injuries. Visual meteorological conditions prevailed, and a VFR flight plan was filed. The flight originated at the Deadhorse Airport, Deadhorse, Alaska, at 1445.

Ground witnesses at the Nuiqsut Airport saw the airplane touch down on runway 22 with the landing gear retracted. The airplane was equipped with a fuselage-mounted belly cargo pod. The belly pod lightly scraped the runway for about 40 feet, but the airplane transitioned to a climb. As the airplane began climbing away from the runway, the ground witnesses saw the landing gear extend. The airplane climbed to about 100 to 150 feet above the ground, and then began a descending left turn. The airplane collided with the ground on a 095 degree heading. The ground witnesses did not describe observing any smoke or flames emanating from the airplane before the crash.

According to surviving passenger statements and interviews, the accident flight and approach to the Nuiqsut Airport was unremarkable. During the landing phase, the passengers said the airplane scraped the runway. A warning horn was not heard before runway contact. The airplane then pulled upward from a level attitude into a climb that several passengers described as a 30 to 45 degree nose high angle. Several of the passengers felt the airplane "shudder" or "shimmy", roll to the right and left, and then heard a warning horn as the airplane banked to the left. The airplane then descended to the ground in a left-wing-low attitude.

The wreckage path extended for about 300 feet, during which the landing gear, belly pod, left wing, and the left engine separated from the airplane. A postcrash fire destroyed the fuselage, right wing, and the right engine.

PERSONNEL INFORMATION

Pilot Information

The pilot held an airline transport pilot certificate with a multiengine land rating, commercial pilot privileges with an airplane single-engine land rating, and private pilot privileges with a single-engine sea rating. The most recent first-class medical certificate was issued to the pilot on August 24, 2000, and contained no limitations.

According to the operator, the pilot was hired by the company on September 27, 1998, and at that time, his total flight experience was 573 hours, with 72 hours of multiengine. The pilot was assigned to the company base at Barrow. He completed his initial company training, including Cessna 207 ground training, on September 30. He then completed Beech BE-99 ground training on October 2, and Beech BE-99 second-in-command pilot flight training on October 6. The pilot was assigned to Beech BE-99 airplanes, eventually accruing 924 hours in the BE-99 as second-in-command.

Company records show that the pilot completed a VFR company check ride in a Cessna 207 on November 13, 1998, and began accruing initial operating experience (IOE) in Cessna 207 airplanes on November 23. He eventually accrued 825 hours in Cessna 207 airplanes.

The pilot received two hours of initial ground training on May 8, 1999, on general subjects for Cessna 185 airplanes. He did not receive any flight training in the airplane.

Company records show that the pilot was unassigned to all aircraft on February 3, 2000, after undergoing minor surgery, and reassigned to all aircraft on February 29. He was unassigned to Cessna 207 airplanes on March 1, pending completion of a company line check. He was reassigned to Cessna 207 airplanes on March 23, after completion of a line check.

According to the company's PA-31-T3 ground/flight training manual, transition training to the airplane requires 16 hours of ground training, 6 hours, or to proficiency, of flight training, a company proficiency flight check, 20 hours of IOE, and then a company line check.

Company records indicate that on May 28, 2000, the pilot began receiving flight training in the accident airplane. He received 16 hours of transition ground training in the Piper PA-31-T3 on October 3rd and 4th, 1999. According to the pilots logbook, the pilot first logged flight time in the accident airplane make and model on April 22, 2000, with 1.2 hours of dual instruction while on an extra section mail flight. On May 28, he logged 2.6 hours of dual instruction in the Barrow area, and on June 25, he logged 2.9 hours as pilot-in-command in the Barrow area. From July 10 to July 11, the pilot logged 6.1 hours in the Nome area as dual instruction. On July 12, the pilot logged 1.9 hours as dual instruction during an aircraft check ride as an on-demand pilot. During the check ride, the pilot received an unsatisfactory rating from the director of operations for his conduct of nonprecision approaches. Following retraining, the company removed all instrument approach restrictions on the pilot.

The pilot began on-demand charter flights in the accident airplane, logging 1.7 hours as pilot-in-command between Barrow and Atqasuk, Alaska, on July 21, 2000, after passing a company proficiency flight at Barrow. On July 25, the pilot began logging IOE on commuter flights, accompanied by a check airman on most, but not all flights. The pilot continued to conduct single-pilot, on-demand flights before completing his commuter IOE requirements. On August 10, after accruing 51 hours of IOE, the pilot logged his first flight as a commuter captain while flying without a co-pilot, or a company check airman.

On September 1, 2000, the pilot accrued 100 hours in the accident airplane, and was authorized to use the autopilot in lieu of a second pilot for IFR operations. He eventually accrued a total of 165 hours in the accident airplane make and model.

On the day of the accident, the pilot had completed one flight (Flight 115) from Barrow, to Atqasuk, to Wainwright, Alaska, to Barrow, for a total of 1.25 flight hours. The day before the accident, the pilot accrued 4.15 flight hours. Two days before the accident, the pilot accrued 1.35 hours.

All of the pilot's ground and flight training, check rides, and line checks, were conducted by company check airman.

A review of the FAA's Program Tracking and Reporting Subsystem (PTRS) data pertaining to the pilot, revealed two en route surveillance flights by FSDO operations inspectors with the pilot in Cessna 207 airplanes. The pilot had two ramp inspections by FSDO maintenance inspectors, one in a Cessna 207, and one in a Beech BE-99. The pilot had one en route

surveillance flight by a FSDO avionics inspector in a Cessna 207.

During a flight in the accident airplane on August 4, 2000, the pilot reported a landing gear problem in which the nose gear would not extend. The chief pilot was also on board the airplane. At that time, the pilot had logged 61.3 hours in the accident airplane make and model.

Company Information

The operator is a Federal Aviation Regulations (FAR) Part 135 Air Carrier, and holds commuter and on-demand operations specifications. Company facilities are located at Barrow, Alaska, Nome, Alaska, Kotzebue, Alaska, and Deadhorse, Alaska. The president, chief pilot, and the director of maintenance reside in Barrow. The director of operations, and the chief maintenance inspector/manager of stations, reside in Nome.

A review of the company's operations manual revealed that the president, director of maintenance, director of operations, chief pilot, and the manager of stations, are designated as having the authority of exercising operational control over company aircraft, and/or flight crews.

The company's operations specification, issued by the FAA, indicate that flights shall only be initiated, diverted, or terminated under the authority of the director of operations, who may delegate his authority, but retains responsibility.

On June 17, 1999, the company requested and received approval from the FAA for a change in the chief pilot position. On August 18, 2000, the FAA withdrew the check airman approval for the company's chief pilot because of his numerous accidents during the previous year.

AIRCRAFT INFORMATION

The airplane is a nonpressurized, twin-engine turboprop equipped with Pratt & Whitney PT6A-11 engines that produce 500 horsepower each. The maximum takeoff and landing weight is 9,000 pounds. The maximum zero fuel weight is 7,600 pounds. The airplane is not required to have a cockpit voice recorder, a flight data recorder, nor a ground proximity warning system. The airplane is equipped for instrument flight into known icing conditions, and may be operated by a single pilot.

The airplane was maintained on an approved aircraft inspection program (AAIP). The AAIP is divided into phase inspections, each consisting of four event cycles, each 150 hours apart.

Examination of the maintenance records revealed that an event number four inspection was accomplished on September 15, 2000, 7.7 hours before the accident. The airplane had accumulated a total time in service of 10,156.7 hours. The left engine had accrued a total time of 11,666.40 hours, 6,017.2 hours since overhaul. The right engine had accrued a total time of 10,622.90 hours, 4,444.1 hours since overhaul. Both propellers had accrued 364.1 hours.

The accident airplane pilot had a nose gear extension problem with the accident airplane on August 4, 2000. The maintenance log notes that the pilot cycled the gear several times, pulled the nose gear bottle (emergency blow-down system), and reset the circuit breaker, even though it had not popped. The nose gear extended after recycling the gear. The corrective action noted in the maintenance log was removal of mud from the nose gear up-lock, cleaning and lubricating of the nose gear, and a replacement of the emergency actuator.

The pilot again wrote up a nose gear problem in the accident airplane on August 8, 2000, by

noting the gear-down light was intermittent, and the red in-transit light was inoperative. Maintenance personnel cleaned the nose gear down switch and adjusted the nose gear actuator.

The accident airplane is equipped with two landing gear warning horn switches that are installed in the control pedestal, each controlled by an engine power lever. The airplane service manual states, in part: "Each switch activates the warning horn when either or both power levers are reduced below 150 foot-pound of engine torque." If the landing gear has not been extended, when either or both power levers are reduced below 150 ft. pounds of engine torque, the landing gear warning horn should sound. The airplane's service manual specifies a ground adjustment procedure, a gear horn operational check procedure, and a flight test.

During a flight from the accident scene to Barrow in a company Piper PA-31-T2 (Cheyenne II) airplane, the landing gear warning horn system was demonstrated to the NTSB IIC by the director of operations. This was performed by reducing each engine throttle until the warning horn sounded. On this flight, the warning horn for the left engine throttle did not sound until the engine torque was reduced to zero. The gear warning horn for the right engine throttle activated at 175 pounds of torque.

On October 2, 2000, the NTSB IIC received a telephone call from an individual who had previously flown as a passenger in the accident airplane. The pilot of the previous flight was not the accident airplane pilot. The passenger reported that during an approach to landing at Deadhorse on May 6, 2000, the airplane descended to within 15 feet of the ground, and the pilot suddenly added engine power and pulled the airplane into a climb. The passenger said the pilot had failed to lower the landing gear. The passenger reportedly did not hear any warning horns during the approach. When questioned about the event, the pilot told the passenger that he was "not paying any attention to what I'm doing."

The accident airplane was landed with the landing gear retracted on January 25, 2000, at Savoonga, Alaska. The gear-up event was reviewed by the FAA as an incident. (The pilot of the Savoonga airplane was not the pilot who is the subject of this report). In the text of the FAA's incident report, the Savoonga pilot reported that during a go-around, he retracted the landing gear. On the next landing approach, the pilot failed to lower the gear. He did not hear or was not aware of a gear unsafe horn until on the ground. The airplane required replacement of the engine propellers, inspection of the engines, and repair of the belly cargo pod.

According to the airplane's operating handbook, the landing gear is hydraulically operated. Each engine is equipped with a hydraulic pump. Selection of gear up or down is accomplished by the movement of the landing gear handle. When the desired position of the gear is obtained, the landing gear handle is automatically forced back to a neutral position by hydraulic pressure. Gear retraction or extension will normally occur in about 6 seconds. When the gear handle returns to neutral, it relieves all pressure in the hydraulic system. The gear is held in position by mechanical locks. The return of the handle to neutral is an indication that the components have reached full extension or retraction. However, the landing gear position lights should be used as primary indications.

The airplane is equipped with landing gear position indicator lights installed on the instrument panel, to the right of the landing gear handle. There is one red, and three green indicator lights. The red light indicates the gear is in transit between the up-locked, and down-locked positions. The green lights indicate when each gear is down and locked. When the gear is up

and locked, there is no indication light.

The nose gear doors, and the outboard main landing gear doors, operate by mechanical linkage to each gear assembly, and remain open when the gear is extended. The inboard main gear doors are hydraulically operated, opening during gear extension, and closing when the gear is fully extended.

The airplane is equipped with an emergency hydraulic hand pump that is used to provide hydraulic system pressure in the event of a failure of the engine-driven hydraulic pumps. The airplane also has a pneumatic extension system (3,000 psi nitrogen bottles) installed on each of the three landing gear (nose, left main, and right main). It is utilized if the hand pump fails to extend and lock all three gear. Once an emergency pneumatic extension system is utilized, the landing gear is hydraulically locked in the down position, and requires resetting by maintenance personnel.

The airplane is equipped with a small mirror, mounted on the inboard side of the left engine nacelle. This mirror allows the pilot to observe the position of the nose gear. A company checklist for the accident airplane states, in part: BEFORE LANDING, Landing Gear - Down and Locked.

The airplane's operating handbook contains several checklists. The BEFORE LANDING checklist states, in part: Gear (below 156 KIAS) - DOWN. Gear lights - 3 Green. Nose gear position - Check in mirror. The BALKED LANDING checklist states, in part: Power levers - As required to obtain maximum power. Airspeed - 113 KIAS. Flaps - Approach, 15 degrees. Gear - Up. Climb power - 455 SHP. Flaps - Full up. Airspeed - 123 KIAS.

According to the airplane's operating handbook, with the cargo pod installed, the balked landing performance chart indicated that at maximum gross weight, gear down, and flaps at 40 degrees, at sea level, the airplane should be capable of about an 800 feet per minute climb.

The airplane is equipped with a stall warning horn. The warning is activated by a sensing vane on the leading edge of the right wing, and it sounds about 4 to 10 knots before an actual stall. The airplane stall speed, full flaps, power off, is 78 knots. The airplane's operating handbook notes that maximum altitude loss in a stall is 800 feet.

The airplane is equipped with one, two-piece main cabin door on the left side of the fuselage. The upper portion of the door pivots upward, and lower portion of the door pivots downward, with cabin entrance steps attached on the inside of the lower portion. An upward pivoting cargo door is installed adjacent to the aft edge of the cabin door. The airplane has one, over-wing emergency window exit, on the right side of the fuselage.

METEOROLOGICAL INFORMATION

At 1500, an automated weather observation system (AWOS) at Nuiqsut was reporting, in part: Wind, 232 degrees (magnetic) at 12 knots; visibility, 10 statute miles; clouds and sky condition, few at 2,000 feet, 3,900 feet broken, 5,000 feet overcast; temperature, 35 degrees F; dew point, 29 degrees F; altimeter, 29.89 inHg.

COMMUNICATIONS

After the airplane departed Deadhorse, there were no reports of communications with the pilot.

AERODROME AND GROUND FACILITIES

The Nuiqsut Airport is equipped with a single, gravel-surfaced runway on a 220/040 degree magnetic orientation. Runway 22 is 4,343 feet long by 90 feet wide. There is a ramp/loading area adjacent to the runway.

WRECKAGE AND IMPACT INFORMATION

An examination of the airplane wreckage at the accident site was conducted on September 19th, and 20th, 2000. A path of wreckage debris and ground scars from the first observed point of ground contact to the wreckage point of rest, was on a magnetic heading of 095 degrees. (All heading/bearings noted in this report are oriented toward magnetic north.) All of the airplane's major components were found at the main wreckage area.

The first observed point of ground contact were two parallel, vertical gouges in the tundra that were 10 feet apart. Fifteen feet forward of the initial gouges were additional small disruptions of the tundra surface. Thirty-three feet forward of the initial point of ground contact was the largest area of soil disruption, and a portion of the right inboard, trailing edge wing-to-fuselage fairing. Forty-eight feet from the initial impact point was a soil disruption to the left of the wreckage path, consistent with the position of the left main landing gear. At 59 feet was a nose gear door.

At 68 feet from the initial point of ground contact was a straight gouge in the tundra, perpendicular to the wreckage path, consistent with the position of the left wing. At the left, outboard edge of the disruption was the left wing position strobe assembly. To the right of the wing impact mark was a door from the belly pod assembly. To the right of the belly pod door was a portion of the outboard end of the right elevator. At 77 feet from the initial point of ground contact was an inner, main landing gear door.

The belly pod, crushed and torn, oriented upright but facing backward from its normal position on the airplane, was located 90 feet from the initial point of ground contact, along the center of the wreckage path. From the area of the belly pod, numerous items of baggage were scattered along the wreckage path to the fuselage point of rest.

Located 102 feet from the initial point of ground contact was the nose wheel strut in the center of the wreckage path. The top of the strut was embedded in the tundra up to the scissors assembly on about a 30 degree angle.

At 116 feet from the initial point of ground contact was the inboard 5 feet of the right wing flap, buckled downward about mid-span. It was torn at the inboard end of the flap track, and the track mechanism was bent to the left.

At 133 feet from the initial point of ground contact, the right main landing gear strut assembly was lying on the ground about 20 feet to the left of the wreckage path. The entire gear assembly was broken from the wing, and displayed aft twisting distortion of the mechanism.

The outer half of a main landing gear upper strut sleeve casting was located 141 feet from the initial point of ground contact. A blue colored rod end connector for an outer gear door was attached to the casting. Also at 141 feet, along the left side of the wreckage path, the remaining outboard portion of the right flap assembly was found.

At 152 feet from the initial point of ground contact, along the left side of the wreckage path, was an area of soil disruption, and the left wing deice light from the left engine nacelle. Along the right side of the wreckage path was a large, square area of gouging in the tundra.

The left main landing gear strut, minus its outer casting and scissors, was located 161 feet and 20 feet to the left of the initial point of ground contact, with the top of the strut embedded in the tundra.

The entire left wing separated from the fuselage at the wing root, and was located 203 feet from the initial point of ground contact. The flap assembly remained attached to the wing, and appeared to be extended with upward curling at the inboard end. The leading edge of the wing had tearing and destruction of leading edge structure from the wing root to the nacelle. The wing had 45 degree wrinkle along upper surface of the wing, from the leading edge to the trailing edge in an inboard direction, and was buckled slightly upward about mid-span. The leading edge had aft crushing and bending from mid-span to the tip, along with wingtip destruction. The leading edge had crushing that was more evident on the underside of the wing, with upward and aft crushing of the leading edge. The wingtip assembly remained attached, and was missing the position and strobe light assemblies. The aileron remained attached to the wing and had upward curling at the inboard end. The left engine was torn off the nacelle. The nacelle had aft crushing and right bending of nacelle structure.

Closer examination of the left wing revealed the upper portion of the landing gear assembly was attached to the wing. The strut casting was broken and the lower strut and wheel was missing. The landing gear assembly was in the down and locked position. The flap jackscrew actuator was found extended 31 threads. According to the airplane manufacturer, the extended jackscrew actuator corresponded to about a 40 degree flap setting.

The fuselage came to rest upright, with the nose of the airplane oriented on a 165 degree heading. The fuselage was about 253 feet from the initial point of ground contact. The nose section of the fuselage, forward of the instrument panel, was intact and unburned. The upper portion of the fuselage, from the instrument panel to the empennage, was consumed by fire to ground level. The cockpit area and instrument panel was destroyed, however the landing gear handle was found in the down position. The annunciator panel was destroyed.

The postcrash fire incinerated the cabin area. Due to the impact and postimpact fire damage, the flight controls could not be moved by their respective control mechanisms. The continuity of the flight control cables was established from the respective flight controls to the cockpit area.

The right wing was found folded under the fuselage in the area of the cockpit. The right engine came to rest on the left side of the fuselage.

The right wing emergency exit window assembly was located about 20 feet to the left and aft of the fuselage point of rest. It was not burned.

The upper half of the main cabin door separated from its attach points, and was located about 25 feet to the left of the fuselage, unburned. The lower half of the door was attached to the fuselage and burned.

The empennage, aft of the vertical stabilizer attach point, was intact. The rudder and elevator remained attached to the empennage. The right horizontal stabilizer, with the elevator attached, was bent upward 90 degrees about mid-span. The outboard end, leading edge of the left horizontal stabilizer was curled upward at the tip.

The elevator trim tab actuator was found extended 4 threads trailing edge down, and the rudder trim actuator was found extended 10 threads trailing edge right. According the airplane

manufacturer, the airplane utilizes an anti-servo tab mechanism that moves the trim tab as the primary flight control surface positions are changed. The extended elevator trim tab actuator, assuming a neutral control position as an index, corresponds to about a 10 degree tab down (nose up) setting. The extended rudder trim actuator, also assuming a neutral control position as an index, corresponds to about an 11 degree trailing edge right (nose left) setting.

At 261 feet from the initial point of ground contact, the left engine, separated from the left wing, came to rest along the right side of the wreckage path, and to the right of the fuselage.

The left propeller gearbox assembly, propeller hub and blades remained connected to the engine. All of the propeller blades were loose in the hub, and had aft bending and torsional twisting. The propeller tips did not have any chordwise scraping or damage.

The right engine, attached to the right wing, was located on left side of the fuselage, 282 feet from the initial point of ground contact. The spinner of the right engine was located at 300 feet. The engine accessory gear case and the engine controls were consumed by fire.

The right propeller gearbox assembly was broken from the engine. The propeller blades remained connected to the gearbox hub. All of the propeller blades were loose in the hub, and had aft bending and torsional twisting. The propeller tips did not have any chordwise scraping or damage.

MEDICAL AND PATHOLOGICAL INFORMATION

A postmortem examination of the pilot and passengers was conducted under the authority of the Alaska State Medical Examiner, 5700 E. Tudor, Anchorage, Alaska, on September 19, 2000. The examination revealed the cause of death for the pilot and three passengers was attributed to asphyxia from smoke inhalation and/or thermal injuries. The fourth passenger sustained thermal injuries over 80 percent of his body. The Safety Board requested, but did not receive, the fourth passenger's cause of death.

A toxicological examination of the pilot was conducted by the FAA's Civil Aeromedical Institute (CAMI) on December 7, 2000. The examination revealed no ethanol or drugs. The presence of carbon monoxide saturation of at least 10 percent was found in the blood. The presence of cyanide at 0.29 (ug/ml) was found in the blood.

FIRE

A postaccident fire destroyed the airplane from the instrument panel to the rear of the cabin. Police personnel reported that the wreckage was still hot and smoldering the next morning after the crash.

SURVIVAL ASPECTS

Following the crash, the five passengers that survived the accident described the airplane fuselage as "ripped open." They exited the airplane via the left main cabin door area, and via the right over-wing emergency exit area. The surviving passengers were seated in the rear half of the airplane, and sustained injuries that included fractures, spinal injuries, and concussion. The fatally injured passengers were seated in the front half of the airplane. One passenger initially survived after being pulled from the wreckage. That passenger died six days after the accident. See the NTSB survival factors specialist's, attached report, for details.

SEARCH AND RESCUE

North Slope Borough police officers, and village residents ran from the airport to the crash scene. The terrain, consisting of soft tundra with a small slough between the airport and the accident site, prohibited any wheeled vehicles, except single seat 4X4 all terrain vehicles, from reaching the site. Fire fighting efforts were accomplished by 32 hand-held, dry chemical fire extinguishers that were carried from the village.

The airport is not a CFR Part 139 airport, and therefore is not required to have any airport fire fighting equipment.

TESTS AND RESEARCH

The engines and propellers were shipped to Pratt & Whitney Canada, for examination. Between November 14 to 16, 2000, a postaccident examination of both engines, overseen by the NTSB IIC, revealed the internal components of each engine's compressor and power turbine sections had circumferential rubbing and scoring and heat discoloration. Evidence of tundra and dirt was found in the compressor section of each engine. No preimpact mechanical malfunctions were discovered. Engine accessories were removed from the engines and were examined at the Pratt & Whitney Controls and Accessories facility. No preimpact mechanical malfunctions were discovered. An examination of the propellers did not discover any preimpact mechanical malfunctions.

ADDITIONAL INFORMATION

Previous Commuter Airline Reviews

The National Transportation Safety Board conducted a safety study, "Commuter Airline Safety" in 1994. The Safety Board stated that the study was drawn from knowledge and experience gained from accident investigations and past studies. In addition, the Safety Board reviewed two additional sources: (1) a site survey of airline operations and policies conducted at representative commuter airlines; and (2) a public forum on commuter airline safety convened by the Safety Board. Given the unique characteristics of the operating environment in Alaska, the Safety Board decided to exclude from the site survey airlines that operated primarily in Alaska. However, the Safety Board emphasized that the issues of concern with scheduled Part 135 operations, and the findings from the information obtained in the course of the study, apply to operations in Alaska, as well as the other 49 states and U.S. Territories.

The Safety Board study arrived at several findings. These included a finding that many commuter airlines do not provide formal crew resource management (CRM) training; the use of simulators enables air carriers to train pilots more effectively; a mandatory airline safety program would enhance a commuter air carrier's ability to identify and correct safety problems before they lead to an accident, including the use of the FAA's advisory circular AC 120-59, "Air Carrier Internal Evaluation Programs"; many airports served by commuter airlines are not certified by the FAA as Part 139 airports, and as a result, passengers may not be provided adequate airport safety or emergency response resources.

The Safety Board conducted a safety study, "Aviation Safety in Alaska" in 1995. One finding of the study noted that the fatal accident rates of Alaska commuter airlines have decreased, but remain greater than those of commuter airlines in the remainder of the United States.

The FAA's Alaska Region, Technical Analysis Branch, AAL-290, published a report (August, 1992) entitled, "Determining Correlation Between Operating Profiles and the Occurrence of

Accidents/Incidents." That report was based on a study of 35 Alaskan commuters, and concluded that there appeared to be a correlation between accidents/incidents and flight hours and fleet complexity. It recommended further study.

The FAA's Alaska Region conducted a study of "Commuter Accidents in Alaska" (1990 to 1993), produced on April 7, 1994. A review of findings indicated the FAA attempted to determine which commuter operators appeared to be at high risk by computing the accident rate based on fleet size.

A basic assumption in the 1994 study was that fleet size was directly related to flight hours. The FAA conceded that a more accurate computation of an accident rate would be based on the number of flying hours, but that data was not available. The FAA indicated that most of the 35 operators reviewed in the 1992 study had less than five accidents. Consequently, for the 1994 report, the FAA selected those operators with five or more accidents from 1990 to 1993, of which there were seven. The accident operator was one of the seven.

The 1994 report notes that the analysis only included accident reports and not incidents. The FAA concluded that accidents and incidents have little correlation with each other, and that incidents do not intensify accident trends. The FAA said that incident trends often negate accident trends since a combined study often conceals true accident trends. The FAA indicated that the remarks contained in incident data bases often described unfavorable situations that resulted in a turn back, an aborted flight, or other emergency procedure. The remarks for accidents often indicated a loss of control of the airplane in an emergency situation, or a disregard for weather conditions. The FAA felt that their assumption was verified by charts depicting the occurrence phase description from accident reports. "In-flight collision with terrain" was the most frequent code given on accident reports, and was used for half of the fatal accidents review in their report. The FAA noted that almost all collision with terrain accidents contained an encounter with weather.

Company inspections/Accident Data

The FAA has developed national program guidelines to serve as the basic source of information used in planning annual surveillance of an operator. FAA inspectors record the accomplishment of the program guidelines in the FAA's Program Tracking and Reporting Subsystem (PTRS) data base. Each FAA inspector assigned to an operator has inspection responsibilities that are either required, or planned items, each scheduled to be completed within a specified time period. In addition to surveillance inspections, the FAA may utilize a National Aviation Safety Inspection Program (NASIP), and a Regional Aviation Safety Inspection Program (RASIP) to monitor the performance of operators. These inspections are performed by inspectors from offices, or regions, outside of the FAA office where an air carrier certificate is held.

The FAA Flight Standards District Office (FSDO) in Fairbanks, Alaska, has oversight (regulatory) responsibility for the operator with FAA inspectors assigned to operations, airworthiness, and avionics.

The Fairbanks FSDO conducted an Office Safety Inspection Program (OSIP) inspection of the operator between February 28 and March 4, 2000, utilizing inspectors from the Fairbanks FSDO. In the overview of the report, the FAA stated that the objective of the inspection was to identify any systemic trends that could lead to future unsafe conditions or significant noncompliance (with FAA regulations), and to provide an independent analysis, identification,

and possible resolution to any root safety issues.

The FAA found that between March 24, 1996, and March 10, 2000, the operator had 14 accidents or incidents. (Incidents identified by the FAA are events that may have been investigated by the NTSB as an incident, and/or other events that did not meet the NTSB's threshold for investigation, and were reviewed only by the FAA). Eight accidents/incidents involved Piper PA-31 airplanes, of which six were PA-31-T3 airplanes. The trends identified in the OSIP were: 1) All accidents/incidents involving multiengine airplanes were flown by a single pilot. 2) Seven of the eight PA-31 events occurred at coastal destinations. 3) Four of the PA-31 events occurred at three villages. 4) Seven of the eight PA-31 events occurred during approach or landing.

In the area of root safety issues, the FAA identified: 1) Lack of procedures. 2) Lack of oversight (by management). 3) Lack of training.

In the area of lack of procedures, the FAA said the operator did not have written procedures to standardize a process for matching experienced pilots to mission difficulty. In the area of lack of oversight, the FAA said that the operator's personnel who are responsible for daily operational control over flights, were often not available because some were flying the line, and others were not physically located at each operations base. The FAA said that analysis of the operator's accidents are examples of ineffective (company) oversight. In the area of lack of training, the FAA said that the operator's pilots were trained and qualified, but the inspection team members believed that a lack of training had contributed to the operator's high number of accidents and incidents. The FAA sighted examples of accidents at coastal airports where the pilots were new, and had low time in poor weather conditions. The FAA indicated the pilot's decision-making abilities were flawed.

In the OSIP summary, the FAA said the operator had failed to recognize company procedures responsible for the unacceptably high accident and incident rate. The FAA also identified several air carrier compliance alert indicators that were areas of concern. These included the operator's operational policies that inhibited the ability to resolve safety-related problems, including inadequate oversight of flight operations; an increase in accidents, incidents, and violations; the lack of training to conduct assigned operations safely; and the need to identify crew scheduling based on factors affecting crew performance, including climatic conditions, instrument operations, and low crew experience.

As part of the OSIP, inspection team members from the Fairbanks FSDO conducted inspections and surveillance of company facilities at Barrow, Nome, Kotzebue, and Deadhorse, Alaska. The team found deviations from approved or accepted procedures in the areas of manuals and maintenance practices. These included a lack of procedures in the operations manual for the elimination of fuel contamination; contradictory revisions of the operations manual; incorrect personnel scheduling aircraft; pilots, instead of the chief inspector, were filling out mechanical interruption reports; improper delegation of maintenance responsibilities; and cracks were found in a airplane spinner after welding.

In the recommendations area of the OSIP, the FAA indicated the operator should develop standard written procedures which outline how pilots will be assigned to specific flights at each base of operations, based on experience, not availability; the person assigning flights should have aeronautical experience to evaluate runway and weather conditions; daily oversight of flight operations, with a decrease in flying obligations by the director of operations and the

chief pilot, and an increase in en route observations of pilots; a change to require two pilots in PA-31 airplanes, the same as required in Beech BE-99 airplanes; develop special training curriculum in the areas of weather and airport conditions a Wales, Point Hope, and Point Lay, Alaska; develop and implement a risk assessment program; provide IOE for pilots temporarily assigned to airports that are not included in their primary duty station; develop and implement a ramp safety program; increase awareness of de-icing procedures; and develop a system of accountability for the Nome and Kotzebue station maintenance supervisors.

The operator responded to the FAA's OSIP report in a letter dated June 13, 2000. The company's comments included a notation that the majority of their destinations were coastal airports. The company expressed the view that their research of accidents/incidents revealed eight belonging to the operator, and nine belonging to other operators in the region over the same time period cited by the FAA (March 24, 1996, to March 10, 2000). The company said that the use of two-pilot crews was being evaluated, but preliminary studies showed the concept to be economically unfeasible, especially since there was no equal competitive playing field (other twin-engine airplane operators were not required to have two pilots for single-pilot certified airplanes). They also indicated the company had begun to utilize an aviation safety consultant, they were developing a risk assessment program, and a company safety officer had been appointed.

The director of operations reported that the company's safety officer was the accident airplane pilot. He assumed the position when the previous safety officer left the company. The director of operations also reported that the company had begun to develop a risk assessment program for each flight, but the program had not been fully implemented into company operations. The pilot of the accident airplane did complete a risk assessment form prior to the accident flight. The assessment placed the flight in a low risk category.

Following the accident, Fairbanks FSDO personnel notified the operator that further flights with passengers in Piper PA-31-T3 airplanes would require two pilots. Single-pilot cargo flights in the T3 were permitted.

A review of NTSB and FAA accident/incident data for the operator revealed that between February, 1983, and September, 2000, the operator was involved in 28 accidents, and 5 incidents that were investigated by the NTSB. Four of the 28 accidents were bird strikes, and 2 of the 28 involved gear-up events. The operator has had the one fatal accident with five fatalities and five serious injuries. Two of the operator's accidents resulted in two serious injures per accident. In the same time period, the FAA reviewed 15 incidents, three of which were gear-up events.

A review of NTSB multiengine airplane accident data, involving gear-up events from 1983 to 2000, revealed that for scheduled CFR Part 135 operations, there were 4 events with two-pilot crews, and 2 with a single-pilot crew. During nonscheduled CFR Part 135 operations for the same period, there were 2 events with two-pilot crews, and 20 with a single-pilot crew. There was no information in the data detailing the use of two-pilot crews on single-pilot certified, multiengine airplanes.

A summary of NTSB and FAA data, covering eight other operator's accident histories, operating in similar geographic areas, is contained in Appendix A.

WRECKAGE RELEASE

The Safety Board released the wreckage, located at the accident site, to the owner's

representatives on September 25, 2000. The engines and propellers were retained by the Safety Board for examination until released on November 21, 2000. The release for the engines and propellers was sent to the operator's representative. A signed copy of the release was not returned.

Pilot Information

Certificate:	Airline Transport; Commercial	**Age:**	39, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	08/24/2000
Occupational Pilot:		**Last Flight Review or Equivalent:**	07/12/2000
Flight Time:	2517 hours (Total, all aircraft), 165 hours (Total, this make and model), 1544 hours (Pilot In Command, all aircraft), 282 hours (Last 90 days, all aircraft), 118 hours (Last 30 days, all aircraft), 5 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N220CS
Model/Series:	PA-31T3 PA-31T3	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	31T-8275013
Landing Gear Type:	Retractable - Tricycle	**Seats:**	10
Date/Type of Last Inspection:	09/15/2000, AAIP	**Certified Max Gross Wt.:**	9000 lbs
Time Since Last Inspection:	8 Hours	**Engines:**	2 Turbo Prop
Airframe Total Time:	10157 Hours at time of accident	**Engine Manufacturer:**	P&W Canada
ELT:	Installed, not activated	**Engine Model/Series:**	PT6-11
Registered Owner:	U.S. BANK CORP.	**Rated Power:**	500 hp
Operator:	CAPE SMYTHE AIR SERVICE INC.	**Operating Certificate(s) Held:**	Commuter Air Carrier (135); On-demand Air Taxi (135)
Operator Does Business As:		**Operator Designator Code:**	CSAA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	PAQ, 38 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	1500 ADT	**Direction from Accident Site:**	360°
Lowest Cloud Condition:	Scattered / 2000 ft agl	**Visibility**	10 Miles
Lowest Ceiling:	Broken / 3900 ft agl	**Visibility (RVR):**	0 ft
Wind Speed/Gusts:	12 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	232°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.89 inches Hg	**Temperature/Dew Point:**	2°C / -1°C
Precipitation and Obscuration:			
Departure Point:	DEADHORSE, AK (PASC)	**Type of Flight Plan Filed:**	VFR
Destination:	NUIQSUT, AK (PAQT)	**Type of Clearance:**	None
Departure Time:	1445 ADT	**Type of Airspace:**	Class G

Airport Information

Airport:	NUIQSUT (PAQT)	**Runway Surface Type:**	Gravel
Airport Elevation:	38 ft	**Runway Surface Condition:**	Dry
Runway Used:	22	**IFR Approach:**	None
Runway Length/Width:	4343 ft / 90 ft	**VFR Approach/Landing:**	Go Around; Straight-in

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	4 Fatal, 5 Serious	**Aircraft Fire:**	On-Ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	5 Fatal, 5 Serious	**Latitude, Longitude:**	70.205556, -151.019167

Administrative Information

Investigator In Charge (IIC):	SCOTT ERICKSON	**Report Date:**	06/18/2002
Additional Participating Persons:	DENNIS WARD; FAA-AL-FAI-FSDO 01; FAIRBANKS, AK TOM NICOLOS; CAPE SYMTHE AIR SERVICE INC.; BARROW, AK CHARLES LITTLE; THE NEW PIPER AIRCRAFT; CHINO HILLS, CA THOMAS BERTHE; PRATT AND WHITNEY CANADA; LONGUEUIL,QUEBEC, TOM McCREARY; HARTZELL PROPELLER INC.; PIQUA, OH		
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/.		