



National Transportation Safety Board Aviation Accident Final Report

Location:	MONARCH, MT	Accident Number:	SEA00FA095
Date & Time:	05/31/2000, 1728 MDT	Registration:	N5113G
Aircraft:	Cessna 414	Aircraft Damage:	Destroyed
Defining Event:		Injuries:	3 Fatal
Flight Conducted Under:	Part 91: General Aviation - Business		

Analysis

During climbout, the airplane encountered an area of freezing rain resulting in rapid airframe ice accretion and loss of climb capability. The pilot informed ATC that he was unable to maintain altitude and requested and received clearance back to Great Falls, the departure airport. ATC radar showed that the airplane then began a right turn over mountainous terrain extending up to 8,309 feet prior to loss of radar contact (lower and relatively flat terrain, down to less than 5,000 feet, was located to the left of the aircraft's track.) During the last minute of radar contact, the aircraft was in a right turn at a descent rate of about 400 feet per minute; the aircraft passed less than 1/2 mile from the 8,309-foot mountain summit just prior to loss of radar contact, at an altitude of 8,400 to 8,500 feet. The aircraft crashed on the southwest flank of the 8,309-foot mountain about 1/2 mile south of the last recorded radar position. Wreckage and impact signatures at the crash site were indicative of an inverted, steep-angle, relatively low-speed, downhill impact with the terrain. The investigation revealed no evidence of any aircraft mechanical problems.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The failure of the pilot-in-command to ensure adequate airspeed for flight during a forced descent due to airframe icing, resulting in a stall. Factors included: freezing rain conditions, airframe icing, an improper decision by the pilot-in-command to turn toward mountainous terrain (where a turn toward lower and level terrain was a viable option), mountainous terrain, and insufficient altitude available for stall recovery.

Findings

Occurrence #1: IN FLIGHT ENCOUNTER WITH WEATHER

Phase of Operation: CLIMB

Findings

1. (F) WEATHER CONDITION - FREEZING RAIN
2. (F) AIRFRAME - ICE
3. CLIMB - NOT POSSIBLE

Occurrence #2: LOSS OF CONTROL - IN FLIGHT

Phase of Operation: DESCENT

Findings

4. FLIGHT TO NEW DESTINATION - ATTEMPTED - PILOT IN COMMAND
5. (F) IN-FLIGHT PLANNING/DECISION - IMPROPER - PILOT IN COMMAND
6. (F) TERRAIN CONDITION - MOUNTAINOUS/HILLY
7. (C) AIRSPEED - NOT MAINTAINED - PILOT IN COMMAND
8. STALL - ENCOUNTERED - PILOT IN COMMAND

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER

Phase of Operation: DESCENT - UNCONTROLLED

Findings

9. (F) ALTITUDE - NOT AVAILABLE

Factual Information

HISTORY OF FLIGHT

On May 31, 2000, approximately 1728 mountain daylight time, radio and radar contact was lost with a Cessna 414, N5113G, being operated by Lynch Flying Service of Billings, Montana, on a 14 CFR 91 company business flight from Great Falls, Montana, to Billings. The wreckage of N5113G was located the following day, June 1, 2000, at approximately the 7,500-foot level on the southwest flank of 8,309-foot Barker Mountain, approximately 37 nautical miles southeast of Great Falls and 6 nautical miles east of Monarch, Montana. The airplane was destroyed, and all three of the aircraft's occupants (the airline transport pilot-in-command, a prospective-hire commercial pilot undergoing a pre-employment screening flight with Lynch Flying Service, and a Lynch Flying Service pilot being repositioned from Great Falls to Billings and riding aboard the aircraft as a passenger) were found dead at the accident scene. Instrument meteorological conditions were reported at Great Falls at 1656 and 1756, and the flight (which departed Great Falls at 1711) was on an instrument flight rules (IFR) flight plan.

The accident flight was the return flight of a planned round trip from Billings to Great Falls and back. The purpose of the flight was to deliver another Lynch pilot to Great Falls to pick up another Lynch aircraft (a Cessna 402) and fly it back to Billings, and to pick up the pilot who had flown the Cessna 402 into Great Falls and return him to Billings. Additionally, the prospective-hire pilot was brought along on the trip to undergo a pre-employment screening evaluation. The pilot-in-command on the trip was Lynch's director of training (NOTE: Subsequent references to the "pilot" in this report are to the pilot-in-command, unless otherwise indicated.) The pilot who was delivered to Great Falls reported to the NTSB that on the flight to Great Falls, the pilot occupied the left seat, and the prospective hire occupied the right seat and flew the instrument approach into Great Falls. The Lynch pilot who rode to Great Falls also reported that the pilot told him that on the return flight to Billings, he intended to have the prospective hire occupy the left seat with the pilot-in-command in the right seat.

Lynch's chief pilot reported to the NTSB that the pilot utilized the WeatherMation computerized weather briefing service at Lynch during preflight planning. Recordings of FAA air traffic control (ATC) and air traffic services communications disclosed that prior to departing Billings, the pilot also twice contacted the Great Falls FAA automated flight service station (AFSS) and requested weather information. During the first contact, at 1321, the Great Falls AFSS preflight briefer advised the pilot that Great Falls was reporting 1/4 mile visibility in heavy snow and fog, and that an AIRMET advisory was in effect for occasional moderate rime and mixed icing conditions in clouds and in precipitation from 6,000 feet to flight level (FL) 180. The briefer also relayed a pilot report (PIREP) from a Cessna 340 aircraft indicating moderate rime ice at FL 190, along with the area forecast for Montana, the Great Falls terminal aerodrome forecast (TAF), and radar information showing light to moderate (with embedded heavy to very heavy) precipitation over most of the state. The briefer indicated that since the reported weather at Great Falls was worse than had been forecast (the visibility had been forecast to be 6 miles, with occasional visibility down to 2 miles, for that time period), he expected the TAF to be amended. The pilot stated that he "might have to try it", but indicated that he would wait and see if the visibility at Great Falls improved beyond 1/4 mile. He then filed an IFR flight plan for the Billings-Great Falls flight, with an estimated departure time of 1430 from Billings.

During the second contact, at 1516, the Great Falls AFSS briefer advised the pilot (who identified himself to the briefer as "Vince down at Lynch") of a convective SIGMET meteorological advisory for an area of thunderstorms around Billings. The pilot asked about any PIREPs of icing conditions. The briefer relayed PIREPs from Boeing 727 (B-727) and Beech Bonanza aircraft, which reported encountering light rime ice at 12,000 feet over Great Falls, and that at 15,000 feet, one of the aircraft had accumulated 1/2 inch of rime ice. The briefer also relayed to the pilot that he could expect to encounter shower activity almost immediately after departure from Billings, and that the precipitation would change to mixed rain and snow approximately 10 to 20 miles west of Lewistown. The briefer further stated that approaching Great Falls, the precipitation would change to light to moderate, and possibly heavy, snow showers. The pilot then revised his estimated time of departure from Billings to 1530, and also filed an IFR flight plan for the Great Falls-Billings flight. The pilot filed for a return flight departure time from Great Falls of 1700, with a cruising altitude of 17,000 feet.

The flight subsequently departed Billings, and at 1616, while en route to Great Falls, contacted the Great Falls AFSS by radio and relayed a PIREP. During this report, the pilot reported he was 71 miles southeast of Great Falls at 16,000 feet, that he was in and out of instrument meteorological conditions (IMC), that the temperature was -11 degrees C, and that he was not encountering any icing or turbulence. The Great Falls AFSS inflight briefer advised the pilot that the flight was north of the convective SIGMET area and relayed the weather conditions at and around Great Falls, including moderate precipitation south to southeast of Great Falls with upslope conditions prevailing in the vicinity. The briefer then asked the pilot if he needed updates to the AIRMETS for icing, and the pilot replied in the negative, stating that he had them.

Investigators interviewed the line service shift supervisor at Holman Aviation in Great Falls who was on duty at the time the accident airplane arrived. The shift supervisor reported that the aircraft arrived between 1630 and 1700, and remained on the ground for approximately 15 minutes. He stated that when the aircraft arrived, he observed approximately 1 inch of rime ice on the unprotected leading edge areas of the wing and tip tanks, and approximately 3/8 inch of ice on the aircraft's nose (he reported that the wing upper surfaces and deice boots appeared clean.) The shift supervisor stated that he removed a small amount of ice by hand from an area between the boot and the tip tank, and that he pointed out the ice to the crew, who replied with a statement to the effect of, "Yeah, we picked up some ice." The shift supervisor stated that the crew did not request that the aircraft be deiced, and that no deice fluid was applied to the aircraft before departure. The shift supervisor reported that the last time he saw the airplane, ice was still present on the airframe. Holman Aviation's president reported that while the crew was in the facility, he observed them looking at satellite weather in Holman's flight planning room (Holman Aviation subscribes to a weather briefing service provided by DTN, Inc.)

Investigators interviewed the Lynch pilot who rode to Great Falls in the accident aircraft (hereafter referred to as the "Lynch relief pilot".) This pilot reported that on the way in to Great Falls, the aircraft picked up about 1/2 inch of ice which was successfully removed with the deice boots. The Lynch relief pilot also stated that the aircraft was "sloughing ice" on the instrument landing system (ILS) final approach into Great Falls. The Lynch relief pilot stated that when the aircraft landed at Great Falls, the only ice he observed on the aircraft was the chunk the lineman picked off the aircraft, which the lineman handed to him. He stated that this piece was approximately 6 inches long and 1/2 inch thick. The Lynch relief pilot stated

that he did not see the accident aircraft deiced before it left. The Lynch relief pilot reported that he blocked out of Great Falls in the Cessna 402 at 1852 (approximately 1 hour and 40 minutes after the accident aircraft's departure), and that no weather delay was involved with his flight. However, he stated that since Great Falls AFSS reported the worst icing conditions to be south and east of Great Falls, he requested a runway 21 departure with a right turnout to a departure heading of 090 degrees until clear of the icing conditions.

FAA ATC information indicated that prior to takeoff, the flight was cleared to the Billings airport as filed via Great Falls direct, climbing to an initial altitude of 12,000 feet with an expected altitude of 15,000 feet 10 minutes after departure. After issuing the flight its clearance, the Great Falls controller called the aircraft and stated that while he did not have any current pilot reports east of the airport, he did have a current pilot report relayed 10 minutes previously (approximately 1700) from a Boeing 727 (B-727) aircraft 30 miles southwest of the Great Falls VORTAC reporting moderate rime ice from 11,000 to 12,000 feet. The pilot replied, "...yah we played with a little ice on the way in but ah we were on top about fourteen or so." The flight was subsequently cleared for takeoff from runway 3, with a right turn to a heading of 120 degrees after takeoff, at 1710:51, and was handed off to Great Falls departure control at 1713:20. Great Falls Departure cleared the flight to resume its own navigation direct to Billings at 1713:36, and cleared the flight to climb to and maintain 15,000 feet at 1717:42. At 1720:14, the departure controller relayed the earlier PIREP from the B-727 of moderate rime ice from 11,000 to 12,000 feet. The pilot replied, "one three golf roger thank you sir." Great Falls Departure handed off the flight to the Salt Lake Air Route Traffic Control Center (ARTCC) at 1724:02.

According to a transcript of the accident aircraft's communications with Salt Lake ARTCC, the flight checked on with Salt Lake Center at 1724:20. Approximately 1 1/2 minutes later, at 1726:00, the pilot reported, "...we're having a little trouble here getting up there we're picking up some ice." Approximately 30 seconds after this call, at 1726:34, the pilot stated he would have to descend back to Great Falls as the aircraft was not getting out of the ice. The controller asked if the pilot could maintain 10,000 feet; the pilot responded, "one three golf requesting vectors back to great falls." The controller cleared the flight direct to Great Falls and asked if the pilot could maintain 9,000 feet; the pilot replied that he could not. The controller then stated that the minimum IFR altitude in that area was 9,000 feet, and that if the pilot was unable to maintain that altitude, to "let me know." The pilot's reply, which was the last transmission from the aircraft (at 1727:32), was, "start a turn back too [sic] great falls keep it moving dave." At 1729:17, the Salt Lake controller attempted unsuccessfully to contact the accident aircraft. The Salt Lake controller also queried the Great Falls approach controller whether the aircraft was on the Great Falls approach control frequency yet; the Great Falls approach controller responded that it was not and that he had lost radar contact with the aircraft. Starting at 1730:00, several airborne aircraft in the area then reported to the Salt Lake controller that they were receiving emergency locator transmitter (ELT) signals.

FAA ATC radar data on the accident aircraft showed the aircraft initiating a right turn after takeoff and proceeding generally southeastbound, directly toward Billings. The aircraft was in a climb until approximately 1722:40, about which point it attained its maximum altitude for the flight of 9,400 feet; it then began a gradual descent while continuing southeastbound. The last positive radar contact with the aircraft on the Great Falls approach radar was at 1727:28, approximately 34.3 nautical miles east and 13.4 nautical miles south (referenced to magnetic) of the Great Falls approach radar, at an altitude of 8,700 feet. After this time, the

radar target went into the "coast" mode on Great Falls' approach radar. Radar data from Salt Lake ARTCC showed the aircraft in a right turn from 1727:29 to 1728:29, and descending from 8,800 feet to 8,400 feet. The coordinates of the last three Salt Lake ARTCC radar returns were plotted on a Great Falls Sectional Aeronautical Chart, and all three plots were found to be less than 1/2 nautical mile from the 8,309-foot summit of Barker Mountain, at an altitude of 8,400 to 8,500 feet. The crash site was located approximately 1/2 nautical mile south of the last Salt Lake ARTCC radar position. Further review of the Great Falls sectional chart revealed generally higher, mountainous terrain (to 9,177 feet above sea level) to the south (right) of the aircraft's southeasterly track, and relatively lower, level terrain (less than 5,000 feet above sea level) to the north (left) of the aircraft's track.

Based on the time radio and radar contact was lost, the accident occurred during the hours of daylight at 47 degrees 4.9 minutes North latitude and 110 degrees 41.2 minutes West longitude.

PERSONNEL INFORMATION

The pilot-in-command, who was Lynch's training manager, held an airline transport pilot certificate with airplane multi-engine land rating, and commercial privileges for single-engine land airplanes and helicopters. He held a first-class FAA medical certificate dated April 17, 2000. The pilot's medical certificate carried a limitation requiring the wear of corrective lenses. According to the operator's accident report to the NTSB, the pilot had 8,000 hours total pilot time, including 7,000 hours of pilot-in-command (PIC) time, 2,500 hours as PIC of multi-engine airplanes, 500 hours of actual instrument time, and 100 hours of simulated instrument time. The operator did not furnish any information on the pilot's total time in the Cessna 414.

According to records furnished by Lynch Flying Service, the pilot last successfully accomplished a 14 CFR 135 qualification check in a Cessna 310 aircraft on March 14, 2000. On this check, the pilot demonstrated (among other items) current knowledge of various aircraft (including the Cessna 414) as per 14 CFR 135.293(a), flight competency in the Cessna 310 as per 14 CFR 135.293(b), and IFR proficiency as per 14 CFR 135.297.

The operator reported that the pilot had flown 105 hours (including 15 hours in the Cessna 414) in the last 90 days, 38 hours (including 8.2 hours in the Cessna 414) in the last 30 days, and 1.8 hours in the last 24 hours.

The prospective-hire pilot held a commercial pilot certificate with airplane single-engine land, airplane multiengine land, and instrument airplane ratings, and a flight instructor certificate with airplane single-engine, airplane multiengine, and instrument airplane ratings. He held a first-class FAA medical certificate dated December 17, 1999. According to the prospective-hire's resume and employment application, furnished to the NTSB by Lynch Flying Service, at the time of his employment application to Lynch (dated May 26, 2000), the prospective-hire was a Beech 1900D first officer for Continental Express Airlines, and had been employed in that capacity since June 1999. Lynch's chief pilot reported that the prospective hire told him he was leaving Continental Express due to personal problems with some of the captains at the airline; on his employment application for Lynch, he gave his reason for leaving as "limited flight time." The prospective hire had also been employed as a flight instructor by Embry-Riddle Aeronautical University, Daytona Beach, Florida, from August 1998 to June 1999. The prospective-hire's resume indicated that he had 1,800 hours total pilot time

including 1,220 hours as PIC, 490 hours as second-in-command, 750 hours of multiengine time, and 200 hours of actual instrument time. Continental Express records indicated that the pilot successfully completed a Beech 1900 first officer initial simulator proficiency check on August 1, 1999, a Beech 1900 first officer initial aircraft proficiency check on August 6, 1999, and Beech 1900 first officer initial operating experience and initial line check on August 21, 1999.

AIRCRAFT INFORMATION

According to the aircraft records, the accident aircraft (a Cessna 414, serial number 4140952) received its last inspection, a 100-hour inspection, on March 2, 2000, at 7,352.9 hours aircraft total time (ACTT). The airplane's last annual inspection was on September 30, 1999, at 7,253.7 hours ACTT. An altimeter and static system test on the aircraft was accomplished on December 2, 1999. The operator indicated that the aircraft had flown 53 hours since the March 2, 2000, 100-hour inspection.

The airplane's left engine, a Continental TSIO-520-N, underwent its last major overhaul on May 23, 1995, and was installed on the aircraft on July 3, 1995, at 1,608.2 hours engine total time and 0 hours since major overhaul. At the March 2, 2000, 100-hour inspection on the aircraft, the left engine had 1,384.5 hours since major overhaul.

The airplane's right engine, a Continental TSIO-520-NB, underwent its last major overhaul on September 4, 1999. The engine records did not indicate the engine total time at the time of this overhaul. The right engine was installed on the accident aircraft on September 4, 1999. At the March 2, 2000, 100-hour aircraft inspection, the right engine had 127.7 hours since major overhaul.

The accident aircraft was equipped for flight into icing conditions. The Performance and Specifications page of the 1977 Cessna 414 Airplane Flight Manual gives the airplane's all-engines service ceiling as 30,100 feet, and its single-engine service ceiling as 11,350 feet.

METEOROLOGICAL INFORMATION

Lynch's chief pilot reported that the accident pilot utilized the WeatherMation computerized weather briefing service to obtain weather information prior to departing Billings for Great Falls. Additionally, FAA ATC records indicated that the pilot contacted the Great Falls AFSS three times before the accident (by telephone at 1321 and 1516, and by radio at 1616) and received an abbreviated briefing on all three contacts. During the first two contacts, the pilot also requested pilot reports for icing. Holman Aviation personnel reported observing the accident flight crew checking weather on Holman Aviation's DTN computer weather terminal before departing Great Falls on the accident flight. A weather archive of the data being broadcast on the DTN system during the time frame the crew used the system (furnished by Kavouras of Burnsville, Minnesota, a DTN company) did contain the AIRMET in effect for icing at the time. A Kavouras representative stated it was not possible to check whether or not the accident crew accessed this specific information, as the system operates in a "broadcast-only" mode.

The 1656 Great Falls hourly METAR weather observation reported weather conditions there as: ceiling 400 feet overcast; visibility 9 statute miles in light snow; temperature 1 degree C; and dewpoint 1 degree C. The 1756 Great Falls METAR observation gave conditions as: ceiling 600 feet overcast; 2 1/2 statute miles visibility in light snow and mist; temperature 1 degree C; and dewpoint 1 degree C, with ceiling variable from 300 to 900 feet.

An AIRMET meteorological advisory in effect for the time frame and route of the accident flight advised of occasional moderate rime and mixed icing in clouds and in precipitation between 5,000 feet and flight level 200. FAA Advisory Circular (AC) 00-45E, "Aviation Weather Services", defines "moderate" icing as follows: "The rate of accumulation is such that even short encounters become potentially hazardous and use of deicing/anti-icing equipment or diversion is necessary."

According to an individual at the Aviation Weather Center in Kansas City, Missouri (the agency responsible for issuing aviation weather warnings and advisories including AIRMETs and SIGMETs), who was contacted by an NTSB meteorology investigator during the accident investigation, the notation "mixed icing in cloud and in precipitation" in the AIRMET implies the potential for supercooled large drop (SLD) icing conditions, including freezing rain or freezing drizzle. Review of various FAA publications providing information on weather subjects (AC 61-23C, "Pilot's Handbook of Aeronautical Knowledge"; AC 00-6A, "Aviation Weather"; AC 00-45E; and the Aeronautical Information Manual [AIM]), did not disclose any direct reference to this information in any of the publications reviewed. However, in a Notice of Proposed Rulemaking (NPRM) (Docket No. FAA-2000-8560) published in the Federal Register on December 22, 2000, the FAA proposed to define a variety of icing-related terms to be used by the FAA and other aviation-related entities (in government aviation regulations, weather-related handbooks, aircraft flight manuals, etc.) One objective of the NPRM, as stated therein, was to "ensure that this icing terminology...is used consistently and clearly by the Flight Standards Service, pilots, dispatchers, the National Weather Service (NWS), Aviation Weather Center, the Aircraft Certification Service, and Air Traffic." In the NPRM, the FAA proposes to define "icing in precipitation" as:

Icing resulting from an encounter with freezing precipitation, that is, supercooled drops with diameters exceeding 50 microns (defined as SLD, which includes both freezing drizzle and freezing rain). The Precipitation may be either within or outside of (usually below) the visible cloud.

The FAA also proposes to define the term "icing in cloud" as:

Icing occurring within cloud (visible moisture) and temperature below freezing, but without precipitation visible. Cloud droplets (diameters <50 microns) will be present. SLD may or may not be present.

The proposed definitions for "freezing rain" and "freezing drizzle" in the NPRM further state that, "When encountered by an aircraft in flight, [freezing rain or freezing drizzle] can cause a dangerous accretion of icing."

Several PIREPs of icing were made over and around Great Falls during a time frame from approximately 35 minutes before, until 50 minutes after, contact with the accident aircraft was lost. These PIREPs reported generally light to moderate rime icing in an altitude regime from 8,000 to 12,000 feet. Among these PIREPs, at 1802 (approximately 1/2 hour after loss of contact with the accident aircraft), a Cessna 402 aircraft approximately 20 nautical miles north of Lewistown, Montana (this aircraft's position was approximately 53 nautical miles east-northeast of the accident site), made an urgent PIREP of moderate to severe icing from 9,000 feet to 5,500 feet, reporting that it was unable to maintain altitude.

The NTSB Operational Factors Division, Washington, D.C., prepared a weather study on the accident. The weather study disclosed additional data on icing conditions and potential in

the region during the accident time frame. Principal factual findings of the NTSB Operational Factors Division weather study, in addition to the above, were reported in the Meteorological Factual Report on the accident (attached) as follows.

Per Great Falls upper air data at 1800, freezing level (temperature 0 degrees C) was about 3,900 feet above sea level. At about 9,000 feet in the accident area, outside air temperature was about -6 degrees C, with relative humidity greater than 80%. GOES-10 satellite IR imagery taken at 1730, and upper air data, disclosed that estimated cloud tops corresponded to about 13,000 feet. The 1730 GOES-10 data passed three of four tests for possible icing conditions (cloud top temperature, visible channel brightness counts, and [IR2-IR4] channel temperature differential parameters; the [IR4-IR5] channel temperature differential value was slightly outside parameters.)

WSR-88D weather radar data from Great Falls (KTFX) disclosed that in a 0.5-degree elevation sweep starting at 1727:32, within about a 5 nautical mile (NM) radius of the accident site the maximum weather radar echo intensity was about 42 dBZ (strong weather radar echo). At the accident site, beam center at 0.5 degrees elevation was 6,581 feet, beam width was 3,677 feet, top of beam was 8,420 feet, and bottom of beam was 4,743 feet. In a 1.4-degree elevation sweep starting at 1728:11, within about a 5 NM radius of the accident site the maximum weather radar echo intensity was about 0.0 dBZ. At the accident site, beam center at 1.4 degrees elevation was 10,064 feet, beam width was 3,677 feet, top of beam was 11,903 feet, and bottom of beam was 8,225 feet. Weather radar echo tops above 10,000 feet showed maximum radar echo intensities about 30 dBZ (weak to moderate weather radar echoes.) Weather radar echoes were evident along most of the route from Great Falls to the accident site below 10,000 feet.

Integrated Icing Diagnostic Algorithm (IIDA) data (generated by the Research Applications Program at the National Center for Atmospheric Research [NCAR] in Boulder, Colorado) indicated that there was a high potential for icing (60% or greater) in the area of Great Falls, and about a 50% or greater potential for SLD in the area of Great Falls. In the area southeast of Great Falls, the maximum icing potential (greater than or equal to 60%) was at a height of about 7,000 to 9,000 feet. The SLD potential in the area southeast of Great Falls was greater than or equal to 50% at a height below 10,000 feet.

WRECKAGE AND IMPACT INFORMATION

Investigators from the NTSB and Cessna Aircraft Corporation performed an on-site examination of the aircraft wreckage on June 3, 2000. The aircraft had impacted a densely wooded, generally west-facing slope which sloped downhill to the west at approximately 28 degrees. A large, generally north-south oriented ground scar, approximately matching the wing span of the accident aircraft in length, was noted at the site, with major craters along this ground scar at locations generally matching the locations of both wing tip tanks, both engine nacelles, and the fuselage on the accident aircraft. The main wreckage, consisting of the major portion of the airframe, was located 24 feet west (down slope) of this ground scar, and had come to rest inverted and headed west (down slope). The piece of wreckage found furthest from the main wreckage, the detached nose landing gear wheel, was located about 20 yards down slope from the main wreckage. Investigators measured the vertical angle from the major ground scar up to the tops of broken trees observed just east of the scar, and determined this angle to be 60 degrees above horizontal. The aircraft wreckage was burned; however, no evidence of inflight fire was found. Investigators found no evidence of pre-impact malfunction

of any airframe components or systems during the on-site examination. It was not possible to perform a detailed on-site examination of the aircraft's engines, due to the wreckage positioning, terrain conditions and equipment available to investigators at the accident site. A Cascade County, Montana, deputy coroner reported to the NTSB that during victim recovery at the accident site, the prospective hire was found in the left front seat, the pilot-in-command was found in the right front seat, and the extra Lynch pilot was found behind the other two occupants.

FIRE

See WRECKAGE AND IMPACT INFORMATION above.

MEDICAL AND PATHOLOGICAL INFORMATION

Northern Plains Pathologists, Great Falls, Montana, performed autopsies on the pilot-in-command and prospective-hire pilot under the authority of the Cascade County, Montana, Deputy Coroner, on June 3, 2000. The cause of death for both individuals was determined to be "blunt force trauma."

The FAA Civil Aeromedical Institute (CAMI), Oklahoma City, Oklahoma, performed toxicology testing on the pilot-in-command and prospective-hire pilot. The CAMI toxicology tests screened for carbon monoxide and cyanide in the prospective-hire pilot, and for alcohol and drugs in both individuals. None of these substances were detected in either individual.

SURVIVAL ASPECTS

The pilot of the accident aircraft reported unable to maintain altitude due to ice accumulation, and requested a divert back to Great Falls, prior to loss of radio and radar contact. Several aircraft reported hearing an ELT signal to ATC immediately after loss of radio and radar contact; a search for the aircraft was subsequently initiated. The aircraft wreckage was spotted the day after contact with the aircraft was lost. Upon arrival at the accident scene, ground search-and-rescue personnel found all three aircraft occupants dead at the scene.

TESTS AND RESEARCH

Both of the aircraft's engines were shipped to the facilities of the engine manufacturer, Teledyne Continental Motors (TCM) of Mobile, Alabama, for teardown/disassembly examination. Examination of both engines was conducted on August 22, 2000, with investigators from the NTSB, Cessna Aircraft Company, and TCM present. TCM's Engine Analysis Report (attached), dated August 22, 2000, concluded that the left engine "exhibited normal operational signatures throughout for the exception of the post impact fire and impact damage", and that the right engine "exhibited normal operational signatures throughout, except for the severe impact damage." The report stated that all internal components of both engines appeared well-lubricated, and that neither engine "[exhibited] any condition that would have caused an operational problem."

NTSB investigators examined several of the aircraft's gyroscopically-driven flight instruments at the NTSB Northwest Regional Office, Seattle, Washington. The instrument examination was completed on or about March 8, 2001. The instruments examined were the pilot's (left-seat) attitude director indicator (ADI) and horizontal situation indicator (HSI), copilot's (right-seat) attitude indicator and directional gyro (DG), and a turn-and-slip indicator. All instruments examined were vacuum-powered except for the electrically-powered turn-and-slip indicator. The instrument examination consisted of disassembly and removal of

the gyroscope element in each instrument, and visual examination of the gyros for rotational scoring. Investigators noted rotational scoring on the copilot's (right-seat) attitude indicator gyro and pilot's (left-seat) HSI gyro. No evidence of any contact of the gyro masses with their respective cases was observed on the other three gyros.

ADDITIONAL INFORMATION

The aircraft wreckage was released to Mr. Brad Hernke of United States Aviation Underwriters, Inc., Seattle, Washington, on March 15, 2001. United States Aviation Underwriters is the insurance adjuster firm representing the aircraft owner.

Pilot Information

Certificate:	Airline Transport	Age:	58, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Right
Other Aircraft Rating(s):	Helicopter	Restraint Used:	Seatbelt
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 1 Valid Medical--w/ waivers/lim.	Last FAA Medical Exam:	04/17/2000
Occupational Pilot:	Last Flight Review or Equivalent:		
Flight Time:	8000 hours (Total, all aircraft), 7000 hours (Pilot In Command, all aircraft), 105 hours (Last 90 days, all aircraft), 38 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	Registration:	N5113G
Model/Series:	414 414	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	4140952
Landing Gear Type:	Retractable - Tricycle	Seats:	6
Date/Type of Last Inspection:	03/02/2000, 100 Hour	Certified Max Gross Wt.:	6350 lbs
Time Since Last Inspection:	53 Hours	Engines:	2 Reciprocating
Airframe Total Time:	7406 Hours	Engine Manufacturer:	Continental
ELT:	Installed, activated, aided in locating accident	Engine Model/Series:	TSIO-520-N
Registered Owner:	LYNCH FLYING SERVICE INC.	Rated Power:	310 hp
Operator:	LYNCH FLYING SERVICE INC.	Operating Certificate(s) Held:	On-demand Air Taxi (135)
Operator Does Business As:		Operator Designator Code:	HSRA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Unknown	Condition of Light:	Day
Observation Facility, Elevation:	GTF, 3677 ft msl	Distance from Accident Site:	37 Nautical Miles
Observation Time:	1656 MDT	Direction from Accident Site:	296°
Lowest Cloud Condition:	Unknown / 0 ft agl	Visibility	9 Miles
Lowest Ceiling:	Overcast / 400 ft agl	Visibility (RVR):	0 ft
Wind Speed/Gusts:	10 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	304°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30 inches Hg	Temperature/Dew Point:	1°C / 1°C
Precipitation and Obscuration:			
Departure Point:	GREAT FALLS, MT (GTF)	Type of Flight Plan Filed:	IFR
Destination:	BILLINGS, MT (BIL)	Type of Clearance:	IFR
Departure Time:	1711 MDT	Type of Airspace:	Class G

Wreckage and Impact Information

Crew Injuries:	2 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:	1 Fatal	Aircraft Fire:	On-Ground
Ground Injuries:	N/A	Aircraft Explosion:	Unknown
Total Injuries:	3 Fatal	Latitude, Longitude:	

Administrative Information

Investigator In Charge (IIC):	GREGG NESEMEIER	Report Date:	07/02/2001
Additional Participating Persons:	EDWARD H WARMOTH; HELENA, MT JOSEPH A HUTTERER; WICHITA, KS FRED FIHE; MOBILE, AL		
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.nts.gov/pubdms/ .		

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).