Aviation Investigation Final Report

Location:	Rawlins, Wyoming	**Accident Number:**	DEN05FA051
Date & Time:	January 11, 2005, 21:45 Local	**Registration:**	N41WE
Aircraft:	Beech BE-90	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	3 Fatal, 1 Serious
Flight Conducted Under:	Part 91: General aviation - Positioning		

Analysis

The air ambulance was dispatched from Steamboat Springs, Colorado (SBS), to pick up and transport a patient in serious condition from Rawlins Municipal Airport/Harvey Field (RWL) to Casper, Wyoming. Approaching RWL, the pilot initiated a right turn outbound to maneuver for the final approach course of the VOR/GPS approach to runway 22. On the inbound course to the airport, the airplane impacted mountainous terrain, approximately 2.5 nautical miles east-northeast of the airport. The airplane, configured for landing, struck the terrain wings level, in a 45-degree nose-down dive, consistent with impact following an aerodynamic stall. Approximately 5 minutes before the accident, RWL reported broken ceilings at 1,100 and 1,800 feet above ground level (agl), 3,100 feet agl overcast, visibility 2.5 statute miles with light snow and mist, temperature 33 degrees Fahrenheit (F), dew point 30 degrees F, winds 240 degrees at 3 knots, and altimeter 29.35 inches. Before departing SBS, the pilot received a weather briefing from Denver Flight Service. The briefer told the pilot that there was a band of light to moderate snow shower activity half way between Rock Springs and Rawlins, spreading to the northeast. The briefer told the pilot there were adverse conditions and flight precautions along his route for occasional mountain or terrain obscurations. The pilot responded that he planned to fly instrument flight rules for the entire flight. The National Weather Service, Surface Analysis showed a north-south stationary front positioned along the front range of the Rocky Mountains beginning at the Wyoming/Montana border and extending south into north-central Colorado. Station plots indicated patchy snow over western Colorado and Wyoming. The most recent AIRMET reported, "Occasional moderate rime or mixed icing in clouds and precipitation between the freezing level and flight level 220." The freezing level for the area encompassing the route of flight began at the surface. Witnesses in the vicinity of RWL reported surface weather conditions varying from freezing rain to heavy snow. An examination of the airplane showed clear ice up to 1 ½ inches thick adhering to the vertical stabilizer, the left and right wings, the right main landing gear tire, and the right propeller. The airplane's aerodynamic performance was degraded due to the ice contamination, leading to a stall. An examination of the airplane's systems revealed no anomalies. A human factors review of

interviews and other materials showed insufficient evidence that the company placed pressure on the pilot to take the flight; however, the review did not rule out the pilot inducing pressure on himself. FAA Advisory Circular (AC) 135-15, Emergency Medical Services/Airplane (EMS/A) addresses several subject areas not practiced by the operator, including, "Additional considerations when planning IFR flights include the following: (1) Avoid flight in icing weather whenever possible."

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's inadvertent flight into adverse weather [severe icing] conditions, resulting in an aerodynamic stall impact with rising, mountainous terrain during approach. A factor contributing to the accident was the pilot's inadequate planning for the forecasted icing conditions.

Findings

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

Findings
1. (C) FLIGHT INTO KNOWN ADVERSE WEATHER - INADVERTENT - PILOT IN COMMAND
2. (F) WEATHER CONDITION - ICING CONDITIONS
3. (F) PREFLIGHT PLANNING/PREPARATION - INADEQUATE - PILOT IN COMMAND

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

Findings
4. (F) AIRFRAME - ICE
5. (C) AIRCRAFT CONTROL - NOT POSSIBLE - PILOT IN COMMAND
6. (F) STALL - ENCOUNTERED

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

Findings
7. TERRAIN CONDITION - MOUNTAINOUS/HILLY
8. TERRAIN CONDITION - RISING

Factual Information

HISTORY OF FLIGHT

On January 11, 2005, approximately 2145 mountain standard time, a Beech E-90, N41WE, operating as Yampa Valley Air Ambulance, was destroyed when it impacted terrain while flying the VOR/GPS approach to runway 22 at Rawlins Municipal Airport/Harvey Field (RWL), Rawlins, Wyoming. The airline transport pilot (ATP) and two flight nurses were killed, and the flight paramedic was seriously injured. The airplane was owned and operated by Mountain Flight Service, Inc., of Steamboat Springs, Colorado. Night instrument meteorological conditions (IMC) prevailed at the time of the accident. The emergency medical services (EMS) repositioning flight was being conducted on an instrument flight rules flight plan under the provisions of 14 Code of Federal Regulation Part 91. The cross-country flight originated at Steamboat Springs, Colorado, about 2116.

About 2018, St. Anthony Hospital's dispatch in Denver, Colorado, sent a general launch page to Mountain Flight Service's on-call flight and medical crews to transport a patient from Rawlins, Wyoming, to Casper, Wyoming. About 2057, St. Anthony Hospital dispatch sent a general page indicating that N41WE was on the way to Rawlins with an estimated en route time of 30 minutes.

About 2112:04, the Sector 11 controller at Denver Air Route Traffic Control Center (ZDV) cleared the pilot for departure from Steamboat Springs Airport (SBS) to RWL, directing him to "climb and maintain one three thousand." About 2116:40, the pilot of N41WE contacted ZDV, stating "…out of nine thousand for one three thousand." The ZDV controller responded, "…thanks have you in radar, just a moment, climb and maintain one four thousand."

ZDV radar contact was established at 2116:52. Radar data indicate that the airplane took off to the south-southeast from SBS and climbed through an altitude of 9,400 feet mean sea level (msl) on a magnetic heading of 140 degrees. Approximately 5 miles south of SBS, ZDV radar showed the airplane make a climbing 207-degree right turn to a heading of 323 degrees. About 2117, the controller cleared N41WE to 16,000 feet msl and direct to RWL. At 2126:04, the pilot checked in with the ZDV Sector 22 controller and stated he was at 16,000 feet, direct RWL. At 2133:41, the pilot contacted ZDV and informed him, "...for planning purposes we'd like...clearance for the VOR/GPS runway 22 approach into Rawlins." ZDV cleared the pilot direct to the Rawlins VOR and told him to expect clearance for the approach.

About 2134:28, ZDV transmitted to N41WE, "...descent at pilot's discretion, maintain one one thousand, Rawlins altimeter two niner three five." The pilot responded with the altitude and altimeter setting. At 2136:31, ZDV told the pilot of N41WE to "cross Rawlins VOR at or above one one thousand, cleared VOR or GPS runway 22 approach to the Rawlins Airport," and the

pilot acknowledged the transmission.

At 2140:14, the pilot reported, "...crossed over VOR at eleven for nine." ZDV told N41WE, "change to advisory approved you can recancel with me ah or through radio, have a good approach." The pilot responded, "With you or through radio…and the radio frequency on the ground at Rawlins is?" ZDV responded, "…I'm showing one twenty-two two." The pilot said, "Roger that same here…thank you." About this time, ZDV radar showed the airplane cross the RWL VOR and turn right to an outbound heading of 044 degrees. About 2142, radar contact with the airplane was lost. At the time radar contact was lost, the airplane was 8 miles east of the Rawlins Airport at 9,200 feet msl. The airplane was flying an approximate heading of 090 degrees, which is consistent with it being midway through the procedure turn inbound for the approach to runway 22.

A ground ambulance driver reported that she was dispatched to the airport to pick up the flight medical crew and take them to the hospital to pick up the patient. She stated that the runway lights were already on when she arrived at the airport and recalled that the time was 2138. She said the airplane was due in a little before 2200. The ambulance driver said she contacted the hospital to inquire about the flight crew and learned that the hospital had not heard anything. She stated that a little after 2200, the runway lights went off. The ambulance driver said she contacted the sheriff's dispatcher by phone, informed them the airplane was late, and inquired if they had heard anything. The dispatcher told her they had heard nothing. At that point, the ambulance driver contacted the emergency room at the hospital. About 2215, they were notified by sheriff's dispatch that the airplane had crashed.

At 2205:44, the Casper Flight Service Station (FSS) contacted the ZDV Sector 22 controller and asked about N41WE's status. The controller informed the FSS of the airplane's approach clearance, and the FSS indicated that the airplane had not arrived at RWL. After the airplane was reported overdue, search and rescue efforts were initiated. The airplane was located approximately 2.5 miles northeast of RWL in mountainous terrain about 0152on January 12, 2005.

The flight to Rawlins was originally scheduled with Wyoming Medical Center in Casper. A pilot for Wyoming Medical Center stated the flight had been pending for several hours. He said the weather was bad and that the pilot on duty before him declined the flight because of the weather, which was below Part 135 minimums. The pilot said he declined the flight initially but later accepted the flight as the weather at Rawlins improved. Before departure, Wyoming Medical Center received a more urgent call, and the mission was changed to Riverton.

PERSONNEL INFORMATION

The 35-year old pilot held an ATP certificate with a multiengine land airplane privileges dated December 22, 2002. The pilot's certificate showed a type rating in the SA-227 airplane and listed commercial privileges in single-engine land airplanes. The pilot also held a first-class medical certificate dated February 21, 2004, with the limitation, "Airman must wear corrective

lenses while exercising the privilege of this certificate."

Company records showed the pilot had completed recurrent training in the B-100 King Air on June 19, 2004, and had successfully completed a proficiency check flight given by a Federal Aviation Administration (FAA) check pilot on November 16, 2004. According to company records, the pilot joined the company in June 2003 and, at that time, reported having approximately 3,800 total flying hours. Of that time, the pilot reported having 3,778 hours as pilot-in-command, 2,823 hours multiengine time, 1,000 hours flight time at night, and 200 hours actual instrument flight time.

Company time and duty records showed that since December 2003, the pilot logged 413.9 flying hours in the company's aircraft. The records also showed the pilot had logged 118.3 hours in the previous 90 days to the accident, 54.3 hours in the previous 30 days, and 1.7 hours within the 24 hours prior to the accident.

AIRCRAFT INFORMATION

The airplane was a 1978 Beech E-90 King Air, serial number (S/N) LW 280. The airplane was owned and operated by Mountain Flight Service, Inc., and was used for EMS transport. The airplane's registration was dated June 17, 2003.

The airplane was being maintained by Mountain Aircraft Maintenance, Inc., of Steamboat Springs, Colorado. The airplane was on a continuous maintenance schedule as prescribed by Raytheon Beech, the airplane manufacturer. The airplane underwent a Phase 3 and 4 inspection (required every 200 hours) on November 14, 2004. At the time of the inspection, the airframe time was 8,891.2 hours, the Hobbs time was 525.2 hours, and the airplane's cycles (one landing gear retraction and one landing gear extension) were 8,772.

The airplane's flight log and load manifest was recovered from the accident site. It showed that the airplane left SBS about 2110. The Hobbs out time was listed as 555.3 hours, and the cycles out was listed as 8,815.

METEOROLOGICAL INFORMATION

Several witnesses in the vicinity of the accident site reported surface weather conditions varying from freezing rain to heavy snow. The National Weather Service Surface Analysis chart for 2300, January 11, 2005, showed a north-south stationary front positioned along the front range of the Rocky Mountains beginning at the Wyoming/Montana border and extending south into north-central Colorado. Station plots indicated patchy snow over western Colorado and Wyoming.

The Weather Surveillance Radar-1988, Doppler (WSR-88D) at Riverton, Wyoming, 322 degrees at 95 nautical miles (nm) from the accident site, was the closest weather radar. Assuming standard refraction, the radar beam was centered over the accident location at approximately

16,700 feet msl for the lowest antennae elevation angle of 0.5 degrees. The beam width was approximately 9,600 feet (see the Meteorological Factual Report in the public docket for this accident).

About 2109, 7 minutes before the airplane's departure from SBS, the automated surface observation system (ASOS) at RWL reported the weather as a broken ceiling at 1,100 feet above ground level (agl), 1,800 feet agl broken, and 3,100 feet agl overcast, visibility 2.5 statute miles (sm) with light snow and mist, temperature 33 degrees Fahrenheit (F), dew point 30 degrees F, winds 240 degrees at 3 knots, and altimeter 29.35 inches of mercury (in Hg).

About 2140, the ASOS at RWL reported the weather as few clouds at 500 feet agl, scattered clouds at 900 feet agl, overcast ceiling at 1,500 feet agl, visibility 2 sm with light snow and mist, temperature 32 degrees F, dew point 32 degrees F, winds 250 degrees at 3 knots, and altimeter 29.35 in Hg.

The Man computer Interactive Data Access for the period 1400 to 0000 showed no pilot weather reports (PIREPs) for icing for Wyoming. During the first hour following the accident, six PIREPs were given reporting light to moderate rime and mixed icing from 11,000 feet msl to 16,000 feet msl.

In-flight advisories (AIRMETS) for IMC, mountain obscuration, turbulence, and icing were updated at 1945. AIRMET ZULU indicated that (icing) extended across an area that included the accident airplane's entire route of flight and states, "occasional moderate rime or mixed icing in clouds and precipitation between the freezing level and flight level 220." The freezing level for the area encompassing the route of flight and the accident airport began at the surface.

About 2036, the pilot contacted the Denver FSS and requested current weather conditions in Rawlins, Wyoming, and Casper, Wyoming. The FSS briefer told the pilot the following:

Looks like...a band of moisture...on radar...looks like moderate precipitation just blowing right up your way...Current observations at Rawlins...report winds 210 at 10 with 10-mile visibility, 3,100 scattered, 8,500 overcast, 1 and -1 for temp[erature] and dew point from what I can see on radar it looks like a band of...light to moderate snow shower activity. At the moment it is about half way between Rock Springs and Rawlins, but it is of course spreading to the northeast. Also this band of snow shower activity extending up to just west of the Casper area too, we'll say almost Casper, Rawlins, and west toward Lander and so forth, light to moderate snow showers on the bill at Casper...winds...360 at 6 with 10 miles visibility and ceilings 2,100 overcast, -4 and -7 on the temperature dew point, that's actually up from what they were previously because they had snow occurring. They had been down to about 1,500 overcast 5 miles, light snow. It ended then they improved. But I think we're going to see conditions probably throughout the afternoon or evening just continuing to fluctuate up and down in the snow shower cells, move in and out of the area. Now, forecast for Rawlins, this is a terminal forecast, until 0600Z, gusty winds are in the forecast, winds 240 at 15 gusts to 25 [knots]. It

seems like winds blow up there all the time doesn't it?

The briefer went on to say about Rawlins that the forecast was 5 miles visibility in fog or mist and showers in the vicinity, with skies 2,000 scattered and ceilings 4,000 overcast. The pilot then said, "Alright, let's go ahead and file a couple of plans for us." The briefer then asked, "[Do] you want that forecast at Casper or anything or do we need to check NOTAMS [notices to airmen]?" The pilot said that he had been there the night before but told the briefer to go ahead and give him the current Rawlins and Casper NOTAMS. After the briefer provided the NOTAMS, the pilot filed his flight plan. The briefer then said, "Okay, I have got that flight plan. Now we do have some...adverse conditions, some flight precautions and so forth up along that route for occasional mountain or terrain obscurations." The pilot said, "Right, I plan on not being able to even look at terrain." The briefer said, "Okay, IFR, well I mean we are required to give them to you if you want them." The pilot said, "Well, I'll be IFR the whole way. Thank you." The briefer said, "Mountain terrain obscuration, icing, and turbulence." The conversation ended after the pilot responded, "All of that fun stuff."

AIDS TO NAVIGATION

The VOR/GPS approach to runway 22 at RWL requires the pilot to fly a procedure turn maneuver to align the aircraft on the final approach course of 224 degrees. The approach requires the pilot to fly over the VOR, which is collocated on the airport at 9,000 feet msl or higher altitude assigned, then initiate a turn outbound to a 044 degree heading. The pilot is required to remain within 10 nm of the VOR during the maneuvers. Once inbound on the 224-degree course, the pilot can descend to a step-down altitude of 7,780 feet (967 feet above the terrain). On passing 3.5 DME (nm by distance measuring equipment), the pilot can descend to the minimum descent altitude (MDA) of 7,520 feet msl (707 feet above airport elevation). The MDA is based on the airplane's category (the Beech E-90 is a category C airplane) or the approach speed required to maintain for the approach. The pilot tracks inbound until he/she sees the runway environment. If the pilot reaches the VOR and does not see the runway environment, the pilot must execute a missed approach. The weather minimums for the approach are a 707-foot ceiling and 2 miles visibility. The field and touchdown zone elevation for RWL is 6,813 feet.

The FAA navigation facilities branch conducted a flight check of the VOR/GPS approach to runway 22 at RWL on January 12, 2005, starting about 0915 and ending about 0940. The flight check showed no anomalies with the approach or the VOR station.

WRECKAGE AND IMPACT INFORMATION

The accident site was located on the northeast side of a 7,269-foot msl ridgeline approximately 2.5 nm northeast of RWL. The ground scar at the accident site measured 104-feet long and 25-feet wide and ran northeast to southwest along a 225-degree magnetic heading, about 800 feet short of the crest of the ridge near the start of the upward rise. The northeast edge of the ground scar was at an elevation of 7,065 feet msl, and its southwest

edge was at an elevation of 7,086 feet msl. Three distinct parallel-running tracks were evident at the northeast edge of the ground scar. Each track was 6 feet apart, approximately 25 inches in width, and ran southwestward for approximately 10 feet 6 inches. Pieces of the airplane's nose gear doors, main gear doors, and belly antennae were embedded about 20 feet southwest of the start of the ground scar.

The airplane's left and right propellers, the left and right main landing gear struts and tires, the nose gear trunnion, and the nose gear strut and tire were located about 270 feet southwest of the beginning of the ground scar. The left propeller assembly was broken torsionally at the flange and rested at an elevation of 7,097 feet msl. The right propeller assembly was located 18 feet northwest of the left propeller assembly and was also broken torsionally at the flange. Both sets of propeller blades showed severe torsional bending, chordwise scrapes and scratches, and nicks in the leading and trailing edges. Both propeller spinners were bent, broken inward, and crushed aft. A 20-inch-long and approximately 1/2-inch-thick area of clear ice was found along the leading edge of a blade right propeller, beginning near the hub . The outer 8 inches of the tip of another right propeller blade was broken off.

The nose wheel and nose wheel strut were located approximately 8 feet south of the right propeller assembly. The right main landing gear and strut were located 30 feet northwest of the right propeller assembly. Clear ice, measuring about 1/8-inch to 1-1/4-inch thick, covered approximately 1/4 of the tire. The left main landing gear was located approximately 45 feet southeast of the left propeller assembly.

A debris field, measuring approximately 45 feet wide, extended southwest along the 225-degree wreckage path, beginning at the propellers and extending approximately 330 feet to the airplane main wreckage. The main wreckage, consisting of the nose section, nose gear strut, cockpit and cabin sections, the left and right wings, left and right engines and engine nacelles, right upper main landing gear strut, aft fuselage, and the empennage, was located approximately 200 feet northwest from the crest of the ridge at an elevation of 7,122 feet msl. The airplane's fuselage rested upright and was oriented on a 223-degree magnetic heading.

The airplane's left wing was predominately intact but was broken upward just outboard of the engine nacelle. Portions of the leading edge of the left wing showed clear ice adhering to the surface. The ice was about 1 1/2 inch thick and completely covered the leading-edge deicing boot. Engine oil from the left engine covered the ice just outboard of the engine nacelle. The right wing was broken aft at the wing root and found resting on the top wing skin and engine nacelle next to the airplane's right-side cabin. Portions of the leading edge of the right wing showed clear ice adhering to the surface. The ice was about 1 to 1 1/2 inches thick and completely covered the leading-edge deicing boot. Engine oil from the right engine covered the ice just outboard of the engine nacelle. A cross-section of the ice showed several layers of smooth contours. Postaccident examination revealed that the landing gear were in the down and locked position and the flaps were partially extended, consistent with approach to landing.

The aft fuselage and empennage was separated from the fuselage and remained attached to

the cabin by the control cables. The vertical stabilizer and rudder rested on the ground on their left side. Clear ice measuring about 1-inch thick was found adhering to the leading-edge surface of the vertical stabilizer from its base to the top.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy of the pilot's remains was conducted on January 13, 2005, at Loveland, Colorado, by the Larimer County Medical Examiner's Office. FAA toxicology testing of samples taken from the pilot were negative for all tests conducted.

SURVIVAL ASPECTS/SEARCH

The lone survivor of the accident, a paramedic, was seat-belted on the third seat of the medical crew bench near the cabin door. The bench ran along the left side of the cabin, between the cockpit bulkhead and the cabin door. According to the paramedic, the flight nurse-in-training was sitting on the first seat (which butted up against the bulkhead) of the medical crew bench. Medical gear was strapped into the middle seat. The litter rack ran along the right side wall across from the medical crew bench. The paramedic stated that, as best he could recall, the flight nurse was wearing her lap belt. He said everything was normal and he was talking to the flight nurse regarding their procedures when they landed at Rawlins. He indicated that the next thing he remembered was being in a hospital bed.

Approximately 2205, local law enforcement engaged in a three-way conversation with the paramedic on the airplane and the Flight for Life dispatch center in Denver. Local law enforcement and fire units used sirens to assist in locating the paramedic. The paramedic told them he heard what he thought was a train and said that he was also able to hear the sirens from the sheriff and fire units, which helped local rescue determine the airplane was east of Rawlins. Using a hand-held receiver, the county fire warden was able to pick up the airplane's emergency locator transmitter (ELT). About 2317, rescue lost cell phone contact with the paramedic. On January 12, 2005, about 0020, a fire unit from Hanna, Wyoming, picked up the ELT signal near Sinclair, Wyoming. Search efforts were coordinated in the area north of Sinclair. Using the hand-held receiver to hone in on the airplane's ELT signal, rescue was able to locate the airplane. Rescue found the pilot deceased and strapped into the left seat, one flight nurse deceased and strapped into the right seat, and the surviving paramedic belted in at the third seat of the medical crew bench. The other flight nurse was found under the airplane's left wing.

TESTS AND RESEARCH

The airplane's systems were examined on February 28, 2005, at Greeley, Colorado. Flight control continuity was reconfirmed. The deice system was examined and tested. Pressure lines initiating at the engine bleed air source were traced through the nacelles to the deice distributor valve and inspected. The ejector and check valves were inspected and found fully

functional. Regulated pressure lines were inspected starting at the deicer distribution valve running laterally to the wing leading-edge deicer boots and longitudinally through the airplanes fuselage from FS 186.37 aft to where the lines ran laterally to the horizontal stabilizers deicer boots at FS 352.00 and continued aft to the vertical stabilizer deicer boot at FS 393.90. The lines were intact and showed some crush damage, particularly through the fuselage. The deicer boots on the wings, horizontal stabilizers, and vertical stabilizer were examined and showed minor tears along the leading edge spans. High-pressure air was introduced where the regulated pressure lines entered the wings at WS 28.95. The left and right wings leading-edge deicer boots inflated normally as designed. High-pressure air was introduced into the regulated pressure line just aft of FS 319.00. The left and right horizontal stabilizers leading-edge deicer boots and the vertical stabilizer leading-edge deicer boot inflated normally and deflated normally when air pressure was removed. On July 12, 2005, the deicer time delay and control relays were examined in Denver, Colorado, for electrical continuity and time sequencing. Electrical continuity and correct sequencing were confirmed.

An examination of the airplane's electrical power systems, fuel system, fire protection system, pneumatic systems, pressurization, heating, and air conditioning systems, avionics systems, pitot-static, and remaining ice and rain protection systems, showed no pre-impact anomalies.

The airplane's engines and propellers were examined on April 6, 2005. The engine examination showed that both engines were developing power (approximated in the low- to mid-power range) at the time of terrain impact. Both engines exhibited light impact damage. The compressor turbine, the power ring guide vane ring, and the power turbine in both engines displayed circumferential rubbing and machining due to axial contact with adjacent components under impact loads and external housing deformation. The power turbine shrouds in both engines displayed circumferential scoring due to radial contact with the adjacent blades under impact loads and external housing deformation.

The propeller examination showed both propellers were operating in the same manner at the time of impact. Both propellers were attached to fractured engine shafts. Blades from both propellers exhibited moderate aft bending with twisting toward low pitch. The damage was typical of that seen when impact occurs at low or moderate power. No discrepancies were noted that would preclude normal propeller operation. All damage was consistent with impact damage.

The annunciator panels and engine instruments were examined at the National Transportation Safety Board's Materials Laboratory, Washington, DC, on June 29, 2005. Bulb filaments were examined with a stereomicroscope for evidence of filament breakage and coil stretching. Each indicator module contained two type-327 light bulbs beneath each indicator. On the 4X4 (4 rows of 4 indicator modules) annunciator panel, possible filament stretching was noted on the right bulb for the indicator module in row 2 at position 1, the "NAV CAP" (heading/course capture) indicator light. On the 2X15 (2 rows of 15 indicator modules) annunciator panel, possible filament stretching was noted on both light bulbs for the indicator module in row 2 at position 13, the "RH AUTOFEATHER ARM" (right hand autofeather armed) indicator light. The

face of each instrument was examined with white light through the glass faceplate with a stereomicroscope for evidence of needle strikes indicative of needle position at impact. No needle impacts were found on any of the instruments. Each instrument was also examined under ultraviolet light with similar findings.

COMPANY INFORMATION

The operator, Mountain Flight Service, Inc., was formed in 1993 and began transporting critically ill patients in January 1994. The company arranged with the Denver Flight Standards District Office (FSDO) that duty time would start when personnel received a launch page. By the end of 2000, Mountain Flight Service was involved in emergency medical services, charter, and corporate flying operations.

In May 2001, Mountain Flight Service entered into a contract with Yampa Valley Medical Center, transferring responsibility for the medical staff and patient billing to that facility. Mountain Flight Service retained the airplanes and the pilots and became a vendor to the hospital. The company and the hospital established a joint committee on EMS transport, and both sought to become CAMTS-(Certification for Air Medical Transport Systems) certified.

On March 19, 2003, a Mountain Flight Service E-90 King Air impacted an 8,489-foot msl mountain ridge south of the Kremmling-McElroy Airport, Kremmling, Colorado (see NTSB Accident Report DEN03LA040). The pilot and two medical crewmembers on board the airplane sustained minor injuries; however the airplane was substantially damaged. The Safety Board determined that the probable cause of that accident was the pilot's improper in-flight planning and his failure to maintain safe clearance from the high terrain. Factors contributing to the accident were the high terrain and the dark night. Following the accident, the FAA conducted a reexamination on the pilot. Mountain Flight Service immediately fired the pilot.

Before the Kremmling, Colorado, accident, the FAA Denver FSDO received several complaints against the operator, many of which involved aircraft performance at SBS with respect to Part 135. Other complaints pertained to crew duty hours. The FAA investigated these complaints and found that the company was operating correctly. The complaints intensified following the Kremmling accident. In response, the Denver FSDO initiated a stance of "heightened awareness" with regard to Mountain Flight Service and conducted several inspections of the company through the remainder of 2003 and during 2004. An inspection conducted March 30 and 31, 2004, revealed problems with the company's training records for pilots and check airmen and discrepancies with its operating manuals. The inspection also revealed numerous paperwork discrepancies committed by both the company and the Denver FSDO. Following the inspection, the FAA rescinded the company's check airman status and flight checked all of its pilots. No competency issues were noted. The Denver FSDO also transferred management of the company's certificate to a different principal operations inspector. According to the FAA, the company took immediate steps to fix the discrepancies, and its efforts to be in compliance with the FAA's directives continued up to the time of the Rawlins accident. Denver FSDO's efforts did not satisfy the complainants. Further complaints were logged against the

operator and the Denver FSDO to the FAA Northwest Mountain Region, as well as to the Department of Transportation Office of the Inspector General.

A local resident and some former employees of Mountain Flight Service and the Yampa Valley Medical Center raised issues with respect to the company's past operating procedures and corporate behavior. These issues were examined. However, at the time of, and following the accident, all of the procedural and operational issues raised were found to have been corrected.

ADDITIONAL INFORMATION

FAA Advisory Circular (AC) 135-15, "Emergency Medical Services/Airplane (EMS/A)," states, "Decisions concerning flight operations should be made by the pilot-in-command (PIC) or management personnel qualified in accordance with Part 135…A final decision to conduct a flight, or to continue a flight as planned, should rest with the PIC based on his/her judgment. The decision should not be based solely upon the condition of the patient." The AC goes on to state that "Additional considerations when planning IFR flights include the following: (1) Avoid flight in icing weather whenever possible." It also states that "The certificate holder should designate a safety officer. This individual should be familiar with each aspect of an EMS operation with emphasis on the safety requirements involved in the operation of EMS aircraft. This individual should plan, organize, and disseminate information about the safety program to all involved persons."

Mountain Flight Service did not have a formal risk management program in place at the time of the accident or maintain tools that a pilot or company management could use to assess and mitigate risk on emergency medical services response missions. According to a co-owner of the company, a pilot's ability to make good decisions was one criterion evaluated during the hiring process. The co-owner said the company's slogan was, "One to say no and three to go;" that is, all three crewmembers (pilot, nurse, and paramedic) had to say yes for the flight to proceed. Medical crewmembers confirmed this policy during postaccident interviews. However, one medical crewmember stated that although this was true, medical personnel "were trusting of the pilot's knowledge of the weather." The other owner stated that the company tried to foster a climate in which there was no recrimination against a pilot for not taking a flight.

FAA Order 8400.10 provides that medical personnel trained in flight operational procedures may be considered crewmembers, and a flight with only crewmembers on board may be conducted under 14 CFR Part 91. FAA Order 8400.10 states:

Medical personnel may or may not be considered crewmembers at the discretion of the operator. If the operator desires to consider the medical personnel crewmembers, the medical personnel must complete initial and recurrent crewmember training programs. Additionally, the medical personnel must perform some duty in the aircraft that relates to the operation of that aircraft, such as assisting flight crewmembers in seeing and avoiding other aircraft,

evaluating a landing site, and emergency shutdown of aircraft systems in a crash. NOTE: If medical personnel are crewmembers, they are not considered passengers. When only crewmembers are on board the aircraft, the flight may be conducted under FAR Part 91. When a patient or passenger is on board the aircraft, the flight must be conducted under FAR Part 135.

A 1992 memorandum of understanding (MOU) between the FAA and the Safety Board designed to establish guidance in the reconciliation process of accident clarification states further: "EMS positioning flights are Part 91 operations until a passenger is picked up. A doctor, nurse, or medical technician is considered part of the crew." It continues by stating that, " ... differences will be reconciled by the Office of Accident Investigation, FAA, and the Regional Operations and General Aviation Division, NTSB."

On August 25, 2005, the Safety Board General Council and Regional Operations and FAA Legal and Flight Standards held a policy meeting at the Safety Board's headquarters to clarify what constitutes EMS repositioning flights under Part 91 and flights under Part 135. The group determined that the language of FAA Order 8400.10 specifies that medical personnel, not employees of the aircraft operator, are crewmembers in that they perform certain functions on the airplane that the flight crew cannot perform, specifically, maintaining medical oxygen, using specialized medical instruments, and on loading and securing patients in the aircraft. Further, if medical personnel are required to undergo initial training in egress and emergency procedures on the airplane and they receive recurrent training, then they are considered crewmembers and a flight for the purpose of traveling to pick up a patient is a repositioning flight operated under the provisions of Part 91. Regarding the MOU, the group agreed that the policy implies that medical personnel are crew by virtue of their medical duties related to the care of the patient and not because of any aviation operational duties.

Mountain Flight Service provides initial and annual training to the medical personnel from Yampa Valley Medical Center that includes procedures for loading and securing patients on the airplane, normal and emergency egress from the airplane, and emergency procedures, including which systems to turn off in the event of an accident.

Parties to the investigation were the FAA Flight Standards Field Office, Casper, Wyoming; the Raytheon Aircraft Company; Pratt and Whitney, Canada; Hartzell Propeller, Inc.; and Mountain Flight Service, Inc.

The aircraft wreckage was released and returned to the operator's insurance company.

Pilot Information

Certificate:	Airline transport	**Age:**	35,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 With waivers/limitations	**Last FAA Medical Exam:**	February 1, 2004
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	November 1, 2004
Flight Time:	3778 hours (Total, all aircraft), 414 hours (Total, this make and model), 118 hours (Last 90 days, all aircraft), 54 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N41WE
Model/Series:	BE-90	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Transport	**Serial Number:**	LW-280
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	November 1, 2004 Continuous airworthiness	**Certified Max Gross Wt.:**	10100 lbs
Time Since Last Inspection:	30.1 Hrs	**Engines:**	2 Turbo prop
Airframe Total Time:	8921.3 Hrs at time of accident	**Engine Manufacturer:**	Pratt & Whitney Canada
ELT:	Installed, activated, aided in locating accident	**Engine Model/Series:**	PT6A-28
Registered Owner:	Mountain Flight Service	**Rated Power:**	10500 Lbs thrust
Operator:		**Operating Certificate(s) Held:**	None
Operator Does Business As:	Yampa Valley Air Ambulance	**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Night
Observation Facility, Elevation:	RWL,6313 ft msl	**Distance from Accident Site:**	3 Nautical Miles
Observation Time:	21:40 Local	**Direction from Accident Site:**	220°
Lowest Cloud Condition:	Few / 500 ft AGL	**Visibility**	2 miles
Lowest Ceiling:	Overcast / 1500 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	3 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	250°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.35 inches Hg	**Temperature/Dew Point:**	0°C / 0°C
Precipitation and Obscuration:	Light - None - Mist		
Departure Point:	Steamboat Spgs, CO (SBS)	**Type of Flight Plan Filed:**	IFR
Destination:	Rawlins, WY (RWL)	**Type of Clearance:**	IFR
Departure Time:	21:16 Local	**Type of Airspace:**	

Airport Information

Airport:	Rawlins Municipal Airport RWL	**Runway Surface Type:**	Asphalt
Airport Elevation:	6813 ft msl	**Runway Surface Condition:**	Wet
Runway Used:	22	**IFR Approach:**	Global positioning system;VOR
Runway Length/Width:	7008 ft / 100 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	2 Fatal, 1 Serious	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	3 Fatal, 1 Serious	**Latitude, Longitude:**	41.818611,-107.152778

Administrative Information

Investigator In Charge (IIC):	Bowling, David
Additional Participating Persons:	Bruce Hanson; Federal Aviation Administration; Casper, WY Darren Zehner; Mountain Flight Service, Incorporated; Steamboat Springs, CO Robert Ramey; Raytheon Aircraft Company; Wichita, KS Tom Berthe; Pratt & Whitney Canada; Montreal Tom McCreary; Hartzell Propeller, Incorporated; Piqua, OH
Original Publish Date:	January 26, 2006
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=60841