NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety

Seattle, Washington 98188

April 7, 2010

OPERATIONS GROUP CHAIRMAN'S FACTUAL REPORT

WPR09MA159

A. ACCIDENT

LOCATION:	Butte, Montana
DATE:	March 22, 2009
TIME:	1430 Mountain daylight time[1]
AIRCRAFT:	Pilatus PC-12/45, N128CM, Serial Number 403

B. OPERATIONS GROUP

Group Chairman:	Thomas M. Little Air Safety Investigator National Transportation Safety Board Western Pacific Region Seattle, Washington
Member:	Eric E. West Air Safety Investigator Office of Accident Investigation Federal Aviation Administration Washington, D.C.
Member:	Peter Duncan

[1] Unless otherwise noted, all times are Mountain daylight (MDT) time based on a 24-hour clock.

Chief Pilot
Pilatus Business Aircraft, Ltd.
Broomfield, Colorado

C. SUMMARY

On March 22, 2009, at 1430 mountain daylight time, a Pilatus PC-12/45, N128CM, descended to ground impact near the approach end of runway 33 at the Bert Mooney Airport (BTM), Butte, Montana. The airplane was owned and operated by Eagle Cap Leasing, of Enterprise, Oregon, as a personal transportation flight under the provisions of 14 Code of Federal Regulations Part 91. The airplane was destroyed in the collision sequence and post crash fire. All 14 persons onboard the airplane were killed in the accident and there were no ground injuries. The flight departed the Oroville Municipal Airport (OVE), Oroville, California, at 1210 Pacific daylight time (PDT) on an instrument flight rules (IFR) flight plan and clearance destined for Gallatin Field (BXN), Bozeman, Montana. The airplane was diverting to Butte at the time of the accident. Visual meteorological conditions prevailed at both the Bozeman and Butte airports.

D. DETAILS OF THE INVESTIGATION

The on-site portion of the operations investigation began on March 23, 2009. This phase of the investigation was conducted at a private lodging facility located in Butte, the accident site, and at the Butte Airport. The Operations Group completed the field portion of the investigation on March 26, 2009. The remainder of the operations investigation was conducted at the NTSB office in Seattle, Washington. The Operations Group was assisted in the investigation by the NTSB Human Performance Division, Washington, D.C.

E. HISTORY OF FLIGHT

According to a family member who arranged the trip and who was also a co-owner of the airplane, the purpose of the flight was to transport family members and friends to a resort facility near Bozeman, Montana for a skiing vacation. The family member reported that a similar trip had taken place about a year earlier. The family member stated that the trip had been planned about six months in advance, and that the original plan had consisted of two flights. The first flight would pick up the parties in Lodi and Napa, California, fly them to Bozeman, then return to Oroville, California to pick up the remainder of the passengers for the second trip to Bozeman. However, on the day prior to the accident the family member who had arranged the trip reported that he had decided to drive himself by car to Bozeman so that a second flight would not be necessary. The family member added that upon completion of trip the pilot would leave the airplane in Bozeman, return to his home in southern California via a commercial

flight, and then return to Bozeman commercially in about a week to transport the passengers back to California.

During the afternoon of March 21, 2009, the day prior to the accident, the airplane had returned to its base at the Redlands Municipal Airport (REI), Redlands, California, from Cabo San Lucas, Mexico after a three-day trip. In preparation for the next day's flights, the pilot had the airplane refueled with 222 gallons of Jet-A fuel. The refueling manager stated that the pilot did not request that a fuel system icing inhibitor (FSII)[2] be added.

On March 21, 2009, at 1946 Pacific daylight time, the pilot filed three IFR flight plans with the Lockheed Martin automated flight service station (AFSS)[3]. The first flight plan indicated that the airplane, with only the pilot on board, would depart REI at 0800 PDT, with its destination being the Nut Tree Airport (VCB), Vacaville, California. The second flight plan leg, which showed 5 people on board, indicated a proposed departure time of 1030 PDT from VCB, with its destination being the Oroville Municipal Airport (OVE), Oroville, California. The third leg of the flight, which listed 9 people on board, indicated a planned departure time of 1130 PDT from OVE, with its planned destination being Gallatin Field (BZN), Bozeman, Montana.

On the morning of March 22, 2009, the pilot departed REI for VCB at 0742 PDT as the sole occupant of the airplane. The pilot filed an IFR flight plan, with a filed altitude of 26,000 feet (Flight Level 260/FL260), a true airspeed of 260 knots, 6 hours of fuel on board, and an estimated time en route (ETE) of 2 hours and 10 minutes. The flight arrived at VCB at 0930 PDT, for an en route flight time of 1 hour and 48 minutes.

The VCB airport manager reported in a statement to the Safety Board investigators that he arrived at the airport about 0930 PDT and observed what appeared to be 4 adults and 4 children on airport property prior the airplane's arrival. The manager stated that about the time the airplane was landing he allowed one of the adults automobile access to the airplane ramp area in order to load the passenger's baggage. The manager further stated that he observed the adult drive the automobile to the fuel island where the airplane was parked, and shortly thereafter, about 1030 PDT when he was leaving, he noticed that the airplane was still sitting at the fuel island. The manager added that he did not observe the airplane being refueled.

At 1020 PDT, the flight departed VCB for OVE on an IFR flight plan with 10 people (9 passengers and the pilot on board); the pilot's flight plan listed "people on board" as 5. The flight plan indicated a filed altitude of 6,000 feet, a true airspeed of 260 knots, 4 hours of fuel on board, and an ETE of 30 minutes. The en route flight time between VCB and OVE was 13 minutes.

The flight arrived at OVE at 1033 PDT where 4 passengers (2 adults and 2 children), boarded the airplane for its third leg to BZN. The airplane was now occupied with 14 people on board, which comprised the pilot and 13 passengers.

[2] FSII refers to a fuel system icing inhibitor.
[3] Refer to Attachment 1, Flight Planning and Flight Plans.

At 1210[4], the flight departed OVE for BZN on an IFR flight plan with 13 passengers and the pilot on board; the pilot's flight plan listed “people on board” as 9. The flight plan altitude was listed as FL250, a true airspeed of 260 knots, 3 hours and 30 minutes of fuel on board, and an ETE of 2 hours and 30 minutes.

About 1359, while en route from OVE to BZN, the pilot contacted the Salt Lake Air Route Traffic Control Center (SLC ARTCC) and advised the controller that he was at FL250. At 1402, the pilot initiated a left turn from his assigned route of flight without air traffic control clearance. At 1403, the pilot made a request to air traffic control to change his destination to Butte, Montana (BTM). The controller cleared the airplane to BTM via direct and to maintain flight level 250. The pilot acknowledged the controller's clearance. About 1404, the pilot requested a lower altitude. The controller issued the pilot a descent clearance, with discretion to 14,000 feet and the local altimeter setting; the pilot acknowledged the clearance. At 1405, the pilot again made a request to the controller to change his destination to BTM. The controller responded to the pilot, advising him that he was previously issued the clearance to BTM and to maintain flight level 250. The pilot acknowledged the controller's transmission. The controller instructed the pilot at 1406 to "Advise receipt of BTM WX & NOTAMS." The pilot replied, “eight Charlie Mike, ‘wilco.’ ”[5] About 1422, the controller issued the pilot a descent clearance to 13,000 feet, advised him that the airport was at his twelve o’clock position, 13 miles, and to report the airport in sight for the visual approach. The pilot acknowledged the controller’s transmission. At 1424, the pilot requested a lower altitude and the controller issued a descent clearance to 12,200 feet. The pilot acknowledged the controller's clearance and at 1427:28 the controller advised the pilot that the airport was at 12 o'clock, 12 miles, and asked the pilot if he would be able to get to the field. The pilot responded that he had "…one more cloud to get around." The pilot reported about 1428 that the airport (BTM) was in sight and cancelled his IFR clearance. The controller acknowledged the pilot's transmission, instructed him to squawk VFR, and advised the pilot of no observed traffic between him and the airport. The pilot did not acknowledge the controller's transmission. There were no further communications between air traffic control and the pilot.

The airplane wreckage was located that afternoon in a cemetery adjacent to the BTM airport, about 2,100 feet west of Runway 33. An initial onsite examination of the wreckage revealed that the airplane had sustained severe fragmentation and deformation as a result of high-energy impact forces, as well as significant thermal damage; fire damage to the right side of the airplane was less severe than to its left side. The examination also revealed that the aileron and rudder trim actuator jack screw measured positions correlated to nearly full right aileron trim and full nose left rudder trim deflections.

A Safety Board investigator reported that several witnesses observed the airplane approaching runway 33, but it appeared at a higher altitude than most airplanes

[4] Based on Air Traffic Control tapes and transcripts.
[5] “Wilco” is short for “will comply.”

they had seen landing at the airport. Witnesses also observed the airplane fly northwest away from the runway and enter a sharp left turn. One witness observed the airplane come out of a cloud layer several miles southwest of the airport at a higher than usual altitude, then appeared to proceed directly toward the end of the runway but appeared too high to complete the landing. Most witnesses reported observing the airplane enter into a steep left bank turn, and then the nose of the airplane pitched down suddenly[6].

Recoverable data from the airplane's Central Warning and Advisory System (CAWS)[7] was successfully downloaded under the supervision of the German Federal Bureau of Aircraft Accident Investigation (BFU).

The CAWS flight log data revealed that on the first flight of the day, Flight Log 1557, REI to VCB, that both of the airplane's fuel boost pumps started cycling on and off after about 1 hour and 30 minutes into the flight at 22,000 feet. About 15 minutes later the flight log data indicated that the left hand (LH) fuel boost pump was activated permanently, and 9 seconds later the right hand (RH) fuel boost pump was deactivated.

On the second fight of the day from VCB to OVE, CAWS flight log 1558 data was unremarkable. Recorded data entries were only for autopilot trim and autopilot disengagement.

On the third flight of the day from OVE to BZN, the CAWS flight log 1559 data revealed that the RH fuel boost pump activated after about 22 minutes and 4 seconds, for 3 minutes and 45 seconds, which is consistent with normal fuel balancing. As the flight progressed both fuel boost pumps began cycling at 1 hour 13 minutes and 32 seconds into the flight. From 1 hour 17 minutes and 59 seconds until 1 hour 21 minutes and 5 seconds, the RH fuel boost pump was off. From then until impact it was either cycling or permanently on. At 2 hours 17 minutes and 5 seconds into the flight, the R FUEL LOW caution light came on, which indicated that only 133 lbs (approximately 20 gallons) of fuel remained in the RH fuel tank. During the last seconds of the flight the "PUSHER CAUTION" light came on 3 times without the pusher system having been activated.

Of interest during the investigation was CAWS flight log 1235 data, which occurred on October 16th, 2007, and which was very similar to what had occurred on the accident flight. It was noted that both fuel boost pumps were initially cycling, followed by a permanent activation of the LH fuel boost pump, with the RH fuel boost pump continuing to cycle. The RH fuel boost pump subsequently switched off, while the LH fuel boost pump remained on.

F. INJURIES TO PERSONS

Injuries	Crew	Passengers	Total

[6] Refer to the Witness Group Chairman's report.
[7] Refer to Attachment 2, Central Warning and Advisory System (CAWS) Log Entries.

Fatal	1	13	14
Serious	0	0	0
Minor/None	0	0	0
Total	**1**	**13**	**14**

G. PILOT INFORMATION

The pilot, age 65, held an airline transport pilot certificate with ratings for airplane multi-engine land and commercial privileges for airplane single-engine land, with type ratings for L-300 and T-33 airplanes[8]. The pilot's most recent second-class medical certificate was issued on April 4, 2008. The medical certificate had a limitation that the holder must possess corrective glasses for near vision.

A review of company records revealed that the pilot had accrued 8,840 hours of flight experience through February, 2009, with 1,759.5 hours in make and model. The pilot's personal logbooks were not obtained during the course of the investigation.

A review of FAA records found no prior accident, incident or enforcement actions.

Flight time[9]

Table 1 Pilot Flight Time

Total time	8,840
Single-engine time	2,043
Multi-engine time	6,797
Instructor time (USAF)	418

Flight time - make and model[10]

Table 2 Pilot Flight Time Make and Model

Total Pilatus time	**1,759.5**
Total Pilatus time Eagle Cap Leasing	**1,171**
Last 90 days	35.1
Last 60 days	26.2
Last 30 days	10.2

Airman Certificates and Date of Original Issue[11]

[8] L-300 refers to the United States Air Force Lockheed C-141 Starlifter. T-33 refers to the United States Air Force Lockheed Shooting Star.
[9] Pilot flight times determined from company records and pilot's "Summary of Flight Hours" data sheet.
[10] This was determined from the pilot's company records.

Table 3 Airman Certificate Information

AIRMAN CERTIFICATE	ORIGINAL ISSUE DATE
Commercial pilot certificate, single-engine land, center thrust limitation, instrument airplane, Lockheed T-33, L-300	October 26, 1966 based on military competency
Airline transport pilot certificate	August 14, 1969
Center trust limitation removed	August 14, 1969

Summary of pilot's flying history[12]

Table 4 Summary of Pilot's Flying History

1965 – 1972	United States Air Force pilot (DHC-4, C-141)
1972 – 1973	Trans International Airlines (airline pilot – DC8)
1973 – 1974	Southern Airways (airline pilot – equipment unknown)
1974 – 1987	No record of pilot employment
1988 – 1989	Resort Commuter Airlines (airline pilot – equipment unknown)
1989 – 1999	No record of pilot employment
1999 – 2002	Native American Air Ambulance (PC-12 air ambulance pilot)
2002 – 2009	Contract pilot for Eagle Cap Leasing (PC-12 equipment)

Pilot's 72-Hour History

There was little information available regarding the pilot's non-work activities in the 72 hours prior to the accident.

On Wednesday, March 18, 2009, the pilot flew the accident airplane from the Redlands Municipal Airport (REI) to Cabo San Lucas, Mexico. Subsequent to the flight's arrival and securing of the airplane, the pilot checked into the Solmar Beach Resort Hotel in Cabo San Lucas at 3:38 pm local time. His activities from the time he checked into the hotel until the morning of March 21, 2009, when he checked out of the hotel are unknown. The pilot's checkout time is unknown.

On Saturday, March 21, 2009, the pilot made the return trip from Cabo San Lucas to REI, which included an intermediate stop at Brown Field, San Diego, California, in order to clear United States customs. After arriving at REI and having the airplane refueled, the pilot reconfigured the airplane by adding additional seats for the next day's flight to Bozeman, Montana. Except for filing 3 flights plans during the evening of March 21, 2009, there was no information relative to the pilot's activities from the time he left REI after readying the airplane for the next days' flights, until he departed REI on the morning of March 22, 2009, for Vacaville, California.

[11] This information was provided by the Federal Aviation Administration.
[12] This information was obtained from pilot's applications for airman medical certificate.

H. Pilot Training

1.0 Native American Air Ambulance PC-12 training

According to the previous Director of Operations (DO) for Native American Air Ambulance, the pilot was employed with the company from 1999 to 2002. The DO stated that all PC-12 pilot training was done in house, totally in the airplane, and that no flight simulators were used. The DO further stated that [the pilot] never had a problem with any of the training or the airports they flew in to. When asked about the company's policy of using Prist[13], the DO revealed that they did not use Prist, as the temperatures they flew in were warm enough to preclude its use.

No formal pilot training records were obtained for the accident pilot from Native American Air Ambulance during the investigation. It was learned that Native American Air Ambulance had merged operations with Omniflight Helicopters in November of 2004, and that any previous flight training records had been purged by Omiflight.

2.0 Eagle Cap Leasing PC-12 Training

According to company personnel at Eagle Cap Leasing, the accident pilot was employed on a contract basis, and as such was responsible for his yearly recurrent training. However, Eagle Cap Leasing did allow the pilot to use the airplane for his training at no cost to himself.

From 2003 until 2009, the pilot successfully completed the PC-12 Ground and Flight Refresher Course conducted by Aviation Training Management (ATM) of Vero Beach, Florida. The pilot's training records revealed the following:

Table 5 Pilots' Training History

DATE(S) OF TRAINING	COURSE COMPLETED	COMPANY
9/27 to 9/28 2003	PC-12 refresher	Aviation Training Management
11/4 to 11/5 2004	PC-12 refresher	Aviation Training Management
11/29 to 11/30 2005	PC-12 refresher	Aviation Training Management
12/4 to 12/5 2006	PC-12 refresher	Aviation Training Management
12/10 to 12/11 2007	PC-12 refresher	Aviation Training Management
1/8 to 1/9 2009	PC-12 refresher	Aviation Training Management

Statement of Aviation Training Management (ATM) instructor pilot

The instructor pilot reported that the last training session he completed with the accident pilot took place on January 9, 2009, at which time he conducted refresher flight

[13] Prist is a fuel system icing inhibitor.

training for him under contract with Aviation Training Management, LLC (ATM). The instructor stated that this was his sixth training session with the pilot, the first being started on September 27, 2003. The instructor reported that he and the pilot spent a lot of time discussing slow flight, stall, and icing procedures in the PC-12, because the NTSB reports had showed an increase in these types of accidents in similar aircraft, and that a lot of emphasis was being placed on flight into known icing conditions as a result of the Buffalo accident[14]. The instructor stated the ground training included a review of the emergency procedures for both the airplane and the autopilot system. He revealed that the pilot always came to class very well prepared with the airplane's maintenance and operations manuals, personal developed notes, and individual questions relative to the maintenance and operation of the airplane. The instructor reported that during the most recent training session the pilot showed a very high level of competency in the airplane and superb professional judgment. The instructor added that during the post flight briefing he queried the pilot as to whether or not he had experienced any undue pressure to get the job done, regardless of weather or mechanical conditions with the airplane. The instructor said the pilot was very "emphatic" that none of the airplane's owners tried to override or coerce him into doing anything that might have been detrimental to the safety of the airplane.

I. Pilot's PC-12 Employment History

1.0 Native American Air Ambulance (1999 – 2002)

Prior to the pilot's employment at Eagle Cap Leasing, he was employed by Native American Air Ambulance of Mesa, Arizona. In an interview with the previous Director of Operations (DO) who was involved in the company's hiring process, the accident pilot was hired "sometime in 1999" for the company's Winslow, Arizona crew base. The DO remembered the pilot as being conscientious, and while not their best pilot, was very competent, very safety conscious, "…and would not do anything illegal while flying. He was very professional." The DO revealed that he was surprised to hear that [the pilot] had overloaded the airplane, as this would be completely out of character for him. The DO stated that all company flight training was done in the airplane, and that the company did not use any simulators for training. The DO further stated that some of the [air]strips they went in to were short, one-way strips, and that the accident pilot never had a problem with any of them. The DO added that he (the DO) had left the company due to "management placing more emphasis on the dollar than they were on safety." The DO further added that the company chief pilot and the accident pilot left the company subsequent to his departure, but could not remember if their departures were voluntary or not. The DO further added that the accident pilot was quiet, professional, and well respected within the company.

[14] Refers to NTSB accident DCA09MA027, Clarence Center, New York, February 12, 2009.

In an interview with the previous Chief Pilot (CP) for Native American Air Ambulance, the CP reported that he was involved in the hiring of the accident pilot, and would rate him with "high marks" relative to his piloting ability, overall professionalism, and general demeanor. The CP added that "…[the pilot] was extremely knowledgeable about the airplane, and that he was the 'go to guy' when it came to something about the airplane." The CP stated that after the departure of the DO due to management changes, such as reducing the Initial Operating Experience (IOE) for new pilots from 3 days to a couple of hours, he resigned his chief pilot's position and went back to flying the line. The CP further stated that shortly after he had resigned his position, the accident pilot and another pilot were called in by management and told they were terminated. The CP concluded by saying that he had nothing but praise for the accident pilot.

2.0 Eagle Cap Leasing (2002 – 2009)

The pilot was hired by Eagle Cap Leasing in November, 2009, and was the sole pilot for the company. The pilot, who operated as a private contractor, was reimbursed for his expenses while engaged in flying activities, and took vacations during the airplane's inactivity. The pilot was on call 24 hours, seven days a week, and according to Eagle Cap Leasing personnel was on a personal monthly retainer. As a contract employee, the pilot paid for his annual recurrent pilot training, but was afforded the use of the airplane by Eagle Cap Leasing.

An examination of the company's flight logs revealed that the pilot had made one previous flight to Bozeman, Montana in the accident airplane, which originated from the Oroville Municipal Airport (OVE), Oroville, California on March 7, 2008. The airplane departed Bozeman for Napa, California, on March 11, 2008.

J. Medical and Pathological Information

An autopsy was performed on the pilot on March 24, 2009, at the Montana Division of Forensic Science, Missoula, Montana. The coroner's report concluded that the pilot died of "blunt force injuries."

Forensic toxicology was performed on specimens from the pilot by the FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma. The toxicology report stated that no ethanol was detected in the liver, and no drugs were detected in the liver.

K. Interview Summaries

The Operations Group Chairman, assisted by an NTSB Human Performance Investigator, conducted telephone interviews with the 3 co-owners of the accident airplane, one previous co-owner, 2 acquaintances of a current co-owner, and the pilot's airman medical examiner.

1.0 Current airplane co-owners

1.0.1 Current airplane co-owner #1

The first co-owner, who organized the accident flight, stated that he had helped hire the pilot about 6 years earlier, and that a Pilatus dealer had recommended him. The co-owner reported that [the pilot] was a natural and had previous time in the Pilatus. He further reported that the pilot was an independent contractor on a monthly retainer, was reimbursed by the company for his expenses, and that he paid for his own recurrent training, but that Eagle Cap Leasing let him use the airplane. The co-owner stated that he had flown with the pilot for more than 5 years, and that he spent about 20 percent of his time sitting in the cockpit's right seat on flights with the pilot. He continued by saying that the pilot was professional, friendly, that everyone felt comfortable with him, and that he was a private person and did not socialize. The co-owner revealed that there was only one instance where there was an issue with the pilot, which was about 4 years ago when he [the pilot] caused a "hot start"[15] at the Orange County airport, but "…[the pilot] had the integrity to tell Eagle Cap Leasing about it." The co-owner further stated that the pilot was in good medical condition and looked physically fit. He said that he never observed the pilot drink alcohol or smoke tobacco, and he was surprised to learn that he was 65. The co-owner also recalled a steep approach into a dirt strip in Mexico when he was sitting in the right front cockpit seat. "The descent rate on approach was nothing abnormal, but to passengers it might appear that he dove right in."

When asked about the accident flight which he had arranged, the co-owner stated that the trip was within weight and balance limits, "…but there were just not enough seatbelts." The co-owner further stated that he did not consider weight and balance an issue for the accident flight and did not really discuss it, and they "were not pushing the envelope." They had carried the same number of passengers and children (the pilot, plus 6 adults and 7 children) on previous trips. They had put 10 adults in the airplane. The co-owner related that as a family they had done this before, and so they knew the children, weights of the passengers, and the gross weight the plane would hold. The co-owner added, "After Redlands [the pilot] knew there were 9 passengers at Vacaville and that there were 4 passengers at Oroville." The co-owner stated that one family had no ski equipment and the other family had some equipment. The co-owner explained that the adults could either hold the children on their laps or place them on the floor to sleep.

[15] A condition which occurs when the temperature exiting the turbine section of a gas turbine engine exceeds the expected exhaust gas temperature for the engine during start.

1.0.2 Current airplane co-owner #2

A second co-owner of the airplane was interviewed and stated that he had flown with the pilot about 20 or 30 times, and characterized him as “straight forward and all business.” The co-owner stated that the pilot always descended somewhat steeply, was very smooth, and that he frequently flew on instruments. The co-owner added that the pilot was not an aggressive pilot, that he was normally quiet, and that he kept to himself. He stated that [the pilot] was the sole pilot for the airplane, was on call 24/7, and was a contract pilot rather than an employee of Eagle Cap Leasing.

1.0.3 Current airplane co-owner #3

The third co-owner of the airplane stated that he flew in the right front cockpit seat with the accident pilot about 10 to 20 percent of the time. He stated that he never observed him being reckless in the airplane, thought he performed well in bad weather situations, and never cancelled a flight. The co-owner added that the only situation he could remember where the partners had an issue with the pilot was when the pilot had a “hot start” with the engine. He further added that [they] had to “prod” him to get the true story about how the “hot start” happened. The co-owner revealed that during all the time he flew with the accident pilot “…there were never more passengers on the airplane than there were seats.” When asked about the pilot’s use of the airplane’s checklist the co-owner stated, “…[the pilot] used it every time, but [I] never saw him do a weight and balance.” The co-owner commented that from a passenger’s standpoint he was very comfortable with the accident pilot, and then commented, “What a great pilot.” The co-owner, who is not a pilot, said that the pilot was in excellent health, was a very private individual, and characterized him as one who did not start conversations.....”you had to initiate them.” When asked about how he might rate the accident pilot’s professionalism, the co-owner said that he would rate him “high” in that area.

2.0 Previous airplane co-owner

A previous co-owner of the airplane, who was not a pilot, reported in a telephone interview that he had flown about “a dozen times” with the accident pilot sitting in the cockpit seat next to hm. He stated that the pilot as “very professional and very sharp,” and that he could land the airplane as “smooth as glass.” He revealed that on one flight in 2008, the pilot broke out in a sweat that lasted for about a minute or less. He reported that the pilot didn’t look uncomfortable, there was no evidence of chest pain and nothing unusual about the pilot’s speech pattern. The co-owner added that the pilot looked fit, was a little skinny, and ate well. He added that the pilot ate snacks on the airplane and that he never smoked or drank. He added that the pilot’s landings were always straight in, that the steepness of his descents seemed normal, and that the pilot never landed

with the flaps up. He said the pilot would use the checklist and that he felt very secure and confident flying with him.

3.0 Acquaintance #1 of current co-owner

An acquaintance of one of the airplane's co-owners, who is a certified pilot, reported in a telephone interview that he first met the pilot when Eagle Cap Leasing bought the airplane. He reported that during the previous October (2008) he and the pilot were assisting his co-owner friend and another friend of the co-owner who were participating in a vintage car road race in Mexico, ferrying the airplane from place to place along the race route. The acquaintance reported that during the 7-day event he and the pilot would share a room along the way. He stated that the pilot was a very private person with good habits, never smoked but did drink coffee, and that he did not observe him get sick while in Mexico. He said that while the pilot didn't exercise, he did walk a little, and he did not take medications. When questioned about flying with the pilot, he said he had flown about 10 flights with him and often sat in the cockpit. He revealed that during one approach to an airport in Mexico, he observed the pilot perform a steep descent while on an extended downwind leg, due to air traffic control holding them up too high. He said the pilot pulled the power [off], [lowered] the gear and performed a radical descent, making a 360-degree turn to land, and at a descent rate of 2,500 to 3,000 feet per minute. He also said that the pilot's normal descent was "…fairly steep and with power. It was not shallow, with a greater than average descent rate." He said that overall "…the pilot was very conservative, other than that one descent."

4.0 Acquaintance #2 of current co-owner

Another acquaintance of one of the current co-owners, a physician (psychiatrist), and who is not a pilot, revealed in a telephone interview that he had flown in the accident airplane as a passenger 5 to 10 times since his friend had purchased it. He related that on the most recent flight to Mexico and back, [the pilot] seemed calm and focused as normal. He added that the pilot always loaded the airplane, that he was friendly and relaxed, that he was very much in charge and his landings were normal. He further added that he interacted socially with the pilot a lot during the trip to Mexico, that the pilot ate normally and was very friendly during the trip. The doctor reported that he did not know if the pilot exercised, but noted that he seemed very fit and looked younger than his late 50s. He stated that the pilot was always slender, moved in an easy way, with no limp or shortness of breath. He added that he never knew the pilot to use the airplane's toilet, even though the flights lasted as long as two, or even three hours. The doctor described the pilot as sharp and pretty compulsive. He felt the pilot seemed levelheaded with no strong emotion, and that he had never seen the pilot angry. The doctor further added that the pilot had positive expectations in life, was a bit stoic, and might not want to alarm anyone in the event there was a "flying problem." When asked

about the flight he was on when the pilot experienced a sweating event, the doctor said that he was sitting in the back of the airplane and did not observe the event.

5.0 Pilot's Airman Medical Examiner

The pilot's airman medical examiner (AME) reported that he had conducted the pilot's medical examination from 1995 to the most recent one, which occurred on April 14, 2008. The AME stated that he remembered the pilot to be in very good health, and that although he had experienced a cardiac catheterization as a teenager, his EKG was normal and he had no heart murmurs. He added that the pilot had some scars from a hernia operation, wore corrective lenses, did not use prescription drugs, and did not use alcohol. He also added that the pilot did not have a history of sweating profusely, and that to his knowledge the pilot did not have a personal physician.

L. Company Information

According to documentation provided by company personnel[16], ARTICLES OF INCORPORATION OF EAGLE CAP LEASING, INC., were filed on March 5, 1992, with the county of Wallowa, state of Oregon. Under the ARTICLE II of the document, the purpose for which the corporation was organized was to:

(1) conduct an automobile and aircraft leasing business.

(2) to engage in any lawful activity for which corporations may be organized under the Oregon Business Corporation Act.

Company personnel revealed that the airplane had been based at the Redlands Municipal Airport, Redlands, California, for about a month prior to the accident. Previously, the airplane was based at the San Bernardino International Airport (SBD), San Bernardino, California, where the company shared hangar space with the San Bernardino County Sheriff's Department.

M. Airplane Information

The accident airplane was registered to Eagle Cap Leasing, of Enterprise, Oregon. The three individuals who co-owned the airplane used it for a combination of personal and business use, and the accident/contract pilot was the sole pilot employed by the co-owners. The flight was being operated in accordance with 14 Code of Federal

[16] Refer to Attachment 3, Eagle Cap Leasing Document of Incorporation.

Regulations Part 91 as a personal cross- country flight at the time of the accident. The maximum number of occupants for the airplane is 9 passengers plus (pilot)s.[17]

1.0 Limitations

According to the Pilatus PC-12 Pilot's Operating Handbook, Section 2, Limitations, the following limitations apply to the PC-12 series airplane:

1.0.1 ANTI-ICING ADDITIVE

Anti-icing additive must be used for all flight operations in ambient temperatures below 0° C.

Use anti-icing additive conforming to MIL-DTL-27686 or MIL-DTL-85470.

Anti-icing additives should be in compliance to Pratt & Whitney Service Bulletin 14004.

Additive concentration must be between a minimum of 0.06 % and a maximum of 0.15 % by volume.

CAUTION

THE CORRECT MIX OF ANTI-ICING ADDITIVE WITH THE FUEL IS IMPORTANT. CONCENTRATIONS OF MORE THAN THE MAXIMUM (0.15% BY VOLUME) WILL CAUSE DAMAGE TO THE PROTECTIVE PRIMER AND SEALANTS OF THE FUEL TANKS. DAMAGE WILL OCCUR IN THE FUEL SYSTEM AND ENGINE COMPONENTS.

1.0.2 Weight Limits

Maximum Ramp Weight 9965 lb (4520 kg)

Maximum Takeoff Weight 9921 lb (4500 kg)

Maximum Landing Weight 9921 lb (4500 kg)

Maximum Zero Fuel Weight 9039 lb (4100 kg)

Maximum Baggage Weight 400 lb (180 kg)

Maximum Floor Loading -

On Seat Rails 205 lb/ft2 (1000 kg/m2)

[17] Refer to Attachment 4, PC-12 Limitations.

On Cabin Floor 125 lb/ft2 (600 kg/m2)

1.0.3 Fuel Limitations

Total Fuel Capacity	406.8 US gal, 2,736.5 lb (1,540 liters, 1,241.3 kg)
Total Usable Fuel	402 US gal, 2,703.6 lb (1,521.5 liters, 1,226.4 kg)
Total Unusable Fuel	4.8 US gal, 32.9 lb (18.5 liters, 14.9 kg)
Maximum Fuel Imbalance	26.4 US gal, 178 lb (100 liters, 80.6 kg) (Maximum 3 LCD segments on indicator)

NOTE
Usable fuel can be safely used during all Normal Category airplane maneuvers.

1.0.4 Maximum Passenger Seating Limits

Maximum number of occupants is 9 passengers plus pilot(s).

N. Weight and Balance

During the investigation the Operations Group found no evidence that the pilot had completed weight and balance computations for any of the three flights on the day of the accident.

Computed weight and balance computations by the Operations Group[18] revealed the following:

Table 6 Aircraft Weight and Balance

FLIGHT	Gross Takeoff Weight Condition[19]	Center of Gravity Condition
REI to VCB	-725 lbs	Within limits
VCB to OVE	+432 lbs	Within limits
OVE to BZN	+572 lbs	Within limits
Divert to BTM	-384 lbs	Within limits

[18] Refer to Attachment 6, for weight and balance computations.
[19] Positive numbers indicate a weight in excess of the airplane's gross takeoff weight, while negative numbers indicate a weight less than the airplane's gross takeoff weight.

O. Central Advisory and Warning System (CAWS) Flight Log Entries

1.0 CAWS Log Entries

The accident airplane's Caution Advisory Warning System (CAWS) logged aircraft warning, caution, and advisory messages that were displayed to the pilot. Data downloaded from the accident airplane's CAWS contained records from 480 flights, all taking place over the preceding 2 years. Of particular interest were the final 3 flights (logged as flight numbers 1557, 1558, and 1559). During flight 1557, the fuel boost pumps began operating in a cyclical manner (on for 10 seconds, off for 1 second) about 1 hour (h) 30 minutes (m) after the beginning of the flight, until the termination of the flight. No low fuel pressure cautions were logged for the flight. During the subsequent flight, 1558, no fuel boost pump activation advisories were logged, nor were any low fuel pressure cautions. During the accident flight, 1559, the fuel boost pumps operated at various times both cyclically and continuously from 1h 13m until the accident occurred at 2h 23m. Additionally, a right fuel quantity low caution was logged about 6 minutes prior to the accident.

Additional information and an interpretation of the data downloaded from the CAWS can be found in the Airworthiness Group Chairman's Factual Report - Attachment 4: Non-Volatile Memory Data Study, which resides in the public docket for this case.

P. Emergency Procedures (Fuel System)

According to the emergency procedures section in the Pilatus PC-12 Pilot's Operating Handbook[20], in the event of a Low Fuel Pressure, Fuel Pump Failure, or Auto Fuel Balance Failure, the pilot is to carry out the applicable emergency procedures checklist:

1.0 LOW FUEL PRESSURE

Indication: FUEL PRESS CAWS CAUTION

1.	Power	reduce to minimum to sustain flight
2.	Fuel pumps	ON

[20] Refer to Attachment 5, PC-12 Fuel System Emergency Procedures.

NOTE

Monitor the fuel state if the LH and RH FUEL PUMPS are set continuously on. If necessary, set the FUEL PUMPS on the emptier side to AUTO.

If **FUEL PRESS** caption remains ON:

3. Aircraft Land as soon as possible
Retain glide capability to landing area if possible.

NOTE

Fuel low pressure will normally cause the fuel pumps to come on automatically.

In this case the Indication are both FUEL PUMPS running continuously, cycling OFF/ON every 10-15 secs.

Table 7 Cockpit Indication Lights

L FUEL PUMP	R FUEL PUMP

4. Fuel Pumps — ON

5. Aircraft — Descent to warmer air:
(A possible cause is the fuel filter blocked with **ice crystals**).

2.0 FUEL PUMP FAILURE

Indication: **No FUEL PUMP advisory when fuel pump(s) ON.**

1. Fuel pump(s) — AUTO

2. FUEL PUMP LH circuit breaker (Battery busbar) — Reset

3. FUEL PUMP RH circuit breaker (Generator 1 busbar) — Reset

4. Fuel pump(s) — ON

5. L and R FUEL PUMP advisory	Check
6. Fuel pump(s)	AUTO

If not successful monitor fuel state. For fuel imbalance refer to 3.17.3.

3.0 AUTO FUEL BALANCING FAILURE

Indication: **EIS analogue fuel gauges indicate 3 segments or more difference between left and right without automatic activation. Possibly aileron deflection required for wings level flight, especially at low speed**

1. Fuel Pump (fuller side)	ON
2. Fuel state	Monitor. If difference cannot be balanced, land as soon as practical
3. When fuel balanced	Fuel Pump AUTO

Q. PC-12 Systems[21]

1.0 Fuel System

Fuel is contained in two integral wing tanks and is supplied to the engine in excess of that required for all ground and flight operations. Each wing tank contains drain valves. The transfer and delivery of fuel is achieved using a motive flow jet pump system and two engine driven pumps (low pressure pump and the FCU high pressure pump). Electric fuel pumps provide pressure only during the engine start sequence and as a standby function when the normal system cannot maintain adequate pressure. Fuel symmetry is maintained automatically by a Fuel Balancing Device.

Fuel quantity and fuel flow rate are displayed on the Engine Instrument System (EIS). Electric pump operation, low fuel pressure, and low fuel quantity conditions will be indicated on the Central Advisory and Warning System (CAWS) annunciator panel. In an emergency, fuel flow to the engine can be stopped by pulling the FUEL EMERG SHUT OFF handle, located at the aft end of the center console.

The distribution system transfers fuel from left and right wing tanks and delivers fuel from the collector tanks to the engine fuel control unit. Within the wing tank are electric boost pumps, transfer ejector pumps, and delivery ejector pumps. From the

[21] Refer to Attachment 7, PC-12 Systems

wing tank the fuel flows through a fuel filter, maintenance and firewall shutoff valves, an air separator, a low pressure engine driven pump, an oil/fuel heat exchanger, and a high pressure engine driven pump to the fuel control unit.

During normal operation with the engine running, fuel is transferred from the wings to the engine by a motive flow system. Fuel under pressure from the low pressure engine driven pump is returned to the wings to provide motive flow through the transfer ejector pump and the delivery ejector pump. The transfer ejector pump transfers fuel from the wing tank to the collector tank. The left and right wing delivery ejector pumps transfer fuel to a common manifold. Fuel then flows through the maintenance shutoff valve and the fuel filter. The fuel filter incorporates a bypass valve in case the filter becomes blocked, and a spring loaded drain valve. Fuel is then directed into the air separator. The air separator passes air in the fuel system to the vent return line and incorporates the fuel low pressure switch. The fuel then passes through the firewall shutoff valve to the low pressure engine driven fuel pump. The firewall shutoff valve is mechanically connected to the FUEL EMERG SHUT-OFF handle in the cockpit. The low pressure engine driven fuel pump includes a pressure relief valve that maintains a fuel pump outlet pressure of 43.5 psi (3 bar). A bypass valve allows for fuel flow around the engine driven fuel pump in the event of a fuel pump failure.

An electric boost pump, located within each collector tank, provides fuel pressure during engine start and is used to maintain system pressure when required. Each boost pump LH and RH is controlled by a two position (ON or AUTO) switch located on the FUEL PUMPS section of the overhead panel. When the switch is pressed the system toggles between AUTO and ON. An arrow symbol in the switch is then annunciated to show which selection is made. When set to ON, the boost pump will operate continuously and a green LFUEL PUMP or RFUEL PUMP caption on the CAWS is illuminated. This indicates that the applicable fuel boost pumps are operating. With the switch set to AUTO (the normal operating setting), the boost pump will operate automatically whenever fuel system pressure falls below 2 psi (0.14 bar). The boost pump will shut off automatically 10 seconds after the fuel system pressure reaches 3.5 psi (0.24 bar). A boost pump is capable of supplying the engine in case the low pressure pump fails. Fuel supply greater than engine demand is returned from the fuel control unit to the vent bays.

Fuel symmetry is automatically maintained by a Fuel Balancing Device when the Fuel Pump switches are set to AUTO. Left and right fuel quantities are monitored to detect fuel asymmetry exceeding 5% of each wing total fuel capacity (approximately 10.5 US gallons, 2 LCD segments) and will activate the fuel boost pump in the tank with the higher quantity. Fuel booster pump activation is delayed one minute to avoid pump cycling during flight in turbulence. The fuel boost pump will continue to operate until the left and right fuel levels are sensed to be equal. Automatic activation of the fuel boost pumps will only occur when the condition lever is out of the CUT-OFF position. To cater for refueling errors of up to 40 gallons (150 liters), up to 6 LCD segments will be automatically handled by the automatic fuel balance system. In the event of a system failure, the fuel load symmetry can be maintained by manually selecting the Fuel Pump

switch to ON for the fuel tank with the higher quantity until a balanced fuel condition is restored and then turning OFF the fuel boost pump. During normal operation the pilot should monitor the fuel quantity gauges to verify that the Fuel Balancing Device is operating properly. Normal system operation is indicated by the left and right fuel quantity gauges remaining within 2 LCD segments of each other. (When a difference of 3 LCD segments is observed, the fuel boost pump for the tank with the higher quantity should be turned ON until the quantities are even. Monitor the fuel quantity gauges for fuel symmetry for the remainder of the flight.)

Normal system operation is indicated by the left and right fuel quantity gauges (see Figures 1 and 2 below) remaining within 2 LCD segments of each other. When a difference of 3 LCD segments is observed, the fuel boost pump for the tank with the higher quantity should be turned ON until the quantities are even. Monitor the fuel quantity gauges for fuel symmetry for the remainder of the flight.

Figure 1 Picture of Fuel Indicator

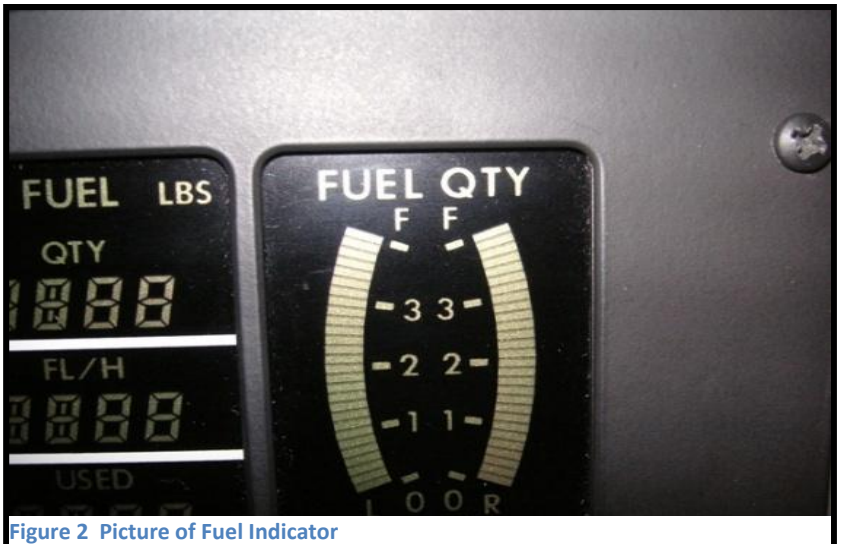

Figure 2 Picture of Fuel Indicator

2.0 Flight Controls

2.0.1 Aileron

The ailerons are connected to the cockpit control wheels by control cables in the fuselage and push-pull rods in the wings. Each aileron is attached to the wing at two hinge points. Each aileron is equipped with a minimum of two static wicks to dissipate static charges to the atmosphere.

The left aileron incorporates a trim tab which is electrically operated from the cockpit.

2.0.2 Elevator

The elevator is a two piece unit attached to the horizontal stabilizer at a total of five hinge points and is connected to the cockpit control wheel by carbon steel control cables. A down spring is installed in the control circuit to improve longitudinal stability. The elevator is equipped with static wicks to dissipate static charges to the atmosphere. Pitch trim is provided by positioning the horizontal stabilizer.

2.0.3 Rudder

The rudder is a single piece unit attached to the vertical stabilizer at two hinge points and is connected to the cockpit rudder pedals by carbon steel control cables. Both pilot and copilot rudder pedals are adjustable by use of a crank located between each set of rudder pedals. Clockwise rotation of the crank moves the pedals aft. The rudder is equipped with static wicks to dissipate static charges to the atmosphere. The rudder incorporates a trim tab that is electrically operated from the cockpit.

3.0 Autopilot

The autopilot installed in the airplane was a Bendix/King KFC 325 Digital Automatic Flight Control System (AFCS), with a 3-axis control: pitch, roll and yaw. The unit has an automatic electric pitch trim system which provides pitch auto trim during autopilot operation. The auto trim system is designed to withstand any single in-flight malfunction. Trim faults are visually and aurally annunciated.

The component has an automatic rudder trim relief function which provides directional trim during yaw damper and autopilot operation. No aileron auto trim function is available. Vertical autopilot functions include Altitude Select and Vertical Speed modes. A lockout device prevents autopilot engagement until the system has been successfully preflight tested.

4.0 Stall Warning / Stick Pusher System

The airplane is equipped with a stick shaker-pusher system to improve aircraft handling in the low speed flight regime by preventing the airplane from inadvertently entering a stall condition. The stick shaker-pusher system contains two Angle-of-Attack (AOA) sensors, two computers, a single stick shaker, a single aural warning device and a single stick pusher. The two computers are connected in such a way that either computer can, independently, provide stall warning (stick shaker and aural warning) but both computers are required to actuate the stick pusher.

The left and right Stick Pusher Computers are each provided power from the Battery and Generator 1 bus. Each computer receives inputs from its respective Angle of Attack (AOA) vane and AIR/GND switch. Both computers receive inputs from the engine torque, flap position, and self test. From these various inputs, each computer independently determines the "Defined Angle of Attack" for stall warning (aural stall warning and stick shaker activation), stick pusher activation, and stick pusher disengagement following an actual push.

The vane attached to the AOA probe aligns itself with the relative airflow. As it moves, it positions a wiper unit in the probe. This resolver adjusts the electrical output to its respective pusher computer. As the airplane approaches the artificial stall (5 to 10 knots before pusher actuator), the stick shaker and the aural stall warning will activate when one of the AOA pusher computers senses the defined angle of attack for stall warning/stick shaker activation. If the stall warnings are ignored and the approach to stall is continued, the stick pusher will activate when both AOA pusher computers sense the defined angle of attack for stick pusher activation. The stick shaker and aural stall warning remain active during pusher operation. Pusher operation will be stopped when either AOA computer senses an angle of attack lower than the angle of attack required to active the pusher or when the airplane acceleration is less than 0.5 g.

R. Weather

A Safety Board meteorologist obtained weather information during the investigation from the National Weather Service, as well as from the National Climatic Data Center.[22]

At 1353, the Butte, Montana (BTM) Automated Weather Observing System (AWOS) reported wind 320 degrees at 10 knots, visibility 10 miles, few clouds at 4,400 feet, overcast clouds at 8,000, temperature 7° Celsius, dew point -3° Celsius, and an altimeter setting of 29.57 inches of Mercury.

At 1453, the BTM AWOS reported wind 300° at 8 knots, visibility 10 miles, broken clouds at 6,500 feet, temperature 7° Celsius, dew point -3° Celsius, and an altimeter setting of 29.57 inches of Mercury.

At 1356, the Bozeman, Montana (BZN) Automated Surface Observing System (ASOS), located about 57 nautical miles east of the accident site, reported wind 290 degrees at 7 knots, variable from 240 degrees to 320 degrees, visibility 10 miles, sky clear below 12,000 feet, temperature 14° Celsius, dew point -1° Celsius, and an altimeter setting of 29.54 inches of Mercury.

At 1456, the BZN ASOS reported wing 350° at 8 knots, visibility 10 miles, broken clouds at 5,000 feet, temperature 14° Celsius, dew point -1° Celsius, and an altimeter setting of 29.54 inches of Mercury.

At 1353, the Dillon (DLN), Montana ASOS, located 43 miles south of the accident site, reported wind 350° at 5 knots, visibility 10 miles, few clouds at 6,000 feet, temperature 8° Celsius, dew point -1° Celsius, and an altimeter setting of 29.53 inches of Mercury.

At 1453, the DLN ASOS reported wind 230° at 15 knots, visibility 10 miles, scattered clouds at 4,100 feet, overcast clouds at 5,000 feet, temperature 4° Celsius, dew point 1° Celsius, and an altimeter setting of 29.52 inches of Mercury.

At 1332, the Boise (BOI), Idaho ASOS, which was located about 42 miles north of the flight's en route position at the time of the report, indicated wind 300° at 5 knots, visibility 10 miles, scattered clouds at 2,800 feet, broken clouds at 3,300 feet, temperature 8° Celsius, dew point 2° Celsius, and an altimeter setting of 29.72 inches of Mercury.

At 1353, when the airplane's en route location was about 73 miles east of BOI and about 10 minutes prior to its diversion to BTM, the ASOS reported wind 310° at 5 knots, visibility 10 miles, few clouds at 3,000 feet, scattered clouds at 3,500 feet, temperature 8° Celsius, dew point 2° Celsius, and an altimeter setting of 29.72 inches of Mercury.

[22] Refer to the Meteorology Group Chairman's Factual Report.

Geostationary Operations Environmental Satellite number 11 (GOES-11) image at 1415 MDT depicted an extensive area of clouds over the route of flight with an enhanced area of mid- to high-level clouds over Idaho and southwestern Montana, which extended over the accident site.

The Area Forecast (FA) at the time of the accident was issued at 1345 and was valid until 0200 on March 23, 2009. The forecast for Idaho was for broken to overcast clouds at 8,000 feet msl with tops to 15,000 feet, with broken cirrus clouds above, with light rain and snow showers and isolated thunderstorms and light rain and snow, with cumulonimbus cloud tops to 28,000 feet. The forecast for southwestern Montana was for broken clouds at 9,000 feet msl layered to 25,000 feet, with light rain and snow showers.

S. Aircraft Fueling Records and Fuel Testing

During the course of the investigation fueling records[23] were obtained which revealed that the pilot had the airplane refueled on the day prior to the accident, March 21, 2009, at the Redlands Municipal Airport, Redlands, California. Records indicate that the airplane was fueled with 222 gallons of Jet-A fuel. The fuel vendor reported that the pilot did not request a fuel additive be added during the refueling process that day, nor had the pilot ever requested that a fuel additive be added during any of the previous refuelings by the vendor.

On March 22, 2009, the airplane was refueled upon its arrival at the Nut Tree Airport, Vacaville, California. Fuel records indicate that the 128.53 gallons of Jet-A fuel was added, that the pilot had used the self-serve fueling island, and that there was no indication that a fuel system icing inhibitor had been added. Nut Tree Airport personnel revealed the when using the self-serve fuel island, there are no provisions for injection of a fuel additive; the pilot must request the fueling truck for this service or inject the additive himself. Airport personnel stated that a search of the area following the accident revealed no empty or partially used fuel additive containers in the fueling area

Fuel samples obtained from the Nut Tree Airport self-serve fueling station were secured and sent to the Air Force Petroleum Agency (AFPET), Wright-Patterson Air Force Base, Ohio, for testing and analysis. The results are appended to this report.[24]

Fueling records indicated that from October, 2007 through January, 2009, N128CM was refueled 40 times by San Bernardino FBO Services, San Bernardino, California. The firm's fuel manager reported that the company has 2 fuel trucks, one designated as truck T-2, the second as truck T-3. During the time frame noted above, N128CM was fueled 33 times by fuel truck T-3 and 7 times by fuel truck T-2. The fueling manager further reported that truck T-2 was not premixed with the fuel additive Prist,

[23] Refer to Attachment 8, Fueling Records.
[24] Refer to Attachment 9, fuel testing documentation.

while truck T-3 was premixed with Prist. The fuel manager stated that truck T-3 would only be dispatched for fueling services if Prist were requested, while fuel truck T-2 would be dispatched in either instance, whether the fuel additive had been requested or not, since truck T-2 had the capability of injecting the fuel additive while fueling. The manager added that the fueling log for truck T-2 does not record whether Prist was injected during the refueling process.

T. Airport / Runway Operations

The Bert Mooney Airport (BTM), Butte, Montana, was served by runway 33/15[25], which was 9,001 feet long and 150 feet-wide, and intersecting runway 29/11, which was 5,100 feet long and 75 feet wide. Both runways were composed of asphalt and grooved. An Instrument Landing System (ILS)[26] and a Precision Approach Path Indicator (PAPI)[27] were installed on runway 15, and a Visual Approach Slope Indicator (VASI)[28] was installed on runway 33. The Airport Facility Directory cautioned pilots not to use the VASI beyond 1.5 miles due to high terrain.

MONTANA 65

BUTTE
BERT MOONEY (BTM) 3 SE UTC_7(_6DT) N45°57.29_ W112°29.85_ **GREAT FALLS**
5550 B S4 **FUEL** 100LL, JET A OX 1, 2, 3, 4 LRA Class I, ARFF Index A **H–1D, L–13C**
NOTAM FILE BTM **IAP**
RWY 15–33: H9001X150 (ASPH–GRVD) S–75, D–160, ST–175, DT–250 MIRL
RWY 15: REIL. PAPI(P4L)—GA 3.5° TCH 55_. Rgt tfc. 0.6% up.
RWY 33: VASI(V4L)—GA 3.0° TCH 78_. Tower.
RWY 11–29: H5100X75 (ASPH-GRVD) S–12.5 MIRL
RWY 11: REIL. PAPI(P2L)—GA 4.0° TCH 38_. Road.
RWY 29: REIL. PAPI(P2L)—GA 4.0° TCH 45_. Bldg.
RUNWAY DECLARED DISTANCE INFORMATION
RWY 11: TORA–5100 TODA–5100 ASDA–5100 LDA–5100
RWY 29: TORA–5100 TODA–5100 ASDA–5100 LDA–5100
AIRPORT REMARKS: Attended dawn–dusk. Deer invof arpt. Snow removal ops in progress during periods of snow. PPR for unscheduled air carrier ops with more than 30 passenger seats call arpt manager 406–494–3771. Twy D rstd to acft 12,500 lbs or less between Rwy 29 apch end and Rwy 15–33, and Twy D between Rwy 11 apch end and Twy F. Rwy 11–29 from Rwy end 29 to Rwy 15–33 and from Twy F to Rwy end 11 not avbl for air carrier acft over 12,500 lbs. Fee for all commercial acft and acft over 10,000 pounds. Landing fee. Rwy 11 PAPI straight–in only. Rwy 33 do not use VASI byd 1.5 miles due to high terrain. PAPI restricted to 2.1 NM from Rwy 29 thld due to high terrain. MIRL Rwy 15–33 preset low ints dusk–dawn, MIRL Rwy 11–29 avbl on req 0600Z‡ to dawn. ACTIVATE MIRL Rwy 15–33 and Rwy 11–29, PAPI Rwy 11 and Rwy 29, and REIL Rwy 11, Rwy 29, and Rwy 15—CTAF.

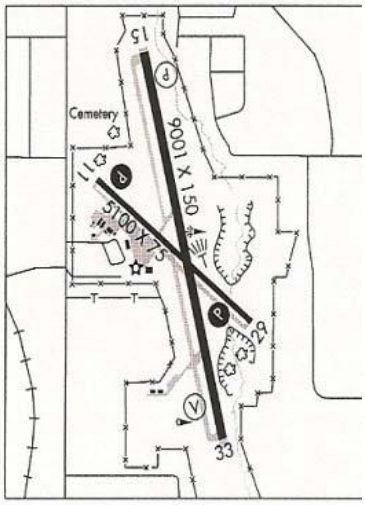

Figure 3 Airport Diagram

[25] Runway number designations are correlated to the compass alignment of the runway centerline referenced to magnetic north, and rounded to the nearest 10-degree increment. Runway 33/11 and 29/11 represent operations o the same runway pavement, only in opposite directions.
[26] Instrument Landing System (ILS) is a radio navigational system that provides runway alignment and glideslope information to pilots of aircraft equipped with ILS receivers and instrumentation.
[27] Precision Approach Path Indicator (PAPI) is a visual aid that provides runway glideslope guidance to a pilot to indicate whether the aircraft is above, on, or below the prescribed glideslope.
[28] Visual Approach Slope Indicator (VASI) is a visual aid that provides runway glideslope guidance to a pilot to indicate whether the aircraft is above, on, or below the prescribed glideslope.

WEATHER DATA SOURCES: ASOS 135.175 (406) 494–1870.
COMMUNICATIONS: CTAF/UNICOM 123.0
COPPERTOWN RCO 122.65 (GREAT FALLS RADIO)
BUTTE RCO 122.2 122.4 (GREAT FALLS RADIO)
SALT LAKE CENTER APP/DEP CON 132.4
RADIO AIDS TO NAVIGATION: NOTAM FILE BTM.
COPPERTOWN (L) VORW/DME 111.6 CPN Chan 53 N46°01.92_ W112°44.85_ 098° 11.4 NM to fld.5780/16E.
WHITEHALL (H) VORW/DME 113.7 HIA Chan 84 N45°51.71_ W112°10.18_ 274° 14.8 NM to fld. 4652/18E.
ILS/DME 110.9 I–BEY Chan 46 Rwy 15. Class IE