Aviation Investigation Final Report

Location:	Laupahoehoe, Hawaii	**Accident Number:**	LAX04FA113
Date & Time:	January 31, 2004, 01:40 Local	**Registration:**	N5637C
Aircraft:	Cessna 414A	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	3 Fatal
Flight Conducted Under:	Part 91: General aviation - Positioning		

Analysis

The airplane collided with trees and mountainous terrain at the 3,600-foot-level of Mauna Kea Volcano during an en route cruise descent toward the destination airport that was 21 miles east of the accident site. The flight departed Honolulu VFR at 0032 to pickup a patient in Hilo, on the Island of Hawaii. The inter island cruising altitude was 9,500 feet and the flight was obtaining VFR flight advisories. At 0113, just before the flight crossed the northwestern coast of Hawaii, the controller provided the pilot with the current Hilo weather, which was reporting a visibility of 1 3/4 miles in heavy rain and mist with ceiling 1,700 feet broken, 2,300 overcast. Recorded radar data showed that the flight crossed the coast of Hawaii at 0122, descending through 7,400 feet tracking southeast bound toward the northern slopes of Mauna Kea and Hilo beyond. The last recorded position of the aircraft was about 26 miles northwest of the accident site at a mode C reported altitude of 6,400 feet. At 0130, the controller informed the pilot that radar contact was lost and also said that at the airplane's altitude, radar coverage would not be available inbound to Hilo. The controller terminated radar services. A witness who lived in the immediate area of the accident site reported that around 0130 he heard a low-flying airplane coming from the north. He walked outside his residence and observed an airplane fly over about 500 feet above ground level (agl) traveling in the direction of the accident site about 3 miles east. The witness said that light rain was falling and he could see a half moon, which he thought provided fair illumination. The area forecast in effect at the time of the flight's departure called for broken to overcast layers from 1,000 to 2,000 feet, with merging layers to 30,000 feet and isolated cumulonimbus clouds with tops to 40,000 feet. It also indicated that the visibility could temporarily go below 3 statute miles. The debris path extended about 500 feet along a magnetic bearing of 100 degrees with debris scattered both on the ground and in tree branches. Investigators found no anomalies with the airplane or engines that would have precluded normal operation. Pilots for the operator typically departed under VFR, even in night conditions or with expectations of encountering adverse weather, to preclude ground holding delays. The pilots would then pickup their instrument flight rules (IFR) clearance en route. The forecast and actual weather conditions at Hilo were below the

minimums specified in the company Operations Manual for VFR operations.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the pilot's disregard for an in-flight weather advisory, his likely encounter with marginal VFR or IMC weather conditions, his decision to continue flight into those conditions, and failure to maintain an adequate terrain clearance altitude resulting in an in-flight collision with trees and mountainous terrain. A contributing factor was the pilot's failure to adhere to the VFR weather minimum procedures in the company's Operations Manual.

Findings

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

Findings
1. LIGHT CONDITION - NIGHT
2. WEATHER CONDITION - CLOUDS
3. (F) PROCEDURES/DIRECTIVES - NOT COMPLIED WITH - PILOT IN COMMAND
4. (C) IN-FLIGHT WEATHER ADVISORIES - DISREGARDED - PILOT IN COMMAND
5. (C) VFR FLIGHT INTO IMC - CONTINUED - PILOT IN COMMAND

Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: CRUISE

Findings
6. OBJECT - TREE(S)
7. TERRAIN CONDITION - MOUNTAINOUS/HILLY

Factual Information

HISTORY OF FLIGHT

On January 31, 2004, about 0140 Hawaiian standard time, a Cessna 414A, N5637C, collided with trees and mountainous terrain during an en route cruise descent near Laupahoehoe, Hawaii. Hawaii Air Ambulance was operating the airplane as a cross-country positioning flight under the provisions of 14 CFR Part 91. The airline transport pilot and two passengers sustained fatal injuries; the airplane was destroyed. The flight departed Honolulu, Hawaii, at 0032, en route to Hilo, Hawaii, to pickup a patient. A combination of visual and instrument meteorological conditions prevailed along the route of flight, and a visual flight rules (VFR) flight plan had been filed. The primary wreckage was at 19 degrees 57.366 minutes north latitude and 155 degrees 19.841 minutes west longitude at an estimated elevation of 3,600 feet.

The National Transportation Safety Board investigator-in-charge (IIC) reviewed a transcript of radio communications between the pilot and air traffic control (ATC).

At 0019, the pilot filed a canned flight plan (number forty-eight tango) indicating a proposed departure time of 0030, with three people on board for the outbound leg, and five on board for the return. ATC provided a clearance during taxi of the shoreline departure to 15,500 feet. ATC cleared him for takeoff at 0031:55. At 0040:47, the pilot checked in with Honolulu Center passing 6,400 feet and stated an intended altitude of 9,500 feet en route to Hilo.

At 0113, the controller provided the pilot with the current Hilo weather. The controller asked him if he was going to Kamuela or Hilo. The pilot responded that he was going to try to go to Hilo. The pilot asked if anyone coming out of Hilo had reported lightening; the controller responded no, but he had just come on duty. At 0130, the controller informed the pilot that he lost radar contact 3 miles east of Kamuela VOR (very high frequency omni-directional radio range). The controller also pointed out that at the airplane's altitude, he would probably not be able to pickup the airplane inbound to Hilo. The controller terminated radar services, and instructed the pilot to change to advisory frequency. The pilot acknowledged the transmission.

The IIC reviewed recorded radar data, and noted that the airplane crossed the island of Hawaii coastline north of Mahukona (near Upolu Point) at a mode C reported altitude of 7,400 feet and flying in an east-southeast direction. The mode C altitude reports showed the aircraft descending, and at the time radar contact was lost, the mode C report showed the airplane at an altitude of 6,400 feet.

The Civil Air Patrol located the wreckage on Monday, February 2. They detected a weak

emergency locator transmitter signal and guided ground personnel to the wreckage.

Safety Board software computed that Hilo was 21 miles at 117 degrees magnetic from the accident site.

PERSONNEL INFORMATION

A review of Federal Aviation Administration (FAA) airman records revealed that the pilot held an airline transport pilot certificate with a rating for airplane multiengine land, and a commercial pilot certificate with a rating for airplane single engine land. The pilot held a certified flight instructor (CFI) certificate with ratings for airplane single engine land, multiengine land, and instrument airplane.

The pilot held a first-class medical certificate issued on April 26, 2003. It had no limitations or waivers.

The operator reported that the pilot had a total flight time of 8,230 hours. He logged 110 hours in the last 90 days, and 30 in the last 30 days. He had 1,037 hours in this make and model. He completed a biennial flight review on December 30, 2003. His last flight check occurred on December 30, 2003, in a Cessna 414A. It included instrument procedures, holding, an instrument localizer system (ILS) approach, a nonprecision approach, a VOR approach, and a missed approach. He scored satisfactory on all phases of the flight, as he had on previous check flights.

The pilot was on the 4th day of a 4-day shift. His shift began at 2200 and was scheduled to end at 0600. He would have then had 2 days off, and rotate to the morning shift for 4 days. Following the 4-day morning rotation, he was going to go on vacation.

The director of operations (DOO) described the pilot's abilities as average for a pilot with that amount of flight time. There was no obvious change in the pilot's attitude the day prior to the accident.

Emergency Medical Technicians (EMTs) who had flown with the pilot reported that they were very confident in the pilot's flying abilities. EMTs who had flown with him the night prior to the accident reported that they did not notice any problems with the pilot and he did not report any.

AIRCRAFT INFORMATION

The airplane was a Cessna 414A, serial number 414A0118. The operator reported a total airframe time of 11,899 hours at the last scheduled maintenance on an approved inspection program. This inspection occurred on January 16, 2004. The airplane had flown 39 hours since that inspection. The previous flight ended at a Hobbs hour meter reading 845.1.

The left engine was a Teledyne Continental Motors (TCM) TSIO-520-NB, serial number 521067. Total time on the engine was 412 hours.

The right engine was a TCM TSIO-520JC-NB, serial number 514071. Total time on the engine at the last inspection was 1,539 hours.

Air Service Corporation (HNL) refueled the airplane with 700 to 800 pounds of fuel prior to departure.

METEOROLOGICAL INFORMATION

The director of operations said that pilots obtained their weather information prior to flight through DUATS (direct user access terminal system) at the company office.

A staff meteorologist provided weather data. There was a band of echoes over the southeastern section of the island that impacted Hilo with echoes in the VIP (Video and Integrator Processor) level 2. FAA Advisory Circular AC 00-24B titled "Thunderstorms" dated January 2, 1983, defines the echo intensity levels and potential weather phenomena associated with those levels. If the maximum VIP levels are 1 "weak" and 2 "moderate," then light to moderate turbulence is possible with lightning.

The Aeronautical Information Manual (AIM) also references these levels in the Pilot/Controller Glossary under radar weather echo intensity levels.

In-Flight Weather Advisories

The National Weather Service issues in-flight weather advisories designated as Severe Weather Forecast Alerts (AWW's), Convective SIGMET's (WST's), SIGMET's (WS's), Center Weather Advisories (CWA's), and AIRMET's (WA's). In-flight advisories serve to notify en route pilots of the possibility of encountering hazardous flying conditions, which may not have been forecast at the time of the preflight briefing. Whether or not the condition described is potentially hazardous to a particular flight is for the pilot to evaluate on the basis of experience and the operational limits of the aircraft.

AIRMET Tango was in effect for over and immediately south through west of the mountains on all islands. It indicated temporary changing conditions of moderate turbulence below 10,000 feet, and that the conditions would continue beyond 0600.

The area forecast for the eastern half of the big island and adjacent waters issued at 2340 and valid until 1200 called for broken to overcast layers from 1,000 to 2,000 feet. It indicated merging layers to 30,000 feet with isolated cumulonimbus clouds with tops to 40,000 feet. It also indicated that the visibility could temporarily go below 3 statute miles.

The Terminal Aerodrome Forecast issued at 1930 was valid beginning at 2000. It predicted

variable winds at 5 knots; visibility greater than 6 miles; and clouds scattered at 1,500 feet to overcast at 3,000 feet.

The closest official weather observation station was Hilo (PHTO). The elevation of the weather observation station was 38 feet mean sea level (msl). While en route at 0113, the controller provided the pilot with the latest Hilo weather. The report noted that it was a special observation at 0108. It reported: winds 260° at 3 knots; visibility 1 3/4 miles; heavy rain, mist; ceiling 1,700 feet broken, 2,300 overcast; temperature 19° Celsius (C); dew point 18° C; and altimeter 30.05 inches of mercury.

A special aviation routine weather report (METAR) for PHTO was issued at 0131. It stated: winds from 260 degrees at 8 knots; visibility 2 1/2 miles; skies 1,300 feet scattered, 1,800 feet broken, 2,800 feet overcast; temperature 66 degrees Fahrenheit; dew point 64 degrees Fahrenheit; altimeter 30.03 inches of mercury.

A witness who lived in the immediate area of the accident site reported that around 0130 he heard a low-flying airplane coming from the north. He walked outside his residence in Umikoa Village (elevation 3,526 feet) and observed an airplane fly over, and estimated that it was about 500 feet above ground level (agl). He grabbed his compass from his police vehicle, and noted that the airplane was heading due south (180°). He observed the weather, and noted that there was light rain. He also noted a half moon, which he thought provided fair illumination. Safety Board software determined that the accident site was 3.42 miles at 107 degrees from Umikoa.

WRECKAGE AND IMPACT INFORMATION

Investigators from the Safety Board, the FAA, and Cessna examined the wreckage at the accident scene. The airplane came to rest in a thick forest of 80-foot-tall eucalyptus trees.

The first identified point of contact (FIPC) was a tree branch about 80 feet above ground level that had the top missing and broken branches at its base. The debris path extended about 500 feet along a magnetic bearing of 100 degrees with debris scattered both on the ground and in tree branches. Approximately 400 feet from the FIPC, the debris path turned left to 090 degrees. The main wreckage was near the end of the debris field. The orientation of the fuselage was 300 degrees, and that of the empennage was 280 degrees.

The main wreckage consisted of the engines and the cabin, and fire consumed the top of the cabin. The right engine separated, came to rest on its right side, and was oriented 100 degrees. The left engine remained attached. The pilot overhead light switch appeared to be on the low setting.

The right aileron was not located.

The first pieces of wreckage were pieces of glass similar to that of the landing/taxi lights and paint shards, which were about 30 feet prior to the FIPC. About 60 feet past the FIPC was a

wing tip piece with a green lens. Other pieces in the first part of the debris field included outboard pieces of the left and right horizontal stabilizers, outboard right elevator, outboard pieces of the left wing, and the tops of the vertical stabilizer and rudder.

MEDICAL AND PATHOLOGICAL INFORMATION

The Hawaii Coroner completed an autopsy. One of the passengers was in the right front seat. Another passenger had been strapped into the gurney in the cabin. The FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed toxicological testing of specimens of the pilot. They did not test for carbon monoxide or cyanide. Analysis of the specimens had no findings for volatiles in the liver or muscle.

The report contained the following results: diphenhydramine detected in the liver and kidney.

TESTS AND RESEARCH

The FAA, Cessna, TCM, and Hawaii Air Ambulance were parties to the investigation.

Investigators examined the wreckage at the Civil Air Patrol Hangar in Hilo on February 7, 2004.

Both propellers separated. Both exhibited s-bends and their blades twisted toward the low pitch, high revolutions per minute (rpm) positions.

The empennage separated into numerous pieces. However, investigators accounted for all of the empennage structure.

Both wings separated in multiple pieces, and investigators could not establish control continuity for the ailerons. Investigators established rudder and elevator continuity from the control surfaces to the center of the melted and crushed cabin. The elevator trim measured 1.5 inches. The manufacturer's representative determined that this equated to 0 degrees, or the neutral position.

Left Engine

Investigators examined the left engine. They removed the top spark plugs. All spark plugs were clean with no mechanical deformation. The spark plug electrodes were gray in color.

Investigators could not rotate the engine, which sustained mechanical damage. Both magnetos sustained mechanical damage and could not be tested.

The vacuum pump drive gear melted, and the vacuum pump would not rotate. All vacuum pump vanes were whole and in position.

The engine driven fuel pump drive gear was undamaged, and the pump rotated freely.

The turbocharger rotated, and the compressor was undamaged.

Right Engine

Investigators examined the right engine. They removed the top spark plugs. All spark plugs were circular and clean with no mechanical deformation. The spark plug electrodes were gray in color.

The engine sustained mechanical damage. Investigators manually rotated the engine about 10 degrees, and observed movement of the accessory gears.

Investigators manually rotated the magnetos, and both magnetos produced spark.

The vacuum pump drive gear remained unbroken, and the vacuum pump turned with engine rotation. All vacuum pump vanes were whole, in position, and moved freely.

The engine driven fuel pump drive gear was undamaged, and the pump rotated freely. The fuel screens were clean.

The turbocharger turned, and it contained chopped up vegetation on the inside. Several blades were bent and had leading edge damage. Compacted vegetation was in the front of the turbo.

ADDITIONAL INFORMATION

Company Information

The director of operations said that Hawaii Air Ambulance normally operated under VFR, even in night conditions or with expectations of encountering weather. This was because IFR flights were held up when departing Honolulu and/or Kona. This helped them get underway to their patients faster. The pilots could pickup their IFR clearance en route.

The normal visual approach into Hilo was to fly over Upolo point at 9,500 feet, and then begin the decent about 15-20 miles later. For IFR flights, they would fly the airways out over the water. The accident flight path was not normal. During the positioning flights, some of the paramedics sit in the right front seat.

Company EMTs said that pilots occasionally had to divert around weather in the Kamuela area. Some nights, pilots would go over the coast, and other times they would go over land. The EMTs usually did not talk about the patient with the pilot.

The operator's Operations Manual specified the conditions that must be met for the pilot to cancel their IFR flight plan and operate VFR in the terminal area. Among the requirements was that the reported visibility was to be as specified in Federal Aviation Regulation (FAR) 91.155,

but not lower than the visibility criteria specified in FAR 135.205. Also, the reported ceiling had to be 1,000 feet or greater. It required the pilot to maintain the basic cloud clearance specified in FAR 91.155. The flight was to be in Class B, C, or D airspace, or within 10 nm of the destination class E airspace, and remain within controlled airspace. Below 10,000 feet, FAR 91.155 specified that the visibility must be 3 statute miles in class E airspace. It also indicated the pilot must maintain 500 feet below, 1,000 feet above, and 2,000 feet horizontal distance from clouds.

Pilot Information

Certificate:	Airline transport; Commercial	**Age:**	38,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 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	April 1, 2003
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	December 1, 2003
Flight Time:	8230 hours (Total, all aircraft), 1037 hours (Total, this make and model), 8145 hours (Pilot In Command, all aircraft), 110 hours (Last 90 days, all aircraft), 30 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N5637C
Model/Series:	414A	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	414A0118
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	January 1, 2004 AAIP	**Certified Max Gross Wt.:**	7085 lbs
Time Since Last Inspection:	39 Hrs	**Engines:**	2 Reciprocating
Airframe Total Time:	11899 Hrs as of last inspection	**Engine Manufacturer:**	Teledyne Continental
ELT:	Installed, activated, aided in locating accident	**Engine Model/Series:**	TSIO-520-NB
Registered Owner:	Pacific Air Ambulance	**Rated Power:**	310 Horsepower
Operator:	Hawaii Air Ambulance	**Operating Certificate(s) Held:**	On-demand air taxi (135)
Operator Does Business As:		**Operator Designator Code:**	H48A

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Night
Observation Facility, Elevation:	PHTO,38 ft msl	**Distance from Accident Site:**	21 Nautical Miles
Observation Time:	01:31 Local	**Direction from Accident Site:**	117°
Lowest Cloud Condition:	Scattered / 1300 ft AGL	**Visibility**	2.5 miles
Lowest Ceiling:	Broken / 1800 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	8 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	260°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.03 inches Hg	**Temperature/Dew Point:**	19°C / 18°C
Precipitation and Obscuration:	N/A - None - Mist		
Departure Point:	Honolulu, HI (HNL)	**Type of Flight Plan Filed:**	VFR
Destination:	Hilo, HI (ITO)	**Type of Clearance:**	None
Departure Time:	00:32 Local	**Type of Airspace:**	Class G

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	2 Fatal	**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	3 Fatal	**Latitude, Longitude:**	19.956666,-155.330551

Administrative Information

Investigator In Charge (IIC):	Plagens, Howard
Additional Participating Persons:	Dave Ryon; Federal Aviation Administration; Honolulu, HI Mike Grimes; Teledyne Continental Motors; Mobile, AL Emile Lohman; Cessna Aircraft Company; Wichita, KS Larry Inouye; Hawaii Air Ambulance; Honolulu, HI
Original Publish Date:	March 28, 2006
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=58693