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Continued Visual Flight in IMC Precedes Controlled Flight Into Terrain by Piper Chieftain

The airplane struck a cloud-covered lava field on the slope of a volcano after the pilot flew into instrument meteorological conditions. The pilot was not authorized to conduct air-tour operations under instrument flight rules and failed to obtain a preflight weather briefing, said the U.S. National Transportation Safety Board.

FSF Editorial Staff

About 1726 local time Sept. 25, 1999, a Piper PA-31-350 Chieftain, operated on an air-tour flight by Big Island Air, struck lava-covered upsloping terrain on the northeast slope of the Mauna Loa volcano near Volcano, Hawaii, U.S. The pilot and all nine passengers were killed; the airplane was destroyed by impact forces and a postimpact fire. The flight was being conducted from Keahole-Kona International Airport under U.S. Federal Aviation Regulations (FARs) Part 135 as an on-demand operation.

The U.S. National Transportation Safety Board (NTSB), in its final report, said that the probable cause of the accident was "the pilot's decision to continue visual flight into instrument meteorological conditions (IMC) in an area of cloud-covered mountainous terrain." The following contributing factors were cited:

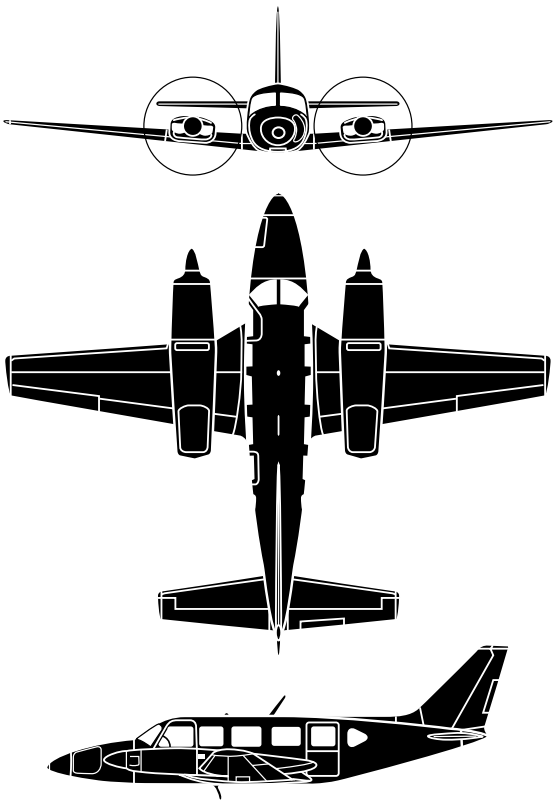
- "The pilot's failure to properly navigate and his disregard for standard operating procedures, including flying into IMC while on a visual-flight-rules [VFR] flight plan; and,
- "[The pilot's] failure to obtain a current preflight weather briefing."

Big Island Air began operation in 1985 and had two PA-31-350 airplanes on its Part 135 certificate at the time of the accident. The company had 16 full-time/part-time employees.

The company's air-tour flights were conducted using three standardized VFR flight plans kept on file with the Honolulu Automated Flight Service Station (AFSS). The report said that the flight plans included two flight plans for routes around the circumference of the Island of Hawaii (called "circle-island flights") and one flight plan for a "round-trip east-to-west route to the island's opposite shore via the saddle area between the Mauna Kea and Mauna Loa volcanoes." The saddle area, about midway between the two volcanoes, has valley-like topography with a maximum elevation of 6,800 feet above mean sea level (MSL) and includes an area in which VFR flight is restricted, the report said.

Company pilots conducting the circle-island flights typically made decisions en route about returning to the Kona airport via either the flight-planned route around the southern end of the island or via the saddle area, a "half-island tour route" that was authorized by FAA-approved operations specifications but was not included in the standardized flight plans. Pilots could make their route-change decision based on meteorological conditions,

volcanic activity or passenger needs; typically they did not notify the AFSS of their route change. [Except when aircraft will penetrate U.S. air defense identification zones, flight plans are not required by the FARs for VFR operations; nevertheless, the FAA *Aeronautical Information Manual* includes, among other advice about flight plans, recommendations that all pilots operating under VFR use VFR flight plans and update air traffic control about their position and route changes during the flight to facilitate search-and-rescue operations.]



Piper PA-31-350 Chieftain

Piper Aircraft introduced the Chieftain in 1972 as a lengthened version of the Navajo C/R and with more powerful engines than the Navajo C/R. At 34.6 feet (10.6 meters), the Chieftain's fuselage is two feet (0.6 meter) longer than the Navajo C/R's fuselage. Each of the Chieftain's Lycoming TIO-540-J2BD turbocharged, piston engines produces 350 horsepower (260 kilowatts) and drives a three-blade, constant-speed Hartzell propeller. (The Navajo C/R has 325-horsepower [241-kilowatt] engines.)

Six seats are standard; 10 seats were available as an option. Maximum takeoff weight and maximum landing weight are 7,000 pounds (3,175 kilograms). Maximum rate of climb at sea level is 1,120 feet per minute (fpm). Maximum single-engine rate of climb at sea level is 230 fpm. Maximum certified altitude is 24,000 feet. Cruise speed at 20,000 feet and 75 percent power is 221 knots. Cruise speed at 12,000 feet and 75 percent power is 205 knots. Stall speed with flaps extended is 74 knots.♦

Source: *Jane's All the World's Aircraft*

In addition to flying standard air-tour routes, company pilots were required to comply with the en route altitudes included in their Part 135 operations specifications.

Special Federal Aviation Regulation (SFAR) 71, which provides operating rules for Part 135 VFR air-tour flights in Hawaii, prohibits conducting an air tour below 1,500 feet above ground level except during takeoff, landing and other specific conditions.

The report said, "In Big Island Air's FAA-approved operations specifications, the operator had received FAA authorization for a deviation from SFAR 71, permitting the operator to reduce the altitude flown at specific locations and transition segments to no lower than 1,000 feet above ground level only when specific conditions were met. During flight, the airplane must be at least 500 feet below clouds, maintain three miles flight visibility, and remain within 0.5 nautical mile [0.9 kilometer] on either side of the approved centerline of the approved flight route."

The altitudes for various route segments were shown in the operator's SFAR 71 Deviation Procedure Manual, which included a map showing the approved routes. On FAA-approved routes, a pilot could fly at the lowest altitudes permitted by FAA for each route segment.

The pilot, 51, had an airline transport pilot (ATP) certificate and 11,514 flight hours. The report did not contain flight hours in type. Most of the pilot's flight experience was in the Hawaiian Islands, and he had flown 12.8 hours in the 30 days preceding the accident and 1.4 hours in the preceding 24 hours.

The pilot was hired by the operator in May 1994 and flew with the company until September 1998, when he took a leave of absence to study Japanese culture in Japan. He returned to work for the company Aug. 15, 1999, and received ground training and flight training on Aug. 15, Aug. 23 and Aug. 29.

"Upon the successful completion of this training, the [company's director of operations] authorized the pilot to assume the duties of pilot-in-command of the PA-31-350 airplane," the report said. "On Aug. 30, 1999, the pilot successfully passed a one-hour, FAA-administered flight test in a PA-31-350, in which he demonstrated proficiency regarding emergency instrument flight procedures and flying the airplane in [visual meteorological conditions (VMC)]."

FAA records said that the FAA principal operations inspector who administered the flight test had determined that the accident pilot lacked one hour of required training on the date of the flight test but said that the training deficiency was corrected "on the spot."

The director of operations said that he had never seen the pilot's personal flight record logbook or an application for employment. The accident pilot's attention to duties since

returning to work for the operator were satisfactory, the director of operations said; the pilot's skill and proficiency level were evaluated as being "OK" and the pilot was described as "adequate." Records examined after the accident showed no previous accident, incident, FAA enforcement action or FAA warning letter involving the pilot during the previous three years.

The accident airplane was manufactured in 1983 and was owned by the air-tour operator. The airframe had about 4,523.7 flight hours and was maintained using an approved aircraft inspection program under authorization of the Part 135 certificate. A progressive maintenance inspection was conducted Aug. 31, 1999; no maintenance discrepancies or corrective actions were found by the FAA principal maintenance inspector between that inspection and the day of the accident. In addition to very-high-frequency omnidirectional radio (VOR) receivers and distance measuring equipment (DME) receivers, the airplane was equipped with a yoke-mounted global positioning system (GPS) receiver with moving-map display. There was no recent maintenance history of navigation-related problems.

Post-accident calculations of prior fueling and prior fuel consumption showed that at the time of departure, the accident airplane's total weight was about 224 pounds [102 kilograms] more than the maximum allowable takeoff weight and that the center of gravity was within allowable limits.

An employee of the operator said that the accident pilot appeared to be alert and well rested when he arrived at the departure airport soon before 0700 to make one on-demand flight in the morning and one on-demand flight in the afternoon. The morning flight was conducted uneventfully with a departure time of 0700.

The pilot departed about 1622 for the afternoon flight. One recorded radio communication, between the pilot and the AFSS, occurred during the en route portion of the flight.

The report said, "About 1720, the pilot requested permission from the Honolulu AFSS to transition through a restricted area airspace (R-3103) that encompasses part of the center of the saddle area. The pilot was advised by AFSS that the restricted area was 'open' and that he was authorized to transition to the area for the next 30 minutes."

FAA-recorded radar data showed that at 1721:04, the accident airplane was flying at about 6,600 feet, about 2,000 feet above underlying terrain, approximately 16 nautical miles (30 kilometers) from the eastern side of the restricted area (and about 8.5 nautical miles [15.7 kilometers] from the accident site).

"Both the airplane's altitude and the terrain's elevation were increasing," the report said. "Between 1721:04 and the last recorded radar return at 1725:29 (when the airplane was within one-third [nautical] mile [0.6 kilometer] of the accident site), the airplane's average ground track was approximately 291 degrees magnetic. During this time, the accident airplane's altitude increased from about 6,600 [feet] to 9,600 feet."

The airplane struck terrain about 1726. The accident site — located at 10,100 feet MSL approximately 7.5 nautical miles (13.9 kilometers) east-northeast from the 13,680-foot peak of the Mauna Loa volcano — was approximately 3.5 nautical miles (6.5 kilometers) south of one of the depicted route segments, which paralleled the 9,000-foot elevation topographical contour line.

The FAA principal operations inspector said that flight along the published route segment required a climb to 10,000 feet to comply with applicable terrain-clearance requirements; flight more than 0.5 nautical mile (0.9 kilometer) south of the published route segment would have required climb to an altitude higher than 10,000 feet for compliance with applicable terrain-clearance requirements.

"Big Island Air's chief pilot reported that, weather permitting, the pilot would be expected to conduct the tour flight via the established FAA-approved VFR routes," the report said. "No flying under instrument flight rules was authorized at any time."

The FAA principal operations inspector had reviewed with the accident pilot the requirements of SFAR 71 during the flight test 25 days before the accident, the report said.

All of the wreckage was found within an area approximately 150 feet (46 meters) in diameter. The main-landing gear was retracted. No sign of in-flight fire or failures or in-flight malfunction of the airplane's air/pneumatic systems was found. The report said that there was no sign of mechanical malfunction or fire involving the left engine or right engine before the accident.

"Examination of the airplane's gyroscopic flight instruments revealed that the damage signatures were consistent with the impact having occurred while the airplane's wings were within 10 degrees of level at zero pitch," the report said.

Using a helicopter, investigators conducted an examination of the accident airplane's flight path in VMC, representing two minutes of the accident airplane's flight before striking terrain. The position of the helicopter relative to the lava field and other terrain could be determined visually, and investigators determined that with a timely change of course 90 degrees left or 90 degrees right, clearance from the lava field could be maintained.

No continuously operating weather-reporting facility was available in the area of the accident, but general weather information for the vicinity — such as an aviation area forecast by the Honolulu National Weather Service Forecast Office — was available. The operator's director of operations

said that he had posted a morning weather report at 0700; company pilots typically referred to such reports before flying. Nevertheless, each pilot was responsible, under standard operating procedures, for obtaining an official weather briefing.

The report said that there was no FAA record that the accident pilot had requested a weather briefing for either the morning flight or the afternoon flight. Available weather information included airmen's meteorological information (AIRMET) Sierra for IMC and mountain obscuration, issued for the Hawaiian area about 1147 and valid until 1800. The AIRMET indicated that no significant IMC was expected.

"On the eastern (windward) side of the island, clouds often form over upsloping terrain," the report said. "The skies on the western side of the island are typically clear or have scattered clouds." The aircraft was being flown in an area northeast of the Mauna Loa volcano at the time of the accident, the report said.

AIRMET Tango, issued for the Hawaiian area about 1147 and valid until 1800, said that temporary moderate turbulence could occur "below 12,000 feet over and immediately south through west of mountains for all islands."

NTSB reviewed data about prevailing weather conditions in the vicinity of the accident aircraft from aviation sources and from non-aviation sources. U.S. government employees working near the accident site observed weather conditions about 1.75 [statute] miles (2.8 kilometers) northeast of the accident site prior to the accident.

"Two witnesses indicated that about 1445, visibility was 30 meters [98 feet] to 200 meters [656 feet or 0.1 statute mile] and that the sky was 'mostly closed' but began clearing about 1630," the report said. "Later that afternoon, around the time of the accident, a column of gray smoke was observed to be southwest. The witnesses indicated that the visibility on the far side of the smoke was 'murky'; however, the smoke was in clear skies. Another witness indicated that the landscape at the area of the smoke column was not well defined because of the clouds."

Images from cameras on a tower at the Mauna Loa Observatory showed "fog conditions in the vicinity of the [observatory] with part of the ridgeline of the volcano visible in several photographs." Other non-aviation meteorological data were consistent with clouds in the vicinity of the volcano, the report said.

A helicopter pilot said that about 1430, the sky was overcast with ceilings less than 500 feet above ground level in an area north of the route flown by the accident airplane. The helicopter pilot said that to the south of the route, an overcast cloud layer was observed between 5,000 feet and 7,000 feet MSL from the east side of the volcano to the ocean.

Surface aviation weather observed about 1653 at the departure airport, which has a field elevation of 47 feet MSL and is located 35 nautical miles (65 kilometers) northwest of the accident site, included winds from 280 degrees at seven knots, visibility 10 statute miles (16 kilometers), scattered clouds at 7,500 feet, temperature 28 degrees Celsius (C; 82 degrees Fahrenheit [F]), dew point 20 degrees C (68 degrees F) and altimeter setting 29.94 inches of mercury (1013.88 hectopascals). About 1753, the observation included winds from 290 degrees at five knots, visibility 10 statute miles, sky clear, temperature 27 degrees C (81 degrees F), dew point 20 degrees C and altimeter setting 29.96 inches of mercury (1014.56 hectopascals).

Hilo International Airport, 26 nautical miles northeast of the accident site at an elevation of 38 feet MSL, provided the surface aviation weather observations closest to the accident site. The weather observed at 1706 included winds from 100 degrees at 12 knots, 10 statute miles visibility, a few clouds at 2,300 feet, scattered clouds at 3,000 feet, a broken ceiling at 3,600 feet, temperature 24 degrees C (75 degrees F), dew point 21 degrees C (70 degrees F) and altimeter setting 29.99 inches of mercury (1015.58 hectopascals). About 1753, the observation included winds from 110 degrees at nine knots, 10 statute miles visibility, a few clouds at 2,400 feet, scattered clouds at 3,200 feet, a broken ceiling at 4,600 feet, temperature 24 degrees C, dew point 21 degrees C and altimeter setting 30.01 inches of mercury (1016.26 hectopascals).

The report said that NTSB investigators received correspondence, photographs and a videotape from a passenger who had flown with the accident pilot on Sept. 4, 1999, during one of the operator's air tours on a route similar to the route during the accident flight.

"The passenger indicated that during his tour, the pilot had flown in dense clouds that prevented him from being able to see both ahead of and below the airplane," the report said. "The [videotape viewed by investigators] showed the airplane flying in clouds on several occasions and in different locations throughout the flight."

Citing the witnesses' testimony that the sky was overcast in the vicinity of the accident site and the passenger's videotape and report about the pilot's earlier flight, "[NTSB] therefore concludes that on the accident flight, the pilot flew into [IMC]."

The report said that use of navigation equipment on the airplane, though not required for VFR operation, could have been used for situational awareness and that all aids to navigation associated with the route of the accident airplane — including a VORTAC facility approximately 29 nautical miles and 055 degrees from the accident site — were operating normally. [VORTAC facilities transmit VOR signals and ultra-high-frequency tactical air navigation [TACAN] signals to enable civilian aircraft equipped with VOR receivers and DME receivers to display continuous bearing and distance from the facility.]

"Although the pilot was not required to use these navigational aids [VOR receiver, DME and GPS receiver], when he departed [VMC] and flew into IMC, he should have used the navigational aids to accurately monitor his track and altitude," the report said. "During the last few minutes of the flight, when the airplane's ground clearance was rapidly decreasing, the pilot did not reverse course or take emergency action. Radar data indicate that at this point in flight, the airplane's track varied little from its predominately west-northwesterly direction. … The airplane's rate of climb during the last [30 seconds] of flight was consistent with the airplane beginning to operate near its maximum (multi-engine) climb performance. … If the pilot had been using his navigational aids correctly, he would have realized that he was nearing high terrain and would likely have changed his course."

"FAA records for Big Island Air revealed no instances of pilots failing to maintain the minimum required distance from clouds during 1998. … The [director of operations] reported that it was company policy for pilots to reverse course, as required, to avoid entering IMC."

The NTSB report said that factual information was insufficient to determine whether fatigue (related to a reported early awakening time and long duty day) or the presence of the drug phentermine in the pilot's tissues and urine were factors in the accident. The report said that phentermine is a prescription stimulant, sometimes prescribed as an appetite suppressant, that has potential side effects including insomnia, irritability, hyperactivity and personality changes, and extreme fatigue and depression following acute withdrawal.

Nevertheless, the report said, "The FAA was not aware the pilot was taking this prescription medication. The use of this drug by the pilot was not approved."

The report did not contain recommendations but included one suggestion by an FAA official who had oversight responsibilities for the operator to improve the safety of air-tour operations in Hawaii.

"The [principal operations inspector] suggested that automated weather-reporting facilities be installed along the various tour routes," the report said. "With these aids, [pilots] could obtain current weather information and make informed go/no-go decisions rather than having to personally evaluate the weather conditions upon their arrival over the sites."♦

[FSF editorial note: This article, except where specifically noted, is based on the U.S. National Transportation Safety Board (NTSB) Aircraft Accident Brief no. DCA99MA088, NTSB Aircraft Accident/Incident Database Report no. DCA99MA088 and the related NTSB factual reports. The accident brief contains 12 pages.]

Further Reading From FSF Publications

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