National Transportation Safety Board
Aviation Accident Final Report

Location:	Leesburg, FL	**Accident Number:**	ERA13FA096
Date & Time:	12/24/2012, 1435 EST	**Registration:**	N78WM
Aircraft:	PIPER PA-31-350	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	1 Fatal, 1 Serious
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

The pilot and the pilot-rated passenger were flying from their home, which was located at a residential airpark where no fuel services were available, to an airport located about 37 miles away. According to the passenger, shortly after departure, she queried the pilot about the airplane's apparent low fuel state. The pilot responded that one of the fuel gauges always indicated more available fuel than the other, and that if necessary they could use fuel from that tank. However, about 15 minutes after departure, the pilot advised air traffic control that the airplane was critically low on fuel. About 5 minutes later, both engines lost total power, and the airplane descended into trees and terrain.

Examination of the airframe and engines after the accident confirmed that all of the airplane's fuel tanks were essentially empty, and that the trace amounts of fuel recovered were absent of contamination.

Based on the autopsy and toxicology results, the pilot had emphysema, hypertension, dilated cardiomyopathy, and severe coronary artery disease; however, given that the passenger did not report any signs of acute incapacitation, and that the pilot did not communicate any medical issues to air traffic control, it does not appear that these conditions affected his performance on the day of the accident.

The pilot did not report any chronically painful conditions to the FAA in his most recent medical certificate applications; however, postaccident toxicology tests indicated that the pilot was taking several pain medications (diclofenac, gabapentin, and oxycodone) and one illegal substance (marijuana). Based on the medications' Food and Drug Administration warnings, gabapentin and oxycodone may be individually impairing and sedating; their combined effect may be additive. The effects of the underlying conditions that necessitated the medication could not be determined. It is impossible to determine from the available information what direct effect the marijuana alone may have had on the pilot's judgment and psychomotor functioning; however, the combination of marijuana, oxycodone, and gabapentin likely significantly impaired the pilot's judgment and contributed to his failure to ensure the airplane had sufficient fuel to complete the planned flight.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's inadequate preflight planning, which resulted in fuel exhaustion and a subsequent total loss of power in both engines during cruise flight. Contributing to the accident was the pilot's use of prescription and illicit drugs, which likely impaired his judgment.

Findings

Personnel issues	Fuel planning - Pilot (Cause)
	Prescription medication - Pilot (Factor)
	Illicit drug - Pilot (Factor)

Factual Information

On December 24, 2012, about 1435 eastern standard time, a Piper PA-31-350, N78WM, was substantially damaged when it collided with terrain during a forced landing following a loss of power in both engines near Leesburg, Florida. The private pilot was fatally injured and the pilot-rated passenger was seriously injured. Visual meteorological conditions prevailed, and no flight plan was filed for the flight, which departed Eagles Nest Aerodrome (FD44), Crescent City, Florida, at 1405, and was destined for Leesburg International Airport (LEE), Leesburg, Florida. The personal flight was conducted under the provisions of Title 14 Code of Federal Regulations Part 91.

According to the pilot-rated passenger, who was also the pilot's wife, the pilot completed the preflight inspection of the airplane and prepared for their departure while she was shopping. Upon returning home, she boarded the airplane, secured the aft cabin door, and prepared the cabin for departure as she would normally do prior to any other flight. She then sat down in the front right seat of the airplane about the time the pilot had taxied onto the runway. Shortly after takeoff, and while reading through the after takeoff checklist, she noticed that the fuel quantity in the left and right fuel tanks appeared to be low, with the left gauge reading slightly above 1/4-tank of fuel and the right gauge reading slightly below 1/4 tank of fuel.

When the passenger queried the pilot about the fuel quantities, the pilot replied that the left fuel gauge always indicated a greater quantity of fuel than the right gauge, and that if the fuel quantity in the right tank became too low, they could always use fuel from the left fuel tank. She continued to closely monitor the fuel quantity state and fuel flow to both engines for the next 10 minutes. About that time, and about 6 miles north of LEE, the right engine began to surge. The pilot responded by repositioning the right engine's fuel selector from the inboard to the outboard fuel tank. He then contacted the air traffic control tower at LEE, requested to land, and advised the controller that the airplane was running low on fuel. Shortly after making that transmission, the left engine began to surge, and the pilot again responded by repositioning the fuel selector from the inboard to the outboard fuel tank.

The pilot then began searching for an off-airport landing site, and during the descent both engines operated intermittently. The pilot later advised air traffic control that the airplane was "going down," prepared for a forced landing to a field below, and extended the airplane's landing gear. The airplane subsequently struck trees short of the pilot's intended landing area.

According air traffic control voice communication information provided by the Federal Aviation Administration (FAA), the pilot initially contacted the LEE air traffic control tower at 1930 and advised the controller that the airplane was about 12 nautical miles north of the airport, that the airplane was "bingo fuel," and that he would like a straight-in approach to the runway. The controller subsequently instructed the pilot to advise him when he was 1 mile from the runway on final approach. When the airplane was about 6 nautical miles from the airport, the pilot advised the controller that one of the airplane's fuel tanks was empty and that he was attempting to make it to the airport "on one." The controller then cleared the pilot to land on runway 13, but shortly thereafter the pilot advised the controller that the airplane was out of fuel and that they were "going in." No further transmissions were received from the pilot.

PERSONNEL INFORMATION

According to airman records maintained by the FAA, the pilot, age 53, held a private pilot certificate with numerous ratings including airplane multi-engine land. Pilot logs recovered from the wreckage documented flight experience accumulated between 1987 and February 2005. During that time, the pilot logged about 3,000 total hours of flight experience, 1,400 hours of which were in multi-engine land airplanes and 500 hours of which were in multi-engine seaplanes. The logs also contained endorsements for flight reviews completed in April 2008 and January 2012.

AIRCRAFT INFORMATION

The twin-engine, low wing, retractable landing gear airplane was manufactured in 1978, and was powered by two Lycoming TIO-540, 350-hp engines. Review of maintenance records showed that the airplane's most recent annual inspection was completed on September 9, 2011 at 4,895 total hours of operation. At the time of the accident, the airplane had accumulated 4,912 total hours of operation.

According to the passenger, the pilot had most recently serviced the airplane with fuel prior to flying from Gatlinburg Pigeon-Forge Airport (GKT), Gatlinburg, Tennessee, to their home at FD44. Review of fueling records from a fixed based operator at GKT revealed that on October 19, 2012, the airplane's inboard fuel tanks were filled to capacity with 32 gallons of aviation gasoline.

METEOROLOGICAL INFORMATION

The weather conditions reported at LEE, at 1453, located about 2 nautical miles south of the accident site included wind from 220 degrees at 11 knots, gusting to 16 knots, 10 statute miles visibility, clear skies below 12,000 feet, temperature 21 degrees Celsius (C), dew point 9 degrees C, and an altimeter setting of 30.00 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

The initial impact point (IIP) was identified as a tree with broken limbs, with various components of wreckage extending from that point on a heading of 135 degrees magnetic. A ground scar approximately 6 feet wide by 100 feet long, began about 50 feet from the IIP, and was oriented along the wreckage path. The fuselage came to rest upright oriented roughly 350 degrees magnetic. First responders reported that no fuel or fuel odor was present at the scene and that all of the airplane's fuel tanks appeared to be absent of fuel.

The airplane was subsequently recovered from the scene and examined at an aircraft recovery facility. Control continuity was traced from the cockpit area, through overload separations and cable cuts performed by recovery personnel to each of the flight control surfaces. Measurement of the stabilator trim tab actuator revealed a position consistent with a slight deflection in the nose-up direction. The flaps were in the retracted position, and the position of the left main landing gear door was consistent with the landing gear being extended at impact.

Trace amounts of fuel were observed in two of the airplane's six fuel tanks and within both fuel strainer bowls. The fuel had an odor consistent with 100 low-lead aviation gasoline and was absent of debris or water. Each of the fuel filler port caps was intact and secure. The fuel quantity float sensors were recovered from the left and right inboard and outboard fuel tanks for functional testing.

Continuity of both engine's crankshaft and valvetrain was confirmed through rotation of the propeller, and thumb compression was confirmed on all cylinders. The top spark splugs from

both engines were removed, and all exhibited normal wear and were grey to black in color. Both propellers remained attached to their respective crankshaft flanges and both propeller spinners exhibited non-torsional crush damage. All of the propeller blades were bent aft about the mid span, and each of the blades exhibited spanwise and chordwise scraping.

MEDICAL AND PATHOLOGICAL INFORMATION

FAA Medical Records

According to the pilot's FAA medical record, he first received a third-class medical certification in 1987, with a restriction for corrective lenses. From that time forward until 2006, the pilot did not report use of any medications, any medical problems or procedures, or any traffic or non-traffic convictions. The single exception was a report of a physician visit and use of Axid (nizatidine, a proton pump inhibitor used to treat ulcers) for heartburn in 1997. In 2006, the FAA received a safety hotline report that the pilot had previously had several convictions for drug possession and two convictions for driving while intoxicated. Investigation revealed that the pilot had been convicted of misdemeanor charges for possession of marijuana in 1977 and 1978, and marijuana and hydrocodone (a prescription narcotic and controlled substance) in 1980. In addition, he had been convicted of driving while intoxicated in 1980 and 1981. During correspondence with the FAA regarding these events in 2006, the pilot reported social drinking, "two or three drinks with dinner" and stated, "I do not use illegal substances." After this process, the pilot reported on subsequent applications for medical certification his previous convictions by checking "yes" to the relevant historical questions and then "previously reported, no change".

Also in 2006, the pilot reported using Advair to treat hay fever (an inhaled, prescription medication used to treat asthma that combines fluticasone propionate [a steroid] and salmeterol [a long acting beta-agonist]), and Prevacid for heartburn (lansoprazole, a proton pump inhibitor used to treat gastroesophageal reflux disease). He was awarded his medical certificate without further investigation. In 2008, he reported an injury to his Achilles' tendon and Motrin (ibuprofen, a non-steroidal anti-inflammatory analgesic) in addition to his previous medications. In 2010, he reported the same medications and was awarded a third class medical certificate.

In August, 2011, the FAA requested more information regarding the pilot's use of Advair. The pilot supplied it with a letter from his physician who noted the Advair was being used to treat chronic obstructive pulmonary disease (also known as emphysema) with symptoms of bronchospasm and mentioned the pilot was trying to quit smoking. No other information was offered. The FAA subsequently provided the pilot with a special issuance medical certificate with the limitation "not valid for any class after 5/31/2012". The pilot was not examined and had not obtained any subsequent medical certificates following the expiration of the special issuance medical certificate.

Post-Accident Findings and Toxicology

An autopsy was performed on the pilot by the Medical Examiner District 5, Leesburg, Florida. According to the autopsy report, the cause of death was "multiple blunt force injuries." Significant natural disease was identified, particularly in the heart, which was markedly enlarged and weighed 750 grams (normal for a man of his weight is between 305 and 531 grams [1]). In addition, the coronary arteries displayed severe atherosclerosis, with greater than 95% narrowing of the proximal left anterior descending coronary artery. Both ventricles

were dilated, but the walls were of normal thickness. No histology of the cardiac tissue was performed. The autopsy also noted severe pulmonary anthracosis and emphysema with scarring.

The FAA's Civil Aerospace Medical Institute performed forensic toxicological testing on specimens from the pilot. The testing identified a number of medications in liver tissue and urine samples including: valsartan and metoprolol (both blood pressure medications marketed under the trade names Diovan and Lopressor respectively); and gabapentin (a medication whose mechanism is not known, used to treat chronic or neuropathic pain or to help prevent seizures and marketed under the trade name Neurontin). Gabapentin carries the following FDA warning: "Warning may cause dizziness, somnolence and other symptoms and signs of CNS depression. Accordingly, they should be advised neither to drive a car nor to operate other complex machinery until they have gained sufficient experience on Neurontin to gauge whether or not it affects their mental and/or motor performance adversely." The urine samples also tested positive for diclofenac, a prescription non-steroidal anti-inflammatory and analgesic marketed under the trade name Voltaren, and oxymetolazine, an over-the-counter intranasal medication used to treat runny nose.

In addition, testing found 0.043 ug/mL of oxycodone in heart blood and 0.767 ug/mL in urine. Oxycodone's primary metabolite, oxymorphone, was identified in urine (2.328 ug/mL). Oxycodone is a semi-synthetic narcotic pain medication prescribed as a schedule II controlled substance; it is the narcotic portion of the medication marketed under the trade name Percocet. Oxycodone's therapeutic dose is considered 0.0130 to 0.0990 ug/mL and it carries the following FDA warning: may impair mental and/or physical ability required for the performance of potentially hazardous tasks (e.g., driving, operating heavy machinery).

Finally, toxicology testing revealed the pilot's use of marijuana including identifying the parent drug, tetrahydrocannabinol, in liver (0.1628 ug/ml), lung (0.1921 ug/ml), and heart blood (0.0139 ug/ml); and the primary metabolite, tetrahydrocannabinol carboxylic acid, in liver (0.3417 ug/ml), lung (0.0454 ug/ml), and heart blood (0.0239 ug/ml).

TESTS AND RESEARCH

According to the Piper Navajo Chieftain Service Manual, the float-type resistance fuel senders could be tested by measuring the resistance at the float's full and empty positions. The published electrical resistance limits at the empty and full positions for the inboard fuel tanks was between 0.0 to 0.5 ohms, while the resistance at the full position was between 48 and 52 ohms. The left inboard fuel tank fuel sender displayed a resistance of 0.38 ohms in the empty position and 59 ohms in the full position, while the right inboard fuel tank sender displayed a resistance of 0.9 ohms in the empty position and 40.5 ohms in the full position.

The published resistance limits at the empty and full positions for outboard fuel tanks was between 0.0 to 0.5 ohms, while the resistance at the full position was between 38 and 42 ohms. The outboard fuel tank fuel sender displayed a resistance of 1.2 ohms in the empty position and 45 ohms in the full position, while the right outboard fuel tank sender displayed a resistance of 60.3 ohms in the empty position and 69 ohms in the full position.

The service manual stated that if any of the resistance tolerances could not be maintained, the fuel sender unit must be replaced.

ADDITIONAL INFORMATION

Fuel Availability

The airplane was based at the pilot's home, which was located on the grounds of a residential airpark, FD44. There were no fueling facilities available at the airpark. Review of a sectional aeronautical chart and the FAA Airport/Facility Directory showed that the nearest airport that provided fuel services was Palatka Municipal Airport (28J), Palatka, Florida, which was located about 15 nautical miles north of FD44.

GPS Data

A hand-held GPS receiver was recovered from the wreckage and forwarded to the NTSB Vehicle Recorder Laboratory, where its contents were successfully downloaded. Review of the data showed that the unit had recorded the entirety of the accident flight, beginning at 1409. The track data showed that the airplane subsequently departed FD44 at 1415 and climbed to a GPS-measured cruise altitude of about 3,200 feet by 1422. During the climb, the airplane flew generally southwest, before it turned south and began heading toward LEE, about 1423.

At 1429:50, the pilot initially advised air traffic control that he was concerned about the airplane's fuel state when the airplane was located about 13 nautical miles north of LEE. At that time, the closest paved runway was located about 6 nautical miles northwest of the airplane's position. The Woods and Lakes Airpark (FA38), Oklawaha, Florida was equipped with a single 2,565-foot-long by 36-foot-wide asphalt runway. No fuel services were available at FA38.

The airplane then began a gradual descent, and when the pilot advised air traffic control that one of the airplane's fuel tanks was completely empty, the airplane had traveled an additional 7 nautical miles south toward LEE, but was still 6 nautical miles from the airport. Data from the GPS ceased recording at 1435:38, about 1,100 feet northwest of the accident site, and about 2 nautical miles north of LEE.

History of Flight

Prior to flight	Preflight or dispatch event
Enroute-cruise	Loss of engine power (total) (Defining event)
Emergency descent	Off-field or emergency landing Collision with terr/obj (non-CFIT)

Pilot Information

Certificate:	Private	**Age:**	53
Airplane Rating(s):	Multi-engine Land; Multi-engine Sea; Single-engine Land; Single-engine Sea	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Seatbelt
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With Waivers/Limitations	**Last FAA Medical Exam:**	05/18/2010
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 3000 hours (Total, all aircraft), 900 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	PIPER	**Registration:**	N78WM
Model/Series:	PA-31-350	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	31-7952047
Landing Gear Type:	Retractable - Tricycle	**Seats:**	8
Date/Type of Last Inspection:		**Certified Max Gross Wt.:**	7000 lbs
Time Since Last Inspection:		**Engines:**	2 Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	LYCOMING
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	TIO-520-J2BD
Registered Owner:	On file	**Rated Power:**	310 hp
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	LEE, 75 ft msl	**Distance from Accident Site:**	6 Nautical Miles
Observation Time:	1453 EST	**Direction from Accident Site:**	180°
Lowest Cloud Condition:	Clear	**Visibility**	10 Miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	11 knots / 16 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	220°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	21°C / 9°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Crescent City, FL (FD44)	**Type of Flight Plan Filed:**	None
Destination:	Leesburg, FL (LEE)	**Type of Clearance:**	None
Departure Time:	1405 EST	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Serious	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal, 1 Serious	**Latitude, Longitude:**	28.863889, -81.812222

Administrative Information

Investigator In Charge (IIC):	Dennis Diaz	**Report Date:**	01/13/2014
Additional Participating Persons:	Mark Hands; FAA/FSDO; Orlando, FL Ron Maynard; Piper; Vero Beach, FL		
Publish Date:	01/13/2014		
Investigation Docket:	http://dms.ntsb.gov/pubdms/search/dockList.cfm?mKey=85876		

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