Aviation Investigation Final Report

Location:	El Campo, Texas	**Accident Number:**	CEN17LA202
Date & Time:	May 28, 2017, 09:10 Local	**Registration:**	N3711E
Aircraft:	Piper PA36	**Aircraft Damage:**	Substantial
Defining Event:	Fuel contamination	**Injuries:**	1 Serious
Flight Conducted Under:	Part 137: Agricultural		

Analysis

The commercial pilot was conducting an agricultural application flight when the airplane experienced a loss of engine power. The airplane subsequently impacted an adjacent field in a nose-low, left-wing-low attitude. Due to his injuries, the pilot did not recall the details of the accident flight, loss of engine power, or impact sequence.

The location of the wreckage, the debris field, and the damage to the airplane are consistent with the airplane being in a turn at the time of the accident. An examination of the engine revealed no evidence of any preimpact mechanical anomalies that would have precluded normal operation. An examination of the fuel system revealed that the internal foam baffles in both fuel tanks were discolored and deteriorated, and they disintegrated into very fine particles when touched. According to the owner/operator, during routine maintenance 5 days before the accident, a mechanic found blue foam, which he identified as coming from the foam baffles, in the fuel filter at the engine. Subsequent periodic inspections of the screen revealed no contaminants. The postaccident examination of three fuel injector nozzles revealed that they were plugged with an unknown substance. In addition, evidence of water was found in the fuel flow divider.

It is likely that, given the condition of the foam baffles and the owner's previous identification of foam in the fuel system, that the particles found in the fuel injector nozzles were from the foam baffles. This contamination, in combination with the water found in the fuel flow divider, likely resulted in the loss of engine power.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

Foam contamination in the fuel injector nozzles from deteriorated foam baffles and water in the fuel flow divider, the combination of which resulted in the loss of engine power.

Findings

Aircraft	(general) - Inoperative
Aircraft	Fuel - Fluid condition

Factual Information

History of Flight

Maneuvering-low-alt flying	Fuel contamination (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

HISTORY OF FLIGHT

On May 28, 2017, about 0910 central daylight time, a Piper PA36-300 airplane, N3711E, was substantially damaged when it impacted a cotton field near El Campo, Texas. The commercial-rated pilot sustained serious injuries. The airplane was owned and operated, by Trade Wind Ag Service Inc., under the provisions of *Title 14 Code of Federal Regulations* Part 137. Visual meteorological conditions prevailed and no Federal Aviation Administration (FAA) flight plan had been filed for the flight. The aerial application flight departed a private field about 0900.

The owner of the accident airplane was conducting agricultural flight operations in another airplane, over a nearby field, and had not seen the accident airplane for a while. He flew to check on the pilot and spotted the airplane wreckage about 0920. Two witnesses in the area reported seeing or hearing the airplane flying just prior to the accident and could hear popping noises or loud shot gun-type popping sounds.

According to the FAA inspector who responded to the accident, the airplane hit the ground in a nose low, left wing low attitude. The airplane wreckage was in the field adjacent to where the pilot was conducting aerial applications. Debris extended for about 60 feet from the initial impact point to the main wreckage. The engine and propeller assembly, and both main landing gear separated from the airframe. The right wing separated partially from the fuselage and the left wing was crushed aft and buckled.

Months following the accident, the pilot could not recall details of the accident. He did recall losing altitude and trying to level the wings. He also recalled trying to egress from the airplane window. Prior to the accident flight, he recalled having a difficult time starting the engine – once the engine started there was a deep rumble with popping, but it eventually cleared, and the engine ran without issue or hesitation.

WRECKAGE INFORMATION

The wreckage was recovered to a secure storage facility and examined by a National Transportation Safety Board (NTSB) investigator and an investigator from Lycoming. The fuel selector valve was in the "On" position. The detents were definitive when tested and the fuel selector valve lever moved without hesitation or sticking. Both fuel tanks were compromised during the impact sequence and the wing skins exhibited hydraulic deformation, consistent with fuel being present at the time of impact. The internal foam baffles in both fuel tanks were discolored and deteriorated. When touched by hand, the baffles would disintegrate into very fine particles.

The engine assembly was impact damaged and had dirt imbedded around the case and cylinders of the engine. The left magneto leads were impact damaged and could not be functionally tested. Both the left and right magneto produced a spark at the end of each lead when placed on a test bench and activated. The valve covers, the upper bank of spark plugs, and the injector nozzles were removed to facilitate the examination. Injector nozzle Nos. 1, 2, and 6 were obstructed with an unknown substance.

The engine was rotated through by hand at the propeller. Valve movement was noted on all cylinders. Tactile compression was observed at all, but the No. 1, cylinder. The accessory gears at the rear of the engine rotated and confirmed valve train and crankshaft continuity.

There was no evidence of fuel in the engine fuel lines; however, trace fuel was noted in the engine driven fuel pump and 5 to 10 ml of fuel was noted in the boost pump output line. The fuel filter, fuel screen, and the throttle body screen were free of visible contaminants. Liquid in the fuel flow divider tested positive for water when tested with a water-finding paste.

The fuel injection servo was examined by an NTSB investigator and an investigator from Precision Airmotive LLC. The flange, mixture shaft, and multiple fittings on the fuel injection servo were impact damaged. The unit was placed on a field flow bench and stoddard solvent was used to test the unit for flow and pressure. A leak was noted at the mixture control shaft; however, it was attributed to impact damage to the unit. The pressures at varying simulated engine rpms were consistent with the mixture control valve in the idle or off position. This position was later confirmed during the disassembly of the unit. Both the drain jet and the venturi drain were plugged and partially plugged, respectively, with an unknown substance. According to Precision Airmotive LLC, both conditions would result in a rich mixture.

ADDITIONAL INFORMATION

According to the owner/operator of the airplane, they had purchased the airplane about a year prior to the accident. On occasion they had issues starting the engine and this was remedied by adjusting the gap on the spark plugs. During flight, the fuel pressure would decrease, and the low fuel pressure light would illuminate. If the pilot turned the fuel pump on, the light would go out, and the fuel pressure would increase. During routine maintenance, 5 days prior to the accident, a mechanic found blue foam, he identified as coming from the internal foam baffles in the fuel tanks, in the fuel filter at the engine. The filter was cleaned and then checked periodically after every flight without further findings. The internal foam baffles were not replaced at the time of the finding.

Piper Service Bulletin 713, dated May 11, 1981, calls for the inspection and maintenance of the fuel cells due to the possibility of foam particles contaminating the fuel system, when they start to discolor and deteriorate.

Pilot Information

Certificate:	Commercial	**Age:**	19,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Single
Other Aircraft Rating(s):	None	**Restraint Used:**	4-point
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	August 24, 2016
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	September 13, 2016
Flight Time:	405 hours (Total, all aircraft), 130 hours (Total, this make and model), 300 hours (Pilot In Command, all aircraft), 50 hours (Last 90 days, all aircraft), 25 hours (Last 30 days, all aircraft), 4 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N3711E
Model/Series:	PA36 300	**Aircraft Category:**	Airplane
Year of Manufacture:	1978	**Amateur Built:**	
Airworthiness Certificate:	Restricted (Special)	**Serial Number:**	36-7860044
Landing Gear Type:	Tailwheel	**Seats:**	1
Date/Type of Last Inspection:	January 23, 2017 Annual	**Certified Max Gross Wt.:**	4400 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	4586.3 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	Not installed	**Engine Model/Series:**	IO-540-K1G5
Registered Owner:	Trade Wind Ag Services Inc	**Rated Power:**	300 Horsepower
Operator:	Trade Wind Ag Services Inc	**Operating Certificate(s) Held:**	Agricultural aircraft (137)

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KARM	**Distance from Accident Site:**	
Observation Time:	09:35 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:		**Visibility**	10 miles
Lowest Ceiling:	Broken / 3300 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	6 knots /	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	180°	**Turbulence Severity Forecast/Actual:**	/ N/A
Altimeter Setting:	29.92 inches Hg	**Temperature/Dew Point:**	29°C / 23°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	El Campo, TX (8TE8)	**Type of Flight Plan Filed:**	None
Destination:	El Campo, TX (8TE8)	**Type of Clearance:**	None
Departure Time:	09:00 Local	**Type of Airspace:**	Class G

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Serious	**Latitude, Longitude:**	29.123056,-96.246948(est)

Administrative Information

Investigator In Charge (IIC):	Rodi, Jennifer
Additional Participating Persons:	Justin Kelly; Federal Aviation Administration; Houston, TX John Butler; Lycoming Engines; PA Peter Nielson; Precision Airmotive LLC; Arlington, WA
Original Publish Date:	June 5, 2018
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=95258