Aviation Investigation Final Report

Location:	Iola, Kansas	**Accident Number:**	CEN17LA009
Date & Time:	October 1, 2016, 17:35 Local	**Registration:**	N38DM
Aircraft:	AERO SMART SOLUTIONS INC LANCAIR EVOLUTION	**Aircraft Damage:**	Substantial
Defining Event:	Fuel contamination	**Injuries:**	1 Minor, 1 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot was flying the airplane in cruise flight at 11,000 ft when the engine lost power. He attempted to restart the engine by switching fuel tanks, turning on the igniters, and holding down the start button but was unsuccessful. He elected to turn back toward the departure airport and feathered the propeller. During the descent, the pilot decided he was unable to make it back to the airport and conducted a forced landing on a dirt road. During the landing rollout, both wings struck trees, which resulted in substantial damage.

Examination of the flight controls, engine, and fuel systems revealed no mechanical malfunctions or failures that would have precluded normal operation. However, fuel samples recovered from the airplane tested positive for water. Data recovered from the engine monitor showed an abrupt power loss that coincided with a loss of fuel flow. The flight instructor who completed transition training with the pilot reported the pilot did not sump the fuel before every flight. Thus, it is likely that the pilot did not perform an adequate preflight inspection and water remained in the fuel system, which led to a total loss of engine power.

The pilot's operating handbook (POH) recommended that the configuration for a forced landing is landing gear up, flaps up, propeller feathered, and airspeed at 110 knots to achieve maximum glide performance. This configuration provides a maximum glide performance of about 500 ft per minute (fpm) descent and about 3.5 nautical miles glide distance per 1,000 ft of altitude lost. Data from the engine monitoring system revealed that, about 3 minutes after the fuel flow stopped and about 2-3 minutes before the accident, the flaps were extended to takeoff position, the airplane achieved 110 kts, and the propeller was feathered. During this time, the rate of descent exceeded 1,000 fpm and was, at times, in excess of 4,000 fpm. The pilot did not mention of the use of an emergency engine-out checklist or consultation of the POH during the event. The pilot's failure to accomplish all of the steps in the emergency engine-out checklist promptly after the loss of engine power led to an accelerated loss of altitude and the subsequent inability to glide to the airport.

Probable Cause and Findings

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

Water contamination of the fuel due to the pilot's inadequate preflight inspection, which led to a total loss of engine power. Contributing to the accident was the pilot's failure to complete the engine-out checklist, which resulted in an excessive loss of altitude and the inability to glide to the intended airport.

Findings

Aircraft	Fuel - Fluid condition
Personnel issues	Preflight inspection - Pilot
Aircraft	(general) - Failure
Personnel issues	Use of policy/procedure - Pilot
Aircraft	Altitude - Not attained/maintained

Factual Information

History of Flight

Prior to flight	Aircraft inspection event
Enroute-climb to cruise	Fuel contamination (Defining event)
Landing-landing roll	Collision with terr/obj (non-CFIT)

On October 1, 2016, about 1735 central daylight time, an Aero Smart Solutions Lancair Evolution airplane, N38DM, experienced a total loss of engine power during cruise flight. The pilot made a forced landing onto a roadway near Iola, Kansas. The private pilot was not injured and the passenger suffered minor injuries. The airplane was registered to, and operated by, Aero Smart Solutions, Inc. under the provisions of Title 14 *Code of Federal Regulations* Part 91 as a personal flight. Visual meteorological conditions prevailed for the flight, and an instrument flight rules flight plan was filed.

The pilot stated he had just departed after stopping to refuel at Allen County Airport (K88) in Iola, Kansas. Shortly after departure, air traffic control (ATC) cleared the pilot to his destination of Ogden-Hinckley Airport (OGD) in Ogden, Utah. The pilot reported he switched from the left fuel tank to the right fuel tank, he did not recall when he made the switch. Around 11,000 ft, the pilot heard the pitch of the engine "drastically change." Immediately following that, the pilot heard an alarm from the engine monitoring instrument which showed the oil pressure had decreased to "0." The pilot did not notice any instrument indications before the engine lost power.

The pilot pushed the nose over, and switched fuel tanks from the right to the left. He turned on the igniters and held the start button down but there were no changes to the engine power. The pilot called ATC and declared an emergency. He used his GPS to return directly back to K88, and the controller also provided a vector. The pilot feathered the propeller and it completely stopped rotating; the pilot noticed a billow of smoke out of the right exhaust pipe. At that time, the airplane was about 6,500 ft and 8-9 miles from the airport. About 6 miles from the airport, the pilot decided he was unable to make it back to the airport. He saw an open dirt road and decided to conduct a forced landing on the road. During the landing rollout, the roadway became tree-lined and both wings were substantially damaged due to impact with trees.

The raw, unsmoothed data from the engine monitoring system indicated normal flight parameters until 17:29:35 when the fuel flow abruptly dropped to zero. The flaps were extended at 17:32:33 to about 16°, or takeoff position, and remained at 16° until the end of the flight. The airplane achieved 110 knots, best glide speed, at 17:32:35. The propeller was feathered at 17:33:10. Figure 1 depicts these events during the flight. From 17:29:48 until 17:33:18 the rate of descent exceeded 1,000 ft per minute (fpm) and was, at times, in excess of 4,000 fpm. During that 3.5-minute period, the airplane descended from about 11,900 ft to about 3,560 ft, an average descent rate of nearly 2,300 ft per minute.

In multiple statements provided by the pilot, there was no mention of the use of an emergency engine out checklist or consultation of the pilot operating handbook (POH) during the event.

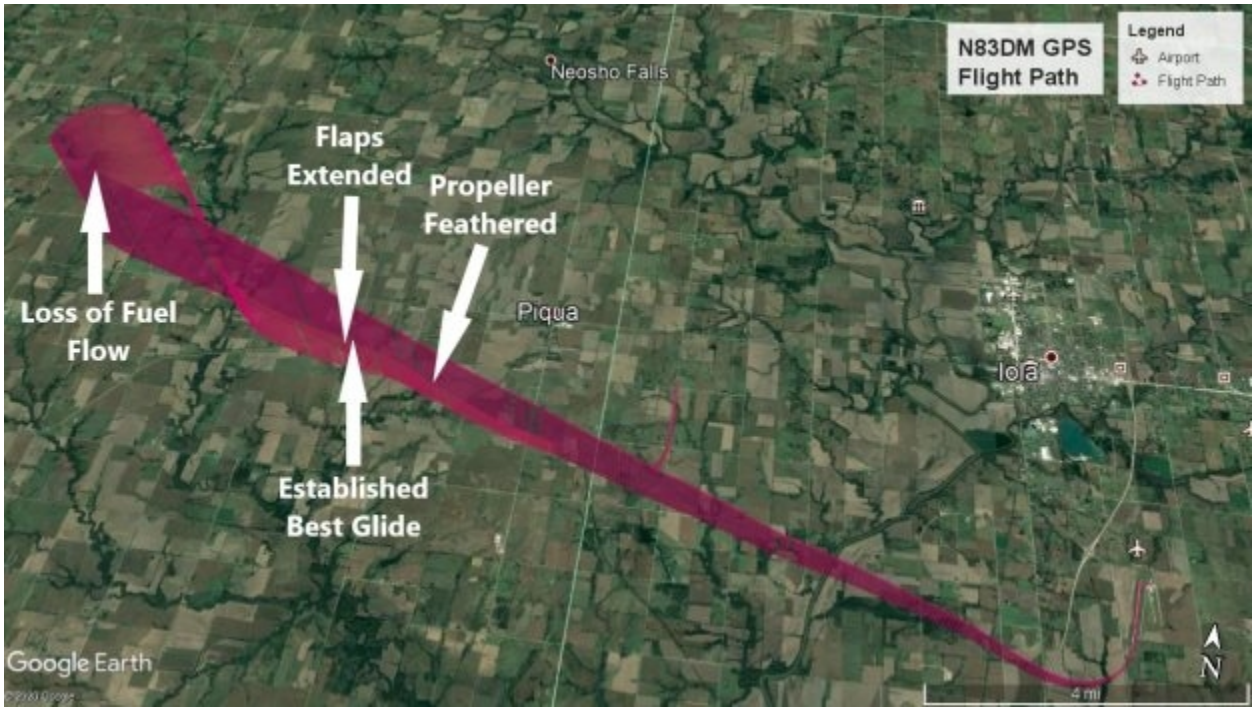

Figure 1: Plot of Flight Track with Control Inputs Depicted

Pilot Information

Certificate:	Private	**Age:**	40,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 Without waivers/limitations	**Last FAA Medical Exam:**	July 16, 2013
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	October 17, 2015
Flight Time:	1660 hours (Total, all aircraft), 359 hours (Total, this make and model), 1660 hours (Pilot In Command, all aircraft), 95 hours (Last 90 days, all aircraft), 37 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Passenger Information

Certificate:		**Age:**	Female
Airplane Rating(s):		**Seat Occupied:**	Right
Other Aircraft Rating(s):		**Restraint Used:**	3-point
Instrument Rating(s):		**Second Pilot Present:**	No
Instructor Rating(s):		**Toxicology Performed:**	No
Medical Certification:		**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:			

The pilot's flight instructor who completed transition training with the pilot stated the pilot did not sump the fuel before every flight. The instructor also explained that he advised his students that the engine can tolerate some water. The instructor did not mention addressing the pilot's lack of a proper preflight inspection or advise the pilot that sumping the fuel was necessary.

Aircraft and Owner/Operator Information

Aircraft Make:	AERO SMART SOLUTIONS INC	**Registration:**	N38DM
Model/Series:	LANCAIR EVOLUTION NO SERIES	**Aircraft Category:**	Airplane
Year of Manufacture:	2013	**Amateur Built:**	Yes
Airworthiness Certificate:	Normal	**Serial Number:**	EVO-0047
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	May 24, 2016 Annual	**Certified Max Gross Wt.:**	4500 lbs
Time Since Last Inspection:		**Engines:**	1 Turbo prop
Airframe Total Time:	442 Hrs at time of accident	**Engine Manufacturer:**	P&W CANADA
ELT:	Installed	**Engine Model/Series:**	PT6A-42
Registered Owner:	AERO SMART SOLUTIONS INC	**Rated Power:**	850 Horsepower
Operator:	AERO SMART SOLUTIONS INC	**Operating Certificate(s) Held:**	None

According to the POH, the recommended configuration for a forced landing is landing gear up, flaps up, propeller feathered, and airspeed at 110 knots. This configuration provides a maximum glide performance of about 500 fpm descent, an 18:1 glide ratio, and about 3.5 nm glide distance per 1,000 ft of altitude lost.

Pratt & Whitney Service Bulletin 12144, Turboprop Engine Fuels and Additives - Requirements and Approved Listing, states, "Fuel shall consist solely of hydrocarbon compounds except as otherwise specified herein. It shall be free from water, sediment, and suspended matter, and shall be suitable for use in aircraft turbine engines." The Lancair Evolution Pilot Operating Handbook (POH) highlights the importance of sumping fuel and checking fuel quality on preflight and after refueling. The POH states, "The fuel system feeds fuel to the engine through a fuel screen pickup, fuel selector, gascolator/fuel filter, electric boost pump ad finally a fuel control unit. The fuel tanks should be sumped at regular intervals." Fuel sumping is also called for in the preflight inspection checklist contained in the POH.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	K88	**Distance from Accident Site:**	
Observation Time:	22:35 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:		**Visibility**	10 miles
Lowest Ceiling:		**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.04 inches Hg	**Temperature/Dew Point:**	23°C / 9°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	IOLA, KS (K88)	**Type of Flight Plan Filed:**	IFR
Destination:	OGDEN, UT (OGD)	**Type of Clearance:**	IFR
Departure Time:	17:25 Local	**Type of Airspace:**	Class G

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Minor	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Minor, 1 None	**Latitude, Longitude:**	37.924446,-95.400001(est)

The airplane came to rest on the side of a tree-lined dirt roadway with substantial damage to both wings, the engine, and the empennage from tree strikes. The left wingtip separated about 9 ft outboard of the fuselage. The right wingtip separated just outboard of the fuel cap. The engine mounts were separated from the firewall, and the propeller blades had separated from the hub. The main and nose landing gear were separated.

Fuel samples were collected from 4 locations within the fuel system: the fuel control unit, fuel/oil heat

exchanger, fuel lines to/from the fuel pump, and the fuel filter. Federal aviation Administration (FAA) inspectors performed testing on the fuel samples collected from the fuel control and fuel filter using a Kolor Kut water finding paste. All 4 samples tested positive for water contamination.

The fuel control unit (FCU) and fuel pump were examined and tested by the engine manufacturer. The FCU test results were consistent with typical field adjustment for operation. Corrosion was noted on the fuel pump; however, it performed satisfactorily during testing.

An examination revealed no preimpact anomalies with the flight controls, engine, or fuel system that would have precluded normal operation.

Administrative Information

Investigator In Charge (IIC):	Liedler, Courtney
Additional Participating Persons:	Jon D George; FAA; Wichita, KS
Original Publish Date:	August 3, 2020
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=94133