



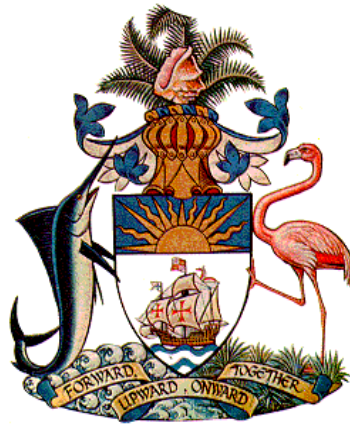
# Aviation Short Investigation Final Report

Fuel Related – (Fuel)  
Piper PA-32-301 – N106MR

**Marsh Harbour, Abaco, Bahamas**  
**10<sup>th</sup> September 2023**

**AAIA Aviation Occurrence Investigation**  
**Report # OCC-2023/0033**

**Date of Final Report**  
**12<sup>th</sup> July 2024**



Released in accordance with Section 25 of the Aircraft Accident Investigation Authority Act (AAIA) 2019 and Section 1.445 of the AAIA Regulations 2021.

### **Publishing information**

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## About the AAIA

The Aircraft Accident Investigation Authority (AAIA) is the independent accident investigation agency under the Bahamas Ministry of Energy & Transport (MOET) charged with the responsibility of investigating all aviation accidents and serious incidents in the Bahamas.

The AAIA's function is to promote and improve safety and public confidence in the aviation industry through excellence in:

- Independent investigation of aviation accidents and other safety occurrences
- Safety data recording, analysis and research
- Fostering safety awareness, knowledge and action.

**The AAIA does not investigate for the purpose of apportioning blame or to provide a means for determining liability.** At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the AAIA endeavors to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

The AAIA performs its functions in accordance with the provisions of the Aircraft Accident Investigation Authority Act 2019 and Regulations 2021, International Civil Aviation Organization (ICAO) Annex 13 and, where applicable, relevant international agreements.

The Aircraft Accident Investigation Authority is mandated by the Ministry of Energy & Transport to investigate aviation accidents and incidents, determine probable causes of accidents and incidents, issue safety recommendations, study transportation safety issues and evaluate the safety effectiveness of agencies and stakeholders involved in air transportation. The object of a safety investigation is to identify and reduce safety-related risk. AAIA investigations determine and communicate the safety factors related to the transport safety matter being investigated.

The AAIA makes public its findings and recommendations through accident reports, safety studies, special investigation reports, safety recommendations and safety alerts. When the AAIA issues a safety recommendation, the person, organization or agency is required to provide a written response without delay. The response shall indicate whether the person, organization or agency accepts the recommendation, any reasons for not accepting part or all of the recommendation(s), and details of any proposed safety action(s) resulting from the recommendation(s) issued.

## About this report

Decisions regarding whether to conduct an investigation, and the scope of an investigation, are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, a limited-scope, fact-gathering investigation was conducted in order to produce a short summary report, and allow for greater industry awareness of potential safety issues and possible safety actions.

# AIRCRAFT ACCIDENT

## INVESTIGATION AUTHORITY

**Registered Owner:** Island Flights Inc.

**Manufacturer:** Piper

**Aircraft Type:** PA-32-301

**Nationality:** United States of America

**Registration:** N106MR

**Place of Accident:** 4.97 miles south of Leonard Thompson Int'l Airport (MYAM), Marsh Harbour, Abaco, Bahamas

**Date and Time:** 10<sup>th</sup> September 2023  
4:28 pm local (2028 UTC)

**Notification:** Civil Aviation Authority Bahamas (CAA-B)  
National Transportation Safety Board (NTSB) United States

**Investigating Authority:** Aircraft Accident Investigation Authority,  
Ministry of Energy & Transport

**Investigator in Charge:** Kendall Dorsett Jr.

**Accredited Representatives:** Ralph Hicks (NTSB) United States

**Releasing Authority:** Aircraft Accident Investigation Authority

**Date of Final Report:** 12<sup>th</sup> July 2024

**Report Publication:**

## History of Flight

On the 10<sup>th</sup> September 2023 at approximately 4:28 pm local (2028 UTC), a Piper PA-32-301 aircraft with United States registration N106MR was involved in an occurrence while enroute to the Leonard Thompson International Airport (MYAM), Marsh Harbour, Abaco, Bahamas with five (5) persons on board.

The pilot reported to have observed a loss of engine power while in excess of 5 miles from MYAM and subsequently executed an emergency landing in an area of brush approximately 4.97 miles south of the airport.

The accident flight departed from the North Eleuthera International Airport (MYEH), Eleuthera, Bahamas shortly after 4:00 pm with the pilot in command of the aircraft indicating that the flight was uneventful up and until approaching MYAM.

Earlier that day, prior to the accident flight, the aircraft made a round trip flight between the Lynden Pindling International Airport (MYNN), Nassau, Bahamas and Sandy Point Airport (MYAS), Abaco, Bahamas, where 30 gallons of AVGAS fuel was added after the return leg to MYNN. Subsequent flights were made between MYNN – MYAM and then MYAM – MYEH.

During the accident flight while approaching MYAM at a distance in excess of 5 nautical miles from the airfield, a loss of engine power was observed and the pilot subsequently determined that the aircraft would not make the airfield which led him to execute an emergency landing in bushes approximately 4.97 miles south of MYAM.

The aircraft came to rest in an area of dense brush and all occupants were able to successfully exit the aircraft, shortly after, emergency responders inclusive of Royal Bahamas Police Force (RBPF) and Airport Authority officials arrived at the scene to render aid.

There were no reported injuries.

Damages were observed to the aircraft fuselage, undercarriage, propeller and left wing with the right wing detached from the aircraft at the wing chord.

## Injuries to Persons

Injuries	Crew	Passengers	Total
Fatal	0	0	0
Serious	0	0	0
None	1	4	5
<b>TOTAL</b>	<b>1</b>	<b>4</b>	<b>5</b>

## Aircraft Information

The Piper PA-32-301 Saratoga is a renowned single-engine aircraft with a rich history. Introduced by Piper Aircraft in 1980, it is the descendant of the esteemed Piper Cherokee Six and Lance models. This aircraft has earned a reputation among pilots for its impressive capabilities and versatility across various missions, such as personal travel, business trips, and flight training.

The airplane is an all metal, low wing, single engine airplane equipped with tricycle landing gear.

This airplane is certified in the normal category. In the normal category all aerobatic maneuvers including spins are prohibited. The airplane is approved for day and night VFR/IFR operations when equipped in accordance with F.A.R. 91 or F.A.R 135.

The aircraft is powered by a Lycoming IO-540-K1G5 engine and is rated at 300 horsepower. It is a six cylinder, normally aspirated, direct drive, air cooled, horizontally opposed, fuel injected engine. The standard fuel capacity of the airplane is 107 gallons (102 gallons usable). The inboard tank is attached to the wing structure with screws and nut plates. The outboard tank consists of a bladder fuel cell that is interconnected with the inboard tank.

Aircraft Manufacturer		Registration	
Piper		N106MR	
Serial Number		Registered Owner	
32-8206009		Island Flights Inc.	
Model/Series		Aircraft Category	
PA-32-301		Normal	
Engine Manufacturer		Engine Type	
Lycoming		Piston (IO-540-K1G5)	
Year of Manufacture		Airworthiness Date	
1981		10/30/1981	

The propeller was manufactured by Hartzell Propeller, model HC-C3YR-1RF/F7663R, Serial Number DY2452A.

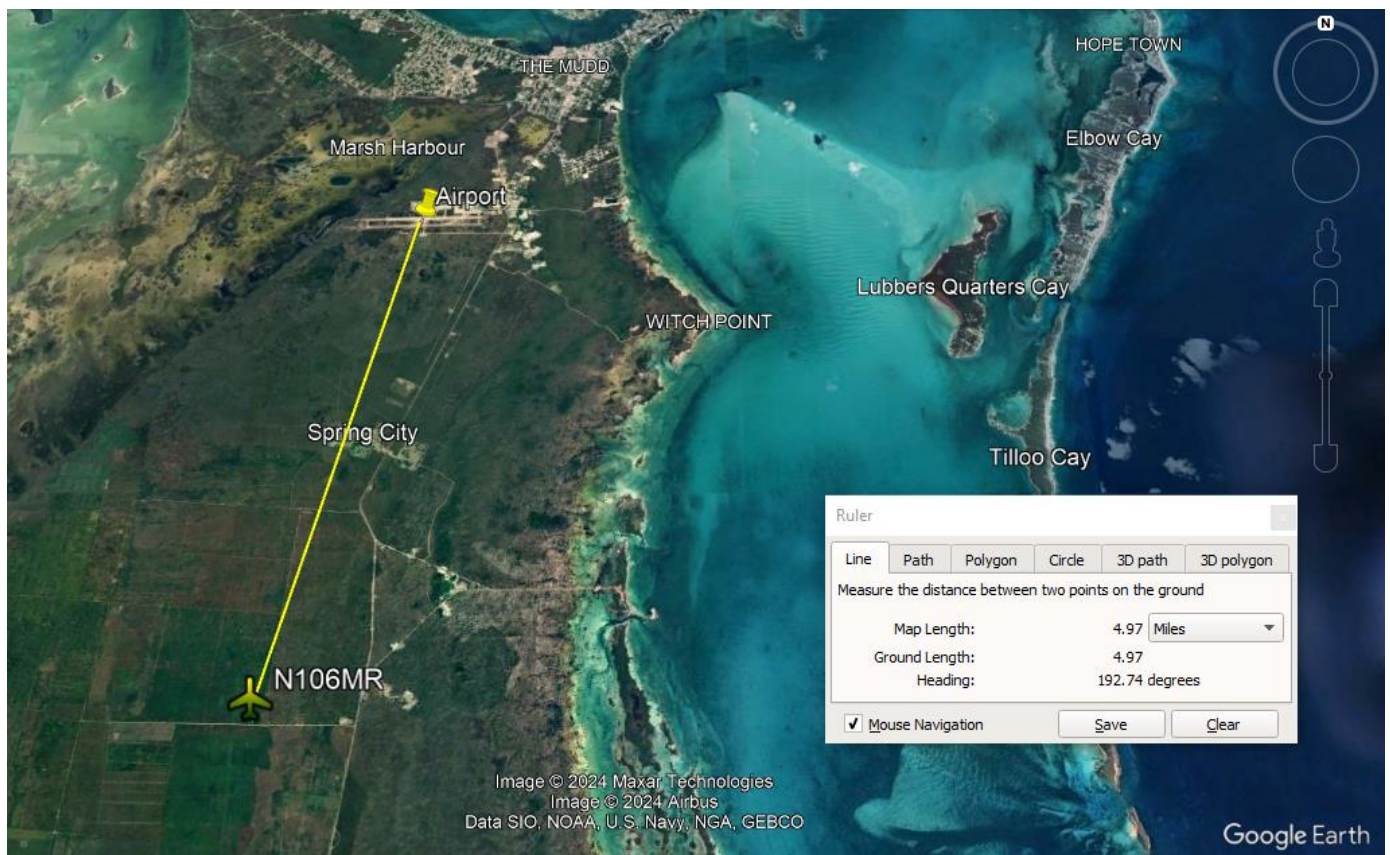
The last annual inspection for the aircraft was conducted on 7<sup>th</sup> March 2023 at an airframe total time of 5885.6 hours.

The AAIA received documentation of the aircraft maintenance records', Engine Annual Sign Off, Propeller Annual Sign Off, including sign off for the Airworthiness Directives (AD's) applicable.

Review of records provided revealed compliance with the manufacturers' maintenance manual and the United States Federal Aviation Administration Regulations Part 91.409 (a) 1 (Annual Inspections).

## Wreckage and Impact Information

<b>Crew Injuries</b>	<b>Aircraft Damages</b>
None	Fuselage, right wing, left wing, undercarriage, propeller, rudder, stabilator
<b>Passenger Injuries</b>	<b>Aircraft Fire</b>
None	None
<b>Ground Injuries</b>	<b>Aircraft Explosion</b>
None	Not Applicable
<b>Total Injuries</b>	<b>Latitude/Longitude</b>
None	26 26 25.6N 77 06 08.1W



*Fig.1: Crash site of N106MR in relation to MYAM*





*Fig.2: N106MR Point of Rest*

The aircraft came to rest in an area of dense brush at coordinates 26 26 25.6N 77 06 08.1W, at a distance of approximately 4.97 miles south of the Leonard Thompson International Airport (MYAM), Marsh Harbour, Abaco, Bahamas.

The aircraft was oriented in a westerly direction facing a heading of approximately 280° and positioned in a slightly nose down attitude on its right side. The right wing of the aircraft was detached from the fuselage at the wing chord and rested inverted diagonally.



*Fig.3: Drone shot of N106MR*

During onsite inspection by investigators in the aftermath of the occurrence, it was noted that there was no observation of the presence of AVGAS fuel visually or via smell, in the area surrounding the accident site. An analysis of the aircraft and engine were conducted at a secure facility by investigators of the AAIA and representatives of the Manufacturer of the aircraft and engine. The following were noted:

### **Airframe Fuel System**

The airframe fuel system was examined. No fuel was present in the left and right wing fuel tanks.

The fuel lines leading from each wing were separated at the wing root. Some fuel was found in the fuel selector valve/fuel sump. This fuel appeared blue in color and had some fine black sediment in it. This fuel was tested for water with Kolor Kut water detecting paste and was found not to contain water. Additional fuel came from the bottom of the fuel sump during removal of the fuel sump screen. The electric fuel pump switch in the cockpit was found in the off position. The electric fuel pump was test run using a 20V battery. The pump ran smoothly during testing. The firewall fuel line that feeds the fuel servo was opened and no fuel was observed. The fuel selector was found in the left tank selected position. Low pressure air was flowed from the firewall fuel line to both the left and right wing root with the fuel selector in the appropriate position for each side. The left and right wing fuel tank screens were observed to be clean. The left and right fuel caps were in place on the wings. The fuel cap gaskets appeared intact and pliable.

### **Wings**

The left wing displayed compression damage 70 inches outboard of the wing root and also at a position 48 inches inboard of the wing tip. The flap and aileron remained attached to the wing at the hinges. The left flap displayed some buckling near the outboard end. The aileron revealed minor damage. The aileron control rod remained attached to both the aileron and the left aileron bellcrank. Both aileron cables remained attached to the left bellcrank. The fixed left main landing gear remained attached and in place on the wing. The pitot mast remained attached to the wing and was clean. Two lift detectors remained attached to the leading edge of the wing and were impact damaged.

The right wing displayed compression damage to the inboard 48 inches of root end. The wing displayed compression damage to the leading edge 78 inches outboard of the wing root that was about 12 inches wide. The right aileron remained attached to the wing. The right aileron control rod from the bellcrank to the aileron was broken. The right flap separated from the wing at all three hinges. The right main landing gear was bent forward, toward the wing root and remained partially attached to the wing.

### **Continuity**

All aileron, rudder, stabilator and stabilator trim control cable continuity was confirmed. Only the aileron cables were separated at the wing roots during the accident and recovery. All flight control surfaces remained attached to their mounting locations with the exception of the right flap and tip of the right stabilator which had separated from the wing and empennage during the impact sequence.

The left and right aileron bellcranks remained attached to their respective wings with both aileron cables attached to each bellcrank. The aileron cables had been cut by recovery personnel at the wing root of each side.

Both rudder cables remained attached at the rudder bar in the cockpit and at the rudder horn at the empennage. Appropriate movement of the rudder pedals and rudder surface were confirmed when moved by hand.

The stabilator remained attached to the empennage. The stabilator trim surface remained attached to the stabilator. The left side of the stabilator had been cut by recovery personnel about 24 inches inboard of the tip. The right side of the stabilator revealed compression damage and was torn off about 54 inches

outboard of the airframe centerline. Both stabilator cables remained attached to the stabilator control tube in the empennage and at the control column. The stabilator balance weight remained attached to the stabilator control tube. Appropriate movement of the control column and stabilator was observed during hand movement.

The stabilator trim actuator rod extension measured 1.1 inches on the top side. That equated to a slight nose up trim setting. The stabilator trim control wheel was intact and moved the stabilator trim actuator appropriately when turned. Stabilator trim cable continuity was confirmed.

## **Propeller**

The Hartzell, three blade propeller remained attached to the engine propeller flange. All three blades were bent aft to varying degrees. One blade was loose in the hub. Two blades displayed some minor chordwise scarring and leading edge gouging at the tip. No significant signatures of power were noted on the propeller blades.

## **Tests**

### **Engine**

An engine exam was conducted by the engine manufacturer on 12/13/2023 at Florida Air Recovery located in Fort Pierce, FL under the supervision of the AAIA with the airframe manufacturer present.

As first viewed, the engine remained attached to the accident aircraft via its respective engine mount with minor impact damage to the lower side and firewall. All exhaust tubes suffered impact damage and were bent rearwards. All intake tubes were found attached and undamaged.

The oil dipstick was installed to the engine at the time of the exam with 12 qts. of oil indicated on the dipstick. The oil suction screen was found tightly installed and free and clear of any debris. The oil filter was found tight to the accessory section of the engine and not removed or cut open as part of the examination.

Both magnetos were found tightly installed to the rear of the engine with their respective ignition harnesses attached. Each magneto was removed and rotated by hand producing spark at each terminal. The impulse of the L/H magneto was also found function during rotation.

The engine starter was attached to the engine and no starter ring gear contact was noted with the starter housing.

The vacuum pump was found tightly installed to the rear of the engine and removed for examination. The drive coupling was found sheared which created small round balls of material between the pump and drive port of the accessory housing. This is usually a condition noted when the engine is operated for a period of time with a sheared coupler. The carbon rotor was also found cracked within the vacuum pump.

The top spark plugs were removed from each cylinder and a lighted borescope inspection was conducted. The borescope was unremarkable on each cylinder. Thumb compression was noted on all cylinders when the engine was rotated through its normal cycle. Valve train continuity was also confirmed on all valves and rocker arms during this engine rotation.

The engine driven fuel pump was found tightly installed to the rear of the engine and removed. The unit was placed in a table top vice and actuated by hand, fuel was present within the pump, actuated by hand, and produced suction and compression at its respective ports.

The fuel servo for the engine was tightly installed with both its mixture and throttle arms free to move through their normal range of motion. The fuel inlet screen was removed and found to be free and clear of debris with trace fuel within the unit. The diaphragms were removed, and both found to be free and clear of debris or any tears. All fuel injectors were tightly installed to their respective cylinders, removed, and found to be clear of obstruction.

The electrical fuel boost pump was located and tested with 20volts DC and the unit actuated and tested ok.

The prop governor was removed from the engine and its gasket screen was free and clear of any debris. The drive was manually rotated with no anomalies noted.

There were no deficiencies noted during the course of this examination that would have precluded normal engine operation at the time of the accident.

# Investigation Findings

## Pilot

The pilot in command of the aircraft was 22 years of age at the time of the accident and possessed a Private Pilot’s License issued by the United States Federal Aviation Administration (FAA) on 22<sup>nd</sup> October 2021 with an Airplane Single Engine Land, Multi-Engine Land and Instrument Ratings, with the limitation “Airplane Multi-Engine VFR Only”.

At the time of the accident, the pilot had accumulated approximately 731 hours of total flight time, with 629 hours of multi-engine time. Within the preceding seven (7) days of the accident, the pilot accumulated approximately 14.6 hours of flight time.

A Third Class medical certificate was held by the pilot, issued July 2020 with no limitations or waivers attached.

## Weather

### Meteorological Information:

Conditions at Accident site		Condition of Light	
Visual Meteorological Conditions		Day	
Observation Facility Location		Observation Time	
Lynden Pindling Int’l Airport (MYNN)		2000 UTC (4:00 PM)	
Distance from Accident Site		Temp /Dewpoint	
90 miles		30° C/ 24° C	
Lowest Cloud Condition		Wind	
FEW015		150/09	
Altimeter Setting		Visibility	
29.97 in. HG		>6 statute miles	

## Analysis

**The AAIA does not investigate for the purpose of apportioning blame or to provide a means for determining liability.** At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the AAIA endeavors to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

In review of the aircraft maintenance documentation, it was determined that the aircraft was maintained in accordance with the manufacturers' specifications and regulatory requirements.

A complete aircraft teardown and analysis was conducted in support of this investigation by the aircraft and engine manufacturers (Piper and Lycoming) under the supervision of the AAIA. At the end of this process, of note was the following:

- The airframe fuel system was examined. No fuel was present in the left and right wing fuel tanks.
- The engine driven fuel pump was found tightly installed to the rear of the engine and removed. The unit was placed in a table top vice and actuated by hand, fuel was present within the pump, actuated by hand, and produced suction and compression at its respective ports.
- The electric fuel pump was test run using a 20V battery. The pump ran smoothly during testing.
- The firewall fuel line that feeds the fuel servo was opened and no fuel was observed.
- Low pressure air was flowed from the firewall fuel line to both the left and right wing root with the fuel selector in the appropriate position for each side.
- There were no deficiencies noted during the course of this examination that would have precluded normal engine operation at the time of the accident.

On the day of the accident, the aircraft conducted four legs prior to the accident flight and there was no observation by the pilot in command of any malfunction or abnormality with the aircraft.

After the second leg, it was verified that 30 gallons of AVGAS fuel was purchased. There was no verification received to confirm what amount of fuel may have been in the fuel tanks prior to the final fuel purchase before the occurrence.

From the point of fuel purchase at Lynden Pindling International Airport (MYNN), Nassau, Bahamas to the Leonard Thompson International Airport (MYAM), Marsh Harbour, Abaco, Bahamas, covers a distance of approximately 90 miles. Then from MYAM to the North Eleuthera International Airport (MYEH), North Eleuthera, Bahamas covers a distance of approximately 67 miles.

As there was no evidence to determine how much fuel was in the tanks before the purchase of 30 gallons, it can be deduced that at the very least, it would have had that amount. The aircraft would have had to cover a total distance of approximately 224 miles if it had successfully landed at MYAM instead of crashing 4.97 miles short of the runway.

It should be noted that the 30 gallons of fuel purchased represents just under 1/3 of the aircraft total fuel capacity whilst the distance of 224 miles would be approximately in the range of 1/4 of the endurance of the aircraft.

With the absence of fuel observed in the fuel tanks during the onsite analysis by investigators responding to the accident and as there was no observation of the presence of fuel in the areas surrounding the crash site, either visually or by scent, it is apparent that the absence of fuel is consistent with the loss of power event when combined with the results of the aircraft teardown that indicated nothing should have prevented the engine from functioning normally at that time.

## Findings

These findings should not be read as apportioning blame or liability to any particular organization or individual.

- 1) The aircraft was certified, registered and equipped in accordance with applicable United States Aviation Regulations and approved procedures.
- 2) The maintenance records indicated that the aircraft was maintained in accordance with the manufacturers' specifications and existing United States Aviation Regulations and approved procedures.
- 3) The pilot in command possessed a Private Pilot License issued by the Federal Aviation Administration (FAA) on 22<sup>nd</sup> October 2021 with an Airplane Single Engine Land, Multiengine land and Instrument Rating. The limitation "Airplane Multiengine VFR Only" was attached.
- 4) The pilot in command possessed a valid Third Class Medical Certificate issued by the FAA.
- 5) The aircraft was not equipped with a flight data recorder (FDR) or a cockpit voice recorder (CVR); neither was required by regulations.
- 6) Weather was not a factor in this occurrence.
- 7) There was no evidence of any defect or malfunction in the aircraft that could have contributed to the accident.
- 8) A purchase of 30 gallons of AVGAS fuel was made after the second leg of flight.
- 9) The amount of fuel present in the fuel tanks prior to the addition of purchased fuel could not be verified.
- 10) The pilot in command observed a loss of engine power and subsequently executed an emergency landing in an area of dense brush approximately 4.97 miles south of the Leonard Thompson International Airport (MYAM), Marsh Harbour, Abaco, Bahamas.
- 11) The aircraft received substantial damage including to the fuselage, both wings, undercarriage, propeller, and rudder.
- 12) Investigators responding on scene did not observe an indication of fuel in the area of bush surrounding the crash site, either visually or by scent.
- 13) Inspections carried out on scene by investigators indicated no observation of the presence of fuel within the fuel tanks.



- 14) Aircraft and engine teardown and analysis was conducted by aircraft and engine manufacturer (Piper and Lycoming) under the supervision of the AAIA.
- 15) Teardown and analysis revealed that both the engine and electric driven fuel pumps were functional and able to operate normally.
- 16) The firewall fuel line was determined to be unobstructed.
- 17) During teardown and analysis, there were no deficiencies noted during the course of the examination that would have precluded normal engine operation at the time of the accident.

## **Probable Cause**

The AAIA has determined the probable cause of this accident to be fuel exhaustion (FUEL) resulting in subsequent controlled flight into terrain (C-FIT).

## **Safety Recommendation(s)**

There were no safety recommendations issued in relation to this occurrence.