Republic of the Philippines
DEPARTMENT OF TRANSPORTATION
CIVIL AVIATION AUTHORITY OF THE PHILIPPINES
MIA Road, Pasay City 1300

AIRCRAFT ACCIDENT INVESTIGATION AND INQUIRY BOARD

FINAL REPORT

RP-R1423
ALLIED AG CAT PRODUCTIONS, INC. G-164

OPERATOR: SOUTH PACIFIC AERIAL SPRAYING SERVICES (SPASS)

TYPE OF OPERATION: AGRICULTURAL SPRAYING

DATE OF OCCURRENCE: DECEMBER 20, 2023

PLACE OF OCCURRENCE: PUROK 5, BARANGAY CONCEPCION, MACO, DAVAO DE ORO, PHILIPPINES

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FOREWORD

This report was produced by the Aircraft Accident Investigation and Inquiry Board (AAIIB), Civil Aviation Authority of the Philippines, MIA Road, Pasay City, Philippines.

The report is based upon the investigation carried out by the AAIIB in accordance with Annex 13 to the Convention on International Civil Aviation, Republic Act 9497 Section 42, and Philippine Civil Aviation Regulation Part 13.

Readers are advised that the AAIIB investigates for the sole purpose of enhancing aviation safety. Consequently, AAIIB reports are confined to matters of safety significance and may be misleading if used for any other purpose. It should be noted that the information in AAIIB reports and recommendations is provided to promote aviation safety, and in no case is it intended to imply blame or liability.

Furthermore, no part of the AAIIB report or reports relating to any accident or investigation shall be admitted as evidence or used in any suit or action for damages arising out of any matter mentioned in such report or reports.

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FINAL REPORT

TITLE: Accident involving an Allied Ag Cat Productions, Inc. G-164 type of aircraft with Registry Number RP-R1423, operated by South Pacific Aerial Spraying Services (SPASS) had a forced landing at Purok 5, Barangay Concepcion, Maco, Davao de Oro, Philippines, on December 20, 2023, at around 0645H.

Notification of Occurrence to National Authority

The accident was reported by the Operator to the CAAP AAIIB on December 20, 2023.

Identification of the Investigation Authority

The Aircraft Accident Investigation and Inquiry Board (AAIIB), the mandated accident investigation organization within the Civil Aviation Authority of the Philippines (CAAP) as the state of Occurrence/Registry/Operator conducted the investigation.

Organization of the Investigation

In accordance with the provisions of Philippine Civil Aviation Regulation (PCAR) Part 13, an Investigator-In-Charge was appointed.

Authority Releasing the Report

The Final Investigation Report was released by Aircraft Accident Investigation and Inquiry Board (AAIIB) and published on the CAAP website on **31 May 2024.**

Synopsis:

On or about 0645H on December 20, 2023, an Allied Ag Cat Productions, Inc. G-164 aircraft with registry number RP-R1423 sustained substantial damage following a forced landing due to a loss of engine power at Purok 5, Barangay Concepcion, Maco, Davao de Oro Philippines. The aircraft, owned and operated by South Pacific Aerial Spraying Services (SPASS) and based at Francisco Bangoy Airport, Sasa, Davao City, had just completed its second round of spraying activities at a banana plantation in the area. It had earlier taken off from the MEPI airstrip located in Sto. Tomas, Davao del Norte. The pilot exited the aircraft without any reported injuries, while the aircraft sustained substantial damage. The investigation determined that the probable cause of the accident was fuel starvation due to a clogged fuel filter.

LIST OF ACRONYMS AND ABBREVIATIONS

AAIIB	:	Aircraft Accident Investigation and Inquiry Board
AMT	:	Aircraft Maintenance Technician
BRGY	:	Barangay
CAAP	:	Civil Aviation Authority of the Philippines
CoA	:	Certificate of Airworthiness
CPL	:	Commercial Pilot License
FSIS	:	Flight Standards Inspectorate Service
OFSAM	:	Office of the Flight Surgeon and Aviation Medicine
PCAR	:	Philippine Civil Aviation Regulations
SPASS	:	South Pacific Aerial Spraying Services
UTC	:	Coordinated Universal Time
VFR	:	Visual Flight Rules
VMC	:	Visual Meteorological Condition

1. FACTUAL INFORMATION

Aircraft Registration No.	:	RP- R1423
Aircraft Type/Model	:	Allied Ag Cat Productions, Inc. G-164
Operator	:	South Pacific Aerial Spraying Services (SPASS)
Address of Operator	:	Francisco Bangoy Airport, Sasa, Davao City, Philippines
Place of Occurrence	:	Purok 5, Barangay Concepcion, Maco, Davao de Oro, Philippines
Date/Time of Occurrence	:	December 20, 2023, at about 0645H/2245 UTC
Type of Operation	:	Agricultural Spraying
Phase of Flight	:	Cruise
Type of Occurrence	:	Reciprocating engine - fuel starvation

1.1 History of Flight

On or about 0645H of December 20, 2023, an Allied Ag Cat Productions, Inc. G-164 type of aircraft with registry number RP-R1423 sustained substantial damage following a forced landing due to loss of engine power at Purok 5, Barangay Concepcion, Maco, Davao de Oro Philippines. The aircraft is owned and operated by South Pacific Aerial Spraying Services (SPASS), based in Francisco Bangoy Airport, Sasa, Davao City. The accident occurred after the second (2nd) round of spraying activities at the banana plantation in the area was completed. The aircraft had earlier taken off from the MEPI airstrip located at Sto. Tomas, Davao del Norte.

According to the pilot, he observed the engine sputtered while executing a turn, just after completing his fourth (4^{th}) line of spraying for his second (2^{nd}) sortie. The engine continued to sputter and subsequently began to lose power. The pilot adjusted his throttle settings to regain power, however, the engine continued to sputter, and the aircraft began to lose altitude.

The pilot decided to look for a suitable area for a forced landing. He spotted a creek that appeared to be a potential landing spot, but decided not to proceed because he could not estimate the water's depth. Instead, he opted to make the forced landing on a small clearing within the banana plantation area.

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1.2 Injuries to Person (s)

Injuries	Crew	Passengers	Others	TOTAL
Fatal	0	0	0	0
Serious	0	0	0	0
Minor	1	0	0	1
None	0	0	0	0

1.3 Damage to Aircraft

The aircraft incurred substantial damage.

Figure 1 – Aircraft wings were damaged after making contact with the ground.

Figure 2 – Damage on the aircraft's lower fuselage and engine.

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1.4 Other Damages

Damage to at least twenty (20) banana crops was noted at the accident site.

1.5 Personnel Information

1.5.1 Pilot

Gender	:	Male
Date of Birth	:	October 30, 1951
Nationality	:	Filipino
License	:	102197 CPL valid until March 31, 2027
Type rating	:	Single Engine Land - AgCat G164
Medical Certificate	:	Class 1 valid until April 02, 2024
Date of last medical	:	September 09, 2023
Total flying time	:	24,808 + 18 Hours as of December 20, 2023
Total flying time on type	:	10,000 + 10 Hours as of December 20, 2023

1.6 Aircraft Information

The Allied Aircraft Productions, Inc. G-164, or Grumman Ag Cat, is a specialized agricultural aircraft known for its durability, performance, and suitability for crop dusting and other aerial farming tasks. Its biplane design, powerful engine, and excellent handling characteristics make it a favored choice among agricultural pilots.

The G-164 was first introduced in the 1950s by Grumman Aircraft Engineering Corporation. Over the years, it has undergone various modifications and improvements, maintaining its popularity among agricultural operators.

Equipped with a powerful radial engine, such as the Pratt & Whitney R-985, providing reliable performance and the capability to carry substantial payloads. It was designed to carry significant loads of chemicals and fertilizers, which are stored in a hopper usually located between the engine and the cockpit. Known for its excellent low-speed handling, stability, and maneuverability, making it ideal for precise agricultural applications.

1.6.1 Aircraft Data

Registration Mark	:	RP-R1423
Manufacturer	:	Allied Ag Cat Productions, Inc.
Country of Manufacturer	:	United States of America
Type/Model	:	Ag Cat G-164
Operator (Owner)	:	South Pacific Aerial Spraying Services
Serial No.	:	352
Year of Manufacture	:	1975
Certificate of Airworthiness	:	Valid until August 13, 2024
Certificate of Registration	:	Valid until May 21, 2024

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Category	:	Restricted
Gross Weight	:	4,500 lbs.
Number of Flight Crew	:	1
Number of Passenger	:	Nil
Airframe total time	:	18,162 + 28 Hours since last C of A

1.6.2 Engine Data

Manufacturer	:	Pratt and Whitney
Type	:	Reciprocating (Radial)
Model	:	R985-AN-14B
Engine Serial No.	:	105084
Engine TBO	:	1,000 Hours
Engine TSO	:	809 + 43 Hours since last C of A
Engine Total Time	:	10,309 + 43 Hours since last C of A

1.6.3 Propeller Data

Manufacturer	:	Hamilton Standard
Type	:	Constant Speed, Hydromatic Propeller
Model	:	2D30
Propeller Serial No.	:	735851
Date last Installed	:	June 18, 2022
Propeller TBO	:	1,200 Hours
Propeller TSO	:	822 + 08 Hours since last C of A
Propeller total time	:	5,622 + 13 Hours since last C of A

1.7 Meteorological Information

Visual Meteorological Conditions (VMC) prevailed at the time of the occurrence.

1.8 Aids to Navigation

The flight departed under VFR. Using VFR, the pilot must be able to operate the aircraft with visual references to the ground and visually avoid obstructions and other aircraft.

1.9 Communications

The aircraft is equipped with a standard radio transceiver. Communications were carried out between the pilot and the plantation's operations personnel overseeing the spraying activity.

1.10 Flight Recorder

The aircraft is not equipped with any flight recorders, and the existing Philippine Civil Aviation Regulation (PCAR) does not require it to be installed for that type of aircraft.

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1.11 Wreckage and Impact Information

During the landing, the aircraft wings collided with steel wires used within the plantation, causing the aircraft to sway around and eventually settle in a water ditch approximately 4-5 meters in depth. Approximately twenty (20) or more banana crops were uprooted or damaged due to a collision with the aircraft.

The aircraft's final position was at 7º 23' 44.5" N, 125º 51'51.7" E with a last heading of 7º NE. The accident site is approximately 14.85 NM from the flight point of departure, which was at MEPI airstrip.

On ocular inspection of the site, it was observed that part of the engine was partly buried in the soft ground due to impact.

Figure 3 – The aircraft hitting some banana trees.

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Figure 4 – The aircraft hanging in the ditch.

Figure 5 – The aircraft's right wing as seen from the other side of the ditch.

Figure 6 – A portion of the aircraft engine is embedded in soft ground.

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1.12 Medical and Pathological Information

The pilot involved underwent the required post-accident medical check-up at the local hospital in Davao, which included drug and alcohol tests. The initial test results indicated a fracture on his right hand (5th metacarpal).

These results were then endorsed to the CAAP Office of the Flight Surgeon and Aviation Medicine (OFSAM) and later cleared by the said office after he submitted additional X-ray results showing healing of his fracture and demonstrated his ability to move the controls with ease and without limitation.

1.13 Fire

Inspection of the aircraft revealed no evidence of a post-crash fire.

1.14 Search and Survival Aspects

The accident was survivable, as the aircraft cockpit was generally intact after the occurrence. The pilot was able to safely exit from the aircraft with only a minor injury. Banana plantation farmers and personnel promptly responded to the crash site to help the pilot. The pilot was later brought to the nearby hospital by responding SPASS personnel.

1.15 Organizational and Management Information

South Pacific Aerial Spraying Services (SPASS) is a holder of a CAAP-issued Agricultural Aircraft Operator Certificate No. 11-2011009, issued on March 24, 2020 and valid until March 23, 2025, 2027. The company's head office is located at Francisco Bangoy Airport, Sasa, Davao City, Philippines. The company is engaged in domestic non-scheduled agricultural spraying services.

Moreover, the company's approved Operations Specifications listed RP-R1423, RP-R1130, RP-R2508, RP-R2515, RP-R4416, RP-R4456, RP-R4418, RP-R441 and RP-R4412 aircraft as part of its operating fleet, supporting its day-to-day operations.

2. ANALYSIS

2.1 Pilot

2.1.1 Training and Qualifications

A review was made of the available pilot's records and was able to establish the following:

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a. The personnel involved was a seasoned pilot who had been flying agricultural spraying aircraft, particularly the Ag Cat G-164, for a very long time;

b. He completed his latest recurrent training on this type of aircraft on September 15-16, 2023;

c. At the time of the accident, the involved pilot has already accumulated 10,000 flying hours operating the Ag Cat G-164 type of aircraft;

d. He has been working as a pilot with SPASS since CY 2016.

2.1.2 Flight/Duty Schedule

A review of the latest published schedule for the subject pilot disclosed the following information:

Date	Area of Assignment/Farm
November 03, 2023	MD Rio Vista
November 07, 2023	MD Rio Vista
November 22, 2023	MD Rio Vista
December 02, 2023	MD Rio Vista
December 04, 2023	MD Rio Vista
December 08, 2023	MD Rio Vista
December 14, 2023	MD Rio Vista
December 15, 2023	MD Rio Vista
December 20, 2023	MD Rio Vista

The above data indicates that the pilot concerned was assigned a schedule that ensures balanced work and rest periods. Observance of the standard pilot duty times and rest requirements appears to have been considered.

Further, an interview with the subject pilot revealed that on the day of the accident, he reported to work in a fitting condition to carry out his pilot responsibilities effectively and safely.

2.2 Aircraft Status

2.2.1 Pre-Flight Inspection

A review of the Pre-Flight Inspection Checklist for RP-R1423 revealed that the required inspection had been regularly performed by the assigned maintenance personnel and pilot before its first flight of the day. Records show that the aircraft had been flying since November 3, 2023, until the time of the accident without any discrepancies noted during pre-flight inspections.

Further checking of records disclosed that the maintenance personnel who conducted the pre-flight inspections of the subject aircraft had an Aviation Maintenance Technician

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(AMT) license issued by the CAAP on February 19, 2020, and valid until February 18, 2025. He also has records of training on the subject aircraft as well as on R-985 radial engines.

2.2.2 Maintenance Records

A review of the aircraft documents revealed that the aircraft had undergone the required 50-hour inspection on September 22, 2023, and its latest 100-hour inspection on October 16, 2023. Additionally, an evaluation of the aircraft logbooks disclosed that all required maintenance documentation on the subject is in order. There were also no recorded discrepancies in the Aircraft Maintenance and Flight Log or any pending maintenance actions for RP-R1423 until the day of the accident.

2.3 Scheduled Flight December 20, 2023

On the morning of December 20, 2023, the pilot took off from the MEPI airstrip at around 0600H for his first flight of the day. The flight was uneventful, and after completing his first load of spraying, he returned to the airstrip to prepare for his next load. He took off again at around 0645H and began his second round of spraying activity. During his second flight, the engine started to make a successive sputtering sound just as he was making his turn after completing the spraying of his fourth line of banana crops. The pilot suspected that some engine cylinders had burst, so he adjusted his throttle settings to reduce further stress on the engine. However, the engine continued to sputter, and the aircraft began to lose altitude, leading to the decision to make an immediate forced landing.

An interview with the pilot revealed that this was his first time encountering such engine behavior on this specific aircraft. He had been flying with it for the past two (2) months and had not experienced anything similar. Everything seemed normal until the sputtering sound, and there were no issues with the aircraft's handling.

2.4 Test and Research

After completing the on-site documentation at the accident site, SPASS maintenance personnel, under the supervision of the CAAP AAIIB Investigator, conducted several tests based on the issue reported by the pilot.

The first thing considered was to check the fuel for any contaminants that may have affected the engine’s performance. A sample of fuel was taken from the aircraft and subjected to a thorough visual inspection to detect any residue that might have led to sputtering. Based on the inspection, it can be said that the fuel used on the aircraft during the accident was free from any impurities.

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Figure 7 – Fuel sampling taken on the site.

After the fuel sampling, the carburetor filter was removed for inspection. Upon examination, the filter appeared significantly darkened or blackened and almost opaque, suggesting a substantial buildup of contaminants. This discoloration indicated that the filter was likely obstructed, potentially affecting the flow of fuel and causing the engine's performance to degrade. To address this, the filter was shaken to remove the suspected clogs, and it was confirmed that a significant residue of fibrous material was blocking the filter. Additional material came off when the filter was further cleaned.

In the discussion with maintenance personnel, it was suggested that the material retrieved from the carburetor filter might have originated from the chamois used as a filter during refueling. It was further learned that the inspection and cleaning of the filter are part of the 50-hour scheduled inspection, which was recently completed on September 28, 2023. According to the maintenance personnel who conducted the inspection, the filter was checked and cleaned during the last 50-hour inspection. Based on experience, such residue can be observed on the filter during inspection. As for the chamois being used as a filter during refueling, this is noted to be part of the existing SPASS Fuel Maintenance Policies and Procedures. However, it can also be noted that currently, there is no specific written process outlining the condition under which a certain chamois can be used as a filter or the duration for which it can still be used.

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Figure 8 – Carburetor filter upon retrieval.

Figure 9 – Carburetor filter after being shaken off.

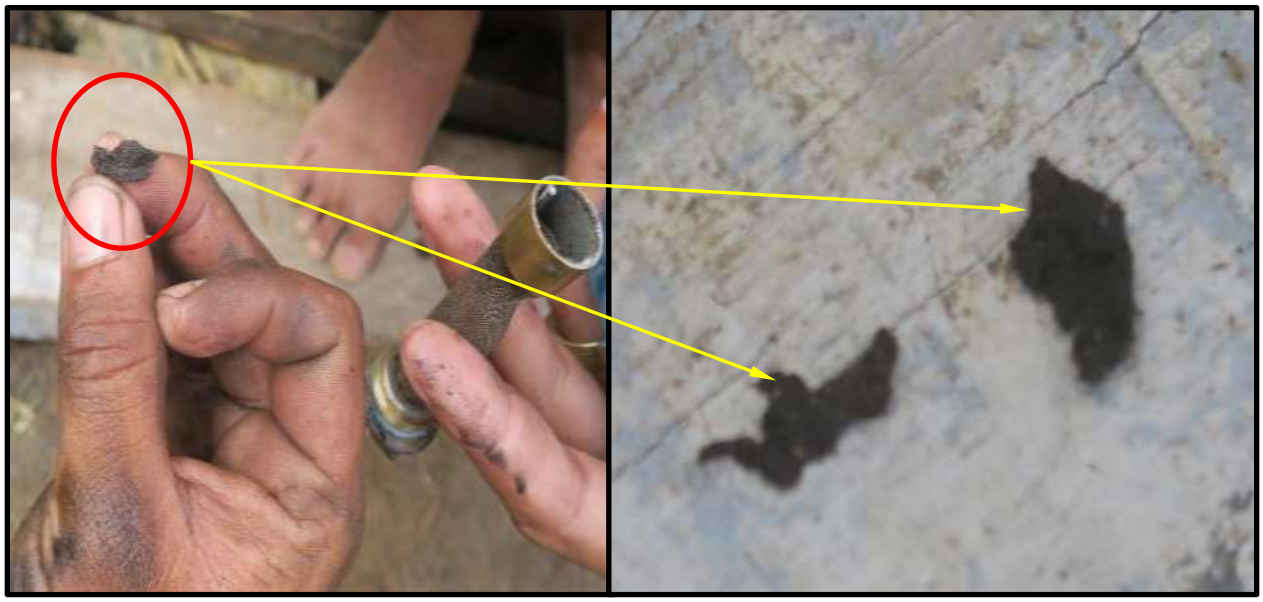

Figure 10 – Fibrous material taken out from the carburetor filter.

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Figure 11 – Funnel and chamois used during refueling.

Furthermore, the engine's magnetos and spark plugs were also tested for operational functionality and found to be in working order. An engine compression check was also performed and yielded satisfactory results. Additionally, the airframe filter was removed and inspected, revealing that it was clear of any obstructions.

Figure 12 – SPASS personnel checking one of the engine's magnetos.

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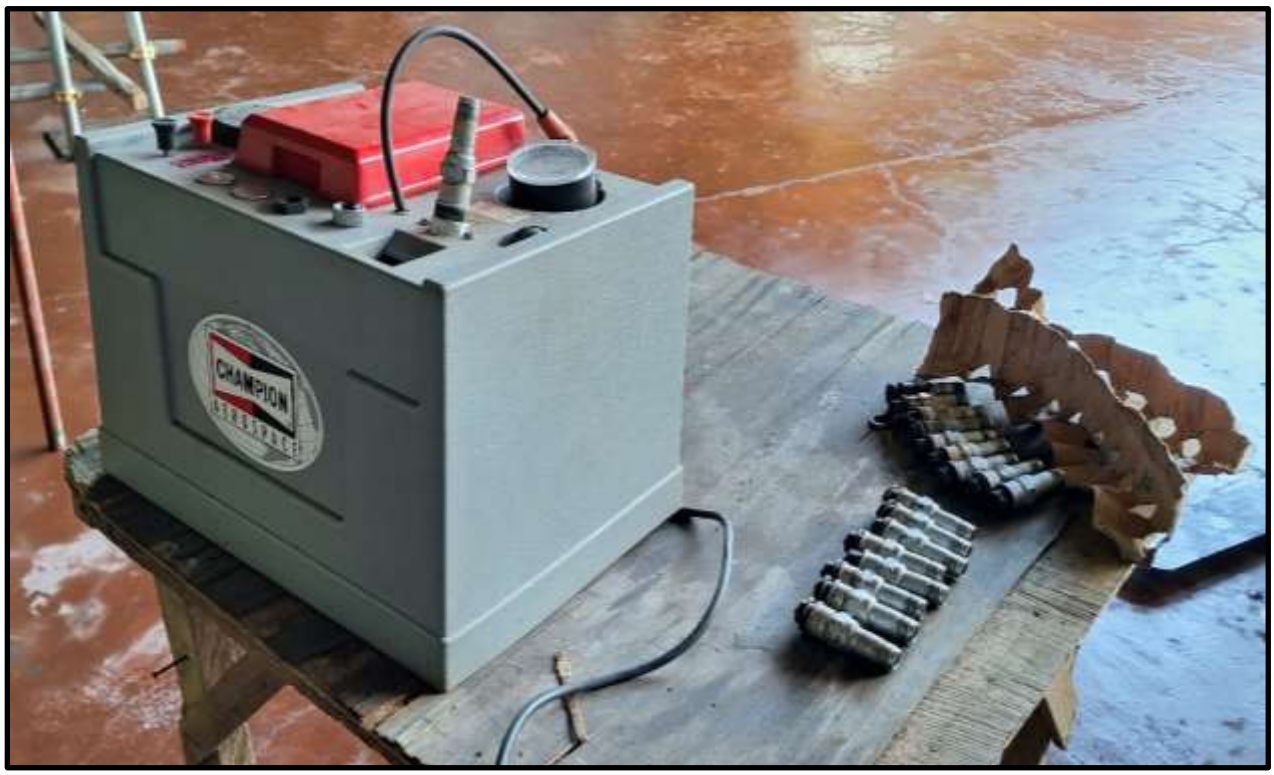

Figure 13 – The engine spark plugs with the tester.

Figure 14 – Some compression checks performed on the engine's cylinders.

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Figure 15 – The engine airframe filter.

3. CONCLUSIONS

3.1 Findings

a. The involved pilot is a holder of a valid pilot license and medical certificate issued by the CAAP.

b. The pilot holds the appropriate rating to perform his functions for that specific type of aircraft.

c. The aircraft has valid Certificates of Airworthiness and Registration.

d. The Operator is a holder of a valid Agricultural Aircraft Operator Certificate issued by the CAAP and the aircraft involved is part of its approved Operations Specifications.

e. The aircraft was released for flight without any recorded maintenance issues. Likewise, documentation of the aircraft maintenance is available and in proper order.

f. Fibrous material residue from the chamois used as a filter during refueling was found blocking the engine's carburetor filter, potentially affecting fuel flow and causing erratic engine performance.

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g. The serviceability of a chamois being used as a filter is not defined in the operator's published Fuel Maintenance Policies and Procedures.

3.2 Probable Cause

3.2.1 Primary Cause Factors

a. Fuel starvation due to clogged fuel filter.

3.2.2 Contributory Cause Factor

a. The use of a chamois as a filter during refueling without any defined criteria or timeline for its serviceability.

4. SAFETY RECOMMENDATIONS

4.1 The AAIIB proposes the following safety recommendation to the CAAP-FSIS as a result of the investigation conducted:

a. The operator should review their current preventive maintenance schedule for inspecting the engine's carburetor filter to ensure that it is free and clear from foreign objects.

b. The operator should define in their published Fuel Maintenance Policies and Procedures the criteria for determining the serviceability of filters, such as chamois, used during refueling.

-----End-----

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