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-R5837
ALLIED AG-CAT G-164A

OPERATOR: AEROWURKZ AERIAL SPRAYING SERVICES

TYPE OF OPERATION: AGRICULTURAL SPRAYING

DATE OF OCCURRENCE: FEBRUARY 2, 2021

PLACE OF OCCURRENCE: KASILAK PANABO, DAVAO DEL NORTE, 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 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: An accident involving an Allied AGCAT G-164A type of aircraft with Registry Number RP-R5837 operated by Aerowurkz Aerial Spraying Services that had a forced landing incident at Kasilak, Panabo, Davao del Norte, Philippines, on February 2, 2021 /0700H.

Notification of Occurrence to National Authority

The notification of accident to AAIIB-CAAP was relayed by the Operator of the aircraft to the OIC, AAIIB through to the Operation Center-CAAP at 1100H (LOCAL) on February 2, 2021.

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 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 **13 December 2021.**

Synopsis:

On February 2, 2021 at about 0700H, an Allied AGCAT G-164A type of aircraft with Registry Number RP-R5837 sustained substantial damage following a forced landing at Kasilak, Panabo, Davao del Norte, Philippines. The pilot who was the sole occupant did not sustain any injury. The Aircraft Accident Investigation and Inquiry Board determined that the cause factor of this accident was attributed carburetor fuel filter contamination with water and particulates leading to engine low power.

LIST OF ACRONYMS AND ABBREVIATIONS

AAIIB	:	Aircraft Accident Investigation and Inquiry Board
AAOC	:	Agricultural Aircraft Operator Certificate
AMO	:	Approved Maintenance Organization
CAAP	:	Civil Aviation Authority of the Philippines
CoA	:	Certificate of Airworthiness
OFSAM	:	Office of the Flight Surgeon and Aviation Medicine
PIC	:	Pilot In Command
SOP	:	Standard Operating Procedures
VFR	:	Visual Flight Rules
VMC	:	Visual Meteorological Conditions

1.0 FACTUAL INFORMATION

Aircraft Registration No.	:	RP-R5837
Aircraft Type/Model	:	Allied AG CAT Production Inc./ AGCAT G-164A
Operator	:	Aerowurkz Aerial Spraying Services
Address of Operator	:	Gen. Aviation Group Area, Old Airport Rd, Sasa, Davao City, Philippines
Place of Occurrence	:	Kasilak, Panabo, Davao del Norte, Philippines
Date/Time of Occurrence	:	February 2, 2021 / 0700H/2300 UTC
Type of Operation	:	Agricultural Spraying
Phase of Flight	:	Cruise
Type of Occurrence	:	Reciprocating engine - fuel starvation

1.1 History of Flight

On February 2, 2021 at about 0700H, an Allied AGCAT G-164A type of aircraft, with Registry Number RP-R5837 sustained substantial damage following a forced landing after experiencing a loss of power while on aerial chemical spraying operation at Kasilak, Panabo, Davao del Norte, Philippines. The pilot who was the sole occupant did not sustain any injury. The aircraft is being operated by Aerowurkz Aerial Spraying Services.

It was during first pass of the fourth (4^{th}) load of aerial chemical spray in the area, when the engine experienced loss of power. The pilot immediately checked the fuel selector valve, mixture lever and magneto switches are on correct position and jettisoned the remaining chemicals to gain altitude. A distress call was then made and the aircraft forced landed in the banana plantation. Upon touched down, it continued to move forward for another fifty (50) feet, colliding with cable wires, guy wires and 30 banana plants before the main landing gears fell into a canal almost three (3) feet deep and five (5) feet wide. The aircraft flipped over and came to a full stop with a heading of 230 degrees and coordinates of 07’23.22” N,125’36.52” E. The pilot egress safely after performing engine shutdown. Visual Meteorological Condition (VMC) prevailed at the time of the accident.

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Figure 1. RP-R5837 aircraft final resting point.

1.2 Injuries to Person (s)

Injuries	Crew	Passengers	Others
Missing/Fatal	0	0	0
Serious	0	0	0
Minor	0	0	0
None	0	0	0
TOTAL	**0**	**0**	**0**

1.3 Damage to Aircraft

The aircraft sustained substantial damage.

1.4 Personnel Information

1.4.1 Pilot in Command (PIC)

Gender	:	Male
Date of Birth	:	September 08, 1993
Nationality	:	Filipino
License	:	118347- CPL
Valid up to	:	31 May 2022
Medical Certificate Valid until	:	Class 1 valid up to May 31, 2022
Type rating		Airplane: Single Engine Land- C152/172, Agcat G-164A (07-11-2019)
Time on Aircraft Type	:	380+00 Hours (As per current logbook)
Grand Total Time	:	650+00 Hours (As per current logbook)

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1.5 Aircraft Information

1.5.1 Aircraft Data

Registration Mark	:	RP- R5837
Manufacturer	:	Allied AGCAT Productions, Inc.
Type/Model	:	Allied AGCAT G-164A
Operator	:	Aerowurkz Aerial Spraying Services
Serial Number	:	503
Date of Manufactured	:	1978
Certificate of Airworthiness valid up to	:	05 February 2021
Certificate of Registration valid up to	:	05 July 2023
Aircraft Total Time	:	11,780+00 Hours as of last C of A
Category	:	Restricted
Number of Crew	:	1
Passenger Seat	:	1

1.5.2 Engine Data

Manufacturer	:	Pratt & Whitney
Type/Model	:	R-983 AN-14B
Serial Number	:	8388
Engine Time Since New	:	8181+00 Hours as of last C of A

1.5.3 Propeller Data

Manufacturer	:	Hamilton Standard
Serial Number	:	AC-41-22400
Type/Model	:	2D30
Propeller Time Since New	:	4,816+00 Hours as of last C of A

1.6 Meteorological Information

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

1.7 Aids to Navigation

The flight was carried out under Visual Flight Rules (VFR). Using VFR, the pilot must be able to operate the aircraft with visual references to the ground and visually avoiding obstructions and other aircraft.

1.8 Communications

Normal communications were carried out between the pilots and other aircrafts operating in the area.

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1.9 Aerodrome Information

1.9.1 General Information

Aerodrome Name	:	Kasilak Airstrip
Aerodrome Operator Address	:	Kasilak, Panabo, Davao del Norte
Coordinates	:	07º 13’ 31.10 N; 127º 27’ 27.14 E
Runway Magnitude Bearing	:	N70 25ºW
Azimuth	:	RWY 18/36
Runway Length	:	800 meters
Runway Width	:	15 meters
Runway Surface	:	Macadam (Graded)
Wind cone	:	Operational
CAAP Permit to Operate	:	AGA-P-006A-2012

1.10 Flight Recorders

The aircraft is not equipped with any flight recorders and existing CAAP regulation does not require it.

1.11 Wreckage and Impact Information

Upon touched down, it continued to move forward for another fifty (50) feet, colliding with cable wires, guy wires and thirty (30) banana plants before the main landing gears fell into a canal almost three (3) feet deep and five (5) feet wide. The aircraft flipped over and came to a full stop with a heading of 230 degrees and coordinates of 07’23.22” N,125’36.52” E.

1.12 Medical and Pathological Information

The pilot was subjected to medical and drug test after the incident with no significant findings. He also had undergone the post flight accident medical examination conducted by the Office of the Flight Surgeon and Aviation Medicine (OFSAM), and the Chief Surgeon recommended that there is no warrant for grounding of the pilot from performing flying duties.

1.13 Fire

The area has no traces of post-crash fire event during the site investigation.

1.14 Search and Survival Aspects

The crash was survivable because the integrity of the cockpit was not impaired. The pilot egress safely on his own after performing engine shutdown.

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1.15 Test and Research

On February 05, 2021, Engine teardown and assessment were conducted on RP-5837, it was performed by the Operator's AMO and witnessed by AAIIB investigator. The inspection was conducted to determine any engine malfunction or failure that might cause the accident.

1.16 Organizational and Management Information

1.16.1 Operator

The aircraft, RP-R5837 is being operated by Aerowurkz Aerial Spraying Services, with an address of Gen. Aviation Group Area, Old Airport Rd, Sasa, Davao City. Aerowurkz Aerial Spraying Services is a holder of Agricultural Aircraft Operator Certificate (AAOC) number 11-2010006 valid to operate up until July 15, 2020 authorized to perform restricted operations that provides agricultural aerial spraying services to the agricultural industries. They cater to banana, sugarcane, palm oil and rice plantations in Visayas and Mindanao area.

1.16.2 Maintenance

The maintenance function of RP-R5837 is being undertaken by Aerowurkz Aerial Spraying Services, Approved Maintenance Organization (AMO) with a current Certificate number 104-11 with facility located at BTC Hangar, Gen. Aviation Area, Old Airport, Sasa, Davao City.

2.0 ANALYSIS

2.1 General

At 0545H, February 02, 2021, the pilot on board RP-R 5837 departed Tagnanan Airstrip, Mabini, Davao De Oro bound for Kasilak, Panabo, Davao del Norte for spraying activity. The pilot revealed that it was during first pass of the fourth (4^{th}) load of aerial chemical spray in the area, when the aircraft experienced low power. He also said that immediately he checked the fuel selector valve, mixture lever and magneto switches are on correct position. He then jettisoned the remaining chemicals to lessen the load and gain more power. The aircraft however could not sustain the flight and distress call was then made as the pilot decided to make an emergency forced landing in the banana plantation. Before touched down, it collided with guy wires and continued to move forward for another fifty (50) feet. It also damaged some 30 banana trees before the main landing gears fell into a canal almost three (3) feet deep and five (5) feet wide. The aircraft flipped over before it came to a full stop.

An engine teardown inspection was performed by the operator's Approved Maintenance Organization (AMO) together with the accident investigator. The inspection revealed no signs of crack in all its cylinders, there were sparks during the magneto check, however the carburetor fuel filter was found to be contaminated with water and the fuel screen contains

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particulates (Figure 2 & 3). It also shows that three (3) of the nine (9) retrieved spark plugs has traces of fuel water contamination (Figure 4).

Figure 2. Carburetor Fuel Assembly contaminated with water.

Figure 3. Carburetor fuel filter with particulates.

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Figure 4. Three (3) of the nine (9) retrieved spark plugs has traces of fuel water contamination.

In the course of investigation, it was found out that the aircraft was being serviced before the first flight of the day instead of after the last flight of the day. Fuel tanks should be filled after each flight or after the last flight of the day to prevent moisture condensation within the tank. The particulates found in the filter could be a result of the operator's traditional way of fueling done by gravity using a chamois where fuel is transferred from the small plastic containers then used to service the aircraft. The use of a chamois will not always ensure decontaminated fuel just like a worn-out chamois will not filter water; neither will a new, clean chamois that is already water-wet or damp. Review of the Company Operations Manual reveals that there is no established procedure on dispensing of aviation fuels as well as inspection and maintenance of the under-ground fuel tank.

Interview was also conducted with the maintenance personnel to determine conditions, acts or safety deficiencies that might have caused or contributed to this occurrence. It further revealed that the operator performs multi transfer fueling cycle in performing agricultural aerial spray. This multi transfer fueling cycle is consist of initially transferring of fuel from the operator's under-ground fuel storage tank to recycled drums then to plastic containers and finally to the aircraft. This multi transfer fueling cycle to service aircraft in remote locations exposes the fuel and equipment for contamination to occur. Likewise, the use of plastic containers not designed for fuel and recycled drums particularly the cap gasket may pose as a hazard. Apart from falling out of the cap and preventing proper sealing, the gasket will become brittle and degrade wherein the fragments can then be tipped into the aircraft fuel tank along with the fuel. This fragment over time can either clog fuel system filters.

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Figure 5. Recycled drums and plastic containers used during multi transfer fueling

Since fuel was stored in underground tank where full capacity is possibly not maintained for extended periods of time, fuel being a gyroscopic fluid, absorbs moisture from the air around it. This develops into water and mixed with the fuel in suspension. Combined with water from condensation can result in contaminated fuel being introduced into the engine. Company records at that time did not show regular inspection of fuel contaminants in under-ground fuel tanks.

Contaminants in the fuel like water and particulate matters have been known to cause engine failures. Water in the fuel without being visibly obvious and while dissolved may not be a hazard to aircraft operation. However, as temperature changes causes the water to separate out of the fuel and became free water which affects safety. Entrained water is similarly difficult to identify since it consists of tiny droplets that have been agitated into fuel by pumps. This water separates into droplets with settling time where water is identifiable long after the fuel is introduced to the aircraft fuel tank. To minimize the risk of this happening, fuel drain checks from the aircraft should be carried out by the operator before the first flight of the day and after refueling. In the light of this case, the efficacy of the fuel contaminated by the water in the aircraft could not be determined since available records in the technical log page on the day of the accident did not indicate that a water drain check was performed prior to the flight.

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3.0 CONCLUSION

3.1 Findings

a. Pilot has a valid license and medical certificate issued by Office of Flight Surgeon and Aviation Medicine (OFSAM), CAAP.

b. Visual meteorological condition prevailed at the time of the accident.

c. The aircraft was released for flight without any discrepancies noted on its logbook.

d. The aircraft has a current aircraft registration and certificates of airworthiness.

e. The aircraft was on its first pass of the fourth (4^{th}) load of aerial chemical spray in the area, when the aircraft experienced low power.

f. The carburetor fuel filter was contaminated with water and the fuel screen has some particulates.

g. Three (3) of the nine (9) retrieved spark plugs has traces of fuel water contamination.

h. The aircraft was serviced before the first flight of the day instead after the last flight of the day.

i. The operator performs multi-transfer fueling cycle in performing agricultural aerial spray.

3.2 Probable Cause

3.2.1 Primary Cause Factor

a. Carburetor fuel filter contaminated with water and particulates leading to engine low power.

3.2.2 Contributory Cause Factor

a. Lack of documented company fueling procedures.

4.0 SAFETY RECOMMENDATIONS

4.1 For **CAAP-FSIS** to ensure that the Operator:

a. Include in the Company Operations Manual the detailed company fueling procedures, including inspection and maintenance of under-ground fuel tanks.

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b. Conduct training to Pilots and Maintenance personnel on the established company fueling procedures.

c. Include discussion on hazards associated with improper refueling procedures during regular safety meetings so that everyone involved in the operation will be fully aware of the potential risks.

-END-

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