

COMANDO DA AERONÁUTICA
CENTRO DE INVESTIGAÇÃO E PREVENÇÃO DE
ACIDENTES AERONÁUTICOS



FINAL REPORT
A-046/CENIPA/2022

OCCURRENCE:	ACCIDENT
AIRCRAFT:	PR-AAM
MODEL:	A188B
DATE:	14ABR2022



NOTICE

According to the Law n  7565, dated 19 December 1986, the Aeronautical Accident Investigation and Prevention System – SIPAER – is responsible for the planning, guidance, coordination, and execution of the activities of investigation and prevention of aeronautical accidents.

The elaboration of this Final Report was conducted considering the contributing factors and hypotheses raised. The report is, therefore, a technical document which reflects the result obtained by SIPAER regarding the circumstances that contributed or may have contributed to triggering this occurrence.

The document does not focus on quantifying the degree of contribution of the distinct factors, including the individual, psychosocial or organizational variables that conditioned the human performance and interacted to create a scenario favorable to the accident.

The exclusive objective of this work is to recommend the study and the adoption of provisions of preventative nature, and the decision as to whether they should be applied belongs to the President, Director, Chief or the one corresponding to the highest level in the hierarchy of the organization to which they are being forwarded.

This Final Report has been made available to the ANAC and the DECEA so that the technical-scientific analyses of this investigation can be used as a source of data and information, aiming at identifying hazards and assessing risks, as set forth in the Brazilian Program for Civil Aviation Operational Safety (PSO-BR).

This Report does not resort to any proof production procedure for the determination of civil or criminal liability, and is in accordance with Appendix 2, Annex 13 to the 1944 Chicago Convention, which was incorporated in the Brazilian legal system by virtue of the Decree n  21713, dated 27 August 1946.

Thus, it is worth highlighting the importance of protecting the persons who provide information regarding an aeronautical accident. The utilization of this report for punitive purposes maculates the principle of “non-self-incrimination” derived from the “right to remain silent” sheltered by the Federal Constitution.

Consequently, the use of this report for any purpose other than that of preventing future accidents, may induce to erroneous interpretations and conclusions.

N.B.: This English version of the report has been written and published by the CENIPA with the intention of making it easier to be read by English speaking people. Considering the nuances of a foreign language, no matter how accurate this translation may be, readers are advised that the original Portuguese version is the work of reference.

SYNOPSIS

This is the Final Report of the 14th April 2022 accident with the model A188B aircraft, registration marks PR-AAM. The occurrence was typified as “[LALT] Low altitude operation”.

The aircraft had taken off from the airstrip for aero-agricultural use on *Fazenda Letícia*, engaged on a crop-dusting flight, with 01 POB (pilot).

During a repositioning turn, loss of control possibly occurred, and the aircraft collided with treetops and, subsequently, with the ground.

The aircraft sustained substantial damage. The pilot suffered fatal injuries.

The United States of America, as the State of aircraft manufacture, appointed an Accredited Representative of the NTSB (USA’s National Transportation Safety Board) for participation in the investigation of the accident.



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GLOSSARY OF TECHNICAL TERMS AND ABBREVIATIONS

AEV	Special Flight-Authorization
ANAC	Brazil's National Civil Aviation Agency
CENIPA	Brazil's Aeronautical Accidents Investigation and Prevention Center
CIV	Pilot Logbook
CMA	Aeronautical Medical Certificate
CVA	Certificate of Airworthiness-Verification
DGPS	Digital Global Positioning System
GRSO	Safety Risk Management
INMET	Brazil's National Institute of Meteorology
IS	Supplementary Instruction
MNTE	Single-Engine Land Airplane Class Rating
NTSB	USA's National Transportation Safety Board
OM	Maintenance Organization
PAGA	Agricultural Pilot Rating (Airplane)
PCM	Commercial Pilot License (Airplane)
PIC	Pilot in Command
PPR	Private Pilot License (Airplane)
RBAC	Brazilian Civil Aviation Regulation
SAE-AG	Specialized Air Service Aircraft Registration Category (Aeroagricultural)
SIPAER	Aeronautical Accidents Investigation and Prevention System
SN	Serial Number
UTC	Coordinated Universal Time

1. FACTUAL INFORMATION.

Aircraft	Model: A188B Registration: PR-AAM Manufacturer: Cessna Aircraft	Operator: <i>Savana Aero Agrícola Ltda.</i>
Occurrence	Date/time: 14ABR2022 – 10:30 (UTC) Location: Fazenda Letícia. Lat. 17°28'45"S Long. 052°44'58"W Municipality – State: <i>Mineiros – Goiás.</i>	Type(s): [LALT] Low altitude operations

1.1. History of the flight.

At around 10:15 UTC, the aircraft took off from the airstrip for aero-agricultural use on *Fazenda Letícia*, in the municipality of *Mineiros*, State of *Goiás*, for crop-dusting flight, with a pilot on board.

During a repositioning turn, loss of control possibly occurred, and the aircraft collided with treetops before crashing into the ground.

The aircraft sustained substantial damage.

The pilot suffered fatal injuries.

1.2. Injuries to persons.

Injuries	Crew	Passengers	Others
Fatal	1	-	-
Serious	-	-	-
Minor	-	-	-
None	-	-	-

1.3. Damage to the aircraft.

The aircraft sustained substantial damage upon colliding with the ground. The propeller assembly, engine shaft, and left-hand wing separated from the fuselage.

1.4. Other damage.

NIL.

1.5. Personnel information.

1.5.1. Crew's flight experience.

FLIGHT EXPERIENCE	
	PIC
Total	530:00
Total in the last 30 days	05:00
Total in the last 24 hours	00:00
In this type of aircraft	05:00
In this type in the last 30 days	05:00
In this type in the last 24 hours	00:00

RMK: data on the hours flown obtained by means of records of the aircraft logbook, as well as records of the pilot's Individual digital Logbook (CIV) of the Integrated Aviation Information System (SACI). There was no access to the pilot's physical logbook (CIV).

The PIC (Pilot in Command) had 27 hours and 41 minutes of recorded experience. His loggings were inconsistent, with the latest having been entered in August 2020 (2 hours) and September 2018 (3 hours). Only revalidation flights were logged.

However, the pilot had been working for the operator since 2016. According to the operating administration file, the PIC had around 530 hours of flight time in service.

1.5.2. Personnel training.

The PIC did his PPR course (Private Pilot – Airplane) in 2001.

1.5.3. Category of licenses and validity of certificates.

The PIC held a PCM license (Commercial Pilot – Airplane) and valid ratings for MNTE (Single-Engine Land Airplane) and PAGA (Agricultural Pilot - Airplane).

1.5.4. Qualification and flight experience.

According to administrative data from the operator and findings by the Investigation Committee, the pilot was qualified and had experience with the type of flight.

Based on the entries of the aircraft's logbook, the pilot's digital logbook (CIV), and accounts from the operator, it was verified that the aircraft's logbook had recent flight entries, all registered under the name of the mentioned pilot.

Thus, it was possible to confirm that the pilot was qualified and had the necessary experience for the flight as provided for in item 61.21 "Recent Experience" of the Brazilian Civil Aviation Regulation nº 61 (RBAC-61), dealing with "Licenses, Ratings and Certificates for Pilots".

1.5.5. Validity of medical certificate.

The Pilot in Command held a valid CMA (Aeronautical Medical Certificate).

1.6. Aircraft information.

The SN 18802728T aircraft was a product manufactured by Cessna Aircraft in 1976, and registered in the SAE-AG category [Public Specialized Air Service Registration Category (Agricultural)].

The aircraft's CVA (Airworthiness-Verification Certificate) was valid.

The records of the airframe, engine, and propeller logbooks were up to date.

The latest inspections of this aircraft (types "200 hours and CVA") were carried out on 11 November 2021, by the Maintenance Organization *Conte Aero Oficina de Manutenção Aeronáutica* (COM 8103-02/ANAC), in the municipality of *Rio Verde*, State of Goiás. The aircraft flew 26 hours after the inspections and, according to notes in the logbook, had 6,154 hours and 10 minutes of total flight time.

Being an agricultural aircraft, certified in the restricted category, equipped with a conventional engine modified for the use of ethanol, and operating according to the RBAC-137, a Special Flight-Authorization (AEV) was issued by the ANAC (National Civil Aviation Agency) authorizing operation of the aircraft.

However, although the aircraft had the SEGVOO 001, the Investigation Committee found that it did not have the identification marks and plates on the panel and fuel nozzle, as provided for in the Supplementary Instruction (IS) nº 137.201-001 "*Use of ethanol in agricultural aircraft*", item 5.4.1, letter "a".

5.4.1 Any person operating an aircraft which demonstrates compliance with the applicability requirements of section 5.1 of this IS may use ethanol in the operation of such aircraft under the following conditions:

a) The following marks and plates must be installed:

I - On the instrument panel:

"This aircraft must be operated with ethanol (Hydrated Ethyl Alcohol Fuel - AEHC)."

II - In the cockpit, in full view of the pilot:

"This aircraft is not eligible for an approval for operation over densely populated areas under section 137.211 of the RBAC-137 or for a deviation from any limitation of section 91.313 of RBAC 91.

"The engine, Serial Number (N/S) _____, installed in this aircraft and operated on ethanol fuel may be installed only in an aircraft to be operated with a special flight-authorization under the IS 137.201-001, unless it is submitted to an overhaul."

III - On the fuel filler cap (or close to it):

"Ethanol (Hydrated Ethyl Alcohol Fuel - AEHC)".

1.7. Meteorological information.

Fazenda Letícia, in the municipality of *Mineiros*, Goiás, did not have a meteorological station, nor any nearby stations. Therefore, the Investigation Committee used, as a reference, temperature data from the A026 station of the National Institute of Meteorology (INMET) located in Mineiros at a distance of 16 km away from the place of occurrence, as well as information made available on the METEOBLUE website.

DATA	HORA (UTC)	TEMPERATURA	DIREÇÃO DO VENTO	INTENSIDADE DO VENTO
14/04/2022	09h00min	19,6 °C	150°	0 kt
14/04/2022	10h00min	19,7 °C	158°	1 kt
14/04/2022	11h00min	20,4 °C	139°	0 kt

Table 1 - with data from the A026 Station of *Mineiros*, State of *Goiás*.
Source: <https://mapas.inmet.gov.br/>

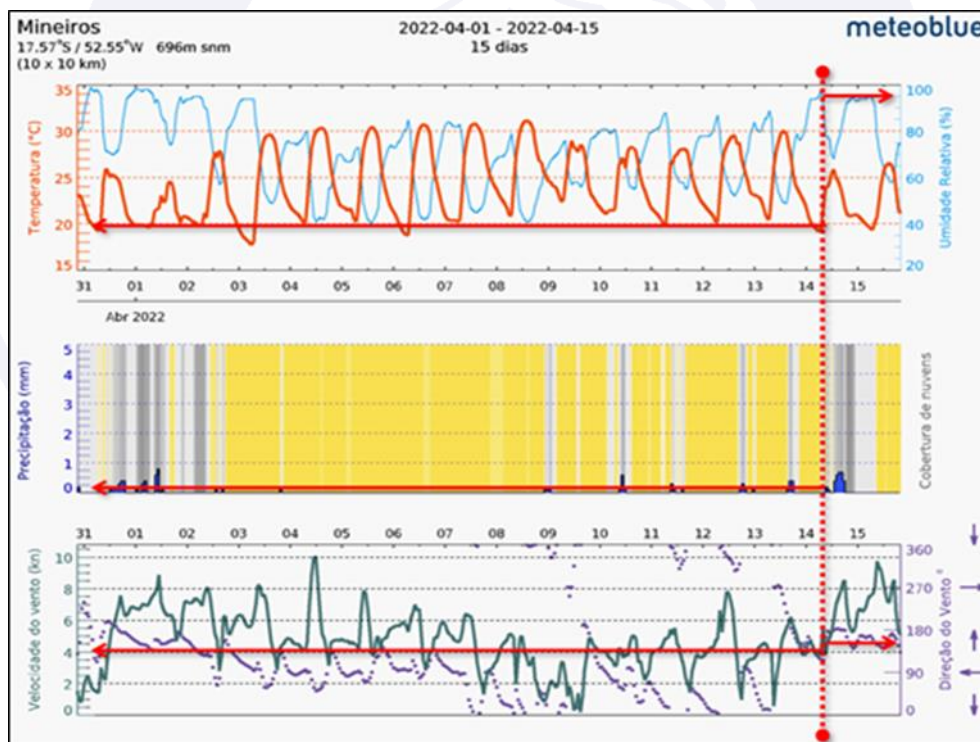


Figure 1 - Weather conditions in the municipality of *Mineiros*, *Goiás*, on 14 April 2022, marked in red at 07:20 local time. Source: Available at METEOBLUE.com

When consulting Figure 1, which adds information on cloudiness, precipitation and humidity, it was possible to verify that the temperature confirms the previous information, close to 20°C, without precipitation, humidity of 95%, clear sky (yellow background) with the presence of sunshine. When analyzing the wind, one observed: wind direction 160° (southeast) and wind strength less than 4 kt, for the time of the event, 07:20 (local time).

The highlighted satellite image, closest to the time of the accident, can be seen in Figure 2.

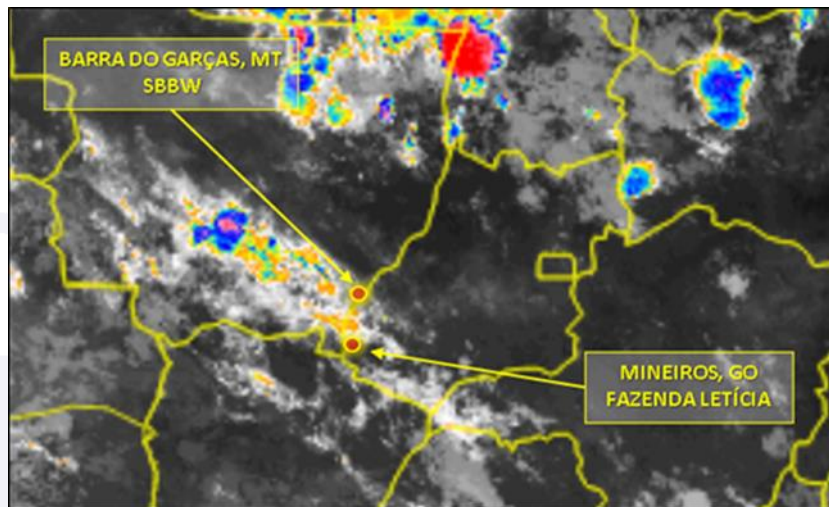


Figure 2 - Highlighted satellite image of the region, at 10:20 UTC.
Source: <https://www.redemet.aer.mil.br>

According to the information collected, one found that the meteorological conditions were above the minimums for carrying out the operation under the rules of the proposed type of flight.

1.8. Aids to navigation.

NIL.

1.9. Communications.

NIL.

1.10. Aerodrome information.

Not applicable.

1.11. Flight recorders.

Neither required nor fitted.

1.12. Wreckage and impact information.

The aircraft initially collided with the treetops, when its heading was approximately 020°.

Subsequently, the aircraft hit the ground, first, with the left wing, in a “pitch-down” attitude and banking to the left, causing separation of the left wing from the fuselage, as well as separation of the propeller assembly from the engine shaft. The aircraft traveled another 9 m before coming to a stop.

The wreckage was concentrated, with the fuselage resting in an upside down position and close to 120° in relation to the axis of movement on the ground (Figure 3).



Figure 3 - Estimated aircraft crash trajectory.

During the initial field investigation, all of the aircraft's flight surfaces were located and identified. The control cables were not broken, and it was not possible to confirm the condition of the pulleys due to the situation of the wreckage after the impact.

As for the controls and instruments in the cockpit, the magneto switches were at the "ON" position, the power and RPM levers at $\frac{3}{4}$ of their course, the mixture lever at "RICH", the auxiliary fuel pump at "OFF", the master at "ON", indicating that the aircraft was configured for normal flight, showing no evidence of configuration for emergency operation (Figure 4).



Figure 4 - Detail of the aircraft panel after the accident.

1.13. Medical and pathological information.

1.13.1. Medical aspects.

The pilot was the only one to fly this model of aircraft for the operator. One verified, by means of the logbook, that the pilot's day's work was compatible with an operation considered normal for the type of flight, with no signs of fatigue identified due to the quantity or volume of flying.

On the day of the accident, the PIC arrived at the usual time, starting his duties as usual. He took off at 10:15 UTC to apply product in the area and did not return for landing, which caught the attention of the ground team, who began ground searches and, later, activated the search and rescue service.

During the course of the investigation, the Committee had access to an expert report on the alcoholic dosage of the pilot's blood sample, prepared by the Technical-Scientific Police Superintendence of the State of Goiás, using the ethanol dosage method in Gas Chromatography coupled with a Flame Detector (HS-GC-FID), using t-butanol as an internal standard. The result showed that:

The chromatographic tests carried out revealed a result of 12.8 dg/L (twelve point eight decigrams per liter).

For the dosage of ethanol in the blood and its effects, one used the reference table in Table 2

BLOOD ETHANOL LEVELS - DG/L	EFFECTS
2,00	Reaching approximately after one drink, light or moderate users feel some warm, relaxed type effects.
4,00	Most people feel relaxed, happy and talkative; the skin may become flushed.
5,00	First significant changes begin to occur: lack of concern, vertigo, disinhibition and less control of thoughts can be felt; self-control and judgment are diminished; coordination may be slightly compromised.
6,00	Judgment and criticism are impaired; the assessment of individual capabilities and the process of rational decision-making are affected (e.g. being able to drive).
8,00	Obvious impairment of motor coordination and decreased speed of reflexes; ability to drive becomes suspect; feeling of numbness in the cheeks and lips; arms and legs begin to tingle until they become numb (this level is considered legally incapacitating in Canada and some US states).
10,00	Vague, indistinct speech, with difficulty in articulating words; slowing of reflexes and deterioration of control of voluntary movements become evident (this level is considered intoxication in most US states).
15,00	Definitive impairment of balance and movement.
20,00	Motor and emotional control centers are considerably affected, slurred speech, staggering, loss of balance (falls are frequent) and double vision may occur.
30,00	Difficulty understanding what is seen or heard; Individuals become confused or in a stupor and loss of consciousness may occur.
40,00	The individual is generally unconscious; the skin becomes cold and clammy.
45,00	Respiratory rate decreases, apnea may occur.
50,00	Death from respiratory system depression.

Table 2 - Reference table Ethanol in the blood. Source: Milhorn Jr, H.T. CNS Depressants: Alcohol In: Chemical Dependence - Diagnosis, Treatment and Prevention, Springer - Vertag, New York, 1990. p.128.

In force at the time of the accident, the ANAC's Brazilian Civil Aviation Regulation nº 91 (RBAC-91), section 91.17, dealing with "Use of Psychoactive Substances", established the following prohibition:

- (a) no person is allowed to act or attempt to act in activities regulated by the ANAC while:
 - (1) [reserved];
 - (2) under the influence of alcohol or using alcoholic beverages;

(3) under the influence of or using a psychoactive substance (as defined in RBAC-120) that affects, in any way contrary to operational safety, such person's faculties; or

(4) having any concentration of alcohol in the body. The tolerance will be conditioned on the nominal margin of error of the device used to measure the concentration, in compliance with the metrological legislation.

1.13.2. Ergonomic information.

NIL.

1.13.3. Psychological aspects.

NIL.

1.14. Fire.

There was no evidence of inflight or post-impact fire.

1.15. Survival aspects.

NIL.

1.16. Tests and research.

The SN 175026R IO-520-D Continental engine (modified for the use of ethanol in accordance with the IS n° 137.201-001), which equipped the aircraft, was disassembled, under monitoring by the investigation committee, at the premises of the maintenance organization *Conte Aero Ltda.* (COM n° 8103-02/ANAC) in the municipality of *Rio Verde*, State of *Goiás*. The referred engine had 26 hours of operation after the latest inspection, and 354 hours and 25 minutes after the latest overhaul.

The engine featured impact marks on the teeth of the crankshaft and camshafts gears, indicating that it was developing some power at the moment of the sudden stop, after the impact against the ground.

No discrepancies were found either in the engine or in the accessories tested, which might indicate in-flight malfunctions at the moment of impact.

Considering the accessories that showed normal functioning during the bench tests, and the maintenance requirements to which such accessories had to comply with, one did not identify any aspects related to the maintenance services provided to the aircraft that could have contributed to the occurrence.

The non-volatile memory of the Digital Global Positioning System (DGPS) made it possible to verify the operation on *Fazenda Leticia*, relative to the previous flight of 11 April 2022 (white lines) and the operation of the flight on the day of the occurrence (red lines), with identification of the horizontal trajectory flown by the PR-AAM aircraft (Figure 5).

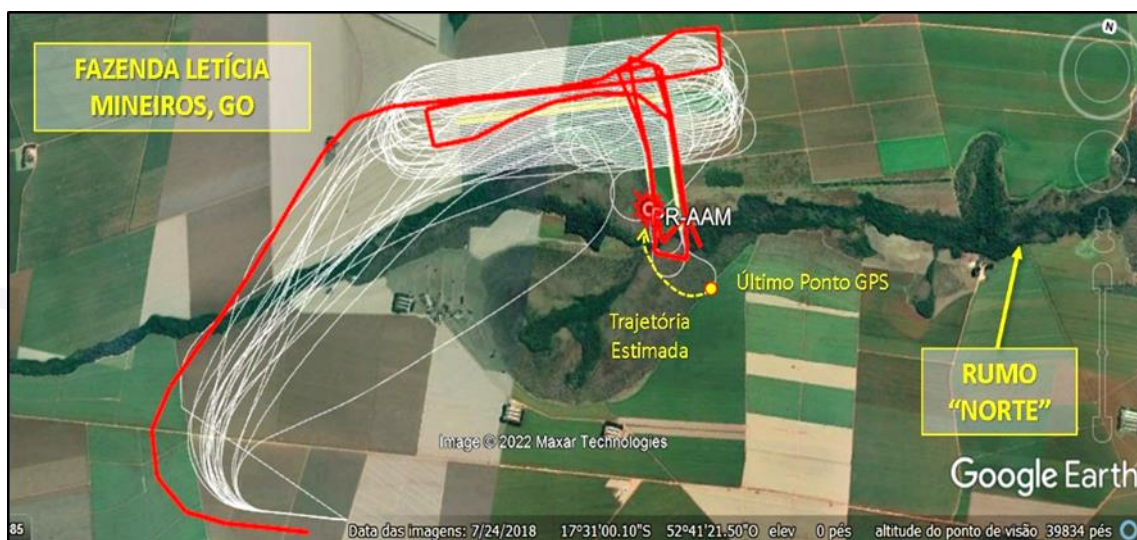


Figure 5 - Horizontal trajectory flown by the aircraft. Source: DGPS of PR-AAM – Adapted from Google Earth, 2022.

Additionally, it was possible to observe, from a lateral perspective, the points of application in a direction perpendicular to the application of the day before, on a North-South axis (Figure 6).

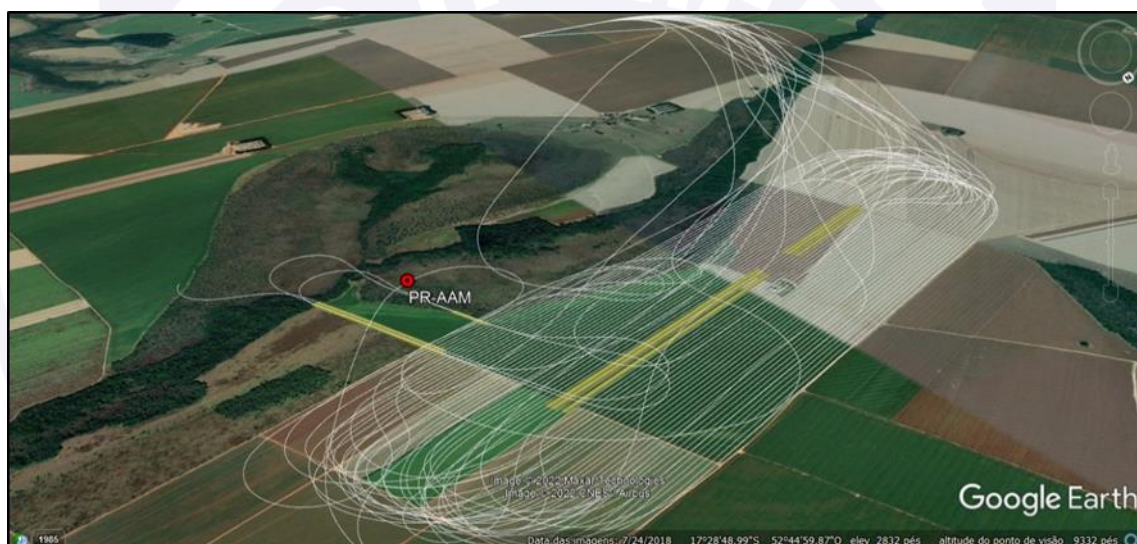


Figure 6 – Side perspective of the aeroagricultural application carried out by the aircraft. Source: DGPS of PR-AAM - Adapted from Google Earth, 2022.

In addition to the profile and trajectory extracted from the DGPS, a simplified model was built to evaluate the flight pattern performed by the aircraft, correlating it with the performance data (Figure 7).

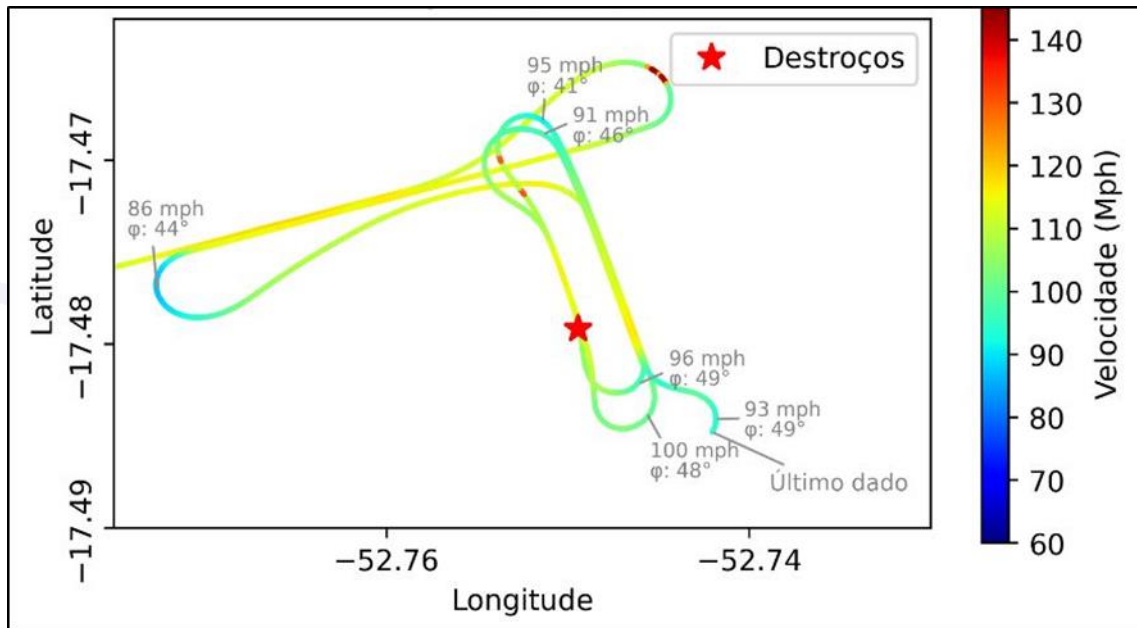


Figure 7 - Flight trajectory with estimated speed and wing banking.
Source: DGPS of the PR-AAM aircraft.

The “*kmf*” file generated by the system presented only a sequence of points recorded at a generally constant rate of 5 Hz.

Through mathematical data derivation processes, it was possible to calculate other important parameters for understanding the event, such as the aircraft’s headings, ground speed, and rate of turn.

Still regarding the investigation of flight data, one found that, based on the aircraft’s rate of turn and speed, it would be possible to estimate the banking of the airplane’s wings.

Even though this calculation was an estimate for sustained level turning conditions (at constant speed) for the flight profile experienced by the aircraft at the minimum speed points, such approach was considered reasonable.

Thus, the data were used with the intention of comparing them with the nominal stall speeds listed in the flight manual. Due to the imprecision of the data, only the ground speed and the rate of turn were considered, since the parameters were smoothed using the moving average of the last second.

It is estimated that approximately 30 seconds of the final part of the flight were not recorded due to equipment limitations.

1.17. Organizational and management information.

The company was requested to provide the Safety Risk Management (GRSO) corresponding to the operation both at *Fazenda Letícia* base and in the area of application on the day of the occurrence.

However, the company only provided a GRSO with a later date (July 2022) for operations in the landing area for agro-agricultural use of *Fazenda Letícia*.

The GRSO for the area where the product was applied on the day of the accident was not made available to the investigation committee.

1.18. Operational information.

The accident aircraft was engaged on a crop-dusting flight, which took off from the landing area for agro-agricultural use on *Fazenda Letícia* for application of pesticides in a nearby area of the farm. The relief of the crop-dusting area did not have significant natural obstacles to be considered for agro-agricultural operations.

It was the first flight of the day and, by means of DGPS data, it was possible to verify that it lasted between 10 and 15 minutes, and that the aircraft was executing the 10th repositioning turn to the right.

According to a report from the airstrip assistant, the replenishment of the agricultural pesticide occurred in accordance with previous operations, but it was not possible to estimate the quantities.

On the day before the occurrence, the pilot carried out application in an area to the north of the location of the occurrence, in an East-West direction, utilizing a "carousel" pattern, according to data from the flight profile obtained from the DGPS.

On the day of the accident, the aircraft took off and climbed on a trajectory similar to the one of the day before, initially maintaining the same pattern of turns and directions used in the area of the previous application. After two passes on an East-West axis, using the back-to-back pattern, the aircraft repositioned for a perpendicular trajectory, on a North-South axis, to complete the antecedent area and start spraying a new area further to the south.

On the North-South axis, the aircraft flew two complete circuits, using a carousel pattern. On the third pass, when turning to the right, the recording was interrupted close to the point of impact.

Neither power cables nor any other obstacles or buildings in the vicinity of the accident site were identified.

According to the DGPS data, one observed that in the last turn before the accident, the registered speed of the aircraft was lower than the speed observed in the two preceding turns.

The Cessna A188B AgWagon POH, of 1979, Section 6, *Operational Data*, established a table of stall speeds correlated with the angle of bank, as shown in Figure 8.

CONFIGURATION		ANGLE OF BANK		
POWER OFF - AFT C.G.		0°	30°	60°
GROSS WEIGHT 4200 LBS.	FLAPS UP	69	74	98
	FLAPS 10°	67	72	95
	FLAPS 20°	65	70	92
GROSS WEIGHT 4000 LBS.	FLAPS UP	67	72	95
	FLAPS 10°	65	70	92
	FLAPS 20°	63	68	89

Figure 6-8. Stall Speeds

Figure 8 – Stall speeds.

According to the data in Figure 8, when interpolating the values from the table, with approximately 45° of wing banking, with flaps "0", weight of 4,000 Lbs, a stall speed of 83.5 MPH was estimated.

1.19. Additional information.

NIL.

1.20. Useful or effective investigation techniques.

NIL.

2. ANALYSIS.

According to data collected during the investigation, it was the first flight of the day of a crop-dusting operation. The estimated duration of the flight was between 10 and 15

minutes. The aircraft was performing the 10th repositioning-turn to the right, according to the last position recorded by the DGPS.

Based on the visibility and wind parameters observed, one verified that the meteorological conditions were above the minimums for performing the operation under the rules of the proposed type of flight, and that there were no limiting phenomena capable of interfering with the aircraft's performance.

According to the information obtained from interviews and logbook records, one found no evidence of fatigue or work overload on the part of the pilot that could have influenced his performance.

The aircraft was configured for normal flights, showing no evidence of emergency configuration at the time of impact.

In the aircraft logbook, one hour of flight with two landings in the area of Fazenda Letícia Farm was logged on 11 April 2022 (three days before the accident). Therefore, the pilot had already operated in that landing area for aeroagricultural use and in the specific crop dusting area of the farm, as could also be seen from the data extracted from the DGPS.

The last turn, approximately thirty seconds before the impact, revealed a pattern that was different from the two previous repositioning turns.

It was noted that the aircraft followed a trajectory with an opening of approximately 45° to the left, then turned to the right with an estimated wing banking of 49° at a speed of 93 MPH, as illustrated in Figure 7.

It was not possible to estimate the weight of the aircraft at the time of the accident. According to Figure 8, when observing the reference stall speeds established in the aircraft manufacturer's Manual, it was noted that, by interpolating the values from the table, with approximately 45° of wing banking, with the flaps at "0", and an approximate weight of 4,000 lb., a stall speed of 83.5 MPH was estimated.

Although the last record of the aircraft speed showed values above the stall speed, it is not possible to rule out a possible increase in the wing banking angle to values greater than 45°, which may have caused a stall condition and loss of control of the aircraft.

The absence of a GRSO for the product application area at *Fazenda Letícia* raised questions about the maturity of the safety management culture within the operator' scope.

The alcoholic dosage identified in the pilot's blood sample was equivalent to 12.8 dg/L, a fact that, according to the report from the Technical-Scientific Police Superintendence of the State of *Goiás*, had the potential to cause evident effects of reflex slowdown and deterioration of control over voluntary movements.

In this scenario, piloting under the influence of alcohol could have caused a slowdown in reflexes and deterioration of control over voluntary movements, potentially reducing performance in reasoning, judgment ability, perception of the operating environment, and precision in using the controls for piloting.

With regard to this subject, the RBAC-91 expressly prohibited any alcohol concentration in the body of a person who performed, or attempted to perform, activities regulated by the ANAC. Therefore, the operation was conducted in disagreement with the aeronautical regulations in force, resulting in safety levels below the minimum acceptable standards established by the Brazilian State.

By failing to observe the minimum safety levels defined by the Brazilian State, which are ensured through compliance with the Brazilian Civil Aviation Regulations (RBAC), latent unsafe conditions may be created, which should be eliminated or mitigated by adherence to the very regulations.

3. CONCLUSIONS.

3.1. Findings.

- a) the pilot held a valid CMA (Aeronautical Medical Certificate);
- b) the pilot held valid MNTE and PAGA ratings;
- c) the pilot was qualified and had experience in the type of flight;
- d) the aircraft had a valid CVA (Airworthiness-Verification Certificate);
- e) the records of the airframe, engine, and propeller logbooks were up to date;
- f) meteorological conditions were above the minimums for conduction of the operation under the rules of the proposed type of flight;
- g) it was the first crop-dusting flight of the day;
- h) a forensic report on the alcoholic dosage of the pilot's blood sample, prepared by the Technical-Scientific Police Superintendence of the State of *Goiás*, indicated an alcohol level of 12.8 dg/L;
- i) the aircraft was executing its 10th repositioning turn on that flight;
- j) the aircraft collided with the treetops and subsequently with the ground;
- k) the aircraft was in a "nose-down" attitude and banked to the left when the impact occurred;
- l) the aircraft suffered substantial damage; and
- m) the pilot suffered fatal injuries.

3.2. Contributing factors.

- **Alcohol – a contributor.**

The level of ethanol identified in the pilot's blood sample was 12.8 dg/L, which, according to a report from the Scientific Police of the State of *Goiás*, causes evident effects of reflex slowdown and deterioration of control over voluntary movements.

- **Handling of aircraft flight controls – undetermined.**

The hypothesis of a loss of control of the aircraft during the repositioning turn may have been caused by inadequacy in the use of the flight controls.

4. SAFETY RECOMMENDATIONS

NIL.

5. CORRECTIVE OR PREVENTATIVE ACTION ALREADY TAKEN.

None.

On May 13th, 2024.