



HELLENIC REPUBLIC
MINISTRY OF INFRASTRUCTURE AND TRANSPORT

AIR ACCIDENT INVESTIGATION AND
AVIATION SAFETY BOARD
(AAIASB)



ACCIDENT INVESTIGATION REPORT
INVOLVING THE HELICOPTER SX-HBB
AT THE AREA OF SCHINIAS – MARATHONAS
ON 23 JUNE 2017

10 / 2018

Revision No. 1

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at the area of Schinias - Marathonas
on 23 June 2017**

The accident investigation was carried out by the Air Accident Investigation and Aviation Safety Board in accordance with:

- **ICAO Annex 13;**
- **Regulation (EU) No. 996/2010;**
- **Hellenic Republic Law No. 2912/2001.**

'In accordance with Annex 13 to the Convention on International Civil Aviation, Regulation (EU) No. 996/2010 and Law No. 2912/2001, the purpose of investigations into aviation accidents and incidents is not to apportion blame or liability. The sole objective of the investigation and its findings is the prevention of accidents and incidents.

As a result, use of the findings for any purpose other than the prevention of future accidents could result in erroneous conclusions.'

The Air Accident Investigation and Aviation Safety Board

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NOTE: The revision of the final report is made in order to take into consideration the last medical certificate of the pilot, which was not registered in the Hellenic Civil Aviation Authority database. The specific certificate was given to AAIASB after the issuance of the final report.

OPERATOR : AIR 1 HELICOPTERS COMPANY
OWNER : ETHNIKI LEASING S.A.
MANUFACTURER : MD HELICOPTERS INC. (MDHI)
MODEL : MD500E
COUNTRY OF MANUFACTURE : USA
NATIONALITY : HELLENIC
REGISTRATION : SX-HBB
PLACE OF ACCIDENT : SCHINIAS - MARATHONAS
DATE & TIME : Friday, 23/06/2017 at 09:45 h
Note : All times are local
(local time = UTC + 3h)

SYNOPSIS

On Friday 23/06/2017, the helicopter with registration SX-HBB owned by ‘ETHNIKI LEASING S.A.’ and operated by ‘AIR 1 HELICOPTERS’ was situated at the wetland of Schinias – Marathonas, performing aerial spraying operations for the control of mosquitoes, on behalf of the joint venture that had been awarded a contract by Attica Region Authority, for the project of mosquito control in the Regional Unit of Eastern Attica. Following the completion of the scheduled aerial spraying operations, the pilot performed one more flight above the wetland of Schinias with two other persons onboard. During that flight, the helicopter crashed in the wetland, having struck power lines, which resulted in the fatal injury of the pilot and one of the two helicopter occupants, whereas the other person onboard was seriously injured.

The Air Accident Investigation and Aviation Safety Board was notified of the accident on the same day and appointed an investigation team under document AAIASB/1946/23-06-2017.

On 26/06/2017, a “Notification to International Authorities” was issued and the state of manufacture appointed on 03/07/2017 an accredited representative (ACCREP).

1. FACTUAL INFORMATION

1.1 History of the flight

On 23/06/2017 at about 06:00 h, the helicopter with registration SX-HBB operated by the company 'AIR1 HELICOPTERS' had been transported on a trailer, without the blades of the main rotor mounted thereon, to the heliport of Schinias Olympic Rowing and Canoeing Center, for performing aerial spraying operations at the wetland of Schinias for mosquito control purposes. The helicopter would perform the aerial spraying operations on behalf of the joint venture that had been awarded a contract with Attica Region Authority (hereinafter "AR") for the project of mosquito control in the Regional Unit of Eastern Attica, employing both ground and aerial means.

After the two engineers of the maintenance organization under Reg. No. EL.MF.0006, that was responsible for the helicopter's maintenance, mounted the main rotor blades on the helicopter, fitted the equipment necessary for the spraying operations and performed the pre-flight inspection as prescribed in the helicopter's maintenance program, the helicopter took off for the first flight at 08:10 h, as per the tech log entry. The aerial spraying operations that were to be performed on that day, were to be the 5th sequence of aerial spraying applications in the mosquito control program implemented since the beginning of year 2017 at the wetland of Schinias.

Prior to the first takeoff, present at the heliport area was the coordinator (a Public Health Inspector) in charge of the mosquito control program in Eastern Attica, representing the Attica Region Authority (AR), accompanied by a student of the Athens University of Applied Sciences majoring in Public Health who at the time pursued practical training at the AR. Present in the same area was also the Scientific Officer of the Contractor that had been awarded the contract for the project of mosquito control in the Regional Unit of Eastern Attica.

Pursuant to the statement of the Public Health Inspector, the helicopter initially conducted a reconnaissance flight in which he was also onboard the helicopter in order to inspect the waters. Then the helicopter, with only the

pilot onboard, conducted four (4) aerial spraying flights in conformance with the schedule of operations for the day. As stated by the Inspector, during the spraying operation, the helicopter flies at a height of about two meters above vegetation, so that droplets of the spraying liquid can reach the water.

Pursuant to the testimony given by the Contractor's Scientific Officer who was present at the heliport area prior to the arrival of AR representatives, the helicopter fitted with the spraying equipment without carrying insecticide initially performed a reconnaissance flight in which the AR Inspector was onboard, possibly to check and verify that water was present in the fields to be sprayed, where access by ground means was not feasible, and then the helicopter conducted the scheduled four (4) aerial spraying flights. She also reported that the relevant contract made no provision about a reconnaissance flight boarded also by an AR representative, however such a flight was performed on the pilot's initiative.

In his testimony the student reports that the four (4) spraying flights were performed first and following their completion, the helicopter performed one additional flight in which the Public Health Inspector was also onboard, so that the pilot could demonstrate the areas where the spraying operations had been performed.

Pursuant to the entries made by the pilot in the helicopter's tech log, four flights were conducted.

After the scheduled aerial spraying flights were completed, the helicopter took off once again at 09:10 h, in order for the pilot to demonstrate to the student, who had expressed an interest in the operation, the entire aerial spraying process, following the Inspector's approval, as reported by the student, a fact however that is not confirmed by the Inspector. Onboard was also an employee (security guard) of a private company responsible for guarding the rowing and canoeing center in Schinias-Marathonas, who reportedly had also expressed an interest in flying with the helicopter. The student was seated in the co-pilot's seat (right-hand side) and the security

guard had taken a seat behind the co-pilot's seat. All persons onboard had their seat belts fastened, whereas the pilot wore the helmet and the student the headset.



Photo 1a: Map of the broader area of Schinias

As stated by the student, who video-recorded the flight on his mobile phone (the student's phone was not found), after the helicopter took off from the heliport, it made a reconnaissance flight at quite a high altitude (more than 100 ft), where the pilot showed to them the areas where spraying operations were undertaken (Photo 1a). Then, descending to a lower altitude, about 50 ft above ground as estimated by the student, the helicopter continued to fly at a steady altitude above the wetland, simulating flight conditions during spraying. Also, the security guard broadcasted the flight live (live streaming) in social media (his phone was not found either). This recording is available, ending at the moment the helicopter struck the power lines. During the flight, the pilot activated momentarily the spraying system in order to demonstrate the whole process to the persons onboard, while at times he explained to them the technicalities of the spraying operation.

With the helicopter flying at a low but steady altitude above the wetland and

while the student and the security guard of the rowing/canoeing center were video-recording the flight with their mobile phones (the student doing so from the right-hand door glass) the pilot was heard, as reported by the student, saying something like “damn, wires”. As soon as he turned his head forward, there was a sound of impact and the windshield of the helicopter became detached from it. At the same time there was a sound similar to that made when a rotating object comes in contact with a stationary one, as well as a smell similar to that in an electric short-circuit. The helicopter then crashed at a small distance from the broken power lines, in the wetland, following an unsteady flight (veering off to the left – right relative to the Roll Axis) (Photo 2a/b).



Photo 2a: The helicopter’s impact and crash sites



Photo 2b: The helicopter’s crash site

The student who was conscious after the impact, after realizing that he could not help the other two persons onboard, he exited the helicopter and moved towards the nearby road. The accident site was reached first by two persons working for the ground spraying crew, who became aware of the helicopter crash, after one of them had already advised by telephone the Contractor's scientific officer about the crash of the helicopter.

The contractor's scientific officer, as well as the RA Public Health Inspector, immediately rushed to the helicopter crash site, where the Inspector assisted by a workman accompanied the student to the nearby road, whereas the other workman moved towards the helicopter, in order to help the other two persons onboard.

The Inspector called the National Emergency Medical Aid Center (EKAB) to send ambulances and also advised the Fire Service and the Public Power Corporation (PPC) given that, while moving on Konstantinoupoleos street after they were notified of the accident, they had seen a broken PPC pole and severed power lines on the ground.

The student, accompanied by the Inspector, was taken by ambulance to 'KAT' General Hospital of Attica, whereas the pilot and the security guard of the rowing/canoeing center were recovered fatally injured from the helicopter wreckage.

1.2 Injuries to persons

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

1.3 Damage to the helicopter

The helicopter was totally destroyed (Photo 2c).



Photo 2c: The helicopter at the hangar of 651 Army Material Depot

1.4 Other damages

The three power lines suspended on a metallic structure in a “T” configuration at the top of the power transmission wooden poles, broke when the helicopter struck them. Moreover, the power transmission pole located at the left-hand side of the helicopter’s course (Photo 2a, southern wooden pole), broke near its base and fell to the ground (Photo 3).



Photo 3: The power transmission pole, on the ground, following the impact

1.5 Personnel information

The pilot of the helicopter was a 67-year old male.

License : CPL(H) license valid until 25/09/2019.

Endorsements : On type HU-369 (MD 500E), valid until 30/09/2017

Medical Certificate : Class 1 valid until 13/08/2017, on the condition that he operates together with a certified co-pilot on board.

Class 2 valid until 13/08/2017, on the condition that he operates together with a certified co-pilot on board.

Flying Experience : The pilot had, as at 05/09/2016, a total of 15,500 flying hours.

The pilot had flown 09:35 flying hours on the specific type of helicopter in the last 30 days and 17:10 flying hours in the last 60 days.

Duty time :

- 11:15 hours in the last 7 days, with a prescribed maximum of 60 hours
- 16:35 hours in the last 28 days, with a prescribed maximum of 190 hours

On the day of the accident the pilot's duty time was 1:50 hours with four landings (prescribed maximum of 12 hrs / day), on the previous day it was 3:45 hours with five landings (prescribed maximum 11 hrs / day) and two days prior to the accident the flights were conducted with a copilot onboard the helicopter, with duty time 5:40 hours with 9 landings (prescribed maximum 9 hrs / day).

As witnessed by the persons who were present at the heliport prior to the flight, the pilot seemed to be in good mood, without any signs of fatigue.

1.6 Helicopter information

1.6.1 General

The MD-500 is a light helicopter that was formerly manufactured by ‘Hughes Helicopters’ as the ‘Hughes Model 500’ and is now manufactured by ‘MD Helicopters’ as the MD-500 (Photo 4).



Photo 4: The helicopter fitted with the spraying apparatus

Manufacturer	: MD HELICOPTERS
Model	: MD 500E
Manufacturer’s serial No.	: 0427 E
Year of manufacture	: 1990
Registration number	: SX-HBB
Country of manufacture	: USA
Maximum take-off weight (MTOW)	: 3,000 lbs
Crew	: One or two
Number of passengers	: 4
Certificate of Registration	: Issued on 30/03/2010
Certificate of Airworthiness	: Issued on 13/06/2007
Airworthiness Review Certificate	: Valid, expiration date 01/03/2018
Aircraft Radio Station License	: Valid, expiration date 31/12/2017
Insurance policy	: Valid, expiration date 01/01/2018

Total Since New:

Flight hours : 6,117
Landings : 19,551
Cycles : 7,185

The helicopter is equipped with a five blades rotor and is powered by a Rolls-Royce 250-C20R/2 turbo shaft engine.

1.6.2 Helicopter maintenance

Continuous Airworthiness Management Organization under Reg. No. EL.MG.0050 was responsible for the management of the helicopter's airworthiness and helicopter maintenance was conducted by the certified maintenance organization under Reg. No. EL.MF.0006.

Pursuant to the records on the helicopter, the following information is established with respect to its maintenance:

Time since last 100 Hrs airframe/engine inspection (22/11/16) : 79:20 hrs
Time since last 100 Hrs visual corrosion inspection (22/11/16) : 79:20 hrs
Time since last 35 Hrs / 200 'torque events' inspection (01/05/17) : 15:30 hrs / 114 t.e.
Time since last 300 Hrs airframe/engine inspection (24/11/15) : 180:35 hrs
Total engine Hrs/Cycles since OVHL : 680 hrs / 3,088 cycles
Total engine Hrs/Cycles since HSI : 680 hrs / 3,088 cycles

The helicopter's Tech Log contained no entry about any mechanical problem and nothing relevant had been mentioned by the pilot.

The helicopter was weighed on 21/11/2016 fitted with the 'Isolair Avenger 3700' equipment for aerial spraying operations, and was found to be of a total weight of 1,721 lbs, longitudinal center of gravity 108 inches and lateral center of gravity + 0.1 inches.

1.6.3 Helicopter loading

Pursuant to the Tech Log of the helicopter, no entry was made of the fuel quantity in the helicopter tanks, prior to the first flight of the day. The

inspection of the tanks after the accident established that the tanks contained fuel almost to the middle. The capacity of both tanks is 435 lbs.

The helicopter's weight at the time of the accident was approx. 2,485 lbs, with longitudinal center of gravity 101.6 inches and lateral center of gravity -0.6 inches.

The limits for the longitudinal center-of-gravity location is 99 inches for the forward limit, whereas for the aft limit it is 107,4 inches at 1,538 lbs, 106,0 at 2,000 lbs, 104,5 in at 2,500 lbs and 103 inches at 3,000 lbs.

The limits for the lateral center-of-gravity location are $\pm 3,0$ inches.

1.7 Meteorological information

The METAR weather report issued by the airport that was closest to the accident site, 'EL. VENIZELOS' Athens International Airport, was as follows:

LGAV 230650Z 05004KT 330V090 CAVOK 30/11 Q1017.

1.8 Aids to navigation

Not applicable.

1.9 Communications

Communication between the pilot and the maintenance engineers of the helicopter, was carried out by radio without any problem.

The pilot had not submitted any flight plan and was not under the surveillance of air traffic control.

1.10 Heliport information

The heliport is located near the Schinias rowing & canoeing center, with coordinates 38°08'22.0''N and 24°00'52.1''E

1.11 Flight recorders

Not applicable.

1.12 Wreckage and impact information

1.12.1 The impact site

After the helicopter strike on the power lines at an altitude of 39 ft, a part of one of the five blades of main rotor detached from it and was found at a small distance to the right of the impact site. The detached part of the blade had multiple deformations. The main section of the helicopter's fuselage (cabin, engine, main rotor) was found within the wetland (38°09'27.5''N and 24°01'37.8''E) with the right-hand side immersed in the water, at a distance of 120 m from the point of impact with the power lines, having first run a 240° course. The blades that had not been detached from the main rotor, were also deformed to a large extent. Furthermore, the tip of one of the main rotor blades was found at a distance of about 50 m away from the fuselage.

The tail boom was found at a distance of three meters away from the fuselage. The tail rotor together with the tail's vertical and horizontal stabilizer, were found approx. 4 m prior of the fuselage (Photo 2b). The cockpit's windshield that had been detached when the helicopter struck the power lines was not found, whereas the tanks used for the spraying liquid, as well as the spraying nozzles and tubing, were found deformed on the helicopter. The front part of the left landing skid had also been detached from it and was not found.

1.12.2 Wreckage recovery

The helicopter was recovered (Photo 5) with the assistance of Armed Forces units and in particular:

- Hellenic Army General Staff, Units: 4th TEAS, 865 TENEK, 784 TME and 305 SPTX
- Hellenic Air Force General Staff, Unit 206 PAY/KOSYTHE and

- 401 General Army Hospital of Athens and 251 Hellenic Air Force General Hospital.

The recovery operation was also assisted by the 1st Disaster Response Unit (EMAK) of the Fire Service.

The whole operation was coordinated by the Hellenic National Defense General Staff (HNDGS)/National Operations Center and HNDGS/A6.

The wreckage is kept in a hangar provided by the Command of 651 Army Material Depot.



Photo 5: A scene from the helicopter recovery operation

1.13 Medical information

Tests performed established that the pilot was not under the influence of alcohol or other substances that would have impaired his flying ability.

1.14 Fire

Not applicable.

1.15 Tests and research

Samples from the helicopter's fuel and lubricants were examined by an accredited laboratory of the Hellenic Air Force and were found to be within

specifications.

Performing engine borescope inspection, the compressor and the hot section were found to be in a good condition and within limits according to the engine manufacturer.

The filters (airframe and engine) in the fuel system were also inspected and found clean, without contamination.

A similar inspection was also carried out on the oil filters (airframe and engine) of the lubrication system, as well as the chip detectors of the engine, main and tail rotor, with no findings.

1.16 Organizational and management information

AIR1 HELICOPTERS was licensed to commercially conduct aerial spraying operations, external load transports, aerial photography, aerial videography and power line stringing. The company was also a licensed Continuous Airworthiness Management Organization (EL.MG.0050) and a licensed Maintenance Organization (EL.MF.0006) for the helicopter MD 500E.

The helicopter pilot was the Accountable Manager and also the Safety Manager of the company.

1.17 Additional information

1.17.1 Video material

There is visual material (a video recording) available, taken by the security guard who was seated behind the co-pilot's seat, which describes the flight up until the moment the helicopter struck the power lines. This material was shown live (live streaming broadcast in real time) in social media.

The first and longer segment of the flight (segment AB, Photo 6) was conducted at a considerably higher altitude than the last segment (segment BC, Photo 6) which lasted about 18 sec and was conducted at a low and almost steady altitude of 40 ft above ground.

1.17.2 Digital plotting of flights

Data from the GPS system installed in the said helicopter were extracted and the flights performed on the day of the accident were digitally plotted.

The yellow line depicts the four aerial spraying flights and the red line shows the last flight which ended with the crash (Photo 6).



Photo 6: Digital plot of the helicopter's flights

1.18 Useful or effective investigation techniques

Not applicable.

2 ANALYSIS

2.1 Helicopter maintenance

The review of the helicopter's maintenance records revealed that maintenance was performed as prescribed in the Maintenance Schedule of the helicopter, approved by the Hellenic Civil Aviation Authority (HCAA).

Furthermore, there was no Airworthiness Directive (AD) outstanding, that could have contributed to the accident.

Pursuant to the results of:

- the Borescope Inspection of the engine,

- the inspection performed on the fuel filters and the fuel nozzle of the engine,
- the inspection performed on the lubrication system of the engine, the main gearbox and the tail gearbox,

there were no findings that could have contributed to the accident, i.e. impairment of the engine performance and a problem in the power transmission system.

Although there is no entry in the tech log of the helicopter of the fuel quantity in the tanks prior to the first flight of the day, in an inspection carried out after the accident, it was found that the tanks contained fuel almost to the middle.

Furthermore, the results of the examination of fuel samples by an accredited laboratory have revealed that the fuel was within the prescribed specifications.

The video material examined, indicates that:

- the sound of the engine as heard was continuous, uniform and characteristic of normal operation,
- there was no abrupt loss in the helicopter's flight altitude,
- there were no sudden changes in the helicopter's position relative to its longitudinal and vertical axis.

The above are indicative of normal operation of both the engine and the control system of the helicopter.

As per the testimony of the only survivor of the crash, there was no mention of any mechanical problem by the pilot during the flight.

Additionally, he was not aware of any change to the operation and attitude of the helicopter in the last seconds prior to the helicopter striking the power lines.

As stated by the maintenance engineers, the pilot did not mention to them any problem over the radio, prior to the impact.

Given the speed of the helicopter prior to the impact, it is not possible that the pilot sought to land the helicopter due to some problem, given that there were several fields on the ground, in the last segment of the flight prior to the impact, that were suitable for landing.

2.2 Helicopter loading

The weight of the helicopter at the time of the accident was 2,485 lbs with a maximum permissible weight of 3,000 lbs. The center of gravity along the longitudinal axis was 101.6 inches with a forward limit at 99 inches and aft limit at 104.4 inches. The lateral center of gravity was -0.6 inches with a limit of ± 3.0 inches.

From the above, it is established that the helicopter loading was within the limits prescribed in the flight manual.

2.3 Digital plotting of the flights / The human factor

The plot of recorded GPS data with respect to the flights on the day of the accident, as well as the video material available, establish that:

- The aerial spraying flights took account of the existing obstacles, i.e. the power lines, and this can be seen from the fact that the flights were conducted parallel to such lines (Photo 6, yellow lines).
- In the flight conducted with the two occupants onboard, after the spraying operations were concluded (Photo 6, red line), as established from the video material, the plot of recorded GPS data on the flight, but also from the testimony of the survivor, its first segment (Photo 6, segment AB) was conducted at a higher altitude than the second segment, which lasted about 18 sec (Photo 6, segment BC) and was conducted at a low but almost steady altitude.
- The altitude at which the helicopter flew at segment BC, shows that the pilot possibly wanted to conduct a simulated spraying flight.
- Also, for the greater part of the last segment (segment BC) of the flight,

it looks that the helicopter had a course approx. 45° relative to the power lines and at a small distance from the power lines (about 200 m) its course became almost perpendicular.

The fact that the pilot had probably not planned to fly low but rather fly at a high altitude and in the last moment he decided to fly at a low and steady altitude in order to simulate a spraying flight, combined with the fact that he conducted a touring flight and not a special operation (SPO), possibly led him to fail to take account of the existing obstacles.

Studies have established that there is a possibility for the human eye to see the power lines, only if it focuses on them.

Even though visibility was very good on the day of the accident at a standard flight speed, the power lines are almost invisible, so for this reason helicopter pilots when conducting a flight at low altitude, they try to scan for the poles supporting the power lines.

It must also be stated that the power lines had no marking that would make them visible in a timely manner to the pilot, even though they were in an area where spraying flights are often conducted at a low altitude for mosquito control purposes.

Although the helicopter was conducting flights at low altitude, it was not equipped with 'Wire Cutters' that protect it, cutting the power lines when the helicopter comes into a contact with them.

The poles on which the power lines were supported were located along the road with trees and high vegetation in general which, combined with the helicopter's 45° course during the greater part of segment BC, but also due to the strong light and its reflection on the water, rendered them hard for the pilot to see.

It is also possible that the pilot's attention had been distracted observing the occupant seated at the co-pilot's seat who video-recorded the flight on his phone and therefore he lost time in timely perceiving the wire poles.

The fact that the pilot failed to timely perceive the wires and only saw them

at the last minute is also established from the testimony of the survivor who stated that when the pilot called out “damn, wires”, he, immediately turning his face forward, did not see the wires but rather felt them hitting the helicopter’s windshield.

Therefore, the time between the moment the pilot became aware of the wires and the impact was not sufficient for the pilot to move the controls for the helicopter to gain altitude.

Pursuant to the results of the tests performed on the pilot after the accident, the testimonies given, his duty time and the stable course of the helicopter, it appears that the pilot has not encountered any health problem during the last segment of the flight that could have contributed to the accident.

2.4 Performance of flight

As shown in the Medical Certificate held by the pilot:

- Medical Certificate Class 1 required for performing aerial spraying operations was valid until 13/08/2017, on the condition that he operates **together with a certified co-pilot on board.**

From the above it can be seen that, even though a valid Medical Certificate Class 1 is required for performing aerial spraying operations, the Medical Certificate held by the pilot, **was valid and entitled him to conduct flights only together with a certified co-pilot on board.**

Contrary to that, the pilot conducted aerial spraying flights on the day of the accident with only him onboard the helicopter, serving as the pilot.

- Medical Certificate Class 2 required for conducting private flights was valid until 13/08/2017, on the condition that he operates **together with a certified co-pilot on board.** Upon inspection of the helicopter, this was fitted with only one set of controls at the pilot’s seat.

The last flight with the two occupants was not a scheduled spraying flight and could be designated as a private flight, even though the helicopter was fitted with the spraying system but carried no spraying liquid. Designating the last flight as a private flight, the pilot’s Medical

Certificate Class 2 was valid, but he was required to conduct the flight together with a certified co-pilot on board.

Contrary to that, the pilot conducted the last flight with only him onboard the helicopter, as the pilot.

Furthermore, designating the last flight as a private flight, in a Visual Flight Regulations (VFR), according to Aeronautical Information Publication (AIP) issued by the Hellenic Civil Aviation Authority (HCAA), he had to maintain a minimum altitude of 500 ft clear of obstacles for a distance of 150 m away from the helicopter.

The first and longer segment of the flight was conducted at a quite higher altitude compared to the last segment which lasted for about 18 sec and was conducted at a low altitude of about 40 ft from the ground and could be designated as a simulated spraying flight. Furthermore, even though the operations manual of the company stipulates that in a Special Operation (SPO) of the helicopter such as aerial spraying, only authorized and trained persons are allowed to be onboard, a simulated spraying flight was probably conducted with unauthorized persons onboard the helicopter.

3 CONCLUSIONS

3.1 Findings

- 3.1.1** The weather conditions were not a contributing factor to the accident.
- 3.1.2** Helicopter maintenance was conducted in accordance with the maintenance program approved by Hellenic Civil Aviation Authority (HCAA), without any outstanding issue.
- 3.1.3** The helicopter was airworthy and all its legalization documents were valid.
- 3.1.4** There were no indications of a technical anomaly that could have caused or contributed to the accident.

- 3.1.5** The fuel tanks of the helicopter contained enough fuel quantity for the flight and the fuel was within the prescribed specifications.
- 3.1.6** The helicopter's loading was within the specified limits.
- 3.1.7** A violation of the Visual Flight Regulations (VFR) is established in terms of the minimum altitudes to be observed, and no flight plan had been submitted.
- 3.1.8** The pilot's license was valid.
- 3.1.9** According to his Medical Certificate, the pilot did not meet the requirements for performing the flight (restrictions).
- 3.1.10** The pilot was rested and no health problem was encountered that could have contributed to the accident.
- 3.1.11** A deficient flight safety culture is evident.

3.2 Probable causes

The violation of Visual Flights Regulations (VFR) and in particular the violation of the minimum altitude clear of obstacles.

3.3 Contributing Factors

The deficient flight safety culture.

4 SAFETY RECOMMENDATIONS

Not applicable.

Nea Philadelfia, 03rd October 2019

THE CHAIRMAN

Antonios Athanasiou

Exact Copy

The Secretary

Kyriakos Katsoulakis

THE MEMBERS

G. Flessas

A. Tsolakis

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