SOUTH AFRICAN CIVIL AVIATION AUTHORITY

Section/division **Accident and Incident Investigations Division** Form Number: CA 12-55

LIMITED OCCURRENCE INVESTIGATION

Reference Number	CA18/2/3/10004								
Classification	ACCID	**Date**	14 May 2021	**Time**	1554Z				
Type of Operation	Private Part 91								
Location									
Place of Departure	Rand Airport (FAGM)		**Place of Intended Landing**	Vaal, Burgundy Bay					
Place	Vaal Marina Bay, Vaal Dam, Gauteng Province								
GPS Co-ordinates	Latitude	S26º54'28.1"	Longitude	E028º12'37.0"	Elevation	4900ft			
Aircraft Information									
Registration	ZS-RSK								
Model/Make	Robinson R44 Raven II								
Damage to Aircraft	Substantial		Total Aircraft Hours	2596.5					
Pilot-in-command									
Licence Type	Private Pilot Licence	Gender	Male	Age	59				
Licence Valid	Yes								
Total Hours on Type	±900		Total Flying Hours	909.7					
People On-board	1+1(+2 dogs)	Injuries	0	Fatalities	1+1+2	Other (On Ground)	0		

What Happened

On 14 May 2021, a Robinson R44 Raven II helicopter with registration mark ZS-RSK was involved in a fatal accident in the Vaal Marina Bay, Gauteng province. On-board the helicopter were two occupants, the pilot-in-command who was seated on the right-side of the helicopter, and the passenger seated on the left-side. The pilot and the passenger had two dogs with them, which were on the rear seats of the helicopter. The helicopter was operated privately under the provisions of Part 91 of the Civil Aviation Regulations (CAR) 2011 as amended.

The passenger was the pilot's sister and was coming to visit for a weekend with family at their weekend home in Vaal Marina. The helicopter took off from Rand Airport (FAGM) at approximately 1530Z with the intention to land on a strip near the pilot's residence, located at Burgundy Bay in Vaal Marina Bay. The helicopter took off in visual meteorological conditions (VMC) by day; it approached the intended landing destination under night conditions.

The helicopter approached from a north-westerly direction at a low height, above the water before making a turn (over the water) to line up for a straight-in approach for landing on an open grassy strip between the dam and the houses. According to the statement from one of the house guests who was already at the pilot's house, about three minutes before final approach, the pilot had contacted the eyewitness via cellular phone to request that they switch on the spotlight mounted on the highest point of the house to shine a light onto the landing spot. The spotlight faced the bay as well as the direction of approach for landing. As requested by the pilot, the light was switched on and, as expected, the helicopter approached for landing while the eyewitness made a recording of the approaching helicopter. In the video footage, no anomalies with the engine and the helicopter

operation were noted during approach; also, the water in the bay was calm and glassy, mirroring the surroundings. In the video footage, the helicopter approaches in a normal flight path as the pilot had done in the past when landing.

The helicopter is then observed descending rapidly and flying very low towards the water surface while turning towards the landing site. It then struck the water surface, followed by a bright spark and a loud bang. The loud bang heard from the video was attributed to the main rotor severing the tail boom section (the aft tail cone bulkhead, empennage, tail rotor gearbox and tail rotor assembly) which separated from the helicopter before sinking. The helicopter lay on its right-side with the left skid gear on top before being completely submerged in water.

The bodies of the pilot and the passenger were recovered on the day of the accident. The body of the passenger was recovered by one of the fishermen who were camping on the west-side of the bay about 150 metres (m) from where the helicopter was observed floating a few minutes after the accident and before it was submerged in water. The pilot's body was recovered later by the South African Police Service (SAPS) Diving Unit at a depth of 9.13m. Both occupants were confirmed fatally injured by emergency services personnel on site.

The helicopter was recovered the next day (15 May 2021) in the same area where the pilot's body was found, about 200m from the edge of the shoreline. It was located 9.13m below the surface of the water. Two floating lifting bags were attached to the helicopter to bring it up to the water surface and it was then pulled to the shore using its skids.

One of the dogs (a smaller dog) was found in the aircraft on the floor on the right-side rear seat. All personal belongings on-board, including the helicopter documents, were still in the wreckage and were handed to the family in the presence of the investigating authorities. The helicopter was recovered from the accident site to a secured hangar at Wonderboom National Airport (FAWB).

The helicopter was substantially damaged. The main rotor blades were bent as a result of impact with water and, later, broke off after striking the aft tail-boom section. The right-side windshield had detached completely from its frame. The edges of the left-side windshield remained in the frame, with some shattered smaller pieces of the windshield found in the wreckage, while some larger pieces were recovered and had multiple cracks on them.

The second dog (a larger dog), the pilot's cellular phone and the tail boom with the tail rotor drive shaft were recovered on Wednesday, 19 May 2021 (four days after the accident). The dog and the cellular phone were handed to the family; the tail boom and drive shaft were transported to FAWB.

The investigation established that based on the video footage obtained from a witness on site, the helicopter flew over calm, glassy waters that mirrored the surroundings. It is, thus, likely that the glassy water illusion could have given the pilot the perception that the helicopter was higher than it actually was, causing the pilot to reduce height, which resulted in the helicopter making contact with the water surface, and hence the subsequent crash.

The information below is extracted from the *Robinson R44 II Pilot Operating Handbook* (POH) section 10: Safety tips and notices. The extract includes the following safety notice information which was of interest to this investigation:

Safety Notice SN-19:

Many helicopter accidents have occurred while manoeuvring low over water. Many pilots do not realise their loss of depth perception when flying over water. Flying over calm glassy water is particularly dangerous, but even choppy water, with its constantly varying surface, interferes with normal depth perception and may cause the pilot to misjudge his height above the water.

MAINTAIN 500FT AGL WHENEVER POSSIBLE AND AVOID MANEUVERS OVER WATER BELOW 200FT AGL.

Helicopter emergency floatation devices (EFS)

https://www.skybrary.aero/index.php/Helicopter_Emergency_Floatation_Systems_(EFS)

Definition

***Emergency Floatation Systems (EFS)** are designed to minimize the chances that a helicopter which is involved in either a controlled ditching or a water impact sinks or capsizes as a result.*

Description

The fitting of an EFS based on floats is well established but the problem of instability on anything but a calm water surface has always been problematic. This is because of the relatively high center of gravity of helicopters due to the location of the rotors, the transmission, and the engines.

The floats which provide EFS buoyancy are either packed within spaces inside the airframe or fitted as externally mounted packs on the lower structure. Inflation is provided by gas stored in pressurized cylinders which are carried on board. The need for rapid inflation is met by the inclusion of helium in the gas but it is usually blended with other gases.

Figure 1: A helicopter fitted with floatation devices. (Source: New York Police Department website)

Safety Action/s

None.

Safety Message and/or Safety Recommendation/s

Safety Recommendation: It is recommended that the Director of Civil Aviation mandates the fitment of emergency floatation devices on helicopters operating over water (including those which approach, land or take-off over a large mass of water).

Safety Message: It is recommended that helicopter owners who operate in areas with large water mass consider installing emergency floatation devices on their helicopters (including helicopters which approach, land or take-off over a large mass of water).

Purpose of the Investigation

In terms of Regulation 12.03.1 of the Civil Aviation Regulations (CAR) 2011, this report was compiled in the interest of the promotion of aviation safety and the reduction of the risk of aviation accidents or incidents and ***not to apportion blame or liability****.*

About this Report

Decisions regarding whether to investigate, and the scope of an investigation are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, no investigation has been conducted, and the Accident and Incident Investigations Division (AIID) has relied on the information submitted by the affected person/s and organisation/s to compile this brief report. The report has been compiled using information supplied in the initial notification, as well as follow-up information to bring awareness of potential safety issues to the industry in respect of this occurrence, as well as possible safety action/s that the industry might want to consider in preventing a recurrence of a similar accident.

This report provides an opportunity to share safety message/s in the absence of an investigation.

All times given in this report are Co-ordinated Universal Time (UTC) and will be denoted by (Z). South African Standard Time is UTC plus 2 hours.

Disclaimer

This report is issued by:

Accident and Incident Investigations Division
South African Civil Aviation Authority
Republic of South Africa