SOUTH AFRICAN CIVIL AVIATION AUTHORITY

Section/division **Accident and Incident Investigations Division** Form Number: CA 12-57

LIMITED OCCURRENCE INVESTIGATION REPORT – FINAL

Reference Number	CA18/2/3/10229						
Classification	Accident	**Date**	15 October 2022		**Time**	0854Z	
Type of Operation	Aerial Surveillance (Part 101)						
Location							
Place of Departure	Anglo American Mogalakwena Mine in Limpopo Province	Place of Intended Landing	Anglo American Mogalakwena Mine in Limpopo Province				
Place of Occurrence	Anglo American Mogalakwena Platinum Mine						
GPS Co-ordinates	Latitude	25°58'49.03" S	Longitude	028°54'9.73" E	Elevation	4478 ft	
Aircraft Information							
Registration	ZT-XNE						
Make; Model; S/N	DJI MATRICE, 300 RTK (Serial Number: 1ZNBJ7B00C00GL)						
Damage to Aircraft	Substantial		Total Aircraft Hours	68.58			
Pilot-in-command							
Licence Type	RPL Multirotor		Gender	Male	Age	46	
Licence Valid	Yes	Total Hours	20.0	Total Hours on Type	17.09		
Total Hours 30 days	07.39		Total Flying on Type Past 90 days	07.39			
People Controlling	1	**Injuries**	0	**Fatalities**	0	**Other (on ground)**	0

What Happened

On 15 October 2022 at 0819Z, a pilot operating a remotely piloted aircraft (RPA) with registration ZT-XNE launched the RPA for aerial surveillance from Anglo American Mogalakwena Mine in Limpopo Province. The flight was conducted under visual line of sight (VLOS) by day and under the provisions of Part 101 of the Civil Aviation Regulations (CAR) 2011 as amended.

The pilot stated that the RPA was launched with 94% battery power. It flew overhead the 'Big Mike Stockpiles' in the mine and completed the mission at approximately 0848Z with 10% battery power still remaining. The pilot observed the RPA from the controller display indicator returning to home base. However, the RPA then disconnected from the controller. This usually lasts a few seconds before the Command-and-Control link (C2) reconnects again, but this time it remained disconnected. The pilot activated the Return-to-home (RTH) function on the controller, but the RPA did not reconnect.

The pilot then radioed the search crew for assistance in locating and recovering the RPA. The RPA was later spotted in the south pit of the mine with the help (use) of another RPA. It was recovered at approximately 1620Z with damage to the antennae, propellers and right front arm.

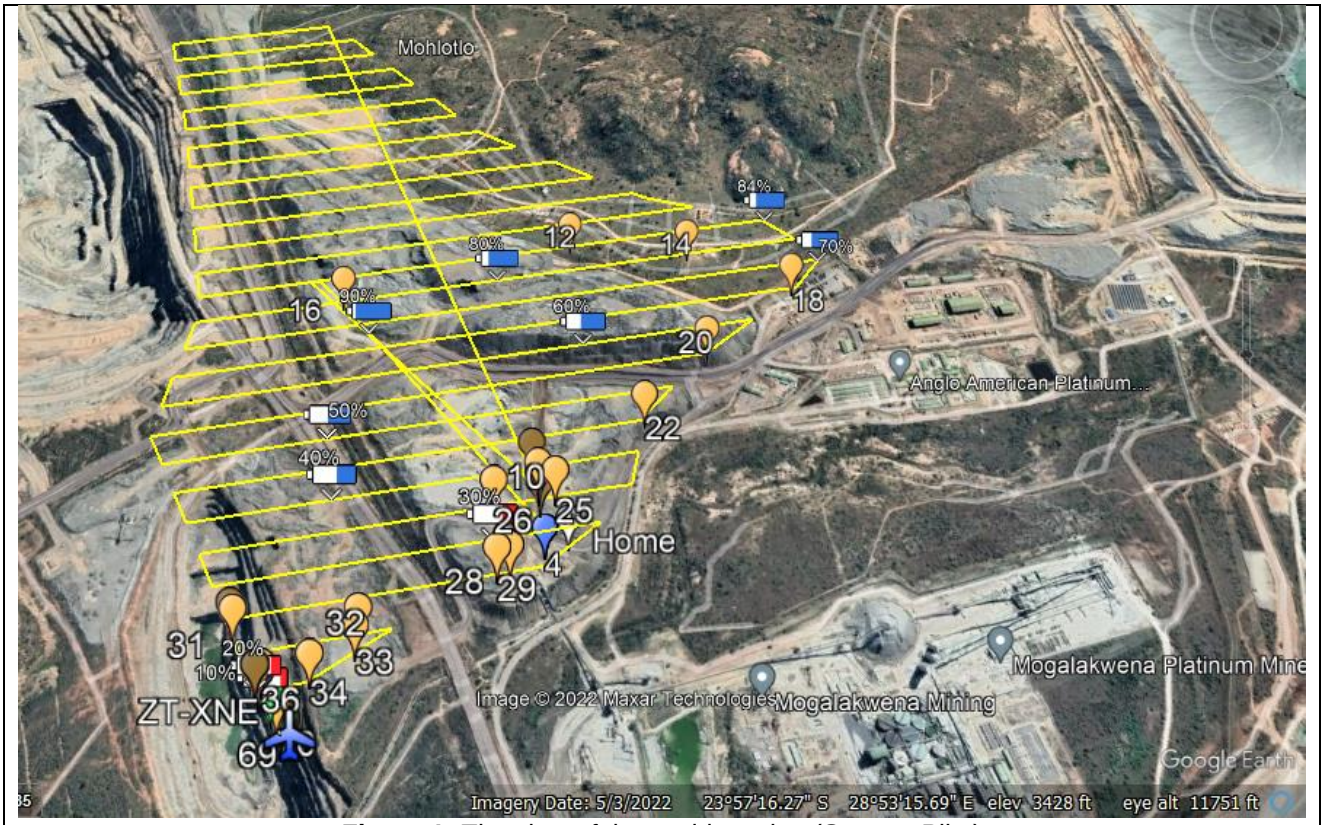

Figure 1: The view of the accident site. (Source: Pilot)

Figure 2: The ZT-XNE after it was recovered. (Source: Operator)

Findings

The Pilot

- The pilot was issued a Multirotor (MR) Remote Pilot Licence (RPL) with a visual line of sight (VLOS) rating by the Regulator (SACAA) on 17 December 2022, valid until 31 December 2023.

- The pilot had a Class 3 aviation medical certificate with no restrictions, which was issued on 9 December 2020 with an expiry date of 31 December 2023.

- The pilot reported that he finished operations at approximately 0848Z with about 10% battery power still remaining.

Aircraft information

- The aircraft had a Remotely Piloted Aircraft Systems (RPAS) Letter of Approval (LOA) which was initially issued on 17 September 2021; it was renewed on 4 August 2022 with an expiry date of 16 September 2023. The aircraft's Certificate of Registration (C of R) was issued to the current owner on 27 August 2021.

- The last scheduled maintenance inspection prior to the accident flight was conducted on 10 October 2022 at 65.54 airframe hours. The aircraft flew a further 3.04 hours since the last scheduled maintenance inspection was conducted.

- The operator had an RPAS Operating Certificate (ROC) that was issued by the Regulator on 31 October 2021 with an expiry date of 31 October 2022.

- Part 101 of the Civil Aviation Regulations (CAR) 2011, subpart 101.05.23 states:

  Power reserves

  (1) During VLOS operations, the remote pilot shall ensure that the aircraft has enough fuel or electrical charge to complete the flight, plus a reserve of at least 10%.

  (2) During B-VLOS operations, the remote pilot shall ensure that the aircraft has enough fuel or electrical charge to complete the intended flight plus a reserve of at least 10%.

- Matrice 300 Series TB60 Intelligent Flight Battery (Source: DJI M300 Manual)

Overview

The TB60 intelligent flight battery has a capacity of 5.935 Milliamp hours (mAh). It supports the hot-swap function allowing to change the battery without powering off the drone, which saves time and ensures smooth flight operation during critical tasks. The battery allows Matrice 300 RTK to fly 55 minutes without load. (Source: https://www.dji.com/).
Tips
Never use damaged, leaking, or swollen batteries. In any of these cases, contact DJI or designated dealers.
In The Box
Smart flight battery x 1
Specifications
Capacity: 5,935 mAh
Weight: ~1.35 kg
Voltage: 52.8 V
Operating Temperature: -20 ~ 50°C (-68 ~ 122°F)

Compatibility
Matrice 300 RTK

The operator's Operating Manual states that the aircraft needs to land with a battery percentage of higher than 20% (reserve fuel). (Source: Operating Manual)

- The pilot did not follow the requirements of the Operating Manual and the Civil Aviation Regulations (CAR) 2011 Part 101, subpart 101.05.23 to land immediately when the battery power was less than 20% (according to the Operating Manual) or at 10% (according to the CAR 2011 Part 101).

Probable Cause
Loss of C2 communication link between the controller and the RPA due to battery power being below 10%.

Contributing Factor
Operating the RPA below the critical battery reserve of 10%.
Safety Action(s)
None.
Safety Message and/or Safety Recommendation/s
Pilots are encouraged to always follow the guidelines as prescribed in the Standard Operating Procedures (SOP) as well as comply with the regulations.
About this Report
The decision to conduct a limited investigation is based on factors including whether the cause is known and the evidence supporting the cause is clear, the level of safety benefit likely to be obtained from an investigation and that will determine the scope of an investigation. For this occurrence, a limited 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 limited report. The report has been compiled using information supplied in the initial notification, as well as from follow-up desk top enquiries 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 occurrence. *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.*
Purpose
In terms of Regulation 12.03.1 of the Civil Aviation Regulations (CAR) 2011 and ICAO Annex 13, 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.
Disclaimer
This report is produced without prejudice to the rights of the AIID, which are reserved.

This report is issued by:

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