



**KOMITE NASIONAL KESELAMATAN TRANSPORTASI
REPUBLIC OF INDONESIA**

FINAL

KNKT.22.07.10.04

Aircraft Accident Investigation Report

PT White Sky Aviation

Bell 505; PK-WSU

Ungasan Heliport, Bali

Republic of Indonesia

12 July 2022

2024

This Final Report was produced by the *Komite Nasional Keselamatan Transportasi* (KNKT), Transportation Building, 3rd Floor, Jalan Medan Merdeka Timur No. 5 Jakarta 10110, Indonesia.

The report is based upon the investigation carried out by the KNKT in accordance with Annex 13 to the Convention on International Civil Aviation, the Indonesian Aviation Act (UU No. 1/2009) and Government Regulation (PP No. 62/2013).

Readers are advised that the KNKT investigates for the sole purpose of enhancing aviation safety. Consequently, the KNKT reports are confined to matters of safety significance and may be misleading if used for any other purpose.

As the KNKT believes that safety information is of greatest value if it is passed on for the use of others, readers are encouraged to copy or reprint it for further distribution, acknowledging the KNKT as the source.

When the KNKT makes recommendations as result of an investigations or research, safety is its primary consideration.

However, the KNKT fully recognizes that the implementation of recommendations arising from its investigations will in some cases incur a cost to the industry.

Readers should note that the information in KNKT reports, and recommendations is provided to promote aviation safety. In no case is it intended to imply blame or liability.

Jakarta, 7 March 2024
**KOMITE NASIONAL
KESELAMATAN TRANSPORTASI
CHAIRMAN**



SOERJANTO TJAHJONO

TABLE OF CONTENTS

TABLE OF CONTENTS	I
TABLE OF FIGURES	III
ABBREVIATIONS AND DEFINITIONS	IV
SYNOPSIS	V
1 FACTUAL INFORMATION	1
1.1 History of the Flight	1
1.2 Injuries to Persons	1
1.3 Damage to Aircraft.....	1
1.4 Personnel Information	2
1.4.1 Pilot in Command	2
1.4.2 Engineer 2	2
1.5 Aircraft Information	4
1.5.1 General	4
1.5.2 Engines	4
1.5.3 Main Rotors.....	4
1.5.4 Tail Rotors.....	5
1.5.5 Aircraft dimension	5
1.6 Aerodrome Information.....	6
1.7 Flight Recorders	6
1.8 Wreckage and Impact Information.....	6
1.9 Survival Aspects.....	6
1.10 Organizational and Management Information	7
1.10.1 Aircraft Operator	7
1.10.2 Indonesia Directorate General of Civil Aviation (DGCA)	9
1.10.2.1 Regulation of Licensing of Aircraft Maintenance Engineer	9
1.10.2.2 Procedure for Issuance and Renewal Aircraft Maintenance Engineer License.....	10
1.10.2.3 AMEL Renewal Process of Engineer 2	11
1.10.3 ICAO Standard of Personnel Licensing	11
1.10.3.1 Annex 1	11
1.10.3.2 ICAO Documents 8984 Manual of Civil Aviation Medicine	14
1.10.4 International Standard of Use of Psychoactive Substances	16

1.10.4.1 ICAO Annex 2	16
1.10.4.2 ICAO Documents 8984 Manual of Civil Aviation Medicine	17
1.10.4.3 ICAO Doc 9654 Manual on Prevention of Problematic Use of Substances	17
1.11 Additional Information.....	18
1.11.1 Bipolar Disorder.....	18
1.11.2 Pharmacotherapy of Bipolar Disorder	19
1.11.2.1 Atypical Antipsychotics.....	19
1.11.2.2 Antidepressants	19
1.11.2.3 Psychoactive Agents (Benzodiazepines)	19
1.11.3 Drug Interactions.....	20
1.11.4 Procedure of Drug Test in Indonesia	20
1.12 Useful or Effective Investigation Techniques	20
2 ANALYSIS	21
2.1 The Medical Issue of the Engineer 2.....	21
2.2 The Medical Assessment for Aircraft Maintenance Engineer Licensing.....	22
2.3 The Control of the Use of Psychoactive Substances.....	23
3 CONCLUSIONS	25
3.1 Findings.....	25
3.2 Contributing Factors.....	28
4 SAFETY ACTION.....	29
5 SAFETY RECOMMENDATIONS.....	30
5.1 PT Whitesky Aviation.....	30
5.2 Directorate General of Civil Aviation.....	30
5.3 International Civil Aviation Organization.....	30

TABLE OF FIGURES

Figure 1. Bell 505 external dimensions	5
Figure 2. Fly Bali heliport layout	6

ABBREVIATIONS AND DEFINITIONS

AOC	:	Air Operator Certificate
AME	:	Aircraft Maintenance Engineer
AMEL	:	Aircraft Maintenance Engineer License
C of A	:	Certificate of Airworthiness
C of R	:	Certificate of Registration
COM	:	Company Operation Manual
CPL	:	Commercial Pilot License
CV	:	<i>Commanditaire Vennootschap</i>
DGCA	:	Directorate General of Civil Aviation
FBH	:	Flybali Heliport
FOO	:	Flight Operation Officer
GCS	:	Glasgow Coma Scale
GWK	:	Garuda Wisnu Kencana statue
HDA	:	Helideck Assistance
HLO	:	Helicopter Landing officer
ICAO	:	International Civil Aviation Organization
KM	:	Kilometer
<i>KNKT</i>	:	<i>Komite Nasional Keselamatan Transportasi</i>
LT	:	Local Time
LTD	:	Limited
NR	:	Rotor RPM
<i>PT</i>	:	<i>Perseroan Terbatas</i>
PTE	:	Private
RPM	:	Revolutions per Minute
SOP	:	Standard Operating Procedures
SQA	:	Safety Quality Assurance
UAI	:	Urban Air Indonesia
VP	:	Vice President
WSA	:	Whitesky Aviation

SYNOPSIS

A Bell 505 Helicopter registration PK-WSU (the helicopter) operated by Urban Air under Air Operator Certificate (AOC) of PT Whitesky Aviation, served sightseeing flight from Flybali Heliport (FBH), Ungasan Bali to fly above tourist iconic destinations around Bali.

On 12 July 2022, the helicopter was scheduled to conduct 12 sightseeing flights. The route was from FBH – Garuda Wisnu Kencana Statue (GWK) – Dreamland Beach – Uluwatu Temple and returned to FBH which took approximately 12 minutes.

About 1615 LT, on day light condition, the helicopter landed on the FBH. During the engine shut down when the main rotor rotation was around 60% RPM (NR), a loud sound was heard and the pilot felt the pedal vibrate. The Engineer 1 checked on the behind of helicopter and saw that the Engineer 2 was laid on the ground with face down position. Afterward, the pilot activated the rotor brake. The Engineer 2 injured on the back and right hand.

The Engineer 2 was transported to the nearest hospital and after the condition has been stable, the Engineer 2 was transported to another hospital which has more facilities, for further treatment. On 23 July 2022, the Hospital 2 stated that the Engineer 2 passed away due to septic shock and acute respiratory distress syndrome.

The Engineer 2 was diagnosed with bipolar disorder since 2014 and treated with medication consisted of atypical antipsychotic, antidepressants, and psychoactive agents. On 13 June 2022, the Engineer 2 tried to hurt himself and admitted at the hospital for several days which then got his medication dose increased by new administration of medication that was consumed once per day to twice per day. The ICAO Annex 1 recommendation states that an applicant with depression, being treated with antidepressant medication, should be assessed as unfit.

There is no requirement of medical assessment for Aircraft Maintenance Engineer License. The Staff Instruction for AME license renewal, requires the applicant to provide a copy current of medical fitness status which states that the applicant is declared fit condition, visual and hearing normal condition. It also requires to provide a copy of statement that no indication under inviolance of drugs. The Staff Instruction only restricts the inviolance of drugs and do not restrict the consumption of prescribed psychoactive substance.

The Engineer 2 who had mental health issue, passed the license renewal, and performed his duty while using the increased medication that contained psychoactive substance. The side effects of sedation might have led the decreasing of awareness and resulted in the engineer 2 hit the tail rotor.

During the investigation, the Komite Nasional Keselamatan Transportasi (KNKT) had been informed several safety actions taken by the aircraft operator. KNKT considered that the safety actions were relevant to improve safety, however there are still safety issues remain to be considered. Therefore, the KNKT issued safety recommendations to aircraft operator, DGCA and ICAO to address the safety issues.

1 FACTUAL INFORMATION

1.1 History of the Flight

On 12 July 2022, a Bell 505 helicopter registration PK-WSU operated by Urban Air Indonesia (UAI) which operated under the Whitesky Aviation (WSA) Air Operator Certificate, to serve sightseeing flight from Fly Bali Heliport (FBH), Ungasan, to fly above tourist iconic destinations around Bali. The helicopter was scheduled to conduct 12 sightseeing flights.

On the last flight, the helicopter flew from FBH – Garuda Wisnu Kencana Statue (GWK) – Dreamland Beach – Uluwatu Temple and returned to FBH which took approximately 12 minutes.

On board the helicopter was one pilot and four passengers and one of the passengers occupied left cockpit seat. At 0817 UTC (1617 LT)¹, during the daylight condition, the helicopter landed on the FBH heading to the windsock (see figure 2 of the heliport layout). The helideck assistant (HDA) came near to the helicopter to assist the passenger disembarkation to be guided to the waiting room.

After the helicopter engine idled and stabilized, the pilot performed engine shut down. Some ground staff including helicopter engineer (the Engineer 1), documentation personnel, and HDA went to the helicopter in preparation for termination of the flight. Most of these personnel went to the cabin. Another engineer (the Engineer 2) also went to the helicopter and stood near the tail boom, between the horizontal stabilizer and the tail rotor. The Engineer 2 left the area and went to the cabin, then returned to the first position, faced toward to the helicopter cabin.

When the main rotor rotation was around 60% RPM (NR), a loud sound was heard and the pilot felt the pedal vibration. The Engineer 1 checked on the area behind of helicopter and saw the Engineer 2 laid on the ground. Afterward, the Engineer 1 asked the pilot to activate rotor brake².

After the rotors stopped rotating, the ground staff checked the Engineer 2 and found injured on the back and right arm. The Engineer 2 then transported to the nearest hospital.

1.2 Injuries to Persons

The engineer was fatally injured after receiving medical treatment 11 days in the hospital.

1.3 Damage to Aircraft

The aircraft was substantially damaged. Both tail rotor blades were broken, and the tail rotor gearbox was cracked.

¹ The 24-hours clock in Local Time (LT) is used in this report to describe specific events occurred. Local time is UTC+8 hours

² Rotor brake is a device used to immediate stop the rotor blade during shutdown

1.4 Personnel Information

1.4.1 Pilot in Command

Gender	: Male
Age	: 26
Nationality	: Indonesian
Date of joining company	: Single
License	: CPL/H
Date of issue	: 3 November 2019
Aircraft type rating	: Bell 505
Medical Certificate	: First Class
Validity	: 15 December 2022
Medical limitation	: None
Flying experience	
Total hours	: 750 hours
Total on type	: 162 hours
Last 90 days	: 124 hours 13 minutes
Last 30 days	: 25 hours 42 minutes
Last 7 days	: 4 hours
Last 24 hours	: 3 hours 42 minutes

1.4.2 Engineer 2

The Engineer 2 was 39 years old, Indonesian nationality. The Engineer 2 had experienced for 18 years as the helicopter maintenance engineer. The Engineer 2 held several helicopter type ratings such as Bell 505, Bell-412 series, AS 350 series, and Sikorsky S-76 series.

When working in the previous company which based at Balikpapan in 2014, the Engineer 2 experienced mental health problem and diagnosed by the psychiatrist with bipolar disorder. Due to this condition, the psychiatrist advised the Engineer 2 to take long-time treatment. Then the psychiatrist initiated the therapy of atypical antipsychotics, antidepressants, and psychoactive agents³. The psychiatrist considered that the Engineer 2 was able to keep doing normal occupation as a helicopter engineer. The Engineer 2 was required to be routinely monitored, including adjusting the time of medication consumption with the work schedule, which was given daily on night time to avoid sedative effect during daytime. During the treatment, the condition of the Engineer 2 was stable.

³ The description of atypical antipsychotics, antidepressants, and psychoactive agents are available in the chapter 1.11.2 of this report.

In 2021, the Engineer 2 stopped working at Balikpapan and moved to South Tangerang. The routine monitoring by psychiatrist in Balikpapan was performed by telemedicine.

On 24 May 2021, the Engineer 2 joined the Urban Air Indonesia (UAI). After conducting basic indoctrination and several trainings, since June 2021 the engineer 2 had started to work which was based in Bali. The telemedicine with the psychiatrist in Balikpapan was continuing.

On 13 June 2022, the Engineer 2 tried to hurt himself and then admitted to the hospital in Denpasar for four days. The Engineers 2 was treated by a psychiatrist. The psychiatrist in Denpasar found that the Engineer 2 had been diagnosed with bipolar disorder and under routine monitoring by psychiatrist in Balikpapan. The psychiatrist in Denpasar found that the Engineer 2 did not take the proper medication lately and sometimes did not consume the medication as advised by the psychiatrist in Balikpapan.

Based on the examination and the latest medical condition, the psychiatrist in Denpasar provided the same medication. The dose of the medications was doubled by new administration of medication that was consumed once per day to twice per day. Considering the increased dose of the medication, the psychiatrist in Denpasar suggested the Engineer 2 to take rest at home and should not perform the duty. The psychiatrist in Denpasar also advised the Engineer 2 to see another psychiatrist nearby to evaluate his condition before going back to work.

The Engineer 2 was off duty for the next three weeks, so he went to his home at South Tangerang. During his off duty, the Engineer 2 visited a psychiatrist in South Tangerang for three times. The psychiatrist in South Tangerang acknowledged that the patient was an aircraft engineer, but the psychiatrist in South Tangerang did not understand the detail of aircraft engineer duty and assumed that it was similar to a building engineer. The psychiatrist in South Tangerang considered that the condition of the Engineer 2 was improved. The Engineer 2 was then allowed to work with maintaining the consumption of the medication which taken twice a day, in the morning and in the evening.

On 10 July 2022, the Engineer 2 returned to Bali for the next working schedule. The detail information regarding the personal medical issue was not reported by the Engineer 2 to the aircraft operator.

On 11 July 2022, the Engineer 2 with another engineer performed a 400-hour inspection of the PK-WSU helicopter.

On 12 July 2022, prior to work in the morning, the Engineer 2 consumed antidepressants and psychoactive agents.

The Engineer 2 and Engineer 1 arrived at heliport at 0900 LT then performed engine compressor wash and preflight inspection. The first flight was scheduled at 1051 LT. After every four landings, the helicopter engine was shut down and both engineers performed normal routine transit check, refueling and maintenance release. The helicopter took off for last flight at 1605 LT and landed at 1617 LT.

1.5 Aircraft Information

1.5.1 General

Registration Mark : PK-WSU
Manufacturer : Bell Helicopter Textron
Country of Manufacturer : Canada
Type/Model : Bell-505
Serial Number : 65264
Year of Manufacture : 2020

Certificate of Airworthiness

Date of issue : 4 June 2022
Validity : 3 June 2023
Category : Normal
Limitation : None

Certificate of Registration

Number : 4303
Owner : Uniserve Trading Forwarding PTE Ltd
Date of issue : 4 June 2021
Validity : 3 June 2024
Time Since New : 832.2 Hours
Cycles Since New : 2,667 Flight Cycle
Last Major Check : 26 May 2022 (2 Years Inspection) 692 hours and 2,239 cycles
Last Minor Check : 11 July 2022 (400-hour inspection) 829 hours and 2,655 cycles

1.5.2 Engines

Manufacturer : Saffran Helicopter Engine
Type/Model : Arrius 2R
Serial Number engine : 54102
Time Since New : 832.2 hours
Cycle Since New : 1,286 flight cycles

1.5.3 Main Rotors

Manufacturer : Bell Helicopter Textron
Part Number : 206-015-001-119

Serial Number-1 Blade : BH734255
 Time Since New : 832.2 hours
 Cycle Since New : 2667
 Serial Number-2 Blade : BH738923
 Time Since New : 832.2 hours
 Cycle Since New : 2,667 flight cycles

1.5.4 Tail Rotors

Manufacturer : Bell Helicopter Textron
 Part Number : 206-016-201-135
 Serial Number-1 Blade : CS21530
 Time Since New : 832.2 hours
 Cycle Since New : 2,667 flight cycles
 Serial Number-2 Blade : CS21531
 Time Since New : 832.2 hours
 Cycle Since New : 2,667 flight cycles

1.5.5 Aircraft dimension

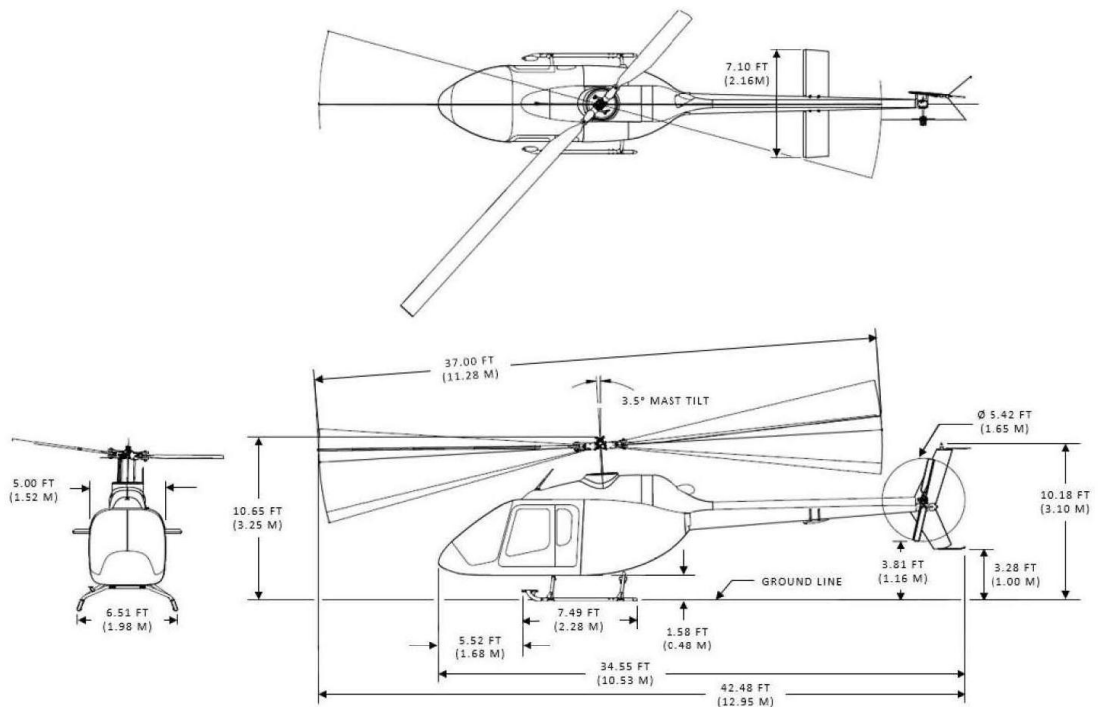


Figure 1. Bell 505 external dimensions

1.6 Aerodrome Information

Heliport Name	: Fly Bali Heliport
Heliport Operator	: CV Fly Bali
Heliport Certificate	: 0108/RSFC-DBU/I/2021
Validity	: 29 January 2024
Coordinate	: 08° 50' 24.15" S; 115° 09' 43.70" E
Heliport Dimension	: 22.5 meter (circle)
Surface	: Concrete

The heliport located at Ungasan Village, Kuta Selatan Regency, Badung district, Bali.



Figure 2. Fly Bali heliport layout

1.7 Flight Recorders

The helicopter was not fitted with flight data recorder nor cockpit voice recorder. Neither recorder was required by current Indonesian aviation regulations.

1.8 Wreckage and Impact Information

After contacted with the tail rotor, the Engineer 2 was found in face down position behind the helicopter with severe bleeding. The tail rotor blades were broken. One of the broken blades was found on the area behind the helicopter and the other broken blade was found in front of the helicopter on the area near the windsock.

1.9 Survival Aspects

At 1617 LT, the helicopter landed. During the preparation for the termination of the flight of the day, the Engineer 2 fell to the ground near the tail boom area. The Engineer 1 asked the pilot to activate the propeller brake. After waiting for the tail rotor to completely stopped (about two minutes), the Helicopter Landing Officer (HLO) who was fixing the windsock and a Flight Operation Officer (FOO) approached the Engineer 2 to assist. The Engineer 2 was found severe bleeding in

face down position with injuries on the back and right arm. The HLO checked the Engineer 2 heart pulse and it was detected. The HLO and the FOO tried to stop the bleeding by using available items on the first aid kit that was delivered by other personnel. Other personnel called for an ambulance however, the ambulance was not available.

As the bleeding could not be stopped and no ambulance was available, the Engineer 2 was evacuated to a hospital using a car. The Engineer 2 was laid down on a stretcher, guarded by the FOO. About 15 minutes later or about 1700 LT, the car arrived at the hospital and the Engineer 2 was administered to the emergency unit. The medical team immediately examined the Engineer 2 and stabilized the condition.

According to the medical team, the blood pressure was low, indicated the sign of shock due to excessive blood loss, the medical team conducted fluid resuscitation. The Engineer 2 was conscious, with the Glasgow Coma Scale (GCS)⁴ of E3V5M6.

The X-Ray was conducted later on and showed comminuted bone fracture on the right upper arm, complete fracture on some right ribs and lung injury. Considering the Engineer 2 required an advance treatment by a subspecialist, the medical team decided to transfer the Engineer 2 to another hospital after stabilizing his hemodynamic condition.

About midnight, the Engineer 2 was received by medical team at emergency unit. The medical team conducted further treatment and preparing a surgery for bone fracture reparation of the right upper arm and right ribs.

The first surgery of the right upper arm was successfully performed later that day and the second surgery for the ribs and the lung injury was performed six days later.

During the treatment at the hospital, infection occurred on the wounds and getting worse.

On 23 July 2022, the hospital stated that the Engineer 2 passed away due to septic shock⁵ and acute respiratory distress syndrome⁶.

1.10 Organizational and Management Information

1.10.1 Aircraft Operator

Aircraft Operator	: PT Whitesky Aviation
Address	: Secure Building-building A, 1 st floor. Jl Raya Protokol Halim Perdanakusuma Jakarta 13610-Indonesia
Operator Certificate	: AOC 135-016
Validity	: 26 April 2026

⁴ The Glasgow coma scale (GCS) is a tool used to assess and calculate a patient's level of consciousness. The GCS uses a triple criterion scoring system: best eye opening (E score, maximum of 4 points), best verbal response (V score, maximum of 5 points), and best motor response (M score, maximum of 6 points). These scores are added together to provide a total score between 3 and 15 ([Glasgow coma scale explained | The BMJ](#))

⁵ Septic shock is a potentially lethal drop in blood pressure due to the presence of bacteria in the blood. ([Septic shock or septicemia | definition of Septic shock or septicemia by Medical dictionary \(thefreedictionary.com\)](#))

⁶ Acute respiratory distress syndrome is an acute, diffuse, inflammatory form of lung injury life-threatening condition of seriously ill patients, characterized by poor oxygenation, pulmonary infiltrates, and acuity of onset. ([Acute Respiratory Distress Syndrome - StatPearls - NCBI Bookshelf \(nih.gov\)](#))

Whitesky Aviation (WSA) operated two Cessna 208B Grand Caravan, one Bell 429 and three Bell 505 including PK-WSU helicopter. The Whitesky Aviation provided air charter services utilizing the PK-WSU helicopter to Urban Air Indonesia (UAI) under the aircraft charter and services agreement since 26 April 2021.

According to the charter and services agreement between WSA and UAI, the WSA shall manage, supervise, and oversee all aircraft operation and maintenance activities. These include:

- a. Conduct surveillance through audit / surveillance;
- b. The training for the UAI employee required to meet the WSA standard;
- c. Ensure the adequate number of qualified personnel for maintenance and operational;
- d. The appointed operation coordinator shall be notified to, acknowledged, and approved by WSA;
- e. UAI shall appoint a safety and quality officer who will carry out the safety and quality function at the UAI operation base, and responsible to the Vice President of Safety and Quality Assurance (VP. SQA) of WSA.

The employee recruitment including operation and maintenance personnel conducted by UAI. After recruitment process completed, the engineer was trained by WSA before administered as UAI employee.

Coordinator of operation, maintenance, and safety in UAI were responsible to the respective position in WSA.

The license renewal process for operation and maintenance personnel were the responsibility of the license holder under supervision of WSA.

The WSA Company Maintenance Manual (CMM) described the duties and responsibilities of several position within the organisation such as:

- Lead Engineer Fixed Wings and Rotary Wings duties and responsibilities includes setting up any maintenance plan and supporting tools, material, and personal in charge to support the aircraft in out of base operation.
- Engineer is directly responsible to Lead Engineer Fixed Wing or Rotary Wings.

The CMM chapter 3.7.3. Medical Fitness stated:

Holders of Company Authorization shall not exercise the privileges of that certificate if they know or suspect that their physical or mental condition renders them unfit to exercise such privileges. At least for authorized personnel perform medical checkup every 2 years under company requirement.

Medical check-up was conducted at an appointed hospital. The medical check-up consisted of complete physical examination, not including mental examination, and performed during the initial recruitment and repeated every two years.

The CMM did not include the policy of the use of psychoactive substance.

1.10.2 Indonesia Directorate General of Civil Aviation (DGCA)

The safety oversight on civil aviation in Indonesia is administered by the Directorate General of Civil Aviation (DGCA) which is part of the Ministry of Transportation. The requirement standards for civil aviation safety in Indonesia are published in the Civil Aviation Safety Regulation (CASR).

The personnel licensing including pilots, aircraft maintenance engineers and flight attendants are the responsibility of the Directorate of Airworthiness and Aircraft Operation (DAAO) of the DGCA. The review of required documents for issuance and renewal of a license for aircraft maintenance engineer is conducted by Airworthiness Inspector.

1.10.2.1 Regulation of Licensing of Aircraft Maintenance Engineer

CASR Part 65 Licensing of Aircraft Maintenance Engineer, prescribes the requirements for issuing the certificates, licenses and associated ratings and the general operating rules for the holders of the certificate, license, and associated rating:

- (a) Basic certificate
- (b) Aircraft Maintenance Engineer License
- (c) Certificate of maintenance approval
- (d) Certificate of validation

A definition of psychoactive substances is given in CASR Part 65, Subpart 65.3: *Alcohol, opioids, cannabinoids, sedatives and hypnotics, cocaine, other psychostimulants, hallucinogens, and volatile solvents, whereas coffee and tobacco are excluded.*

The CASR Part 65, Subpart 65.9 Use of Psychoactive Substances described as follows:

- (a) The holder of licenses or certificate provided under this part shall not exercise the privileges of their license or certificate while under the influence of any psychoactive substance which might render them unable to safely and properly exercise these privileges.*
- (b) The holder of licenses or certificates provided under this part shall not engage in any problematic use of substance.*

The CASR Part 65, Subpart 65.19 Medical Fitness described as follows:

Holders of a license or certificate shall not exercise the privileges of that license or certificate if they know or suspect that their physical or mental condition renders them unfit to exercise such privileges.

The CASR Part 65, Subpart 65.51 Eligibility Requirement: General for Aircraft Maintenance Engineer License, described as follows:

A license and associated category may be issued to a person who meets the following requirements:

- (a) is not less than 21 years of age;*

- (b) *is able to read, write, speak and understand the technical English as used in manufacturers manuals;*
- (c) *has passed the oral and practical test within the period 24 months specified in section 65.55; and*
- (d) *hold appropriate basic certificate which is currently effective and has been in effect for a total of at least 18 months.*

The CASR Part 65, Subpart 65.65 Renewal of Aircraft Maintenance Engineer License describes as follows:

- (a) *Upon application to the Director General, and showing compliance with this section, the period of validity of aircraft maintenance engineer licenses may be renewed for a further period not exceeding 3 years*
- (b) *To be eligible for renewal of an aircraft maintenance engineer license, an applicant must present evidence to the DGCA to show completion of the recurrent human factor training and one of the following activities within preceding 24 months:*
 - (1) *Performed at least one annual inspection or 100-hour inspection required by CASR part 91 on an aircraft and approve and return it to service, for which he is rated; or*
 - (2) *At least 6 months, perform or supervise the maintenance, preventive maintenance or alteration, and approved and return it to service, for which is rated, under CASR part 121, 135 and 145.*
- (c) *An aircraft maintenance license holder who does not complete one of the activities set forth in paragraph (b) of this section within preceding 24 months, may be eligible for renewal after passing a written test from the DGCA to determine that the applicant's knowledge of the applicable regulations and standards are current.*

1.10.2.2 Procedure for Issuance and Renewal Aircraft Maintenance Engineer License

The procedure for issuance and renewal Aircraft Maintenance Engineer License were stipulated on the Staff Instruction (SI) 65-01. The medical fitness should be reported by the applicant during process of issuance and renewal the Aircraft Maintenance Engineer License (AMEL).

For renewal of AMEL, the applicant or AMEL holder required to file the Form 65-02A and need to submit the following document to be reviewed by the Airworthiness Inspector.

1. *A copy of current certificate of human factor training (at least 24 months)*
2. *A copy current of Medical Fitness Status. The applicant is declared "fit condition, visual and hearing normal condition", (at least 6 months)*
3. *A copy of current statement that no indication under inviolance of drugs (at least 6 months)*

4. *A copy current Certificate of English Proficiency (at least 24 months) able to read, write, speak, and understand the technical English as used in manufacturers manuals, issued by English test provider or under CASR parts 91, 121, 135, and 145, in accordance with their approved training program.*
5. *Personal Experience Logbook DGCA Form 65-07 Aircraft Maintenance Personnel Experience Log Book, perform or supervise the maintenance, preventive maintenance, or alteration of aircraft and approved and return it to service, for which is rated, under CASR part 121, 135, and 145 at least 6 months (180 days)*
6. *Statement Letter (original) signed by Quality or Authorize Person with state the applicant's document valid and meet the requirement CASR 65 Subpart B to complete several documents.*

The regulation and procedure did not describe the requirement in details of the physical and mental health condition and the use of psychoactive substances by the applicant during the renewal process.

1.10.2.3 AMEL Renewal Process of Engineer 2

The Engineer 2 regularly renewed the Aircraft Maintenance Engineer License (AMEL) every 2 years, which required medical fitness status. The last rating endorsement was conducted on 8 July 2021 and the last renewal was recorded on 9 January 2022. During these rating endorsement and license renewal, the Engineer 2 submitted a medical report which contained the assessment result of color-blind test, hearing test, including drug free certificate, and statement of no indication of drugs violence. Neither information related to mental health condition nor using psychoactive substances was reported. The Engineer 2 fulfilled all the requirements and granted new license.

To obtain the drug free certificate, the Engineer 2 conducted drug test for several substances. Among the substance parameters on drug test, the medication that the Engineer 2 regularly took (benzodiazepines) was not found.

1.10.3 ICAO Standard of Personnel Licensing

1.10.3.1 Annex 1

Chapter 4. Licenses and Ratings for Personnel Other Than Flight Crew Members

4.1 General rules concerning licenses and ratings for personnel other than flight crew members

4.1.1 An applicant shall, before being issued with any licence or rating for personnel other than flight crew members, meet such requirements in respect of age, knowledge, experience and where appropriate, medical fitness and skill, as are specified for that licence or rating.

4.1.2 An applicant, for any licence or rating for personnel other than flight crew members, shall demonstrate, in a manner determined by the Licensing Authority, such requirements in respect of knowledge and skill as are specified for that licence or rating.

4.2 Aircraft maintenance (technician/engineer/mechanic)

Note.— The terms in brackets are given as acceptable additions to the title of the licence. Each Contracting State is expected to use in its own regulations the one it prefers.

4.2.1 Requirements for the issue of the licence

1. Age
2. Knowledge
 - Air law and airworthiness requirements
 - Natural science and aircraft general knowledge
 - Aircraft engineering
 - Aircraft maintenance
 - Human performance
3. Experience
4. Training
5. Skill

6.1.1 Classes of Medical Assessment

Three classes of Medical Assessment shall be established as follows:

a) Class 1 Medical Assessment;

applies to applicants for, and holders of:

- commercial pilot licences — aeroplane, airship, helicopter and powered-lift*
- multi-crew pilot licences — aeroplane*
- airline transport pilot licences — aeroplane, helicopter and powered-lift*

b) Class 2 Medical Assessment;

applies to applicants for, and holders of:

- flight navigator licences*
- flight engineer licences*
- private pilot licences — aeroplane, airship, helicopter and powered-lift*
- glider pilot licences*
- free balloon pilot licences*

c) Class 3 Medical Assessment;

applies to applicants for, and holders of:

- air traffic controller licences*
- remote pilot licences.*

Requirements for Medical Assessments

6.2.1 General

An applicant for a Medical Assessment issued in accordance with the terms of 1.2.4.1 shall undergo a medical examination based on the following requirements:

- a) physical and mental;*
- b) visual and colour perception; and*
- c) hearing.*

6.2.2 Physical and mental requirements

An applicant for any class of Medical Assessment shall be required to be free from:

- a) any abnormality, congenital or acquired; or*
- b) any active, latent, acute or chronic disability; or*
- c) any wound, injury or sequelae from operation; or*
- d) any effect or side-effect of any prescribed or non-prescribed therapeutic, diagnostic or preventive medication taken;*

such as would entail a degree of functional incapacity which is likely to interfere with the safe operation of an aircraft or with the safe performance of duties.

Note.— Use of herbal medication and alternative treatment modalities requires particular attention to possible side-effects.

6.5 Class 3 Medical Assessment

6.5.2 Physical and mental requirements

6.5.2.1 The applicant shall not suffer from any disease or disability which could render that applicant likely to become suddenly unable to perform duties safely.

6.5.2.2 The applicant shall have no established medical history or clinical diagnosis of:

- a) an organic mental disorder;*
- b) a mental or behavioural disorder due to psychoactive substance use; this includes dependence syndrome induced by alcohol or other psychoactive substances;*
- c) schizophrenia or a schizotypal or delusional disorder;*
- d) a mood (affective) disorder;*
- e) a neurotic, stress-related or somatoform disorder;*
- f) a behavioural syndrome associated with physiological disturbances or physical factors;*
- g) a disorder of adult personality or behaviour, particularly if manifested by repeated overt acts;*
- h) mental retardation;*
- i) a disorder of psychological development;*

- j) *a behavioural or emotional disorder, with onset in childhood or adolescence; or*
- k) *a mental disorder not otherwise specified;*

such as might render the applicant unable to safely exercise the privileges of the licence applied for or held

6.5.2.2.1 Recommendation.— An applicant with depression, being treated with antidepressant medication, should be assessed as unfit unless the medical assessor, having access to the details of the case concerned, considers the applicant's condition as unlikely to interfere with the safe exercise of the applicant's licence and rating privileges.

Note 1.— Guidance on assessment of applicants treated with antidepressant medication is contained in the Manual of Civil Aviation Medicine (Doc 8984).

The Annex 1 did not include the requirement of medical assessment for aircraft maintenance engineer license.

1.10.3.2 ICAO Documents 8984 Manual of Civil Aviation Medicine

Chapter 2: Medical Requirements

2.1.1 Two basic principles are essential when assessing an applicant's medical fitness for aviation duties as specified in Annex 1, Chapter 6, "Medical Provisions for Licensing," namely:

- a) The applicant shall be physically and mentally capable of performing the duties of the license or rating applied for or held.*
- b) There shall be no medical reasons which make the applicant liable to incapacitation¹ while performing duties.*

2.1.2 The main objective of the Manual of Civil Aviation Medicine is to provide guidance material and present concepts on how to achieve these principles by assessing symptoms and signs that occur commonly in medical examinations for the aviation licences but which have not been or cannot be included in detail in Annex 1.

Mental health and behavioural questions for use by medical examiners

2.2.16 There are various questionnaires with various degrees of complexity available for assessing mental health and behavioural aspects of an individual's health. The questions below may serve to promote a relevant discussion between the medical examiner and the pilot...

2.2.17 The questions suggested address those conditions that are most common in the age range of professional pilots and those which are most likely to affect performance on the flight deck. Statistics show that the main psychiatric conditions in this context are mood disorders and certain anxiety disorders, especially panic episodes...

2.2.18 In developing the questions, a review of the literature was undertaken by specialists in the field, with the aim of choosing simple questions that can be answered quite quickly. The vast majority of pilots will respond to all questions in

the negative, and it is unnecessary to request pilots without any relevant problems to undertake a prolonged screening questionnaire...

2.2.19 The questions below may not represent the most suitable questions for the pilot populations of all States, but they offer guidance — a starting point — for States that intend to implement 6.3.1.2.1 and wish to develop an approach that includes these important aspects of medical fitness.

2.2.20 The questions do not necessarily have to be posed verbally by the medical examiner but could, for example, be given to the applicant to read prior to the examination.

Suggested questions for depression:

- 1) During the past three months, have you often been bothered by feeling down, depressed or hopeless?*
- 2) During the past three months, have you often been bothered by having little interest or pleasure in doing things?*
- 3) During the past three months, have you been bothered by having problems falling asleep, staying asleep, or sleeping too much, that is unrelated to sleep disruption from night flying or transmeridian operations?*
- 4) In the past three months, has there been a marked elevation in your mood lasting for more than one week?*

Suggested questions for anxiety/panic attack:

- 1) In the past three months, have you had an episode of feeling sudden anxiety, fearfulness, or uneasiness?*
- 2) In the past three months, have you experienced sensations of shortness of breath, palpitations (racing heart beat) or shaking while at rest without reasonable cause?*
- 3) In the past year have you needed to seek urgent medical advice because of anxiety?*

Part III Medical Assessment

Chapter 9 Mental Health

9.5 MOOD DISORDERS

9.5.1 Depressive mood disorders (DSM-IV: Major Depressive Disorder) are common disorders which present with depressed mood, reduced energy, impaired concentration and memory, loss of interest in surroundings, slowed cerebration, difficulty in making decisions, alteration of appetite and sleep, guilt feelings and low self-esteem. Suicide is common; the incidence varies with cultural background, but may approach 20 per cent per depressive episode. The illness is usually of insidious onset and persists for many months when not treated adequately. Depression may be accompanied by a number of somatic symptoms. There may be diurnal variation in the symptoms, and many persons with depression may have some good days in

between. It is not unusual for sufferers to try to modify their symptoms (especially the dysphoria and insomnia) by the use of alcohol and/or drugs.

9.5.5 Because depressive mood disorders are recurring disorders, it is imperative that the “recovered” patient be monitored closely for signs of recurrence for a period of time following recovery. There is evidence that recurrence is most likely to happen during the first two years. An educative approach may help the individual recognize the earliest signs and thus facilitate early intervention. Ordinarily pilots should not be allowed to return to flying unless they have been off medication for at least some months after having returned to their euthymic state of health. In recent years, the use of SSRI (selective serotonin re-uptake inhibitors) has become widespread and there is indication that such treatment, aimed at preventing a new depressive episode, may be compatible with flying duties in carefully selected and monitored cases (see Appendix 2).

9.5.6 A history of mania, whether occurring in isolation or as part of a bipolar disorder, should lead to long-term disqualification. Mania is an unpredictably recurring disorder, which presents with grandiosity, increased energy, euphoria, reduced sleep, distractibility and poor judgement. It may progress to overt delusions with marked irritability, anger and danger to self and to others. Substance abuse is a fairly common consequence. Although this condition may respond moderately well to mood stabilizing agents, the risk of recurrence is significant and the degree of disruption of performance too great to allow a return to flying or air traffic control duties. When the episode of mania has remitted, the patient often feels as well as before and the reason why he should not assume or resume an aviation career requires a great deal of explanation. However, the significant risk of recurrence even with mood stabilizing medication, along with the degree of disruption of mental function when there is a recurrence, precludes an aviation career.

1.10.4 International Standard of Use of Psychoactive Substances

1.10.4.1 ICAO Annex 2

Psychoactive substances considered in this document are: alcohol, opioids, cannabinoids, sedatives and hypnotics, cocaine, other stimulants, hallucinogens, and volatile solvents. The document does not consider tobacco or caffeine.

Safety-sensitive employees are persons who might endanger aviation safety if they perform their duties and functions improperly. This definition includes, but is not limited to, technical air crew, cabin crew, aircraft maintenance personnel, air traffic controllers, and security screeners.

2.5 Problematic use of psychoactive substances

No person whose function is critical to the safety of aviation (safety-sensitive personnel) shall undertake that function while under the influence of any psychoactive substance, by reason of which human performance is impaired. No such person shall engage in any kind of problematic use of substances.

1.10.4.2 ICAO Documents 8984 Manual of Civil Aviation Medicine

Use of psychoactive substances

1.2.35 *In the context of aviation, any use of psychoactive substances, even when prescribed in accordance with best medical practice for a medical condition and used in amounts that allow normal daily activities to be carried out as usual, is likely to jeopardize flight safety. The term “problematic use”, which is employed in regulatory aviation medicine, is defined in Annex 1:*

Problematic use of substances. The use of one or more psychoactive substances by aviation personnel in a way that:

- a) constitutes a direct hazard to the user or endangers the lives, health, or welfare of others; and/or*
- b) causes or worsens an occupational, social, mental or physical problem or disorder.*

1.2.36 *It is important to distinguish between the terms “under the influence of any psychoactive substance” (1.2.7.1) and “engage in any problematic use of substances” (1.2.7.2). The former relates to any person who has recently taken a psychoactive substance (such as some alcohol) and for that reason is temporarily unsafe, whereas the latter relates to a person who is a habitual user of psychoactive substances and consequently is unsafe, also between uses.*

1.2.7.1 *Holders of licenses provided for in this Annex shall not exercise the privileges of their licenses and related ratings while under the influence of any psychoactive substance which might render them unable to safely and properly exercise these privileges.*

1.2.7.2 *Holders of licenses provided for in this Annex shall not engage in any problematic use of substances.*

1.2.7.3 *Recommendation.— Contracting States should ensure, as far as practicable, that all license holders who engage in any kind of problematic use of substances are identified and removed from their safety-critical functions. Return to the safety-critical functions may be considered after successful treatment or, in cases where no treatment is necessary, after cessation of the problematic use of substances and upon determination that the person’s continued performance of the function is unlikely to jeopardize safety.*

Note.— Guidance on suitable methods of identification (which may include biochemical testing on such occasions as pre-employment, upon reasonable suspicion, after accidents/incidents, at intervals, and at random) and on other prevention topics is contained in the Manual on Prevention of Problematic Use of Substances in the Aviation Workplace (Doc 9654).

1.10.4.3 ICAO Doc 9654 Manual on Prevention of Problematic Use of Substances

Definition

Problematic substance use prevention *consists of the actions necessary to preclude problematic substance users from being employed within the safety-sensitive areas of*

aviation and the actions aimed at deterring safety-sensitive aviation personnel from engaging in problematic substance use.

Psychoactive substances considered in this document are: alcohol, opioids, cannabinoids, sedatives and hypnotics, cocaine, other stimulants, hallucinogens, and volatile solvents. The document does not consider tobacco or caffeine.

Safety-sensitive employees are persons who might endanger aviation safety if they perform their duties and functions improperly. This definition includes, but is not limited to, technical air crew, cabin crew, aircraft maintenance personnel, air traffic controllers, and security screeners.

1.3 It should be noted that this manual also addresses the use of drugs (whether prescribed or over-the-counter) for appropriate medical purposes, if the use of such drugs in the workplace poses a risk to aviation safety, to the employee himself or to his co-workers. Even the therapeutically indicated use of some drugs can adversely affect performance, as is discussed in detail in Chapter 13 of the Manual of Civil Aviation Medicine (reprinted as Attachment F). In addition to the prevention efforts that will be addressed in this document, and which are specific for the aviation workplace, governments and regulatory agencies should consider steps to ensure that pharmaceutical manufacturers, clinical practitioners, and pharmacists properly ascertain and convey information regarding the possible impairing effects of medication use on the safe performance of workplace functions.

1.5 With respect to medical fitness. Annex I contains, in 1.2.6.1. a Standard according to which "license holders shall not exercise the privileges of their licenses and related ratings at any time when they are aware of any decrease in their medical fitness which might render them unable to safely exercise these privileges." In 1.2.6.1.1, a Recommendation is addressed to all Contracting States which "should, as far as practicable, ensure that license holders do not exercise the privileges of their licenses and related ratings during any period in which their medical fitness has, from any cause, decreased to an extent that would have prevented the issue or renewal of their Medical Assessment."

1.11 Additional Information

1.11.1 Bipolar Disorder⁷

Bipolar disorder is a mental illness that can be chronic (persistent or constantly reoccurring) or episodic (occurring occasionally and at irregular intervals). In bipolar disorder, the range of mood changes can be extreme. People with the disorder have manic episodes, or unusually elevated moods in which the individual might feel very happy, irritable, or "up," with a marked increase in activity level. They might also have depressive episodes, in which they feel sad, indifferent, or hopeless, combined with a very low activity level.

Most of the time, bipolar disorder symptoms start during late adolescence or early adulthood. Although symptoms may come and go, bipolar disorder usually requires lifelong treatment and does not go away on its own. Bipolar disorder can be an important factor in job loss, ability to function, suicide, and family discord.

⁷ The description of this subchapter is based on article on this following link [NIMH » Bipolar Disorder \(nih.gov\)](https://www.nimh.nih.gov/health/topics/bipolar-disorder/index.shtml)

However, proper treatment can lead to better functioning and improved quality of life.

Mental health professionals treat bipolar disorder with medications, psychotherapy, or a combination of treatments. Certain medications can help control the symptoms of bipolar disorder. The most common types of medications that doctors prescribe include mood stabilizers and atypical antipsychotics. Medications that target sleep or anxiety are sometimes added to mood stabilizers as part of a treatment plan.

1.11.2 Pharmacotherapy of Bipolar Disorder

1.11.2.1 Atypical Antipsychotics⁸

Atypical antipsychotics are antipsychotics used to relieve symptoms such as delusions, hearing voices, hallucinations, or paranoid or confused thoughts typically associated with some mental illnesses, which are used in the treatment of severe depression, severe anxiety, or for stabilizing episodes of mania in people with bipolar disorder.

The common side effects of atypical antipsychotics are difficulty concentrating, drowsiness, shuffling walk, tremor, and vision problem (blurred or double vision).

1.11.2.2 Antidepressants⁹

An antidepressant is used to relieve the symptoms of depression, such as low mood, anxiety, and worthlessness. The commonly reported side effects of antidepressants are blurred vision, disorientation or confusion, dizziness, drowsiness, headache, and tremor. Some antidepressants have been associated with a discontinuation syndrome when they have been stopped suddenly. For this reason, the withdrawal of all antidepressants should be conducted slowly.

1.11.2.3 Psychoactive Agents (Benzodiazepines)¹⁰

Benzodiazepines are a class of medications that work in the central nervous system and are used for a variety of medical conditions, such as anxiety, seizures, and for alcohol withdrawal. Benzodiazepines work by blocking excessive activity of nerves in the brain and other areas in the central nervous system.

The side effects that most commonly reported are drowsiness, sleepiness, or dizziness. Driving or operating machinery or perform other hazardous tasks can be dangerous while using these drugs.

Benzodiazepines are classified into sedatives and hypnotics category and listed among the psychoactive substances on ICAO Doc 9654 Manual on Prevention of Problematic Use of Substance in the Aviation Workplace.

⁸ The description of this subchapter is based on article on this following link [List of Atypical Antipsychotics + Uses, Types & Side Effects - Drugs.com](#)

⁹ The description of this subchapter is based on article on this following link [List of Antidepressants + Uses, Types, Side Effects - Drugs.com](#)

¹⁰ The description of this subchapter is based on article on this following link [Benzodiazepines: Uses, Side Effects, Interactions & Warnings \(drugs.com\)](#)

1.11.3 Drug Interactions¹¹

Concomitant administration of the drugs listed above can increase the potential for central nerve system effects (e.g., increased sedation or respiratory depression).

1.11.4 Procedure of Drug Test in Indonesia

According to official announcement of National Narcotics Board/*Badan Narkotika Nasional (BNN)* number Peng/6/IV/KA/PM.00.02/2020/BNN regarding standardization of rapid urine drug tests, the drug test in Indonesia should be contained seven parameters as follows:

1. Metamphetamine
2. Tetrahydrocannabinol (THC)
3. Amphetamine
4. Opiate
5. Cocaine
6. Carisoprodole
7. Benzodiazepine

1.12 Useful or Effective Investigation Techniques

The investigation was conducted in accordance with the KNKT approved policies and procedures, and in accordance with the standards and recommended practices of Annex 13 to the Chicago Convention.

¹¹ The description of this subchapter is based on article on this following link [Drug Interactions Checker - Medscape Drug Reference Database](#)

2 ANALYSIS

The investigation did not find any issue related to aircraft system malfunction, flight procedure nor weather therefore, the analysis will discuss about the medical issue of the Engineer 2, medical assessment for the aircraft maintenance engineer licensing, and the control of the use of the psychoactive substances.

2.1 The Medical Issue of the Engineer 2

On the day of the occurrence, the Engineer 2 started to work on normal working hour. The Engineer 2 performed engine compressor wash and preflight check prior to the first flight. Flight schedule on the day started at 1051 LT. The Engineer 2 with another engineer performed transit check, refueling and maintenance release after every four flights. The transit check was conducted three times on that day. The engineers had no significant activity related to the helicopter between landings, so it was less likely that the Engineer 2 was on fatigue condition.

In the morning, prior to go to work, the Engineer 2 consumed antidepressant and psychoactive agent as prescribed by the psychiatrist. The Engineer 2 had been on therapy of these medications since 2014, but was taken once a day. After 13 June 2022, the medication dose was doubled by the administration that was changed to be taken twice a day. The day of the occurrence was the second day of the engineer working in this new administration of the medication.

The common side effects of antidepressants and psychoactive agents are, drowsiness, dizziness, difficulty concentrating, and blurred vision. The concomitant use of these two medications increased the sedation side effect. Considering the increased dose of the medication, the psychiatrist in Denpasar suggested the Engineer 2 to take rest at home and should not perform the duty. The psychiatrist in South Tangerang considered that the condition of the Engineer 2 was improved and was allowed to work with maintaining the consumption of the medication. From the psychiatrist in South Tangerang perspective, the side effects would not interfere the performance of an engineer, since the psychiatrist assumed that the engineer 2 worked like a building engineer.

After the last landing, passengers were disembarked and the engineers normally would conduct post flight check after termination of the daily flight. Other ground crew would also normally to do their jobs. The Engineer 1 came to the cockpit to ask the pilot whether any abnormality to the helicopter, while the Engineer 2 stood near the tail boom, between the horizontal stabilizer and the tail rotor.

The Engineer 2 was left unmonitored by other teammates while standing near the tail rotor. This was probably due to the assumption that the Engineer 2 was an experienced helicopter engineer that should have fully aware of the risk of working near a helicopter. This also might due to the teammates did not know about health issue of the Engineer 2.

Considering the 18 years of experience as the helicopter engineer, the Engineer 2 should have been fully aware of the risk of standing near the tail rotor. The reason of the Engineer 2 stood near the tail rotor was unknown. The impact with the tail rotor might be due to the side effects of the medication.

2.2 The Medical Assessment for Aircraft Maintenance Engineer Licensing

The ICAO Annex 1 requires the applicant of licensing for personnel other than flight crew members includes the requirements of medical fitness. The ICAO Document 8984 required the applicant of license shall be physically and mentally capable performing the duties of the license or rating applied for or held. To be declared as medically fit, the applicant shall conduct medical assessment.

The ICAO Document 8984 also states that the applicant for any class of Medical Assessment includes the requirement of free from any effect or side-effect of any prescribed or non-prescribed therapeutic, diagnostic, or preventive medication taken. However, the requirement of medical fitness is not applicable for aircraft maintenance engineer. These requirements are adopted by the Indonesia regulation, as stated in the CASR Part 65.

The requirement of medical fitness for any class of medical assessment includes physical and mental health. Several mental health issues may disqualify the applicant. The ICAO Document 8984, Part III Medical Assessment, Chapter 9 Mental Health, stated that mood disorder which has a history of mania, whether occurring in isolation or as part of a bipolar disorder, should lead to long-term disqualification.

The procedure for renewal Aircraft Maintenance Engineer License in Indonesia were stipulated on the Staff Instruction (SI) 65-01. The applicant or AMEL holder is required to file the Form 65-02A and to submit a copy current of Medical Fitness Status which declared the applicant in fit condition, visual and hearing normal condition for the period of at least 6 months.

During these rating endorsement and license renewal, the Engineer 2 submitted the medical report which contained the assessment result of color-blind test, hearing test, including drug free certificate, and statement of no indication of drugs violence. The Engineer 2 fulfilled all the requirements and granted new license.

The Engineer 2 had been diagnosed with bipolar disorder since 2014, and treated with atypical antipsychotics, antidepressants, and psychoactive agents. After 13 June 2022, the medication dose was doubled by the administration that was changed to be taken twice a day.

The SI 65-01 that requires the applicant or AMEL holder to submit a copy of Medical Fitness Status and the declaration of no indication of drug violence are more restrict than the ICAO requirement, which not required any medical assessment for aircraft maintenance engineer. However, the SI 65-01 did not describe in detail the requirement of medical fitness status to include the mental health assessment.

The lack of detail of the SI 65-01 had made the Engineer 2 that had been diagnosed with bipolar and treated with medication which contain psychoactive substance, passed the license renewal.

The aircraft maintenance engineer license is not required to conduct medical assessment by the ICAO Annex 1 which adopted in Indonesia in the CASR Part 65. Should aircraft maintenance engineer license holder require to conduct medical assessment, the mental health issue of the Engineer 2 might have been detected and would not be able to renew the license.

The CASR Part 65.19 and adopted in the WSA Company Maintenance Manual describe that the holder of a license or certificate shall not exercise the privileges of that license or certificate if they know or suspect that their physical or mental condition renders them unfit to exercise such privileges.

The WSA Company Maintenance Manual stated that authorized personnel shall perform medical check-up minimum of every 2 years under company requirement. The medical check-up started since joining the company and conducted at an appointed hospital and consisted of complete physical examination, but not include mental health examination. By the time the Engineer 2 was recruited by the UAI in 2021, the mental condition was undetected. This might be due to the UAI had not established a system to check and monitor the mental condition.

While returning for work after the medication, the Engineer 2 did not provide detail information of his medical condition to the company. The Engineer 2 did not report his medical condition might be due to the consideration that he might not be hired and would not be able to get remuneration.

The mental health condition of the engineer 2 did not meet the requirement of any class medical assessment. However, the medical assessment is not required for the engineer, therefore the engineer license was able to be renewed.

2.3 The Control of the Use of Psychoactive Substances

The ICAO Annex 2 and ICAO Document 9654: Manual on Prevention of Problematic Use of Substances, states that aircraft maintenance personnel are included as safety-sensitive employees that are persons who might endanger aviation safety if they perform their duties and functions improperly. The psychoactive substances considered in these documents are alcohol, opioids, cannabinoids, sedatives and hypnotics, cocaine, other stimulants, hallucinogens, and volatile solvents.

The ICAO Document 9654 also addresses the use of substances whether prescribed or over the-counter for appropriate medical purposes, if the use of such drugs in the workplace poses a risk to aviation safety, to the employee himself or to his co-workers.

The Engineer 2 was treated with medication consisted of atypical antipsychotics, antidepressants, and psychoactive agents (benzodiazepine). All the three types of medications above had the side effects of drowsiness, dizziness, difficulty concentrating and blurred vision that potentially interfere with the safe exercise of the task, especially on concomitant use.

Since 2014, the Engineer 2 had conducted license renewal every two years. The Staff Instruction requirements as stated in the Form 65-02A, requires a copy of statement that no indication under inviolance of drugs. The SI 65-01 did not describe the details of the kind of drugs and no regulation about the use of psychoactive substances. The SI 65-01 only restricts the inviolance of drugs and do not restrict the consumption of prescribed psychoactive substance. During the renewal process, the Engineer 2 also provided drug test letter as a required document for the renewal. However, the drug test only consisted of four parameter and benzodiazepine was not included. Benzodiazepines are classified as sedatives and hypnotics on psychoactive

substances, and should be included as one of the drugs tests parameters while undergo drug test as required by the National Narcotics Board of Indonesia.

This lack of detail of kind of drugs and applicable only for inviolance drug had made the Engineer 2 was able to obtain drug free statement to renew the license since 2014 while had been consuming medication which contain psychoactive substance.

The Annex 1 and adopted in CASR Part 65 states that holders of licenses shall not exercise the privileges of their licenses and related ratings while under the influence of any psychoactive substance which might render them unable to exercise these privileges safely and properly.

Based on this regulation, the Engineer 2 was not eligible to perform his duty as he consumed medication which contain psychoactive substance. However, without medical assessment, this regulation requires a self-assessment.

The Engineer 2 might not aware that his medication was classified as psychoactive substance. Considering the increased dose of the medication, the psychiatrist in Denpasar suggested the Engineer 2 to take rest at home and should not perform the duty. The psychiatrist in South Tangerang considered that the condition of the Engineer 2 was improved and was allowed to work with maintaining the consumption of the medications. The psychiatrist in South Tangerang did not aware of the Engineer 2 task and assumed that the engineer 2 worked like a building engineer. Therefore, the Engineer 2 was granted to work.

The Engineer 2 was recruited by the UAI in 2021, the routine consumption of psychoactive substances that was caused by the mental condition was undetected. This might be due to the UAI had not established a system to check and monitor the usage of psychoactive substances of the employee.

The absence of a system to monitor the use of psychoactive substance, had made the Engineer 2 conducted the duties as aircraft maintenance engineer while under the influence of psychoactive substance.

3 CONCLUSIONS

3.1 Findings

The findings are statements of all significant conditions, events or circumstances in the accident sequence. The findings are significant steps in the accident sequence, but they are not always causal, or indicate deficiencies. Some findings point out the conditions that pre-existed the accident sequence, but they are usually essential to the understanding of the occurrence, usually in chronological order.

In this occurrence, the KNKT identified several findings as follows:

1. The aircraft had valid Certificate of Airworthiness (C of A) and Certificate of Registration (C of R).
2. The pilot held valid license and medical certificate.
3. The Engineer 2 held a valid license.
4. The Engineer 2 was diagnosed with bipolar disorder since 2014 and treated with medication consisted of atypical antipsychotic, antidepressants, and psychoactive agents.
5. On 13 June 2022, the Engineer 2 tried to hurt himself and admitted at the hospital for several days which then got his medication dose increased by new administration of medication that was consumed once per day to twice per day. Considering the increased dose of the medication, the psychiatrist in Denpasar suggested the Engineer 2 to take rest at home and should not perform the duty.
6. The common side effects of antidepressants are confusion, drowsiness, and dizziness, while common side effects of psychoactive agents are drowsiness, dizziness, and sleepiness. The concomitant use of these two medications increased the sedation side effect. From the psychiatrist perspective, the side effects would not interfere the performance of an engineer, since the psychiatrist assumed that the Engineer 2 worked like a building engineer.
7. On the last visit to the psychiatrist in South Tangerang, the condition of the Engineer 2 was improved and considered able to return to work, but the medication dose remained.
8. While returning for work after the medication, the Engineer 2 did not provide detail information of his medical condition to the aircraft operator. The Engineer 2 did not report his medical condition might be due to the consideration that he might not be hired and would not be able to get remuneration.
9. The aircraft operator and the employees did not know about the health issue of the Engineer 2 had since 2014 and did not know on the reason of the Engineer 2 being hospitalized on 13 June 2022.
10. On 12 July 2022, prior to work in the morning, the Engineer 2 consumed antidepressants and psychoactive agents this day was the second day the Engineer 2 returned to work after the medication dose increased by the new administration of medication.

11. After the completion of the flight, some ground staff went to the helicopter in preparation for termination of the flight. The Engineer 2 went to the helicopter and stood near the tail boom, between the horizontal stabilizer and the tail rotor, faced toward to the helicopter cabin.
12. During the engine shut down, a loud sound was heard and the pilot felt the pedal vibrate. The engineer 1 checked on the behind of helicopter and saw that the Engineer 2 laid on the ground. Afterward, the engineer 1 asked the pilot to activate rotor brake. After waiting for about two minutes for the tail rotor to completely stopped, some ground staff approached to assist the Engineer 2. While another ground staff contacted ambulance.
13. The Engineer 2 was left unmonitored by other teammates while standing near the tail rotor. This was probably due to the assumption that the Engineer 2 was an experienced helicopter engineer that should have fully aware of the risk of working near a helicopter. This also might due to the teammates did not know the health issue of the Engineer 2.
14. The reason of the Engineer 2 stood near the tail rotor was unknown. This might be due to low situational awareness caused by the side effects and interaction of the medication.
15. The Engineer 2 was evacuated to the Hospital 1. The medical team immediately examined the Engineer 2 and stabilized the condition. The Engineer 2 was conscious, the blood pressure was low, indicated the sign of shock due to excessive blood loss.
16. The X-Ray examination found comminuted fracture on the right upper arm, complete fracture on some right ribs and lung injury.
17. Considering the Engineer 2 required an advance treatment by a subspecialist, the Engineer 2 transferred to Hospital 2 after stabilizing his condition.
18. During the treatment at the hospital, infection occurred on the wounds and getting worse. After about 11 days of medical treatment in the hospital, the Engineer 2 passed away.
19. The ICAO Annex 1 requires the applicant of licensing for personnel other than flight crew members includes the requirements of medical fitness. The ICAO Document 8984 required the applicant of license shall be physically and mentally capable performing the duties of the license or rating applied for or held. The ICAO Document 8984 also states that the applicant for any class of Medical Assessment includes the requirement of free from any effect or side-effect of any prescribed or non-prescribed therapeutic, diagnostic, or preventive medication taken. However, the requirement of medical fitness is not applicable for aircraft maintenance personnel. These requirements are adopted by the Indonesia regulation, as stated in the CASR Part 65.
20. The requirement of medical fitness includes physical and mental health. Mood disorder which has a history of mania, whether occurring in isolation or as part of a bipolar disorder, should lead to long-term disqualification as it considers as mentally unfit.

21. The Engineer 2 had been diagnosed with bipolar disorder since 2014, and treated with atypical antipsychotics, antidepressants, and psychoactive agents. The ICAO Annex 1 recommendation states that an applicant with depression, being treated with antidepressant medication, should be assessed as unfit.
22. The ICAO Doc 9654 Manual on Prevention of Problematic Use of Substances, states that aircraft maintenance personnel are including as safety-sensitive employees. The use of drugs whether prescribed or over the-counter for appropriate medical purposes, is not allowed if the use of such drugs in the workplace poses a risk to aviation safety, to the employee himself or to his co-workers.
23. The Engineer 2 was treated with medication consisted of atypical antipsychotics, antidepressants, and psychoactive agents. The psychoactive agents are classified as psychoactive substances, while all the three types of medications above had the side effects that potentially interfere with the safe exercise, especially on concomitant use.
24. The Staff Instruction for AME license renewal, requires the applicant to provide a copy current of medical fitness status which states that the applicant is declared fit condition, visual and hearing normal condition. It also requires to provide a copy of statement that no indication under inviolance of drugs. The Staff Instruction did not describe the details of the kind of drugs and no regulation about the use of psychoactive substances. The Staff Instruction only restricts the inviolance of drugs and do not restrict the consumption of prescribed psychoactive substance.
25. This lack of detail had made the Engineer 2 was able to renew the license since 2014 while he had been diagnosed with bipolar disorder and consumed medication which contain psychoactive substance.
26. The regulation and procedure did not describe the requirement in details the physical and mental health condition and the use of psychoactive substances by the applicant during the renewal process
27. The CASR Part 65 forbids license holders to perform his while under the influence of any psychoactive substance or if they know or suspect that their physical or mental condition which might render them unable to safely and properly.
28. The Engineer 2 might not aware that his medication was classified as psychoactive substance. The psychiatrist did not aware of the Engineer 2 task as aircraft maintenance engineer and assumed that the task was like a building engineer. Therefore, the Engineer 2 was granted to work by the psychiatrist.
29. The WSA Company Maintenance Manual stated that a holder of Company Authorization shall not exercise the privileges of that certificate if they know or suspect that their physical or mental condition renders them unfit to exercise such privileges.
30. The authorized personnel shall perform medical check-up under company requirement. The medical check-up was conducted at an appointed hospital, consisted of complete physical examination, but not include mental examination.

The first medical check-up performed during the initial recruitment and repeated every two years.

31. During the recruitment by the UAI in 2021, the routine consumption of psychoactive substances that was caused by the mental condition was undetected.
32. The WSA had not established a system to monitor the mental health condition and the usage of psychoactive substances of the employee.
33. The absence of the requirement for medical fitness for aircraft maintenance engineer had made the Engineer 2 who had mental health issue, passed the license renewal, and performed his duty.

3.2 Contributing Factors

Contributing factors is defined as actions, omissions, events, conditions, or a combination thereof, which, if eliminated, avoided or absent, would have reduced the probability of the accident or incident occurring, or mitigated the severity of the consequences of the accident or incident.

The identification of contributing factors does not imply the assignment of fault or the determination of administrative, civil, or criminal liability. The presentation of the contributing factors is based on chronological order and not to show the degree of contribution.

The KNKT concluded the contributing factors as follows:

The Engineer 2 who had mental health issue, passed the license renewal, and performed his duty while using the increased dose of medication that contained psychoactive substance. The side effects of sedation might have led the decreasing of awareness and resulted in the Engineer 2 hit the tail rotor.

4 SAFETY ACTION

At the time of issuing this draft Final Report, the KNKT had been informed of safety actions taken by the PT. Whitesky Aviation resulting from this occurrence.

PT Whitesky Aviation letter number 0311/ WSA/QZ/KNKT/X/2022 date 19 October 2022 informed the KNKT that they have conducted safety action as follow:

- In house recurrent training for Whitesky personnel about Safety Management System and Quality Management System, Human factor, Dangerous Goods, Aviation Security awareness at Fly Bali Heliport Ungasan.
- Safety Action Group (SAG) monthly meeting at Fly Bali Heliport Ungasan and make action taken plan and follow up from SAG result.
- Enhanced socialization about Standard Operating Procedures in accordance with current Fly Bali Heliport operation manual
- Conducting evaluation to enhance supervision during work, make hazard identification, personnel movement restriction upon helicopter landing, socialize risk management about hazard to safety, security and personnel health

5 SAFETY RECOMMENDATIONS

The KNKT acknowledges the safety actions taken by PT Whitesky Aviation and considered that the safety actions were relevant to improve safety, however there still safety issues remain to be considered. Therefore, the KNKT issued safety recommendations to address safety issues identified in this report.

5.1 PT Whitesky Aviation

- **04-O-2022-10-1**

The Engineer 2 returned to work in condition of having an increased dose and new administration of medication after being admitted at the hospital on the previous month due to attempt to hurt himself. The Engineer 2 had already on therapy of bipolar disorder since 2014. The company was unaware of these conditions. There was no obligation for the employee to report their health issue to the company.

Therefore, KNKT recommends PT Whitesky Aviation to have a fit to return to work letter from the employee to get back to work after being sick. KNKT also recommends PT Whitesky Aviation to increase the supervision on the employee especially regarding to health issue.

5.2 Directorate General of Civil Aviation

- **04-R-2022-10-2**

Civil Aviation Safety Regulation (CASR) Part 65 subpart 9 described that the holder of licenses or certificate shall not exercise the privileges of their license or certificate while under the influence of any psychoactive substance which might be render them unable to safely and properly exercise these privileges. The engineer 2 had been on therapy containing psychoactive substances since 2014, while he conducted license renewal every two years. During renewal of license, there was no requirement on the Staff Instruction to implement the regulation about the use of psychoactive substances.

Therefore, KNKT recommends DGCA to provide the Staff Instruction regarding implementation of the regulation about the use of psychoactive substances.

5.3 International Civil Aviation Organization

- **04-RL-2022-10-3**

The ICAO Annex 1 requires the applicant of licensing for personnel other than flight crew members includes the requirements of medical fitness. The ICAO Document 8984 required the applicant of license shall be physically and mentally capable performing the duties of the license or rating applied for or held. To be declared as medically fit, the applicant shall conduct medical assessment which include physical and mental health. The requirement of the ICAO Annex 1 for medical fitness did not include the aircraft maintenance engineer.

Aircraft maintenance personnel are included as safety-sensitive employees that defined as persons who might endanger aviation safety if they perform their duties and functions improperly.

Without medical assessment for aircraft maintenance engineer, the medical fitness, which include physically and mentally, the capability in performing the duties of the license is unable to be assured.

In this accident, the engineer who had been diagnosed with mental health issue and treated with medication that contained psychoactive substance, passed the license renewal, and performed his duty, resulted in decreasing of awareness and hit the tail rotor.

Therefore, KNKT recommends ICAO to require aircraft maintenance engineer to conduct medical examination when applying a new or renewal license.

KOMITE NASIONAL KESELAMATAN TRANSPORTASI REPUBLIK INDONESIA

Jl. Medan Merdeka Timur No.5 Jakarta 10110 INDONESIA

Phone : (021) 351 7606 / 384 7601 Fax : (021) 351 7606 Call Center : 0812 12 655 155

website 1 : <http://knkt.dephub.go.id/webknkt/> website 2 : <http://knkt.dephub.go.id/knkt/>

email : knkt@dephub.go.id