

**FINAL**  
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# NATIONAL TRANSPORTATION SAFETY COMMITTEE

Aircraft Accident Investigation Report

**PT. Nyaman Air Service**  
**Bell 412; PK-FUG**  
**Dua Saudara Mountain, Bitung,**  
**North Sulawesi**  
**Republic of Indonesia**

**3 August 2011**



NATIONAL TRANSPORTATION SAFETY COMMITTEE  
MINISTRY OF TRANSPORTATION  
REPUBLIC OF INDONESIA  
2013

This Final Report was produced by the National Transportation Safety Committee (NTSC), Ministry of Transportation 3<sup>rd</sup> Floor, Jalan Medan Merdeka Timur No. 5 Jakarta 10110, Indonesia.

The report is based upon the initial investigation carried out by the NTSC in accordance with Annex 13 to the Convention on International Civil Aviation Organization, the Indonesian Aviation Act (UU No. 1/2009) and Government Regulation (PP No. 3/2001).

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## GLOSSARY OF ABBREVIATIONS

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AD	Airworthiness Directive
AFM	Airplane Flight Manual
ALAR	Approach-and-landing Accident Reduction
AOC	Air Operator Certificate
ATPL	Air Transport Pilot License
BMKG	<i>Badan Meteorologi Klimatologi dan Geofisika</i> (Meteorological Climatological Geophysical Agency)
CASO	Civil Aviation Safety Officer
CASR	Civil Aviation Safety Regulation
CFIT	Controlled Flight Into Terrain
CPL	Commercial Pilot License
COM	Company Operation Manual
CRM	Cockpit Recourses Management
CSN	Cycles Since New
CVR	Cockpit Voice Recorder
DGCA	Directorate General of Civil Aviation
FDR	Flight Data Recorder
ICAO	International Civil Aviation Organization
IIC	Investigator in Charge
Kg	Kilogram(s)
Km	Kilometer(s)
Kts	Knots (NM/hour)
Mm	Millimeter(s)
MTOW	Maximum Take-off Weight
NM	Nautical mile(s)
KNKT / NTSC	Komite Nasional Keselamatan Transportasi National Transportation Safety Committee
°C	Degrees Celsius
QFE	Height above aerodrome elevation (or runway threshold elevation) based on local station pressure
QNH	Altitude above mean sea level based on local station pressure
S/N	Serial Number
TSN	Time Since New
TT/TD	Ambient Temperature/Dew Point
UTC	Coordinated Universal Time
VFR	Visual Flight Rules

VMC

Visual Meteorological Conditions



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# INTRODUCTION

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## SYNOPSIS

On 3 August 2011, a Bell 412 helicopter, registered as PK-FUG, was being operated by PT. Nyaman Air as scheduled chartered flight by PT Nusa Halmahera Mineral (NHM). The chartered flight served route of Gosowong (Halmahera Island, north Maluku) – Manado (North Sulawesi) – Gosowong.

The accident flight was on route from Sam Ratulangi Airport, Manado (MDC/WAMM)<sup>1</sup>, North Sulawesi, to Gosowong. The aircraft was operated by single pilot.

The aircraft took-off from Manado at 0626 UTC<sup>2</sup> (14:26 LT). There were 10 persons on board, consist of one pilot, one engineer and eight passengers.

at 0629 UTC, the aircraft reported position was on radial 105 from MNO VOR at 4.5 NM.

The aircraft location at coordinate N 01° 28' 51.90" E 125° 08' 19.21" as Dua Saudara mountain and elevation 2,283 feet.

All passengers and crew fatally injured and the aircraft suffered substantial damage.

The impact area and wreckage examination suggested that the aircraft engine and systems were working properly prior to impact. This accident was classified as Controlled Flight into Terrain (CFIT) where an airworthy aircraft, under control of the pilot, un-intentionally collided with terrain.

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1 Sam Ratulangi Airport will named Manado for the purposes of this report.

2 The 24-hours clock used in this report to describe the time of day as specific events occurred, is in Coordinated Universal Time (UTC). Local Time, Centre Indonesian Standard Time (WITA) is UTC+8 hours.

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# **1 FACTUAL INFORMATION**

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## **1.1 HISTORY OF THE FLIGHT**

On 3 August 2011, a Bell 412 helicopter, registered as PK-FUG, was being operated by PT. Nyaman Air as schedule chartered flight by PT Nusa Halmahera Mineral (NHM). The flight served route of Gosowong (Halmahera Island, North Maluku) – Manado (North Sulawesi) and return.

The accident flight was on route from Sam Ratulangi Airport, Manado (MDC/WAMM)<sup>3</sup>, North Sulawesi, to Gosowong. The aircraft was operated by single pilot.

The aircraft took-off Manado at 0626 UTC<sup>4</sup> (14:26 LT), on board in this flight were of one pilot, one engineer and eight passengers with total of 10 person. After takeoff, the aircraft was seen flew via north side of Mount Klabat which was the direct track to Gosowong.

The last communication with Manado ATC was at 0629 UTC, while the pilot reported the position was on radial 105 from MNO VOR at 4.5 NM.

At 0646 UTC the Manado ATC contacted the pilot but there was no reply.

At 0647 UTC, the Manado Approach controller seek information about the aircraft to the Manado information office, Manado Flight Services Sector (FSS), Babullah Tower - Ternate and the PT Nyaman Air station in Balikpapan.

At 0659 UTC The Manado airport authority declared INCERFA and informed to the Manado briefing office.

At 0701 UTC The Manado airport authority declared ALERFA<sup>5</sup> to other related ATS.

At 0802 the Manado airport authority declared DETRESFA<sup>6</sup> to the other related ATS.

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<sup>3</sup> Sam Ratulangi Airport will named Manado for the purposes of this report.

<sup>4</sup> The 24-hours clock used in this report to describe the time of day as specific events occurred, is in Coordinated Universal Time (UTC). Local Time, Centre Indonesian Standard Time (WITA) is UTC+8 hours.

<sup>5</sup> ALERFA : alert phase when there is apprehension about the safety of an aircraft and its occupants when communication is not received or the aircraft fails to arrive within 60 minutes of a prescribed time.

<sup>6</sup> DETRESFA: Distress phase when there is reasonable certainty that the aircraft and its occupants are threatened by grave and imminent danger.

At 0830 UTC the Manado Approach controller received information from PT Nyaman Air at Balikpapan of the last aircraft position recorded in the Skynet<sup>7</sup> system. The last aircraft position was recorded at coordinate N 01° 29' 2.66" E 125° 07' 50.59".

Upon receiving distress notification from the Airport Authority, the Indonesia Search and Rescue Agency (BASARNAS) deployed a team for search and rescue operation.

At 1650 UTC the BASARNAS discovered the aircraft wreckage at Mount Dua Saudara at elevation of 2,283 feet at coordinate N 01° 29' 5.6" E 125° 08' 45.8"

All occupants were fatally injured and the aircraft severely damage.



**Figure 1: The accident site relative to Manado (Satellite image courtesy of Google Earth)**

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<sup>7</sup> SKYNET : satellite data communications between aircraft and ground based station. This system provides an integrated Iridium and GPS that allows owners, operators, and passengers to track, and communicate with, aircraft world-wide



Figure 2 : The aerial picture of the accident site.

## 1.2 INJURIES TO PERSONS

Injuries	Flight crew	Passengers	Total in Aircraft
Fatal	1	9	10
Serious	-	-	-
Minor/None	-	-	-
<b>TOTAL</b>	<b>1</b>	<b>9</b>	<b>10</b>

The passengers were two Australians and two South Africans.

## 1.3 DAMAGE TO AIRCRAFT

The aircraft was severely damaged.

## 1.4 OTHER DAMAGE

There was no other damage reported.

## 1.5 PERSONNEL INFORMATION

### 1.5.1 PILOT

Gender : Male  
 Age : 56 years  
 Nationality : Indonesia

License	:	ATPL/H
Date of issue	:	13 April 2011
Valid to	:	30 April 2012
Aircraft type rating	:	Bell 212; Bell 412, Bell 205, Bell 206 ,BO-105
Medical certificate	:	Class I
Date of medical	:	12 July 2011
Valid to	:	12 January 2012
Last proficiency check	:	08 February 2011
Total hours	:	11,907 hours 18 minutes
This make and model	:	1,998 hours 42 minutes
Last 90 days	:	70 hours 12 minutes
Last 24 hours	:	2 hours 24 minutes
This flight	:	about 1 hour 34 minutes

At the time of accident was the Ramadhan, when the pilot was on fasting.

Refer to Maintenance Log Book between May to August 2011, the Pilot has performed ten flights while 5 times as single Pilot and 5 times two pilots on route Gosowong- Manado vv.

### **1.5.2 MAINTENANCE ENGINEER**

Gender	:	Male
Age	:	42 years
Nationality	:	Indonesia
License	:	AMEL
Aircraft type rating	:	Bell 212,Bell 412, Bell 206 PW PT6T-series

## **1.6 AIRCRAFT INFORMATION**

### **1.6.1 General**

Aircraft Registration	:	PK-FUG
Country of Manufacturer	:	United State of America
Manufacturer	:	Bell Helicopter Textron
Type/ Model	:	Bell 412 HP
Serial Number	:	36063

Year of Manufacture : 1993  
Certificate of Airworthiness validity : 27 January 2012  
Certificate of Registration : 27 January 2012  
Total flight hours since new : 5186.7 hours  
Total cycle since new : 16,769 cycles

### **1.6.2 Engines**

Engine type : Turbo Shaft  
Manufacturer : Pratt Whitney  
Model : PT6T-3BE  
Engine number 1  
Serial Number : CP-PS-T13O174  
Time Since New (TSN) : 2,250 hours  
Cycle since new Engine : 4,835 cycles  
Engine number 2  
Serial Number : CP-PS-T13O175  
Time Since New (TSN) : 2,250 hours  
Cycle since new : 4,835 cycles

### **1.6.3 Main rotor blade**

MR type : Composite Bell Textron  
Blade number 1  
Serial number : A-1660  
Time Since New : 1,867 hours 48 minutes  
Time between Overhaul : 2,500 hours  
Blade number 2  
Serial number : A-1663  
Time Since New : 1,867 hours 48 minutes  
Time between Overhaul : 2,500 hours  
Blade number 3  
Serial number : A-1654  
Time Since New : 1,867 hours 48 minutes

Time between Overhaul : 2,500 hours  
Blade number 4  
Serial number : A-1668  
Time Since New : 1,867 hours 48 minutes  
Time between Overhaul : 2,500 hours

#### **1.6.4 Weight and Balance**

The investigation could not find weight and balance document for this flight.

### **1.7 METEOROLOGICAL INFORMATION**

The weather reported in Manado at 06.00 UTC was as follows:

Surface wind : 330°/ 8 knot  
Visibility : 10 Km  
Weather : NIL  
Cloud base : F 2100 feet Broken 10000 feet  
TT / TD : 29° C / 22° C  
QNH : 1008 mb / 29.77  
QFE : 1000 mb / 29.49

Some villagers near the accident site who were working at their field stated that the weather at the time of accident was cloudy and drizzle. At the higher elevation, the area was covered by cloud and the visibility was below minima, however the cloud base could not be determined.

### **1.8 AIDS TO NAVIGATION**

Not relevant to this accident.

### **1.9 COMMUNICATIONS**

Communications between air traffic services (ATS) and the crew was normal and no communication difficulty. Last contact communication held at 0629 UTC. There was no distress message.

### **1.10 AERODROME INFORMATION**

Airport Name : Sam Ratulangi Airport

Airport Identification : WAMM / MDC  
Airport Address : JL. AA. Maramis, Manado - 95374  
Elevation : 270 feet  
Airport Operator : PT. Angkasa Pura I (Persero)  
Runway Directions : 36 – 18  
Runway Length : 2,650 meters  
Runway Width : 45 meters  
Surface : Asphalt concrete

The airport was surrounded by mountainous area. The highest obstacle was Klabat Mountain on the east side of airport with the height up to 6500 feet. The gap areas were on the south west side toward Manado city, north side of the airport and south east side toward Airmadidi. These three flat areas commonly use for VFR flight route to entry and exit to Manado. The Manado Airport authority has published a guidance of VFR route within Manado CTR/TMA for these three VFR routes.

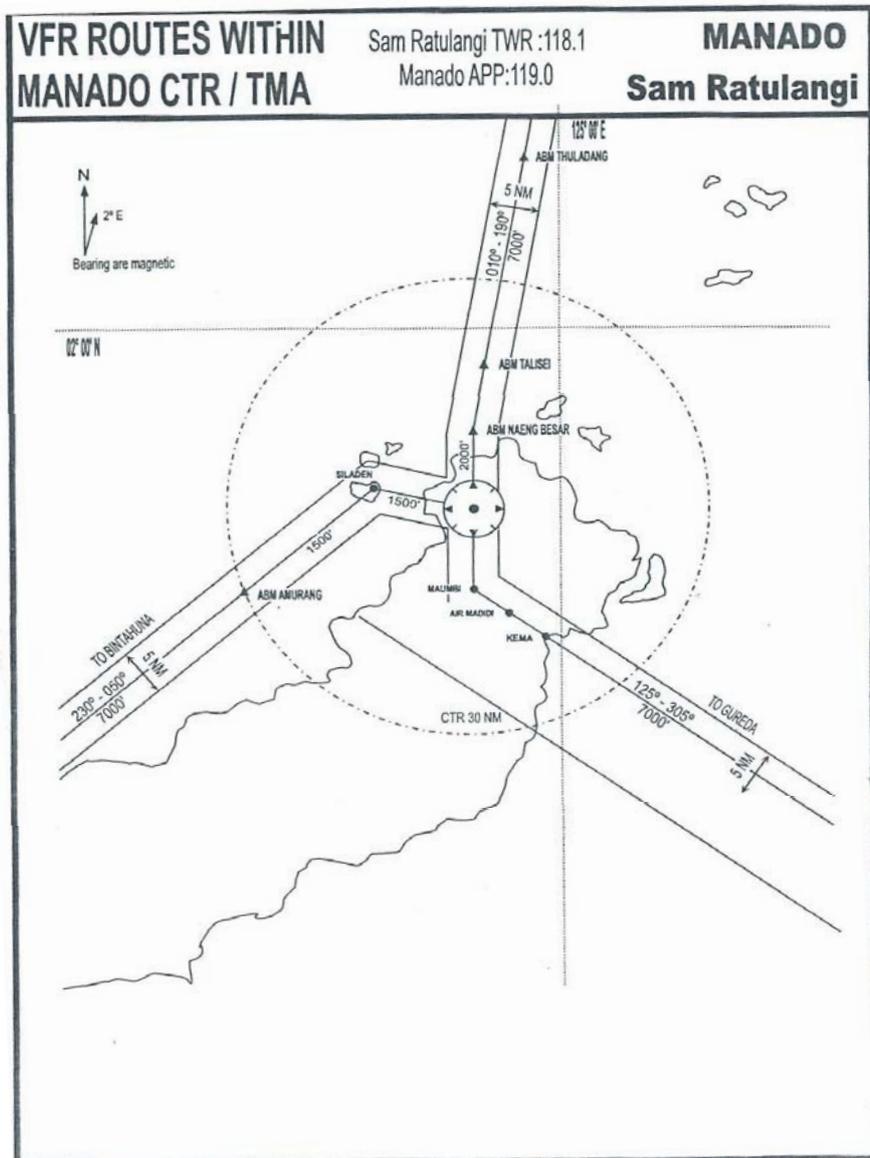


Figure 4. VFR routes guidance within Manado.

### 1.11 FLIGHT RECORDERS

The aircraft was not equipped with a Flight Data Recorder (FDR) or Cockpit Voice Recorder (CVR). Neither recorder was required by current Indonesian Civil Aviation Regulations.

## **1.12 WRECKAGE AND IMPACT INFORMATION**

The aircraft was found in the tropical rain forest on Dua Saudara National Park. Prior to impact, the aircraft hit several tree tops. The type of cutting on the tree tops indicating a clean cut, which typical of high speed impact.



**Figure 5: Clean cut on the top of trees prior to impact.**

Prior to its final position, the aircraft has impacted and collapsing at least 4 significant size trees. The main wreckage leaned on another big tree.



**Figure 6: Aircraft final position**

The aircraft wreckage was transported to the nearest police station for further examination. The examination was conducted by NTSC and assisted by Bell Helicopter.

The examination found that the tail rotor shaft twisted, this indicated that the tail rotor shaft was rotating on impact. The examination concluded that the engine and flight control were functioning properly prior to impact. The result of this examination is attached in the appendix.



**Figure 7: Examination of the wreckage.**



**Figure 8: Twisted tail rotor shaft**

### **1.13 MEDICAL AND PATHOLOGICAL INFORMATION**

All aircraft occupants were fatally injured as result of impact during the accident.

### **1.14 FIRE**

There was no pre or post impact fire.

### **1.15 SURVIVAL ASPECTS**

The aircraft wreckage was found at 1650 UTC. All occupants were fatally injured as result of impact forces.

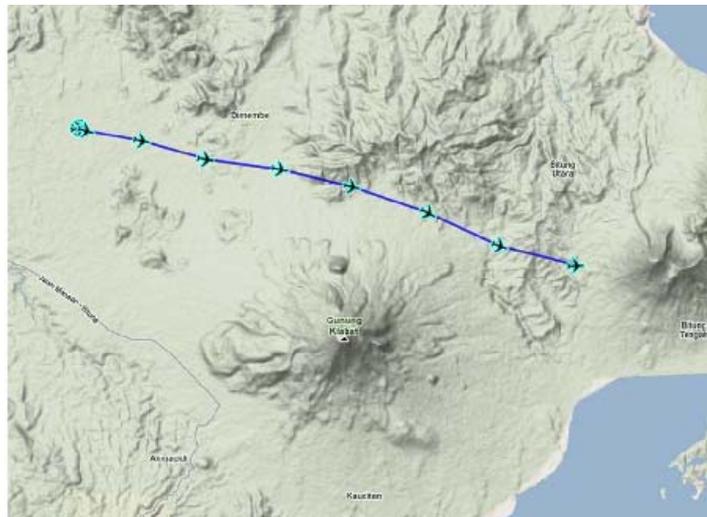
### **1.16 TESTS AND RESEARCH**

No test and research was performed during this investigation.

## 1.17 ORGANIZATIONAL AND MANAGEMENT INFORMATION

Aircraft owner : PT. Nyaman Air  
Aircraft operator : PT. Nyaman Air  
Hanggar B6 Sepinggan International Airport  
Jl. Marsma R. Iswahyudi  
Balikpapan, East Kalimantan 76115 Indonesia  
Air operator certificate : AOC/135-042

The operator utilized flight following by Skynet system. This system was capable of monitoring the flight path as the data were transmitted by the aircraft periodically.



**Figure 8: The aircraft PK-FUG accident route recorded in the Skynet.**

The skynet recorded that the aircraft flew direct track to Gosowong. This direct track was very common used by Nyaman Air pilots. This route was chosen to shorten the flight time. Nyaman air did not have route guidance for this direct track.

## 1.18 ADDITIONAL INFORMATION

CASR 135.383 regarding single pilot Aircraft operations with regard to number of passenger.

### *135.383 Minimum Flight Crew*

*(a) No air carrier may operate an aircraft in any air transportation service operated under this part, with fewer than two pilots, where the aircraft:*

*(1) is an aero-plane with a certified seating configuration of 10 or more passenger seats;*

*(2) is carrying passengers and is being operated IFR; (3) is of a type required by its type certificate to be operated by two or more pilots; or*

*(4) is operating under special authority where the minimum flight crew is greater than those specified in this section.*

### **1.19 USEFUL OR EFFECTIVE INVESTIGATION TECHNIQUES**

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

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## **2 ANALYSIS**

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### **2.1 IMPACT AND WRECKAGE ANALYSIS**

Prior to the final impact, the aircraft hit several tree tops and resulted to clean cuts. These typical of clean cutting were caused by a high speed impact. In this particular accident, most likely this caused by high energy of main rotor blade rotation. This high energy could be produce only by powered engines.

Prior to the final impact, the aircraft also collapsed several significant sizes of trees. In order to collapse several big trees, it requires high forces. The high forces could be result from high aircraft speed.

Refer to the clean cut on the tree tops and collapse of several big trees, these indicated that the engine was on power and the aircraft was on high speed.

The examination found that the tail rotor shaft twisted, this indicated that the tail rotor shaft was rotating on impact. The examination concluded that the engine, main and tail rotors were functioning properly prior to impact.

### **2.2 FLIGHT ROUTE**

The Manado Airport was surrounding by several high terrain. There were 3 routes commonly uses for visual flight as published on a guidance of VFR route. The aircraft flew via the north side of Mount Klabat which was the direct track to Gosowong and did not follow published guidance for VFR.

This direct track was very common used by Nyaman Air pilots to shorten the flight time.

### **2.3 WEATHER ANALYSIS**

The weather at the Dua Saudara National Park at the time of the accident was cloudy and drizzle with the minimum visibility. A VFR flight could not be conducted in such weather condition.

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## **3 CONCLUSIONS**

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### **3.1 FINDINGS**

- The aircraft was airworthy prior the accident and there was no pilot report of any system malfunction during the flight.
- The crew had valid license and medical certificate.
- The pilot was on fasting on the day of accident.
- The aircraft flew via direct track to Gosowong, which was not a published VFR route.
- The wreckage and impact analysis indicated that the engine, main and tail rotors were functioning properly during impact.
- The weather at the accident site prevented a flight to be performed under VFR.

### **3.2 FACTOR**

The flight was conducted under VFR while the weather was below the VFR minima.

This accident was classified as Controlled Flight into Terrain (CFIT) where an airworthy aircraft, under control of the pilot, un-intentionally collided with terrain.

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## **4 SAFETY ACTION**

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At the time of issuing this Draft Final Accident Investigation Report, the National Transportation Safety Committee has not been informed of any safety actions as result of this accident.

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## **5 SAFETY RECOMMENDATIONS**

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As a result of this accident investigation, the National Transportation Safety Committee issued recommendation to address safety issues identified in this report, as follows:

### **5.1 RECOMMENDATION TO PT. NYAMAN AIR**

The National Transportation Safety Committee recommends that PT. Nyaman Air :

- To reinforce the flight operation procedure to follow Visual Flight Rules.
- Re-evaluate the single pilot operation for long distance flights particularly for extended overwater operation.
- Ensure to brief pilots with safety briefing more particular ALAR and CFIT prevention.
- Produce “Pilot Guidance” for VFR assigned route for each of operation base/ area, and have it positively controlled. And establish a local VFR procedure for each of operation area/base

### **5.2 RECOMMENDATION TO DIRECTORATE GENERAL OF CIVIL AVIATION**

The National Transportation Safety Committee recommends that Directorate General of Civil Aviation should:

- Evaluate the requirement of two pilots operation for aircraft regards to number of passenger carried, IFR and or long distance operation with refer to CASR 135.383.
- Evaluate the necessity of CVR/FDR to be installed in aircraft certified to carry certain number of passenger.
- Reemphasis operators to conduct ALAR,CFIT and Mountainous training/ briefing to all Flight Crew
- Reemphasis for operators to produce/generate assigned VFR route for each area of operations.
- Reemphasis to operator to adapt the published circular regarding to pilot operations during fasting condition (No. AU/5660/DKUPPU/2898/EK/III/2010).