KOMITE NASIONAL KESELAMATAN TRANSPORTASI
REPUBLIC OF INDONESIA

FINAL

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Aircraft Accident Investigation Report

PT. Amur Aviation Indonesia

Helicopter Bell 206L-4; PK-UAG

Siriwo Area – Papua

Republic of Indonesia

3 February 2016

2017

This final investigation 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).

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ABBREVIATIONS AND DEFINITIONS

AFIS	:	Aerodrome Flight Information Services
AGL	:	Above Ground Level
AOC	:	Air Operator Certificate
BMKG	:	*Badan Meteorologi klimatologi dan geofisika*/Bureau of Meteorology, Climatology and Geophysics
ºC		Degree Celcius
CASR	:	Civil Aviation Safety Regulation
CFIT	:	Controlled Fligth Into terrain
C of A	:	Certificate of Airworthiness
C of R	:	Certificate of Registration
COM	:	Company Operation Manual
CPL	:	Commercial Pilot License
CRM	:	Crew Resource Management
CVR	:	Cockpit Voice Recorder
DGCA	:	Directorate General of Civil Aviation
ETL	:	Effective Translational Lift
FDR	:	Flight Data Recorder
GPS	:	Global Positioning System
ICAO	:	International Civil Aviation Organization
IFR	:	Instrument Flight Rules
Km	:	kilometers
KNKT	:	Komite Nasional Keselamatan Transportasi
LT	:	Local Time
LTE	:	Loss of Tail rotor Effectiveness
Mbs	:	millibars
MTOW	:	Maximum Take-off Weight
m	:	Meters
OGE	:	Out of Ground Effect
RPM	:	Rotation per Minute
UTC	:	Universal Time Coordinate
VMC	:	Visual Meteorological Condition

SYNOPSIS

A Bell 206L-4 helicopter registration PK-UAG was being operated by PT. Amur Aviation Indonesia on 3 February 2016 as charter flight. The flight was planned for four sectors from Moses Kilangin International Airport (WAYY), Timika to Enarotali Airstrip (WAYE) then to Bayabiru, Spot 99 and Enarotali for overnight.

The helicopter was not equipped with flight recorder therefore the information for the investigation mainly based on the witness statement and Global Positioning System (GPS) data.

At 0730 LT (2230 UTC), the helicopter departed Timika to Enarotali then continued to Bayabiru and to Spot 99 helipad.

At 0040 UTC, the helicopter arrived at Spot 99 area at about 30 feet AGL and speed approximately of 10 – 15 knots the helicopter entered spin to the right. The pilot pushed the cyclic stick with intention to gain the speed and applied left rudder pedal to recover the spin. The spin was not recovered and the pilot decided to close the power lever to idle and impacted to the roof of local housing near the helipad at coordinate 3° 36’ 2.60” S 136° 18’ 15.61” E.

The helicopter substantially damaged as result of impact forces. The pilot was seriously injured and the three passengers were not injured.

Komite Nasional Keselamatan Transportasi concluded that the helicopter was subject to a loss of tail rotor effectiveness (LTE) at a height that occurred too low to the terrain to complete a successful recovery

KNKT had not been informed the safety action by the helicopter operator following this occurrence, therefore KNKT several safety recommendation to the helicopter operator.

1 FACTUAL INFORMATION

1.1 History of the Flight

A Bell 206L-4 helicopter registration PK-UAG was being operated by PT. Amur Aviation Indonesia on 3 February 2016 as charter flight. The flight was planned for four sectors from Moses Kilangin International Airport (WAYY), Timika [1] to Enarotali Airstrip (WAYE) [2] then to Bayabiru, Spot 99 and Enarotali for overnight.

At 0730 LT (2230 UTC[3]), the helicopter departed Timika to Enarotali. On board this flight was one pilot and five passengers.

At 2317 UTC, the helicopter arrived at Enarotali and the pilot coordinated with the customer in preparation to perform a survey flight to Spot 99 helipad via Bayabiru.

At 0015 UTC, the helicopter departed Enarotali with the same pilot and passenger, and arrived at Bayabiru at 0030 UTC to disembarked two passengers.

At 0033 UTC, the helicopter departed Bayabiru for continuing the flight to Spot 99 helipad and estimated time of arrival in Spot 99 helipad. The weather at the Enarotali to Spot 99 was clear.

At 0040 UTC, the helicopter arrived at Spot 99 area at the altitude approximately 150 feet. The helicopter approached to Spot 99 helipad on inbound heading 066 then turned right for proceeding final approach from the north of the helipad. At about 30 feet Above Ground Level (AGL) and speed approximately of 10 – 15 knots the helicopter entered spin to the right. The pilot pushed the cyclic stick with intention to gain the speed and applied left rudder pedal to recover the spin. The spin was not recovered and the pilot decided to close the power lever to idle and impacted to the roof of local housing near the helipad at coordinate 3° 36’ 2.60” S 136° 18’ 15.61” E.

The pilot was seriously injured and three passengers were not injured. Two local houses were severely damage. The helicopter substantially damaged as result of impact forces.

Figure 1. The helicopter last position

1 Moses Kilangin International Airport (WAYY), Timika will be named Timika for the purpose of this report.

2 Enarotali Airstrip (WAYE) will be named Enarotali for the purpose of this report.

3 The 24-hours clock in Universal Time Coordinated (UTC) is used in this report to describe the local time as specific events occured. Local time is UTC+9 hours.

1.2 Personnel Information

Gender	:	Male
Age	:	55
Nationality	:	Indonesia
Marital status	:	Married
Date of joining company	:	13 August 2015
License	:	Commercial Pilot License
Date of issue	:	20 April 2007
Helicopter type rating	:	BO 105; B 206
Medical certificate	:	First Class
Last of medical	:	28 July 2015
Validity	:	28 February 2015
Medical limitation	:	Holder shall possess glasses that correct for near vision
Last proficiency check	:	22 September 2015

Flying experience

Total hours	:	5,047 hours
Total on type	:	49 hours 41 minutes
Last 90 days	:	30 hours 46 minutes
Last 60 days	:	30 hours 16 minutes
Last 24 hours	:	-
This flight	:	54 minutes
Remarks	:	The occurrence flight was the first flight for the pilot to Spot 99 helipad

1.3 Helicopter Information

1.3.1 General

Registration Mark	:	PK-UAG
Manufacturer	:	Bell Helicopter Textron
Country of Manufacturer	:	Canada
Type/Model	:	Bell 206L-4
Serial Number	:	52340
Year of Manufacture	:	2005

Certificate of Airworthiness

Issued	:	24 November 2015
Validity	:	23 May 2016
Category	:	Normal
Limitations	:	None

Certificate of Registration

Number	:	3752
Issued	:	24 November 2015
Validity	:	23 November 2016
Time Since New	:	8,115.18 hours
Cycles Since New	:	24,218 cycles
Last Major Check	:	12 month / 100 hours, carried out on 20 August 2015 at helicopter time 8058.10 hours
Last Minor Check	:	50 hour inspection, carried out on 3 February 2016

1.3.2 Engines

Manufacturer	:	Rolls Royce
Type/Model	:	Turbine, RR 250 – C30P
Serial Number Engine	:	CAE – 895871
▪ Time Since New	:	10,890.48 hours
▪ Cycles Since New	:	8,530 cycles
Manufacturer	:	Rolls Royce
Main Rotor Blade	:	206-015-001-119
▪ Serial Number Main Rotor Blade	:	A7491
▪ Serial Number Main Rotor Blade	:	A7203
Tail Rotor Blade	:	206-016-201-135
▪ Serial Number Tail Rotor Blade	:	CS-19709
▪ Serial Number Tail Rotor Blade	:	CS-19756

The orientation of main rotor blade rotation of this helicopter is counterclockwise viewed from the upper of the helicopter.

1.4 Meteorological Information

1.4.1 Meteorological Reports

The meteorological reports issued by Enarotali Meteorological Station were as follows:

	2300 UTC	0000 UTC	0100 UTC
Wind	Calm	Calm	280° / 3 knots max 6 knots
Visibility	5 km	8 km	10 km
Weather	FOG at A DIST / Cloudy	NIL / Cloudy	NIL / Cloudy
Cloud	4/8 CuSt 690 – 1,200 feet	4/8 CuSt 900 – 1,200 feet	3/8 CuSc 1,200 feet
TT/TD	17°C / 13°C	19°C / 15°C	22°C / 17°C
QNH	-	-	-
QFE	826.4 mbs	826.4 mbs	825.8 mbs

The weather along the route from Enarotali to Spot 99 helipad was clear and within the Visual Meteorological Condition (VMC) minima.

1.4.2 Satellite Image

A satellite image provided by *Badan Meteorologi, Klimatologi dan Geofisika* (BMKG – Bureau of Meteorology, Climatology and Geophysics) on 0100 UTC indicated development of Cumulus clouds around the Spot 99 area (red circle). The cumulus clouds usually have their bases in the low altitude from the earth surface up to 6,500 feet and their vertical extent is often that their tops may reach into the middle and high clouds[4].

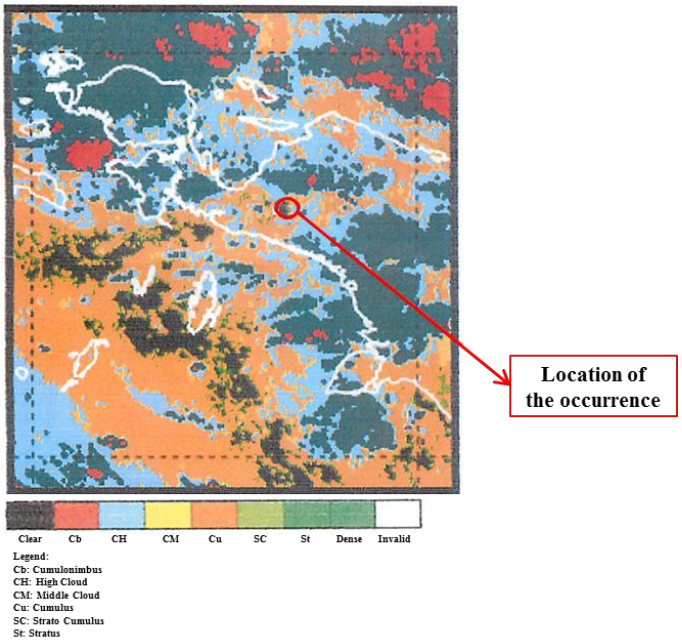

Figure 2. Satellite image at 0100 UTC

4 International Cloud Atlas Volume I: Manual On The Observation Of Clouds And Other Meteors, is manual issued by World Meteorological Organization that can be found in http://wmo-cloudatlas.org/index.php/en/

1.5 Aids to Navigation

There was no navigation system at the Spot 99.

1.6 Communications

The pilot communicated with the Enarotali Aerodrome Flight Information Services (AFIS) prior to departue until the end of service at about five minutes out was conducted normally. The communication was not recorded.

The Spot 99 helipad was not equipped with communication facility. The pilot did not make any communication.

1.7 Aerodrome Information

1.7.1 Enarotali Airstrip

Airport Name	:	Enarotali
Airport Identification	:	WAYE
Airport Operator	:	Directorate General Civil Aviation (DGCA)
Coordinate	:	03°56’00” S, 136°25’00” E
Elevation	:	5741 feet (1750 meter)
Runway Direction	:	09/27
Runway Length	:	990 meter
Runway Width	:	18 meter
Surface	:	Asphalt
Airport Name	:	Enarotali

1.7.2 The Spot 99 helipad

The Spot 99 helipad located at coordinate 3° 36’ 6” S 136° 18’ 14” E approximately 20 Nm from Enarotali on direction 350° with elevation of 3,257 feet. Only one gap available for entry and exit the area. The helipad used for transportation of person and equipment of the traditional gold mining.

Figure 3. Helipad Spot 99 and the gap for entry and exit the area

Several experienced pilots familiar with the Spot 99 stated that the approach to this helipad normally initiated from the river on inbound heading 060°, when go around required, the pilot shall make turn right while gaining the altitude approximately 1,000 feet and return to inbound for another attempt to land.

1.8 Flight Recorders

The helicopter was not fitted with a flight data recorder or cockpit voice recorder. Neither recorder was required by current Indonesian aviation regulations.

The pilot was fitted with a Global Positioning System (GPS) Garmin GPS Map 296. The GPS was recovered from the accident site. The GPS data was successfuly retrieved and contained the several information of the flight.

The helicopter flight track retrieved from the GPS and superimposed to the Google earth is as follow:

Figure 4. The flight path from Enarotali to Spot 99

1.9 Wreckage and Impact Information

The helicopter crashed at a local house which at coordinate 3° 36’ 2.60” S 136° 18’ 15.61” E approximately 100 meter on radial 30° from the Spot 99 helipad at elevation of 3,240 feet. The location was near the cliff with height approximately 10 – 15 meters. The heading of helicopter wreckage was 210° and the floatation devices were inflated. The main rotor blades and the tail boom detached and found within radius approximately 2 meters.

The figure below shows the location of the helicopter wreckage relative to the Spot 99.

Figure 5. Aerial view of crash site

Figure 6. Helicopter wreckage

1.10 Medical and Pathological Information

After the occurrence, the pilot was hospitalized for back pain and required total rest.

1.11 Fire

There was no evidence of pre- or post-impact fire.

1.12 Survival Aspects

All occupants were evacuated by local people. The pilot had serious injury and the three passengers were not injured. The passengers stayed at the Spot 99 area.

The pilot was evacuated to hospital in Nabire by helicopter Bell 212 operated by PT. Satria which was conducting flight to Spot 99.

1.13 Tests and Research

No test and research have been conducted until the issuance of this report.

1.14 Organizational and Management Information

1.14.1 PT. Amur Aviation Indonesia

Helicopter Owner	:	Bank of Utah
Address	:	200 E, South Temple, Ste. 210 Salt Lake City, UT 8411
Helicopter Operator	:	PT. Amur Aviation Indonesia
Address	:	Villa Melati Mas, Blok SR I, No. 14, Bumi Serpong Damai, Tangerang, Indonesia
Operator Certificate Number	:	121-037

The Company Operation Manual (COM), regarding the flying over a new route or area stated as follows:

STANDARD OPERATING PROCEDURES

Company Operation Manual document number AAI-COM-102-03-03

2.5. Familiarization

Any pilot assigned to this contract for the first time shall undergo an area check ride with the Chief pilot or his approved deputy.

3.3.6. Line Check, Route, Airports and Landing Areas

a. The Company shall not be use a pilot, nor may any pilot serve as a pilot in command of a flight unless, since the beginning of the 6th calendar months before that service, that pilot has passed a flight check in one of the types of aircraft which that pilot is to fly. The flight check shall:

1. Be given by an approved Company pilot, or by the DGCA Inspector.

2. Consist of at least one flight over an en route segment.

3. Include take-offs and landings at one or more representative airports. In addition to the requirements of this paragraph, a pilot authorized to conduct IFR operations,

at least one flight shall be flown over a civil airway, an approved off airway route, or a portion of either of them.

b. The pilot who conducts the check shall determine whether the pilot being checked satisfactorily performs the duties and responsibilities of a pilot in command in operations under this part, and shall so certify in the Company's pilot training record.

The flight was the first flight for the pilot to the Spot 99. The pilot had not conducted a flight check for this route nor accompanied by a pilot who had flight experience to Spot 99 because there was no company pilot available at Timika. Prior to this flight, the pilot was briefed that there were several helipads surrounding Spot 99 and to ensure landing on the correct helipad.

The company considered that the helicopter is a single pilot seated and the pilot considered as an experienced pilot therefore the passenger who familiar with the Spot 99 area would provide sufficient information to the pilot.

1.14.2 Civil Aviation Safety Regulation Part 135

135.473 Line Checks: Routes and Airports

(a) No certificate holder shall assign a pilot to act, and no person shall act, as pilot-in- command of a multi-engine airplane which has a MTOW of greater than 12500 pounds, or is a turbojet airplane unless that pilot has passed a line check as required by section 121.440.

(b) No certificate holder shall assign a pilot to act, and no person shall act, as pilot-in- command of an airplane on a route or route segment unless that pilot has complied with section 121.443 and 121.445.

(c) No certificate holder shall assign a pilot to act, and no person shall act, as pilot-in- command of a helicopter on an operation for which that pilot is not currently qualified unless such pilot

(1) has an adequate knowledge of the operation to be flown in accordance with section 121.443.

(2) shall have made takeoff and landing at one or more representative heliports, as member of the flight crew and accompanied by a pilot who is qualified for the operation.

(d) A certificate holder shall not continue to utilize a pilot as a pilot-in-command of a helicopter on an operation unless, within the preceding 12 months, the pilot has made at least one representative flight as a pilot member of the flight crew, or as a check pilot, or as an observer on the flight deck. In the event that more than 12 months elapse in which a pilot has not made such a representative flight, prior to again serving as a pilot-in-command on that operation, that pilot must requalify in accordance with paragraph (c)(1) and (2) of this section.

1.14.3 Civil Aviation Safety Regulation Part 121

121.443 Pilot in Command Qualification: Route and Airports

(a) Each certificate holder shall provide a system acceptable to the Director for disseminating the information required by Paragraph (b) of this section to the pilot in command and appropriate flight operation personnel. The system must also provide an acceptable means for showing compliance with Section 121.445.

(b) No certificate holder may use any person, nor may any person serve, as pilot in command unless the certificate holder has provided that person current information concerning the following subjects pertinent to the areas over which that person is to serve, and to each airport and terminal area into which that person is to operate, and ensures that that person has adequate knowledge of, and the ability to use, the information:

(1) Weather characteristics appropriate to the season.

(2) Navigation facilities.

(3) Communication procedures, including airport visual aids.

(4) Kinds of terrain and obstructions.

(5) Minimum safe flight levels.

(6) Enroute and terminal area arrival and departure procedures, holding procedures and authorized instrument approach procedures for the airports involved.

(7) Congested areas and physical layout of each airport in the terminal area in which the pilot will operate.

(8) Notices to Airmen.

121.445 Pilot in Command Airport Qualification: Special Areas and Airports

(a) The Director may determine that certain airports (due to items such as surrounding terrain, obstructions, or complex approach or departure procedures) are special airports requiring special airport qualifications and that certain areas or routes, or both, require a special type of navigation qualification.

(b) Except as provided in Paragraph (c) of this section, no certificate holder may use any person, nor may any person serve, as pilot in command to or from an airport determined to require special airport qualifications unless, within the preceding 12 calendar months:

(1) The pilot in command or second in command has made an entry to that airport (including a takeoff and landing) while serving as a pilot flight crew member; or

(2) The pilot in command has qualified by using pictorial means acceptable to the Director for that airport.

(c) No certificate holder may use any person, nor may any person serve, as pilot in command between terminals over a route or area that requires a special type of navigation qualification unless, within the preceding 12 calendar months, that person has demonstrated qualification on the applicable navigation system in a manner acceptable to the Director, by one of the following methods:

(1) By flying over a route or area as pilot in command using the applicable special type of navigation system;

(2) By flying over a route or area as pilot in command under the supervision of a check airman using the special type of navigation system.

1.15 Additional Information

1.15.1 Helicopter Basic Maneuver[5]

UNANTICIPATED YAW / LOSS OF TAIL ROTOR EFFECTIVENESS (LTE)

Unanticipated yaw is the occurrence of an un-commanded yaw rate that does not subside of its own accord and, which, if not corrected, can result in the loss of helicopter control. This un-commanded yaw rate is referred to as loss of tail rotor effectiveness (LTE) and occurs to the right in helicopters with a counterclockwise rotating main rotor and to the left in helicopters with a clockwise main rotor rotation. Again, this discussion covers a helicopter with a counter-clockwise rotor system and an anti-torque rotor.

LTE is not related to an equipment or maintenance malfunction and may occur in all single-rotor helicopters at airspeeds less than 30 knots. It is the result of the tail rotor not providing adequate thrust to maintain directional control, and is usually caused by either certain wind azimuths (directions) while hovering, or by an insufficient tail rotor thrust for a given power setting at higher altitudes.

For any given main rotor torque setting in perfectly steady air, there is an exact amount of tail rotor thrust required to prevent the helicopter from yawing either left or right. This is known as tail rotor trim thrust. In order to maintain a constant heading while hovering, you should maintain tail rotor thrust equal to trim thrust. The required tail rotor thrust is modified by the effects of the wind. The wind can cause an un-commanded yaw by changing tail rotor effective thrust. Certain relative wind directions are more likely to cause tail rotor thrust variations than others. Flight and wind tunnel tests have identified three relative wind azimuth regions that can either singularly, or in combination, create LTE conducive environment. These regions can overlap, and thrust variations may be more pronounced. Also, flight testing has determined that the tail rotor does not actually stall during the period. When operating in these areas at less than 30 knots, pilot workload increases dramatically.

MAIN ROTOR DISC INTERFERENCE (285-315°)

Refer to figure 11-10. Winds at velocities of 10 to 30 knots from the left front cause the main rotor vortex to be blown into the tail rotor by the relative wind. The effect of this main rotor disc vortex causes the tail rotor to operated in an extremely turbulent environment. During a right turn, the tail rotor experiences a reduction of thrust as it comes into the area of the main rotor disc vortex. The reduction in tail rotor thrust comes from the airflow changes experienced at the tail rotor as the main rotor disc vortex moves across the tail rotor disc. The effect of the main rotor disc vortex initially increases the angle of attack of the tail rotor blades, thus increasing tail rotor thrust. The increase in the angle of attack requires that right pedal pressure be added to reduce tail rotor thrust in order to maintain the same rate of turn. As the main rotor vortex passes the tail rotor, the tail rotor angle of attack is reduced. The reduction in the angle of attack causes a reduction in thrust and a right yaw acceleration begins. This acceleration can be surprising, since you were previously adding right pedal to maintain the right turn rate. This thrust reduction occurs

5 This subchapter was adopted from FAA-H-8083-21 Rotorcraft Flying Handbook, the document can be found in https://www.faa.gov/regulations_policies/handbooks_manuals/aircraft/

suddenly, and if uncorrected, develops into an uncontrollable rapid rotation about the mast. When operating within this region, be aware that the reduction in tail rotor thrust can happen quite suddenly, and be prepared to react quickly to counter this reduction with additional left pedal input.

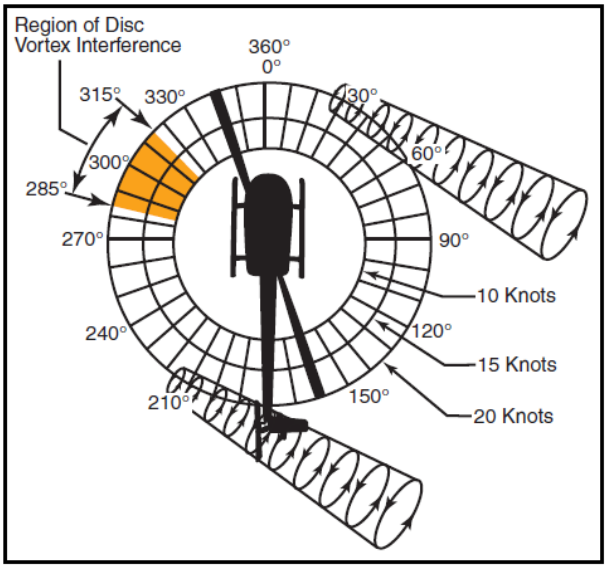

Figure 7. Main rotor disc vortex interference

LTE AT ALTITUDE

At higher altitudes, where the air is thinner, tail rotor thrust and efficiency is reduced. When operating at high altitudes and high gross weights, especially while hovering, the tail rotor thrust may not be sufficient to maintain directional control and LTE can occur. In this case, the hovering ceiling is limited by tail rotor thrust and not necessarily power available. In these conditions gross weights need to be reduced and/or operations need to be limited to lower density altitudes.

REDUCING THE ONSET OF LTE

To help reduce the onset of loss of tail rotor effectiveness, there are some steps you can follow.

1. Maintain maximum power-on rotor rpm. If the main rotor rpm is allowed to decrease, the anti-torque thrust available is decreased proportionally.

2. Avoid tailwinds below an airspeed of 30 knots. If loss of translational lift occurs, it results in an increased power demand and additional anti-torque pressures.

3. Avoid out of ground effect (OGE) operations and high power demand situations below an airspeed of 30 knots.

4. Be especially aware of wind direction and velocity when hovering in winds of about 8-12 knots. There are no strong indicators that translational lift has been reduced. A loss of translational lift results in an unexpected high power demand and an increased anti-torque requirement.

5. Be aware that if a considerable amount of left pedal is being maintained, a sufficient amount of left pedal may not be available to counteract an unanticipated right yaw.

6. Be alert to changing wind conditions, which may be experienced when flying along ridge lines and around buildings.

RECOVERY TECHNIQUE

If a sudden unanticipated right yaw occurs, the following recovery technique should be performed. Apply full left pedal while simultaneously moving cyclic control forward to increase speed. If altitude permits, reduce power. As recovery is effected, adjust controls for normal forward flight.

Collective pitch reduction aids in arresting the yaw rate but may cause an excessive rate of descent. Any large, rapid increase in collective to prevent ground or obstacle contact may further increase the yaw rate and decrease rotor rpm. The decision to reduce collective must be based on your assessment of the altitude available for recovery. If the rotation cannot be stopped and ground contact is imminent, an autorotation may be the best course of action. Maintain full left pedal until the rotation stops, then adjust to maintain heading.

RECONNAISSANCE PROCEDURES

Anytime you are planning to land or takeoff at an unfamiliar site, you should gather as much information as you can about the area. Reconnaissance techniques are ways of gathering this information.

HIGH RECONNAISSANCE

The purpose of a high reconnaissance is to determine the wind direction and speed, a point for touchdown, the suitability of the landing area, the approach and departure axes, obstacles and their effect on wind patterns, and the most suitable flight paths into and out of the area. When conducting a high reconnaissance, give particular consideration to forced landing areas in case of an emergency. Altitude, airspeed, and flight pattern for a high reconnaissance are governed by wind and terrain features. You must strike a balance between a reconnaissance conducted too high and one too low. It should not be flown so low that you have to divide your attention between studying the area and avoiding obstructions to flight. A high reconnaissance should be flown at an altitude of 300 to 500 feet above the surface. A general rule to follow is to ensure that sufficient altitude is available at all times to land into the wind in case of engine failure. In addition, a 45° angle of observation generally allows the best estimate of the height of barriers, the presence of obstacles, the size of the area, and the slope of the terrain. Always maintain safe altitudes and airspeeds, and keep a forced landing area within reach whenever possible.

LOW RECONNAISSANCE

A low reconnaissance is accomplished during the approach to the landing area. When flying the approach, verify what was observed in the high reconnaissance, and check for anything new that may have been missed at a higher altitude, such as wires, slopes, and small crevices. If everything is alright, you can complete the approach to a landing. However, you must make the decision to land or go-around before effective translational lift is lost. If a decision is made to complete the approach, terminate it in a hover, so you can carefully check the landing point before lowering the helicopter to the surface. Under certain conditions, it may be desirable to continue the approach to the surface. Once the helicopter is on the ground, maintain operating rpm. until you have checked the stability of the

helicopter to be sure it is in a secure and safe position.

APPROACHES

An approach is the transition from traffic pattern altitude to either a hover or to the surface. The approach should terminate at the hover altitude with the rate of descent and groundspeed reaching zero at the same time. Approaches are categorized according to the angle of descent as normal, steep, or shallow. In this chapter we will concentrate on the normal approach. Steep and shallow approaches are discussed in the next chapter. You should use the type of approach best suited to the existing conditions. These conditions may include obstacles, size and surface of the landing area, density altitude, wind direction and speed, and weight. Regardless of the type of approach, it should always be made to a specific, predetermined landing spot.

NORMAL APPROACH TO A HOVER

A normal approach uses a descent profile of between 8° and 12° starting at approximately 300 feet AGL.

TECHNIQUE

On final approach, at the recommended approach airspeed and at approximately 300 feet AGL, align the helicopter with the point of intended touchdown. After intercepting an approach angle of 8° to 12°, begin the approach by lowering the collective sufficiently to get the helicopter decelerating and descending down the approach angle. With the decrease in the collective, the nose tends to pitch down, requiring aft cyclic to maintain the recommended approach airspeed attitude. Adjust anti-torque pedals, as necessary, to maintain longitudinal trim. You can determine the proper approach angle by relating the point of intended touchdown to a point on the helicopter windshield. The collective controls the angle of approach. If the touchdown point seems to be moving up on the windshield, the angle is becoming shallower, necessitating a slight increase in collective. If the touchdown point moves down on the windshield, the approach angle is becoming steeper, requiring a slight decrease in collective. Use the cyclic to control the rate of closure or how fast your are moving toward the touchdown point. Maintain entry airspeed until the apparent groundspeed and rate of closure appear to be increasing. At this point, slowly begin decelerating with slight aft cyclic, and smoothly lower the collective to maintain approach angle. Use the cyclic to maintain a rate of closure equivalent to a brisk walk. At approximately 25 to 40 feet AGL, depending on wind, the helicopter begins to lose effective translational lift. To compensate for loss of effective translational lift, you must increase the collective to maintain the approach angle, while maintaining the proper rpm. The increase of collective pitch tends to make the nose rise, requiring forward cyclic to maintain the proper rate of closure.

As the helicopter approaches the recommended hover altitude, you need to increase the collective sufficiently to maintain the hover. At the same time you need to apply aft cyclic to stop any forward movement, while controlling the heading with anti-torque pedals.

COMMON ERRORS

1. Failing to maintain proper rpm during the entire approach.

2. Improper use of the collective in controlling the angle of descent.

3. Failing to make anti-torque pedal corrections to compensate for collective changes during the approach.

4. Failing to simultaneously arrive at hovering altitude and attitude with zero groundspeed.

5. Low rpm in transition to the hover at the end of the approach.

6. Using too much aft cyclic close to the surface which may result in tail rotor strikes.

GO-AROUND

A go-around is a procedure for remaining airborne after an intended landing is discontinued. A go-around may be necessary when:

• Instructed by the control tower.

• Traffic conflict occurs.

A good rule of thumb to use during an approach is to make a go-around if the helicopter is in a position from which it is not safe to continue the approach. Anytime you feel an approach is uncomfortable, incorrect, or potentially dangerous, abandon the approach. The decision to make a go-around should be positive and initiated before a critical situation develops. When the decision is made, carry it out without hesitation. In most cases, when you initiate the go-around, power is at a low setting.

Therefore, your first response is to increase collective to takeoff power. This movement is coordinated with the throttle to maintain rpm, and the proper anti-torque pedal to control heading. Then, establish a climb attitude and maintain climb speed to go around for another approach.

1.16 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.

2 ANALYSIS

Refers to the data gathered from the factual information the helicopter was airworthy prior to the impact and considered not contributed to the accident therefore, the analysis will discuss the relevant issues of helicopter flight approach and management decision.

2.1 Helicopter Flight in Unfamiliar Area

The helicopter flight into unfamiliar area induces additional workload to the pilot such as the pilot requires to reconnaissance (observation) either in high, low or ground reconnaissance to gather as much as information about the area.

A high reconnaissance should be done at an altitude of 300 to 500 feet above the surface to observe the best estimate of the height of barriers, the presence of obstacles, the size of the area, and the slope of the terrain.

A low reconnaissance is accomplished during the approach to the landing area. When flying the approach, verify what was observed in the high reconnaissance, and check for anything new that may have been missed at a higher altitude, such as wires, slopes, terrain and small crevices. If everything is alright, the pilot can complete the approach to a landing while considering the decision to land or go-around.

The helicopter descended inbound heading 066 at the altitude approximately of 150 feet and overhead to Spot 99 helipad. Subsequently the helicopter turned right proceeded to final approach of the helipad from the north. Flying overhead at 150 feet indicated that the pilot did not conducted reconnaissance, resulted in the loss of awareness to the environment condition such as terrain surrounding the helipad, the approach and go around path.

During approach at about 50 feet AGL with the speed approximately of 10 – 15 knots, the pilot made a right turn and the helicopter was flown near the cliff with height approximately 15 meters to attempt landing. The helicopter entered a spin to the right and the pilot pushed the cyclic stick with intention to gain the speed and applied left rudder pedal to recover the spin.

The helicopter entered the spin most likely due to the tail rotor losing effective thrust and the experienced a loss of tail rotor effectiveness (LTE). This resulted in an un-commanded yaw with a rapid spin to the right. The pilot attempted to recover the spin and pushed the cyclic stick with the intention to gain speed and applied left tail rotor pedal. However, the space was not sufficient to correct the situation, due to the helicopter being close to the cliff with height approximately 15 meters. The spin was not recovered and the pilot decided to close the engine power to idle and the helicopter impacted the roof of local housing.

Several pilots experienced to the Spot 99 stated that to reach this location, the track was conducted by flying over the river with inbound heading of 060°. If a go-around should be conducted, make right turn while gaining altitude up to approximately 1,000 feet and make another approach over the river.

The illustration of the common approach compared to the accident flight is showed in the following picture.

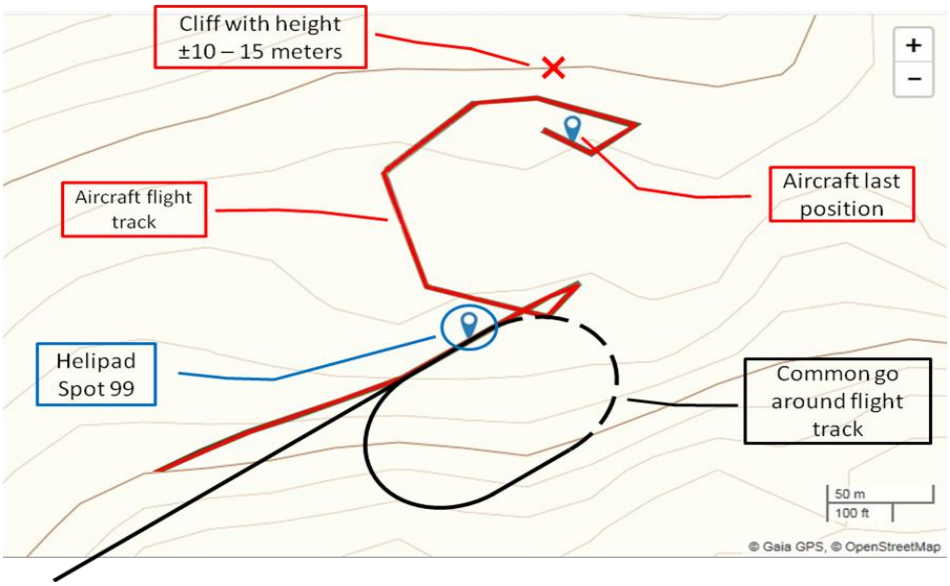

Figure 8. Illustrated actual flight track and common go around flight track

The accident flight was the first flight for the pilot to Spot 99 therefore reconnaissance was required, however the location and terrain prevented a high reconnaissance. This may have resulted in a lack of awareness of the pilot to the estimate of the height of surrounding terrain, the presence of obstacles, the size of the area, and the slope of the terrain. The approach was conducted in a limited space without anticipating abnormal condition. During approach, the helicopter experienced LTE and the helicopter entered the spin. The recovery action was conducted correctly however due to the limited space the spin was unrecoverable.

2.2 Management Decision

Refer to CASR 135.473 stated that to conduct the flight into a new routes or routes segment, the pilot requires to have adequate knowledge for the operation to be flown, or have made minimum of one takeoff and landing as member of flight crew and accompanied by a qualified pilot.

The operator COM chapter 3.3.6 stated that a pilot shall have passed a flight check within 6 months prior to serve as pilot in command. The flight check includes take-off and landing at one or more representative airports.

The flight to Spot 99 was the first time for the pilot and was not accompanied by a qualified pilot. The company considered that the passenger who was familiar with the Spot 99 area would provide sufficient information to the pilot.

Even though the passenger was familiar with the Spot 99, the passenger without adequate aviation knowledge would not be able to provide required information for the pilot such as approach and go around path.

The decision to rely on the passenger information resulted in insufficient information being made available to the pilot.

3 CONCLUSIONS

3.1 Findings[6]

1. The helicopter had a valid Certificate of Airworthiness.
2. The pilot held current license and medical certificate.
3. The weather along the route from Enarotali to Spot 99 helipad was clear and within the Visual Meteorological Condition (VMC) minima.
4. The accident was the third sector from the schedule of four sectors from Timika to Nabire via Enarotali, Bayabiru and Spot 99.
5. The flight to Spot 99 was the first time for the pilot and was not accompanied by a qualified pilot. The company considered that the passenger who familiar with the Spot 99 area would provide sufficient information to the pilot.
6. The helicopter descended inbound heading 066 at the altitude approximately of 150 feet and overhead to Spot 99 helipad indicated that the pilot did not conducted reconnaissance, resulted in the loss of awareness to the environment condition such as terrain surrounding the helipad, the approach and go around path.
7. During approach at about 50 feet AGL with the speed approximately of 10 – 15 knots the pilot made right turn and the helicopter entered an uncommanded spin to the right.
8. The spin to the right was likely a result of a loss of tail rotor effectiveness (LTE).
9. The pilot attempted to recover the spin by pushed the cyclic stick with intention to gain the speed and applied left tail rotor pedal.
10. The space was not sufficient to correct the situation, due to the helicopter was near to the cliff with height approximately 15 meters and the spin was not recovered.
11. The spin was not recovered and the pilot decided to close the power lever to idle and the helicopter impacted to the roof of local housing.
12. Several pilots experienced to the Spot 99 stated that the track was conducted by flying over the river with inbound heading 060°. If a go-around should be conducted, make right turn while gaining altitude up to approximately 1,000 feet and make another approach.
13. The decision to rely on the passenger information resulted in the inadequate information to the pilot.

6 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.

3.2 Contributing Factors[8]

The helicopter was subject to a loss of tail rotor effectiveness (LTE) at a height that occurred too low to the terrain to complete a successful recovery.

8 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. (Refer to ICAO Doc 9756 Part IV).

4 SAFETY ACTION

Komite Nasional Keselamatan Transportasi (KNKT) did not receive any Safety Action until issuance of draft report.

5 SAFETY RECOMMENDATIONS

As a result of this investigation, the Komite Nasional Keselamatan Transportasi issued safety recommendations to address safety issues identified in this report.

DGCA requested to ensure that the recommendations addressed to the relevant parties are well implemented.

5.1 PT. Amur Aviation Indonesia

- The flight to Spot 99 was the first time for the pilot and was not accompanied by a qualified pilot and prior to this flight appropriate briefing has not been conducted therefore KNKT recommend to ensure that the flight to the specific area shall comply with the requirement of company SOP or conduct risk assessment to cover the operation to unfamiliar area.
- Management assigned the pilot to conduct flight to Spot 99 that was the first time for the pilot and was not accompanied by a qualified pilot and no appropriate briefing prior to this flight has not been conducted which contrary to the company SOP therefore KNKT recommend to emphasize the management to improve the safety by conducting safety oversight to the operation.

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