



**KOMITE NASIONAL KESELAMATAN TRANSPORTASI
REPUBLIC OF INDONESIA**

FINAL

KNKT.12.10.19.04

Aircraft Accident Investigation Report

Yayasan Pelayanan Penerbangan Tariku

PAC 750 XL; PK-RWT

Mountain area Kina Village, Yahukimo, Papua

Republic of Indonesia

3 October 2012



2016

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 Organization, the Indonesian Aviation Act (UU No. 1/2009) and Government Regulation (PP No. 62/2013).

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ABBREVIATIONS AND DEFINITIONS

ALA	:	Aerodrome for Light Aircraft
BMKG	:	<i>Badan Meteorologi, Klimatologi dan Geofisika</i> (Meteorology, Climatology and Geophysics Agency)
CASR	:	Civil Aviation Safety Regulation
CFIT	:	Controlled Flight Into Terrain
CPL	:	Commercial Pilot License
DGCA	:	Directorate General Civil Aviation
ELT	:	Emergency Locator Transmitters
FL	:	Flight Level
GPS	:	Global Positioning System
ICAO	:	International Civil Aviation Organization
IFR	:	Instrument Flight Rules
IIC	:	Investigator in Charge
IMC	:	Instrument Meteorological Condition
kg	:	Kilogram (s)
km	:	Kilometre (s)
Kt	:	Knots (nm/hours)
KNKT / NTSC	:	<i>Komite Nasional Keselamatan Transportasi / National Transportation Safety Committee</i>
LT	:	Local Time
LUT	:	Local User Terminal
MEA	:	Minimum En-route Altitude
MSL	:	Mean Sea Level
nm	:	Nautical Mile (s)
OC	:	Operator Certificate
QFE	:	Height above airport elevation (or runway threshold)
QNH	:	Altitude above mean sea level based on local station pressure
S/N	:	Serial Number
SOP	:	Standard Operating Procedures
TT/TD	:	Ambient Temperature/Dew Point
UTC	:	Coordinated Universal Time
VFR	:	Visual Flight Rules
WIT	:	Waktu Indonesia Timur / Eastern Indonesian Standard Time
YPPT	:	Yayasan Pelayan Penerbangan Tariku Aviation

INTRODUCTION

SYNOPSIS

The investigation could not reach the accident site due to terrain condition, therefore the investigation utilized photos of the wreckage and other relevant data, which were taken by the search and rescue personnel.

According to the KNKT policy and procedures, investigation report of accident with fatality should be in full report format. However, to minimize subheadings without information, this investigation reported in short report format.

On 03 October 2012, a Pacific Aerospace LTD, PAC 750 XL aircraft registration PK-RWT was being operated by Yayasan Pelayan Penerbangan Tariku Aviation on a flight from Koropun to Dekai in Papua area. This flight was the 9th flight of that day. All flights were performed in accordance to the Visual Flight Rules (VFR).

The first flight was from Sentani to Langda which was arrived at 2220 UTC (0720 LT). The last contact of the pilot was “the aircraft on the ground Koropun” at 0120 UTC as reported by the pilot through the company flight following system. The aircraft then departed Koropun to Dekai and lost contact during this flight. On board in this flight were one pilot and one passenger.

The aircraft was found on 5 October 2012, in mountainous area with approximate elevation of 7,000 feet, at coordinate 04°52’S; 139°29’E. Both crew and passenger on board were fatally injured.

The pilot held valid license and medical certificate. All mandatory trainings and checks have been performed. The duty and rest period for the pilot were in accordance with the current Indonesia regulations.

There was no damage or any system problem reported and the aircraft was airworthy prior to the departure.

This aircraft was not required to be equipped with any recorders according to the current Indonesia regulations.

The examination to the aircraft wreckage indicated that this accident was classified as Controlled Flight into Terrain (CFIT) where an aircraft, under control of the pilot, unintentionally impact to terrain. The CFIT accident commonly occurred when pilot vision to the terrain is blocked or in low visibility.

The investigation concluded the contributing factors as follows: The accident was classified as Controlled Flight into Terrain (CFIT) which most likely occurred in low visibility classified as IMC (Instrument Meteorology Condition) while the flight should be performed in Visual Flight Rules (VFR).

Prior to issuing this final report, the KNKT has not been informed several safety actions taken by PT. Yayasan Pelayan Penerbangan Tariku Aviation.

Included in this final report, the KNKT has issued several safety recommendations to the PT. Yayasan Pelayan Penerbangan Tariku Aviation, and Directorate General of Civil to address the safety issues identified on chapter 5 (five) in this report.

1 FACTUAL INFORMATION

1.1 History of the Flight

On 03 October 2012, a Pacific Aerospace LTD, PAC 750 XL aircraft registration PK-RWT was being operated by Yayasan Pelayan Penerbangan Tariku on a cargo supply flight from Koropun to Dekai in Papua area. This flight was the 9th flight of that day. All flights were performed in accordance to the Visual Flight Rules (VFR).

The first flight was from Sentani to Langda which was arrived at 2220 UTC¹ (0720 LT). The aircraft arrived Koropun at 0120 UTC (1020 LT) as reported by the pilot through the company flight following system². The aircraft then departed Koropun to Dekai and lost contact during this flight.

On board in this flight were one pilot, one passenger and 975 kg of cargo when departure from Sentani.

The distance between Koropun to Dekai is about 24.6 Nm and normally takes about 11 minutes.

The weather information issued by Badan Meteorologi Klimatologi and Geofisika/BMKG (Indonesia Meteorology Climatology and Geophysics Agency) between 0200 UTC to 0300 UTC, showed the development of cumulus cloud classified as Middle Cloud formation along the route from Koropun to Dekai.

According to the company flight following procedure, the pilot should report after the aircraft lands by mentions “*aircraft on the ground*” which this means that the aircraft had arrived at destination. After aircraft airborne, the pilot should report aircraft airborne time and give the estimate of time arrival at destination.

The last contact of the pilot was “*the aircraft on the ground Koropun*” at 0120 UTC. Normally, the next report would be within 15 up to 20 minutes after arrival. There was no report from the pilot after 20 minutes of the last report. The flight following officer tried to contact the pilot and was unsuccessful.

At 0145 UTC, the Operation Manager of the aircraft operator received information from the New Zealand Search and Rescue Agency that informed that Local User Terminal (LUT) has received ELT distress signal from PK-RWT. This information was followed by information through email, which was received at 0150 UTC.

Based on this information, the Indonesia Search and Rescue operation was initiated. The aircraft was found on 5 October 2013, in mountainous area with approximate elevation of 7,000 feet, at coordinate 04°28.62’S 139°39’E.

The crew and passenger on board were fatally injured and the aircraft substantially damaged.

¹ The 24-hour clock used in this report to describe the time of day as specific events occurred is in Coordinated Universal Time (UTC). Local time for Dekai is Waktu Indonesia Timur (WIT) is UTC + 9 hours.

² Flight following system is a monitoring method of the flight progress, using a system that capable to send several information such as altitude, heading, coordinate, etc. in certain period of time to the operator ground base.

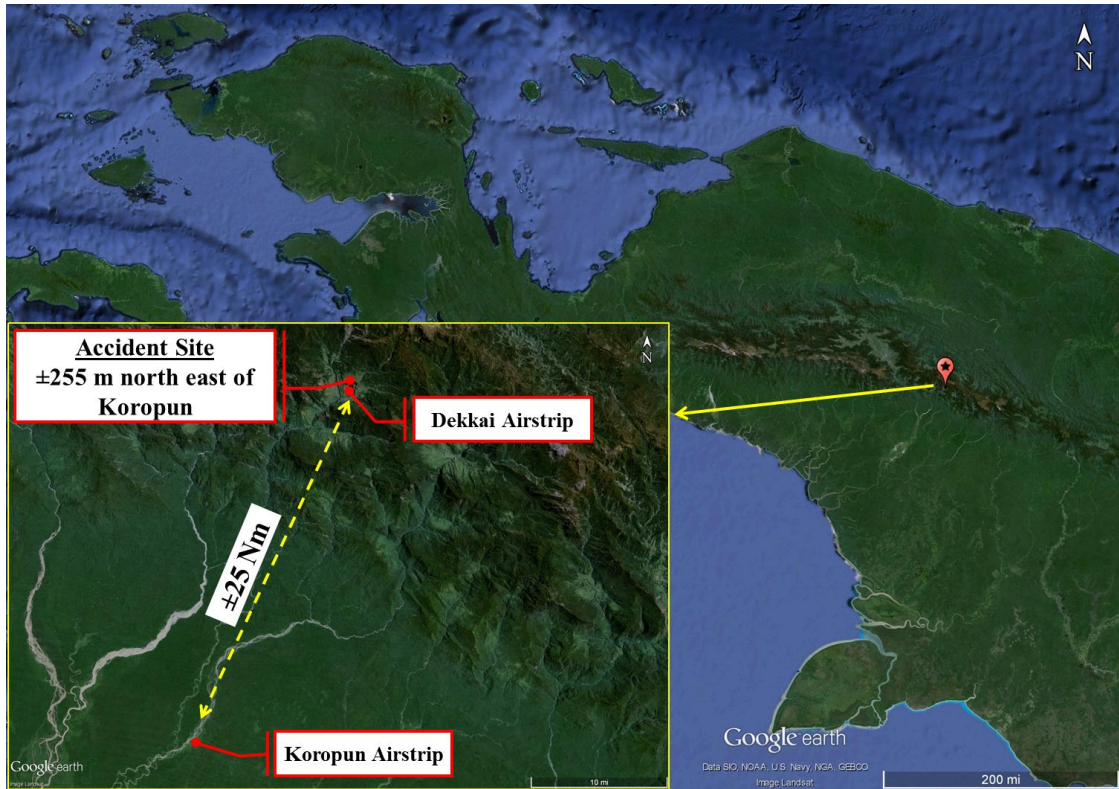


Figure 1: The route planned and accident site

1.2 Pilot Information

Gender	: Male
Age	: 42 years
Marital status	: Married
Date of joining company	: 1 November 2010
Nationality	: Indonesia
License	: CPL
Date of issue	: 12 May 1998
Aircraft type rating	: Pilatus PC-6, PAC 750 XL
Medical certificate	: Class I
Date of medical	: 13 September 2012
Valid to	: 13 March 2013
Last proficiency check	: 10 April 2012
Last line check	: 10 April 2012
Total hours	: 1,546 hours
Flying Experience (flying hours)	
This make and model	: 1,315 hours

Last 90 days : 248 hours
Last 60 days : 161 hours 4 minutes
Last 7 days : 30 hours
Last 24 hours : 2 hours 4 minutes
This flight : 3 hours 26 minutes

1.3 Aircraft Information

Registration Mark : PK-RWT
Manufacturer : Pacific Aerospace Limited
Country of Manufacturer : New Zealand
Type/ Model : PAC 750 XL
Serial Number : 157
Date of manufacture : 2009
Special Certificate of Airworthiness
Issued : 20 June 2012
Validity : 19 June 2013
Category : Normal
Certificate of Registration
Number : 2922
Issued : 20 June 2012
Validity : 19 June 2013

Prior to departure, there was no damage or any system problem reported and the aircraft was airworthy.

1.4 Meteorological Material

Badan Meteorologi Klimatologi dan Geofisika/BMKG (Indonesia Meteorology Climatology and Geophysics Agency) provided satellite image that showed clouds type over Papua Islands on 03 Oct 2012 at 0100 UTC and 0200 UTC.

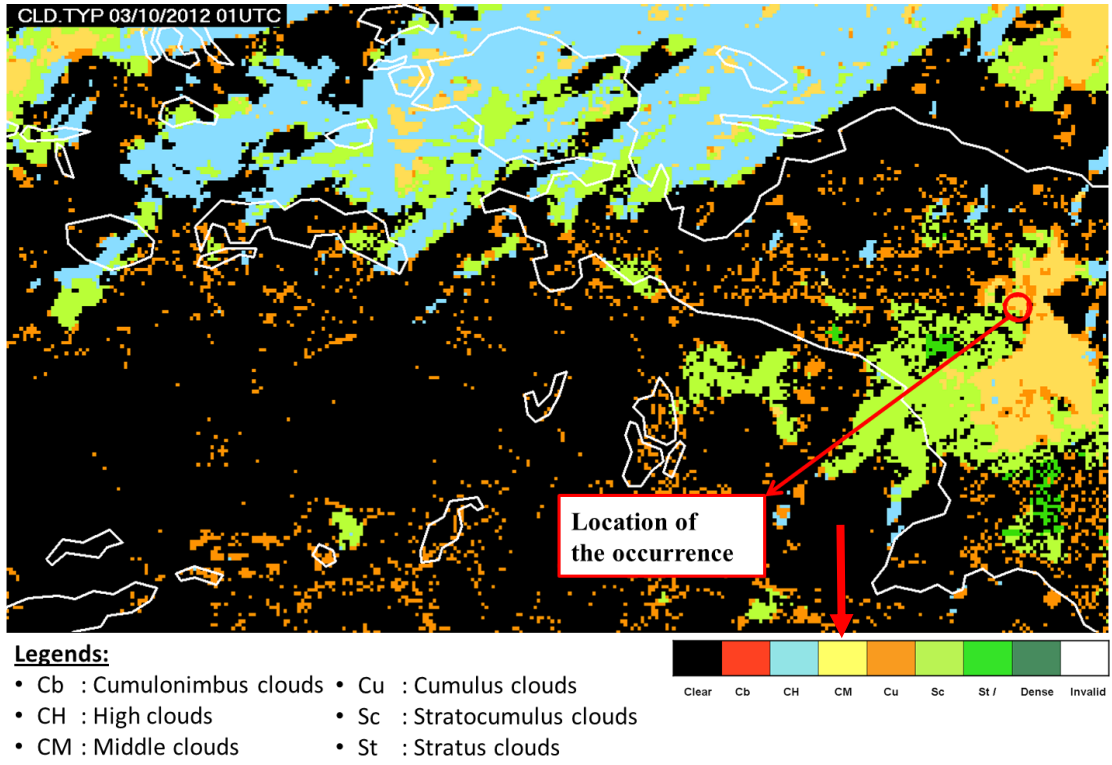


Figure 2: Satellite weather image at 0100 UTC

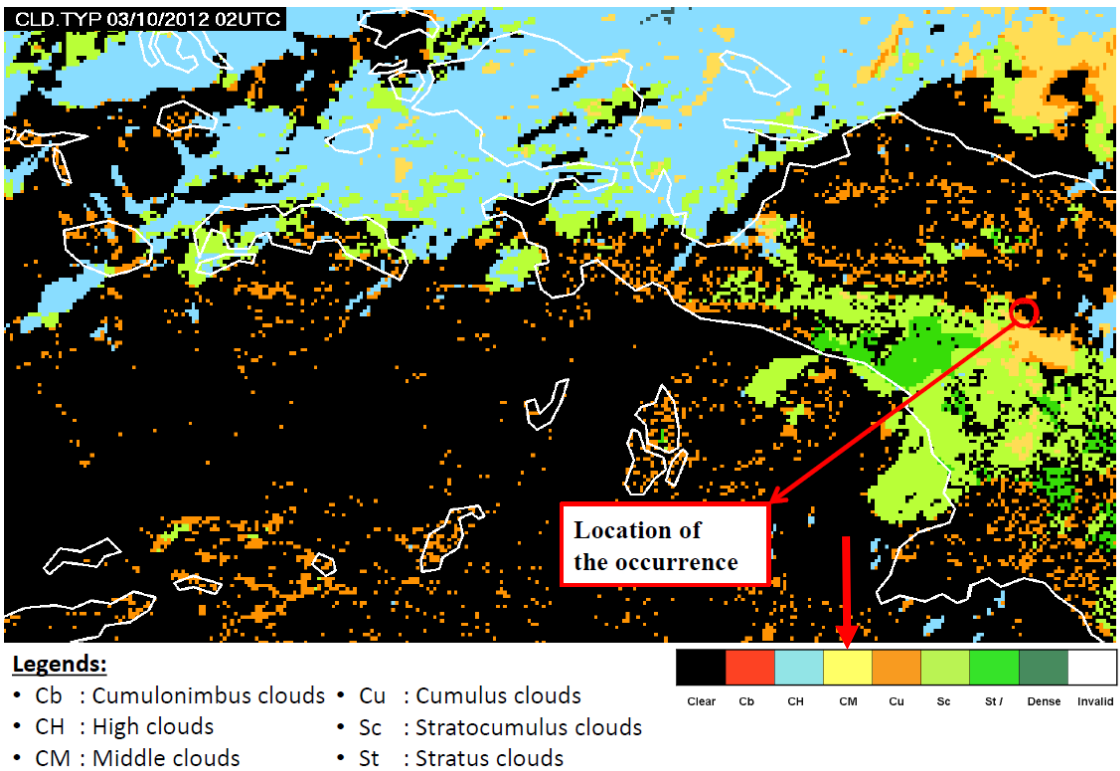


Figure 3: Satellite weather image at 0200 UTC

The satellite weather image indicated that there were middle clouds and cumulus clouds surround the occurrence area. According to International Cloud Atlas Volume I³, the altitude ranges of middle clouds in the tropical area are between altitudes of 6,500 up to 25,000 feet and the cumulus usually have their bases in the low altitude from the earth surface up to 6,500 feet, however their vertical extent is often that their tops may reach into the middle and high clouds.

1.5 Aerodrome Information

1.5.1 Aerodrome Information Based on Aerodrome Directory for Light Aircraft

The Aerodrome Directory for Light Aircraft (ALA) published by the Directorate General of Civil Aviation (DGCA) is classified as class F airspace and contained information of aerodrome for light aircraft operation. The aerodrome information of Koropun described on the ALA was as follows:

Airport Name	:	Koropun
Airport Operator	:	Regions Beyond Missionary Union (RBMU)
Coordinate	:	4°29'S 139°38'E
Elevation	:	5,498.96 feet
Runway Direction	:	16 – 34
Runway Length	:	427 meters
Runway Width	:	20 meters
Runway Slope	:	7%
Surface	:	Grass
Runway strip dimension	:	530 x 23 meters
Landing Facility	:	Windsock

1.5.2 The Aerodrome Information Issued by Tariku

The aerodrome Koropun information issued by Tariku describes the takeoff & landing direction with the additional information of hazards and environment.

³ 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/>

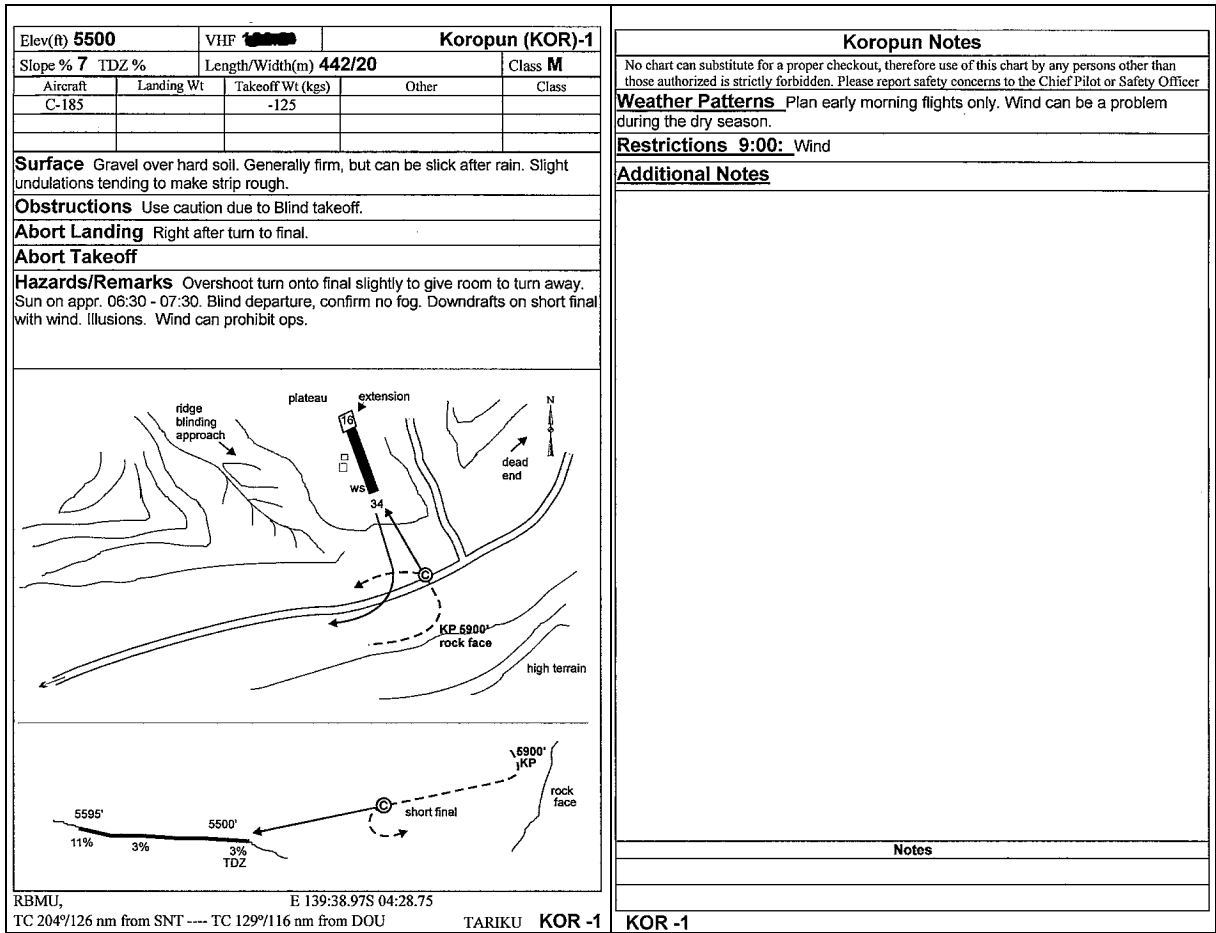


Figure 4: The Koropun aerodrome information

1.6 Wreckage and Impact Information

Observation on crash site showed that the aircraft was rest in level position, the nose of the aircraft hit the hill and both wings were still attached on the fuselage.

The environment and incoming - outgoing route of the Koropun aerodrome supersede from the Google earth shows in figure 5.

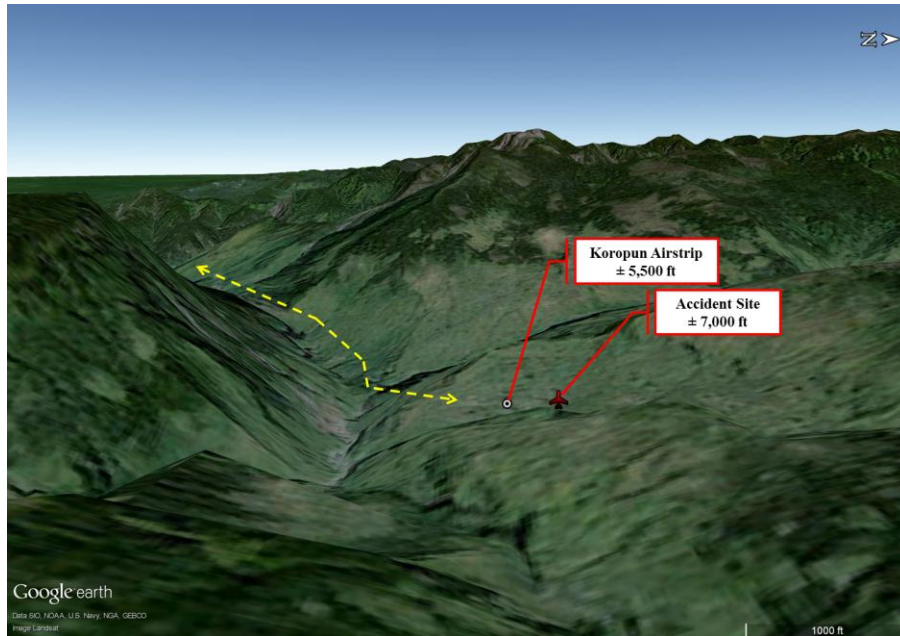


Figure 5: The arrival and departure route of Koropun airstrip

The investigation could not find other wreckage information, due to limited facility and resources to reach the remote accident site at the time of occurrence.



Figure 6: The crash site

The figure 7 shows the relative impact direction to the uphill land.



Figure 7: The aircraft impact direction

1.7 Organizational and Management Information

1.7.1 Pacific Aerospace Limited

Aircraft Owner : Pacific Aerospace Limited
 Address : Private Bag 3707, Hamilton, New Zealand
 Aircraft Operator : Yayasan Pelayan Penerbangan Tariku
 Address : Jalan Yabaso No 89 Sentani
 Papua, Indonesia
 Air Operator Certificate Number : OC/91-007

1.7.1.1 Operator Operation Manual

The Yayasan Pelayan Penerbangan Tariku had a Standard Operating Procedure (SOP) and Pilot Checklist of PAC 750 XL revision date of August 2011. The relevant information from the particular manual on page 14 to 15 was as follows:

GENERAL PRINCIPLES

- a. *Position the aircraft so that you have two courses of action available-your primary plan and a secondary plan (an 'out'). This generally means that the pilot must always be in a position to safely perform a 180 degree turn.*
- b. *Avoid climbing into rising terrain.*
- c. *When entering a valley system, use chart, GPS, TAWS, and heading to verify that you are entering the correct valley.*
- d. *Absolutely no flight in IMC⁴ unless at or above MEA on established IFR routes.*

⁴ Instrument Meteorological Conditions (IMC). Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, less than the minima specified for visual meteorological conditions.

- e. Without a clear view of the horizon, terrain can create strong illusions: you may not be able to out climb what you think you can out climb.
- f. If weather or terrain clearance is marginal use ½ flaps to
 - Lower the stall speed
 - Decrease turn radius
 - Give better visibility over the nose

MANUEVERING AT ALTITUDE

- g. The aircraft's turn radius is significantly higher because your true airspeed (and thus groundspeed) increase 2% per 1000'. So at 10,000 MSL your groundspeed is 20% higher than your turn radius is 44% larger than at sea level (no wind condition).
- h. The aircraft's performance is reduce due to losses in engine performance and prop efficiency at altitude.

1.7.2 Directorate General of Civil Aviation

1.7.2.1 Civil Aviation Safety Regulation (CASR) part 91

91.155 Basic VFR Weather Minimums

(a) Except as provided in Paragraph (b) of this section and Section 91.157, no person may operate an aircraft under VFR when the flight visibility is less, or at a distance from clouds that is less, than that prescribed for the corresponding altitude and class of airspace in the following table:

Airspace	Flight Visibility	Distance from Clouds
Class A	Not applicable	Not applicable
Class B	8 km above 10.000 feet and 5 km below 10.000 feet	Clear of clouds
Class C	8 km above 10.000 feet and 5 km below 10.000 feet	1,000 feet above 1,000 feet above 1,500 meters horizontal
Class F	8 km above 10.000 feet and 5 km below 10.000 feet. The higher of: 3000 feet AMSL 5 km, or 1000 feet AGL in sight	1,000 feet above 1,000 feet above 1,500 meters horizontal Clear of clouds
Class G_	8 km above 10.000 feet and 5 km below 10.000 feet. The higher of: 3000 feet AMSL 5 km, or 1000 feet AGL in sight	1,000 feet above 1,000 feet above 1,500 meters horizontal Clear of clouds

1.8 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

The investigation had limited data that could be used to support the investigation, as such the assumption and extrapolation which relevant to occurrence were used for this investigation. From the data collected, the KNKT had concerned to examine the VFR flight conduct as the safety issue to this accident.

The VFR Flight Conducts

The investigation could not determine the exact time of the accident, however the accident can be assumed between the times of last communication (0120 UTC) until the time of ELT distress signal from the aircraft has been received (0145 UTC).

After impact, the aircraft rested in relatively level with the horizon, and this was most likely that the aircraft was on straight and level position prior and during the impact. There was no indication of climb or pull up position.

The aircraft damage showed a major damage to the aircraft and could only occur in relatively high speed. The indication of aircraft impact in level position and high speed impact were strong indication that the accident was typical of Controlled Flight into Terrain (CFIT) where an aircraft, under control of the pilot, unintentionally impact to terrain.

The satellite weather image between 0100 and 0200 UTC showed the middle cloud of cumulus formation surround the Koropun aerodrome. The height ranges of the middle cloud of cumulus in tropical could extend up to 25000 feet.

The investigation could not determine the actual visibility around the accident area, however, it most likely that the clouds formation had might reflected to the environmental visibility in vertical and horizontally.

Visual Flight Rule (VFR)

It is required by CASR 91 subpart 91.155, Basic VFR Weather Minimum class F; it stated that, the minimum altitudes for aircraft flying below 10,000 feet are as follow;

The higher of; 3000 feet above mean sea level (AMSL) visibility is 5km or 1000 feet above ground level (AGL) and 1500 feet horizontally should be clear from the cloud.

Refer to Operator SOP, it stated that;

- *Position the aircraft so that you have two courses of action available-your primary plan and a secondary plan (an 'out'). This generally means that the pilot must always be in a position to safely perform a 180 degree turn.*
- *Avoid climbing into rising terrain.*
- *When entering a valley system, use chart, GPS, TAWS, and heading to verify that you are entering the correct valley.*
- *Absolutely no flight in IMC unless at or above MEA on established IFR routes.*

CFIT accident may occurred only when pilot vision to the terrain is blocked or in low visibility.

The investigation concluded that the aircraft was flown into IMC (Instrument Meteorology Condition) weather, where space available was less than the requirement stated for the Weather Minimum class F.

3 CONCLUSIONS

3.1 Findings⁵

- a. The aircraft was airworthy prior the departure.
- b. The aircraft had a valid Certificate of Airworthiness.
- c. Pilot held valid licenses and qualified for the flight in accordance with existing Indonesia regulations.
- d. The weather surround occurrence area showed Middle Cloud of the cumulus in between 0100 – 0200 UTC.
- e. On board in this flight were one pilot, one passenger and 910 kg of cargo when departure from Sentani.
- f. The investigation had limited data that could be used to support the investigation, as such the assumption and extrapolation which relevant to occurrence were used for this investigation.
- g. It is required by CASR 91 subpar 91.155, Basic VFR stated that, the minimum altitudes for aircraft flying below 10,000 feet are as follow; The higher of; 3000 feet above mean sea level (AMSL) visibility is 5km or 1,000 feet above ground level (AGL) and 1500 feet horizontally should be clear from the cloud.
- h. The Operator has a SOP which explaining flight maneuver procedures in mountainous area.
- i. The impact position and damage to the aircraft indicated that the impact was straight and level and relatively in high speed.
- j. The investigation could not found other wreckage information, due to limited facility and resources at the time of occurrence.

3.2 Contributing Factors⁶

The accident was classified as Controlled Flight into Terrain (CFIT), which most likely the aircraft was flown into the weather environment below the VFR margins.

⁵ 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.

⁶ “Contributing Factors” is defined as events that might cause the occurrence. In the case that the event did not occur then the accident might not happen or result in a less severe occurrence.

4 SAFETY ACTION

At the time of issuing this Final report, the Komite Nasional Keselamatan Transportasi had been informed of safety actions resulting from this occurrence.

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.

5.1 Yayasan Pelayanan Penerbangan Tariku

- **04.O-2016-84.1**

The accident was classified as Controlled Flight into Terrain (CFIT) which most likely occurred in low visibility while the flight should be performed in Visual Flight Rules (VFR). The KNKT recommends the operator has to review the effectiveness of the maneuver procedures for mountainous area.

5.2 Directorate General of Civil Aviation

- **04.R-2016-85.1**

To review the ALA publication to include additional information such as weather phenomenon, departure and arrival procedure.

6 APPENDICES

6.1 Direct Involves Parties Comments

On 28 February 2014, the Komite Nasional Keselamatan Transportasi had been received comments related to this investigation report from Transport Accident Investigation Commission of New Zealand as state of aircraft manufacturer. The comments were as follows:

<i>Comment</i>	<i>Remarks</i>
<p><i>The report describes the accident as having the character of a controlled flight into terrain accident and concludes that the aeroplane was flown into instrument meteorological conditions while being operated under visual flight rules.</i></p> <p><i>However the report states: "The investigation could not determine the weather conditions along the route".</i></p> <p><i>In our view, without knowledge of weather information, we do not believe there is sufficient evidence presented in the report to support a finding that "this was a controlled flight into terrain accident."</i></p>	<p><i>The weather data was included in the report.</i></p>
<p><i>The report does not mention whether the investigation was able to determine the position of the wing flaps at impact, the condition of the engine or what propeller damage occurred. That information would be useful to the reader to support the estimation of airspeed and engine power output at the time of impact.</i></p>	<p><i>The impact trajectory was included in the report.</i></p>
<p><i>Many of the 750XL aeroplanes have engine trend monitoring systems fitted, which can be downloaded by the engine manufacturer, Pratt & Whitney Canada. The report does not discuss whether trend monitoring data was available.</i></p>	<p><i>As it was mentioned "Limited data"</i></p>
<p><i>The report does not discuss whether any cargo was on board and any consideration of whether this could be a factor.</i></p>	<p><i>Used as consideration, due to limited data.</i></p>

<p><i>We interpreted the title of figure 2, "The accident site at 17.4 GRIDMORA", to mean the minimum off route altitude in the highlighted square was 17,400 feet. The relevance is not clear, because the aeroplane was on a VFR flight and might often fly well below that altitude. Indeed, the wreckage was found at about 7000 feet. The report would be improved if it showed the departure and destination airstrips and described or showed the usual route and altitude(s) for flights between the 2 airstrips.</i></p>	<p><i>It included in the aerodrome information.</i></p>
<p><i>We think the report should include a section on "Aeroplane Information ". The aeroplane was manufactured in New Zealand by Pacific Aerospace Limited and had the manufacturer's serial number 157.</i></p>	<p><i>Accepted and included in the report</i></p>
<p><i>LUT - 'local user terminal'</i></p>	<p><i>Accepted</i></p>
<p><i>UTC - 'coordinated universal time' [UTC is the abbreviation of the French expression]</i></p>	<p><i>Accepted</i></p>
<p><i>1.1 Personnel information "Date of joining company" [or "date joined company"] Are the hours for "Last 90 days" and so on, flight hours or duty hours?</i></p>	<p><i>Corrected</i></p>
<p><i>The second paragraph could perhaps say: "The aircraft sustained major damage that indicated the impact was at a relatively high speed".</i></p>	<p><i>Accepted</i></p>

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