

FINAL

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**NATIONAL
TRANSPORTATION
SAFETY
COMMITTEE**

Aircraft Accident Investigation Report

Yayasan Jasa Aviasi Indonesia (YAJASI)

Pilatus PC6/B2-H4; PK-UCE

**Yahatma Village, Yalimo District – Papua
Republic of Indonesia**

22 September 2011



**NATIONAL TRANSPORTATION SAFETY COMMITTEE
MINISTRY OF TRANSPORTATION
REPUBLIC OF INDONESIA
2014**

This Final Report was produced by the National Transportation Safety Committee (NTSC), Transportation Building 3rd 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, Aviation Act (UU No.1/2009), and Government Regulation (PP No. 62/2013).

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GLOSSARY OF ABBREVIATIONS

AFFIS	:	Aircraft Flight Following Information System
AGL	:	Above Ground Level
AOC	:	Air Operator Certificate
BMKG	:	<i>Badan Meteorologi Klimatologi dan Geofisika /</i> Meteorological Climatology and Geophysical Agency
°C	:	Degrees Celsius
CASR	:	Civil Aviation Safety Regulation
C of A	:	Certificate of Airworthiness
C of R	:	Certificate of Registration
CPL	:	Commercial Pilot License
CSN	:	Cycles Since New
CVR	:	Cockpit Voice Recorder
DGCA	:	Directorate General Civil Aviation
FDR	:	Flight Data Recorder
hPa	:	Hectopascals
Hr	:	Hours
ICAO	:	International Civil Aviation Organization
IIC	:	Investigator in Charge
Km	:	Kilometer(s)
Kt	:	Knots (nm/hours)
NM	:	Nautical mile(s)
KNKT / NTSC	:	<i>Komite Nasional Keselamatan Transportasi /</i> National Transportation Safety Committee
PIC	:	Pilot in Command
P/N	:	Part Number
QFE	:	Height above airport elevation (or runway threshold elevation) based on local station pressure
QNH	:	Altitude above mean sea level based on local station pressure
RPM	:	Revolution Per Minute
SCT	:	Scattered
S/N	:	Serial Number
TSN	:	Time Since New
UTC	:	Universal Time Coordinate
VFR	:	Visual Flight Rules

INTRODUCTION

SYNOPSIS

On 22 September 2011 Aircraft PC 6 Pilatus Porter registered PK UCE operated by Yayasan Jasa Aviasi Indonesia (YAJASI) departed from Pagai at 0403 UTC, the reported the ETA for Wamena was at 0436 UTC.

Before entering North Gap corridor the pilot at time 0413 UTC sent a message to the Flight Following Officer at Sentani Airport.

Since there was no message nor radio contact from the pilot until its ETA in Wamena, the Flight Following Officer at Sentani informed to the other personnel at the operation base, and alarmed to the other YAJASI aircraft which were flying in that area to start search the PK UCE.

Some other aircraft flying in the vicinity also contacted to search the PK-UCE. Finally the PK UCE found in mountain location adjacent to Pass Valley airstrip.

The accident site was at coordinate S 030 54' 54.4'', E 1390 02' 24.3'', the aircraft was hit the trees and the ground where the elevation was about 7500 feet.

The investigation concluded the contributing factors as follows:

- The pilot decided to descend from the cruise altitude 10000 feet to penetrate the area of marginal weather was most likely not as what his perceive.
- The pilot avoided the cloud to the left of the VFR route guidance and most likely that the space available was less than the requirement stated for the Weather Minimum class F.

Prior to issuing this final report, the NTSC has not been informed several safety actions taken by Yayasan Jasa Aviasi Indonesia.

Included in this final report, the NTSC has issued several safety recommendations to the Yayasan Jasa Aviasi Indonesia 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 22 September 2011, a PC 6 Pilatus Porter aircraft, registration PK-UCE was being operated by Yayasan Jasa Aviiasi Indonesia (YAJASI) departed from Pagai to Wamena. The aircraft departed at 0403 UTC¹ (1303 LT) and estimated to arrive at Wamena was at 0436 UTC. Aircraft cruise at altitude of 10,000 ft and conducted under Visual Flight Rules (VFR) and followed the visual route via North Gap corridor, which one of visual route to Wamena.

Prior to enter the North Gap corridor at time 0413 UTC, the pilot sent a message via a system they called AFFIS to the company Flight Following Officer at Sentani Airport, which was the operation base. The pilot also sent a blind transmission message through Wamena Tower radio frequency. This was local procedure, to submit the message consists of position, altitude and destination to make the other aircraft pilots aware each other.

As in the intern YAJASI flight following procedure, pilot should send message when the flying passes the North Gap corridor. In this flight, until the normal elapsed time, the pilot did not send any message to their Flight Following Officer at Sentani that the flight has passed the North Gap corridor.

Since there was no message nor radio contact from the pilot until the ETA in Wamena, the Flight Following Officer at Sentani informed to the other personnel at the operation base, and alarmed to the other YAJASI aircraft which were flying in that area to start search the PK-UCE.

Some other aircrafts which were flying in the vicinity also contacted to search the PK-UCE. PK-UCE was found in mountain location adjacent to Pass Valley airstrip.

The accident site was at coordinate S 03⁰ 54' 54.4'', E 139⁰ 02' 24.3'', the aircraft was hit the trees and the ground where the elevation was about 7500 feet, the propeller blades was not on feather and bent rearward, the left wing was broken and the aircraft stopped on heading about 85°.

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 Gorontalo is Waktu Indonesia Timur (WIT) is UTC + 9 hours.

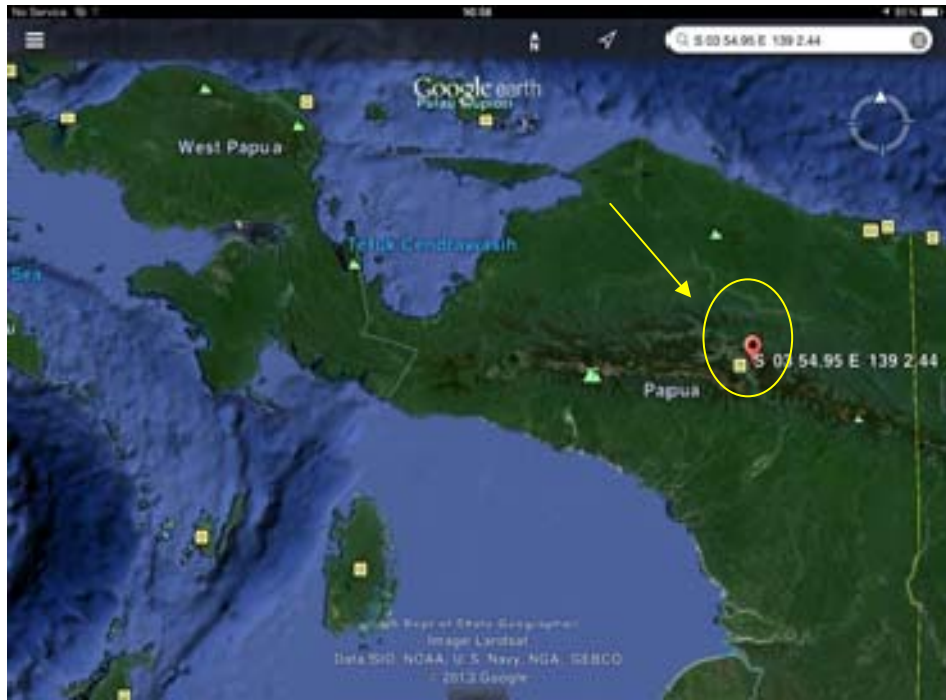


Image courtesy of Google Earth

Figure 1. Accident site at the North Gap



Image courtesy of Google Earth

Figure 2. The accident site on North Gap corridor taken from the Google earth



Figure 3. The route guidance and accident site

1.2 Injuries to Persons

Injuries	Flight crew	Passengers	Total in Aircraft	Others
Fatal	1	2	3	-
Serious	-	-	-	-
Minor	-	-	-	-
Nil Injuries	-	-	-	-
TOTAL	1	2	3	-

All the passengers were citizens of Indonesia and the pilot was American.

1.3 Damage to Aircraft

The aircraft was substantially damaged, the propeller blades were bent rearward, and the flange C was buckling /twisted



Figure 4. Aircraft left side



Figure 5. Aircraft right side

1.4 Other Damage

There were several trees cut off.

1.5 Personnel Information

1.5.1 Pilot in Command

Gender	: Male
Date of birth	: 14 June 1954
Nationality	: USA
License	: CPL
Date of issue	: 09 October 2006
Valid to	: 31 November 2011
Aircraft type rating	: PC-6
Medical certificate	: First Class
Date of medical	: 15 September 2011
Valid to	: N/A
Last proficiency check	: 22 August 2011
Total hours	: 11,312 hours 8 minutes
Total on type	: 2,647 hours 8 minutes
Last 90 days	: 105 hours 7 minutes
Last 30 days	: 75 hours 4 minutes
Last 24 hours	: 6 hours 1 minute
This flight	: 3 hours 8 minutes

1.6 Aircraft Information

1.6.1 General

Aircraft manufacturer	: Pilatus Aircraft LTD
Aircraft model/type	: Pilatus PC-6/B2-H4
Serial number	: 943
Year of manufacture	: July 2004.
Aircraft registration	: PK-UCE
Certificate of Registration	: 2189
Valid to	: 06 January 2012
Certificate of Airworthiness	: 2189
Valid to	: 06 January 2012

TSN : 5,774.8 hours
CSN : 6,662 cycles
MTOW/MLDW : 6173 lb/5864 lb.

1.6.2 Engines

Engine type : Turboprop.
Manufacturer : Pratt & Whitney, Canada
Model : P&W PT6A-27
Serial Number : P-50851
TSN : 6,449 hours
CSN : 5,896 cycles

The Pilatus Flight manual for the PC-6/ B2-H4 specifies the maximum operating altitude as 25,000 feet MSL.

1.7 Meteorological Information

1.7.1 Weather at the accident site

Refer to the eyewitnesses of the local people who were about 50 meters from the wreckage telling that, the weather in the time of the accident of the accident was cloudy and rain.

The white smoke shown, it rose from the wreckage.

1.7.2 Weather at Wamena Airport

Weather report for Wamena Airport, Papua (WAJM), issued on 22 September 2011, at 0400 UTC:

Surface wind : 130/06
Present weather : Intermittently Slight Rain.
Visibility : 9 km
Cloud : SCT/ 900 ft.
Temperature : 20° C
Dew Point : 16° C
QNH : 1008 mbs
QFE : 835 mbs

Weather report for Wamena Airport, Papua (WAJM), issued on 22 September 2011, at 0500 UTC:

Surface wind	: 140/03
Visibility	: 8 km
Present weather	: Recent Rain
Cloud	: SCT/ 1300 ft..
Temperature	: 21° C
Dew Point	: 15° C
QNH	: 1007 mbs
QFE	: 834 mbs



Figure 6. Satellite Image at 04:00 UTC, 22 September 2013

1.8 Aids to Navigation

There were VOR and NDB navigation aids served from Sentani Airport and the VOR aids normally captured up to entering the North Gap.

There was an NDB at Wamena and it was operating normally at the day of the occurrence.

1.9 Communications

All the air to ground communication was operating normal.

1.10 Aerodrome Information

The accident occurred at about 25 nm from the destination as such, this section is not required to be explored for the investigation purposes.

1.11 Flight Recorders

The aircraft was not fitted with a Flight Data Recorder (FDR) or Cockpit Voice Recorder (CVR).

1.12 Wreckage and Impact Information

The accident site was about S 03⁰ 54' 54.4'', E 139⁰ 02' 24.3'' the aircraft was surround cut branch of trees and hit the ground horizontally, also found that one third part from the wing tip of the left wing was broken.



Figure 7. The accident aircraft propeller

1.13 Medical and Pathological Information

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

1.14 Fire

There was evidence of fire in the engine.

1.15 Survival Aspects

It was an un-survivable accident.

1.16 Tests and Research

Test and research will be considered as additional factual data indicate the requirement.

1.17 Organisational and Management Information

1.17.1 The Company Information

Aircraft Owner : YAYASAN JASA AVIASI (YAJASI)

Address : Jl. PLN Airport Sentani, Jayapura
P.O BOX. 1800, Jayapura

The owner address information is based on the aircraft Certificate of Registration.

Aircraft Operator : YAYASAN JASA AVIASI (YAJASI)

Address : Jl. PLN Airport Sentani, Jayapura
P.O BOX. 1800, Jayapura

AOC Number : AOC 91/500

The operator address information is based on the Operator's Operation Specification.

1.17.2 Training and Route Qualification Program

The training and the route qualification program were performed as described in the CASR 91.

1.18 Additional Information

1.18.1 VFR (Visual Flight Rule)

CASR 91 VFR reference:

The table shows the limitation requirement for the VFR flight in Airspace classes, for this accident flight the VFR limitation will consider to the C and F Airspace classes as shown in the red box table below.

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

- (b) Class G Airspace. In Class G airspace below 1,200 feet above the surface notwithstanding the provisions of Paragraph (a) of this section, a helicopter may be operated clear of clouds if operated at a speed that allows the pilot adequate opportunity to see any air traffic or obstruction in time to avoid a collision.

1.18.2 Visual Flight Guide

The Indonesian DGCA had proposing a VFR flight guide named Visual Flight Guide (VFG) edition 2010 for the operators in Papua.

This VFG laid downs the visual reference route for approximate 35 aerodromes and airstrips in Papua, and currently this VFG is not officially stated as a reference by the Indonesian DGCA.

1.19 Useful or Effective Investigation Techniques

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

2 ANALYSIS

The analysis part of this report will discuss the relevant issues resulting in the CFIT accident of PK UCE On 22 September 2011 Aircraft PC 6 Pilatus Porter registered PK UCE operated by Yayasan Jasa Aviiasi Indonesia (YAJASI) departed from Pagai at 0403 UTC

The investigation had determined that there were some safety issues which will be discussed in this part of analysis.

All aircraft system could be assumed was operating normally since there were no reports or records observed the analysis will therefore focus on the following issues:

- Decision to continue flight into marginal weather and space.
- VFR flight conduct.

2.1 Decision to continue flight into marginal weather and space

Refer to satellite image time 04:00 UTC on 22 Sep'11 shown that the cloud formation was laid down along the North Gap.

The investigation was also examined the correlation of weather phenomenon amongst the areas which is believed that, it might have similar weather, the theory meteorology mentioned that in the same longitude within the radius of 90 nm the weather phenomenon most likely same.

The weather report at Wamena Airport, Papua (WAJW), issued on 22 September 2011, at 0400 UTC: Intermittently Slight Rain.

Those two areas of particular weather condition above were most likely generated marginal in visibility and the manoeuvre space along the North Gap.

In such marginal condition above, the pilot had decided to continue the flight to Wamena, it was indicated by the aircraft was impacted the terrain at approximately 7,500 feet at the North Gap.

The investigation could not determine what the highest cloud base along the North Gap, however the highest obstacle along the North Gap indicate 9,792 feet on the right and 10,200 feet on the left, the aircraft is none pressurized. As such the pilot should not fly more than 10,000 feet, unless the supplemental oxygen is available.

As those particular condition, the investigation concludes, that the pilot decided to descend from the cruise altitude 10,000 feet to penetrate the area of marginal weather was most likely not as what his perceive.

2.2 VFR flight conduct

It is required by CASR 91 subpar 91.155, Basic VFR Weather Minimum class F; it stated that, the minimum altitudes for aircraft flying below 10000 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.

The aircraft was found few miles on the left of the VFR route guidance at the North Gap, while the VFR weather minimum stated on Class F are clearly mentioning the requirement of the vertical and horizontal distance.

The investigation concluded that the pilot avoided the cloud to the left of the VFR route guidance and most likely that the space available was less than the requirement stated for the Weather Minimum class F.

3 CONCLUSION

3.1 Finding

- a. The aircraft was airworthy.
- b. The pilot held valid license and certify to operate this Pilatus aircraft.
- c. The training and the Route Qualification program were performed as described in the CASR 91.
- d. The VFG proposed by Indonesian DGCA had not officially stated as a reference by the Indonesian DGCA.
- e. The pilot had flown through VFR route via North Gap corridor, which one of visual route to Wamena.
- f. All the air to ground communication was operating normal.
- g. At 0413 UTC, before entering North Gap corridor the pilot sent a message to the Flight Following Officer at Sentani Airport.
- h. Since there was no message nor radio contact after 0413 UTC from the pilot until its ETA in Wamena, the Flight Following Officer at Sentani informed to the other personnel at the operation base, and alarmed to the other YAJASI aircraft which were flying in that area to start search the PK-UCE.
- i. The aircraft is none pressurized. As such the pilot should not fly more than 10,000 feet, unless the supplemental oxygen is available.
- j. The higher of; 3,000 feet above mean sea level (AMSL) visibility is 5km or 1,000 feet above ground level (AGL) and 1,500 feet horizontally should be clear from the cloud.
- k. The PK-UCE found in mountain location adjacent to Pass Valley airstrip.
- l. The accident site was at coordinate S 030 54' 54.4'', E 1390 02' 24.3'', the aircraft was hit the trees and the ground where the elevation was about 7,500 feet.
- m. The aircraft was substantially damaged, the propeller blades were bent rearward, the flange C was buckling /twisted.

3.2 Contributing Factors²

- The pilot decided to descend from the cruise altitude 10000 feet to penetrate the area of marginal weather was most likely not as what his perceive.
- The pilot avoided the cloud to the left of the VFR route guidance and most likely that the space available was less than the requirement stated for the Weather Minimum class F.

² “Contributing factors” is an event or condition that, if it occurred in the future, would increase the likelihood of an occurrence and/ or severity of the adverse consequences associated with an occurrence.

4 SAFETY ACTION

At the time of issuing this draft final investigation report, the National Transportation Safety Committee had been informed by Yayasan Jasa Aviasi (YAJASI) of any safety actions resulting from this occurrence.

YAJASI's Training response to the Crash of PK-UCE on September 22 2011

While YAJASI management doesn't know the specific cause of PK-UCE crash on September 22 2011 we do know that weather conditions were a significant factor. Therefore YAJASI will through training increase our emphasis of "Pilot Decision Making" related to the weather conditions particularly in the mountains.

Changes and additions will be made to the YAJASI training documents and form to reflect the following items:

1. Increased emphasis of the YAJASI standard "it is better to turn around and not complete the desired flight rather than to continue into challenging weather conditions".
2. Increased emphasis of the need to maintain adequate inflight visibility margin. The higher the altitude the greater those margins need to be in order to maneuver the aircraft safely. Higher altitude result in greater true airspeed (TAS) for the same indicated airspeed (IAS). For example when flying at 80 kts at 10,000 Density Altitude (DA) results in a 96 kts TAS which results in a 44% increase in the size of the circle it takes to turn around compared to sea level DA. Therefore the inflight visibility needs to be greater at higher altitudes in order to safely maneuver the aircraft.
3. Increased emphasis of adequate ground clearance particularly with reduced contrast weather conditions when compared to weather conditions with distinct cloud boundaries. With the widespread poor contrast conditions the loss of a distinct visual horizon makes visual turns significantly more difficult, often resulting in the pilot focusing or fixating on one item rather than watching the multiple factors (Airspeed, Altitude, Bank Angle and Power setting and Navigation) necessary for safe flight.
4. Increased emphasis on stall recognition and the reduced stall warning at increased bank angle.
5. Increased emphasis the use of surveyed IFR routes with CASR mandated vertical and horizontal clearance standards whenever the weather is questionable even though the increased distance and flight time is less efficient than the shorter and lower VFR route.

5 SAFETY RECOMMENDATION

According to factual information and initial finding on the safety issues identified in respect to the decision to continue the flight into marginal weather, space and the VFR flight conduct. The National Transportation Safety Committee issued the following recommendations and addressed to;

5.1 Yayasan Jasa Aviasi (YAJASI)

- a) The pilot had decided to continue the flight to Wamena thought out marginal weather and manoeuvring space, it was indicated by the aircraft impacted the terrain at approximately 7500 feet over the North Gap. Referring to the aforesaid pilot decision the NTSC concludes that the safety actions issued by the chief pilot are relevant for the improvement and the application of these safety actions should be oversighting systematically.
- b) According to this final report analysis on the VFR flight conduct, The investigation concludes that the pilot had chosen to penetrate the cloud formation to the left of the VFR route guidance, but the space available was less than the requirement stated for the Weather Minimum class F. referring to the result of this analysis the NTSC recommends that Yayasan Jasa Aviasi has to ensure that the pilots has well recognize the application of the VFR flight requirement and limitation laid down in CASR 91 subpar 91.15.

5.2 Director General of Civil Aviation

As the growing rate of the VFR flight in Papua is become significant, it is necessary that a standard VFR route guidance should be made available. As such, the NTCS recommends, that the draft of VFG (Visual Flight Guide) proposed by the Indonesian DGCA which had not been officially issued, can be processed and to be issued at the soonest possible time.