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**NATIONAL
TRANSPORTATION
SAFETY
COMMITTEE**

Aircraft Accident Investigation Report

**CASA 212-200
PK-TLF
Leuser Mountain National Park,
North Sumatera
Republic of Indonesia**

29 September 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 Building 3rd Floor Ministry of Transportation, Jalan Medan Merdeka Timur 5 Jakarta 10110, Indonesia.

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GLOSSARY OF ABBREVIATIONS

ATC	:	Air Traffic Controller
BASARNAS	:	<i>Badan SAR Nasional</i> (National Search and Rescue Board)
BPPT	:	<i>Badan Pengkajian dan Penerapan Teknologi</i> (The Agency for Assessment and Application of Technology)
BMKG	:	<i>Badan Meterologi Klimatologi dan Geofisika</i> (Meteorological, Climatological and Geophysical Agency)
°C	:	Degrees Celsius
CSN	:	Cycles Since New
CSO	:	Cycles Since Overhaul
CVR	:	Cockpit Voice Recorder
FDR	:	Flight Data Recorder
Hrs	:	Hours
ICAO	:	International Civil Aviation Organization
IIC	:	Investigator in Charge
Kg	:	Kilogram(s)
Km	:	Kilometer(s)
Kts	:	Knots (nm/hours)
MTOW	:	Maximum Take-off Weight
NM	:	Nautical mile(s)
KNKT/NTSC	:	Komite Nasional Keselamatan Transportasi / National Transportation Safety Committee
QFE	:	Height above airport elevation or above runway threshold elevation, based on local station pressure
QNH	:	Altitude above mean sea level based on local station pressure
RPM	:	Revolution per Minutes
R/W	:	Runway
S/N	:	Serial Number
TSN	:	Time Since New
TSO	:	Time Since Overhaul
UTC	:	Universal Time Coordinate
VCP	:	Visual Control Post
VMC	:	Visual Meteorological Conditions

INTRODUCTION

SYNOPSIS

On 29 September 2011, a CASA 212-200 aircraft registered PK-TLF was being operated by Nusantara Buana Air as a non-scheduled passenger flight from Polonia International Airport(MES/WIMM), Medan - North Sumatera¹ to Alas Leuser Airstrip Kuta Cane, South East Aceh. The flight was conducted under Visual Flight Rules (VFR)

The aircraft departed from Medan at 0728 LT (0028 UTC) and scheduled to be arrived at Kuta Cane at 0058 UTC. There were 18 person on board consisted of two pilots and 16 passengers including two children and two infants.

The aircraft radar target was last observed on the radar screen at about 0050 UTC, while at position on radial 262° and 35 NM from MDN VOR.

The aircraft was found impacted to a of 70° slope terrain at 5,055 feet altitude in the Leuser Mountain National Park, direction of 109 and 16 Nm from Kuta Cane on coordinate N 03⁰ 24' 00" E 098⁰ 01' 00".

All 18 occupants were fatally injured and the aircraft was severely damage.

The Cockpit Voice Recorder recorded conversation between the pilots in the cockpit. The recorder did not record any conversation relating to aircraft system problem prior to impact.

The CVR revealed conversation between pilots, discussed about the cloudy weather and there was no gap of cloud to pass and both pilots agreed to fly into the cloud, consequently, the flight crew had lost visual references to the ground and no or late recovery action prior to impact.

This accident classified as Controlled Flight Into Terrain (CFIT), which defined as a serviceable aircraft, under control of the pilot, and un-intentionally collision with terrain.

Following this accident, the operator has issued some safety actions. The National Transport Safety Committee (NTSC) considered the safety actions taken by the operator were sufficient to prevent an occurrence with similar cause and decide not issued safety recommendation to the operator. The NTSC issued safety recommendations to the DGCA.

¹ Polonia International Airport, Medan - North Sumatera will be named as Medan for the purpose of this report.

1 FACTUAL INFORMATION

1.1 History of the Flight

On 29 September 2011, a CASA 212-200 aircraft registered PK-TLF operated by Nusantara Buana Air (NBA) as a non-scheduled passenger flight from Polonia International Airport (MES/WIMM), Medan - North Sumatera² to Alas Leuser Airstrip Kuta Cane, South East Aceh.

The aircraft departed from Medan at 0728 LT (0028 UTC) and expected to be arrived on Kuta Cane at 0058 UTC. There were 18 person on board consisted of two pilots and 16 passengers including two children and two infants. The flight was conducted under the Visual Flight Rules (VFR).

At 0032 UTC the aircraft contacted Medan Director controller reported climbing passing 4000 to 8000 feet, informed the estimate time of arrival Kuta Cane to be at 0050 UTC, and also requested to fly direct to point "PAPA".

At about 0041 UTC the aircraft reported established contact to Kuta Cane Radio. The communication with Medan Director controller was terminated. The CVR recorded that the pilot contacted Kuta Cane Radio three times but there was no reply.

At about 0050 UTC, the aircraft was last observed on the radar screen and the position was on radial 262° at 35 NM from MDN VOR.

At 0100 UTC, Kuta Cane airport authority contacted to the NBA representative at Kuta Cane and asked the aircraft position. The NBA staff at Kuta Cane then contacted the NBA office in Medan and informed that the aircraft has not been arrived at Kuta Cane.

At about 0120 UTC, a Cessna Caravan operated by Susi Air flew from Kuta Cane to Medan and reported that the weather was Visual Meteorological Condition (VMC) and the wind was calm. Few clouds were observed at some mountain peaks.

At about 0150 UTC, Medan Airport authority received information from search and rescue office in Jakarta (BASARNAS) that there was an Emergency Locator Transmitter (ELT) signal detected at coordinate N 03⁰ 24' 00"; E 098⁰ 01' 00".

At about 0700 UTC, the search mission flight was initiated by two Cessna Caravan of Susi Air. The mission was successfully found the aircraft location at a 70° slope terrain at 5,055 feet altitude in the Leuser Mountain National Park, on radial 109 and 16 Nm from Kuta Cane, on coordinate N 03⁰ 24' 00"; E 098⁰ 01' 00".

All occupants were fatally injured and the aircraft was severely damage.

2 Polonia International Airport, Medan - North Sumatera will be named as Medan for the purpose of this report.

1.2 Injuries to Persons

Injuries	Flight crew	Passengers	Total in Aircraft	Ground	Others
Fatal	2	16	18	-	-
Serious	-	-	-	-	-
Minor /Nil	-	-	-	-	-
TOTAL	2	16	18	-	-

1.3 Damage to Aircraft

The aircraft was severely damaged. Severe damage found at the bottom part of the forward fuselage. Both wing tips detached at the outer wing area and wing leading edge severely damaged. Both engine propellers found in fine position.



Figure 1: The aircraft was severely damaged

1.4 Other Damage

Not relevant to this accident

1.5 Personnel Information

1.5.1 Pilot in Command

Gender : Male
Age : 56 years
Nationality : Indonesia
License : Air Transport Pilot License
Date of issue : 09 August 2004
Aircraft type rating : CASA 212, DASH-7.
Medical certificate : First Class
Limitation : No medical limitation
Date of medical : 18 May 2011
Valid to : 18 November 2011
Last proficiency check : 1 June 2011

Flying experience

Total hours : 5,935 hours
Total on type : 3,730 hours
Last 90 days : 108 hours 24 minutes
Last 30 days : 62 hours
Last 24 hours : 07 hours 15 minutes
This flight : 48 minutes

Prior to join with the company, the PIC has experience in Sulawesi, Kalimantan, Sumatera and Nusa Tenggara. The PIC joined the company since 10 Dec 2010.

The PIC has several times flown on this route after joined the company. The last flight schedule prior to the accident flight was on 17 August until 5 September 2011.

While in the company the PIC has conducted several training such as wind shear training, Crew Resources Management (CRM), dangerous goods, Aviation security, Reduced Vertical Separation Minima (RVSM), emergency training. The investigation did not reveal any evidence of Approach and Landing Accident Reduction (ALAR) Training.

1.5.2 Second in Command (SIC)

Gender : Male

Age	: 49 years
Nationality	: Indonesia
License	: CPL
Date of issue	: 3 May 2007
Aircraft type rating	: CASA 212
Medical certificate	: First Class
Limitation	
Date of medical	: 8 April 2011
Valid to	: 8 October 2011
Last proficiency check	: 30 May 2011

Flying experience

Total hours	: 2,500 hours
Total on type	: 1,100 hours
Last 90 days	: 102 hours 58 minutes
Last 30 days	: 13 hours 9 minutes
Last 24 hours	: 13 hours 9 minutes
This flight	: 48 minutes

The SIC was Indonesian Army Pilot and joined the company since 16 February 2010 and has qualified as PIC on CASA 212-200 on 13 May 2011. He has flown several times on this route after joined the company. The last flight schedule prior to the accident flight was on 22 – 26 May 2011.

While in the company the SIC has conducted several training such as wind shear training, Aviation Security Course (AVSEC), Crew Resources Management (CRM), dangerous goods. The investigation did not revealed any evidence of Approach and Landing Accident Reduction (ALAR).

1.6 Aircraft Information

1.6.1 General

Aircraft manufacturer	: PT. Dirgantara Indonesia (PTDI); also known as Indonesian Aerospace (IAe)
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Aircraft model/type : CASA 212-200
Serial number : 88N/283
Year of manufacture : 1993
Aircraft registration : PK-TLF
Certificate of Registration : 2580
Valid to : 24 February 2012
Certificate of Airworthiness : 2580
Valid to : 31 October 2011
Total time since new (TSN) : 11348 hours 3 minutes
Cycles Since New (CSN) : 13,646 cycles

1.6.2 Engines

Left Engine

Engine type : TPE-331-10R-521C
Manufacturer : Garret Turbine Engine Company
Serial Number : P-37453C
TSN : 7,602 hours 36 minutes as per 28 September 2011
CSN : 7,535 cycles
TSO : 4,003 hours 52 minutes as per 28 September 2011
CSO : 3,285 cycles

Right Engine

Engine type : TPE-331-10R-521C
Manufacturer : Garret Turbine Engine Company
Serial Number : P-37252 C
TSN : 10,643 hours 47 minutes as per 28 September 2011
CSN : 11,807 cycles
TSO : 6,195 hours 44 minutes as per 28 September 2011
CSO : 7,315 cycles

1.6.3 Propellers

Left Engine

Propeller type : R334/4-82F/13
Manufacturer : Dowty Rotol Ltd
Serial Number : DRG-8612/83

TSN : To be affirmed
 TSO : 9,249 hours 36 minutes

Right Engine

Propeller type : R334/4-82F/13
 Manufacturer : Dowty Rotol Ltd
 Serial Number : DRG-2104/90
 TSN : To be affirmed
 TSO : 11,819 hours 48 minutes

1.7 Meteorological Information

At 0120 UTC a Cessna Caravan flew around the area. The pilot reported that the wind was calm and some relatively small cloud formations were observed on the top of the mountains. The pilot stated that the weather was met the requirement for Visual Meteorological Condition (VMC).

The Meteorological Climatology and Geophysical Agency (BMKG) Medan observed the weather condition on 29 September 2011. The weather observation at altitude of 5000 feet by the satellite image found cloudy (cumulus and strato cumulus) and wind was westerly 10 knots.

The satellite image at 0000 UTC indicated an active cloud around east coast line of Aceh and at the north of accident site (Figure 2).

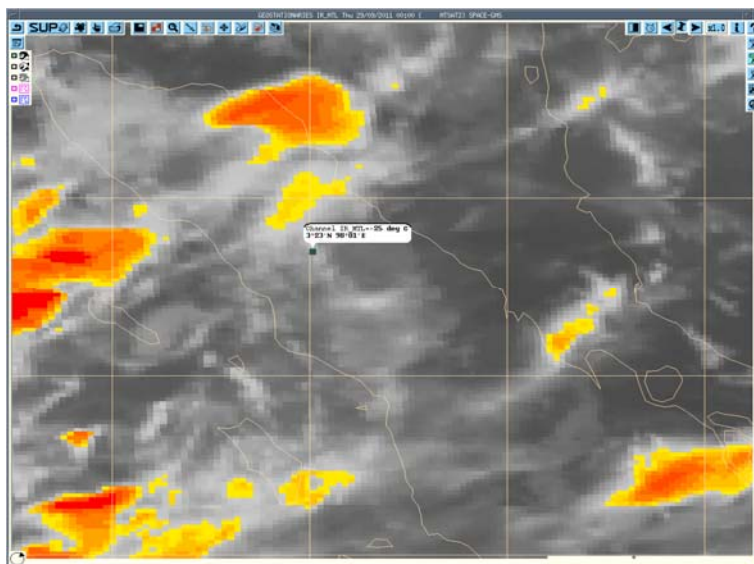


Figure 2: Weather satellite image at Sumatera at time 00.00

The satellite image at 0100 UTC indicated an active cloud around east coast line of Aceh has decreasing on its intensity indicated by the changing of its colour from red to yellow. The satellite image also showed that the active cloud on the north of accident site has disappeared (Figure 2)

Both satellite images showed that there was no active cloud around the accident site.

1.8 Aids to Navigation

Not relevant to this accident.

1.9 Communications

All of the radio communication between the crew of PK-TLF and Medan controller was normal and was recorded on the Polonia Airport ground base. There was no distress information.

1.10 Aerodrome Information

Not relevant to this accident.

1.11 Flight Recorders

The aircraft was equipped with a Cockpit Voice Recorder (CVR).

Manufacturer	:	Fairchild
Model	:	A 100
Part Number	:	93-A 100-80
Serial Number	:	61248

The aircraft was not equipped with a Flight Data Recorder (FDR). The FDR was not required by current Indonesia regulation for this type of aircraft.

The CVR was recovered from the accident site and was downloaded in the NTSC laboratory. The CVR contained 30 minutes of good quality recording. The highlight of the CVR is as follows:

(note: time based on CVR recorded time. Time format written in minutes: second)

- 14:58 Conversation between pilots, discuss about the several high could surround the flight path.
- 20:53 The pilot reported to Medan Director controller “reaching 8000 and establish contact Kuta Cane”.
- 24:54 The pilot tried to contact Kuta Cane Radio for three times, but no reply.
- 25:29 Conversation between pilots, discussed about the cloudy weather and there was no gap of cloud to pass. Both pilots agreed to fly into the cloud.
- 25:29 Both pilots discussed whether they had passed a certain point which could not be determined by investigation.
- 29:54 The CVR stop recording.
- The CVR did not record any discussion related to any aircraft problem or malfunction.
- The engine sound recorded on the CVR was constant.

- The CVR did not record any crew briefing and checklist reading.
- The PIC dominated the conversation. There was no suggestion made by the SIC and all PIC decisions were immediately replied by an agree statement.

1.12 Wreckage and Impact Information

The aircraft impacted at Leuser Mountain, in slope of mountain which 70° and 5,055 feet high.



Figure 3: Impact area of the accident

The damage to the tropical rain forest of the accident site was narrow. There was damage to tree behind the aircraft final position. Both wing tips were detached. The detached wing tips were found near to the main wreckage.

1.13 Medical and Pathological Information

Autopsy was not performed for both pilots.

1.14 Fire

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

1.15 Survival Aspects

The search operation was initiated on 07.00 UTC by two Cessna Caravan aircraft which successfully identify the aircraft position.

The rescue operation deployed immediately after the identification of aircraft position by land and air rescue. The rescue operation was coordinated by Indonesia Search and Rescue Agency (BASARNAS). The rescue operation was assisted by Indonesia Police, Indonesia Army, Indonesia Air Force, medical

expertise and local government.

The rescue operation was terminated on 5 October 2011. The rescue operation successfully evacuated all occupants and the CVR.

All occupants were fatally injured as result of high impact forces as indicated by the fracture on the occupant body and the level of damage to the aircraft. This accident was un-survivable.

1.16 Tests and Research

There was no test or research conducted following this accident.

1.17 Organisational and Management Information

Aircraft Owner	: BPPT-UPT Hujan Buatan
Aircraft Operator	: PT. Nusantara Buana Air
Address	: Jl. DR. Sahardjo 123 EF Jakarta 12860.
AOC Number	: AOC/135-041

The pilot trainings of the company conducted at Merpati Training Centre (MTC). The training for the company pilots consist of Crew Resources Management (CRM), Dangerous Goods Regulation (DGR), Aviation Security (AVSEC), Wind Shear Training, including the periodic recurrent.

The investigation did not found any evidence of line indoctrination training for individual pilot on special route including mountainous flying.

1.18 Additional Information

There is no additional information for this report.

1.19 Useful or Effective Investigation Technique

The investigation is being 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

2.1 Weather Analysis

Weather reported by Meteorological Climatology and Geophysical Agency (BMKG) Medan, at 0047 UTC indicated that the weather at the accident site was partly cloudy, westerly wind about 10 knots.

The satellite image indicated a weather changing between 00.00 UTC to 01.00 UTC as shown by decreasing of active cloud observed over east coast of Aceh and dissipating of active cloud north of the accident site.

The weather that was observed by a Cessna Caravan pilot that was flying around the area at 0120 UTC was within the requirement for Visual Meteorological Condition (VMC) and wind was calm. Few cloud formations were observed on the top of the mountains.

Refer to the weather improvement indicated by satellite images suggested that the weather condition during accident flight might be worst than the Cessna flight which was flying after the accident flight.

The Cockpit Voice Recorder (CVR) revealed that there was pilot discussion concerning the weather condition, where pilot mentioned some high cloud surround the flight path. There was also a statement one of the pilot and was agreed by another pilot that they would fly into the cloud due to no gap of cloud to pass.

Refer to the discussion above the weather on route of this flight did not meet the requirement for Visual Flight Rules (VFR) minima.

2.2 Pilot Awareness

The pilot has flown to this route for many times, and the last flight on this route was 24 days prior to the accident.

The CVR revealed that there was conversation indicating uncertainty of the aircraft position in relation to a certain point. This might caused by lost visual reference.

There was a small trees area that was damage by the impact of the aircraft. The damage at the bottom part the forward fuselage indicated that the aircraft was on relatively level position while impacted to 70° slope ridge. These indicated that the aircraft was flying directly to the terrain and no indication or late of recovery such as a pull up action.

Missing or late of the recovery action was caused by very low visibility prior to impact.

The conversation and impact area indicated that the pilots had lost the situational

awareness.

2.3 Crew Coordination

The CVR did not record any crew briefing and checklist reading. Absent of crew briefing might lead to both pilots could not understand the intention of the other pilot, especially for the Pilot Flying.

The conversation between pilots recorded that there was no suggestion made by the SIC and all PIC decisions were immediately replied by an agree statement. This indicated a 'steep transition gradient' where the PIC dominated the conversation. This might caused by the Army working culture of the second in command.

In a 'steep transition gradient' cockpit environment where the PIC dominated the conversation might develop an environment where the SIC reluctant to explain the opinion or suggestion. This condition did not support good crew coordination.

3 CONCLUSIONS

3.1 Findings

- The aircraft was airworthy prior the departure.
- The aircraft had a valid Certificate of Airworthiness.
- Both pilots held valid licenses and qualified for the flight in accordance with existing Indonesia regulations.
- The weather on route was below the VFR minima.
- There was no evidence of in-flight or post impact fire.
- Both pilots agreed to fly into the cloud.
- There was no checklist reading and crew briefing recorded.
- The pilot might have lost the situational awareness due to lost of visual references.
- There was no or late recovery action prior to impact due to low visibility when the aircraft was inside the cloud.
- The CVR indicated there was a steep cockpit transition gradient.
- The investigation did not find any evidence that the flight crew had received the ALAR and CFIT training.
- There was no evidence of aircraft system failure or malfunction.

3.2 Factors

1. The flight was in VFR however both pilots agreed to fly into the cloud, consequently, the flight crew had lack of situation awareness due to lost of visual references to the ground and no or late recovery action prior to impact due to low visibility.
2. There was lack of good crew coordination due to steep cockpit transition gradient.
3. There was no checklist reading and crew briefing.

4 SAFETY ACTIONS

4.1 PT. Nusantara Buana Air

At the time of issuing this Draft Accident Investigation Report PT. Nusantara Buana Air has issued Aviation Safety Notice No: CASO/IX/2011/N-08 to Pilot, Flight Operation Officer (FOO), Operation Control and Engineer, which contains:

Operation:

- a. Route analysis and procedure should be made in more detail and may include a picture (sketch) if necessary especially for a flight in mountainous area.
- b. Reemphasis of a VFR flight should be fully visual (VMC) especially in mountainous area.
- c. Good crew coordination should be implemented by good Cockpit Resource Management (CRM) concept.
- d. Flight following should be performed and recorded. Radio operator should stand by until the end of flight.
- e. Copy of dispatch release document, passenger and cargo manifest, weather and report and flight log should be left at flight operation office (Flops).
- f. Visual chart, route chart and approach chart, aerodrome chart should be available, understood and followed by the flight crew.

Maintenance:

- a. Maintenance Procedure should be according to the Company Airworthiness Maintenance Program (CAMP);
- b. Measurements Tools should be calibrated.
- c. Inspection should be according to the task card and signed after completion of the task.

Following this accident the Director General of Civil Aviation (DGCA) has conducted a special safety audit to the PT. Nusantara Buana Air.

5 SAFETY RECOMMENDATIONS

The National Transportation Safety Committee considered that the safety action taken by the operator were relevant to the safety issues found in this investigation and sufficient to prevent an occurrence with similar cause. The NTSC did not issue safety recommendation in this Draft report to PT. Nusantara Buana Air.

5.1 Recommendation to Directorate General Civil Aviation (DGCA)

The National Transportation Safety Committee (NTSC) recommends to Directorate General Civil Aviation (DGCA) should:

1. ensure the training implementation of Control Flight into Terrain (CFIT), and Approach and Landing Accident Reduction (ALAR);
2. Improve the quality and quantity of operation inspector to ensure the surveillance of the DGCA to the operator.